

# **Charter Applicant Information Sheet**

Name of Proposed Charter School: Advanced Math and Science Academy Charter School

School Address (if known): To be determined

School Location (City/Town): Marlborough, Hudson, Maynard or Clinton

Name of Group Applying for the Charter: Advanced Math and Science Academy Charter School Founding

<u>Group</u>

Contact Person: Dr. Julia Sigalovsky

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The proposed school will open in the fall of school year: 2004-05

School Year	Grade Levels	Total Student Enrollment
First Year	6,7	276
Second Year	6-8	414
Third Year	6-9	552
Fourth Year	6-10	690
Fifth Year	6-11	828

Will the school be at total enrollment in Year 5? No. The school plans to continue with 12<sup>th</sup> grade in year 6.

If not, in what year and with how many students will the school be at total enrollment? The school will be at total enrollment in Year 6 with 966 students in grades 6-12.

Commonwealth charter applicants only:

Will this school be a Regional Charter School? <u>Yes</u> School Districts from which students are expected to come (use additional sheets if necessary): <u>Marlborough</u>, <u>Hudson</u>, <u>Maynard and Clinton</u>

# Commonwealth Charter School Certification Statement

Proposed Charter School Name\_\_\_Advanced Math and Science Academy Charter School

Proposed School Location (City/Town) Marlborough, Hudson, Maynard, or Clinton

I hereby certify that the information submitted in this application is true to the best of my knowledge and belief; that this application has been or is being sent to the superintendent of each of the districts from which we intend to draw students; and further I understand that, if awarded a charter, the proposed school shall be open to all students on a space available basis, and shall not discriminate on the basis of race, color, national origin, creed, sex, ethnicity, sexual orientation, mental or physical disability, age, ancestry, athletic performance, special need, proficiency in the English language, or a foreign language, or academic achievement. This is a true statement, made under the penalties of perjury.

Signature of		
Authorized Person	Date	November 14, 2003
(please label copy with original signature)		

Print/Type Name: Dr. Julia Sigalovsky

Address: P.O. Box 217, Marlborough MA, 01752

Daytime Tel: (617) 721-0610 Fax: (508) 872-8911

# **Statement of Assurances**

This form must be signed by a duly authorized representative of the applicant group and submitted with the Final Application. An application will be considered incomplete if it is not accompanied by the Statement of Assurances.

As the authorized representative of the applicant group, I hereby certify under the penalties of perjury that the information submitted in this application for a charter for Advanced Math and Science Academy Charter School to be located at Marlborough-Hudson-Maynard-Clinton region is true to the best of my knowledge and belief; and further, I certify that, if awarded a charter, the school:

- 1. Will not charge tuition, fees, or other mandatory payments for attendance at the charter school or for participation in programs that are required for students.
- 2. Will enroll any eligible student who submits a timely and complete application, unless the school receives a greater number of applications than there are spaces for students, in which case a lottery will take place in accordance with Massachusetts charter laws and regulations.
- 3. Will be secular in its curriculum, programs, admissions, policies, governance, employment practices, and all other operations.
- 4. Will be open to all students, on a space available basis, and shall not discriminate on the basis of race, color, national origin, creed, sex, ethnicity, sexual orientation, mental or physical disability, age, ancestry, athletic performance, special need, proficiency in the English language or a foreign language, or academic achievement.
- 5. Will adhere to all applicable provisions of Federal law relating to students with disabilities, including the Individuals with Disabilities Education Act; section 504 of the Rehabilitation Act of 1974; and Title II of the Americans with Disabilities Act of 1990.
- Will adhere to all applicable provisions of Federal law relating to students who are limited English proficient (LEP), including Title VI of the Civil Rights Act of 1964; the Equal Educational Opportunities Act of 1974; MGL c. 76, § 5; and MGL c. 89, 71 § (f) and (I).
- 7. Will comply with all other applicable Federal and state laws and regulations including, but not limited to, the requirement to administer the Massachusetts Comprehensive Assessment System (MCAS) and offer a school nutrition program.
- 8. Will submit an annual report, an accountability plan, and annual independent audits to the Massachusetts Department of Education by all required deadlines.
- 9. Will submit required enrollment data each March to the Department of Education by the required deadline.
- 10. Will operate in compliance with generally accepted government accounting principles.
- 11. Will maintain separate accountings of all funds received and disbursed by the school.
- 12. Will participate in the Massachusetts State Teachers' Retirement System as applicable.
- 13. Will employ individuals to teach that either hold a license to teach in a public school in Massachusetts or that will take and pass the Massachusetts Tests for Educator Licensure (MTEL) within their first year of employment and meet all applicable staff requirements of the Federal No Child Left Behind Act. Will employ individuals as special education service providers that are appropriately certified and/or licensed.
- 14. Will provide the MA Department of Education with written documentation that a criminal background check has been performed on all employees of the school.
- 15. Will obtain and keep current all necessary permits, licenses, and certifications related to fire, health and safety within the building and on school property.
- 16. Will at all times maintain all necessary and appropriate insurance coverage.
- 17. Will submit to the MA Department of Education the names, home addresses, and employment and educational histories of proposed new members of the Board of Trustees prior to their service.
- 18. Will file with the MA Department of Education, the State Ethics Commission, and the city or town clerk where the charter school is located, completed financial disclosure forms for the preceding calendar year for all members of the Board of Trustees according to the schedule required by the charter school regulations.

- 19. Will, in the event the Board of Trustees intends to procure substantially all educational services for the charter school through a contract with another person or entity, provide for approval of such contract by the Board of Education in advance of the beginning of the contract period.
- 20. Will submit in writing to the Commissioner of Education a request to amend its charter if the school plans to make a change to its program or governance, as defined in 603 CMR 1.11.
- 21. Will provide to the Charter School Office a school code of conduct, Board of Trustee bylaws, an enrollment policy, and a certificate of building occupancy, according to the schedule set by the Charter School Office but in any event prior to the opening of the school.

Signature

\_<u>November 14, 2003</u> Date

## **Executive Summary**

<u>Mission</u>. The Advanced Math and Science Academy Charter School (the Academy) will create an atmosphere of celebration of knowledge where children of all backgrounds and abilities excel in all subjects, especially in math, science and technology, empowering them to succeed in the workplace in our modern high-tech world.

<u>The student population</u>. The Academy, when at full capacity, will serve students in grades 6 through 12 in the Marlborough, Hudson, Maynard, and Clinton region.

We, at the Academy, believe that children with a wide range of abilities can achieve a world-class education if given an opportunity to apply themselves diligently. The Academy does not intend to attract only talented students, but on the contrary, will serve <u>ALL</u> students that come to the Academy.

The "Advanced" in the Academy's name means that every student will become an advanced student. The Academy's innovative educational approach will ensure that students previously considered "not capable" or "underachievers" will reach a level of knowledge that is currently considered only reachable by a few gifted and talented students. The "middle achievers" of the student population will find themselves enthusiastic, engaged and passionate about learning. Those who are chronically under-challenged and bored will thrive.

<u>Need.</u> The Academy is designed to meet the needs for high-quality math and science secondary education in the Marlborough-Hudson-Maynard-Clinton (MHMC) region. This small geographic area has an exceptionally high concentration of national and internationally recognized corporations in the computer science, bio-technical, financial, manufacturing, marketing and business management consulting fields. However, analysis of the demographics of the area shows that professionals with school age children who work in these towns are choosing to live elsewhere.

Characteristics of public schools in MHMC region are systematically worse than similar average indicators for surrounding towns<sup>\*</sup>. For example, 2003 MCAS Math scores<sup>\*\*</sup> for 8<sup>th</sup> graders in the MHMC region range from 32-40 with the surrounding towns averaging 58 (the MHMC state rank range is 129-212 out of 270, with the state rank of surrounding towns average 57). The 2003 MCAS Math scores for 10<sup>th</sup> grade range from 41-60 with the surrounding towns' averaging 77 (the MHMC state rank is 109-201 of 273 while the surrounding towns average rank is 57). The drop-out rates in MHMC are 2.2-4.5% while the surrounding towns average 0.8% (the drop out rates for Marlborough, 4.5%, and Hudson 4.3%, are even higher than the state average of 3.5%).

Given the wealth of high-tech resources available in the region and the relatively poor quality of the available education, there is a great need for a high-level math and science school in the MHMC region. Demand for higher quality education is further demonstrated by the fact that parents of more than 1,330 students from the MHMC area have chosen independent or parochial schools.

<u>Vision</u>. The mission of the Academy will be accomplished by creating an educational model using an internationally recognized educational approach. At the center of the Academy model is a highly structured curriculum consisting of continuous, logically organized, and interconnected multi-year courses.

<u>Teaching Principles</u>. The cornerstone of our teaching philosophy is a firm belief that all children are able to learn complex, abstract concepts at an early age and build on them as they develop. We will use the following teaching approaches:

<sup>\*</sup> The comparison region included the surrounding districts (Ashland, Berlin-Boylston, Holliston, Hopkinton, Nashoba, Northborough, Southborough, Sudbury/Lincoln-Sudbury, and Westborough).

<sup>\*\*</sup> Score and rank after Boston Globe 2003 MCAS ranking system (www.boston.com/news/education/k\_12/mcas/)

- Students will be taught the content and skills of the various academic disciplines before being asked to
  integrate ideas. The Academy's curriculum will consist of a range of subject-specific courses whose common
  themes run parallel and correspond to one another. For example, Science will be taught in three separate
  subjects, Physics, Chemistry and Biology. Social Studies will be taught in two separate subjects: History and
  Geography. English Language Arts will be split into English Language and Literature. The order and timing of
  topics will be designed to support sequential learning.
- The courses will emphasize theory and will be designed to move from general concepts to concrete ones. Contrary to the widely-accepted belief that every subject must be intimately connected to a student's every day life, the Academy believes that the foundational principles and laws of academic disciplines designed to explore the world and universe are fundamentally more interesting to and useful for students.
- Students will experience multiple-year exposure to all subjects rather than one-year courses. The curriculum
  will be built on the belief that understanding grows from exposure to ideas and concepts developed over time.
  This approach ensures that even the least academically successful students have the opportunity to obtain both
  basic fundamental knowledge and advanced conceptual understandings of a wide range of subjects.
- The course structure will be linear rather than spiral. At the Academy, concepts will gradually progress from the simple to the more complicated.
- At the Academy, all students will take the same sequence of academic subjects, allowing them to maximize opportunities for academic success. Each new concept will be reinforced through the use of practice and exercises in class work and homework. We expect high achievement for all students.

**Curriculum.** This will consist of separate, multi-year courses in Mathematics, Physics, Chemistry, Biology, Information Technology/Computer Science/Engineering Design (IT/CS/ED), World Geography, World History, World Literature, English Language, Foreign Language, Arts, and Physical Education.

Another unique feature of the Academy curriculum is its Foreign Language program, which offers a choice of Latin, French, Portuguese, Spanish, Russian, Chinese, and Hebrew. The idea is to offer the area's immigrants who pay for Sunday language schools an option to have their children study their home language within the mainstream curriculum for academic credit.

Students are expected to complete the main curriculum by the end of 11<sup>th</sup> grade. In 12<sup>th</sup> grade, students will choose one of three specializations or majors: (1) Math-Physics-IT/CS/ED, (2) Bio-Chemistry, or (3) Humanities and Language Arts. In addition, in preparation for college, the Academy will provide 12<sup>th</sup> graders with a full array of services for successful acceptance into the colleges of their choice: essay writing class, interview training, and counseling.

**Capacity.** The Founding Group of the Academy currently consists of 15 members from the community: parents, businesspeople, and educators. Founding Group members are highly qualified professionals in their particular fields, and are highly motivated and committed to the development of the Academy.

# **Public Statement**

The Advanced Math and Science Academy Charter School will serve 6<sup>th</sup>-12<sup>th</sup> grade students in the Marlborough, Hudson, Maynard, and Clinton region. The Academy's mission is to create an atmosphere of celebration of knowledge where children of all backgrounds and abilities will excel in all subjects, especially in math, science and technology, empowering them to succeed in the workplace in our modern high-tech world. The mission will be accomplished by creating an educational model using a classical, internationally recognized approach. At the center of the model is a highly structured curriculum consisting of continuous, logically organized, and interconnected multi-year subject courses.

I. Charter School Mission

A. Mission Statement

i. Provide a clear and concise statement that defines the mission of the school in one or two sentences.

The Advanced Math and Science Academy Charter School (the Academy), when at full capacity, will serve students in grades 6 through 12 in the Marlborough, Hudson, Maynard, and Clinton region. The Academy will create an atmosphere of celebration of knowledge where children of all backgrounds and abilities will excel in all subjects, especially in math, science and technology, empowering them to succeed in the workplace in our modern high-tech world.

#### B. Statement of Need

i. Explain the need for this particular school in the communities it will serve and the target student population it will serve.

<u>Why a school focusing on math, science and technology is needed:</u> We live in an age of a continuous and everaccelerating technological evolution. Demand for qualified specialists in the sciences, engineering, information and computer technology is growing exponentially, and with it comes an increased need for highly educated specialists. Countless reports (see, e.g., C. Branigan, 2002; T. Lynds, 2002, C. Haley, 2003; The Science & Engineering Pipeline. *Fueling the Pipeline: Attracting and Educating Math and Science Students*. Conference Report, May 2003; W. N. Fogg and Paul E. Harrington, 2003; G. R. Emery, 2003) identify a significant shortage of qualified professionals in these fields. As a result, many high tech companies depend on foreign specialists that they retain on work visas. This is especially true for Eastern Massachusetts, one of the nation's biggest high-tech centers.

<u>The region the Academy will serve.</u> The Academy will serve Marlborough, Hudson, Maynard and Clinton, the MHMC region. Historically these old towns (Marlborough and Hudson were established in the 1660's, Clinton and Maynard incorporated in the mid-1800s) have had an economy dependent on blue-collar industries, as is evident by the many abandoned manufacturing mills. Today the MHMC region is exceptionally rich in high-tech companies in the following fields: computer science, bio-tech, finance, manufacturing, marketing and business management consultants. This small geographic area has an unusually high concentration of internationally recognized corporate names.<sup>1</sup>

Although the proximity of high-tech companies should result in a high number of professionals living in the region, a look at the map (below, left)<sup>2</sup> shows that these 4 towns have the lowest percentage of individuals with a Bachelor's degree (or higher) compared with surrounding towns. As is clear from the maps, many professionals with school age children who work in these towns are choosing to live elsewhere.



#### Student Achievement in the MHMC Area

The cumulative 2002 MCAS and 1999 SAT result maps give a clear, one-glance confirmation of the above conclusion: students in MHMC schools achieve at far lower levels than their peers in surrounding school districts:

<sup>&</sup>lt;sup>1</sup> Some examples: Raytheon Electronic Systems, Legato Systems, Inc., Verizon, 3Com Corp., Fidelity Investments, Worcester Controls Corp., Concord Communications Inc., ValueClick, Sepracor, Shipley Company, Intel Massachusetts, Inc., ACT Manufacturing Inc., Moster.com, Stratus Computer and Delphi Communication Systems, Injectronics, Inc., and Nypro, Inc. <sup>2</sup> Caliper Corporation reports www.caliper.com



Specific school characteristics including latest 2003 MCAS results, compared with the surrounding area, <sup>3</sup> are shown in the table below:

Characteristic	Marl-	Uudaan	Maxmand	Olinton	Surrounding Area <sup>3</sup>	
Characteristic	borough	Huason	Maynard	Clinton	Range	Average
2003 MCAS <sup>4</sup> Math 6th Grade: Score	51	27	51	48	48-735	63
Rank (out of 300)	123	265	112	144	20-144	63
2003 MCAS Math 8th Grade: Score	32	40	35	40	40-67	58
Rank (out of 270)	183	129	166	129	29-129	57
2003 MCAS Science/Technology 8th Grade: Score	30	24	36	30	31-72	54
Rank (out of 270)	167	201	131	167	6-161	57
2003 MCAS Math 10th Grade: Score	60	55	50	41	62-83	77
Rank (out of 273)	109	133	160	201	14-98	38
2003 MCAS Overall: Score	52	51	54	49	57-78	71
Rank (out of 210)	124	132	114	147	11-95	35
2000 SAT I Math test results	524	485	529	461	512-576	553
College-Enrollment Rates – 4-year colleges (2002)	63.3	65.4	85.76	67	71-92	79.9
Drop-Out Rates (2000-2001)	4.5%	4.3%	2.6%	2.2%	0.2-1.8	0.8%
Children of school age in independent and parochial schools, %	14.9%	9.8%	2.6%	7.9%	0-11.1%	6.0%
Same, number (total=1337)	828	301	38	170		

Results for public schools in the MHMC region given in the table above are systematically lower than similar average indicators for surrounding towns. Some of the indicators also are below the state average. For example, the drop out rates for Marlborough (4.5%) and Hudson (4.3%) are higher than the statewide average (3.5%).<sup>7</sup> In addition, SAT I Math scores for Hudson (485<sup>8</sup>) and Clinton (461) are lower than both the state (514) and national (515) averages.

Parents' School Choice. Considering the low school quality and high demand for high quality education in the region, there are few choices for parents: for example, there is only one middle school in Marlborough and Hudson,

<sup>5</sup> Without Boylston Public Schools that scored 26 (rank 269) on 6<sup>th</sup> grade Math.

<sup>&</sup>lt;sup>3</sup> The comparison area included the surrounding districts (Ashland, Berlin-Boylston, Holliston, Hopkinton, Nashoba, Northborough, Southborough, Sudbury/Lincoln-Sudbury, and Westborough).

<sup>&</sup>lt;sup>4</sup> Score and rank after Boston Globe 2003 MCAS ranking system (www.boston.com/news/education/k 12/mcas/)

<sup>&</sup>lt;sup>6</sup> As reported on the DOE web site (http://profiles.doe.mass.edu, 2002 District Profiles). The historical data

<sup>(</sup>www.doe.mass.edu/infoservices/reports/hsg) show the following percent of Maynard High graduates entered 4-year colleges: 2000 – 63%, 1999 – 48%, 1998 - 64 %.

<sup>&</sup>lt;sup>7</sup> U.S. Census Bureau, 2000, www.census.gov

<sup>&</sup>lt;sup>8</sup> Hudson High School reported in a presentation the latest SAT I Math score of the class of 2003 to be 527, that is above the state average, but below the area average. The data confirmation was not found on the DOE web site.

and one high school in each of the four towns. There are no charter schools in the region. In search of a school alternative, parents of more than 1,300 students have chosen independent and parochial schools for their children. However, working class families who cannot afford tuition are limited to participating in the existing public school system.<sup>9</sup>

Given the wealth of high-tech resources available in the region, the relatively poor quality of the available education specifically in Math and Science, and substantial number of parents going elsewhere in search of better education alternative, - there is a great need for a high-level math and science school in the MHMC area. The Academy is designed to meet this need.

<u>The student population.</u> We, at the Academy, believe that children with a wide range of abilities can achieve a world-class education if given an opportunity to apply themselves diligently. The Academy does not intend to attract only talented students, but on the contrary, will serve <u>ALL</u> students that come to the Academy with the goal to achieve.

The "Advanced" in the Academy's name means that every student will become an advanced student. The Academy's innovative educational approach will ensure that students previously considered "not capable" or "underachievers" will reach a level of knowledge that is currently considered only reachable by a few gifted and talented students. The "middle achievers" of the student population will find themselves enthusiastic, engaged and passionate about learning. Those who are chronically under-challenged and bored will thrive.

<u>The grade span.</u> The Academy will serve students in grades 6 to 12, because (1) in this grade span most math and science learning occurs, and (2) this is the middle and high school grouping traditionally accepted in the schools of the MHMC region.

#### ii. Clarify why a charter and the type of charter sought (Commonwealth) is necessary in order for this school to exist or succeed.

In order to successfully implement our mission and innovative educational program, we need the flexibility afforded by a Commonwealth charter, particularly in the following areas:

- <u>Curriculum</u>. The Academy will develop and implement a unique curriculum. Its main features high academic level, individual subjects, continuity throughout 6-11 grades, and specialization in 12<sup>th</sup> grade – require full control of the curriculum.
- <u>Teachers' Qualifications</u>. Because of the unusually advanced academic level in both middle and high school, we need teachers that are professionals in their academic fields for all grade levels and all subjects. A Commonwealth charter is the only option for providing full control over teacher hiring and firing. In addition, a Commonwealth charter will give us control over the budget to attract and compensate the best specialists in all academic subjects, but particularly in math and science where there are significant shortages.
- <u>Teachers' Schedule.</u> The high degree of professionalism required of the Academy's teachers can be reached and maintained only when they are provided with substantial time for professional and curriculum development. Using the flexibility of a Commonwealth charter, we will create a unique schedule that allows teachers 20-25 hours a week to prepare curriculum and attend to responsibilities beyond their work in the classroom.

#### II. How will the school demonstrate academic success?

A. Educational Philosophy

- i. Describe the educational foundation of the proposed school. Include in this description a discussion of the instructional methods to be used.
- 11. Describe how this educational theory aligns with your mission.
- iii. Describe the research on this educational theory and/or approach that demonstrates that it will result in high academic achievement for your anticipated student population.

<sup>&</sup>lt;sup>9</sup> In addition, recently the Marlborough school district decided not to participate in the Department of Education's School Choice program [Kristen Bradley "Committee says no to School Choice" MetroWest Daily News, 5/14/03].

Our mission is to raise a generation that excels in math, science and technology. This requires teaching all students at a very high academic level. The cornerstone of our teaching philosophy is a firm belief that children of all backgrounds and abilities are able to learn complex, abstract concepts at an early age and build on them as they develop (Bruner, 1977; Hirsch, 1996).<sup>10</sup>

When looking for a sound academic program to support our mission, we studied national and international teaching techniques. Multiple international studies comparing test results show that United States students lag behind most leading foreign countries in math and science. For example, in the 1995 Third International Mathematics and Science Study (TIMSS), American 12<sup>th</sup> grade students were 19<sup>th</sup> in math and 16<sup>th</sup> in science out of 21 nations. In 1999, with 38 countries participating, American 8<sup>th</sup> graders were ranked 27<sup>th</sup> in Geometry and 20<sup>th</sup> in Physics (18<sup>th</sup> in overall science) (Martin, et al, 1995, 1999; OECD, 1997; Ed. at a glance, 2000, 2001).

Studies of teaching methods adopted in more highly ranked countries showed distinct differences from the United States, in teaching and curriculum, particularly in course structure, curriculum coherence, academic intensity of courses, and homework load (Stevenson & Stigler, 1992; Stigler & Heibert, 1999; Ma, 1999). The Academy will incorporate the best of these methods in its teaching approach:

 The Academy will teach students to understand the form and structure of the individual academic disciplines before asking them to integrate ideas across disciplines. Research<sup>11</sup> has shown that longitudinal structure and "strand-oriented organization" of subjects rather than the "layer-cake" approach to curriculum (semester- or year-long separate courses common for middle and high schools) result in subject continuity and better learning.

To this end, the Academy's curriculum will consist of a range of subject-specific courses whose common themes run parallel, corresponding to one another (Gardner, 1991). For example, Science will be taught in three separate subjects, Physics, Chemistry and Biology. Social Studies will be taught in two separate subjects: History and Geography<sup>12</sup>. English Language Arts will be split into English Language and Literature courses.

The order and timing of topics in different subjects will be designed to complement and mutually reinforce each other. For example, the study of the Hellenic civilization in History will occur in 7th grade, at the same time that students are reading Homer's "Iliad" in their Literature course. This will be supported by a trip to the Museum of Fine Arts to view Greek art collections. The study of polynomials in 7<sup>th</sup> grade Math will be accompanied by the Computer Science class, where students will develop a computer program to calculate coefficients of Newton's binomial. A detailed study of Organic Chemistry in 10<sup>th</sup> grade will build a base for 11<sup>th</sup> and 12<sup>th</sup> grade study of biochemical processes in cells for the Biology course.

In contradiction to the widely-accepted belief that every subject must be intimately connected to a student's everyday life, the Academy believes that the foundational principles and laws of the academic disciplines designed to explore the world and universe are fundamentally more interesting to and useful for students (Ravitch, 2001). To this end, courses will emphasize theory, and will be designed to move from general concepts to concrete applications. In this model, examples serve as illustrations of complex ideas, rather than a path providing reductive access to concepts. For instance, in Physics, Newton's first and second laws will be presented in their general, conceptual form. Then the concept will be illustrated through examples such as a

<sup>&</sup>lt;sup>10</sup> Conference Report, May 2003. The Report states: "Not that long ago, conventional wisdom held that if you wait until high school, it is too late to interest students in Math, Science and Technology. The too-late point soon became middle school. Now elementary schools have become the focus."

<sup>&</sup>lt;sup>11</sup> Steen (1990) insists that "[t]raditional school mathematics picks very few strands ... and arranges them horizontally to form the curriculum: first arithmetic, then simple algebra, then geometry, and finally ... - calculus. This layer-cake approach to mathematics education effectively prevents informal development of intuition along the multiple roots of mathematics". <u>See also</u>, Kaput & Nemirovsky, 1995, and Kaput, 1994.

<sup>&</sup>lt;sup>12</sup> A necessity of Geography as a separate course is supported by the recent research of the school graduates' geography proficiency conducted by National Geographic (Bijal P. Trivedi, 2002)

balloon floating in the air or a car resting on a road slope. Ultimately, students will practice the application of Newton's first and second laws by solving problems.

- Students will experience multiple-year exposure to all subjects rather than one-year courses. Our curriculum is built on the belief that understanding grows from exposure to ideas and concepts developed over time. This approach ensures that even the least academically successful students have the opportunity to obtain both basic fundamental knowledge and advanced conceptual understandings of a wide range of subjects. For example, Physics, Chemistry and Biology are commonly taught as one-year courses in three separate years (that could be followed by a one-year advanced course during a fourth year, but normally in only one of these subjects). The Academy will teach all three courses over a period of 6 (Chemistry and Physics) or 7 (Biology) years, allowing students to become deeply immersed in the topics, building on their knowledge as they go, and making connections to other areas of study. Geometry is commonly taught as a stand-alone, one-year course, though it is an incredibly complex and rich subject that many students fail to master, as documented in the TIMSS Study. At the Academy, Geometry will be taught over a seven-year period, where each semester and year will build on the prior knowledge garnered in earlier terms.
- The course structure will be linear rather than spiral. More than two decades ago, Jerome S. Bruner considered the "ordering of elements" (1979) to be an important part of teaching. He insisted that "Learning should not only take us somewhere; it should allow us later to go further more easily" (1977). More recent studies showed that one of the problems in teaching Math in the United States is the discontinuity of the course structure<sup>13</sup>. At the Academy, concepts will gradually progress from simple to more complicated. The curriculum section below illustrates this.
- High achievement for all students: All students will take the same sequence of courses<sup>14</sup>. Statistics<sup>15</sup> and research<sup>16</sup> reveal that, in high schools that offer dozens of non-academic subjects, many students enroll in relatively small numbers of academic subjects. In addition, an abundance of choice in academic subjects and their sequence creates an inconsistent curriculum and disrupts sequential learning. At the Academy, every student will take the same sequence of academic subjects to allow them to maximize opportunities for academic success. Each new concept will be reinforced through the use of practice and exercises in class work and homework. At the same time, all subjects will include unusual, interesting and challenging problems, projects and activities to promote "intellectual exploration"<sup>17</sup>. In 12<sup>th</sup> grade the students will be asked to choose a "specialization" with concentration either in Math/Physics/Computer Science, Biology/Chemistry, or Humanities.
- B. Curriculum i. Provide a description of the curriculum that will be used by the school.

The Academy's general curriculum outline is presented in the table below<sup>18</sup>.

<sup>&</sup>lt;sup>13</sup> Naomi Freundlich (1998) points out that "... the U.S. did poorly on TIMSS primarily because its science curriculum ... is repetitive from year to year."

<sup>&</sup>lt;sup>14</sup> Individual differences are accommodated using difficulty levels.

<sup>&</sup>lt;sup>15</sup> The National Commission on Excellence in Education recommended that all college-bound high school students take the following year-long courses as a minimum: 4 English, 3 social studies, 3 Science, 3 Math, 0.5 Computer science, and 2 Foreign language. In 1998, 46% of the college freshmen who entered colleges had not completed the minimum recommended courses. Also, a quarter (25.5%) of the high school graduates did not even complete a bare-bones set of 4 English, 3 Social Studies, 2 Science, 2 Math. U.S. Department of Education, National Center for Education Statistics, 1994-1998.

<sup>&</sup>lt;sup>16</sup> Howley et al. (1995) using multiple research data argued that "Curriculum... based on students' choice of subject matter... allows students to enroll in courses that require the least effort, and it encourages teachers to accept students' compliance in lieu of academic engagement."

<sup>&</sup>lt;sup>17</sup> For example, in 6<sup>th</sup> grade when studying powers of natural numbers the teacher may give a "fun" problem such as: How many digits are there in number 2<sup>1000</sup> – is it more or less than 500? Why?

<sup>&</sup>lt;sup>18</sup> The topic labels given for each grade do not designate separate courses, but are listed to give some idea about the year content.

Grade	6	7	8	9	10	11	12	
Mathematics	Sequential 7-year course. Algebra and Geometry in parallel.							
Information Technology/ Computer Science/ Engineering Design	MS User's A Web acce Developing thinking and programming gar	Applications. ss, Email. algorithmic , elementary skills through nes	Basics of Architecture an Des Developing programming s on algorithr	Computer nd Engineering sign; elementary skill. Emphasis nic thinking.	Computer Languages and Programming; Emphasis on algorithmic thinking		Optional Math, Physics, and IT/CS/ED specialization	
Physics		Concepts in physics	Introduction to mechanics	Fluids and thermo- dynamics	Electricity and Magnetism	Waves and Particles		
Chemistry		General Chemistry	Inorganic	Chemistry	Organic Chemistry	Kinetics. Electro- Chemistry	Optional Biology-	
Biology	Gen Z	eral Biology, Bo Zoology, Ecolog	otany y	Paleontology	Human Anatomy & Physiology	Genetics. Intro to Biochemistry	specialization	
World Geography	World Physical Geography.		Descriptive Astronomy	Geology, mineralogy	World Political and Economical Geography			
World and American History	Systematic stu through Middle	Systematic study of World history from pre-historic people and ancient civilizations, through Middle Ages, to Modern times.			Optional			
World Literature	World literature written in or about corresponding historic period			specialization				
Arts	Music, painting, pottery, and art history for corresponding historic period							
English	Vocabulary, spelling, punctuation, creative writing, editing, rhetoric							
Foreign Language	Choice of Latin, French, Portuguese, Spanish, Russian, Chinese, Hebrew							
Physical Education								

Detailed course content descriptions for 6<sup>th</sup> through 9<sup>th</sup> grade are presented below (see Attachment 11 for 10<sup>th</sup> through 12<sup>th</sup> grade curriculum outline).

		6 <sup>th</sup> Grade
:	Mathematics	Natural numbers, decimal positional system, whole numbers. Properties and order of operations. Divisibility rules. Prime and composite numbers, factorization. Fractions and Decimals. Percents. Variable, Monomial. Opposite, negative, rational numbers, number line. Powers. Linear Equations. Ratio and Proportions. Introduction to inequalities. Elements of Statistics. The Mean, the Median and the Mode.
0011	IT/CS	History of computers, computer usage and terminology, typing skills, word processing, computer documentation, data storage, introduction to Internet, search engines and Internet, web sites for children, computer graphics, basic understanding of "how computers think", electronic mail.
	Biology	Unity and diversity of living things. 9 life processes: nutrition, transport, respiration, excretion, synthesis, regulation, growth/development, reproduction, responsiveness/adaptation to environment. Food chains. Classification of living organisms: criteria and levels. 5 kingdoms: Monera, Protista, Fungi, Plants, Animals. Nomenclature. Equipment and techniques to study living organisms. Structure of living organisms, cell theory, structure of cells. Major cell organelles. Exceptions of cell theory. Beginning of systematic study of living organisms: Monera, Protista, Fungi.

English	Introduction to the idea of language as a spectrum of dialects, registers, and styles. Distinctive features of the language; oral and written diction. Myth, fiction, the ballad, contemporary poetry, e-mail. Writing assignments to reinforce concepts of literary genres and their elements and structures as students learn to convey feelings and ideas in poetry, written dialogue, and expository prose. Vocabulary development through the systematic study of prefixes and suffixes. Parts of speech and formal structure of Standard English in a context comparing dialects of English and comparing English with other languages. Development of oral reading skills, presentation, and memorization through performing a class play.
т	Prehistory. Ancient Middle East and Africa. Archaic and classical Greece. C. 3000 BCE-c. 300 BCE.
Literature	Initial tools of literary analysis. The concept of genre: prose (fiction and nonfiction), poetry, and drama. The basic components of literary texts (themes, plots, characters), the basic structural elements of various genres. Reading: various adaptations plus primary texts presented by excerpts (Gilgamesh; Iliad and Odyssey by Homer; The Bible; Plato's Dialogues; Antigone and Oedipus Rex by Sophocles, etc.) Visual art projects and dramatic reading and performance project.
Geography	Maps: distance and direction, scale, legend. Types of maps: physical, topographical, political, weather. Learn to use local maps to find directions, estimate distance and travel time. Sections of Geography: physical, political, economic. Climate on Earth: how Earth's movement and position in space controls climate, how climate affects Geography (include the origin of a steep and flat riverbanks) Absolute locations (latitude and longitude) of places. Time zones.
	7 <sup>th</sup> Grade
Math	Monomials and Polynomials. Factoring monomials. Simplifying a polynomial. Point, line, plane, space. Angle. Congruent Factoring polynomials. Solving polynomial equations. Definition of a rational expression. Simplifying rational expressions. Rational equations. generalizations, and applications of math Introduction to a function and its graph. Coordinate Plane. The graph of a linear function. SAS, and ASA postulates.
Physics	Physical quantities: what is physics, measure and measuring, errors in measurements, units. Elements of kinematics: distance and displacement, motion along a straight line, speed and velocity. Forces in nature: concept of force, contact & action-at-a-distance forces, normal and friction forces, gravity, electric force, magnets, other macroscopic & microscopic forces, unification of forces. Dimensional analysis. Energy: kinetic energy, work, potential energy, mechanical energy, converting energy & energy conservation.
cs	Computer usage and terminology, hardware installation and removal, operating system essentials, software installation and removal, MS Office I, computer data flow, Computer Programming I, search on Internet, Internet programming I, basic digital technology.
Chemistry	Definition of Chemistry. Forms of matter: homogeneous and heterogeneous, elements and compounds. Gases, liquids, solids. Chemical and physical properties of matter, chemical reactions. Energy change during chemical reactions. Measurements in chemistry, mathematics of chemistry. Atomic mass, mole, stoichiometry. Chemical equations. Gas laws, solutions and their properties. Calorimetry.
Bio.	Plant Kingdom. Plant structure and classification. Differences from Fungi. Genetic structure of plants. Chlorophyll. Geography of plants. 9 life processes in plants. Ecology. Structure and functions of ecosystems, energy flow relationships. Biosphere. Ecosystems change over time, competition. People and the biosphere.
English	Further development of skills in analyzing language and literature. Linguistic choice as a mark of mood, tone, and genre, distinctive features of language used in various settings, effect of register on voice and character. Use of formal diction in expository writing to enhance both credibility and clarity. Grammar study including sentence diagramming. Diagramming the logical argumentation of students' essays and plotting of development in fiction. Creative writing and essays focusing on literature discussed in class. Reviewing multimedia, discussion of social, cultural, and historical context; social critique. Sharing the writing aloud and performing a class play. Greek and Latin roots, other language roots.
Ξ	Hellenism and the rise of Rome. India, China, Central Asia, Eurasian tribal cultures. Late Roman empire, Germanic invasions and decline of ancient World.
Literature	Roman myths and the interaction of Greek and Roman cultures. Early Roman comedy. The Golden Age of Latin literature. The birth of lyric poetry in Latin. Catullus: Poems. Lucretius. Cicero and his works. The Augustan age and the greatest achievements in Latin literature. Livy and his History. Seneca and the early Latin tragedy. Early Chinese literature: Li Bo, Du Fu, Confucius. Early Indian myths and legends.
Geogr.	<u>Physical Geography.</u> Continents, oceans, seas, major rivers, mountain ridges, deserts, islands etc. Physical Geography of North America, South America, Europe, Asia, Africa and Australia including terrain, climate, watershed. Physical Geography of United States.
	8th Grade

Math	Elements of Logic (Sentence, Phrase, Proposition, Truth table). Systems of Parallels and Transversals. Angle sum linear equations and inequalities. Solving using graphs. Square Roots. Rational and irrational square roots. Quadratic equations and inequalities. Diverse Roots. Circles: diameter, radius, chord, Quadratic function and its graph. Irrational equations. Extending the set of functions. Domain and Range. Representing a function by formula.
Physics	Introduction to Mechanics. Kinematics: motion in 1-D, 2-D and 3-D. Vectors. Newton's Laws. Mechanical energy, work, conservation & change of mechanical energy. Systems of particles, Newton's Second Law for systems, collisions. Static Equilibrium. Rotational Dynamics: rotational kinematics, Newton's Second Law – rotational, rotational energy and work. Gravity: gravitational force in the universe, Newton's Gravitational Law, gravitational potential energy, near-Earth gravity, the solar system & beyond, Kepler's Laws
IT/CS/ED	MS Office II, how is data stored and manipulated in computers, Computer Programming II, how computers handle conditions, computers and algorithms, evolution of computer programming. Steps of the engineering design process, prototype and model. Manufacturing systems. Construction technologies: parts of a structure; major types of bridges. Transportation systems and devices; subsystems of a transportation vehicle or device. Bioengineering technologies: adaptive or assistive devices, adaptive and assistive bioengineered products.
Chemistry	Atoms and models of atomic structure. Parts of atom. Chemical bonding, electronegativity. Types of chemical bonding, ions, molecules. Molecular attraction. Chemical formulas, chemical equations, problems using chemical equations. Periodic Table. Arrangement of elements, periods and columns. Atomic radii. Types of elements in Periodic Table. Electronic structure of atoms in periods and columns. Notation of electronic state of atoms and ions.
Bio	Animal Kingdom. Animal Genome. Animal structure and classification. The nine life processes in animals. Different theories of evolution. Vertebrates. Amphibians, reptiles, birds, mammals: anatomy and physiology. Mammalian genome.
English	Analyzing language and interpreting literature. Theme, genre, mood, tone, character development, voice, structure, and authorial purpose. Analysis of differences in register, dialect, and style, identifying grammatical structures. Essays and creative writing; focus on literary and cultural analysis, including analysis of works in other media. Further development of editing skills for dialogue, poetry, and stream-of-consciousness writing that may integrate other dialects and registers of English. Vocabulary development, work with dictionaries and work deducing definitions from context.
Ŧ	History of medieval world and pre-Colombian America. c. 600 CE-c. 1500 CE. Introduction to the U.S. history c. 1500- 1876.
Literature	St. Augustine's Confessions. Beowulf the first great book of English literature. Icelandic and Germanic sagas. The genre of romance in Europe. Sir Thomas Malory. Chaucer. Wandering theaters and their repertoire. French epic poems. The troubadours. Dante Alighieri. Renaissance in European literature. Rabelais, Boccaccio, Petrarch, etc. Non-European medieval poetry. Omar Khayyam; Japanese tanka. First American documents and literary texts.
Geography	<u>Descriptive Astronomy</u> . Earth and Solar System. Size, orbits, satellites and properties of Solar System planets. Lunar and solar eclipses, the observed moon phases, and tides. Properties and conditions of Sun, planets, moons and the Earth in the solar system: gravitational force, distance from the Sun, speed, movement, temperature, and atmospheric conditions. Billions of galaxies in the Universe, major constellations. Different theories of the origin of the Universe. History of space exploration.
	9 <sup>th</sup> Grade
Math	Solving linear equations and systems of linear equations using graphs. Similarity of triangles/polygons and its Slope and intercepts. Matrices: properties, operations with matrices. "n"th applications. Proportions. Pythagorean root of a real number. A power having a rational exponent. Complex theorem and its converse. Trigonometric numbers: properties, operations. Polynomial function. Polynomial Ratios in a right triangle. Sine, Cosine, equations/inequalities. Elements of Combinatorics and Probability. Tangent, and Cotangent Ratios. Perimeters and Areas of plane figures Loci. Coordinate functions. Analytic Trigonometry.
Physics	<u>Fluids and Thermodynamics.</u> Pressure, liquids and gases. Hydrostatics: hydrostatic pressure, Pascal's Principle, Archimedes' Principle, floating and sinking. Hydrodynamics: ideal fluids, laminar & turbulent flow, Continuity Equation, Bernoulli's Principle, turbulence. Temperature. Ideal gas equation of state. First Law of Thermodynamics. Heat flow. Irreversible processes. The Second Law of Thermodynamics.
CS	Computer Programming III, CPUs and Assembly sembler programming, computer database, operating systems, computer networks.
Chem	Chemistry of groups in Periodic Table: Metals, non-metals, halogens, noble gases, transitional elements. Reactions between elements in different groups. Chemistry of periods.

Bio.	Paleontology. Origin of the Earth, formation of ocean and continents. Geological periods, changes of the climate, movement of continents. Corresponding changes and development of organisms.
English	Develop critical thinking and skills in literary and linguistic analysis. Literary interpretation focused on appreciating imagery and symbolism, use of specific language contributes to establishing tone, voice, and genre. Discussion of linguistic diversity within English will include role-playing formal job interviews and informal neighborhood and family conversations to practice using language appropriate to diverse socio-cultural settings. Creative and expository writing; essay assignments: logical argument and textual evidence. Development of argumentation. Vocabulary development: work with linguistic databases, senses of words in context.
History	History of modern World, Part I. c. 1500-c. 1815. Renaissance Europe. Discovery and conquest of New World. Development of global trade, growth of capitalism. Technological advances and beginnings of Industrial revolution in 18th century England. Reformation, Baroque Europe. Absolutism and constitutionalism. The age of Enlightenment. European colonization of North America, American Revolution and early Republic. French Revolution and Napoleonic Empire. Latin America, Middle East and North Africa, Sub-Saharan Africa, India, China, Japan and Korea during the early modern period.
Literature	Renaissance and Baroque in Elizabethan England. Shakespeare. Metaphysical poetry: John Donne. John Milton - English Homer. Restoration theater and the comedy of manners. The Augustan Age. Swift, Pope, Laurence Sterne, Boswell. French and Spanish classicism. The Age of Reason in France. Golden Age of Spanish literature: Don Quixote. Lope de Vega the father of Spanish theater. Spanish baroque. Martin Luther and German Reformation. Goethe and Schiller. The Dream of the Red Chamber - the most famous Chinese novel. Basho and his Haiku. Japanese national theater: Kabuki and No. Young American literature.
Geography	Understanding geological time, geological timeline. Forces shaping the Earth. Global plate tectonics in action. Birth of oceans. Volcanoes, earthquakes. Origin of minerals and rocks. Igneous, sediment and metamorphic rocks. Recycling of rocks: weathered rocks. How soils form. How to become a rock collector, how to read the landscape. Mineral identification and classification by properties. Formation of fossils. Identification and classification of fossils. Practical application of paleontology. Rock and fossil sites.

In addition to classroom instruction, regular field trips to academic resources in the Boston metropolitan area, such as the Science Museum, Children's Museum, Museum of Fine Arts, Harvard Mineralogy and Nature Museum, and the New England Aquarium, will be widely used with relevant topics of study.

Another unique feature of the Academy curriculum is its Foreign Language program that offers a choice of Latin, French, Portuguese, Spanish, Russian, Chinese, and Hebrew. The idea is to offer the area's immigrants who pay for Sunday language schools an option to have their children study their home language within the mainstream curriculum for the academic credits.

The students are expected to complete the main curriculum by the end of 11<sup>th</sup> grade. In 12<sup>th</sup> grade, students will select one of three specializations, or majors: (1) Math-Physics-Information Technology/Computer Science/Engineering Design (hereinafter "Computer Science"), (2) Bio-Chemistry, and (3) Humanities and Language Arts. In preparation for college, the Academy also will provide its college-bound 12<sup>th</sup> graders with a full array of services for successful acceptance into the colleges of their choice: essay writing class, interview training, and counseling. Vocational training will be provided on demand, for example via industry certification classes.

#### ii. Explain the process the school will use to ensure that its curriculum is aligned with the Massachusetts Curriculum Frameworks.

This curriculum is designed to meet and exceed the Massachusetts Curriculum Framework standards. Examples of topics in each subject and how we plan to ensure compliance are given in the following table. For example detailed standards for the 7<sup>th</sup> grade can be found in section II.C.i below.

Examples of s	Mass Curriculum			
Subject Content		Skills	Frameworks Standard	
	Students should know	Students should be able to	Reference	
Mathematics	Monomial: constant, variable, coefficient, degree of a monomial.	Evaluate monomial when given numeric values of constant and variable.	Mathematics, Grade 8, Standard 8.P.2	

English	Know the spelling of words with Greek and Latin roots	Recognize the meaning of the words with Greek and Latin roots and use them in essays correctly.	English Language Arts, Standard 4.21
Literature	General taxonomy of genres (prose - fiction and nonfiction, poetry, and drama) and their basic characteristics.	Define different genres. Recognize them in sample excerpts. Analyze and interpret mood and tone, as well as a character's traits in a fictional text, basic organizational structures in a nonfiction text, analyze patterns of imagery and symbolism in both poetry and prose.	Reading and Literature, grades 7-8: Standard 8, p. 37, Standard 9, p. 40, Standard 10, p.42, Standard 11, p. 44.
Physics	Speed. Average and instantaneous speed.	Know the definition of a speed. Derive the formula of average speed. Use and convert the units of speed in different unit systems. Understand the meaning of instantaneous speed and how it differs from the average speed.	Physical Sciences (Chemistry and Physics), Grades 6–8. Standards 11, 12.
Chemistry	Mixtures and pure substances	Compare and contrast mixtures and pure substances using atom model. Give examples of both.	Physical Sciences (Chemistry and Physics), Gr. 6–8, St. 8
Biology	Structure and functions of ecosystems	Describe parts of major ecosystem types and explain how organisms in these ecosystems interact with environment.	Life Science (Biology), Gr. 6–8. Standard 13.
Computer Science	Computer data flow	Understand how computers are connected in the network and how information is transported.	Technology/Engineering, Gr. 6-8, Strd. 3.1
History	Traditional mythology and historical data about the origins of Rome	Analyze possible socio-economic and geographic conditions that led to rise of Rome.	History and Social Studies, Standard 7.36
Geography	Climate zones and seasons	Locate and name all climate zones on the globe. Explain why there are different climate zones on Earth. Understand how and why the climate may vary within a zone.	Earth and Space Science, Grades 6–8. Standard 11.

iii. Explain how limited English proficient learners, disabled students, and students who enter the school below grade level will be engaged in and benefit from the curriculum.

The Academy will offer multiple ability-based tracks within some courses<sup>19</sup>. The topic coverage will be the same for different levels, but the levels will differ in the depth of coverage<sup>20</sup>. This will enable students with special needs, those with less rigorous academic preparation, and those with limited English proficiency to remain at the same temporal point in the longitudinal curriculum as their peers, and to achieve functional competence in all subjects. Such students will thus remain fully integrated participants in the total experience of the Academy, and of their respective grades, with goals aligned with their peers. In addition, the Academy will have the flexibility to move students from one track to another without creating a situation where students are ahead of, or behind their peers.

Students with limited English proficiency (LEP) will rapidly master the language due to total English immersion in the academic classrooms, as well as intensive, separate "English as a Second Language" instruction. While these students might begin in a "lower" track, as their language improves, it will be entirely possible for them to shift as their English proficiency increases. In courses like mathematics, a universal language, and in the mathematics-dependent sciences, it is entirely possible there will be few or no linguistic barriers for LEP students.

Services to LEP, SPED, disabled and below grade students will be off9ered through a Learning Center – a specially equipped suite of small classrooms where small-group and one-on-one tutoring will occur.

<sup>&</sup>lt;sup>19</sup> Mostly within technical subjects such as Math, Physics and Computer Science.

<sup>&</sup>lt;sup>20</sup> For example, study of linear equations in the 6<sup>th</sup> grade's higher level may include equations containing multi-level parentheses, variables in both sides, algebraic coefficients, while the lower level will study linear equations with one-level parentheses, variables in one side, and numeric coefficients.

#### iv. Describe any plans for setting non-academic goals for students and creating a process for measuring progress toward their attainment.

The mission of cultivating successful industry and academia professionals requires teaching working habits such as meeting deadlines and sustaining a substantial workload, participating actively in groups, and engaging in schoolwide events. Therefore, our non-academic, socio-emotional curriculum and standards will be a very important part of student learning at the Academy. In order to assess student progress we will use a rubric similar to the one below, and "grades" will be recorded and reported as part of the regular report card. Because 6-12 graders go through complex socio-emotional changes, and a group of peers can be in different states of maturity, socio-emotional development will be one criterion considered when discussing grade promotion.

Socio- emotional goals	Definition	Needs improvement	Satisfactory	Excellent
Work skills	Follows through on assignments, comes on time, meets deadlines, does homework, actively participates in class work, follows on responsibilities on patrol and cleaning duties.	Less than 70% of the time	Between 70% and 90% of the time	Over 90% of the time
Leadership	Peer and younger students' tutoring, class prefect duty, active participation in and organization of class- and school-wide events	Does not take responsibility, rarely volunteers	Takes some responsibility, volunteers 70-90% of the time	Takes active responsibility, volunteers most of the time, inspires others
Behavior	Dealing with others, conflict resolution pattern, respect to other students and teachers	Disrespectful to others and others' opinions, creates conflicts, disruptive in the class	Respectful to others most of the time, avoids conflicts with others' opinions, often become a mediator for other students' conflict resolution	Always respectful to others and others' opinions, often become a mediator for other students' conflict resolution
Open Circle	Open Circle studies	Does not participate in discussions most of the time, holds back, does not demonstrate development of understanding of the issues.	Participates in discussions most of the time, is open and honest, demonstrates development of understanding of the issues.	Actively participates in and sometimes facilitates discussions, is open and honest, improves his/her own and others' understanding of the issues.
Extra- curriculum activities	Examples: drama, school newsletter and radio station, community service		Honorable mention	

#### C. Promotion and Graduation Standards

i. Provide examples of "exit standards" for the school's grade groupings (e.g. elementary, middle, high school or primary, upper elementary, etc.) in three areas: Mathematics, English Language Arts and one other subject area of your choice.

Because of the continuous 6-12 curriculum structure, the Academy's 6-12 grades will not be grouped into traditional middle and high schools, there is one point of graduation: at the end of high school. Each grade will be an individual step on the learning ladder and will have its own promotion—or "graduating"--standards. The content and skills students should master at each stage are summarized in brief in the tables of sections II.B.i and ii. Based on the content for each grade and subject, the Principal and the Lead Teachers will develop a detailed list of 15-25 standards to cover all topics. The standards will be developed in accordance with (1) the Academy mission of excellence and demanding teaching principles, (2) Massachusetts Frameworks requirements, and (3) adopted

assessment system (see section II.D below). Examples of the Academy graduation standards at the end of high school for Math, Computer Science, and English/Literature are given below.

## Mathematics

## Strand: Number Sense and Operations

- 1. Define complex numbers and operations on them. Relate the system of complex numbers to the system of real numbers. Plot complex numbers using both rectangular and polar coordinate systems.
- 2. Apply DeMoivre's theorem to multiply, take roots, and raise complex numbers to a power.

## Strand: Patterns, Relations, and Algebra

- 3. Demonstrate solid knowledge of trigonometry formulas for the sine and cosine of the sum or the difference of two angles.
- 4. Demonstrate the understanding of principle of mathematical induction as one of types of proof. Use mathematical induction to prove theorems and verify summation formulas.
- 5. Identify and describe features of conic sections: axes, foci, asymptotes, and tangents.

## Strand: Data Analysis, Statistics, and Probability

- 6. Select, create, interpret and utilize various tabular and graphical representations of data, e.g. tables, charts, graphs, Venn diagrams.
- 7. Apply combinatorics to solve probability problems. Prove the Binomial Theorem and construct Pascal's triangle. Explain how the rows are formed.

## Strand: Geometry

- 8. Describe the nature of a postulation system. Distinguish between postulates and theorems. Use inductive and deductive reasoning and proof by contradiction. Write proofs of theorems, such as theorems about congruent and similar figures, parallel or perpendicular lines, and lines perpendicular to a plane.
- 9. Define vector, and operations on them. Prove the properties of operations. Use vector method to solve problems.

## **Computer Science**

## Strand: Computer Hardware, Computer Networks

- 1. Demonstrate a solid understanding of computer architecture, identify major computer parts.
- 2. Identify components of wide area and local area networks. Configure TCP/IP settings.

## Strand: Computing and Communication Software

- 3. Use spreadsheet applications to analyze numerical data, create graphs, define trends and apply functions to perform statistical calculations for computer-based problem solving.
- 4. Use word processing, presentation applications, computer graphics, and electronic communications to create and share documents, presentations, and web pages (e.g. for science fair presentations, videoconferences, school web site).

## Strand: Computer Science Fundamentals, Algorithms

- 5. Demonstrate a solid understanding of concept of an algorithm and relationship between algorithms, flowcharts, pseudo code and computer programs.
- 6. Use high level computer language (e.g. C, C++, Java) to write computer programs. Apply top-down design, modularity, logical conditions, loops, conditional statements, and parameter passing.

## Strand: Databases

- 7. Demonstrate understanding of different database concepts. Design a correspondent relational database and its objects: tables, keys, views, and indexes.
- 8. Access data using SQL to retrieve information and update data (e.g. use INSERT, UPDATE, DELETE, SELECT statements and FROM, WHERE, GROUP BY and ORDER BY clauses).

## English/Literature

## Strand: Writing.

- 1. Write a poem (8-12 lines) using poetic techniques (alliteration, onomatopoeia, rhyme scheme), figurative language (simile, metaphor), and graphic elements (capital letters, line length).
- 2. Write a 5-6-page essay on a given literary, informational, or expository reading.

Strand: Fictional/literary texts. Dramatic literature.

- 3. In a prosaic or dramatic text, identify its time of creation and historical background. Locate and analyze the text's structure and various elements of the plot.
- 4. Interpret one of the character's traits, emotions, or motivation and give supporting evidence. Determine how qualities of the central characters influence the resolution of the conflict.

Strand: Poetic texts

5. Identify the poem's form/subgenre (sonnet, ballad, song, heroic couplets), etc.). Identify and analyze its meter and rhyming pattern/ stanzas.

6. Analyze the effects of sound, form, figurative language, and graphics in its relation to the poem's meaning. <u>Strand: Discussion, Oral presentation</u>

- 7. Select a literary work, film or play for review and oral presentation. Conduct research using various sources. Choose and describe your audience, choose presentation style, level of formality, and format. Organize your ideas and supporting details. Create a system of self-assistance (index cards, outlines, visual aid, etc.) Present your review to a panel.
  - ii. Describe the proposed school's policies and standards for promoting students to the next grade, achievement level, or grouping level.

<u>Difficulty levels</u>. Math, Physics and IT/CS/ED will be taught in two parallel levels as shown in section II.B.iii. To be moved from a lower to a higher track, students will need to be in the highest 10% of their current level. Similarly, students in the lowest 10% of the higher level will, in most cases, be moved to the lower level.<sup>21</sup> In this way, we will be able to support students who are either struggling with material that is too difficult, or under-challenged by material that is too simple. The Lead Teacher, the subject teacher, and the Home Teacher will review students' level placement on a regular basis, so that very little time elapses before students' needs are identified and addressed. The subject teacher will be the main decision-maker on this issue.

Passing a subject. In order to pass a subject, a student will need to master each of the standards in the subject with a yearly grade of at least 60% (a D-).

<u>Grade promotion</u>. Students with passing grades in all subjects will be promoted to the next grade. The student who fails more than one subject will be retained in the same grade.

The student who fails one subject will be promoted to the next grade, but s/he will be enrolled in a mandatory remediation program. The program will start with a summer session of one-on-one or small-group tutoring. At the beginning of the following year the student will be placed in the remediation program for the subject for two quarters and then returned to the regular class. S/he will continue receiving additional training in a small group or one-on-one tutoring during the rest of the year. If the student fails the same subject for a second time, s/he will be retained in the same grade.<sup>22</sup>

<u>The Academy graduation</u>. The students successfully promoted to the next grade in every grade 6<sup>th</sup> (or 7<sup>th</sup>) through 11<sup>th</sup> and passed the 12<sup>th</sup> grade standards will be considered successfully graduated from the Academy.

iii. Provide an example of performance standards for a grade grouping of your choice to indicate how students will be graded.

Example of the performance standards are given in Section II.C.i. The Academy's grading system will be similar to the one accepted in most schools as shown below.

<sup>&</sup>lt;sup>21</sup> Although the described procedure will be followed "as a rule", there may be occasional cases when the teachers will need to exercise their best judgement as to unusual exceptions. An example may be an ADD-affected, talented student who has trouble handling established rules and procedures such as bringing in the homework on time, and whose grades are poor, but whose level of comprehension of the material is high. This student may still be advanced to the higher level class where the SPED teacher will work with him/her to help reduce the ADD interference with the student's achievement.

<sup>&</sup>lt;sup>22</sup> In some cases, the subject teacher still may suggest remediation measures, such as extensive summer tutoring, at the parents' expense.

% Completed	Grade	Proficiency
90-100	A- to A+	The students have a deep understanding of the subject matter and can complete their work independently with no or few mistakes.
80-89	B- to B+	The students have a good understanding of the subject matter and can complete their work with minimal help.
68-79	C- to C+	The students have moderate understanding of the subject matter and can complete their work with substantial help.
67 and below	D- to D+ F	The students have very little understanding of the subject matter and can complete their work only with substantial help. F is below 60% and is a not-passing grade.

When using internal tests, the Academy will evaluate student knowledge in a criterion-referenced system, rather than a norm-referenced one; i.e., evaluation will be determined by examining how student performance compares to the Academy's established performance standards; internal normalization (the "bell-curve") will not be used. The norm-curves will be used when comparing the Academy's students with other schools.

Quarterly and yearly academic grades for a subject will be calculated as a combination of the separate average grades. For example, a quarterly grade may be calculated based on 35% class work, 25% homework and 40% on-going tests and quizzes. Yearly grades may be 30% class work, 20% homework, 30% on-going tests and quizzes, and 20% annual exams. The system will be created jointly by the Principal and Lead Teachers before school opens and will be verified and refined every year.

#### D. Assessment System

- i. Indicate whether, in addition to administering the Massachusetts Comprehensive Assessment System (MCAS) as required by state law, the
- school will use additional standardized assessment tools to determine and report student progress.
- ii. Describe how baseline achievement data will be collected and used.

Driven by our mission of excellence in learning, we thoroughly will monitor student achievement using an extensive personal accountability system of external and internal assessments. A preliminary schedule of major external and internal tests and exams is given in the table below.

Grade		6			7		8	3	ç	)	1	0	1	1	1	2
	Fall	Wntr	Spr.	Fall*	Wntr	Spr.	Wntr	Spr.	Wntr	Spr.	Wntr	Spr.	Wntr	Spr.	Wntr	Spr.
English			WE			WE		WE		WE		WE		WE		
English						M						M		AP		
Literature			WE			WE		WE		WE		WE		WE		
						M						M				
Math	PT		WE	PT		WE		WE		WE		WE		WE		
Malli			M					M				M		AP		
Physics							OE		OE	М	OE		OE	AP		
Chemistry							OE		OE		OE		OE	AP		
Biology		OE			OE		OE		OE		OE		OE	AP		
CS		Pr			Pr		Pr		Pr		Pr		Pr			Pr
History		OE			OE				OE				OE	AP		
Geography							OE				OE					
Science & Eng. Tech. MCAS								M				М				
Terra Nova	TN		TN	TN		TN		TN								
LAS, MELA						LAS	& MEL	A per	the stat	e sche	dule					
SAT							PS/	AT, SA	T I and	II per	the stat	e sche	dule			
baseline	data	collection	on			<u>Co</u> externa	olor Co al exam	odes Is		[	in	ternal	exams			

#### Abbreviations and Notes

PT = placement test	AP = Advanced Placement	Spr. = Spring, Wntr. = Winter	
WE = written exam	Pr = Project	TN =Terra Nova	M = MCAS
OE = oral exam	*New students only	**Introductory physics only	

**External Assessment.** Mandatory tests. MCAS will be administered according to the Massachusetts DOE's schedule. In addition, the Academy will use the Terra Nova<sup>23</sup> test to gather baseline assessment data on newly enrolled 6<sup>th</sup> and 7<sup>th</sup> grade students. Thereafter, it will be given every spring and used to assess annual progress and to demonstrate accelerated learning in comparison to our sending districts, and the state. All students will take the PSAT and SAT tests, which will provide us with comparative district, state and national data (a course for PSAT and SAT I test preparation will also be available as part of the after-school program).

The Language Assessment Scales (LAS) and Massachusetts English Language Assessment (MELA) tests in reading, writing, speaking, and listening will be administered to assess the English Proficiency of LEP Students as they enroll in the Academy, and in every spring thereafter.

<u>Optional tests.</u> Material covered in each core multi-year subject course (English/Literature, Math, Physics, Chemistry, Biology, and History/Geography) will meet or exceed requirements of the corresponding AP exams. All students who complete any core academic subject with a grade of B and above will be prepared and encouraged to take an AP exam and/or SAT II test in that subject.

We expect that some students will be able to take the SAT I and II tests early, in grades 8-10, which will make them eligible for programs such as The Center for Talented Youth (CTY) at Johns Hopkins University. Student participation in these programs will increase their chances to enter the colleges and universities of their choice, and provide them with opportunities to enhance their knowledge in various extra-curricular programs and summer camps provided by CTY.

Another form of assessment will be local, state and national Math, Science and History competitions. Participation in these competitions will be highly encouraged, but optional.

iii. Describe how the administered tests and consequent data will be used to demonstrate student achievement. Include how assessment and achievement information will be reported. Indicate which audiences will receive this information and how often.

<u>Families</u>. Each student's results and personal achievements will be recorded and reported to the families through the following system.

- 1. Record notebooks (RN). Each student will be given a specially printed notebook with daily subject schedules where teachers will record all academic and non-academic grades as well as comments on the student's behavior and notes for parents on at least a weekly basis. The students will carry the RN's with them, so that parents regularly can see results at home. The students will be required to have the RN's signed by parents/legal guardians at the end of each week.
- 2. All grades, comments and notes from RN's also will be placed on the Academy's securely accessible (password protected) web site<sup>24</sup>.
- 3. Report cards will be mailed home at the end of each quarter, and will contain quarterly grades, detailed academic and non-academic profiles and teachers' notes.

#### The Academy:

- 1. The Board of Trustees will receive quarterly and annual summary reports on the students' achievement.
- 2. Administration and faculty will have access to the students' results through the computer database.

<sup>&</sup>lt;sup>23</sup> Terra Nova test is used at some of the region's district schools.

<sup>&</sup>lt;sup>24</sup> A parent/guardian will be able to view this information for his/her own child only.

<u>The Public</u>. The Academy will report its students' achievements to the DOE and to the community through the annual report that will contain a summary of external and internal assessment results.

#### iv. Describe which internal/school-developed assessment instruments will be administered in order to measure and report student progress.

Internal Assessment. The internal assessment system will include graded class work and homework, quizzes, tests, and written and oral exams within each subject. The internal assessment system will serve to provide the

Example of Quiz and Test Schedule for Math in 6th Grade (covers 5 weeks)								
Торіс	# of periods	Assessment						
Numerical/variable expression. Numerical coefficient	3							
Power with natural exponent. Powers and order of operations.	3							
Monomial. Examples of evaluation in the set of non-negative numbers	4	Quiz (during last hour): powers, monomials						
Negative numbers. Representation on the number line.	4	Quiz (during last hour):						
Absolute values, basic algebraic properties, simple equations.	5	negative numbers, equations						
Addition and subtraction of positive and negative numbers	9	Quiz (during last hour) on this topic						
Evaluation of variable expressions	5	Quiz (during last hour) on this topic						
Review and exercises <sup>1</sup>	17	Intermediate Quiz and Test on entire section						

faculty with detailed and accurate information about student mastery of the subject matter, providing them with an opportunity to swiftly and effectively adjust the teaching process to address student needs.

<u>Homework.</u><sup>25</sup> Teachers will rely heavily on homework to reinforce understanding of concepts introduced and discussed in class, ensuring fluency in the material. Students and parents are expected to take homework very seriously as one of the key components of the learning process. Homework will be graded both for the mastery and

for the effort.

<u>Quizzes</u> (brief, 10-15 minutes) <u>and tests</u> (from 30 to 90 minutes) will be a seamless part of the teaching process. They will be administered at the end of topics and units, serving to assess the students' level of mastery. The majority of tests will use open-ended questions, with multiple-choice questions typically restricted solely to specific preparation for external tests. An example of an on-going internal quiz and test schedule for a 6<sup>th</sup> grade math class is given in the accompanying table.

<u>Final Exams</u>: Important milestone exams will be administered once a year: oral exams for History, Geography, Biology, Chemistry and Physics and written exams in English/ Literature. The objective of these exams is to thoroughly assess course-wide proficiency.

Written exams will include a set of problems (math), questions (English), or topics for compositions and essays (literature). Oral exams also will help students develop the ability to prepare a presentation on the spot in a short period of time, and deliver it to a group of several people. Oral exams will be administered by a commission of two to four people that may include a teacher (other than the one who taught the class), the Principal, a Board member, or an invited prominent science or industry professional. During an oral exam the students will draw at random one of the tickets with questions and problems. They will be given 10-15 minutes to prepare a presentation to the commission with answers to the questions and solutions to the problems. During the presentation the student will be expected to respond to additional questions. For example, an examination ticket on the Physics exam for 8<sup>th</sup> grade

<sup>&</sup>lt;sup>25</sup> The importance of homework is emphasized by a number of researchers; <u>see</u>, <u>e.g.</u>, Lawrence Steinberg, 1997. Using multiple research data Haley <u>et al</u>. showed that "homework had an effect on high school grades even when such variables as race, family background, ability, and school program were controlled. By completing 10 hours of homework per week, low ability students were able to earn equivalent grades to those earned by high-ability students who did no homework" (Craig Howley, Aimee Howley, Edwina Pendarvis, 1995)

can ask a student to formulate Newton's Second Law, derive the formulas related to it, and present examples. The ticket also may include a problem on an unrelated topic, for example on the conservation of energy law.

<u>Projects</u> will be used to assess the students' knowledge in CS/IT/ED. Every student will create an annual project and present it at the annual school-wide computer science fair. The project might be a web site, a PowerPoint presentation, a programmed algorithm or a game.

Socio-emotional development will be graded using the rubric described in section II.B.iv.

v. Describe how assessment information will be used to improve instruction and student learning.

For <u>early prevention</u> of student failure, the Academy will design a computer database that will regularly calculate students' year-to-date (rolling) averages in all subjects.<sup>26</sup> Students with an average of a C- or lower will be considered "in-danger-of-failing" and will be scheduled for a meeting with the appropriate teachers and family members. The goal of the meeting will be to make the families aware of the students' learning status; to determine what topics, types of work (class work, homework, etc.), or testing system (oral exam, written test, essay) are causing problems; and to create an effective remediation plan. The plan might include additional exercises, modification in the teacher's pedagogy, one-on-one tutoring, SPED consultation, after-school training or other appropriate measures.

<u>Advanced students</u>. Students that continuously score "A-" or higher in a subject will be provided with the opportunity of becoming a peer-tutor. This highly prestigious role will be given to the student only if all other subjects are passed with a minimum grade of "B-." The "tutor" status will be honorably mentioned in the school newsletter and placed in the student's permanent record.

vi. Explain how assessment data will be used to plan staff development that will support the goal of improved student learning.

External and internal assessment results will be a part of each teacher's review and will be used when planning teachers' personal and intra- and inter-discipline teams' professional development plans (see section D.4, i-iii).

#### E. School Characteristics

#### i. Describe the school calendar, the daily hours of operation, and the way the school will be organized.

The Academy's calendar, class schedule, teachers' schedule are designed in accordance with its mission of promoting intellectual growth. The school year will start on the Tuesday after Labor Day<sup>27</sup> and finish on June 20<sup>th</sup>. The school year will be 188 days, with 7 holidays (Columbus Day, Veterans' Day, Thanksgiving Day (2 days), New Year Day, President's Day, and Memorial Day), three mid-year vacations (winter vacation, February vacation, and spring vacation) and one 10-week summer vacation.

The 7-hour school day will start at 8:30 A.M. and finish at 3:25 P.M. The day will consist of seven 50-minute periods separated by 5-minute recesses. One 15-minute recess after the first two periods will be provided for snack, and one 30-minute recess after the fourth period will serve as a lunch break.

<u>Students' Schedule</u>. There will be a total of 35 periods per week. In line with our commitment to high academic standards, each period will be a subject study, with no free periods. A total of 10 (in 6<sup>th</sup> grade) to 12 (in 7<sup>th</sup> -10<sup>th</sup> grades) subjects will be spread throughout the week in a balanced schedule. The chart below illustrates the number of hours students will spend in each class on a weekly basis. In line with the Academy's emphasis on Math and Science, the majority of hours will be spent on these subjects, except in 6<sup>th</sup> grade when more hours than in other grades will be dedicated to literacy.

<sup>&</sup>lt;sup>26</sup> The program may also provide other multi-dimensional comparisons: recording decreases in grades over a period of time, comparing results to previous averages, and providing a warning, or generating a "notice of recognition" if a student achieves an increase in one grade without decreasing the others.

<sup>&</sup>lt;sup>27</sup> On the first year, the school year will start on September 15<sup>th</sup> and will run later in June.

The last three columns of the table provide information about the amount of time students will spend in their chosen specializations/"majors" in 12<sup>th</sup> grade: Math/Physics, Biology/Chemistry, or Humanities (described in the curriculum section above). The next table provides an example of the weekly period schedule.

	Hours/week									
Subject	6th Grade	7-10 Grades	11th grade	12th	grade, Specializations					
				Math/ Physics/CS	Biology/ Chemistry	Humanities				
Math <sup>28</sup>	10	8	9	10	5					
IT/CS/ED	4	4	4	5						
Physics		3	3	6						
Chemistry		2	2		8					
Biology	2	2	2		8					
Geography	1	1								
History	3	3	3			8				
Literature	4	3	3	3	3	8				
English language	4	3	3	3	3	8				
Foreign language	2	2	2	2	2	3				
Art	2	2	2	2	2	4				
PE	2	1	1	1	1	1				
Class meeting	1	1	1	1	1	1				
College prep. servi	ces: essay and int	erview training, co	punseling, etc.	2	2	2				
Total	35	35	35	35	35	35				
Math&Science	16	19	20	21	21	0				
Humanities	14	12	11	8	8	27				
Arts & PE	4	3	3	3	3	5				

Time		Ту	pical wee	k schedule	e for 6 <sup>th</sup> gra	ade	Typical week schedule for 7-10th grade				
٩		Mon	Tue	Wed	Thu	Fri	Mon	Tue	Wed	Thu	Fri
1	8:30-9:20	Math	Math	Math	Math	Math	Math	Math	Math	Math	Math
2	9:25-10:15	Math	Math	Math	Math	Math	Math	Math	Arts	Math	Arts
3	10:30-11:20	IT/CS/ ED	IT/CS/ ED	IT/CS/ ED	IT/CS/ ED	PE	IT/CS/ ED	IT/CS/ ED	IT/CS/ ED	IT/CS/ ED	Chemi- stry
4	11:25-12:15	Litera- ture	History	Litera- ture	History	English	Litera- ture	History	Foreign language	History	English
5	12:45-1:35	Litera- ture	English	Litera- ture	History	English	Litera- ture	English	Litera- ture	History	Foreign language
6	1:40-2:30	Geogra- phy	English	PE	Biology	Arts	Physics	PE	Biology	Physics	Biology
7	2:35-3:25	Biology	Foreign lang.	Arts	Foreign lang.	Class meeting	Physics	Geogra- phy	Chemi- stry	English	Class meeting

<u>Special Education and English Learners' Schedule</u>. The IEPs of identified special needs students will govern the frequency and intensity of the additional services they receive. Students will be placed in the track appropriate for their learning needs. The special educator will, regularly, be part of the lower track classes to provide additional support to the SPED students. If this degree of assistance is insufficient, some identified special-needs students may combine attendance in regular classes with additional full, small group or tutorial-class periods. In general, since there are, by design, no free periods during the school day, small group and tutorial instruction will occur during the after-school program. In addition, such students as well as students with limited English proficiency may

<sup>&</sup>lt;sup>28</sup> Math for grades 6-11 will consist of separate Algebra and Geometry courses. Number of hours for each may vary.

be pulled out for specialized classes or an ESL class to replace their foreign language class or other regular classes.

Since any student will be able to request or be referred by his or her teacher for temporary special help — such as the special acceleration program for 7<sup>th</sup> grade entrants to hone entering skills — substantial ongoing movement of regular students in and out of the Academy's Learning Resource Center is anticipated. This will further reduce any stigma for identified special-needs students that might be associated with receiving extra help.

<u>After-School Activities</u>. The Academy will apply a significant effort to offer additional intellectual growth promoting activities during after-school hours and school vacations. The after-school program will run from 3:30 p.m. until 6 p.m. In particular, the Academy will try to identify a partner who provides such a program, and will work with the provider to create an appropriate environment for students to do their homework, create adequate support for identified SPED and LEP students, etc. The program also may include such extra-curricular activities as sports, theater, a newspaper and radio station, a debate club, a literature critics club and a chess club.

<u>Teachers' Schedule</u>. Research (Stigler and Hiebert, 1999; Ma, 1999) shows that teachers in American schools are overloaded with classroom teaching that does not leave time for professional development, curriculum improvement, meetings or discussions with colleagues.

The Academy's innovative curriculum and rigorous academic schedule, intensive grading system and reliance on homework will require that teachers be provided with ample time to prepare curricular materials and pedagogy for their work with students. To this end, we have organized the schedule in such a way that teachers will teach an average of 20 academic periods per week. The rest of their time will be dedicated to professional development, curriculum development and planning, student work assessment, interaction with students and parents, and participation in administrative meetings (see section III.D.5.vii for more details).

#### ii. Describe the implementation of the educational program in terms of the daily or weekly organization of students and faculty

<u>Organization of Students</u>. The students will be assigned to each class to ensure maximum possible diversity based on gender, race, nationality, SPED, family income level, home town, etc. Each class will be assigned a Home Class Teacher and a "Home" classroom. Whenever possible, the Home Class Teacher will stay with the class for several years.<sup>29</sup>

Tracking. The Academy will offer two ability-based tracks within several courses (section II.B.iii).

<u>Organization of Space</u>. Generally, the class will stay together in the Home classroom for most subjects and the teachers will move between classes with their supplies, manipulatives and props. The students will move to separate facilities, or to specially designed labs, during Information Technology/Computer Science/ Engineering Design, PE and some Physics and Chemistry lessons. Part of the class will move to another room for Math, Physics, and Foreign Language subjects when splitting into level/language groups.

<u>Organization of Teachers</u>. The Teachers will be organized into two departments: Math/Science and Humanities. Within each department, the teachers will work on curriculum development in same-subject or multi-subject teams.

111. For illustrative purposes, please summarize a typical day from the perspective of a student in a grade level of your choice.

Jon Lee is in the 7a class. Today is Monday; he came to school close to 8:30 AM and went to his Home classroom where he had two periods of Math. He found half of the 7b class came to his Homeroom to take class with their Math level. He learned about factoring polynomials during the algebra part of the class and proving congruency of triangles when their side-angle-side are congruent. He solved a number of problems on these topics and had a quiz on yesterday's material.

<sup>&</sup>lt;sup>29</sup> The Home Class Teacher may change when class is rearranged due to attrition in following years.

After his snack break, from 10:15 to 10:30, Jon hurried to his computer lab where half of his 7a class and half of the 7b class had their Computer Science class. They studied functions in MS Excel and he created a spreadsheet that allowed him to conduct polynomial calculations similar to those he did in his algebra class. After that, at 11:25, he returned to his Home classroom for doubled Literature class. During the class, he was deeply involved in the discussion about comparing *The Aeneid* and *The Odyssey* and the role that these great epics played in Greek and Roman cultures. During the last 30 minutes of the class they wrote a short essay about the two poems. The last two periods Jon has Physics. There was no lab today, so he went, together with a half of his class, to the 7b class' Home classroom for his level Physics where they continued discussing various forces in nature.

At the end of the day, Jon did not go to the bus. He was very excited: he just was awarded the title of Tutor, and it was his first one-on-one tutoring with a 6<sup>th</sup> grader who joined the Academy from the waiting list. Since it was 2 months later in the year, she was behind her class in Math. Jon followed the signs to the Learning Center where the teacher and the 6<sup>th</sup> grader were waiting for him. He had prepared all weekend, but still was worried if he could explain to the student so she would understand. The 45-minute tutoring was over so quickly that Jon did not notice the time. Jon was very proud of himself: the 6<sup>th</sup> grader had learned the addition of fractions and it was because of him!

#### iv. Describe the culture or ethos that will be developed in the school and any plans you have to create or implement this culture/ethos.

Following its mission, the Academy's goal will be to create an atmosphere of celebration and appreciation of learning and competency for adults and students alike. To provide inspiration, the walls of the Academy will be decorated with portraits of famous scientists in history and quotations that emphasize the importance of knowledge and learning.

Academic achievement will be emphasized and celebrated. For example, one bulletin board will be dedicated to posting the names and results of the students who are members of Math, Science, and History competition teams as well as winners of the competitions. Every week a problem-of-the-week in Math and Physics for each grade will be posted on the board. At the end of the week, the students who solved the problems will have their work posted on the board. Also, there will be special weekly "effort and attitude" awards given to students showing the best improvement rate in their studies.

As stated in our mission, learning will lead to success in the workplace. To create a work-like environment and promote a business-like attitude of "professional learners," all students will wear uniforms.<sup>30</sup> Students in uniform outside the Academy will be considered the Academy's ambassadors and will be required to behave according to the Academy's Code of Conduct.

Future career success also requires promoting personal responsibility of students for the school organization and learning of management and organizational skills. At the Academy, every student will be responsible for the school management and organization through the following duties:

- The Class Teacher will appoint a class <u>Prefect</u>, who will serve for a month. The Prefect will be responsible for the organization of multiple non-academic class activities.
- To promote communal commitment, each class and its Home Teacher will be responsible for a one-week duty
  of patrolling and tidying the school ("<u>Patrol Duty</u>").
- Two students from each class ("<u>Helpers Crew</u>") on a rotating daily basis will be responsible for helping teachers bringing their props, books, test results, etc. to the class and back to the teachers' lounge. They also will help serving snacks and lunch, and cleaning the Home classroom.

The Academy also will ensure students have the opportunity to discuss issues outside the academic realm. Each

<sup>&</sup>lt;sup>30</sup> The school will reserve some funds to subsidize uniforms for students in need.

class will hold a weekly meeting, where students may talk through difficult moral and ethical problems<sup>31</sup>. The Open Circle<sup>32</sup> curriculum — focused on social and emotional issues outside the academic curriculum — is one of the programs we will consider as the basis of these meetings. The class discussions will be planned by the Prefect and the Class Teacher, and facilitated by the Prefect.

v. Describe the school's philosophy regarding student behavior and discipline for the general student population and special needs students.

<u>Philosophy</u>. In accordance with the Academy's goals for student achievement in academics, the students will be given a clear message that behavior and discipline problems stand in the way of success in student learning, and therefore, cannot be tolerated. See the Academy's Code of Conduct in Attachment 5 for further detail.

<u>Classroom behavior</u>. If a student is engaged in behavior that is disruptive for the teacher and for other students' learning, the teacher might take any of the following actions:

- Asking the student to stop the disruptive behavior.
- Analyzing the student's aptitude level versus the studied material to determine whether the student is "bored" or over-challenged with the lesson and then providing an appropriate alternative task.
- Sending the student to the Head of Student Affairs' office to calm down.

In the case of repetitive disruptions of the lessons, it will be the teacher's responsibility to work with the Head of Student Affairs to develop a series of solutions.

<u>Discipline outside of the classroom</u>. Behavior of the students in the hallways, in the rest rooms, in the library, and in the schoolyard will be managed by student patrol classes. Acting under a "do not touch, do not yell" policy, they will try to peacefully resolve conflicts, or if a peaceful resolution fails, report difficulties to the Head of Student Affairs<sup>33</sup>.

The Head of Student Affairs will be responsible for determining <u>consequences</u> for disruptive students. The consequences may include a meeting with the students' parents, possible involvement of the SPED teacher, detention, suspension and, in some worst case scenarios - such as a student bringing a weapon to school - expulsion. Students' behavior reports will be kept as part of their official school record, and will be taken into account in the quarterly assessment of social-emotional development (see section II.B.iv, above).

<u>SPED students</u>. If a student is referred to a SPED teacher as a result of continuous disruptive behavior, or if it is a SPED student with discipline problems, the Head of Student Affairs, the SPED teacher and the parents will work as a team to determine whether the behavior is related to a learning difficulty. If it is so determined, they will strive to develop an appropriate solution, which may ultimately result in adjustments to the student's IEP to include work on the student's social-emotional development, or other areas in which the student is struggling.

vi. Describe how the school plans to build and maintain family-school partnerships that focus on strengthening support for the school's goals.

vii. Describe how parental satisfaction will be gauged and the process for gathering and publicizing parental satisfaction results.

<u>The Parent Support Group.</u> During the preparation of the Prospectus and Final Application, the Founding Group was constantly on the lookout for parents interested in playing an active role in the development of the school. It is the Founding Group's hope that these parents will organize a group of 7-15 committed parent-volunteers to form a Parent Support Group. The Group may engage in the following types of activities:

• Collect parents' feedback on school performance and provide information to the Head of Student Affairs.

<sup>&</sup>lt;sup>31</sup> For example, the class may discuss a problem of bullying and how to prevent and fight it.

<sup>&</sup>lt;sup>32</sup> http://www.open-circle.org

<sup>&</sup>lt;sup>33</sup> The student patrol duty, besides having the disciplinary effect, is designed to teach students how to behave when given authority over others and how to responsibly handle power. The teachers and the Head of Student Affairs will monitor carefully the patrols' disciplining methods and ensure that abuse of authority is corrected as strictly as discipline violations.

- Gather information on the school programs' need, create a plan of action, gather and organize volunteers to conduct the programs, raise money or collect donations. For example, the Parent Support Group may decide that the school needs a soccer team, identify soccer coaches among the parents, find a field, raise the money, donate uniforms, and organize a school soccer team. They may find volunteers to give various math and science lectures and seminars in coordination with school Administration.
- Assist in fundraising for the school.
- Assist in supervising field trips.
- Contribute to and evaluate the parents' education.

<u>Parent education.</u> Because of the unusual and challenging academic program, the parents' full understanding and support will be crucial for success of the Academy's mission of high academic achievement. The Academy will continuously market its ideology, teaching approach and curriculum as well as explain what is required from parents to ensure their children's success. The goal of parent education will be to get the parents actively involved in encouraging their children's efforts and contributing to their success by providing adequate conditions at home.

Parent education will include the following:

- A special book list will be compiled and supplied to parents about the research behind the Academy's teaching philosophy. Most books will be available in the Academy library.
- Regular parent' information sessions will be held explaining the teaching philosophy, the advantages of the Academy's teaching approach, current and future curriculum trends, coming tests topics, etc.
- Special parent information sessions will be dedicated to homework and its importance for successful learning. The parents will be advised how to structure their children's time and the home space to assist in homework preparation.
- The Academy Newsletter will publish articles about the students' success stories, tips on how to help children succeed academically, information on state and national math, science and history competition dates and results, etc.
- Quarterly report cards will include detailed explanations of what they mean and what the next steps are to improve achievement. Reports on the external tests will be done by comparison with results of other schools, districts, and states.

<u>Feedback from the parents</u> on the students' academic learning collected by the Parent Support Group (surveys, etc.) will be included as a part of students' achievement data used in the curriculum development and the teachers' professional development cyclic process described in the section III.D.4, I-iii. The parental satisfaction data will be widely <u>publicized</u> in the Academy Newsletter, on the bulletin board and web site, during the parent information sessions, and in the Annual Reports.

VIII. Describe the relationship the school intends to build with community agencies and organizations that support the school's educational program and serve the youth who attend the school. Letters of support may be included as attachments.

Our rigorous and innovative academic program attracted considerable interest of Math and Science professors and of Education specialists from major colleges and universities (see Attachment 1, Letters of Endorsement). We plan to invite prominent college professors to be guest lecturers on specific topics in Math and Science subjects. In the future we plan to establish regular relations and schedule such lectures systematically. We plan to invite college students interested in teaching to work as teaching assistants, supervise science labs and after school programs. When we have 12<sup>th</sup> graders, some of our students may take additional courses in nearby colleges as part of their specialization program.

#### F. Special Student Populations and Student Services

- Describe any support services that will serve Limited English proficient students above and beyond the regular education program.
- ii. Describe how the school will comply with state and Federal special education requirements for serving students with disabilities.
- iii. Include your plan for offering special education supports and services in the regular education classroom (inclusion setting) and in a resource room as needed (pull-out).

Special Education is identified in "The Massachusetts Charter School Initiative" as one of the six key challenges

facing charter schools. Arguably, the greater challenge is not to serve identified special-needs students per se, but rather to meet the needs of a heterogeneous student population, admitted through open enrollment, within a rigorous academic program analogous to that of selective-admission, examination schools. Within such a diverse student population, remediation of inadequately learned prerequisite skills and compromised entering behaviors can be anticipated as an ongoing need, both in the general student body and among identified special needs students, though for the latter, a broader array of supports and compensatory strategies will be required.

We will integrate our SPED students into our regular programming as much as possible. In addition, we will employ two tracks within each grade as well as individual help within the difficulty levels in Math, Physics and Computer Science with the goal of the lower performing track being a successive approximation of the higher performing one, until those students have caught up to their peers. Part-time tutorial and small group instruction in the Learning Center will be available to identified special needs pupils, and to other students who may, from time to time, demonstrate the need for it in order to succeed.

The Learning Center and the program as a whole will employ a test-teach-test paradigm, with no prior assumptions about the skill set of any student to assure that foundation skills are solidly in place before higher level concepts are taught.

Some special-needs pupils will require specific accommodations, but not curriculum modification. For some, a modified curriculum will be indicated. Due to the stated emphasis of this program on rigorous academics, we anticipate that most special-needs applicants will fall into the former category. For these students, supportive measures are straight-forward, including but not limited to readers for visually impaired students, signing interpreters for hearing-impaired students, a barrier-free environment and physical assistance for those with physical handicaps, and appropriate supervision and assistance for those with medical needs.

Individually customized, specialized and adaptive equipment, such as mobility aids, closed-circuit magnifiers, scanning keyboards, etc., are generally provided by the student. When necessary, as specified in Individual Educational Plans (IEP), the use of this equipment will, of course, be integrated into the programs of those students.

Compensatory learning strategies, as specified in Individual Educational Plans, will be employed for students with emotional disorders, specific learning disabilities, or intellectual limitations. Appropriate behavioral supports will be provided. For some of these students, curriculum modifications may be necessary, but successive approximations to, mastery of, and proficiency in, the standard academic curriculum will remain their ultimate goal.

Formerly undiagnosed special needs may become evident in some members of the general student population. Students who evidence learning problems or other disabilities that are refractory to remediation in the regular classroom will be referred to the Learning Center for in-depth analysis of their problems and potential solutions, and for consideration of whether core evaluation and an Individual Educational Plan are warranted.

Similarly, on an as-needed basis, ESL instruction will be provided for students with limited English proficiency. In alignment with new MA legislation, the Academy will employ an immersion approach. As a part of the professional development program, all staff will be trained to address core needs of English Language Learners (ELL) and SPED students within the classroom whenever possible.

# iv. Describe the school's procedure for identifying students with special needs, developing Individual Education Plans, and providing related services.

Before the school year starts, the SPED Director will review the records of already identified SPED students and their previous schools' IEP's. S/he will set up individual meetings with parents and the Head of Student Affairs to discuss the IEP's and proposed learning settings. After the meetings, s/he will contact the Head of Operations and provide a list of required instructional aid for approval and purchasing.

During the school year, the SPED Director will take an active part in on-going in-classroom observations and identification of the students that might need SPED services because of their academic or non-academic problems, and will help the teachers create special approaches for these students. We anticipate that in many cases the SPED Director will advise teachers how to handle specific students' problems, and not make a disability referral. In case of a disability referral, the SPED Director, the Head of Student Affairs, an outside psychology consultant and the parents will compose a team to discuss and create the IEP for the student.

A Special Learning Center will be created where SPED and ELL students as well as the students that need additional tutoring will come for services.

v. Describe your plan for staffing the special education program, including the number and qualifications of staff you propose to hire.

The SPED staffing is discussed in section III.D.5.i. In addition, SPED and ESL teaching and communication skills will be part of professional development for all teachers and administrative staff.

vi. Describe your plan for addressing student health needs, including any counseling services or outreach that may be offered.

The Academy will employ a part-time school nurse who will provide basic medical care, health screenings and administer prescribed medication.

Substantial health education will be a part of the Human Anatomy course in Biology. Additional health education including personal hygiene and social issues such as drug and alcohol abuse, and adolescent development, will be part of the Open Circle discussions described in section II.B.iv. Certain topics (e.g. puberty and personal hygiene) will be addressed in single-sex settings.

The Academy will use the services of a psychology consultant who will be available for one-on-one consultations in some cases.

vii. Describe your plan to provide a nutrition program at the school.

During the all-school 15-minute snack break and half-hour lunch break, we will offer snacks and lunch to all students, including free and reduced lunches for eligible students. The snack/lunch vendor will be selected using the bidding process per the Academy's vendor selection policies. The meals will comply with all applicable federal and state dietary guidelines.

## viii. Describe the steps that the school will take to intervene before students become dependent on remediation or fail completely.

The Academy will have a rigorous process of day-to-day monitoring of student achievement to prevent the students from falling behind as described in section II.D.v.

## ix. Describe your plan for working with advanced students to keep them challenged and engaged in their classes.

The Academy's mission of cultivating a generation of leaders in science and technology requires full commitment from us to ensure that every student is challenged at the maximum of his/her ability and current intellectual preparedness with the goal of further advancing this "maximum" level.

- All behavior problems raised in class first will be analyzed from the standpoint of the student being under challenged ("bored") in the class and, if it is confirmed, the student will be given higher level assignments.
- The performance of the top 10% of students in the lower level groups in Math, Physics and Computer Science will be reviewed on a semiannual basis for possible placement into the high level group.
- All advanced students will be offered a chance to participate in the state- and nation-wide competitions ("Olympiads"). Additional after school training will be provided to competition teams.
- All advanced students will be considered for tutoring of their peers and younger children.
- Academic achievements will be highly recognized through a variety of means such as awarding certificates of achievement, mention in the school newspaper, placement of names on the bulletin board, etc.

#### III. How will the school demonstrate organizational viability?

- A. Enrollment and Recruitment
  - i. Indicate the number of students to be enrolled each year and over the five-year term of the charter. Explain in detail your rationale for selecting the particular enrollment size for your school as well as the growth strategy you have developed.

A few factors affected our enrollment plan:

- 1. The academic program will be similar to standard high school organization for all grades in that each subject will be taught by a teacher who is a professional in the discipline. In addition, since Physics and Chemistry courses will start in 7<sup>th</sup> grade and the high-intensity Computer Science course will be taught to all students, the Academy will need Physics and Chemistry labs, as well as at least two computer labs fully equipped for 25 people, to be used both in middle and high school. This will drive the cost of the instruction higher than the typical cost of instruction for middle school students. Therefore, enrollment in the middle school will be relatively large to support the cost of instruction.
- 2. Due to the multi-year structure of courses at the Academy, it will be virtually impossible for students enrolled in grades 8<sup>th</sup> and higher in district schools to catch up with their peers who already have been at the Academy for a year or two. Therefore, the Academy will not enroll students after 7<sup>th</sup> grade. This will result in reduction of number of students in higher grades due to attrition.

Grade	6	7	8	9	10	11	12	Total	Classes #
Year 1	138	138						276	12
Year 2	138	138	117					393	17
Year 3	138	138	117	100				493	21
Year 4	138	138	117	100	85			578	25
Year 5	138	138	117	100	85	72		650	28
Year 6	138	138	117	100	85	72	61	711	31

3. To ensure that teachers can devote appropriate attention to each child during a lesson, we plan to keep the class size relatively small, with a maximum of 23 students.

Based on the design constraints listed above, the Academy is planning to enroll 6<sup>th</sup> and 7<sup>th</sup> grade students<sup>34</sup> into 6 classes per grade (a total of 12 classes, with 138 students per grade) in its first year. In these grades, attrition will be addressed by accepting students from the waiting list during the year. Each consecutive year, the Academy plans to enroll 6 classes of

23 students each in 6<sup>th</sup> grade and fill out the seats vacant due to attrition in the 7<sup>th</sup> grade. The Academy will not enroll students in 8<sup>th</sup> grade or higher. With the actual attrition rate unknown, a model using 15% attrition (see table above) was used for the number of teachers' projections and for the budget prognosis.

#### ii. Provide a description of how the founding group has assessed parental demand for the proposed school.

The Founding Group and the volunteers have been applying a tremendous effort to reach as many parents in the region as possible. Over 400 flyers announcing the school were posted in stores, restaurants, clubs, churches, and other local organizations as well as in condominium and town house complexes. The flyer was translated in Portuguese and distributed among Brazilian community and published in *Brazilian Press* newspaper. The flyers and other printed material reference the Academy's web site, with detailed information about the school design. The full Prospectus text was published on the Academy's web site on September 8th.

Our founders were invited to give a presentation at the Marlborough Rotary Club. The presentation drew considerable interest from local parents.

Parents in the Marlborough-Hudson-Maynard-Clinton region have demonstrated support for the proposed Advanced Math and Science Academy Charter School in multiple ways. The Founding Group received about two dozen calls from parents requesting information, about a dozen volunteered to help, and 376 parents signed a statement of support for the school (total of 124 signatures from Marlborough, 52 from Hudson, 47 from Maynard, 51 from Clinton, and 102 from surrounding towns were collected, see sample signatures in Attachment 2), including electronically signed letters of support through the Academy web site.

<sup>&</sup>lt;sup>34</sup> A special acceleration program will be designed for the newly enrolled 7<sup>th</sup> grade students to assure that they are at the same level at the end of the 8<sup>th</sup> grade as their peers that entered the school in the 6<sup>th</sup> grade.

#### iii. Describe how the school will publicize its program to a broad cross-section of prospective students.

The Founding Group and parent volunteers will continue the effort to reach all parents in the region. They plan to continue calling businesses and organizations in the region, and will try to give presentations at some of the larger ones. In addition, in January and February, we plan to organize at least two public meetings in the public libraries to inform prospective parents about the proposed charter school. We send press releases in the local newspapers covering the region such as *The Community Advocate* (Marlborough and Hudson) with an announcement of the proposed school, date and time of the public meetings, and the Academy web site. New 1-page flyers, including those in Portuguese and Spanish will be posted at the same locations with information about the public meetings. In particular, we will target organizations where parents congregate: after-school programs, shopping centers, pediatricians' offices, etc.

In order to work with parents in a personal, informal manner, we will establish a place or places (in the Founding Group members' offices if available, or their homes) and hours when interested parents can meet for one-on-one consultations about their children's needs, and a personal Q&A session about the school.

iv. Describe the proposed enrollment process, including a plan for a lottery. include your complete enrollment policy in the attachments.

During public meetings described above we plan to start distributing Letters of Intend to Enroll to allow parents to express their interest to apply for the school. The Letters of Intend (after the charter is obtained - enrollment forms) also will be available online. All hard and electronic copies of the Letters of Intend and enrollment forms will be carefully collected and logged.

The enrollment process will be conducted in accordance with the Academy's Enrollment Policy (Attachment 4) that was developed in full compliance with state laws and regulations (MGL c. 71, \$ 89 and 603 CMR 1.00).

 B.
 Capacity

 i.
 Briefly describe how the founding group came together to form this school.

 ii.
 Explain how often the group meets and how the planning and writing process is being executed.

The Founding Group of the Academy began meeting in March 2003. Initially, it was a small group of committed academics from the MHMC and surrounding area interested in thinking about designing a different kind of school. Over the past few months, the group has grown to include 15 members of the community: parents, businesspeople, and educators (see attached resumes and statements of interest).

The Founding Group is composed of two subgroups: the Founding Board, which consists of seven members who intend to become Governing Board members (Dr. Anna Charny, David Foster, Prof. Andrzej Herczynski, Deepak Narain, Samuel Rodriguez, Edward Shamber, and Prof. Mikhail Shubin); and a Design Team of five members, which is assisting with the creation of the Academy educational program. Ellen and Robert Kaplan, founders and codirectors of the Math Circle, are members of our Advisory Board designed to include experienced K-12 educators. The full Founding Group meets about once a month to discuss overarching issues related to the Academy. The Founding Board and Design Team meet in smaller groups twice a month to attend to the specific tasks related to their roles and to assist the Lead Founder, Dr. Julia Sigalovsky, in writing the Application. In addition, there is regular e-mail and phone contact between members.

Please summarize each founder's and/or proposed board member's experience and qualifications briefly within the text of the document.
 Please attach a statement of no more than one page from each founding group member that highlights his/her interest in the school.

Dr. Anna Charny received her MS and Ph.D. degrees in Computer Science from the Massachusetts Institute of Technology in Cambridge. She has extensive industry experience in the field of Telecommunication Networks and is employed by Cisco Systems, Inc. She is leading a group of teachers and scientists working on unique Information Technology/Computer Science/Engineering Design curriculum for the Academy.

David Foster, a 20-year Marlborough resident, is an educator and an organizational performance consultant. He will work on the Founding Board Community Outreach Committee as well as will oversee the Academy's organizational design for the best performance.

Prof. Andrzej Herczynski is a faculty member in the Department of Physics at Boston College, where he is Director of the Physics Laboratory and lecturer. In addition to serving on the9 Board, Prof. Herczynski develops innovative and rigorous Physics curriculum.

Deepak Narain is a software engineer and parent who lives and works in Marlborough.

Samuel Rodriguez, a resident of Maynard, is a Cornell University graduate and an attorney. Mr. Rodriguez has served on a number of community boards in the Boston area relating to education and education advocacy. Also for a period of two years Mr. Rodriguez was the Executive Director of the Latino Parents Association and non-profit organization geared towards the parent training.

Edward Shamber is the CFO of Marlborough Savings Bank. He has been with the bank since 1984 as vice president and treasurer. He has a long history of interest in education and has been involved with Junior Achievement, and teaching at the Marlborough Middle Schools and High Schools for more than 15 years.

Prof. Mikhail A. Shubin is currently a Matthews Distinguished University Professor of Mathematics at Northeastern University in Boston. Prof. Shubin oversees development and implementation of the Academy's Math curriculum. Professors Shubin and Herczynski will serve as outreach liaisons for academia<sup>35</sup>.

Evelyn Lima, an English and Portuguese teacher and interpreter, works in Marlborough. She will serve on the Outreach Committee of the Board as a liaison with Brazilian community.

Dr. Julia Sigalovsky, the Lead Founder, has more than 25 years of experience in academia and industry, including nine years of entrepreneurial experience as the founder and President of GeoTek Engineering, Inc., a geotechnical engineering consulting and drilling company.

Resumes and Statements of Interest of the Founding Board as well as the Design Team are given in the Attachments 6 and 11.

#### C. School Governance

Governance Structure i. Present an organizational chart and narrative.

<u>The Board of Trustees</u> (hereinafter, the Board) will hold the charter for the Academy (see details on the Board responsibilities in section III.C.2.i). The Academy's administrative staff will be responsible for the day-to-day management of the school. The Board and the Executive Director (ED) will work together to ensure that the governing functions of the Board and the management functions of the ED and the administration are clearly separated. The Board's responsibilities are given in detail in section III.C.2.i.

<u>The Executive Director</u> will be responsible for the overall management of the Academy and will be the sole person to report directly to the Board. The main role of the ED is to ensure that all Academy's departments, sections and branches function in an effective, expeditious and coordinated manner. The ED's responsibilities will include: working with the Board on the Academy's policies; representing the Academy to the Department of Education, community, media, charter community, donors, and elected officials; managing fund-raising activities; preparing

<sup>&</sup>lt;sup>35</sup> Based on the Academy's mission of educating the future academia and industry leaders, we expect most of our graduates to apply to high-level colleges with the goal to gain leadership positions in the work place. Because the Academy's teaching principles and curriculum structure is new to the U.S. college enrollment and industry HR decision-makers, the school plans to implement a substantial outreach effort of educating colleges and marketing to companies about its teaching program, so these institutions would know about our graduates' preparedness level.

grant applications; supervising the Academy's finances; ensuring legal and regulatory compliance; directing the recruitment, hiring, training and evaluation of the Principal and the Head of Operations; and observing the hiring, training, and evaluation of other staff members.



The Academy will have two branches of organization: instructional and administrative (see organizational chart on next page, positions that will start in the 2<sup>nd</sup> year are in white boxes). The heads of each will report to the ED.

Because our mission makes academics our first priority, <u>the</u> <u>Principal's job responsibilities</u> will consist, entirely, of issues related to instructional activities: supervising curriculum development; recruitment, hiring, training and evaluation of instructional staff, special education staff, ESL staff, etc.; organizing professional development opportunities; managing the Academy's assessment system; and overseeing student performance.

Because of our curriculum structure, the teachers will be organized into subject-specific teams: the Math and Science Department and the Humanities Department. Separate subject teachers will form sub-departments, or "sections". For each section, the Principal will appoint a <u>Lead Teacher</u>, the most experienced and prominent specialist, to take the leading role in curriculum development and improving instruction, and who will train less experienced or less qualified teachers.

In the 1<sup>st</sup> year the Principal will supervise all Departments, sections and teachers. In the 2<sup>nd</sup> year the Academy will hire a <u>Vice-Principal of</u> <u>Humanities</u> with expertise in one of the Humanities disciplines to supervise and organize work of the Humanities department. The Vice-Principal in Humanities will report directly to the Principal. The Principal will concentrate his/her effort on the Math/Science Department<sup>36</sup>.

<u>The Head of Student Affairs</u> will report to the Principal and will be responsible for student recruitment, enrollment, and placement; welcoming new families; addressing student discipline issues and parents' concerns; supervising volunteers; and overseeing schoolwide events and student trips. This will free the Principal to concentrate on the instructional leadership, therefore further supporting the Academy's mission.

The Head of Operations is responsible for supervising the office staff

(2<sup>nd</sup> year) and outsourced services (bookkeeping and accounting, transportation, custodial, food service, computer network administrator, nurse), establishing and implementing personnel policies (with the Principal), maintaining the facility, and organizing school-wide events.

In the second year, the Academy will hire a <u>Head of Resource Development</u> to be responsible for identifying grant opportunities and writing grant applications, for reaching out for potential donors of time, money and materials, and

<sup>&</sup>lt;sup>36</sup> Because the Academy's academic focus is Math and Science, we plan to hire the Principal with technical expertise in one of these disciplines.
for organizing fundraising campaigns.

<u>An Administrative Assistant</u> will be hired part-time in the first year and full-time in the 2<sup>nd</sup> year. The Administrative Assistant will report to the Head of Operations and will provide office support to other staff members.

The Bookkeeper and the IT Specialist will be hired part-time and will report to the Head of Operations.

The SPED department will initially consist of one full-time and one part-time teacher, with additional teachers to be hired every year (see section III.D.5.i for projected number of SPED teachers). The head SPED teacher also will perform some SPED administrative functions. Specialists teaching English Language Learners will be hired on an as-needed basis as consultants or part-time employees.

# ii. Briefly describe the recruitment, selection, and development plans for Board members.

At the first stage of the Board development – the charter application - each Founding Board member assists in the recruitment of additional Board members. The Founding Board has developed a written board member "job" description that lists desired qualifications as well as indicating responsibilities and the expected time commitment. Once a potential candidate is identified and is familiarized with the "job" description, a board member will conduct an interview based on the developed list of questions to determine whether the candidate fits the criteria and is willing to commit the time and effort necessary to serve on the board. Then the Lead Founder will conduct a second interview. Candidates who pass the two interviews are invited to attend a Founding Board meeting for orientation and confirmation by other board members.

Once the Founding Board becomes a legally recognized Board of Trustees, it will establish a Governance Committee to be responsible for overseeing the nominating and election process. The Governance Committee will ensure that a fair and equitable process is maintained for consideration of all potential candidates, that the candidates have specific skills and qualifications required for the benefit of the Academy, that the diversity of the regional tax-payers base as well as the diversity of opinions is represented. The Governance Committee also will recruit non-board members to serve on committees and task forces with the intent that they might be potential Board members at a later date.

The Board of Trustees will consist of 9 to 15 members, each to serve a three-year term renewable once and then step down for a minimum of one year.

In addition, the Governance Committees will be responsible for the Board development and evaluation, see details in section III.4.ii.

iii. If you are filing the application in conjunction with a college, university, museum, educational institution; another not-for-profit entity; or any other partner please provide the information below.

This application is not filed in conjunction with an educational institution or another not-for-profit entity or partner.

2. Roles and Responsibilities i. Describe the roles and responsibilities of the Board of Trustees.

The Board of Trustees (hereinafter, the Board) will hold the charter for the Academy and therefore will be legally, morally and ethically responsible for the Academy. The Board will be responsible for all governance issues (Ingram, 1996):

- Define and refine the Academy mission, vision, and direction
- Ensure the Academy's instruction and organizational alignment with the mission
- Provide fund development and fiscal oversight
- Ensure effective organization planning, develop policies and strategic plans
- Ensure legal and ethical integrity
- Maintain accountability and ensure adherence to the Accountability Plan
- Serve as ambassadors of the Academy to the public

- Recruit and orient new Board members
- Self-assess the Board performance
- Recruit, supervise, support and evaluate the Executive Director

To ensure that this work is carried out effectively and efficiently, the board will elect a Chair, a Vice-Chair, a Treasurer and Clerk, and will establish three standing committees (Finance, Development, and Governance) as well as task forces (such as facilities, accountability, student achievement and parent outreach).

ii. Outline the criteria and process the Board will use to choose the school's leader.
 iii. Describe the process by which the Board will evaluate the school's leader.

After the charter is granted, the Board will develop a detailed job description of the ED. The Board seeks an outstanding candidate that would ideally possess the following qualifications:

- Deep understanding of and commitment to the Academy's mission and vision.
- Experience in starting up and successfully sustaining rapid growth of an organization.
- Extensive experience in the administrative, financial and managerial leadership in an organization of size and number of employees comparable to the Academy in its full capacity.
- Academic training and technical expertise sufficient to implement the Academy's unique teaching concept and curriculum.
- Preferably, familiarity with the international school systems.

The ED will be evaluated annually by the Board, according to the following criteria:

- Faithfulness to the Academy's mission and vision
- Student academic achievement, as demonstrated by internal and external test indicators
- School organizational viability, including financial health, organizational growth, and stable infrastructure
- Acquisition, professional development and retention of highly professional administrative and instructional personnel
- Parental approval and demand
- Success in working with the Board towards the strategic goals developed by the Board

For the ED evaluation, the Board will appoint a school leader evaluation task force that may consist of both board and non-board members and may include a consultant-expert in human resources. The task force will develop and annually re-examine the ED evaluation procedure, performance expectations and timetable. The evaluation also will include input from the ED. The task force will conduct the evaluation using the developed tools and within the set timeline, and report it to the Board.

iv. Describe the role distinctions between the Board and the school administration as they relate to curriculum, personnel decisions, budget allocation, and vendor selection.

The Board will have governing functions and the ED will have management functions. The Board and the ED will work together to create a written manual on how to distinguish between these functions. The manual will be based on the best practices used by other charter schools and non-profit organizations<sup>37</sup>. The main distinction is that governance defines the ends (results) and management defines the means (methods). If an issue sets a goal or an expectation, or determines a direction, then it is governance and will be a responsibility of the Board. If an issue is related to the means to accomplish the goal, or carry out an activity, then it is a management issue and will be a responsibility of the ED. Special attention and time will be dedicated during the Board development sessions to train the Board members to understand and to make the distinction in practice. Examples of the responsibility distribution are given in the table below.

<sup>&</sup>lt;sup>37</sup> Cornell-Feist, 2002, Chiat, 1994

	Sets goals	Main decision maker	Implements	Supports	Approves
Curriculum	Board	Principal	Principal, teachers	ED	ED
Personnel decision	Board	ED, Principal. The Board hires ED, ED hires Principal	ED, Principal	Outside hiring agency	ED
Budget Allocation	Board (Finance Committee)	Board, ED	ED, Head of Ops	Bookkeeper, CPA	Board
Vendor Selection	Board	ED	Head of Ops	Admin. Assistant	ED

### v. Provide a brief job description for the Board of Trustees Chairperson, including a plan for succession when terms end.

Responsibilities of the Chair of the Board of Trustees include the following important functions:

- In cooperation with the ED, create the Board meetings agendas and preside at Board meetings.
- Appoint, supervise and assist committees and task forces.
- Manage the Board's work, set the Board development goals and ensure that the goals are achieved.
- Ensure effective and open communication between the Board members.
- Support the ED.
- Cultivate future leadership, attract new talents to the Board.
- Take a leadership role in representing the Academy to major stakeholders.

The Board Chair ideally should possess the following qualifications:

- Fully share and commit to the Academy mission and vision
- Have outstanding interpersonal and facilitation skills
- Be a leader: Take responsibility and make important decisions in serious situations.

The Board Chair plan for succession is included in the bylaws (Attachment 3).

3. Policy Development i. Please provide a copy of your complete bylaws in the attachments.

Complete bylaws of the Academy are presented as Attachment 3. The bylaws will be reviewed and revised as needed by a task force headed by the Board Chair; the Board will review and vote on the revisions.

ii. Describe the process by which the Board of Trustees will develop policies and make decisions.

Policy development is one of the prime responsibilities of the Board and the ED. The Board will focus on the broad organizational policies, while development of the operating policies and procedures will be responsibilities of the ED with concurrent Board approval. The policy-making process will include the following steps:

- 1. Recognize the need for the policy. Committees, the Chair or a member of the Board, the ED, a staff member, parents, students, or community member can bring forward a need for a new policy. The party will bring the idea to the Board for a discussion.
- 2. Assign a task force. The full Board will consider the policy need and establish general considerations for the policy. The Board will assign a team to draft a new policy.
- 3. Draft the policy. The task force will write a draft of the policy based on the Board's input during the discussion.
- 4. Consult legal counsel. Depending on the issue, it may be suitable for the task force to seek legal advice.
- 5. Present to the Board for approval. After review and discussion, the Board votes.
- 6. Review periodically. The Board will review all its policies periodically and revise as needed.

The ED with support of administrative staff will develop the non-governance policies related to the everyday Academy operations with the Board's advice and guidance. The administrative procedures are detailed in *The* 

*Employee Manual* developed by the Founding Group, that covers hiring, evaluation, promotion, and separation policies; salaries, payroll, workers compensation and benefits package; work day and week hours, vacations, holidays, sick and personal days; snow emergency procedures; health and safety issues; sexual harassment; conflict resolution and arbitration procedures, and all other policies.

### iii. Describe the plan for seeking feedback from the school staff, parents and the larger community when setting policy.

Feedback from the staff, parents and the community, a management rather than governance issue, will be a responsibility of the ED and other administrative staff. The ED will collect feedback using the following mechanisms:

- 1. The Academy's web site will have an option open for <u>everyone in the community</u> to submit comments through e-mail.
- 2. The <u>staff</u> will be able to discuss the policies at the monthly full-staff meetings.
- 3. The <u>parents</u> will be able to bring their comments and concerns to the Parent Support Group either in person (coming to the meetings) or through e-mail to the Parent Support Group Chair.

The ED will collect and sort the received feedback and report it to the Board during the Board meetings. S/he will include in the report suggestions on the action (e.g. revisit and modify the policy) that may be warranted by feedback. The Board will make a decision if the feedback requires an action and if the proposed action is appropriate.

iv. Indicate if legal counsel and an independent auditor have or have not been obtained. If not, describe what plans there are to do so.

An independent legal counsel and auditor have not yet been retained. The Board will interview a number of firms or individual experts when the school is chartered.

4. Board Development i. Describe the orientation process for new Board members.

The Governance Committee will develop a thorough plan of new member orientation. The plan will include the following steps:

- 1. The new member will be given in advance a *Board of Trustees' Manual* (to be developed by the Board). The Manual will contain the bylaws, the charter, current budget, biographical information of current Board members, and all additional policies and procedures the Board follows in its activities. The Manual will be periodically revised and renewed.
- 2. A member of the Governance Committee will conduct an orientation meeting with the new member. The meeting should cover the Academy's mission, vision and current strategic plan, the Board organizational structure and operation procedures/policies, Board member roles and responsibilities, the relations between the Board and the ED/administration (the governance and management relations).
- 3. The new member will be given a tour of the Academy, so s/he can see the school in action.
- 4. The member of the Governance Committee will follow up with the new member after the orientation meeting. S/he also will request and discuss with the new member his/her feedback after his/her first Board meeting.
  - ii. Describe the process the Board will use for its own evaluation and development.

The Governance Committee will be responsible for ongoing training of Board members to ensure constant growth of governance skills. The Governance Committee will present to the Board an annual plan for Board professional development to include the following:

- The board will work with an experienced outside consultant on a regular basis to conduct board retreats, etc.
- The Board will conduct annual retreats. Retreats are very important for board members to take the time to really get to know each other. They will be used for building board relationships, long-range planning, or specific problem-solving as well as for exchanging experiences, ideas, and dreams.

The Governance Committee will initiate and maintain a fair and consistent Board self-evaluation process and

develop standard forms and procedures for it. Evaluation forms and procedures will be a part of the Board of Trustees Manual.

The Board will conduct an annual evaluation on two levels:

- Evaluation of its own work as a body. A special Board meeting will be dedicated to discussion of the selfevaluation results. The Governance Committee will distribute in advance the Board evaluation forms, then will collect and summarize the feedback of members. A Governance Committee member will present the results at the meeting for Board discussion. The summary and the discussion will be recorded and used by the Committee for development of the following year Board development plan. In addition, the Board will routinely conduct evaluations of the Board at the end of Board meetings.
- Evaluation of each individual member. Annually, the other Board members will provide input on the member's performance to the Governance Committee that, together with the Board Chair, will produce a summary report. The report will be sent to the member and discussed during a personal meeting of the member with the Board Chair. Also the Board member will complete a written self-evaluation.

### D. Management

- 1. Management Structure
  - i. Describe the proposed reporting structure of all-administrative positions and teachers.
- 2. Roles and Responsibilities
  - i. Describe the roles and responsibilities of the school's leader and other administrative staff.

The organizational chart, reporting structure and roles and responsibilities of the staff of the Academy are given in section C.1.i.

- 1. Management Structure
  - ii. Describe how the school will make key organizational decisions about curriculum and teaching, student achievement, fiscal planning, and operations.
- 2. Roles and Responsibilities
  - ii. Articulate key role distinctions with regard to student achievement, personnel, financial management, and operations.

Principles of the roles and responsibilities of the staff and decision-making process regarding the three of four issues are given in the following table (personnel issues are described in the table above):

	Sets goals	Main decision maker	Implements	Supports	Approves
Curriculum and Teaching; Student Achievement	Board, ED	Principal (Vice Principal)	Principal, (Vice Principal), Lead Teachers, teachers, SPED & ESL teachers	Consultants	Board, ED
Fiscal Planning	Board (Finance Committee)	ED	Head of Operations, Bookkeeper	CPA, Admin. Assistant	Board
Operations	Board	Head of Operations	Head of Ops, Admin. Assistant	Outsourced agencies	ED

<u>Curriculum, teaching and student achievement<sup>38</sup></u>. The goal for these issues is driven by the Academy mission, is set up by the Board and is formulated in detail by the ED. The Principal (in Humanities starting the second year– the Vice Principal) will be the ultimate decision-maker in all decisions regarding these issues. In decisions regarding the disciplines outside his/her own technical expertise, the Principal will rely heavily on the Lead Teachers' opinions. Implementation of the curriculum, teaching and, ultimately, student achievement improvement will be the responsibility of all teachers including SPED and ESL teachers and the Principal. Expert Consultants will provide support to the math and science subjects' curriculum development. Finally, the Principal will report the instructional and student achievement progress to the ED for the ED's and Board's ultimate approval.

<sup>&</sup>lt;sup>38</sup> Detailed description of the curriculum and teaching improvement is given in the Section 3, I, ii below

<u>Fiscal planning</u>, discussed in more detail in Section F.1 below, is governed by the Board, which is ultimately accountable for the Academy's finances. The ED, in concert with the board's Financial Committee, will prepare the long-term fiscal plan, which the ED will ultimately manage. Actual implementation of the fiscal plan will be the responsibility of the Head of Operations who will make purchasing decisions on a daily basis and by the Bookkeeper who will write the checks. Fiscal operations will be supported by the CPA, who both will provide financial advice and annually review the Academy's books.

<u>Personnel</u>. The Board will hire the ED, and the ED will hire the Principal. The ED will make all decisions related to hiring administrative personnel, and the Principal will be the main decision-maker when hiring instructional staff. A hiring agency may support their recruitment efforts. Because personnel decisions belong to the management functions, approval will be granted by the ED.

<u>Operations</u>. The Board will set core goals related to such operational issues as facilities planning, acquisition, remodeling, and policy on vendor selection as well as transportation. Decisions on the details of day-to-day operations reside with the Head of Operations. S/he will plan and implement issues such as:

- Work with an architect on the facilities layout, number and size of the classrooms, rest rooms, and teachers' rooms.
- Work with the contractor on the renovation materials, decoration details, and schedule.
- Select goods and services and vendors for all purchases.
- Compile and discuss with the ED weekly and monthly budgets and cash flow reports and projections. Regularly report short-term plans and operational activities to the ED to obtain his/her approval.
- Select the transportation vendor and discuss bus number, size, routes, and schedule. Supervise every day student busing in and out of the school.
- Maintain the facilities. Hire, communicate with and direct outsourced services such as payroll, custodian, plumber, snow remover, landscaper, etc.

The Administrative Assistant will assist the Head of Operations in these activities: s/he will be responsible for the paperwork, communication (phone calls, mailing, faxes, e-mails), purchase orders, records, on-site supervision, etc.

- 3. Policy Development
  - . For a school opening in Fall 2004, attach the school's Code of Conduct.
  - ii. For a school opening in Fall 2004, attach the school's Student Enrollment Policy.

The complete Code of Conduct and the Student Enrollment Policy are provided in Attachments 4 and 5.

- 4. Educational Leadership
  - i. Describe the process for the development, supervision, coordination, and continual assessment of the educational content and pedagogical approach of the school. Explain how the operations of the school will be continually aligned to support instructional goals and student achievement.
  - ii. Describe how the principal will use student assessment data to improve instruction to lead to higher student achievement.
  - iii. Explain how student assessment data will be used to plan staff development that will support the goal of improved student achievement.

The essence of the Academy's mission is academic excellence. This mission implies that the key task of school personnel is continuous work on improving curriculum and teaching techniques as a means of consistent improvement in student achievement. The Principal will lead the process of supervising, coordinating and evaluating the ongoing process of the teachers' curriculum improvement and professional development.

Curriculum development will occur in intra- and inter-disciplinary teams, with expert coaches to serve a consultative role. The Principal, Vice Principal, and Lead Teachers will work with the teams that reflect their particular subjectarea expertise. For example, the following teams may be created:

- Math, Physics, and Astronomy
- Biology, Chemistry, Geography and Geology
- Humanities: History, Literature, Arts, and Foreign Languages

Before school begins during the summer of 2004, both the intra- and inter-disciplinary teams will participate in creating curricula write-ups to include detailed class and homework assignments for the 6<sup>th</sup> and 7<sup>th</sup> grades.<sup>39</sup> Math, Physics and Computer Science write-ups will be created for both academic tracks.

After the school opens, a cyclical process of improvement will be employed at all levels of the organization. Because of the size of the school, it is unrealistic for the Principal and Vice-principal to directly supervise and manage all of the teachers, except in a superficial manner. As a result, we have developed a system whereby the Principal and Vice-principal will oversee the process, but primarily with the intra- and inter-disciplinary Lead Teachers. The process will look something like the following:



Data collection includes the following:

- (1) The first set of data will include student assessment data: homework and class work grades and results of internal and external tests. These data will be collected electronically in the form of a secure, passwordprotected computer database. It will be immediately accessible to all instructional personnel for viewing in the form of flexible customized reports.
- (2) The second set of data will include classroom observations. A possible weekly schedule might include:
  - The Principal sits in classes 10-12 hours/week. The schedule of the sit-ins is created so that all subjects and all teachers are observed periodically, with the emphasis on identifying problem lessons, classes or issues.
  - Every teacher sits in another teacher's class in the same subject section once in one or two weeks. For example, during the first year the Academy will employ 6 math teachers; therefore each math teacher will have, on average, a visiting teacher every day or two, making the classrooms open places where teachers can (and should) discuss their practice with one another.
  - The Consultant for the math or science subject sits in a class at least once a month, offering coaching and support.
  - The SPED teacher sometimes may visit specific lessons.
  - Self-observations are conducted at least once a month by means of videotaping and analyzing lessons.

During and right after the lesson sit-ins, observers will create an observation report using a standard evaluation form to be developed by the Principal. The evaluation form will include rubrics related to the following aspects: curriculum, teaching technique, student participation.

<sup>&</sup>lt;sup>39</sup> The curriculum will be based on the outlines provided in the section II.B.i.

- (3) The third set of data will come from the other members of the subject's inter-disciplinary team. Initial coordination of the subjects will happen while creating first drafts of the curricula. Then periodic meetings of each team will verify and adjust the curricula coordination.
- (4) The fourth set of data will be supplied by the Head of Student Affairs and will include feedback from students and parents regarding learning, analysis of student behavior, an overview of students' social-emotional development, etc.

The "<u>analysis and discussion</u>" step includes meetings once a week of the Principal with each subject's Lead Teacher to summarize and discuss the data. The Consultants on Math and Science subjects are expected to review the data and provide their input in writing as needed and to participate in the Principal - Lead Teacher meetings at least once a month. As preparation for the meetings, all participating parties are expected to review and analyze the data and come up with suggestions regarding curriculum and instruction improvement. Student achievement data will provide the key input to the analysis step. In their analysis, the participants will answer the following questions:

- How does the student achievement data measure against the Academy internal performance standards?
- What is the trend in the data since the last review? During last month? The last few months?
- How did the last incorporated changes affect student achievement?
- How does the effect vary for different student populations?
- What changes are needed in the curriculum and teaching?

As a result of the meeting <u>decisions</u> will be made:

- On curriculum and instruction: changes in the curriculum and instructions adjustment will be adopted. Modifications to the curriculum will be recorded in the curriculum database to be studied and integrated into everyone's practice over time.
- On the teachers' evaluation and professional development: information will be added to the teachers' evaluation file and the professional development plan will be adjusted as deemed appropriate (see details on the teachers' evaluation and development in section III.D.4.iii).

As the final step in the curriculum development cycle, each Lead Teacher will have a meeting with other teachers in his/her subject section to inform the teachers about curriculum changes and to discuss lesson <u>plans and teaching</u> technique improvement. During these meetings, specific lesson plans and techniques will be collectively discussed and improved. Because of the input of every teacher, each emerged lesson will be a group product<sup>40</sup> and corrections of teaching will be introduced so that no individual teacher can be blamed for the "wrong" teaching techniques.

As an option, when there is only one or two teachers of a subject (e.g. during the first year in subjects other than Math) there will be one meeting of the Principal and all teachers of the subject to discuss the collected data and make decisions on the curriculum and teaching technique.

The final step in the professional development plan adjustment cycle will be implementation of the plan (section III.D.4.iii).

The Principal will go through a similar process with the Lead Teachers, helping them learn how to supervise and coach fellow teachers, identifying gaps in their knowledge base and providing appropriate professional development, etc.

The cycling process will continue to ensure constant student achievement improvement.

<sup>&</sup>lt;sup>40</sup> Similar lesson-creation process typical for Japanese schools is described in J. Stigler and J. Hiebert "The Teaching Gap: Best Ideas from the World' Teachers for Improving Education in the Classroom", The Free Press, 1999.

# Human Resources Indicate the number of faculty to be hired. Explain the process of determining job positions, roles, and responsibilities.

Estimated Number of Teachers										
Year	1st	year	2nd	year	3rd	year	4th	year	5th	year
Subject	FT	PT								
Math	6		8		9		10		10	
IT/CS/ED	2		2		4		4		4	1
Physics	1		1	1	2		2		3	
Chemistry		1	1		2		2	1	2	1
Biology	1		1	1	2		2		2	1
Geography	2		1		1		1		1	
History			2		3	1	3		3	1
Literature	2		F		c		7		4	
English language	2		Э		0		1		4	
Foreign language*		2		3		4		5		5
Art	1		1	1	2		2		2	1
PE	1		1		1		1	1	1	1
TOTAL	18	3	23	6	32	5	34	7	36	11
SPED	1	1	2		2	1	3		3	1

The number of teachers in each subject was estimated based on the 15% student attrition rate and assumption of

Workload for 6 and 7th grade Math									
	teachers								
Class #	Level	Hour/	Teacher						
		wk	#						
6a	6a/b, level 1	10	1						
6b	6a/b, level 2	10	2						
6c	6c/d, level 1	10	1						
6d	6c/d, level 2	10	2						
6e	6e/f, level 1	10	3						
6f	6e/f, level 2	10	4						
7a	7a/b, level 1	8	3						
7b	7a/b, level 2	8	4						
7c	7c/d, level 1	8	5						
7d	7c/d, level 2	8	6						
7e	7e/f, level 1	8	5						
7f	7e/f, level 2	8	6						

not more than 16-24 teaching periods per week for each teacher.

An example of how the above numbers

\* part-time teachers of various languages. PT= part-time, FT= full-time

Math	Total		
Teacher #	instructional		
	hours		
1	20		
2	20		
3	18		
4	18		
5	16		
6	16		

were estimated for the Math section is shown in the table on the right. Of six 6<sup>th</sup> grade classes, every two (for example, 6a and 6b, 6c and 6d, 6e and 6f) will be scheduled to have the math lessons together, so that these two classes can be split in two levels (for example, 6a and 6b will be split into two groups, 6a/b, level 1 and 6a/b, level 2). Teachers #1 and 2 will teach these two levels at the same time 10 hours a week. From the table it is clear that in the first year the Academy will need 6 math teachers with the teaching load hours from 16 to 20 (table below).

As courses span a number of years, most teachers will teach the same students at least a few years. This will create a strong bond between teachers and students,

prevent teachers from getting burned out by teaching the same grade level year after year, increase teacher

Year	1st year	2nd year	3rd year	4th year	5th year
Executive Director	F	F	F	F	F
Principal	F	F	F	F	F
Vice Principal - Humanities		F	F	F	F
Head of Business		F	F	F	F
Development					
Head of Operations	F	F	F	F	F
Head of Student Affairs	F	F	F	F	F
Admin Assistant	Р	F	F	F	F
IT Specialist	Р	Р	F	F	F
Bookkeeper	Р	Р	Р	F	F
Nurse	Р	Р	Р	Р	Р
Total	4F, 4P	7F, 3P	8F, 2P	9F, 1P	9F, 1P
F = full-time, P = part-time					

responsibility for student achievement, and provide great opportunity for professional development by exposure to a range of grade levels.

In addition, <u>administrative personnel</u> staffing was estimated as shown in the table below. Roles and responsibilities of the ED and the Principal are outlined in section III.C.1.i. When chartered, the Board will write a detailed job position description for the ED. When the ED is hired, s/he will create a job position description for the Principal and other administrative staff. The Principal and ED will develop the job description for teachers.

All job descriptions will include the following:

- Roles and responsibilities of the position. The ED will be responsible for ensuring that the responsibilities, the reporting structure (whom the position reports to and who reports to the position), the time frame for specific tasks, expectations and performance criteria are spelled out clearly.
- Professional qualifications required for the job. This is especially important for the instructional personnel. Because of our mission, it will be the top priority to ensure that all hired faculty possess exceptional professional qualifications in the subject s/he is hired to teach. The most qualified professionals will be offered positions of Lead Teachers.
- Personal qualities and dispositions, commitment to the Academy's mission and vision. Special attention will be
  paid to this requirement because the Academy's mission success highly depends on the high moral and ethical
  standards of its personnel as well as on the devotion of all adults at the school to the mission.

# ii. Describe the school's plan for staff recruitment, advancement, and retention.

Hiring of the ED and the Principal was described above in the section III.C.1.i. Based on the job descriptions developed in the process described in the previous section, the ED and the Principal will conduct candidate searches for all positions using common recruitment methods such as newspaper and professional journal ads, web site publishing, engaging a recruitment agency specializing in teacher placement, attending job fairs, and word of mouth. As soon as suitable candidates are found, the ED and the Principal will conduct interviews.

<u>Faculty recruitment</u>. Ideally, it would be most beneficial to recruit Lead Teachers in each subject first, and then with their participation, fill out other teachers' positions. If obvious Lead Teacher candidates are not found immediately, the instructional positions will be filled with the best possible candidates and then the ED and the Principal will review new hires for each subject section and identify the candidates for the Lead Teacher positions.

<u>Hiring</u>. Teachers' interviews will consist of three steps:

- (1) A personal interview will be conducted by the ED, the Principal and the Lead Teacher (if already hired) with the goal of determining whether the candidates' professional experience, personal and professional goals, commitment of effort and time, enthusiasm and dedication fit the position and is in line with the Academy mission and vision.
- (2) The Academy's high academic standards make it crucial that our teachers are experts in their respective technical fields. This calls for a special, non-standard way of selecting instruction personnel. A technical examination of the teacher candidates may be conducted as part of the interview process with the discretion of the ED and Principal. The ED, the Principal and the Board experts will create written tests appropriate for assessing candidates.
- (3) Each candidate will be invited to teach a model lesson on a topic chosen by the ED and the Principal with the goal of determining the candidate's teaching qualifications. The Principal and the Lead Teacher will observe the model lesson and compile lesson reports.

The candidate's personal interview, model lesson reports, test results, resume, and professional references will be assessed using a point system (see Attachment 9) and the total amount of points will constitute a basis for deciding whether or not to make an offer as well as determining the starting salary.

<u>Administration recruitment</u>. All administrative personnel will be selected by the ED and the Principal team based on personal interview and professional references.

<u>Personnel advancement</u>. When a position at the Academy becomes vacant, the ED and the Principal will start the replacement search by looking at current personnel to identify a potential candidate for the vacant position. If a suitable candidate among the existing Academy employees is found, s/he will be given preference over outside candidates. For example, when a position of Lead Teacher becomes vacant, all same-subject teachers' files and

records will be reviewed and analyzed against the Lead Teacher job description and qualification criteria before the position is advertised.

<u>Personnel retention</u>. The Academy will be a great place to work for both instructional and non-instructional personnel for the following reasons:

- The Academy mission of academic excellence implemented using innovative teaching approaches will result in strong student achievement. The greatest reward for all adults at the Academy will be watching students succeed beyond their and the parents' expectations, and to feel their participation in the students' success.
- Conditions of work at the Academy will be, although demanding, nevertheless highly desirable for an energetic, committed person: challenging teaching environment, maximum opportunity for professional development and innovation, professional courteous working relations with administration and co-workers, structured work schedule allowing time outside of the classroom, clearly defined responsibilities and specified requirements.
- Competitive salary and benefits package.

To ensure that personnel are retained, the administration will conduct annual surveys on job satisfaction using questionnaires that will cover issues such as those described above. The questionnaire will be developed by the Head of Operations and the ED. If a staff member decides to leave the Academy, the ED, the Principal and, if the person is an administration staff member, the Head of Operations will conduct an exit interview and will record the reasons why the person is leaving. The reasons will be discussed by the Academy administration and, if the reasons relate to problems in procedures or policies, they will be revisited and revised.

### iii. Explain how individuals' salaries and related increases will be determined. Describe how the faculty and administrators will be evaluated.

Initial teachers' salaries. Available statistical data on teachers' salaries are summarized in the table below.

	Marlboro	Hudson	Maynard	Clinton	Average	State
Average Teachers' salary, 2001	\$ 48,708	\$49,111	\$46,231	\$38,221	\$ 45,568	\$48,649

Because our goal is to attract the best, the initial average salaries in the Academy will exceed the region and state average and will be \$49,000 with the range from \$34,000 to \$64,000. The starting teacher's salary will be determined by the total points accumulated during the three-step interview (see section III.D.5.ii) using a table finalized by the ED and the Principal and will be similar to the following (a teacher with total points below 20 will not be hired):

Points	20	26	32	38	44
Salary	\$34,000	\$41,500	\$49,000	\$56,500	\$64,000

<u>Initial administrative salaries.</u> We based our administrative salary budget on the latest charter schools survey, which reports a wide range of administrative salaries for suburban schools.

- The survey reports ED salaries in the \$60,000-99,999 range with the higher end being paid to the leaders with
  more years of experience (schools in their 4th-8th year). Because the Academy will start as a relatively large
  school from year 1 and will rapidly grow each year, it is essential that the ED have unique experience in
  successfully starting up and rapidly growing an organization. In addition, based on our mission, we will reward
  high technical expertise. Therefore, the ideal candidate's salary will be in the higher end of the above range.
- The Principal's salary is reported to be in the \$50,000-\$99,999 range. The Principal as the instructional leader is very important for the Academy's mission. We will search for and reward the Principal for substantial instructional leadership experience and deep understanding of and experience with our unique teaching approach. Because the Principal will not carry responsibilities of communicating with students and parents (we will hire a full-time Head of Student Affairs to carry this responsibility), the salary of the Principal will be in the middle of this range.
- The business manager and technical director's salaries are reported in the range \$40,000-50,000. We will adopt this range for the Academy's lower level administrators: Head of Student Affairs and Head of Operations.

<u>Performance standards and review</u>. Before the school begins, the performance standards for all employees will be detailed in the form of a rubric: by the ED for the administrators, and by the ED and the Principal for the instructional staff. All personnel will have an annual review to evaluate their performance, compare it with the standards, and determine salary increases. The salary increase will be in the range of 2-7% where 2% will be a minimum increase to compensate for the cost of living increase and up to an additional 5% can be earned based on the merit system.

<u>The teacher review</u> will include data on the teacher's performance accumulated throughout the year. The data will be collected in the teacher's evaluation file weekly as a part of the lesson sit-in and report cycle (see sections III.D.4.i-iii). The data will include the performance evaluation during the lesson using the point system similar to the model lesson point system used for the interview. The salary increase for the teachers will be determined based on accumulated points. Because of the Academy's mission-driven goal of the highest students' academic achievement, the compensation point system will be designed to reward the qualities and skills most important for the Academy teachers' qualifications: academic knowledge in their subject field and teaching excellence.

The administrator review. The Academy's administrators will undergo annual reviews using the following system:

- The ED will be reviewed by the Board by the process described above (section III.C.2.iii).
- All other administrators will be reviewed by their direct supervisor based on the organization reporting structure (see section III.C1.i).

Student achievement will be a significant part of the review and, therefore, salary increases for all administrators in the Academy.

# iv. Describe plans for teachers, administrators, and other school staff to engage in professional development activities.

<u>The initial professional development (PD) plan</u> will be developed for the instructional staff by the ED and the Principal and for administrative staff by the ED and the Head of Operations. It will include the following components.

- (1) Collaboration on curriculum development and teaching technique improvement. As described above, all instructional staff will be continuously involved in the cycle of curriculum and teaching technique improvement. Everyone will contribute to creating the best practices of teaching and will learn from the process.
- (2) Learn from the teacher-experts. Because the first and foremost requirement for the teachers will be professional knowledge of the subject, we anticipate that some teachers at the Academy will be professional mathematicians, physicists, chemists, computer engineers, etc. with little or no teaching experience. For these teachers, a special program will be set up to teach the basics of teaching techniques, child psychology and development, and learning theories. A sequence of seminars and one-on-one consultations with the expert teachers will be set up. The Lead Teachers will devote special attention to the novice teachers to ensure that their teaching practices are in line with their technical expertise.
- (3) Exchange of teaching practices with schools in other countries. The Academy's curriculum and teaching approach, although new for the United States, have close analogs in some Eastern European and Asian countries. The Academy plans to establish relations with the schools where similar curricula are successfully implemented and organize an exchange of teaching practices with these schools.
- (4) Advancing technical expertise. Although the Academy plans to hire predominantly top specialists in the technical fields, we recognize that there is always room for improvement. The Academy generously will support continuous education of both instructional and administrative staff and will contribute to course tuition toward advanced degrees or additional credits.
- (5) Academy's Consultants (see section III.D.4.i-iii) will be available for the staff to consult on both teaching technique improvement and technical knowledge enhancement.

Initially, the PD plan will be constantly modified for the faculty as a group and for individual teachers. <u>The PD plan's</u> <u>adjustment</u> will be an essential part of the cyclic process described in section III.D.4.i-iii. For example, an inexperienced teacher may bring up, and the lesson observers may confirm, a problem related to disruptive behavior of two students during her class. In discussions between the Principal, the Lead Teacher, and the SPED teacher, they might determine that one of the problems is the teacher's lack of experience in dealing with such

behavior. For PD, she might receive a list of readings on child psychology and adolescent development. She also would have one-on-one consultations with the consultant-specialist in child psychology to learn different methods of responding to disruptive behavior in the class. She also would meet with the Lead Teacher or the Principal regularly to discuss her teaching practice. For example, if the problem students are advanced students, more challenging material may be given to them during the class. In the course of the following month, the observers in her class will pay special attention to how she handles the students, working with her to strengthen her practice in this arena. If needed, the PD plan can be continually adjusted.

Another example could be a Math teacher who has failed to answer the students' questions during a class discussion and to give a comprehensive explanation regarding what statements in geometry qualify as axioms and which should be proved as theorems. The Principal schedules a seminar for the math team to discuss and clarify this issue. The math Consultant is invited to the seminar. As a result of the seminar, all math teachers will gain a clearer understanding of the issue and know how to teach it. At the same time, the line of logic worked out during the seminar is recorded as a curriculum adjustment if needed.

### v. Describe the school's plan for staffing special education, including the number and necessary qualifications of special education staff.

The expected number of special education students was estimated based on the 2002-2003 data for Marlborough (20.1%), Hudson (17.8%), Maynard (10.6%), and Clinton (14.9%). Assuming 15% for our calculations, we estimate that the number of SPED students will be 41, 59 and 74 for 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> years respectively. The number of SPED teachers in years 1-5 is estimated in the table in section III.D.5.i. Beside the staff SPED teachers, we are planning to use outside consultants and a child psychologist on an as-needed basis.

The special education teachers should have all of the attributes expected of the regular education staff, and be thoroughly invested in the philosophy of the Academy. In addition, special education teachers must enjoy the challenge of working with students with disabilities. They must be able to use a wide variety of remedial techniques, appropriate to the specific needs of their students, to promote learning through individualized instruction, special assignments, and small group work. They must be able to promote students' behavioral as well as academic development, help them develop emotionally, and help them learn to conform their behavior to socially acceptable norms. They must be able to identify children with previously undiagnosed special needs, and be able to develop an Individualized Education Program (IEP) for each special education student. They must be able to work closely with parents to keep them informed of their child's progress and suggest techniques to promote learning at home. They must have the skills and experience to be able to act as consultants to the regular classroom teachers.

### vi. Describe the qualifications and attributes of an ideal teacher for the proposed school.

Ideal teacher for the Academy:

- Fully understands, shares and is fully committed to the Academy's mission.
- Is an expert in his/her technical field.
- Is an excellent teacher: has a clear lesson plan, gives detailed and clear explanations of material, ensures
  enthusiastic engagement of entire class, reaches to multiple learning styles, makes sure everyone understands
  and has an opportunity to demonstrate understanding, and challenges advanced students. Is engaged in and
  successfully learning from professional development.
- Is committed to dedicate as much time and effort as needed to reaching the Academy's target student achievements.
- Loves children, considers all children at the Academy his/her "own", in all decisions always puts the students' interest first.
- Is a cooperative, respectful colleague, easy to work with, ready to help and share.
- Possesses honesty, integrity and modesty.

### vii. Briefly describe the teaching program of typical teachers.

The teachers are expected to arrive to school at 8 AM and leave at 5 PM. Although this will make their work day 9 hours long and their work week 45 hours long, we expect that all their work will be done at school during these

hours, reducing or eliminating evening and weekend work. A typical week of a 6<sup>th</sup>-grade math teacher might look like the following:

- The typical teaching time will include 16-24 periods per week during which the teacher will see up to 46 students. The Lead Teachers will have less of a teaching load to devote more time to curriculum development and coaching of less experienced teachers. The teachers who are Home Teachers also will have a reduced teaching load to free up time for their home class supervision.
- Lesson preparation time (5-6 hours) mostly can occur during morning's most productive hours.
- Homework and quiz grading (5 hours) also will include inputting data into the computer database.
- One-on-one tutoring two periods a week will help students catch up with more difficult topics.
- Each teacher will sit in another same-subject teacher's class once a week or two weeks and write an observation report (total 0.5-1.5 hours).
- Staff meetings (once or twice a week, 45 min to 1 hour each) will include the teacher's meetings with the Principal and the Lead Teacher for instructional announcements/discussions, as well as with the Head of Student Affairs for discussion of issues related to students and parents.
- Group professional development (curriculum and teaching technique improvement) and personal professional development described in sections III.D.4.i-iii and III.D.5.iv, are expected to take a total of about 3-4 hours a week. Amount of time for each can vary from week to week and can be interchangeable.
- Every teacher is expected to be reachable by parents and students by e-mail, so every teacher's day will end with e-mail replies that will take 2-3 hours weekly.
- The teachers will supervise the morning 15-min snack break in the class they teach immediately before the break (in the model case above in the 6a or 6b class) and the lunch break in his/her home class (if she is a Home Teacher). During the 5-min breaks every teacher also will supervise the cleaning and lesson preparation activities of the daily students-on-duty. At the end of the day, all teachers will come to their home classes where the students are assembled and see the students to the gym or other pre-departure gathering area.
- The home class meeting will be scheduled on Fridays' last period and together with the preparation for it can take the Home Teachers about 2 hours.
- E. Facilities and Student Transportation
  - i. Describe the viable options for a facility for this school and explain why these sites were chosen as possibilities.
  - ii. If possible, provide a layout and description of the proposed charter school facility. Include the number and size of classrooms, common
  - areas, and recreational space. Indicate an estimated timeline for identifying possible locations and securing financing.
  - iii. Describe the financing plans and proposed budget for acquisition (purchase, lease, etc.) of a facility and any necessary renovations to it.

The Founding Group representatives had been working with a local real estate broker to identify viable options for a facility. A total of 24 sites in Marlborough, Hudson, Maynard and Clinton were considered against the criteria of space sufficient for at least 2 years with expansion in-site, sufficient parking, convenient access by a high way, and feasibility of partitioning for the school floor plan. Five potential candidates were selected and a Request for Proposal (RFP) was sent to them. The request of proposal included a specific request for financing of the renovation by the landlord.

So far three proposals have been received. The potential candidate sites are:

- 1. 140 Locke Drive, Marlborough
- 2. 410 Forest Street, Marlborough
- 3. Solomon Pond Park, 500 Donald J. Lynch Boulevard, Marlborough

The proposals serve as letters of intent to lease the space. All proposals include a 5-year lease, permit on-site expansion, and include partial or complete financing of the renovation by the landlord. All buildings are in good condition and require only internal remodeling such as partitioning, painting, flooring, and suspended ceiling construction.

During winter 2003-04 the Founding Group plans to continue lease negotiations with the site owners and to select the site by the end of February. As soon as the charter is received, we plan to sign the lease agreement and immediately start renovation. We expect that 4-5 months should be sufficient to complete this work.

<u>The initial floor plan</u> is designed to serve for two years. By year 2 the Academy will be home for about 400 students in 17 classes and 23 full-time and 6 part-time teachers. Therefore, as a minimum, the floor plan needs to include the following:

Layout Component	Area, SF	Layout Component (cont.)	Area, SF
17 classrooms (17 @ 500sf each)	8,500	Rest Rooms: girls	700
2 computer labs (2 @ 600sf each)	1,200	boys	700
Chemical lab with a hood	600	Teacher's lavatory - Women	200
Physics lab	600	Teacher's lavatory - Men	200
6 small classrooms (6 @ 150sf each)	900	corridors 12' wide	7,200
Learning Center: 2 classrooms	1,000	Teachers' lounge divided into 30 cubicles	3,000
Gym with dressing rooms and stage	3,500	Offices: 4x200 sq. ft., 3x150 sq. ft.	1,250
Library	400	TOTAL, approximate	30,050

We plan to expand on site to 45,000 SF and will start renovation of an additional 15,000 SF in year 2 to be completed by the beginning of the 3<sup>rd</sup> school year.

<u>Facilities Budget</u>. The quoted rent price including real estate taxes and management fees is about \$10 per square foot (SF). The rent payments will be \$300,000 for 30,000 SF during the first year and \$450,000 for 45,000 SF in years 2 and 3.

The initial renovation is estimated to cost about \$14/SF or approximately \$400,000. We plan to borrow this money from the landlord as a 5-year loan at up to 9% annual interest; the annual payment will be about \$100,000. Renovation of an additional 15,000 SF is budgeted at \$15/SF, or \$225,000. To ease the cash flow burden, the payment for renovation will be made in installments divided between the 2<sup>nd</sup> and 3<sup>rd</sup> year budgets.

### iv. Describe how transportation services will be provided to eligible students.

Students who live in the district in which the school is located will be eligible for transportation equivalent to that provided to students attending other public schools in the district. At this time, we do not believe we can afford to provide transportation for students in other districts. We will work closely with parents to arrange car pools and the use of public transportation if possible. It is our understanding that transportation funding is available for low-income students, even to reimburse parents who drive their children to school.

However, we plan to raise money to help cover the transportation cost and apply the best effort to provide transportation to all students in future years.

v. Explain how students who are physically challenged will be transported and have access to the school facility.

All students will be provided with the access, services, and accommodations necessary to assure their full participation in the learning process and in full compliance with all applicable laws and regulation including the Americans with Disabilities Act.

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F. School Finances
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- 1. Fiscal Management
  - i. Explain who will manage the school's finances and how.

The Board of Trustees (the Board) ultimately will be responsible for the Academy's finances. The Board will elect a Treasurer with expertise in finances and/or accounting. The Treasurer will serve as Chair of the Finance Committee, who will work with the ED to ensure that an annual audit is completed.

The Annual Operating Budget will be presented to the Board of Trustees for approval. Each line item of revenue and expense in the Operating Budget will have a separate backup worksheet. The worksheet will show the assumptions and support for the figure used. Each sheet will be reviewed and approved by both the Treasurer and ED before being presented to the Board. On a monthly basis, the actual Operating Statement will be compared to the Operating Budget and presented to the Board of Trustees for their review. In addition, an Annual Cash Flow Statement (by month) may be provided to show the cash requirements of operations and the time periods when cash may be necessary from borrowing or fund raising.

The ED will be responsible for the Academy's day-to-day financial operations. S/he will meet with the Head of Operations at least weekly to discuss all issues related to finances including the spending plan and the cash flow analysis. The Head of Operations will be responsible for procurement of supplies, equipment and services and for supervision of the Bookkeeper and the Administrative Assistant. The Bookkeeper will be responsible for weekly data entry in the accounting software system, coordination of payroll with the payroll company, accounts payable, monitoring of the budget and cash flow. The Head of Operations and ED will consult with the Principal in all purchases related to instruction. The Administrative Assistant will be responsible for maintaining benefits packages, managing petty cash and for purchasing all office supplies.

ii. Describe the fiscal controls and financial management policies the school will employ to track finances in its daily business operations in order to maintain needed cash flow.

The ED and the Treasurer will set up internal Academy procedures to control finances in accordance with the relevant laws and regulations that govern charter schools within the Commonwealth of Massachusetts. They will develop a Financial Control Manual that specifies the financial control procedures based on the *Massachusetts Charter School Recommended Fiscal Policies and Procedures Guide.* The Financial Control Manual will cover the roles and responsibilities of all staff involved with financial management, processes of budgeting and reporting, transaction approval, purchasing of services and procurement of goods, books and record keeping, issuing and signing checks, employees' expenses, payroll and benefits, and inventory management.

The Academy will maintain the accounting records and related financial reports on the accrual basis of accounting. All records and reports will be consistent with the special purpose governmental unit requirements of the Governmental Accounting Standards Board (GASB).

The ED will select and ensure the proper set up and maintenance of an accounting software package (Quick Books Pro multi-user is recommended). The Bookkeeper will complete data entry on a weekly basis. The ED and the Head of Operations will have access to the accounting system to be able to obtain immediate information on the current cash flow situation.

To ensure a positive cash flow the Bookkeeper will provide the ED with a cash flow monthly projection report that she will update weekly for the weekly ED-Head of Operations meetings. They will review the report and adjust the spending plan accordingly.

The Finance Committee will research the possibility of obtaining a revolving credit line sufficient to support the operations in case of a cash deficit. The Finance Committee will help the ED and the Head of Operation to put together an application for the credit line.

#### 1. Budget and Budget Narrative

- i. Using the attached budget template (see pages 48-55), please indicate the school's estimated expenditures and revenues from the school's startup phase through its third year of operation.
- ii. Describe expense projections in detail and show the calculations of each line item in the operating budget with assumptions.
- iii. Summarize financial forecasts from the school's startup phase through its third year of operation. Financial forecasts may include total cash requirements, the time frame for positive cash balance, and the anticipated growth of the school. Define and give support for the assumptions behind projections.

All budget allocations will follow our mission of academic excellence: the biggest possible share of funds will be always dedicated to instruction. A detailed Academy's budget from the start-up phase through the third year of operation is given in Attachment 7. Each line item has a detailed explanation in the "Assumption" column.

<u>Start up budget.</u> The start up phase will be the period of 5.5 months between obtaining the charter at the end of February and receiving the first tuition check on August 15<sup>th</sup>, 2004. The <u>revenue</u> during this period will consist of \$150,000 of the Federal Start-up Assistance Grant. In addition, we plan to apply to the private grant from the Walton Family Foundation that historically averages about \$130,000. We plan to conduct a fundraising campaign, but considering the limited time, do not expect substantial revenue. For the purpose of this budget we will assume that a modest amount of \$20,000 will be collected, bringing total revenue to \$300,000.

The start-up expenses are summarized below.

Instructional	\$\$	%%	
Staff Stipends	100,269	34%	1 months of teachers' salaries
Equipment and Supplies	1,000	0.3%	Educational subscriptions
Information Technology	50,765	17%	Desktops (\$550) and software (MS \$150/license) for new teachers. 2 computer labs, 25 computers each. Set up computers and network @10% of cumulative computer cost
Curriculum Development	32,000	11%	Curriculum development, 800 hrs @\$40/hr
Professional Development	5,000	2%	Consultants 50 hrs@\$100/hr, materials \$1,000
Total Instructional	189,034	63%	
Administrative			
Staff Stipends	51,989	17%	2.5 months of Executive Director and Principal salaries, and 1/2 months of other admin. personnel salaries
Equipment and Supplies	18,200	6%	\$4,000 for copy machine, \$400 for refrigerator. \$500/year service agreement for the copier, \$2,000 for office supplies, \$550 per each full- and part-staff for furniture, \$8K for phone system.
Information Technology	6,900	2%	\$500 for desktops. \$1K/two laptops, \$600 for server, \$400 printer/fax and software (\$150/ Microsoft Office license).
Total Administrative	77,089	26%	
Business Services			
Recruitment- Students	3,000	1%	Ads in newspapers, direct mailing
Recruitment- Staff	4,000	1%	Ads in newspapers
Marketing (including postage, printing)	2,000	1%	\$2,000 Parent information sessions, \$500 postage and shipping, \$500 printer and copier supplies
Telephone/ Fax	1,800	1%	\$500 per month plus 2 cell phones @\$50/mo for 3 months
Accounting and Consultation Fees	150	0.1%	\$50 per stipend payments once/months for 3 months
Other	1,500	0.5%	\$1,000 liability insurance, \$500 office supplies
Total Business Services	12,450	4%	
Operation and maintenance			
Operation and maintenance	750	0.3%	Custodian services \$1/SF per year and \$0.1/SF janitorial supplies for temp. Office space prorated for 3 months, \$100 maintenance of office equipment, \$100 supplies and materials for maintenance.
Physical Plant			
Rent	5,000	2%	Short term office space 2000 SF @\$10/sf, 3 months
Utilities	750	0.3%	For temp. space, \$1.50 per square foot per year for gas, electricity and water - 3 months
Total Physical Plant	5,750	2%	
Board of Trustees			
Legal Fees	5,000	2%	501c3 set up, permit, other paperwork
Fundraising Fees	1,800	1%	Fundraising events, solicitation letters design, printing, mailing
Staff/ Board Development	500	0.2%	Board meetings/retreats
Contingency Fund	6,000	2%	Contingency fund for unexpected expenses.
Total Board of Trustees	13,300	4%	
TOTAL START UP EXPENDITURES	298.373	100%	

<u>Personnel</u>. Because the funds will not be received at least till June, the ED functions will be carried out by the Founding Group until the ED is hired approximately by June 1, 2004. Driven by our mission of highest academic

performance and because of our unique curriculum, we also plan to hire the Principal by June 1<sup>st</sup> and the teachers by July 15<sup>th</sup>, so that the work on detailed curriculum write up and teachers training starts early. To get ready for the school opening, we plan to hire administrative personnel on or about August 1<sup>st</sup>, so they start working on construction oversight, furniture and materials purchasing, students' paperwork, SPED requirements, etc. We allocated total of \$152,258 in personnel stipends.

<u>Facilities</u>. Details of the rental and renovation budget are given in section III.E.i-iii. Rent payments of \$300,000 for year 1 and \$450,000 for years 2 and 3, and the renovation debt service of about \$100,000 per year are included in the 3-year budget.

Between March 1<sup>st</sup> and August 30<sup>th</sup>, 2004, we plan to lease temporary office space of about 2,000 SF (estimated \$5,500) for curriculum work and staff training. The staff furniture, telephones, computers for the staff and the students will be ordered from vendors in July to be delivered to the new building right after renovation. Total cost of equipment and staff furniture is estimated to be \$76,865.

We anticipate spending during the start-up phase, excluding building renovation, a total of \$298,373. In full agreement with our mission, 63% of this money is instructional cost, 26% - administrative, and 11% - business and other costs.

# <u>Three-year budget projections</u> are given in the Attachment 7 in details.

<u>Revenue</u>. Our main revenue will come in the form of per pupil tuition. In calculating our annual tuition payments, we assumed the annual enrollment growth in accordance with the annual 15% attrition model (see table in section III.A.i). Because the Academy will be a regional school and plans to draw students from four school districts with different per pupil tuition, for the purpose of these calculations we assumed that the average tuition of our student population will be equal to the average tuition of the four districts. Also, for conservative budgeting we assumed an additional 3% tuition reduction. Total tuition revenue is estimated to be \$2,225,824 (88% of total revenue), \$3,171,799 (85%), and \$3,975,878 (86%) in 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> years respectively. Because per pupil tuition is the main part of the revenue, the annual revenue change will be predominantly due to enrollment expansion.

Revenues	Yr. 1		Yr. 2	2	Yr. 3		
State Sources	2,264,395	90%	3,226,763	87%	4,044,776	88%	
Federal Sources	85,408	3%	268,519	7%	296,663	6%	
Local Sources	166,684	7%	220,525	6%	266,289	6%	
TOTAL REVENUE	2,516,487	100%	3,715,806	100%	4,607,728	100%	

Other state sources of revenue will be the state facilities grant expected to be \$75 per student. Federal sources of revenue include Title I, disadvantaged students, eligible for the free or reduced lunch, SPED grant codes 274

(\$7500/school) and code 240 (\$550/SPED student, for about 15% of the student population), Start-Up Assistance Grant, and the school lunch grant for eligible students. The Academy will collect lunch fees from students not eligible for the free or reduced lunch program. In an effort to budget conservatively, we included a modest amount of \$40,000 from fundraising, although we plan a substantial effort to raise money. We also did not include any competitive grants, although we plan to hire a full time Head of Development in the 2<sup>nd</sup> year whose responsibility will be searching for and applying for these grants.

<u>Contingency plan</u> in case that revenues are not received or are lower than budgeted includes: 1. Using contingency funds (see below); 2. Additional fundraising; 3. Cutting administration cost (reduction of administrative staff and/or administrative salaries and expenses). The Academy will apply its best effort to maintain the level of instructional personnel as much as possible. Also, the strategy of combining resources with other charter or district schools may be considered.

Expenditures. The expenditures break down for three years are shown in Attachment 7 and summarized in the table below.

Expandituraa	Yr	. 1	Yr.	. 2	Yr. 3		
Experiances	\$\$	% of Total	\$\$	% of Total	\$\$	% of Total	
Instructional	1,375,804	55%	1,843,165	50%	2,540,692	55%	
Physical Plant	463,000	18%	725,500	20%	755,500	17%	
Administration	356,014	14%	560,018	15%	617,618	13%	
Student Services	186,911	7%	274,580	8%	339,915	7%	
Business Services	59,000	2%	95,100	2%	108,400	2%	
Contingency Fund	25,165	1%	111,474	3%	138,232	3%	
Operations and Maintenance	33,800	1%	41,000	1%	57,500	1%	
Board of Trustees	14,000	0.6%	27,000	0.7%	29,000	0.6%	
TOTAL EXPENDITURES	2,513,694	100%	3,677,838	100%	4,586,857	100%	

• <u>Instructional expenditures</u> will run at 55%, 50% and 55% of all expenditures for years 1 through 3 respectively. This substantial domination of instructional expenditures is in line with our mission of academic excellence. The slight decrease of the instructional portion in year 2 will be due to hiring additional administrative personnel.

### Taxes and Benefits Assumptions

Taxes	
Social Security rate of gross pay	6.20%
Medicare of gross pay	1.450%
MA Unemployment	3.50%
W. Comp. of gross pay	2.00%
Total	13.15%
Benefits	
Health Insurance- per family (per month)	\$ 800.00
Health insurance- per individual (per month)	\$ 250.00
% Family policies	25%
% Individual policies	75%
% School paid- family	50%
% school paid- individual	50%
% employee participation (0% or 100%)	100%

Personnel salaries were budgeted based on the instructional and administrative salary policies discussed in section III.D.5.iii, the staffing plan is given in section III.D.5.i. Assumed taxes and benefits are given in the table on the left. We allocated to spend \$1,708,877 \$1.227.199 (49%), (46%). \$2,357,997 (51%) on instructional personnel salaries and \$342,814 (14%), \$545,368 (15%), \$606,918 (13%) on administrative personnel salaries in years 1-3 respectively. This, again, demonstrates our commitment to invest in academics.

• <u>Materials and supplies</u> allocated for instructional purposes will be \$148.605 (6%).

\$134,288 (4%), and \$182,696 (4%). Higher spending in year 1 reflects initial purchase of the classroom furniture and higher spending in year 3 includes an upgrade of students' computer labs. At the same time, materials and supplies for administrative purposes are allocated at \$13,200 (0.5%), \$14,650 (0.4%), and \$10,700 (0.2%) for three years. That is more than an order of magnitude lower than that for instruction.

- <u>Facilities</u> expenditures shown in the table will include rent payment, back payment of the initial renovation loan, and occupational expenses (utilities, pest control, etc.). The sharp increase of costs in years 2 and 3 is related to anticipated rent increase for additional space and its renovation.
- <u>Other Expenditures.</u> Student services including transportation (only for residents of the district where the school will be located), health services (nurse), food, and field trips will run at 7-8% in years 1 through 3. All other expenses such as business expenses, Board meetings, legal expenses and others will be at 1% to 2% of total expenditures. Contingency funds of 1% in year 1 and 3% in years 2 and 3 will be put aside in a special account for unanticipated expenditures and emergencies. The contingency fund will be governed by the Board, and can only be used with Board approval.

The per pupil expenditure analysis shown below reflects the general trend of heavy emphasis on academics that will govern all decisions at the Academy including fund allocation decisions:

Per Pupil Analysis	<b>Yr.</b> 1	1	Yr. 2	2	Yr.	3
Per pupil revenue (including all sources)	9,118		9,448		9,346	
Per pupil expenditures			_			
Total	9,108	100%	9,351	100%	9,304	100%
Instructional	4,985	55%	4,686	50%	5,153	55%
Business and Administration	1,504	17%	1,666	18%	1,473	16%
Operations and Maintenance and Physical Plant	1,800	20%	1,949	21%	1,649	18%

#### iv. Briefly describe any planned fundraising efforts and who will lead and coordinate these efforts.

The fundraising effort will be led by the Fundraising Committee of the Board of Trustees. The Chair of the Board, together with the Board Chair and the Executive Director, will develop a plan for fundraising and will review the plan annually. The plan will include the list of contacts, preparation and mailing of fundraising letters, phone calls, follow up, and schedule of the fundraising events such as dinners, golf tournaments, and school theater performances. Although it will be the responsibility of the Fundraising Committee to follow up the plan, the entire Board is expected to participate and donate personal funds as well as solicit donations.

### G. Action Plan

### i. Outline the steps and strategies and provide a clear timeline for opening the school from March 1, 2004 to the first day of school in 2004.

The action plan for November 15<sup>th</sup>, 2003, through September 15<sup>th</sup>, 2004 (first day of school), is given in Attachment 8. The Plan demonstrates that the Founding Group is fully prepared to successfully complete all preparation activities in a swift and orderly manner and open the school in September 2004. The highlights of the Action Plan are:

- Tasks completed by submittal of the final application (November 14<sup>th</sup>, 2003): outlines of curricula in all subjects; first round of facilities selection, RFP and proposals collection; Code of Conduct; Enrollment Policy; By-Laws.
- Tasks to be completed before obtaining the charter (end of February): parent information sessions, preenrollment; facilities lease and financing negotiations; Board expansion, training; personnel policies, job descriptions, staff Handbook.
- Tasks to be completed from obtaining the charter to the school opening (September 15, 2004): enrollment, students' paperwork; facilities renovation; inspection, permitting; fundraising, establishing financial controls; Board policies development; staff hiring and training; lesson plans preparation; students' services set up; supply and equipment purchase and installation.

#### IV. How will the school demonstrate that it is faithful to the terms of its charter?

- A. Accountability
  - i. Summarize the school's important goals and associated assessments in the following two categories:
    - (1) Describe two or three school performance goals for student learning and the instruments and data that will be used to evaluate the progress toward achieving these goals.

Following the Academy's mission, the centerpiece of the Accountability Plan will be the measurement of the students' academic achievement using a variety of measurement tools including:

- <u>Criterion-referenced</u> assessments will measure the students' academic achievement against an absolute standard. In addition to MCAS, we will use the PSAT, SAT, and AP exams.
- <u>Norm-referenced</u> Terra Nova results will be analyzed as <u>value-added</u> assessments to measure progress over time.
- Both norm-referenced Terra Nova (up to 8<sup>th</sup> grade) and criterion-referenced MCAS results will be used for norm-referenced assessment to check progress against a control group. The control group will be a weighted average of sending districts.
- We also will measure our students' achievement on the <u>international scale</u> using such tests as found in the Third International Mathematics and Science Study (TIMSS<sup>41</sup>).

Driven by our mission, we hope to achieve the following academic goals:

### End of Year 2

- The Academy average in MCAS Math and Science tests will be 10% higher than the state average and the sending districts' weighted averages.
- 90% of all 8<sup>th</sup> grade students taking the Math and Science MCAS, who were at the Academy for 2 years, will score "advanced" or "proficient".

<sup>&</sup>lt;sup>41</sup> http://timss.bc.edu/

# End of Year 3

- On average, each cohort of Academy students will gain a yearly average of three national percentiles on their mean score on the Terra Nova math and reading batteries until such time as the overall cohort average is 70%, at which time each cohort will at least maintain its performance level.
- 70% of the students taking international Math and Science tests will score in the highest 25% among participating countries.
- At the close of the 9<sup>th</sup> grade year, all students will design and present a computer science project to the satisfaction of a panel of scientific professionals meeting the approval of the charter schools office and using a rubric to be submitted by May 1 of the second year of school operations.

# End of Year 5.

- 70% of 11<sup>th</sup> grade students will take an AP test on at least one subject and score at least 3.
- 70% of 11<sup>th</sup> grade students will take an SAT II exam on at least one subject and score above 500.
- The Academy average in SAT I Math exam will be 10% higher than the state average.

(2) Describe two or three school performance goals for organizational viability and the instruments and data that will be used to measure progress towards these goals. These goals should be for the school's management of its administrative structure and resources.

# The Academy will pursue the following performance goals for organizational viability:

Organiza-	Be	nchmarks
tional area	End of Year 2	End of Year 4
Governance/	• 80% of Board meetings will have a quorum.	• 90% of Board meetings will have a quorum.
Fundraising	<ul> <li>100% of all Board members will contribute personal funds.</li> </ul>	<ul> <li>100% of all Board members will contribute personal funds.</li> </ul>
	<ul> <li>70% of Board members will secure another contributor.</li> </ul>	<ul> <li>90% of Board members will secure another contributor.</li> </ul>
Finance	<ul> <li>The Academy will demonstrate financial viability annually to an independent auditor.</li> </ul>	<ul> <li>The Academy will demonstrate financial viability annually to an independent auditor.</li> </ul>
	<ul> <li>The Academy will maintain a positive cash flow without borrowing additional funds.</li> </ul>	<ul> <li>The Academy will secure funds sufficient to lease/purchase and renovate a long-term facility.</li> </ul>
Personnel	<ul> <li>80% of the teachers will satisfactorily pass annual reviews.</li> </ul>	<ul> <li>90% of the teachers will satisfactorily pass annual reviews.</li> </ul>
Parent Organiza- tion	<ul> <li>The Parent Support Group will create and maintain at least one program in addition to those existing at the Academy.</li> </ul>	<ul> <li>The Parent Support Group will arrange volunteers and sponsors for at least one annual field trip for each class.</li> </ul>
Parent Demand	<ul> <li>The Academy has a waiting list of 5% of its new enrollment</li> </ul>	<ul> <li>The Academy has a waiting list of 10% of its new enrollment</li> </ul>
	<ul> <li>70% of the parents will indicate their satisfaction with the students' academic progress as demonstrated by the annual survey.</li> </ul>	<ul> <li>80% of the parents will indicate their satisfaction with the students' academic progress as demonstrated by the annual survey.</li> </ul>

#### (3) Please describe the process you will undertake in the first year of the proposed school to create an effective accountability plan.

During the 1<sup>st</sup> year the Executive Director (ED) will assemble a task force, to include the Principal, teachers and administration representatives that will collect and analyze base line information on student achievement. The task force also will observe the students' progress during the year. The observations will serve as a basis for developing ambitious but realistic Accountability goals. The Accountability goals will be similar to those given above. The academic goals will concentrate on reaching the highest academic standards by all Academy students. The organizational goals will primarily target financial stability and sound management practices.

Based on the goals, the task force will develop a clear, coherent, and comprehensive Accountability Plan consistent with the Academy's mission and will follow the guidelines of the DOE's *Massachusetts Charter Schools* Accountability Handbook and the standards set in the No Child Left Behind initiative. At the end of the first year, the taskforce will present the plan to the Board for approval.

	Evidence sup	porting affirmative answers to the th	iree questions
Parts of the school visit	Is the school an academic success?	Is the school a viable organization?	Is the school faithful to the terms of its charter?
Observation of classes	All students are deeply engaged in the class work. The level of academic curriculum being discussed in class is higher than a typical level familiar to inspection team members.	The class work, break and after school activities are conducted in an orderly manner; everyone knows his/her, schedule and routine.	The observed class work reflects the charter application descriptions.
Interviews of the Academy's Board of Trustees	The Board expresses deep satisfaction and pride in the students' academic results	All Board committees demonstrate recorded and measurable accomplishments.	The Board members demonstrate full understanding of the Academy's mission, vision, and goals for the future.
Interviews with the instructional and admin. staff	Most of the teachers are deeply satisfied with the students' progress.	Most of the staff are happy with the work conditions and pay package.	Confirm that most promises to the employees expressed in the charter are being fulfilled
Interviews with the students and parents	Parents express deep satisfaction and pride with the students' academic progress	Students and parents express full understanding of how all organizational branches function	Confirm that most promises to students and parents expressed in the charter are being fulfilled
Documentation evidence	Academic records far exceed the records of peers in the sending districts, state, and national and international results	Financial reports demonstrate fiscal stability. All personnel records of hiring, evaluation, and promotion are well documented and fair.	Most documentation is in accordance with the charter

(4) In no more than two paragraphs, describe what you would like a renewal inspection team to learn about your school during their threeday visit in the school's fourth or fifth year.

(5) Describe plans to define, evaluate, and disseminate best practices of the charter school to the local district and/or to other schools.

The plans for dissemination of the Academy's best practices will be defined in detail by the ED after the 1<sup>st</sup> year and will be reviewed and improved based on practical observations. The plans will include:

- Review of the other charter schools dissemination practices and selection of the ones best fit for the Academy.
- The Academy's academic success stories and analysis of the underlying work will be published on the Academy's web site and its newsletter.
- The Academy will obtain membership in teachers' organizations, especially those related to teaching Math and Science at schools such as the National Consortium for Specialized Secondary Schools of Mathematics, Science and Technology, and will participate actively in their conferences with presentations.
- The Academy will respond to any and all requests of the public school districts interested in learning about the Academy's teaching methods and curriculum, and participate in mutually organized workshops, conferences, school visits, and teacher exchanges.

# Attachment List

# Required and counted toward 35 pages:

- 1. Letters of Endorsement
- 2. Examples of collected signatures in support of the Academy
- 3. Complete Bylaws
- 4. Enrollment Policy
- 5. Code of Conduct
- 6. Statement of interest and qualifications of each founding group member
- 7. 3-year budget
- 8. Action plan
- 9. Teachers' Qualification Assessment

# Required but not counted toward 35 pages:

- 10. Resume from each founding member including proposed position in the school if chartered
- 11. The Curriculum for grades 10-12.

DEPARTMENT OF MATHEMATICS MASSACHUSETTS INSTITUTE OF TECHNOLOGY CAMBRIDGE, MASSACHUSETTS 02139 USA	David A. Vogan, Jr. Room 2-281 [617] 253-4991 dav@math.mit.edu	October 31, 2003	Dr. David P. Driscoll, Commissioner Massachusetts Department of Education 350 Main Street Malden, MA 02148	Dear Dr. Driscoll:	I am writing in support of the proposed Advanced Math and Science Academy Charter Scho (AMSA). The Academy's rigorous curriculum in mathematics and science appears ambition in comparison with other public schools in Massachusetts, but it follows a model with a lor and successful history in Europe and Japan. Mathematics and science <i>can</i> be taught at th high level to all students.	My own experience in teaching at MIT, and discussions with colleagues at many other college and universities, make clear the tremendous importance of the foundations established ( neglected) in secondary schools. Those few students (including many from other countrie with a strong high school preparation can move easily into the demands of college classe students with more typical American preparation must struggle to catch up.	The proposal for the AMSA is based firmly on the rich and varied experience of the Foundir Board. I am confident that the Academy can offer wonderful educational opportunities for i students. Parents and students now living in Marlborough, Hudson, Maynard, and Clinton wi benefit from these opportunities, and others will be attracted to these communities.	I hope that the Department of Education will give serious consideration to the proposed Ac vanced Math and Science Academy, and will endorse its application for a charter.	Sincerely, Sewed A. Rogan, Jr. Professor of Mathematics
From: xxxxxx@xxxxx.com Date: Tue, 14 Oct 2003 11:03:33 EDT	Subject: the Advanced Math and Science Academy Charter School To: jsigalovsky@buildingexcellentschools.org X-Mailer: 7.0 for Windows sub 10709 X-Borosity: I hering tests=borofilter snamicity=0.707018	A-bogosity. Unsure, tests-bogoniter, spannicity-0.737310, version=0.11.1.3	Dear Dr. Sigalovsky, I am happy to endorse your proposal for the Advanced Math and Science Academy Charter School. I certainly hope that the	Wassachusetts State Board of Education sees fit to grant a charter to	If I were a parent in your district, I would eagerly sign my children (now, grandchildren) to attend. Grandchildren) to attend. Given all the attention that has been expended on the stagnation of student achievement in American schools, a proposal like vours should	be welcomed by parents and educators. This is a description of a model school towards which all of public education should aspire. Despite much talk about standards and rigor, few districts have fashioned the kind of sequential curriculum that takes standards seriously. You have	done this. I wish you great success. I wish that there were an academy like yours in every school district in the United States, for parents who truly	want the best for their children and to serve as an exemplar for all public schools.	Diane Ravitch Research Professor of Education New York University

Advanced Math and Science Academy Charter School Attachments



BIOLOGY DEPARTMENT

November 11, 2003

Dr. David P. Driscoll, Commissioner Massachusetts Department of Education 350 Main Street Malden, Massachusetts 02148

Dear Dr. Driscoll:

I am writing in support of the charter application for establishment of the proposed Advanced Math and Science Academy Charter School (AMSA). Creation of this school will provide challenging educational opportunities that are not currently available to students in the Nashoba Valley/Metro-West area. The anticipated success of the proposed AMSA Charter School curricular structure will also validate a "new" and attractive model, based on European traditions of secondary education, for secondary education in Massachusetts.

This fall I am teaching Introductory Biology to science majors at Boston College, and this experience reinforces my long-standing concern about the types and levels of math and science preparation provided by the majority of US secondary schools. Pursuit of a curriculum along the lines proposed by the AMSA Charter School Founding Board has the potential to substantially strengthen the preparation and readiness of high school graduates for baccalaureate study in the natural sciences, as well as in other disciplines. The school as conceived would also prepare all of its students to be more knowledgeable and more effective citizens, whatever their post-secondary pursuits.

The proposed curriculum offers the prospect of addressing and helping counter the disturbing trends we continue to see in US secondary science and math education, which indicate that our students lag in these disciplinary areas behind students in most of the industrialized nations. While the proposed curriculum is rigorous, it exhibits good balance, and the Founding Board expresses its commitment to supporting learning by students throughout the ability spectrum. Furthermore, the establishment of this institution in the proposed location will offer a new opportunity for parents from Marlborough, Maynard, Clinton, and Hudson to enroll their children in a school that will provide an educational experience with exceptional breadth and depth.

Overall, I believe the proposed AMSA Charter School is an exciting initiative in public education. The Design Team and Founding Board have devoted substantial thought and care to developing a well-structured, rigorous curriculum and formulating a deeply held ethos for creating a community of learners and teachers within the proposed charter school.

I hope the Department of Education will perceive the potential of this initiative to contribute to the improvement of secondary education, in Massachusetts over the near term and the nation as a whole over the long term, and will endorse the application for the award of a charter to the proposed AMSA Charter School.

Sincerely,

Trentaute

Marc A.T. Muskavitch, Ph.D. De Luca Professor and Chairperson Biology Department Boston College

#### **BOSTON COLLEGE** COLLEGE OF ARTS AND SCIENCES CHESTNUT HILL, MASSACHUSETTS 02467

THE HONORS PROGRAM DR. MARK O'CONNOR DIRECTOR (617) 552-4574 FAX 617-552-2588 MARK.OCONNOR.1@BC.EDU

9 November 2003

Dr. David P. Driscoll, Commissioner Massachusetts Department of Education 350 Malden Street Malden, MA 02148

Dear Dr. Driscoll,

I am writing in support of the proposed Advanced Math and Science Academy Charter School (AMSA). I urge that you approve its charter application. The Academy's focus on the hard sciences and its intent to pursue all subjects of study with rigor and enthusiasm will supply an invaluable educational opportunity for youngsters in the suburbs west of Boston, especially around the Nashoba Valley.

As a professor, and as the director of Boston College's special interdisciplinary curriculum for the top 5 percent of BC's undergraduates, I have had considerable exposure over the years to college applications from around the country, and have been dismayed to see how under-prepared the majority of American high school students are for the intensive course of studies any first-rate Chemistry or Physics department will demand. Sadly, that's true even for most of the first-rate young minds at the top of the applicant pool. Compared to what I've seen in a European lycée or gymnasium -- well, there really is no comparison. Our students are at a distinct disadvantage, and this has ripple affects which continue through both undergraduate studies, then on to graduate training, and increasingly even to the composition of our university faculties. The gulf between the few who are prepared and the many who aren't only grows wider with each year of advanced study.

The curriculum proposed by the Academy is based on successful models from other parts of the world. What makes me particularly optimistic about the school's chance for success is that the educators who want to implement this ambitious course of studies are highly successful products of such an approach. I know well and greatly esteem Professor Andrzej Herczynski, a member of AMSA's Founding Board. We have collaborated on educational initiatives in the past, and I can personally vouch for his extraordinary abilities, his exceptional energy, his infectious enthusiasm. Years of experience have taught me that any curriculum, no matter how promising its potential, is only as good as the people who implement it. In Professor Herczynski, you have the best. While I do not know his colleagues on the Board, I must say their credentials suggest they, too, are at once unusually talented and accomplished.

In sum, the AMSA initiative would make a major difference in the formation of young people from the towns of Marlborough, Hudson, Maynard, and Clinton. I strongly recommend that the Department of Education give serious consideration to the proposed Advanced Math and Science Academy, For my part, I enthusiastically endorse its application for a charter.

Yours sincerely, huc

Mark O'Connor L Director, The Honors Program Boston College

		Computer Science Department 111 Cummington Street. Boston. MA 02215.	Boston University (617) 353-3649. e-mail: Ind@bu.edu
	Northeastern UNIVERSITY		October 13, 2003
College of Arts and Sciences Department of Mathematics 567 lade hall Northeatern University Boston, Massachusets 02115-5000	Dr. David P. Driscoll, Commissioner, Massachusetts Department of Education, 350 Main Street, Malden, MA 02148 October 13, 2003	<ul> <li>Dr. David P. Driscoll, Commissioner, Massachusetts Department of Education, 350 Main Street, Malden, MA 02148</li> <li>Dear Dr. Driscoll:</li> </ul>	
Phone: 617.373.2450 Facimile: 617.373.5658	Dear Dr. Driscoll, I am writing to support the Advanced Math and Science Academy Charter School (AMSA) charter application. I believe that the Academy's mission, vision, teaching philosophy and curriculum address the need for high-quality K-12 education, especially in the areas of mathematics and the sciences.	I am writing in support of the proposed Advanced Math (AMSA) and to urge the approval of its charter application will provide a heretofore unavailable opportunity for stude area. In addition, it will serve as an invigorating alternative I probably should introduce myself. I am Leonid Levin, a Pi University. I also taught and performed research at UC Berk	and Science Academy Charter School n. The Academy's rigorous curriculum ints in the MetroWest/Nashoba Valley i model for public education in general. cofessor of Computer Science at Boston eley, Calrech, MIT, Hebrew University
	As Chairman of the Mathematics Department at Northeastern University, I am keenly aware of the difference that a solid pre-college education can make. This is particularly true in math and science, which require gradual development of skills over many years. Students who arrive on campus with a weak background in these fields are at a distinct disadvantage.	in Jerusalem, Institute of High Scientific Studies in France of Sciences, and other reputable institutions. Having work foreign Universities, I am keenly aware of the difference a so is a substantial gap between those of our incoming students classes and those who lack adequate preparation. This is which require gradual development of skills over many years a weak background in math face daunting challenges and c	A MOSCOW UNIVERSITY, SOVIEL ACADENTY ed with students in many top US and blid pre-college education makes. There is who are ready for the university-level particularly so in math and sciences, s. Students who arrive on campus with an rarely make up for the lost time.
	It is a disturbing fact that American high school graduates lag behind students in other industrialized countries. The curriculum proposed by the Academy builds on long-standing traditions of secondary education in Europe and elsewhere to teach math and science systematically from the early grades, balanced with exposure to the humanities.	The curriculum proposed by the Academy, while unusually public high schools, is building on the long-standing traditi and elsewhere. It is a disturbing fact that our high school g all industrialized countries in math and physics. The Acaden and balanced curriculum, with math and science taught in the right way to redress this deficiency.	accelerated in the context of American tion of secondary education in Europe praduates lag behind students in nearly my aims to demonstrate that a rigorous a systematic way from early grades, is
	Moreover, the program will serve children hour the courts of Marlborough, Hudson, Maynard and Clinton, who otherwise have few educational choices. If the Academy is as effective as I expect it will be, it will provide an important role model for the improvement of education in the rest of the United States.	It is clear that the program proposed by the AMSA has bee will ensure superior education for its students, in the scien serve children from the area of Marlborough, Hudson, May few educational choices. And, if it is as effective as I expect what constitutes a successful public school.	n carefully thought out. The Academy nees as well as the humanities. It will nard and Clinton, who otherwise have it to be, it will stimulate rethinking of
	I believe that the AMSA will be a great asset for the education of K-12 students, and I urge you to grant its charter.	I hope the Department of Education will give a serious co Math and Science Academy Charter School, and will endor	msideration to the proposed Advanced se its application for a charter.
	Lohnt SUl Croon	Sincerely yours, Levid N. Z	
	Robert McOwen Professor and Chair of Mathematics	/Leonid Levin/, Professor	
Advanced Math and Sc Attachments	cience Academy Charter School	Page 4	

AND THE PROPERTY OF	AXETIN'	TUFTS UNIVERSITY	bepartment of Mechanical Engineering October 10, 2003	Dr. David P. Driscoll, Commissioner,	Massachusetts Department of Education, 350 Main Street,	Malden, MA 02148.	I am writing to support the Advanced Math and Science Academy Charter School (AMSA) charter application. I believe that the Academy's mission, vision, teaching philosophy and curriculum address the need for high-quality K-12 education, especially in the areas Math and Sciences.	I am Professor at the Department of Mechanical Engineering of Tufts University. Our college is one of US leaders in practice oriented higher education. We work with	students coming from all over the country, many of them from Massachusetts. We know first-hand that our school Math and Science education is far below the international	standard and certainly are far below the level where it should be to ensure that our country remains a World leader is science and technology. This situation needs immediate action and the charter schools like AMSA is an important step in the right direction.	I believe that the AMSA's students will not only realize their full intellectual potential, but will succeed academically way beyond their parents' and their own expectations. It is	my opinion that they will graduate from AMSA with a solid, high-level knowledge in a broad range of subjects.	I am convinced that AMSA as designed is an exceptional school and nothing like it is currently available in our state or even our country. I believe that AMSA will be a great asset for American school education and it will immensely benefit many students.	I fully support the Advanced Math and Science Academy Charter School.	Sincerely, M. R. B. Line Proposition	Mark Kachanov Professor of Mechanical Engineering Tufts University
	BOSTON COLLEGE	October 28, 2003	Dr. David P. Driscoll, Commissioner Massachusetts Department of Education 350 Main Street	Malden, MA 02148	Dear Dr. Driscoll,	Lam writing in support of the proposed Advanced Math and Science Academy Charter School (AMSA) and to unce the approval of its charter application. The Academy's	rigorous curriculum will provide approvide unavailable opportunity for students in the rigorous curriculum will provide a heretofore unavailable opportunity for students in the Metro-West and Nashoba Valley area. In addition, it will serve as an invigorating alternative model for public education.	As a professor and an academic leader, I am keenly aware of the difference a solid pre- college education makes. There is a substantial gap between those of our incoming students who are ready for the university-level classes and those who lack adequate	preparation. This is particularly so in main and sciences, which require gradual development of skills over many years. Students who arrive on campus with a weak background in math face daunting challenges and can rarely make up for the lost time.	The curriculum proposed by the Academy, while unusually ambitious in the context of American public schools, is building on the long-standing tradition of secondary education in Europe and elsewhere. It is a disturbing fact that our high school graduates lag behind students in nearly all industrialized countries in math and physics.	The Academy aims to demonstrate that a rigorous and balanced curriculum, with math and science taught in a systematic way from early grades, is the right way to redress this deficiency.	It is clear that the program proposed by the AMSA has been carefully thought out. The Academy will ensure superior education for its students, in the sciences as well as the	humanities. It will enable parents from the towns of Marlborough, Hudson, Maynard and Clinton to choose an accelerated school for their children. And, if it is as effective as I expect it to be, it will stimulate rethinking of what constitutes a successful public school.	I hope the Department of Education will give a serious consideration to the proposed Advanced Math and Science Academy, and will endorse its application for a charter.	Sincerely, Refell	Kevin S. Bedell Chair, Department of Physics Rourke Professor of Physics

PHYSICS DEPARTMENT

Advanced Math and Science Academy Charter School Attachments

FRAMINGHAM STATE COLLEGE         Mathematics           100 State Street, P.O. Box 9101         Tel (508) 626-4700         Fax (508) 626-400           Framingham, Massachusetts 01701-9101         Tel (508) 626-400         www.framingham.edu	vid P. Driscoll November 12, 2003 ssioner states beartment of Education in Street v. MA 02148	I am writing to strongly support the Advanced Mathematics and Science wy Charter School (AMSA) application. The Academy's mission, vision, teaching pativ, and curriculum address the need for quality education in K-12, especially in actics and science, that our youngsters have been deprived of for a number of for no faultis of their own. Through a number of newspaper articles over the years. Tried to convey to the public the sad state of public education, especially, in math enc. 
T E C H N O L O G Y 1139-4307, U.S.A. ностя та. (6/7 253-408) км (6/7 253-408) (617) 253-2945 e-mail: kac@math.mit.edu	.8, 2003 Dr. Dav Commi Massar 350 Ma Malden	and Science Academy Charter and Science Academy Charter for students in the Metro-West for students in the Metro-West for students in the Metro-West rigorating alternative model for are of the difference a solid pre- those of our incoming students who lack adequate preparation. are of the difference a solid pre- those of our incoming students those of our incoming students those of our incoming students and solid pre- physics and evelopment of skills weak background in math face the adition of secondary education gh school graduates lag behind physics. The Academy aims to in math and science taught in a st this deficiency. The Academy aims to in the sciences as well as the orough, Hudson, Maynard and And, if it is as effective as I as been carefully thought out. as been carefully thought out. And, if it is as effective as I acconsideration for a charter. yours, the of Mathematics
M A S S A C H U S E T T S I N S T I T U T E O F 77 Massachusetts Avenue, Cambridge, MA 021 rest of mothematics Victor Kac Room 2-178	October 28 Dr. David P. Driscoll, Commissioner Massachusetts Department of Education 350 Main Street Malden, MA 02148	Dear Dr. Driscoll, I am writing in support of the proposed Advanced Math School (AMSA) and to unge the approval of its charter applica curriculum will provide a heretofore unavailable opportunity fa and Nashoba Valley area. In addition, it will serve as an invi- public education makes. There is a substantial gap between the and Nashoba Valley area. In addition, it will serve as an invi- public education makes. There is a substantial gap between the many years. Students who arrive on campus with a w daunting challenges and can rarely make up for the lost time. The curriculum proposed by the Academy, while unusua American public schools, is building on the long-standing tra demonstrate that a rigorous and balanced curriculum, with systematic way from early grades, is the right way to redress it is clear that a rigorous and balanced curriculum. The Academy will ensure superior education for its students; humanities. It will enable parents from the towns of Marlbo Clinton to choose an accelerated school for their children. expect it to be, it will stimulate rethinking of what constitut I hope the Department of Education will endorse its a Sincerely a Vićtor Kaa Professor o Victor Kaa

Advanced Math and Science Academy Charter School Attachments

Attachment 2. Examples of collected signatures in support of the Academy



**Advanced Math and Science** Academy Charter School

Highlights

- Grades 6-12 public, tuition-free school.
   Rigorous, highly structured curriculum with emphasis on Math and Science.
   Promotes values of knowledge, intellectual curiosity, personal achievement and responsibility.

Mission: The Advanced Math and Science Academy Charter School (AMSA) will graduate students with a solid knowledge in a broad range of subjects that will last them a lifetime to empower them to be leaders in science, technology, and education in our modern high-tech world.

By signing below I indicate that I support the Advanced Math and Science Academy Charter School and welcome it to my community.

check if Parent	Name	Town of Residence	Signature
1	Marion	Marlbovo	Thorn Pacfec
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### Attachment 3. By-Laws of the Board of Trustees

### Section 1. General Provisions

**1.1 Charter.** The name and purposes of the Advanced Math and Science Academy Charter School (the "Academy") shall be as set forth in its Charter, which Charter is granted by the Commonwealth of Massachusetts Department of Education (the "DOE") and which may be amended from time to time. The Charter is hereby made a part of these By-Laws, and the powers of the Academy and of its Board of Trustees, and all matters concerning the conduct and regulation of the affairs of the Academy, shall be subject to such provisions in regard thereto, if any, as are set forth in the Charter. In the event of any inconsistency between the Charter and these By-Laws, the Charter shall be controlling. All references in these By-Laws to the Charter shall be construed to mean the Charter as from time to time amended.

**1.2 Location.** The principal office of the Academy shall be located in the building of the Academy after school has commenced. Until that time, members of the Founding Group shall coordinate all start-up activities.

**1.3 Fiscal Year.** Except as from time to time otherwise determined by the Trustees of the Academy, the fiscal year of the Academy shall end on the last day of June in each year.

**1.4 Corporate Seal.** The common seal is, and until otherwise ordered and directed by the Board of Trustees shall be, an impression upon paper bearing the name of the Academy, the date "2004" and such other device or inscription as the Board of Trustees may determine.

# Section 2. Board of Trustees

**2.1 Powers.** The Board of Trustees shall oversee the affairs of the Academy and shall exercise all of the powers of the Academy, except as otherwise provided by law, by the Charter, or by these By-Laws. The Board of Trustees reserves to itself exclusively the power:

- (a) to purchase, sell, or lease real property,
- (b) to pledge, assign, create liens on or security interests in the real or personal property of the Academy,
- (c) to establish, execute and modify investment policies,
- (d) to determine, execute and modify the educational policy of the Academy,
- (e) to appoint or remove the Academy Executive Director(s), and
- (f) to delegate, from time to time, powers to the Academy Executive Director(s) in accordance with these By-Laws except as otherwise provided by law or by the Charter.

**2.2 Number of Trustees.** The Board of Trustees shall consist of not less than seven nor more than fifteen individuals (excluding ex-officio and honorary members). The Board of Trustees may include, but is not limited to, a parent/guardian representative, interested members of the community, a faculty representative, and the Academy Executive Director(s). The Academy Executive Director(s), the faculty representative, and the parent representative, respectively, shall serve as ex-officio members of the Board of Trustees without power to vote.

**2.3 Term of Office of Trustees.** The term of office of a trustee shall be three years or until his or her successor is elected and qualified. Terms of office shall be staggered and each group shall be as nearly equal in number as possible. A trustee may serve for two consecutive terms and shall be eligible for reelection to the Board after a one-year hiatus or at the pleasure of the Board, if longer terms are desired. The term of office of the Academy Executive Director(s) as a trustee shall correspond with his or her tenure in that position. The term of office of the faculty representative as a trustee shall be two years. The term of office of the parent representative shall be one year.

**2.4 Election of Trustees.** Trustees shall be elected by the Board of Trustees at any meeting of the Board of Trustees. A trustee elected to fill an unexpired term shall have tenure only to the end of that term.

**2.5 Resignation and Removal.** Any Trustee may resign by delivering a written resignation to the Chair or the Clerk, as defined herein, or to the Academy at its principal office. Such resignation shall be effective upon receipt unless it is specified to be effective at some later time. To facilitate the election of new Trustees, the Academy formally encourages Trustees intending to resign or to decline nomination to provide notice of the Trustee's intent before June. Any Trustee may be removed from office with or without cause by an affirmative vote of a majority of the Trustees then in office. A Trustee may be removed for cause only after reasonable notice and an opportunity to be heard by the Board of Trustees. Any Trustee may be removed from office by an affirmative vote of the Trustees.

**2.6 Vacancies.** Any vacancy in the Board of Trustees may be filled by vote of a majority of the Board of Trustees then in office. The Board of Trustees may exercise all their powers notwithstanding the existence of one or more vacancies in the Board. Vacancies in any office may be filled by the Board of Trustees.

# Section 3. Meetings of the Trustees

**3.1 Open Meeting Law.** All meetings of the Trustees shall be conducted in accordance with Section 23B of Chapter 39 of the Massachusetts General Laws (the "M.G.L."), as amended from time to time, or any successor statute. Except as otherwise permitted by such Section 23B,

- (a) no quorum of the Board of Trustees shall meet in private for the purpose of deciding on or deliberating toward a decision on any matter and
- (b) no executive session shall be held until:
  - (i) the Board of Trustees shall have first convened in an open session for which notice shall have been given in accordance with law,
  - (ii) a majority of the Trustees at such meeting shall have voted to go into executive session,
  - (iii) the vote of each trustee shall have been recorded on a roll call vote and entered into the minutes, and
  - (iv) the Chair (or other person presiding over the meeting) shall have cited the purpose of the executive session and shall have stated whether or not the Board of Trustees shall reconvene after the executive session. Executive sessions may be held only for purposes permitted by law.

**3.2 Regular and Special Meetings.** Regular meetings of the Board of Trustees may be held at such times as the Board of Trustees may determine, at least four times annually. Special meetings may be called by the Chair at any time and shall be called by the Clerk or his or her designee following a written application of two or more voting members of the Board of Trustees.

**3.3 Meetings Using Communications Equipment.** Unless otherwise provided by law or the charter, trustees may participate in a meeting of the Board of Trustees by means of a conference telephone or similar communications equipment by means of which all persons participating in the meeting can hear each other at the same time, and participation by such means shall constitute presence in person at a meeting.

**3.4 Annual Meeting.** The Trustees shall meet annually in the month of June at the principal office of the Academy or at such place and at such time as the Board of Trustees shall determine, except that such date shall not be a legal holiday. Notice of the annual meeting setting forth the date, time, and place of any such meeting shall be mailed to all Trustees at the Trustee's usual or last known business or home address not less than seven (7) days prior to the date of the annual meeting.

**3.5 Quorum.** A majority of the Trustees then in office shall constitute a quorum, but a lesser number may, without further notice, adjourn the meeting to any other time. At any meeting of Trustees at which a quorum is present, the vote of a majority of those Trustees present shall decide any matter unless the Charter, these By-Laws, or any applicable law requires a different vote.

**3.6 Notice of Meetings.** Public notice of meetings shall be given as required by law. Notice of the date, time, and place of all regular and special meetings of the Trustees shall be given to each Trustee by the Clerk or, in case of the death, absence, incapacity or refusal of the Clerk, by the officer or one of the Trustees calling the meeting. Such notice shall be given to each Trustee in person, by mail or by telephone, telegram, facsimile transmission, or electronic mail sent to such Trustee's usual or last know business or home address at least 7 days in advance, unless shorter notice is adequate under the circumstances.

# Section 4. Officers of the Board

**4.1 Numbers and Qualifications.** The officers of the Academy shall be a Chair, Vice Chair, Treasurer, Clerk, and such other officer, if any, as the Board of Trustees may determine. An individual may hold more than one office at the same time.

**4.2 Election and Tenure.** The Chair, Vice Chair, Treasurer, and Clerk shall be elected annually by the Board of Trustees at the annual meeting. Other officers, if any, may be elected by the Board of Trustees at any time. The fact that an individual is currently serving in any office shall not create any presumption that such individual shall be nominated for such office in any subsequent year. If the office of Chair, Vice Chair, Treasurer, or Clerk becomes vacant, the Trustees shall elect a successor. If any other office becomes vacant, the Trustees may elect a

successor. Each such successor shall hold office for the unexpired term and, in the case of the Chair, Vice Chair, Treasurer, and Clerk, until a successor is chosen and qualified, or in each case, until the officer dies, resigns, is removed, or becomes disqualified.

**4.3 Resignation and Removal.** Any officer may resign by delivering a written resignation to the Chair or the Clerk or to the Academy at its principal office. Such resignation shall be effective upon receipt unless it is specified to be effective at some later time. Any officer may be removed from office with or without cause by an affirmative vote of a majority of the Trustees then in office. Any officer may be removed for cause only after reasonable notice and an opportunity to be heard by the Board of Trustees.

**4.4 Chair and Vice-Chair of the Board.** The Trustees may elect a Chair and Vice-Chair of the Board of Trustees. Except as otherwise provided by law, the Charter or these By-Laws, the Chair and Vice-Chair shall hold office until the next annual meeting of the Trustees or the special meeting held in lien thereof, and thereafter until their respective successors are chosen and qualified, unless a shorter term is specified in the vote electing or appointing them. The fact that an individual is currently serving as Chair or Vice-Chair shall not create any presumption that such individual shall be nominated for either such position in any subsequent year. The Chair shall preside at all meetings of the Board of Trustees, except as the trustees otherwise determine. The Chair shall have such other duties and powers as the Board of Trustees or Executive Committee shall determine. With the approval of the Executive Committee, the Chair shall appoint all Standing and Special Committees, may fill vacancies in these Committees, and may remove any member of these Committees for any reason. The Chair may call meetings of the Executive Committee, and shall call such meetings at any request of two members of the Executive Committee. In the absence of the Chair, or if at any time the office of Chair is vacant, the Vice Chair may discharge any or all of the duties of the Chair including the Chair's functions as a member and chair of the Executive Committee.

**4.5 Treasurer.** Subject to the direction and control of the Board of Trustees, the Treasurer shall have general oversight of the financial affairs of the Academy, shall provide monthly reports to the Board of Trustees on the financial condition and affairs of the Academy and shall oversee all filings required by the Commonwealth, the Internal Revenue Service, or any other governmental entity. The Treasurer shall have such other powers and duties as are usually incident to that office and as may be vested in that office by these By-Laws or by the Trustees.

**4.6 Clerk.** The Clerk shall record and maintain records of all proceedings of the Trustees in a book or series of books kept for that purpose and shall give such notices of meeting of Trustees as required by the Charter, these By-Laws, or by law. The Clerk shall distribute to the members of the Board of Trustees copies of any minutes of prior meetings for approval. The Clerk shall have such other powers and duties as are usually incident to that office and as may be vested in that office by these By-Laws or by the trustees. The Clerk shall be a resident of the Commonwealth, unless the Academy shall appoint a resident agent for the service of process. In the absence of the Clerk from any meeting of Trustees, a temporary Clerk designated by the person presiding at the meeting shall perform the duties of the Clerk.

**4.7 Other Officers.** Other officers shall have such duties and powers as may be designated from time to time by the trustees.

### Section 5. Committees

**5.I Appointment and Duties.** The Board of Trustees shall annually appoint such standing and special committees as the Board may deem proper and prescribe their membership, powers, and duties. The Board of Trustees, or the Chair acting under the authority of the Board, may appoint such other boards and committees as the Board may deem necessary.

**5.2 Standing Committees.** Standing committees of the Board may include but are not limited to the Executive Committee, Finance Committee, the Committee Development, and the Governance Committee. Each Committee shall hold office for one year and until a new Committee is appointed.

**5.3 The Executive Committee.** The Executive Committee shall consist of not less than four nor more than eight trustees, and may include the Chair, Vice Chair, Treasurer, and Academy Executive Director(s) ex officio. The Chair shall be the Chairman of the Executive Committee. A majority of the members of the Executive Committee shall have power to do all things deemed by them necessary for, or conducive to, the welfare of the Academy that are not delegated to other committees or officers nor contrary to the bylaws or votes of the Board of Trustees, or

any applicable to the foregoing. The Executive Committee may exercise all the powers of the Board of Trustees except the election of trustees, the election of Chair, Vice-Chair, Treasurer, or Clerk, the selection of Academy Executive Director(s), or the amending of the bylaws. The Executive Committee shall make reports of their doings to the Board of Trustees.

**5.4 The Development Committee.** The Development Committee shall include not less than three trustees, and the Chair shall appoint its Chair. The Development Committee shall be responsible for overseeing planning, implementing, and monitoring all fundraising programs. The Development Committee shall assist in the advancement of the Academy to all its constituencies.

**5.5 The Governance Committee.** The Governance Committee shall include not less than three trustees, and the Chair shall appoint its Chair. The Governance Committee shall oversee the quality of the trustees and trustees' self-management. The Governance Committee shall select and nominate all candidates for the Board of Trustees, nominate Board officers, oversee trustee orientation and education, and conduct periodic evaluations of individual trustees and the trustees as a whole.

**5.6 Academy Executive Director(s).** The Academy Executive Director(s) may be ex officio members of all Standing and Special Committees.

# Section 6. Academy Executive Director(s)

**6.1 Selection.** The Academy Executive Director(s) shall be appointed by the Board of Trustees and shall serve at the pleasure of the Board of Trustees and shall receive such compensation as the Board may direct. The Board of Trustees shall conduct an annual review of the Academy Executive Director(s).

**6.2 Duties.** The Academy Executive Director(s) shall carry out the policies established by the Board of Trustees and shall be directly responsible to the Board of Trustees. The Academy Executive Director(s) shall have general management of the artistic, academic, and administrative operations of the Academy and shall prescribe and direct the course of study, the discipline to be observed, the assessment of student performance, and shall be responsible for all required reporting to The State of Massachusetts. The Academy Executive Director(s) shall prepare an annual budget for submission to the Board. The Academy Executive Director(s) shall employ and discharge all personnel, prescribe their duties and terms of office, shall set their salaries within the minimum and maximum limits established by the Board of Trustees, and shall conduct annual reviews of all personnel.

# Section 7. Compensation and Personal Liability

**7.1 Compensation.** No Trustee or officer shall receive any compensation for services rendered as a trustee or officer. Notwithstanding the foregoing, any Trustee or officer may receive reasonable compensation for services rendered as an employee or subcontractor of the Academy and any Trustee or officer may, if authorized by the Academy Executive Director(s) or the Board of Trustees, be reimbursed for necessary expenses, including travel expenses, reasonably incurred by the Trustee or officer in the performance of duties as a trustee or officer. Any Trustee must make full disclosure to other members of the Board of any compensation received.

# Section 8. Miscellaneous Provisions

**8.1 Execution of Instruments.** All contracts, deeds, leases, bonds, notes, checks, drafts and other instruments authorized to be executed by an officer of the Academy on its behalf shall be signed by one or both of the Academy Executive Director(s) or the Treasurer except as the Trustees may generally or in particular cases otherwise determine. Any recordable instrument purporting to affect an interest in real estate, executed in the name of the Academy by the Academy Executive Director (s) and the Treasurer, who may be one and the same person, shall be binding on the Academy in favor of a purchaser or other person relying in good faith on such instrument notwithstanding any inconsistent provisions of the Charter, By-Laws, resolutions or votes of the Academy.

**8.2 Corporate Records.** The records of all meetings of trustees, the names and addresses of the Trustees and officers of the Academy, and the originals or attested copies of the Charter and the By-Laws of the Academy shall be kept in the Commonwealth at the principal office of the Academy or of the Clerk, but such corporate records need not all be kept in the same office.

8.3 Guarantees and Suretyships. The Academy shall make no contracts of guarantee or suretyship.

**Section 9. Amendments** These By-Laws may be altered, amended or repealed, or new By-Laws may be adopted, by an affirmative vote of a majority of Trustees then in office, at any annual meeting of the Trustees or special meeting of the Trustees; provided, however, that notice shall be given in the notice of the meeting that an alteration, amendment or repeal of the By-Laws, or that new By-Laws may be adopted, will be proposed.

# Section 10. Indemnification

10.1 Generally. The Academy shall, to the extent legally permissible and only to the extent that the status of the Academy as exempt from federal income taxation under Section 501(c)(3) of the Code is not affected thereby, indemnify and defend each person who may serve or who has served at any time as a trustee. Director, Treasurer, Clerk, or other officer of the Academy, each person who may serve or who has served at the request of the Academy as a Trustee, officer, employee or other agent of another organization and each person who may serve or has served at its request in a capacity with respect to any employee benefit plan (collectively, "Indemnified Officers" or individually, "Indemnified Officer"), against all expenses and liabilities, including, without limitation, counsel fees, judgments, fines, excise taxes, penalties and settlement payments, reasonably incurred by or imposed upon such person in connection with any threatened, pending or completed action, suit, claim, or proceeding whether civil, criminal, administrative, or investigative (a "Proceeding") in which an Indemnified Officer may become involved by reason of serving or having served in such capacity (other than a proceeding voluntarily initiated by such person unless a majority of the full Board of Trustees authorized the Proceeding); provided, however, that no indemnification shall be provided to such Indemnified Officer with respect to any matter as to which such indemnified Officer shall have been finally adjudicated in any proceeding (a) to have breached the indemnified Officer's duty of loyalty to the Academy, (b) not to have acted in good faith in the reasonable belief that such Indemnified Officer's action was in the best interest of the Academy, (c) to have engaged in intentional misconduct or a knowing violation of law, or (d) to have engaged in any transaction from which the Indemnified Officer derived an improper personal benefit; and further provided, that any compromise or settlement payment shall be approved by the Academy in the same manner as provided below for the authorization of indemnification. Any person who at the request of the Academy may serve or has served another organization or any employee benefit plan in one or more of the foregoing capacities and who shall have acted in good faith in the reasonable belief that his or her action was in the best interests of such organization or in the best interests of the participants or beneficiaries of such employee benefit plan shall be deemed to have acted in such manner with respect to the Academy.

**10.2 Advances: Repayment.** Such indemnification may, to the extent authorized by the Board of Trustees of the Academy, include payment by the Academy of expenses, including attorneys' fees, reasonably incurred in defending a civil or criminal action or proceeding in advance of the final disposition of such action or proceeding, upon receipt of an undertaking by the Indemnified Officer, as defined in Section 10.1 above, to repay such payment if not entitled to indemnification under this Section which undertaking may be accepted without regard to the financial ability of such Indemnified Officer to make repayment.

**10.3 Authorization.** The payment of any indemnification or advance shall be conclusively deemed authorized by the Academy under this Section, and each Trustee and officer of the Academy approving such payment shall be wholly protected, if:

- (a) the payment has been approved or ratified
  - (i) by a majority vote of the Trustees who are not at time parties to the proceeding, or
  - (ii) by a majority vote of a committee of two or more Trustees who are not at that time parties to the proceeding and are selected for this purpose by the full Board (in which selection Trustees who are parties may participate); or
- (b) the action is taken in reliance upon the opinion of independent legal counsel (who may be counsel to the Academy ) appointed for the purpose by vote of the Trustees in the manner specified in clauses (i) or (ii) of subparagraph (a) or, if that manner is not possible, appointed by a majority of the Trustees then in office; or
- (c) the Trustees have otherwise acted in accordance with the standard of conduct applied to Trustees under Chapter 180 of the Massachusetts General Laws, as amended from time to time; or
- (d) a court having jurisdiction shall have approved the payment.

# Attachment 4. Enrollment Policy for School Year 2004-05

The Advanced Math and Science Academy Charter School (the "Academy") plans to serve children in grades 6-12. It will open in September 2004 with 6<sup>th</sup> and 7<sup>th</sup> grades, with 138 students in each grade. The enrollment process will be conducted in accordance with the state laws and regulations (MGL c. 71, \$ 89 and 603 CMR 1.00).

# **Application Process**

The Academy will accept applications till 5 PM on Friday, March 5<sup>th</sup>. All applicants will be notified in writing that their applications have been received.

Two parent information sessions are planned in mid-January and mid-February that will detail to prospective parents and students the school teaching philosophy, curriculum and policies. All parents and students potentially interested in applying are strongly encouraged to attend the information sessions.

# **Eligibility**

- The student must be a resident of Massachusetts.
- A student entering the Academy in the 6<sup>th</sup> (7<sup>th</sup>) grade may enter at the age of 10 (11) years and 9 months provided that they reach age 11 (12) no later than October 31<sup>st</sup>.
- In general the students entering 6<sup>th</sup> grade must complete 5<sup>th</sup> grade and the students entering 7<sup>th</sup> grade must complete 6<sup>th</sup> grade. If a student applies for a higher grade than the student is eligible to (e.g. a student completed 4<sup>th</sup> grade wants to apply for the 6<sup>th</sup> grade), the parents must submit a letter explaining in detail their decision with any applicable supporting documents. The Academy administration will consider such application on the case by case basis.
- Parents must complete and submit the Academy's enrollment form.
- The student must sign the application stating that he or she understands the expectations of the school and agrees to comply with the Code of Conduct and other Academy's rules.
- The parent/guardian of the applicant must sign the application stating that s/he understands the family obligations to the school.

# <u>Lottery</u>

If by 5 PM on March 5<sup>th</sup>, there are more applications than the number of the seats available, we plan to hold a lottery on March 11<sup>th</sup> where a third independent party will draw names at random for each grade separately. Preference will be given to children residing in the towns of Marlborough, Clinton, Hudson and Maynard (the "Region of Service"), specifically: if there are fewer applicants from the region than seats, all local applicants will be enrolled, and applicants from other districts will be drawn by the lottery. After the enrollment capacity is reached, the drawing will continue and the students above the capacity will be placed on the waiting list in the order they were drawn unless they are siblings of the students on the enrollment list. These siblings will be placed in a separate waiting list that will be given preference when the seats become available. Parents of all students accepted in the lottery will be sent an acceptance letter and a package of admission. If the signed acceptance letter is not returned within 20 calendar days, the student will be removed from the enrollment list.

If the number of applicants from all districts is fewer than the available seats, all applicants who submitted their applications by 5 PM on March 5<sup>th</sup> will be enrolled and will be reported to the Department by March 15th. We will continue the newspaper advertising of the remaining seats and will hold another public information session. We will continue further enrollment in the order applications are received. Preference will be given to the siblings of students already enrolled in the lottery.

# Waiting List.

All applicants on the waiting list will be notified in writing on their position on the list after the lottery, at the beginning of the school year, and in the beginning of January 2005. Each time the student will have 10 days to reply with a
signed slip that s/he is interested in remaining on the list; otherwise the student will be removed from the waiting list.

If a seat becomes available either due to an acceptance letter not being returned or due to attrition during the first 4 months of school, the seat will be offered to the student on the top of the waiting list by phone and in writing. The student will have 5 calendar days to respond. If no response is received, the student will be permanently removed from the waiting list, and the next student on the list will be offered the seat.

If new enrollment forms are received after the lotteries are completed and full enrollment capacity is reached, they will be added to the waiting list in the order in which they arrive. They will be placed after those drawn in the lottery unless the applicants are siblings of those who have already returned the signed acceptance letter. These siblings are placed in order of the date of arrival of their enrollment form at the top of the waiting list but after any siblings drawn in the lottery.

### Admission Requirements

Students, who have returned an acceptance letter, are not considered enrolled in the Academy until all required documents are received and the student is found to be eligible to attend based on the documents. The documents include:

- A <u>questionnaire</u> that includes detailed information about the student's background information and the parents/guardian contact information, medical insurance, diet restrictions, and other data.
- <u>Proof of Residency</u> that can be a parent's driver's license or any utility bill such as a phone, cable or electric bill, which indicates that the family receives mail at the address provided to the school. Two separate bills with that address must be provided in order to prove residency. In instances in which families do not receive bills to their home, e.g., they live with a relative, the school seeks acceptable, but convincing substitutions on a case by case basis. For example, a family might be asked to provide a driver's license, a paycheck stub, and general mail with that address.
- Permanent transcripts as evidence that the student will complete his/her current grade by August.
- <u>Other student's records</u>, e.g. health records and individualized education plan, from the previous school.
- All required by the law medical forms to include:
  - 1. Massachusetts School Health Record. This form must contain the following: 1) a record of a physical exam within the six months prior to the start of the school year; 2) up-to-date immunizations; 3) screening for vision, hearing, and scoliosis. The student must have a physical examination before entering the school.
  - 2. Authorization for Dispensing Medication in School Form signed by the physician accompanied by the letter from the parent/guardian explaining the procedure for administering medication in school.
  - 3. Physician Information Release Form with physician contact information.
  - 4. Emergency Medical Treatment Release Form. This form, which must be signed by a parent/guardian, gives the school permission to provide for emergency medical treatment in the event that a parent/guardian cannot be reached. No child will be allowed to enter school if the school does not have this form on file.

All these forms must be returned to the school prior to August 15th. If the records are not received by August 15th, the School reserves the right to give the seat to the next person on the waiting list.

# Attachment 5. CODE OF CONDUCT

The Advanced Math and Science Academy Charter School (the "Academy") strives to create an environment where everyone will be able to concentrate on the main task – learning. Discipline is the key element that helps implement the Academy's mission of academic success. Therefore, the Academy maintains the rule system for all that states that all actions that disrupt learning will have strict consequences.

<u>The Infractions.</u> The infractions will be considered of three types:

# Type A:

- Minor talk during class.
- Minor failing to follow a teacher's instructions.
- Dress code violations.
- Noisy behavior, running and jumping, involuntary pushing others in the corridor during a break.
- Absence or late appearance for class
- Using cell phones during class when there is no emergency
- Eating or chewing gum during class
- Littering during lunch

# Type B:

- Disrespectful behavior toward teachers, staff, guests, or other students.
- Deliberately refusing to follow a teacher's instructions
- Repeated talking or deliberately distracting other students during class
- Cheating and plagiarism.
- Intentionally pushing others in the corridor during a break.
- Acts or threats of violence or aggression, minor fighting, abusive or aggressive language.
- Possession of alcohol and tobacco. Alcohol and tobacco will be immediately confiscated. Smoking on school grounds is strictly prohibited.
- Intentional destruction, or defacement of school or private property

# Type C:

- Thefts of school or private property.
- Harassment based on race, color, religion, national origin, age, gender, sexual orientation, or disability.
- Major act of violence, fighting except on the grounds of self-defense<sup>42</sup>.
- The sale, transfer, use, or possession of illegal drugs at school or school-related events constitute a violation of state and federal laws and all violators will be subject to prosecution.
- Consumption of alcohol at school or school-related events.
- Possession of weapons including knifes.

<u>The Consequences.</u> The three types of infractions will have different consequences; also repetitive infractions will be considered equivalent to raising the infraction to the higher type.

The consequences for types A will include, but will not be limited by:

- 1. Verbal and eye contact warning.
- 2. Moving the student to the front of the class.
- 3. 15 or 30 minute lunch detention.
- 4. Suspension at the office of the Head of Student Affairs followed by the student's written explanation of the behavior and plan for improving the behavior.

The consequences for type B will include, but will not be limited by:

- 1. Record of the infraction in the Record Notebook for parents' information. Direct e-mail or a phone call to the parents with more detailed information about the student's behavior.
- 2. A phone call to set up an immediate meeting with the parents. The student may be temporarily detained at school till the parents arrive.
- 3. A record in the student's personal file.

<sup>&</sup>lt;sup>42</sup> A thorough investigation will be conducted before taking measures.

Infractions of <u>type C</u> present danger to the school community and as a result will have severe consequences that will include immediate out-of-school suspension, possible police involvement, and potentially expulsion.

**The Honor Level System.** The Academy plans to use a promotion model and software tool to track the infractions and consequences. The suggested system is *Discipline by Design, The Honor Level System* by School Discipline Consulting<sup>43</sup>. The model allows creating and maintaining a comprehensive, fair and consistent infractions/consequences system and the software allows having detailed records of the system.

Based on the *Discipline by Design* model, the Academy will use the four Honor Levels for students who are involved in infractions of types A and B:

*Honor Level One* students are youngsters who rarely get into trouble. To qualify for Honor Level One, a student must not have infractions of the type B or C at all and not more than one infraction of the type A in the last 14 calendar days<sup>44</sup>. Problems on school buses and other situations involving discipline also disqualify a student from Honor Level One.

The students on Honor Level One will receive special privileges. These may include special roles at well-publicized events such as Academy assemblies, newsletter mention, and Prefect appointments. It may also include "surprise" activities, such as free ice-cream certificates, cinema tickets, etc.

*Honor Level Two* students are youngsters who may have only had one or two problems of the type B or up to 3 problems from the type A in the last 14 calendar days. Some of the extra privileges awarded Honor Level One students also may be awarded Honor Level Two Students.

*Honor Level Three* students are youngsters who seem to have more difficulty staying out of trouble. They will have had three or more problems of type B within the last 14 calendar days. Honor Level Three students will not receive the extra privileges that the Honor Level One's and Two's enjoy. Often they are excluded from activities as are the Honor Level Fours, but these students might negotiate the right to participate.

*Honor Level Four* students are youngsters who consistently get into trouble at school<sup>45</sup>. Youngsters on Honor Level Four usually do not participate in any of the extra activities that the other students enjoy. For example, they may be asked to sit in a study hall during school assemblies and are ineligible to attend drama or athletic events. They do not negotiate, as do the Honor Level Three students.

### Dr. Anna Charny

# ATTACHMENT 6 - STATEMENTS OF INTEREST

### Proposed Position: Board of Trustees Member

I have worked in a number of high-tech companies in the Metrowest-Assabet Valley area as an Engineer and Computer Scientist for the last 15 years. I have received a Ph.D. in Computer Science from the Massachusetts Institute of Technology, and earlier a B.S. in Applied Mathematics from the Moscow Institute of Physics and Technology and a M.S. in mathematics from Tver University in Russia. I have a life-long interest in education, and, throughout my professional career I have been tutoring a number of kids in a number of subjects both individually

<sup>&</sup>lt;sup>43</sup> http://www.honorlevel.com/x83.xml

<sup>&</sup>lt;sup>44</sup> When determining any Honor Level, we only take into account a student's discipline record for the last 14 days. Problems that occurred more than 14 days ago do not affect the calculation. This will allow the students to work back up to Honor Level One. Students who have fallen from Honor Level One are notified the day they make it back. And as they progress upward through the Honor Levels, they are encouraged and reminded that they are improving.

<sup>&</sup>lt;sup>45</sup> Schools using *The Honor Level System* have reported that this group rarely exceeds 5% of the students.

and in an evening school environment in both Russia and the U.S. I am also a mother of two girls – one having just passed through the public school system in elementary and middle school and the other a kindergartner.

The value of a thorough academic education has been instilled in me from early childhood by my parents. As a child in Moscow, I went through very rigorous academic instruction in middle and high school, and I have come to appreciate the enormous value of the knowledge and skills I acquired during my school years throughout my subsequent professional career. But it is through all of my experiences as a high-tech professional, a teacher and a mother in the U.S. that I have come to the conclusion that the creation of public schools with a highly structured academic curriculum is essential for bringing up a generation of kids well equipped for today's sophisticated high-tech environment.

Observing many young professionals and interns entering the workplace after high school and even after college, I realized that the lack of a thorough academic background in math and basic sciences was a frequent handicap in professional success. Observing my older child in middle and high school, I noticed that the methods of math and science instruction at school seem to be lacking both rigor and structure, and more importantly, very little emphasis is placed on the development of deep understanding of the underlying concepts and critical thinking skills. These conclusions were confirmed by observing many children from different school systems in my experience as a private tutor and a teacher at the Russian School of Mathematics, a successful after-school program in Newton, MA where I taught on weekends.

All of these observations have led me to a conclusion that there is a tremendous value in creating a charter school with a rigorous academic curriculum, especially in towns where district schools consistently under-perform. This interest has led me to join the founding effort of the Advanced Math and Science Academy Charter School. I have been actively involved in the Founding Board from early on, and have also joined the Curriculum Development team where I took the lead in developing IT/CS curriculum.

I strongly believe that rigorous academic instruction can be combined with a nourishing and exciting environment where that the children of diverse backgrounds and abilities will thrive. I believe a school like the Advanced Math and Science Academy will be a wonderful place for children to learn, and I am excited to be part of such an important endeavor.

### David C. Foster

Proposed Position: Board of Trustees member, Community Outreach; Performance Evaluation Design Team

I have resided in Marlborough, Massachusetts for 20 years. My wife and I have six children—3 boys and 3 girls of age 17 to 27. During their schooling years our children experienced our own home school, three private schools (Meadowbrook Elementary, St. Johns High School for boys and Dana Hall High School for girls) and two public district schools (Marlborough Middle School and Marlborough High School). Three of our children attended Marlborough High School.

I have a B.A. in psychology from the University of Oregon and a Masters degree in Business and Organizational Behavior from Brigham Young University. I have worked as both an educator and as an organizational performance consultant. As an educator I taught Organizational Behavior to Boston University MBA students and English, World History and U.S. History to inner-city high school students at Brighton High School. As a consultant I have worked with executives of business, healthcare and education organizations to design and implement improved performance management systems for sales people, production people, technical professionals and educators. Managing educational outcomes is perhaps the most important performance system in our society.

Because of these parental, educational and professional experiences, I feel that I am amply qualified to assess the strengths and weaknesses of a proposed charter school designed to serve middle and high school students in Marlborough, Hudson, Maynard and Clinton. I have examined the AMSA prospectus and found it very attractive.

Its curriculum design represents a fundamentally different paradigm from that which governs conventional public school education. AMSA will start each major subject in the 6<sup>th</sup> grade and driving the student's knowledge in that subject in a continuous, comprehensive fashion to ever-deeper levels without a break for six years. This depth-of-knowledge approach is a radical departure from the way subjects are presently taught over those same years in public district schools, which mostly feature a non-sequential or "a la carte" approach to various subjects. In the latter case, major subjects are either crammed into one year (e.g., biology) or sub-divided without tight integration over several years with major gaps in between (e.g., "Algebra I", then "Geometry", then "Algebra II"). The typical public school's high-speed, large-breadth subject matter coverage without proper long-term sequencing and indepth conceptual integration fosters a quick "learn-and-forget" mentality, shallow conceptual mastery, and serious gaps in subject matter coverage. (Typical physics or biology textbooks are far too big and the subjects too vast to master in one year. Teachers rarely "get through" the book.)

I find AMSA's **education-for-mastery** approach very attractive. Its design drives deep comprehension into longterm memory through structured repetition and continuous, hierarchical subject matter sequencing over many years. Ironically, this design allows students to progress more gradually through major subjects, absorbing "bite-sized chunks" more slowly yet much more effectively. Education after this fashion is designed to last and will provide each student with a rigorous intellectual foundation for a lifetime of effective cross-disciplinary learning—a necessity in the 21<sup>st</sup> century. AMSA provides a proven alternative for those parents who are open to new education paradigms.

### Prof. Andrzej Herczynski

### Proposed Position: Board of Trustees Member

My pre-college education was probably as academically rigorous as anyone can hope for. My father, a mathematician, organized a Sunday math school for several of my friends and those of my brother. Together with my peers, at age 9 or so, we were learning abstract topology. This continued in various forms until I finished primary school, and then I entered a special Mathematics High School, where math and physics was taught by university professors. At about the same time, I began tutoring other kids, usually children of my parents' friends. Thus begun my interest in teaching, and my belief that challenging young minds at an early age is a wonderful gift, whatever their aspirations.

After earning my MS in math from Warsaw University, I enrolled in graduate studies in physics at Lehigh University in Pennsylvania. Working toward my Ph.D., I taught labs and recitation classes for five years and became one of the most popular Teaching Assistants. I realized then that effective teaching required high enthusiasm and high expectations on the part of the instructor, in addition, of course, to a thorough knowledge of the subject. This is my teaching "credo" which I have now successfully implemented in the Department of Physics at Boston College. In my seven years here, I have made the introductory physics course more demanding and more appreciated, even by pre-medical students, than it was before. The number of undergraduate physics majors has nearly doubled in this time, and our pre-medical students excel on MCAT tests.

While teaching university students, I have also focused my interest in pre-college education. For five years, I have organized a small summer program for high school students interested in science. The program has been so successful, that we are now planning to expand in cooperation with local schools. I also have begun an outreach program, with a mobile physics demonstration show that we will take to schools. These are no doubt worthwhile initiatives, but they are limited in scope. So, when I learned of the Academy of Math and Science, a charter school whose founding principle is an academically rigorous program with advanced math and physics offered from the early grades, I immediately identified with its goals. As a board member, I hope to help design the school's curriculum so that it will offer an educational experience of the kind I enjoyed as a lucky child but in a public school setting open to anyone. And, beyond the Academy, all of us on the board think of the Academy as a model for other schools, whose "experimental" approach can be readily multiplied. The experiment, we're confident, will

demonstrate that high academic standards compel all students to learn more, and provide optimal conditions for developing their individual talents.

#### Evelyn Lima

Proposed Position: Board of Trustees Community Outreach Committee: Brazilian Community Liaison.

I am extremely impressed by the Advanced Math and Science Academy (AMSA) Charter School's curriculum. I completely support the school for several reasons:

- This is the school system I was brought up in; I can tell IT WORKS!
- As a teacher, I recognize its great benefits and the curriculum speaks for itself.
- Finally, as a mother; I am so excited to have the choice and the pleasure to see my kids being educated in a system that is proven to be great, otherwise it would not be used by most of the countries.

For those reasons I would like to express my great interest in working with the Founder's group as a Bilingual (Portuguese/English) Community Liaison. I am sure there will be a great interest by the Brazilian community because AMSA and Brazilian schools have very similar curricula.

#### Deepak Narain

Proposed Position: Board of Trustees Member

I would like to express my full support for the Advanced Math and Science Academy Charter School. I am a longtime resident of Marlborough and a parent of a Public School first grader. I look forward to a choice in schooling as my children grow older and start to make choices about their future.

As somebody whose academic background covers both the breadth-oriented American educational system, and a depth-oriented, classical math- and science-oriented education, I feel that I am in a unique position to be able to judge the merits and demerits of each system. Having studied the agenda and the design of this school, I am very happy to see it is going to be built on a foundation that combines the best of both educational cultures.

I believe the proposed Academy provides a service that is complementary to anything being offered by the public school system. Much more importantly, I believe that it provides a service that is becoming increasingly important in a modern, networked, technology-oriented world.

While I do not think that a focused math/science education should be forced, I believe that those children (and parents) who are so inclined should have a choice without having to resort to extremes like home-schooling or rigorous weekend education programs; both of which take away from the opportunity for a student to learn from peers and interact with others with similar interests.

I also can attest that there is a sizeable population of such parents and students whose needs are not being fulfilled by the public educational system.

Our community desperately needs such an option. My hope is that this school can blaze a trail in setting the standards for math and science education in the future and set an example for the public system to emulate. I have great faith in the capabilities of the founders and look forward to the establishment of this school and in participating in its success.

#### Samuel L. Rodriguez Proposed Position: Board of Trustee member

My name Samuel L. Rodriguez and I am a resident of Maynard Massachusetts with my wife Terri and son Jordan who is three years old. We are graduates of Cornell University. I have been an attorney for the past fifteen years.

Over the past ten years I have served on numerous education and advocacy groups as an attorney and as one of the Youth Directors at St. Paul A.M.E. church, an inner city church in Cambridge with 1500 members. In particular, I was the Executive Director of the Latino Parents Association a non-profit organization geared towards the parent training and self-empowerment.

I know first hand the importance of a good education to increase the chances of excellence for children in all communities. Unfortunately, I have also seen too many children with tremendous potential "fall through the cracks" because of poor placement of children, poor tracking of children and poor curriculum development. I truly believe that a charter school that implements a fresh (although not new) curriculum development and student tracking is needed particularly in those communities where children have historically under performed.

While to some degree raw intelligence is something that cannot be taught, the skills necessary for children to excel in this ever competitive and global economy can be taught and learned over time to most students no matter the socio-economic status so long as the right curriculum student tracking is implemented over time. I support charter schools because it provides the best environment to implement the necessary paradigm shift in how we educate our children if they are going to excel (not just succeed) in the 21<sup>st</sup> Century.

#### Edward J. Shamber

Proposed Position: Board of Trustees Member

During my business and banking career as a financial executive, I have been an active advocate for selfdevelopment and growth. Born, raised and educated in Boston, early on I realized the value of education, training and development for self-enrichment.

After becoming a licensed CPA in 1972, I joined the oldest (in the country) and largest Massachusetts Savings Bank. I helped implement a modern financial management approach in the bank. Within two years, I became the bank's youngest treasurer at age 28 and, as Director of Finance, helped direct the financial growth of the bank. During the 10 years I was with the bank, it grew from \$700 million to \$1.5 billion in assets. Formal education was stressed and numerous training exercises and courses were developed and offered in-house. A middle management program was developed and implemented in-house. Supervisors had to complete a self-learning course to be promoted. This growth and education environment further flamed my continuous interest in selfdevelopment.

In my 25 years as a volunteer business instructor with Junior Achievement, I have stressed to students to think about what they are good at. What are your abilities, skills and interests? Then, take steps to improve them. One of my favorite development clichés is "If you don't know where you are going, any road will take you there." I am particularly interested in our youth learning to maximize their potential through education and training.

I believe in the mission of the Advanced Math and Science Academy Charter School and share its goals. Our charter school will be geared to significantly improve the math and science abilities (scores) of the students who attend. The school will benefit many students in Marlborough-Hudson-Maynard-Clinton area.

#### Prof. Mikhail Shubin

Proposed Position: Board of Trustees Member

I started teaching high school students when I was 16 years old. This happened right after I came to Moscow from a provincial Russian city to become an undergraduate student of the Department of Mechanics and Mathematics

(Mekhmat) at Moscow State University. I was invited to participate in a special teaching program for Moscow high school students, called Mathematical circles. Under supervision of the older students I taught 10th grade students (which was the highest grade in Russian schools at that time). We had a freedom to choose the topics that we deemed interesting for the participants of our circle. Next year we were trusted to start teaching 8th grade in a continuous, 3-year program.

This was just a start, my work with different level school students continued almost uninterrupted until this day. It included teaching in various Mathematical circles, in an evening school at Mekhmat (where I was the principal for two years), in a correspondence math school (where I supervised a group of teachers), in an advanced math and physics high school in Moscow. Two of these schools were organized and/or supervised by world-famous mathematicians, Prof. Gelfand and Prof. Dynkin. Then for many years I participated in the organization of a number of summer schools around the country. I am an author of two books for high school students. I also never interrupted my teaching at different universities (in Moscow State University, M.I.T. and Northeastern University), and published a successful textbook on one of the topics that I taught. Overall, I discovered that teaching is one of my vocations, as important as research in mathematics. I had many teaching successes in my past, and almost no failures.

Right after coming to the U.S., I discovered that the school education level in this country is behind other countries in many respects. I feel that I should try to contribute to attempts to change this situation. I believe that the Advanced Math and Science Academy Charter School will provide a successful model of improving the middle and high school education, and I am willing to contribute my time and expertise. I think that helping to organize and direct a new, academically innovative and rigorous charter school may be one of the opportunities, which I should not miss.

# Dr. Julia Sigalovsky

Proposed Position: Lead Founder, Executive Director; Design Team member – Chemistry.

My family and I came to the U.S. about 15 years ago: myself, my husband, my 11-year-old son and a dog. All our worldly possessions included \$400 in cash and six suitcases full of clothes. But we also brought with us something larger than any luggage: we brought an excellent education. Both my husband and I are graduates of one of the best advanced Math and Physics high schools in Moscow. And, in spite of the fact that we are also graduates of Moscow State University and I have a Ph.D. degree in Chemistry from the Russian Academy of Sciences, it was our knowledge base from high school that made all the difference in survival and success in our new world. Both of us had to change our specialties and learn new technical disciplines a few times, and every time we drew the ability to accommodate to new conditions and to master new professions from the solid base of knowledge received many years ago at the Math and Physics high school in Moscow.

In the U.S., as a research scientist at MIT, I supervised undergraduate and graduate students. As a president of my engineering company with over 30 employees, I hired and managed engineers. As a parent of two very academically different children, I closely participated in their school work and helped them in their learning. I observed that the students and engineers, although they may be professionals in their narrow specialties, nevertheless lacked a basic knowledge in most of the broad disciplines, especially in math and science. I also observed through my children's schooling that the school education was lacking a solid knowledge base in math and science.

Over the years, I developed a sense of urgency for the vital necessity of a school that would be different from the schools I observed around me. My vision of a new public school was one that would build leaders in science and technology; it would have a structured sequential curriculum in all subjects starting from the early years, especially in Math and Science; it would teach that hard work and personal responsibility are the keys to success in any future profession.

I feel so strongly in the need for this type of public school to be created that I have chosen to work full time to make it a reality. I strongly believe that the Advanced Math and Science Academy Charter School will fill the "learning and teaching gaps" between the knowledge base that our children obtain at school - and the requirements of it for success in college, between our school graduates - and the high demands of modern work place, between the technical level of the U.S. scientists and engineers and the position of the U.S. as the world technological leader.

### Gene Buchman

Proposed Position: Design Team member, Consultant, Child Psychology and Special Education

I strongly support the establishment of the Advanced Math and Science Academy Charter School, from the dual perspectives of my career in technology, and my subsequent career in education. My experiences have taught me the need for core disciplines to be taught rigorously and, especially, the fundamental importance of mathematics as the *lingua franca* of science. Indeed, virtually all scientific and technical fields of advanced study comprise applied mathematics superimposed on a specialized knowledge base.

It is essential for our Commonwealth and our country that we produce mathematically and scientifically literate students who are able to "hit the ground running" in college; students suited for advanced placement, rather than remediation; students who have learned how to learn and to love learning. I believe the philosophy and proposed methods of the Advanced Math and Science Academy Charter School offer a vehicle to produce such students. I am excited to be associated with a school focused on excellence rather than simple adequacy, and one which recognizes the central role of mathematics in the sciences.

I feel that the curriculum and structure of the Advanced Math and Science Academy Charter School are superbly suited to attain the objective of molding an intellectually fit student body, and I look forward to continuing to have an active role in that effort.

# Mikhail Khmelnitskiy

Proposed Position: Design Team member, Mathematics, Computer Science; Principal

I greatly value the academic style, logical structure and consistency of the curriculum of the Advanced Math and Science Academy Charter School and the philosophy of its founders and am excited about the opportunity to work at this school. As a Moscow State Pedagogical University graduate with over 18 years teaching experience, I am confident that a solid background in Math and Science is a necessity of our time with its constantly changing environment. This does not mean that Humanities and Language Arts should be undervalued, quite the opposite. I believe that every child is capable of understanding any subject and that this is a teacher's responsibility to explain difficult concepts in a simple way and make it enjoyable for children to participate in the discovery process.

I myself started to feel a strong desire to study science since I was 10. The first manned flight into space amazed me so much that I began to learn astronomy and physics. Living in a small town near St. Petersburg, Russia, I had no option to choose a school that would better fit my interests and ability, and my best educators were books, the 10-volume Encyclopedia for children printed in 1961, in particular. I received my first exposure to serious mathematics through the Mathematics Correspondence School founded by Prof. Gelfand. The assignments were diverse, challenging, and it was pure fun to solve the problems. I believe that students who receive such assignments will feel the same way. That is why I am attracted by the concept of the Advanced Math and Science Academy Charter School and would like to contribute to its success.

I worked with a group of great educators and authors of textbooks for high school students. Inspired by them, I developed innovative curricula in Precalculus, Graph Theory, and Computer Science. The last one led me to establish close relationships with computer centers and laboratories of the Russian Academy of Science and State Department of Education. They allowed students to work on their facilities during a summer internship.

Being a Lead Teacher of Moscow High School No.179, I attended an Educational Leadership Program and was assigned the responsibilities of Assistant Principal. This led me to develop leadership skills necessary to lead the government-funded project that resulted in a successful implementation of an advanced computer-based educational system.

Working on computer system design, I tried to find time for teaching. I founded the Computer Science School (called School of Young Programmer) that attracted dozens of interested children from the Moscow metropolitan area every year. Several university professors supported the idea; they volunteered to serve as consultants, introduced the students to real-life projects, and sometimes organized internship of small groups of students at their university departments. As a school Principal for about 10 years, I am especially proud that many of our students, who were school-age youngsters, had contributed to the development of the entirely new approach to the computer-assisted education. Among the Computer Science School graduates there are scientists and computer specialists; one of them eventually had become the Dean of the Mechanics Department in a university.

I feel confident that having a team of like-minded enthusiasts supported by a group of dedicated parents, the Academy will achieve the goal of significant improvement in students' level of knowledge and will be a model for other schools.

#### Josef Novotny

Proposed Position: Design Team member, Information Technology/Computer Science/Engineering Design; Teacher

Living in the area for the last 14 years, I always believed there is a need for a regional charter school as an alternative to many public and private schools located in this area.

Today, parents in our region are faced with a choice of a public school that is free but does not provide a high quality education, or a private school that provides a high quality education but at a very expensive price.

I come from Czechoslovakia, a small country located in the middle of Europe. Our country, like other Socialist European countries, was poor. One of the few good things it offered was an excellent public education based on strong math and science in its middle and high school curriculum. It helped me to succeed not only in college but also in getting good jobs after graduation both in Europe and in the U.S.

After arriving in this country in 1982 and working for several years, I was accepted to the MIT graduate school. I used all my savings before graduation, but I believed that high quality education is a good long-term investment. I also realized that a student's performance has nothing to do with ethnic or social background, but with the education acquired in previous years, namely in middle and high school. I knew that to introduce such an education would require not only a strong European-like curriculum, but also teachers who attended schools in an education system similar to the one I went through in Czechoslovakia. Only after I met with members of the Founding Group, I realized that there are other dedicated parents in the area who share the same idea of establishing a public school providing a premium education accessible to all children in the entire region.

I am confident that the proposed Advanced Math and Science Academy Charter School can fill the gap in the education system in the area.

#### Victoria Vainer

Proposed Position: Design Team member, Literature; Lead Teacher

As part of the Advanced Math and Science Academy Charter School enthusiastic team, I came to the United States with extensive education and diverse professional skills as my only luggage and capital.

I started my professional life in Russia as a violinist, playing, among others, in the Moscow State Symphony Orchestra. Later, after graduating from The Moscow State University School of Journalism, I had been working for many years as a journalist, writing music, literature, and theater reviews for different Moscow art magazines. I also worked for five years as one of the editors and a staff writer of the *Dionysus*, an international magazine on theater and arts, where my responsibilities included writing and editing articles about theater and musical life in Moscow.

My teaching career started in 1987, when I was invited to participate in creating the Department of the History of Culture in the Moscow Institute of Physics and Technology (the most prestigious institute of its kind in Russia, analogous to MIT). My responsibilities included creating and teaching courses on the History of Russian Literature, Theater and Drama for students majoring in physics and computer science. The experiment proved to be successful, and in 1990, I was invited to teach similar courses in a public school (Moscow Lyceum), affiliated with this institute.

While pursuing my master's degree in Comparative Literature at Michigan State University, I worked as a Teaching Assistant and a visiting instructor, teaching Russian language and other courses in the humanities. For the last five years, I have been employed by the Academic Achievement Center, a small private school for gifted/talented students with learning disabilities. My responsibilities include teaching English Language Arts and social sciences to the elementary, middle, and high school students (2-12).

It did not take long to realize how uneven and - in many cases - flawed the American public school system has become. It fails many of its students; the level of total or partial illiteracy in the country's public high schools speaks volumes about this long and ongoing crisis.

That is why I think that the Advanced Math and Science Academy Charter School should get full support form anyone who is as seriously and deeply concerned about education in America as the Founders are. That is why I am so enthusiastic and willing to join their brave and promising enterprise. In my opinion, the country's only chance to solve the problem with education lies in an incessant and aggressive search for positive and radical changes. The Academy seems to be perfectly equipped to become one of them.

### Robert Kaplan, Ellen Kaplan

### Proposed Position: Advisory Group members

As co-founders and co-directors of The Math Circle, we are pleased to support the Advanced Math and Science Academy Charter School. Institutions of quality are desperately needed, and this promises to be one. We are especially concerned with the teaching of mathematics, notoriously dismal in so many ways. The program that the Advanced Math and Science Academy offers is ambitious, of a high standard and directed not toward rote memorization but vivid comprehension of the principles and practices of mathematics.

We hope the Department of Education will give the proposal of the Advanced Math and Science Academy Charter School the serious consideration it deserves.

Attachment 7. 3-Year Budget Projections

Maior Accumutions	Vr. 1	V. 3	Vr 2	Accumutions (Bacad on 2003 data)
		7		
Tuition per student	8,314	8,314	8,314	Marlborough - \$8,765, Hudson - \$8,479. Maynard - \$8,368, Clinton - \$7,646. Average \$8,314
Student Enrollment	276	393	493	Assumed 15% annual attrition each year in grades 8 and up.
Facility Size (square footage)	30,000	30,000	45,000	1st and 2nd year - 29,000 SF, 3rd year - 45,000 SF
Average Full-time Teacher Salary	49,000	51,450	54,023	5% annual cost of living increase
Full time teachers	18	23	32	
Part time teachers	ε	9	5	
# of full-time admin. staff	4	7	7	
# of part-time admin. staff	2	2	2	
Revenues	Yr. 1	Yr. 2	Yr. 3	Assumptions
Revenue from State Sources				
Per pupil tuition	2,225,824	3,171,799	3,975,878	(Per pupil tuition) x (student enrollment) x 97%
State Entitlements				Will apply starting year 2. Because amount is unknown, not included in the budget
State Grants	20,700	29,498	36,975	Charter school facilities grant: estimate \$75/student.
Transportation	17,871	25,466	31,922	FY03 transportation \$259 (in Marlborough) ofset exactly by cost.
Revenue from Federal Sources				
Federal Entitlements	59,250	81,244	90,938	Title I:\$400-1000 (\$700 average) per eligible student per year. Title I- "disadvantaged students, eligible for the free or reduced lunch": Marlborough-22.3%, Hudson-11.9%, Maynard-12.2%, Clinton-30%, for the budget used 15%. SPED: grant codes 274 (\$7500/school) and code 240(\$550/sped student). SPED population: Marlborough-20%, Hudson-18%, Maynard-10%, Clinton-14.9%, for the budget used 15%.
Federal Direct Grants	0	0	0	The Executive Director will apply to as many competitive grants as possible, but because amount is unknown, not included in the budget
Federal Revenue Pass Through Commonwealth		150,000	150,000	Start-Up Assistance Grant (first year - in the start-up budget)
Federal Reserve Pass Through Another Agency	0	0	0	N/A
School lunch	26,158	37,275	46,724	FY04 DOE data: Paid Lunch \$ .2665, Reduced Price Lunch \$1.8465, Free Lunch \$2.2465. For budget calculations used 15% eligible for fee/reduced lunch
Revenue from Local Sources				
Private Grant Revenue	0	0	0	N/A
Fundraising	40,000	40,000	40,000	
Investment Income	0	0	0	No investment is expected in years 1-3.
Program Fees	0	0	0	Programs such as field trips will be funded by fundraising and staffed by volunteers.
Lunch	126,684	180,525	226,289	\$3 per student per day for those students who are not entitled to free or reduced lunch

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Facilities Rental	0	0	0	No facility income is expected.
TOTAL REVENUE	2,516,487	3,715,806	4,607,728	
Expenditures	Yr. 1	Yr. 2	Yr. 3	Assumptions
School Administration				
Salaries and Wages-Executive Director	98,000	102,900	108,045	5% annual cost of living increase
Salaries and Wages-Principal	70,000	73,500	77,175	5% annual cost of living increase
Salaries and Wages- Vice Principal, Humanities		65,000	68,250	Starting in the 2nd year, 5% annual cost of living increase
Salaries and Wages-Head of Operations	45,000	47,250	49,613	5% annual cost of living increase
Salaries and Wages-Head of Student Affairs	45,000	47,250	49,613	5% annual cost of living increase
Salaries and Wages-Bookkeeper	9,000	18,900	28,350	Part-time contractor, \$25/hr, increase 5% each year. First year: once a week for a day, 45 weeks/year. 2nd and 3rd years: 2 and 3 days/wk.
Salaries and Wages-Admin. Assistant	10,800	35,000	36,750	1st year - 2 days/wk, \$15/hr
Salaries and Wages-Head of Resources Developr	rnent	50,000	52,500	starting the second year, 5% annual cost of living increase
Salaries and Wages-IT specialist	18,000	30,000	55,000	2 days/week @\$25/hr in the 1st year, 1/2 time starting the second year, full-time starting the third year
Fringe Benefits-Health Insurance	9,300	16,275	16,275	See table of taxes & benefits
Fringe Benefits-Retirement Benefits				No retirement expences are planned
Payroll Taxes	37,714	59,293	65,348	See table of taxes & benefits
Accountability	10,000	5,000	5,000	Required spending by Start Up Assistance Grant \$10k in 1st yr, 5K in 2nd & 3rd of grant.
Office equipment	800	800	800	\$800/year service agreement for the copier.
Office Supplies	2,400	3,900	3,900	\$500 per full-time administrator and \$200 per part-time administrator
Equipment and Furniture		1,650		\$550 per each new full- and part-staff for furniture
Information Technology		3,300	1,000	Desktop computers for new administrative staff, \$500/each. Software license \$150/ea. \$1,000 - laptop. 2nd and 3rd year - \$1,000 for maintenance
Sub-total- School Admin	356,014	560,018	617,618	
Instructional Staff (Teachers)				
Salaries and Wages- Full Time Teachers	882,000	1, 183, 350	1,728,720	5% annual cost of living increase
Salaries and Wages- Special Ed. Teacher	82,500	115,500	144,375	Estimated average SPED teachers salary 55,000. SPED teachers: 1st year - 1 FT+1PT, 2nd year - 2 FT, 3rd year - 2 FT + 1 PT. 5% annual increase
Salaries and Wages- Part Time Teachers	73,500	154,350	135,056	5% annual cost of living increase
Salaries and Wages- Substitutes	4,500	4,725	4,961	36 days/year* \$125/day, 5% increase every year.
Fringe Benefits-Health Insurance	41,850	53,475	74,400	see table of taxes & benefits
Fringe Benefits-Retirement Benefits	0	0	0	MTRS has one time set up fees of \$1500. No other required expense for employer
Payroll Taxes	137,089	191,717	264,724	see table of taxes & benefits
Sub-total Instructional Staff	1,221,439	1,703,117	2,352,237	
Instructional				

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Consultants	5,760	5,760	5,760	2 hrs/wk, 36 weeks @\$80/hr
Professional Development	5,760	5,760	5,760	Outside experts 2 hrs/wk, 36 weeks @\$80/hr
Special Education	10,350	14,749	18,488	Special education materials and equipment, \$250/SPED student
Student Assessment/Testing	5,520	7,866	9,860	\$20 per student
Supplies/Materials- Instructional	27,600	39,330	49,301	\$100/student
Classroom Furniture	44,160	18,768	15,953	\$160 per new student
Equipment- Instructional	7,200	9,200	12,800	\$400/full-time teacher
Textbooks	41,400	24,840	26,600	\$150/per new student, reuse of 90% of the last year books
Informational Technology		5,600	31,600	Desktops(\$550) and software (\$150/ Microsoft Office license) for new teachers. Upgrade of computer labs in the 3rd year (50 computers @\$500/ea and a server \$1000).
Computer Supplies and Repairs	4,615	5,175	8,335	10% of cumulative computer cost
Library	2,000	3,000	4,000	Staff subscriptions to journals, student library - donations
Sub-total- Instructional	154,365	140,048	188,456	
Business Services				
Accounting	3,000	4,000	4,000	CPA: cost of purchase and annual upgrade of accounting system (\$1000), year-end financial statement \$3,000
Reporting/Documenting/Internal Controls	5,000	5,000	5,000	Required spending by Start Up Assistance Grant \$5k/year of grant.
Advertising-Student Recruitment		3,000	3,000	6 ads \$500/ea per year. First year - in the start up budget.
Advertising- Teacher Recruitment		3,000	3,000	6 ads \$500/ea per year. First year - in the start up budget.
Public Relations/Marketing	2,000	3,000	4,000	Printing flyers
Insurance- General Liability	10,000	15,000	20,000	Increase \$5k per year
Insurance- Vehicle				N/A
Insurance- Other	5,000	5,000	5,000	Officers & Directors insurance-\$5k
Office Expenses: office supplies	9,600	12,700	17,000	\$500 per full-time teacher, and \$200 per part-time teacher
Fees, Licensing, Dues, and Memberships	2,000	4,000	4,000	State Charter School Association, other associations in year 2 and 3.
Payroll Services	1,200	1,200	1,200	assume \$50 per pay period, 24 pay periods
Postage and Shipping	4,000	7,000	10,000	\$2,000 per grade per year, plus 1000 each additional year
Printing/copies	1,000	10,000	10,000	Copier supplies, additional copiers and printers purchase and service agreements in years 2 and 3
Telephone	10,200	10,200	10,200	\$500 per month plus 4 cell phones @\$50/mo, plus DSL @150/month
Travel	6,000	12,000	12,000	International teachers exchange
Sub-total Business Services	59,000	95,100	108,400	
<b>Operations and Maintenance</b>				
Contract Labor- Non-Instructional	0	0	0	N/A
Custodial Services	30,000	30,000	45,000	\$1 per square foot per year
Maintenance- Vehicle	0	0	0	N/A
Maintenance-Facility	3,000	3,000	4,500	Janitorial Supplies: \$0.10/sq.ft.
Maintenance- Office Equipment	500	4,000	4,000	Office equipment repairs and maintenance
Supplies/Materials- Maintenance	300	4,000	4,000	Office equipment repairs and maintenance
Sub-total Operations and Maintenance	33,800	41,000	57,500	

Physical Plant				
Rent	300,000	450,000	450,000	Marlborough market prices from \$7 to \$12 /SF, assumed \$10/SF for 30,000 SF in year 1 and 45,000 in years 2 and 3.
Mortgage				N/A
Renovation/Construction		112,500	112,500	Renovation of additional 15,000 SF at \$15/SF to be done at the end of 2nd year. Renovation cost to be paid in equal portions from the 2nd and 3rd year budgets.
Capital Debt Service	100,000	100,000	100,000	Payback of the initial renovation loan (\$400,000 for 5 years, 9% interest rate).
Utilities	60,000	60,000	90,000	\$2 per square foot per year for gas, electricity and water
Parking	0	0	0	Free parking included with the facility.
Grass/snow removal	0	0	0	Included in rent, done by the landlord
Pest control	3,000	3,000	3,000	10 times/year @300 (monthly because the students eat in the classrooms)
Sub-total Physical Plant	463,000	725,500	755,500	
Student Services				
Health (nurse)	20,000	21,000	22,050	Part time nurse \$20k. 5% increase per year
Transportation	17,871	25,466	31,922	Transportation cost for FY03: \$259 (in Marlborough)
Food	149,040	212,382	266,223	\$3.00/day for x 180 days for all students
Recreation	0	15,732	19,720	1st year use fundraising and volunteers, 2 and 3 year: 4 trips/year @\$10/student
Sub-total Student Services	186,911	274,580	339,915	
Board of Trustees				
Audit		10,000	10,000	Audit \$10,000 in year 1 and 2
Advertising	0	0	0	N/A
Dues and Subscription		1,000	1,000	\$1,000 starting 2nd year
Workshops and Conferences	8,000	8,000	8,000	Start Up Assistance Grant requires \$8000 to be spent on Governance.
Fundraising	2,000	3,000	4,000	Fundraising events: dinners, sales, bakes, trips
Legal	4,000	5,000	6,000	Legal consulting allowance.
Contingency Fund	25,165	111,474	138,232	1% in year 1 and 3% in years 2 and 3.
Sub-total Board of Trustees	39,165	138,474	167,232	
TOTAL EXPENDITURES	2,513,694	3,677,838	4,586,857	
NET	2,793	37,969	20,870	

		A	Atta	chr	nen	t 6.	Ac	tio	n Pl	an													
Task/planning area	<sup>o</sup> rimary Respon.	Secondary Respon.	5-Nov	-Dec	5-Dec	-Jan	5-Jan	I-Feb	15-Feb	-Mar	5-Mar	l-Apr	5-Apr	l-May	5-May	-Jun	15-Jun	-Jul	15-Jul	-Aug	5-Aug	-Sep	5-Sep
Student Deenvitment		0.15	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	1	-	_	-
Design family information flyer in	ED	D	v	v	v	v	v	v	v														
English and Portuguese. Distribute, post on web site	ED	D	X	X	X	x	x	x	X														
Design student "Pre-enrollment Interest" form in English and	ED	В			х	х																	
Portuguese. Post on web site		N1/A																				┢──┥	
newspapers including Portuguese	ED	N/A				Х	Х	Х	Х	Х	Х												
newspapers																							
Set up and hold parent information sessions	ED	В				Х	х	Х	Х														
Collect Pre-enrollment Interest and	ED	N/A				Х	х	Х	Х	Х													
Hold a lottery	FD	N/A									Y												
Notify families of status	FD	$N/\Delta$									v												
Establish a wait list or repeat lottery	FD	N/A									^		v										
Send enrollment list to the DOF	FD	N/A									Y		^										
Request student records	FD	N/A									~			¥	¥	Y							
Perform intake interviews	Staff	ED.									-			~	~	^				v	v	v	
Assess what social services students	Staff	FD																		Ŷ	× Y	Ŷ	
will require and arrange for services to	otun																			^	^	Â	
be provided.																							
Create the Parent/Student Handbook.	Staff	ED																		х	х	х	
mail to families																							
Hold Parent Orientation meeting	Staff	ED																			Х		
Initiate Parent Support Group	Staff	ED																				х	х
Facilities																							
Contract a real estate broker, review	ED	N/A	С																				
available sites, prepare a short list																							
Contract a lawyer to draft a contract	ED	N/A						Х															
Negotiate lease	ED	N/A						Х	Х	Х													
Secure financing	ED	N/A							Х	Х													
Sign lease	ED	N/A								Х													
Issue bids for renovations	ED	N/A								Х	Х												
Hire contractor	ED	N/A									Х												
Oversee construction/renovation	ED	N/A									Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х
Undergo final inspection/granted	Staff	ED																			Х	Х	Х
occupancy certificate																							
Acquisition of furniture, equipment and materials	Staff	ED																			Х	х	Х
Prepare building infrastructure (e.g.	Staff	ED																			х	х	х
lights, phones, computer networking)																							
Obtain property insurance	Staff	ED									-											х	Х
Fund Raising																							
Establish 501c3	ED	В									Х												
Develop strategy	В	ED								Х	Х	Х											

	r		-	-		1	-	-	-	-	1	1	-	-		-	-		1	1	-	-	
Write and submit proposals to	ED	В									Х	Х	Х										
government sources and foundations	D																						
Plan and nost series of fundraising	В	ED											Х				Х				Х		
Einancial Management																							
Dovelop cohodulo of Poord financial	ED	Stoff																				v	v
reviews		Stall																				X	X
Contract annual auditor	Staff	ED																		х	х		
Define signature policies	ED	В																		х			
Open bank accounts	FD	N/A														x				~			
Purchase and set up accounting	FD	N/A													Y	Y							
software		1.1/7													^	^							
Develop a list of accounts to track	Staff	ED																				Х	Х
finances																							
Identify check writers and signers	Staff	ED																		х			
Design accounting process forms and	Staff	ED																				х	х
reporting templates																							
Contract and implement payroll	ED	ED														х							
Contract insurance	FD	FD														x							
Governance	1 - 5															~							
Recruit and pominate new Board	R	ED	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v
members			^	^	^	^	^	^	^	^	Â	Â	^	^	^	^	^	^	Â	^	^	^	^
Create a Board members handbook	B	ED						v	v	v													
Create a load members handbook	D							^	^	^ V	v	v											
board for individual board mombors	D	IN/A								X	X	X											
or the officers. Elect officers																							
Or the onicers. Elect onicers.	D	NI/A																					
create a job description for each	D	IN/A									X	X	X	X									
Committee chair and each committee.																							
Cond Tructon information to the DOF:	Б																						
Send Trustee information to the DOE:	в	ED									х	X											
infancial disclosures, information form,																							
and resume.	P																						
Develop a board calendar for the year	В	ED		Х	Х					Х	X												
Create a board development plan to	В											Х	Х	х	Х								
include orientation of new members,																							
retreats, worksnops, etc.	_																						
Develop Board templates for meeting	В	N/A									Х	Х	Х	х									
agenda, meeting minutes, Board																							
handouts, evaluation forms,																							
	_	N1/A																					
Develop and file articles of	В	N/A									Х	Х											
Incorporation	_																						
Create and approve necessary	В	N/A								Х	Х	Х	Х	Х	Х	Х	Х	х	Х	Х	Х	Х	Х
policies	_																						
Create a job description and	В	N/A							х	х													
evaluation process for the school																							
leader.																							
Hire the school leader.	В	N/A								Х													
Personnel																							
Create staff job descriptions, flyers,	ED	N/A				х	х	х	х														
and ads. Develop candidate																							
information packets to include the																							
school brochure, benefits package,																							
school calendar. Design a	1				1															1			

filing/documentation process.																							
Develop staff handbook. Define	ED	N/A					х	х	х	Х													
policies and procedures for evaluation																							
of staff																							
Create various "form letters" including	ED	N/A					х	х	х	Х													
"Application received" postcard,																							
Decline letter, Offer letter, drafts of																							
teacher's contract and administrator's																							
work agreement																							
Evaluate recruiting agencies, select an	ED	N/A					Х	х	Х	Х													
agency.																							
Place ads in newspapers, recruiting	ED	N/A								Х													
agency, college career boards																							
Conduct interviews, teachers' tests,	ED	Instr.								Х	Х	х	х	Х	Х	Х	Х	х	Х	х			
model lessons.																							
Evaluate candidates, make hiring	ED	Instr.								х	х	х	х	х	х	х	Х	х	х	х			
decisions, check references, conduct																							
criminal check, send offer letters																							
Negotiate and sign work agreements	ED	N/A								х	х	х	х	х	х	х	Х	х	х	х			
and contracts																							
Fill out forms to enroll teachers in	Staff	ED															Х	х	х	х			
Mass. Teacher Retirement Board																							
Plan and hold staff orientation	ED	Staff															Х	х	х	х			
sessions																							
Perform teachers' training	Instr.	ED																	х	х	х	х	х
Transportation																							
Define transportation requirements	ED	Staff																х	х	х	х	х	х
Determine transportation	Staff	FD																		x	x	x	x
arrangements	• • •																			~	~	~	~
Assign eligible students to buses	Staff	ED																			х	х	х
Mail memo to parents regarding the	Staff	ED																				х	Х
bus stops and the bus schedule																							
Food Service																							
Identify free/reduced lunch students	ED	N/A												х	х	х							
and contact DOE																							
Mail letters to parents with food	Staff	N/A																		х	х	х	
arrangements information, collect fee																							
for lunch																							
Determine food service arrangement,	Staff	ED																			х	х	х
evaluate and select vendors, sign																							
contract																							
Curriculum, Teaching, and Learning																							
Design curricula outlines in all subjects	ED	В	С														-						
Identify the intra- and inter-disciplinary	Instr.	N/A														Х	Х	х	х	х			
teams for the lesson plan development																							
for each subject																							
Create detailed benchmarks for all	Instr.	N/A														х	х	х					
grades and all subjects																							
Set up deadlines and format for 6th	Instr.	N/A			1											х	Х						
and 7th grade lesson																							
plans/homeworks/tests.					<u> </u>	<u> </u>	<u> </u>		<u> </u>	<u> </u>	<u> </u>								<u> </u>				
Create lesson plans in all subjects for	Instr.	N/A														Х	Х	Х	Х	Х	Х	Х	Х
jouriand / In grades.	1			1	1	1	1		1	1	1								1	1	1		

			_		-		-				-						-		-				
Set up a system of instructional record keeping (filing, storage, information update and exchange) for easy access	Instr.	N/A															Х	Х					
Burghass materials and touthooks	Inotr	Ctoff																			7		
Purchase materials and textbooks	Instr.	Stall N/A														v	v	v	v	v	X	X	v
timeline including baseline	11150.	IN/A														X	X	x	X	X	X	X	X
assessment																							
	ED	Inetr													v	v	v						
Special Education		11150.													^	^	^						
Identify SPED student population	Inetr	NI/A															v	v	v	v	v		
Acquire SPED student records		In/A													v	v	×	^	^	^	^		
Conduct meetings with the SPED	Inetr	NI/Λ													^	^	^	v	v	v			
students' parents	msu.	N/A																	^	^			
Consult with SPED administrator from the district	Instr.	N/A																Х	х	х			
Develop IEPs	Instr.	N/A																х	х	х	Х	х	Х
Define service requirements for all	Instr.	N/A		1	1	1	1	1										Х	х	х			
SPED students																							
Hire/contract providers	Instr.	N/A																			Х	Х	Х
Identify and secure specific texts and	Instr.	N/A																			Х	Х	Х
School Culture and Climate																							
Create and distribute school calendar	Staff	Instr																		v	v	v	
and class weekly schedule	Otan	mou.																		^	^	^	
Review Code and Conduct discipline	Staff	FD																		x	x	x	x
policy. Establish discipline procedures	otan	20																		~	~	~	
and responsibilities																							
Develop special rituals/routines	Staff	ED																		х	х	х	х
Design uniforms	ED	В										х	х	х									
Identify potential vendors, select the	ED	N/A												X	х								
vendor		-																					
Mail memo to parents regarding	ED	N/A														х	х						
uniform purchase		-																					
Health and Safety																							
Acquire medical forms and send to	ED	ED												х	х	х	х	х					
parents																							
Develop a system for record-keeping	Staff	ED																		х	Х	Х	
Check for completion and file returned	Staff	ED																		х	Х	Х	
forms																							
Report to state	Staff	ED																			х	х	
Create and distribute health and safety	Staff	ED																		Х	Х	Х	Х
handbook																							
Purchase first aid resources, hire	Staff	ED																		х	х	х	Х
nurse																							
Staff first aid training	Staff	ED																			Х	Х	Х
Develop fire drill policy, schedule, and	Staff	ED																		х	х	х	
exit routes																							
Undergo fire and building inspection,	Staff	ED			1		1														х	х	х
drinking water test																							
Communications																							
Research and select available	ED	N/A															х	Х	х				
software for student management				1	1	1	1	1	l I	1		1											1

Set up/develop computer database for students information data, assessment results, behavior records, attendance records, etc.	Staff	ED															X	X	x	
Develop filing system to store student academic, disciplinary & health records	Staff	ED																X		
Define information flow routes and procedures.	Staff	ED															Х	Х	х	
Train all staff in procedures	Staff	ED																Х	х	Х
Define procedure for tracking visitors and school tours	Staff	ED																Х	х	Х
Set up, design and update website	Staff	ED												Х	Х	х	х	Х	х	Х
Select provider for Internet access (DSL, cable)	Staff	ED													Х	х				
Set up computer network	Staff	ED																	Х	Х
Set up nonprofit mailing status with Post Office	Staff	N/A								х	х									
Set up phone systems and answering services	Staff	N/A																	Х	Х
Develop format for Academy	Staff	ED																X	Х	X
Purchasing																				
Create a comprehensive list and schedule of purchases	ED	N/A						х	х	х										
Purchase classroom equipment and furniture	Staff	N/A																X	х	
Purchase office equipment and furniture	ED	N/A													Х	х				
Purchase postage meter	ED	N/A											х							
Purchase office/restroom/medical supplies	Staff	N/A																X	Х	Х
Organize library donations drive	Staff	N/A																Х	х	Х
Purchase instructional materials and	Instr.	Staff															х	Х	х	
supplies																				
Line up testing company (ie. Terra Nova)	Instr.	Staff																	х	Х
Contract Personnel																				
Hire janitorial services	Staff	N/A																	х	х
Line up electrician, plumber, & handyman	Staff	N/A																Х	Х	
Line un substitute teachers	1		 	1	1	1	1	 	1	1			-	-						
	Instr.	Staff													Х	Х	Х	Х		1

ED = Executive Director, B = The Founding Board, Staff = Administrative Staff, Instr. = Instructional Staff, c = Completed as of 11/14/03

עוממוווומוור אי וכמר							
							Мах
							possible
Points	0	-	2	3	4	5	points
			Interview				
Content knowledge	Not qualified	Demonstrates some	Demonstrates	Clearly demonstrates			3
		knowledge of the subject	average knowledge	high-level knowledge of the subiect			
Pedagogic	Not qualified	Has a remote idea of	Demonstrates some	Clearly demonstrates			с
knowledge		how to teach	understanding how to	good understanding			
			reach high student	how to reach the			
			achievement	highest student			
				achievement			
Personal and	The goals are very	Mostly disagrees with	Generally agrees with	The goals fully			ო
professional goals,	different from the	the Academy's goals	the Academy's goals	aligned with the			
commitment to	Academy's, do not	and mission.	and mission except a /	Academy's goals.			
Academy's mission	share the mission		few details	Fully understands,			
				shares and is very			
				enthusiastic about the			
			,	Academy's mission			
Commitment of effort	Not willing to work	Understands that	Reasonably	Fully committed to			ო
and time	over the regular work	additional time and	committed to	dedicate as much			
	hours	ettort may be	dedicate additional	time and effort as			
		required for improving	time and effort to	needed for reaching			
		the students achievement	Improve the students	the Academy's target student achievements			
Total interview							12
points							
			Ability and Aptitu	de Test			
Problems	below 50%	50-59%	60-69%	20-79%	80-89%	90-100%	5
Open questions	below 50%	50-59%	60-69%	70-79%	80-89%	90-100%	5
Total test points							10

Attachment 9 Teachers' Qualification Assessment

Advanced Math and Science Academy Charter School Attachments

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Model lesson (double	No lesson plan	No clear lesson plan	Has a lesson plan	Has a lesson plan	Organized lesson	Has a clear lesson	10
points)	explanation of	vague explanation of	but it is not well	explanation of	plan, explanation of	plan, detailed and	2
	material is unclear,	material, only a few	organized, mediocre	material is	material is	clear explanation of	
	class is not engaged,	are engaged, reaches	explanation of	understandable for	understandable for	material, full class	
	nobody learns,	to one learning style,	material, less than	some students,	most, most of the	engagement, reaches	
	advanced students	many did not learn,	half of the students	portion of the class is	class is engaged,	to multiple learning	
	are not challenged	advanced students	are engaged, reaches	engaged, reaches to	reaches to more than	styles, makes sure	
		are not challenged	to one learning style,	more than one	one learning styles,	everyone	
			less than half learn,	learning styles, some	most students	understands and has	
			few advanced	students understand	understand and have	an opportunity to	
			students are	and have an	an opportunity to	demonstrate	
			challenged	opportunity to	demonstrate	understanding,	
			)	demonstrate	understanding. some	advanced students	
				understanding, some	advanced students	are challenged	
				advanced students	are challenged	2	
				are challenged	2		
			Teaching Credential	ls (resume)			
Documented teaching		0-3 years	3-7 years	7-12 years	12-17 years	over 17 years	5
experience							
Education		Teacher certificate	BS, BA	MS, MA,	Ph.D.,	Ed.D., post doc	5
References	The references are	All references are	All references are				2
	not enthusiastic and	enthusiastic and	extremely				
	their description of	articulate in praising	enthusiastic and				
	the candidate's	the candidate in	articulate in praising				
	qualities sounds	some aspects of	the candidate in all				
	formal and artificial	his/her work,	aspects of his/her				
		qualification and	work, qualification				
		character	and character				
Total Teaching							12
Credentials points							
Total points							44

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### Attachment 10 - Resumes

ANNA CHARNY, Ph. D. 408 Dutton Road, Sudbury, MA 01776 acharny@cisco.com

#### SUMMARY:

Extensive industry experience in the field of Telecommunication Networks. Research and development of algorithms and protocols for high-speed communications networks. Extensive number of patents and publications in journals and conferences. Active involvement in the development of Internet standards.

#### **PROFESSIONAL EXPERIENCE:**

1999-present	Technical Leader	Cisco Systems
2002 – present	Visiting Professor	Imperial College of London
2000-2001	Math Teacher	Russian School of Mathematics (after-school program)
1998-1999	Principal Engineer	Cabletron Systems, Digital Network Products Group
1988-1998	Principal Engineer (1994-1998) Senior Engineer (1990-1994)	Digital Equipment Corporation
	Software Engineer (1988-1990)	
1986-1987	Research Associate	Moscow State University (Russia)

### EDUCATION:

*Ph.D. in Computer Science*, Massachusetts Institute of Technology, Cambridge, MA *MS in Computer Science*, Massachusetts Institute of Technology, Cambridge, MA *MS in Mathematics*, Tver State University, Russia *BS in Applied Mathematics*, Moscow Institute of Physics and Technology, Russia

#### PATENTS:

13 Issued United States Patents: 5734825, 5745697, 5781531, 6047328, 5995995, 5956322, 5978357, 6130878, 6072772, 6108305, 6337851, 5968128, 6,563,837 9 other patents pending

#### JOURNAL AND CONFERENCE PUBLICATIONS:

- 1. On the Speedup Required for Work-conserving Crossbar Switches, Krishna, P., Patel, N., Charny, A., Simcoe, To appear in Special Issue on Next Generation Switches and Routers of IEEE JSAC, 1999
- 2. Time Scale Analysis and Scalability Issues for Explicit Rate Allocation in ATM Networks, Charny, A., Ramakrishnan, K.K., Lauck, A. IEEE/ACM Transactions on Networking, August 1996
- 3. A Mathematical Model of Interaction of Virus Encephalomiocarditis with an Infected Cell, *Charny, A. Geometrical Problems of Function and Set Theory, Russia 1986 (in Russian)*
- Packet Scale Rate Guarantee for non-FIFO Nodes, J.-Y. Le Boudec, A. Charny, Proc. Infocom 2002 (submitted for fast track publication in Transaction on Networking as per recommendation of Infocom 2002 Program Committee as one of the 8 best papers)
- Delay Jitter Bounds and Packet Scale Rate Guarantee for Expedited Forwarding, J. Bennett, K. Benson, A. Charny, W. Courtney, J.-Y. Le Boudec, Proc. Infocom 2001 (submitted for fast track publication in Transaction on Networking as per recommendation of Infocom 2001 Program Committee)
- 6. Delay Bounds in A Network With Aggregate Scheduling, Proc. QoFIS2000, Berlin, September 2000

- 7. Algorithms for Providing Bandwidth and Delay Guarantees in Input-Buffered Crossbars with Speedup, *Charny, A., Krishna, P., Patel, N., Simcoe, R. Proc. IWQOS'98, May 1998.*
- 8. On the Speedup Required for Work-conserving Crossbar Switches, *Krishna, P., Patel, N., Charny, A., Simcoe, Proc. IWQOS'98, May 1998* (invited for publication in JSAC Special Issue on Next Generation Switches and Routers of IEEE JSAC, 1999)
- 9. Hierarchical Relative Error Scheduling, Charny, A. Proc. Nossdav'97, May 1997
- Time Scale Analysis of Explicit Rate Allocation in ATM Networks, *Charny, A., Ramakrishnan, K.K. Proc.* Infocom 1996, April 1996 (invited for publication in Transaction on Networking as per recommendation of Infocom 2001 Program Committee as one of the 10 best papers)
- 11. Scalability Issues for Explicit Rate Allocation in ATM Networks, *Charny, A., Ramakrishnan, K.K., Proc. Infocom* 1996, *April* 1996 (invited for publication in Transaction on Networking as per recommendation of Infocom 2001 Program Committee as one of the 10 best papers)
- 12. Congestion Control With Explicit Rate Indication, Charny, A., Clark, D., Jain, R. Proc. ICC'95, June 1995

# STANDARDS CONTRIBUTIONS:

- 1. An Expedited Forwarding PHB (Per-Hop Behavior, RFC 3246, B. Davie, ed. et al
- 2. Supplemental Information for the New Definition of the EF PHB (Expedited Forwarding Per-Hop Behavior), RFC 3247, A.Charny ed. et al.
- 3. MPLS Traffic Engineering Fast reroute: backup tunnel path computation for bandwidth protection draftvasseur-mpls-backup-computation-00.txt, J.P. Vasseur, A. Charny, F. Le, Faucheur
- 4. Integrated Service Mappings for Differentiated Services Networks, darft-ietf-issll-ds-map-00.txt, Wroclawski, J., Charny, A., March 2000
- 5. EF PHB Redefined, draft-charny-ef-definition-00.txt, Charny et al, August 2000
- 6. Some observations on Source Behavior 5 of the Traffic Management Specification, Charny, A., Leeb, G., Clarke, M., AF-TM 95-0976R1, August 1995
- 7. Some Preliminary Results on the EPRCA Rate-control Scheme, Charny, A., Ramakrishnan, K.K., Bennett, J.C.R., Des Jardins, T. AF-TM 94-0941, September 1994
- 8. Congestion Control with Explicit Rate Indication, Charny, A., Clark, D, Jain, R., AF-TM 94-0692, July 1994

# PROFESSIONAL ACTIVITIES:

- 1. Technical Program Committee Member, Eleventh International Workshop on Quality of Service, June 2003
- 2. Technical Program Committee and Session Chair, SPIE, October 2000
- 3. Member of the editorial board of IEEE Network Magazine, 1997-2000
- 4. Technical Program Committee Member and Session Chair, Infocom'98, April 1998
- Reviewer for IEEE/ACM Transactions on Networking , IEEE/ACM Transactions on Communications, Journal on Selected Areas of Communications, Infocom'96, Infocom'97, Infocom'98, Sigcomm'96, Sigcomm'97, Computer Communications Review, IEEE Communications Letters, IEEE Network Magazine
- 6. Panelist, 9-th IEEE Communication Society TCCC Computer Communications Workshop, Sept. 1994

# DAVID C. FOSTER

20 Cetrina Drive, Marlboro, MA 01752-2530 dcfoster2@aol.com

**SUMMARY**: Experienced educator, researcher and business consultant with significant experience in diverse industries and functions ranging from high technology to healthcare to corporate strategy research. Areas of demonstrated academic strength include:

- Love for students as individuals; able to inspire them
- Positive relationships with colleagues and administration
- Integrative, cross-disciplinary thinking ability
- Demonstrated teaching and writing skills
- Ability to present complex relationships in simple terms
- Published author of 3 books and 25+ articles

- Experienced business and education consultant
- Survey research design and evaluation experience
- Collegiate and high school teaching experience
- Comfortable in team teaching and research projects
- Open and responsive to feedback
- Experience with MBA curriculum development

# **Teaching and Presentations**

**Teaching:** Adjunct Assistant Professor of Organizational Behavior, Boston University MBA Program.

- Taught OB714 class to evening MBA students. Corporate Management Trainer, Boston University Corporate Education Center
- Co-developed "Introduction to TQM" and "TQM: Tools and Techniques".
- Trained company representatives in Total Quality Management principles and practices.
- Courses developed and delivered on time. Training evaluations averaged "10" (Scale: 1-12).

Presentations: "The Customer Relationship Program as a Measurement Tool and Basis for Strategic Development", National Account Managers Association Annual Conference, San Diego, 1998. "Service Customer Feedback: Moving from Information to Action", Northeast Regional Conference Address, AFSMI, 1997.

### **Research and Consulting**

Management Curriculum	: Collaborated with Harvard Business School professors in development of executive accountability workshops to address malfeasance in fiduciary responsibilities for cases such as Enron, Worldcomm, etc.
Career Development:	Developed principles, practices and information tools for global career development of IT human resources. These included implementation guidelines, 22 articles and 2 books (see below). Program became the basis for a worldwide career development program affecting 3500 professionals. Over 60 senior and middle managers implemented the program with my active consultation and support.
Corporate Strategy:	Conducted best practice research on use of the "strategy-focused organization" model (Kaplan and Norton). Interviewed private and public sector executives and implementers of the Balanced Scorecard. Collected procedural and outcome data; wrote 22 best practice case reports. Managed educational product development team which translated written cases into webcast-ready multimedia learning toolsincluding text, graphics, audio clips and video clipswhich are now used in online training.
Customer Value Researc	<b>h:</b> Developed neural network-based survey research program to determine customer value drivers for \$250 Million semiconductor company. Used summary analysis and action recommendations to upgrade the entire customer account management process, including follow-up dialogues and action plans.

**Performance Consulting:** Translated diagnostic research on sales performance vs. reward/recognition practices into executive recommendations for Fortune 500 investment company. Sales compensation system realigned so that financial and recognition incentives supported inter-division cooperation, knowledge exchange, and unlimited access to the highest recognition and reward levels. Five sales regions exceeded revenue goals by 121 to 136%.

# Professional Experience

# 2002 – 2003 Business School Researcher

*Research Assistant*, Harvard Business School MBA Program. Researched and developed executive workshops on corporate accountability, a book on executive best practices for increasing total shareholder return, and teaching notes on experimental approaches to continuous performance improvement.

### 1993 - 2001: Research Consultant

Research Consultant/Mgr. of Web Content Development; Balanced Scorecard Collaborative, (1999-01) Built best practice knowledge base on Balanced Scorecard and Strategy-Focused Organization implementations. Managed preparation of multimedia case reports for webcast conferences.

Director, Northeast Research Operations, Development II, inc. (1996-98) Proposed, sold, designed and managed delivery of customer relationship research for Wang, Motorola and other high tech clients.

President, Quality Research International (1993-96)

Founded and led customer research consultancy for small and mid-sized businesses.

### 1988 - 1993: Quality Improvement Consultant, Manager and Trainer

*Quality Improvement Manager,* Mass General Hospital Materials Division (1991-93) Managed quality improvement services, vendor relations, mail services and employee training.

Quality Improvement Program Manager, Waltham-Weston Hospital (1990-91)

Developed and delivered process improvement training and improvement team facilitation. *Senior Quality Consultant*, Boutonics, Inc. (1988-89)

Developed and delivered corporate TQM training on contract with Boston University.

Adjunct Assistant Professor of Organizational Behavior, Boston University. (1991-evenings) Taught OB714 course for MBA students.

# 1977 - 1988: Manager, Consultant, and Trainer in Human Resources and Information Technology

Manager, Outplacement Services, Digital Equipment Corporation (1986-87)

Managed 5 counselor/trainers in design and delivery of career workshops and counseling. *Consultant, Office Computing Systems,* Digital Equipment Corporation (1983-85)

Installed office application systems and training for Maynard manufacturing plant organization. *Manager, IT Career Development Program,* Digital Equipment Corporation (1979-83)

Conceived, developed and implemented career management program for worldwide IT function. Sr. Consultant, Employee Relations, Digital Equipment Corporation (1977-79)

Delivered HR consulting, training and administrative support to manufacturing plant staff.

**Cases:** 22 best-practice reports and 8 web-ready multi-media cases on implementation of the "strategyfocused organization", including AT&T Canada, Nova Scotia Power, and City of Charlotte.

- Articles: "The Balanced Scorecard, Disruptive Technology and Changing Strategic Contexts", 1999, unpublished "Supporting Sales Relationships with Solid Customer Research", Marketing News, Jan. 5, 1998. "Neural Networks: Moving from Information to Action", Marketing News, Oct. 27, 1997.
  - "The Account Development Survey: A Creative Tool for Improving Sales Rep and Company Performance", Marketing News, March 31, 1997.
- Books: I.T. Career and Professional Development Handbook, Digital Press, 1980.
  - I.T. Job Design and Education Planning Guide, Digital Press, 1981.
  - A Career Development Primer, Digital Press, 1983.
- Education & M.A., Marriott School of Management, Brigham Young University, 1977.
- Affiliations B.A., Phi Beta Kappa, Psychology/Pre-Law, University of Oregon, 1972.
  - Member, International Society for Performance Improvement

### Prof. ANDRZEJ HERCZYNSKI

131 Villa Street, Waltham, MA 02453 andrzej@bc.edu

#### SUMMARY:

Extensive academic experience in scientific research in Mathematics and Physics specifically the areas of Fluid Dynamics (analytical methods for compressible flows and similarity solutions in hydrodynamics) and Kinetic Theory (transport coefficients and variational methods). More than 20 years of teaching experience in colleges and decades of tutoring experience for school students.

### **PROFESSIONAL EXPERIENCE:**

September 1996 - present La	Boston College, Boston, MA aboratory Director and Lecturer (September 1998 – present) Visiting Assistant Professor, Department of Physics (1996-1998)
September 1995-19	96 State University of New York at Buffalo, Department of Physics Visiting Assistant Professor
March - August 199	5 State University of New York at Buffalo, Assistant Vice Provost for Science and Technology, International Education
1990-1994	American Institute of Physics Assistant to the Exec. Director and Physics Management Fellow
1987-1990	University of Colorado at Boulder, Center for Low-Gravity Fluid Mechanics and Transport Phenomena Postdoctoral Research Associate
1987	Lehigh University, Spring, Department of Mathematics Lecturer
EDUCATION:	Lehigh University, Department of Physics, 1980-1986 Master of Science in Physics, January 1983 Ph.D. in Physics, January 1987 Warsaw University, Department of Mathematics, 1975-1980 Applied Mathematics Division Master of Science in Mathematics, May 1980
RESEARCH:	<ul> <li>Fluid Dynamics</li> <li>analytical methods for compressible flows</li> <li>similarity solutions in hydrodynamics</li> <li>Kinetic Theory</li> <li>transport coefficients and variational methods</li> </ul>
TEACHING:	Physics Teaching Assistant, Lehigh University, 1980-1985
	Lecturer in mathematics, Lehigh University, 1987 Freshman and Junior level courses Mathematics for business students (Summer 1997)

	Visiting Assistant Professor, University at Buffalo, 1995 - 1996 Lecturer, Fall 1995, Summer 1996 Laboratory Director (introductory labs), Fall 1995, Spring 1996
	Boston College, 1996 - present Lecturer (undergraduate and graduate courses), 1996 - present Laboratory Director, September 1998 – present Summer lab courses director and teacher – 2001-present Director of summer program for high school students, 1999-2003
MEMBERSHIPS: America	n Physical Society, 1983-present, Fluid Dynamics Division American Association of Physics Teachers Polish Institute of Arts and Sciences in America (PIASA), 1983-present
NSF PANEL:	Invited to serve on the National Science Foundation Review Panel for Operation Primary Physical Science (OPPS), October 1997 - 2001 a program to develop science modules for elementary schools
NSF SYMPOSIUM:	Selected as one of 35 scholars in the nation to participate in the NSF Faculty Enhancement Conference at Harvard University, June 15-26, 1998

### PUBLICATIONS: Papers

- R.T. Folk and A. Herczynski, "Solutions of Elastodynamic Slab Problems Using a New Orthogonality Condition," *J. Acoust. Soc. Am.* <u>80</u> No.4, 1986, 1103-1110.
- A. Herczynski and R.T. Folk, "Orthogonality Condition for the Pochhammer-Chree Modes," *Quart. J. Mech. Appl. Math*. <u>42</u> No. 4, 1989, 523-536.
- A. Herczynski, D.R. Kassoy, and B. Zappoli, "Mass Flux Enhancement by Volume Heating in Vapor Transport Systems," Proceedings of the 7th Int'l. PCH Conference, MIT, June 1989.
- R. Herczynski and A. Herczynski, "Kinetics of Thermo-mechanical Problems," Proceedings of 17th Int'l. Symposium on Shock Waves and Shock Tubes; Lehigh University, July 1989.
- A. Herczynski and D.R. Kassoy, "Response of a Confined Gas to Volumetric Heating in the Absence of Gravity: I. Slow Transients," *Phys. Fluids A* <u>3(4)</u>, 1991, 566-577.
- A. Herczynski, R. Herczynski, and A. Kozlowski, "Determination of the Differential Cross-Section for a Realistic Intermolecular Potential," *Phys. Rev. E*. <u>51</u> No.1, 1995, 266-272.
- A. Herczynski, P.D. Weidman, and G.I. Burde, "Two-Fluid Jets and Wakes," submitted to *Physics of Fluids* (August 2003).
- P.D. Weidman and A. Herczynski, "On the Inverse Magnus Effect in Free Molecular Flow: the Newtonian Approach," submitted to *Physcis of Fluids* (September 2003).

### Books

- In Macmillan Encyclopedia of Physics J.S. Rigden, editor, Macmillan Reference 1996
- A. Herczynski, "Density," Volume I, 342-343, "Doppler Effect," Volume II, 378-382, and "Rotating Reference Frame," Volume II, 616-619
- A. Herczynski with assistance from M. Vannette, Introductory Physics Laboratory Manual, Wiley 2002.

### **EVELYN LIMA**

### 25 Yorkshire Terrace #12, Shrewsbury, MA 01545 elima@townisp.com

**SUMMARY:** English and Portuguese teacher and translator. Extensive experience of working as a liaison with immigrants from Brazil and other countries.

#### PROFESSIONAL HISTORY:

- 2001 Present MCSI Marlborough Community Services, Inc., Marlborough, MA
  - *Bilingual Advocate* Working directly with organizations referring clients to programs of relevance. Assisting clients in becoming self-sufficient and independent.
  - Educational and Interpreting Services Coordinator Developing cultural assimilation workshops and cross-cultural presentations to local providers in addition to coordinating the ESOL program.
- 2000 2001 MCOA Marlborough Council on Aging, Marlborough, MA Bilingual Outreach Worker
- 1999 2000 BCA Brazilian Community Association. Framingham, MA Volunteer activity - Event Planning
- 1989 1999 English and Portuguese Private Classes, Ashland, MA
- 1986 1989 Number One English School Brazil, Vitoria, ES ESOL Teacher
- 1986 1988 Idiomas Servicos Linguisticos Brazil, Vitoria, ES Teacher/Translator

### Accomplishments:

- Created the "English Lab" course English Lab was designed to enable the foreign student to improve pronunciation, learn nuances of the English language and acquire improved fluency by exposure to learning strategies, pronunciation practice, phonetics and cross cultural communication.
- Created a bi-monthly newsletter for the ESOL program.
- Coordinated the first Brazilian craft fair in Marlborough BrazilExpo 2002

# Strength:

- Excellent communication skills and leadership
- Able to handle multiple tasks
- Self motivated and dependable
- Positive attitude
- Knowledge of Windows and Microsoft Office
- Fluent in English and Portuguese

### Educational Background:

1987 - 1989		ES
	ESOL (English for speakers of other languages) and Portugue	ese
1984 - 1989	Number One - Brazil	Vitoria, ES
	English Language - Graduate Level	
Additional Education:		
June 2003	Unemployment Insurance Benefits	03 Hours
March 2003	Medical and Legal Interpreting	40 Hours
2001	Cultural Competency	08 Hours
July-Sept 1988	LTC - Language Training Centre - Kingston, Jamaica	
	Near - Native Speaker Level - English	
March- Sept 1987 SENAC	- Vitoria, Brazil, Event Planning	
1987	Assistant to Librarian	40 Hours

#### DEEPAK NARAIN

55 Violetwood Circle, Marlborough, MA 01752 Deepak\_Narain@yahoo.com

### SUMMARY:

Extensive software development and architecture background, complemented by strong technical product management, sales support and marketing experience. Design and development of several enterprise-class or telco-grade distributed applications and middleware platforms.

### PROFESSIONAL EXPERIENCE:

1/02-present <u>Manager, Availability Solutions Engineering</u> Legato Systems

- Lead a team of engineers developing High Availability solutions for targeted vertical applications
- Architect and lead the development of HA solutions for high performance applications like Oracle and SQL Server

### 10/01-1/02 Independant Consultant

- Provided technical and product strategy consulting for a very well-established startup building web-based provisioning systems for VoIP networks. This was a company that understood the web and ecommerce very well, but did not have any domain knowledge in telecommunications and networking.
- Worked with architects to re-engineer the product to use SIP as a control protocol instead of developing a
  proprietary solution
- Worked with marketing to craft and polish product strategy for presentation to critical customers

### 3/99-9/01

Lucent Technologies/Ascend Communications

Senior Product Manager Lucent Softswitch (LSS) Programmability

- Managed the definition, development and delivery of OpenAPI middleware implementation of network programmability standards JAIN, Parlay, SIP
- Managed all customer commitments; successfully led product delivery and acceptance at some of the largest network service providers in the world
- Worked with customers, marketing and engineering to set technology direction, manage product requirements and roadmap
- Engaged and managed key partners to add value to this product with enhanced applications like ClickToTalk, VPN, Prepaid, Messaging etc.

# <u>Senior Product Manager</u>, Lucent Softswitch Media Server (LMS)

- Developed media server product and technology direction based on interactions with architects, engineers, senior management and customers
- Extensive customer interaction to establish credibility for chosen direction
- On completion of this critical task, transitioned off this role to focus on programmability aspects of the LSS
  product

# Product Marketing Manager, eServices/PacketIN Group 3/99-8/00

- Cradle-to-grave management for a suite of eCommerce enabled VoIP applications (prepaid, call routing)
- Developed marketing collateral, sales presentations and white papers for the complete PacketIN line of enhanced broadband services and platforms took a marketing strategy based on technology upsell and repackaged it into one focused on increasing subscriber stickiness and reducing churn

• This role required extensive evangelical activity, tradeshows, customer visits; these efforts were instrumental in building mindshare - both with upper management and with the customer base

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8/94-3/99 Senior Software Engineer
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Ascend Communications /Stratus Computer
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- Built enterprise-scale distributed applications, worked at various layers of product architecture from the OS kernel to web-based applications
- Developed the architecture, wrote specifications and tens of thousands of lines of code for large projects including:
- *Persistent Memory*: Proposed Stratus HPUX feature to provide in-memory data stores that can survive system crashes (without backup to disk)
- Isis Availability Manager: A rules-based distributed network/application monitoring tool to analyze and maximize network and application availability
- *Isis for Database*: a 3-tier database replication tool used to create redundant databases using traditional, non-replicated RDBMS like Oracle and Sybase

8/92-8/94	<u>Researcher</u>	Center for High Performance	Computing, WPI
		0	1 01

- Research into applications for parallel and distributed systems
- Invented and implemented several tools for analyzing and predicting scalability characteristics of applications written for distributed clusters
- Taught undergraduate classes in operating systems and programming

### EDUCATION:

1999	MBA, graduated with honors	Boston University
1996	MS, Computer Science,	Worcester Polytechnic Institute
1992	BS, Electrical Engineering,	University of Notre Dame

### TECHNICAL SKILLS:

Networks:	VoIP, Softswitch, Media Servers, Application Servers, 3G/UMTS, 2.5G/GPRS, Optical/SONET, Distributed Systems, IP LAN/WAN
Standards:	SIP, Parlay, JAIN, H.248, H.323, SS7, IN/WIN, TCP/IP, CORBA
Development:	Unix, Windows, Java, C++, C, VB/ASP, JavaScript, VoiceXML, Perl, Unix Shell, ODBC, Visual C++/MFC, Smalltalk, OO design, J2EE, HTML
Applications:	VPN, Prepaid/Calling Card, Call Centers, IP Centrex, Voice Browsers, Billing and Customer Care, Freephone/PremiumRate

### Samuel L. Rodriguez

5 Orchard Terr, Maynard, MA 01754 slr@riw.com

#### SUMMARY:

Mr. Rodriguez has been an attorney in Massachusetts for the past fifteen years. Currently he focuses his practice on construction law, intellectual property and commercial litigation. He divides his time between his private practice in Acton Massachusetts and at Ruberto Israel & Weiner in downtown Boston where his is a contract attorney.

Mr. Rodriguez has served on a number of community boards in the Boston area relating to education and education advocacy. Also for a period of two years Mr. Rodriguez was the Executive Director of the Latino Parents Association and non-profit organization geared towards the parent training. Finally, Mr. Rodriguez is a licensed preacher in the African Methodist Episcopal church obtaining his seminary training at the Andover Newton School of Theology.

### PROFESSIONAL EXPERIENCE:

<u>Construction Law.</u> Representation of General Contractors and subcontractors in all facets of construction law including the negotiation of contracts, including EPC contracts, subcontracts and AIA contracts. Defense of General Contractors and subcontractors in both Federal and State courts along with appearances before arbitration panels over disputes regarding lien waivers, mechanic liens and claims of breach of contract.

<u>Labor and Employment</u>. Representation of management in employment law ranging from wages claims, wrongful termination claims, discrimination claims and matters before the National Labor Relations Board. Appeared before state and federal courts and the EEOC and MCAD.

<u>Corporate/Intellectual Property</u>. Representation of start up business whether LLC, joint venture or small business. Also represented businesses in connection with the protection of intellectual property from copyrights, trademarks and trade secrets, including the prosecution of unfair competition claims in both state and federal courts.

<u>Litigation</u>. Appeared and conducted jury trial in all in both federal and state courts, including complex commercial litigation. Successfully briefed and argued before the United States First Circuit and the Massachusetts Appeals Court.

### WORK HISTORY:

April 2002 – present	Ruberto Israel & Weiner/Update Legal, Boston, Massachusetts Contract attorney complex construction litigation
August 2000- January 2002	Latino Parents Association, Boston, Massachusetts Executive Director of education training and advocacy group
June 1994-present	Solo Practice/Of Counsel arrangement Boston, Massachusetts
July 1992-July 1994	Epstein Becker & Green Boston, Massachusetts Litigation Associate
October 1991-July 1992	Finnigan & Stanzler Boston, Massachusetts Litigation Associate

September 1998-October of 1991

Gaston & Snow/Csaplar & Bok Boston, Massachusetts Litigation Associate

# ADMITTED:

Admitted to Practice in the Commonwealth of Massachusetts

### EDUCTATION:

CORNELL UNIVERSITY Ithaca New York School of Industrial and Labor Relations B.S. 1985

STATE UNIVERSITY OF NEW YORK AT BUFFALO Buffalo New York School of Jurisprudence J.D. 1988

ANDOVER NEWTON SCHOOL OF THEOLOGY Newton Massachusetts Masters of Divinity Candidate

### EDWARD J. SHAMBER

#### 53 Plain Street, Abington, MA 02351 eshamber@marlboroughsavings.com

**SUMMARY:** Senior Vice President and Treasurer of **Marlborough Savings Bank.** Capable and experienced financial executive with solid management skills and the ability to strategize, create, design, implement and refine priorities in a team-oriented fashion. Strong financial, management, systems and interpersonal skills background.

- Extensive senior financial management experience with a major money center bank and a suburban community bank.
- Corporate controller in industry; as well as several years of diversified professional
- CPA experience.
- CFO, MBA, CPA

#### **PROFESSIONAL EXPERIENCE:**

1984-Present	Senior Vice President and Treasure <b>Marlborough Savings Bank</b> Community Bank – 5 offices	r \$250+Million Assets
1983	Corporate Controller <b>Cunningham Export Corp.</b> Export Trading Company	\$30+Million Sales
1982	Corporate Controller <b>Murdock Webbing Co.</b> Multi-Plant Manufacturer	\$30+Million Sales
1971-1982	Vice President and Treasurer Boston Five Cents Savings Bank Money Center Bank – 24 Offices	\$1.5+Billion Assets
1967-1971	CPA firms, Staff Accountant, progressin Deloitte, Haskins & Sells Spark, Mann & Company Leo Wasserman & Company	ig from junior to senior level
EDUCATION:		
1977-2003, & ongoing	Extensive CPE courses	
June, 1976	Masters Degree in Business Adminis Concentration: Finance, Systems, a	stration, Boston College nd Behavior
June, 1967	Bachelors Degree in Business Admir Major: Accounting	ninistration, Northeastern University

#### ACCOMPLISHMENTS:

- Directed conversions to modern fully integrated financial information systems in both a large multiresponsibility center environment and a community oriented environment.
- Established, coordinated and administered Budget and Profit Plans.
- Tax strategist, developed and implemented short and long-range tax plans, with bottom-line savings over \$1 Million.
- Created an Internal Audit function and directed its continual development over 7 years.
- Developed, coordinate and manage the Asset/Liability Management Policy with the President.
- Responsible for administration of \$100+ Million fixed-income securities portfolio.
- Initiated a Cost & Profit analysis function to provide effective control of income and expenses with significant bottom-line savings.
- Evaluated and recommended the feasibility of an in-house and on-line integrated computer system. Major involvement with the conversion to an operating on-line computerized system.
- Introduced and implemented modern financial policies on accounting, financial reporting and forecasting.

# PROFESSIONAL AFFILIATIONS:

Licensed CPA in Massachusetts from 1972-Present Member American Institute of CPAs from 1972-Present Member Mass. Society of CPAs from 1972-Present - Member of Banking Committee 1972-73, 85-86, 93-94, 99-01

# **BUSINESS & COMMUNITY ACTIVITIES:**

- Member Board of Trustees, Marlborough Savings Bank from 1990-Present
- Marlborough Chamber of Commerce, participant in various functions since 1990
- Active Instructor in Junior Achievement in Marlborough Schools from 1985-Present
- Member Business Program Advisory Committee Assabet Valley Reg. H.S. 2001-Present
- Member Boston College MBA Alumni Network
   Past Panelist on B.C. Careers in Business Panel
- Past United Way, Professional Account Volunteer 1992-1993
- Former Accounting Instructor at NE School of Finance, 1985-1987 (Eves.)
- Past member Mass. Savings Banks Controller's Association 1971-1990
  - Past Panelist & Moderator
- Former member Financial Executive's Institute, 1979-1982
- Former Abington Youth Soccer Coach, 1976-1987
  - R > R > 7 Executive Board Member, 1979-1981

### Prof. MIKHAIL SHUBIN, Dr. Sc.

487 Washington St., #1, Brookline, MA 02446 shubin@neu.edu

#### SUMMARY:

Nationally and internationally recognized research mathematician and educator with huge teaching experience on levels from high school to Ph.D. program in graduate school.

#### **PROFESSIONAL EXPERIENCE:**

1992 – Present	Professor, then Matthews Distinguished University Professor (from 2001), Department of Mathematics, Northeastern University, Boston, MA
1991 - 1992	Visiting Professor, Department of Mathematics MIT, Cambridge, MA
1990 - 1991	Leading researcher, Institute of New Technologies, Moscow, Russia
1969 – 1990	Assistant Professor, then Associate Professor, Dept. of Mechanics and Mathematics, Moscow State University, Moscow, Russia

#### **EDUCATION AND DEGREES:**

1981	Doctor of Science in Physics and Mathematics, Leningrad branch of Steklov Mathematical Institute of Academy of Sciences of USSR (LOMI), St. Petersburg, Russia
1969	Ph.D. in Mathematics (Differential Equations), Department of Mechanics and Mathematics, Moscow State University, Moscow, Russia
1966	Master degree in Mathematics, Department of Mechanics and Mathematics, Moscow State University, Moscow, Russia

### HONORS:

Member of Russian Academy of Natural Sciences (elected in 1996). Matthews Distinguished University Professor, Northeastern University (from 2001).

#### PUBLICATIONS:

Published 11 books and about 150 research papers, co-edited 11 other books, in particular, seven volumes of Springer Encyclopedia of Mathematical Sciences, co-author of three of them.

#### OTHER ITEMS:

- Member of editorial boards of three international journals and World Scientific Monograph Series in Mathematics.
- Two important objects in mathematics are called by his name (Shubin's trace formula, which expresses the integrated density of states from the physics of solids and alloys in terms of von Neumann algebra, and the Novikov - Shubin invariants which are topological characteristics of geometric objects coming from spectral theory).
- From 1992 Prof. Shubin's research was funded by a series of National Science Foundation grants.
- Made invited talks in many universities (including Harvard, Princeton, Stanford, M.I.T., Yale, Caltech, University of California Berkeley in US; Cambridge and Oxford universities in UK; Ecole Normale Superieure,
Ecole Polytechnique and College de France in France; E.T.H. in Zuerich; Humboldt University, Technical University and Free University in Berlin; Hebrew University and Weizmann Institute of Science in Israel). Delivered numerous invited talks in national and international conferences worldwide. Among them is a plenary lecture at the joint meeting of the American Mathematical Society and Mathematical Association of America in San Diego (January 1997).

- Was Ph.D. advisor of 15 graduate students, who received the Ph.D. in Moscow State University and Northeastern University.
- From the age 16 worked with school students (mainly on the high school level). This was always volunteer work. His experience includes teaching mathematics in the Advanced Math and Science high school in Moscow, supervising the evening mathematical school at Moscow State University, teaching at the Correspondence Mathematical School in Moscow, teaching in numerous Summer schools for high school students in Latvia, Karelia and Krasnoyarsk. His publications include several popular papers and two books for high school students.

# JULIA SIGALOVSKY, Ph. D., P.G.

8 Oak Street, Sudbury, MA 01776 jsigalovsky@buildingexcellentschools.org

# SUMMARY:

More than 25 years of working experience in academia and industry: fundamental scientific research and client-oriented problem solution, teaching, consulting, technical editing in the areas of geology, geochemistry, crystallography, materials science. Founded a company and successfully sustained its rapid growth. Nine years experience in general, financial and project management of an engineering consulting company.

### **PROFESSIONAL EXPERIENCE:**

1994- present	GeoTek Engineering, Inc., Framingham, MA President
	• Founded a company, successfully sustained a rapid growth of organization at the rate of up to 550% in one year.
	<ul> <li>Administrative and financial management of the company.</li> <li>Marketing, job estimating and bidding.</li> <li>Client relations</li> </ul>
	<ul> <li>Supervision of environmental engineering work using geochemical and geological technical expertise.</li> </ul>
1990- 1996	Massachusetts Institute of Technology, Cambridge, MA Materials Processing Center Research Scientist
	New materials development for high-temperature ceramic and composite applications, and optical sensors (single crystal oxide fibers silicon carbide - silicon nitride ceramics). Consulting on materials characterization.
1990, 1993-1995	Arthur D. Little, Inc., Cambridge, MA
1000-1000	Customer-oriented research in the field of development and analysis of materials for industrial applications, including batteries, high-temperature superconducting wire manufacturing, polymer synthesis, glass fiber stability. Consulting on X-ray diffraction instrumentation and software.
1989-1990	Northeastern University, Boston, MA Barnett Institute of Chemical Analysis and Materials Science Postdoctoral Fellow
	R&D of new high-temperature superconductors and nitrides of metals and alloys formed by plasma processing.
1980-1988	V.I. Vernadsky Institute of Geochemistry and Analytical Chemistry, Academy of Sciences, Moscow, Russia Senior Scientist, Scientist, Graduate Student
	<ul> <li>Served as a research coordinator for the National Committee on Powder X-ray and Neutron Diffraction.</li> </ul>

 Performed research on silicate and aluminosilicate field minerals and their synthetic analogues for development of thermometers and barometers for geochemical and geological applications.

1977-1980 **Graphite Research Institute, Moscow, Russia** Engineer Conducted research on structure and texture of graphites and coals. Studied kinetics of coal to graphite transformations.

# EDUCATION:

1986	Ph.D. in Chemistry, V.I. Vernadsky Institute of Geochemistry and Analytical Chemistry,
	Academy of Sciences, Moscow, Russia
1977	BS and MS in Geology and Geochemistry (Magna Cum Laude), Moscow University, Moscow,
	Russia

# **PUBLICATIONS:**

More than 50 scientific papers in major journals and conference proceedings.

# **REGISTRATIONS:**

- Well Drillers Certificate (Monitoring Wells), Commonwealth of Massachusetts, Department of Environmental Management (No. 748M)
- Monitoring Well Driller's Certificate, National Ground Water Association (No. 3049625)
- Registered Professional Geologist, Tennessee (TN 3764)

# **PROFESSIONAL MEMBERSHIPS:**

American Consulting Engineers Council of Massachusetts Women in Transportation Seminar, Boston Chapter National Groundwater Association National Drilling Association Boston Society of Civil Engineers Section Association of Engineering Geologists Construction Industries of Massachusetts

# COMMUNITY SERVICE:

Dr. Sigalovsky maintains an extensive load of community service. She serves on boards of various societies and organizations. She is an active member of the Boston Society of Civil Engineers Section (BSCES). She just finished her one-year term as a chair of the BSCES Infrastructure Technical Group directing the mentoring, organizational and sponsoring effort of the society, together with the Massachusetts Pre-Engineering Program, to conduct the Model Bridge Competition among Boston high school students. During the competition, students compete in designing and building models of bridges from provided material according to the Infrastructure Group Specifications. The competition is designed to promote engineering profession among the inner-city high school students.

# GENE BUCHMAN, M.A.

27 Ashmont Drive, Framingham, MA 01701-3378

#### SUMMARY:

30 years of extensive experience as a Behavioral and Educational Consultant for schools as well as a Clinical Specialist in Psychology. Teacher's certification to teach grades K – 12, with specialties in Experimental Education and Curriculum Consulting. Extensive tutoring experience.

# **PROFESSIONAL EXPERIENCE:**

5/72-present	Behavioral, Eucational, Technical Consultant	Buchman Research & Consulting Co., Framingham & Concord MA	
10/87-present	Designer & Clinical Specialist in Psychology	Therapeutic Equipment Center & Psychology Department, Fernald Center, Waltham MA	
01/73-10/87	Behavior Analyst, Research Associate	Psychology Department, Behavior Research Laboratory, Walter E. Fernald State School Waltham MA	
07/78-02/80	Behavioral Psychologist	Skills Acquisition Center, Edco, Inc. Brookline MA	
09/76-06/78	School Psychologist	Boston College Campus School Chestnut Hill, MA	
05/76-09/77	Instructor and Research Coordinator	Camp Freedom, Behavioral Ed. Projects Inc. Center Ossipee NH	
09/74-01/77	Lecturer in Special Education	Lesley College Graduate School of Education Cambridge, MA	
09/73-09/76	Children's Unit Psychologist and Special Education Teacher	Walter E. Fernald State School Waltham, MA	
06/70-10/72	Engineering Group Leader	Raytheon Co., Waltham MA	
02/68-06/70	Electronics Quality Control and Test Engineer	Raytheon Co., Equipment Div. Waltham, MA	
09/66-01/68	Electronics Engineer	Lehigh Design Co. Waltham MA	
EDUCATION:			
1975	M.A. Experimental Psychology and Special Education	Goddard College Plainfield, VT	
1972	B.A. Social Sciences Concentration in Extension Studies, cum laude	Harvard College Harvard University, Cambridge, MA	
1961-1963	Electrical Engineering	Massachusetts Institute of Technology, Cambridge, MA	
CERTIFICATIONS			
1975	Experimental Education, grades K through 12	Vermont, with interstate reciprocity	

1975 Experimental Education, grades K through 12 Curriculum Consultant, grades K through 12

# MIKHAIL KHMELNITSKIY

147 Wainwright Dr., Matawan, NJ 07747 mkhmelnitskiy@yahoo.com

# SUMMARY:

Extensive experience in math and computer science education, development of curriculums for high school and college courses. Design and development of computer-based education and school management systems. Strong organizational and leadership skills. High school Principal experience.

#### **PROFESSIONAL EXPERIENCE:**

2001 - 2003	Software Development Analyst	DataPeer, Inc., Fort Lee, NJ Octet Corp. Inc., New York, NY
1998 - 2000	Lead Developer	ASO, Inc., Valley Stream, NY
1992 - 1997	Lead Developer	Svoboda Corporation, Moscow, Russia
1991 - 1992	Senior Developer	OWIMEX, German-Russia Joint Venture
1978 - 1990	Senior Researcher (1989 – 1990)	Moscow Institute of Technology (MTIPP)
	IT Department Manager (1983-1990) Senior Developer (1978-1982)	Dep.of Applied Mathematics, Computer Center
1978 - 1988	Principal	School of Young Programmer (after-school program)
1975 - 1977	Senior Software Engineer	Computer Center of State Department of Higher Education, Moscow, Russia
1973 - 1978	Assistant Principal (1978) Math and Computer Science Teacher	Moscow Math and Science High School No.179
1973 - 1974	Math Teacher	Moscow Middle School No. 759
1971 - 1972	Computer Science Teacher	Moscow Math and Science High School No. 444
1971 - 1973	Software Engineer	Moscow State Pedagogical University

# TEACHING EXPERIENCE:

- More than 18 years of teaching experience on the levels from middle school to college
- Developed curriculums for Math and Computer Science programs (1971-1989):
  - o Math for students of Advanced Physics courses
  - Precalculus, and Graph Theory for high school
  - Computer Science for high school, School of Young Programmer and School of Continuing and Professional Studies
- Open lessons for district school teachers
- Lectured in School of Continuing and Professional Studies, Moscow, Russia (1988-1989)
- Participates in Gelfand Correspondence Program in Mathematics, Rutgers University, NJ (1997-present)
   Discussed and reviewed assignments, assisted students, maintained students database
- Was advisor of 5 graduate students who received MS in Applied Mathematics (MTIPP)

# **PROJECTS:**

1998-2003 Designed, evaluated, and supervised up to five concurrent projects in software development companies in the New York Metropolitan area. Staff management, including interviewing, training, performance evaluation, recommendation for promotion and firing.

- Web-based collaboration tool for school management, curriculum sharing, and communication between teachers, students, parents, school and district administration (2001-2002, DataPeer)
- On-line storage system for files and personal information (2001-2003, DataPeer)
- Proposal of Internet Database Search Engine (2002, DataPeer, for Lockheed Martin)
- Trading platforms for stock, options and FOREX trading (2000-2001, Octet for GFT)
- Medical claims and pension funds processing systems (ASO, 1998-2000)
- 1989-1997 Developed enterprise-wide and industry-wide business applications for Russia health care industry. Designed, and managed the entire restructuring of information system of the largest cosmetic and health care enterprise in Russia, Svoboda Corp. Managed team of 12.
- 1975-1989 Participated in government funded development of the advanced computer-based educational system (SADKO, analog American system PLATO)
  - Designed and developed software development kit for computer-assisted assessment, and psychological research. It included syntax and semantics analyzers to process free text responses (non multiple-choice approach), sets of grammar rules for different subjects (such as Algebra, Calculus, Math Logic, and Computer Languages), macro-tools for instructional courses preparation.
  - Led development of interactive models of technological processes and instructional courses. Implemented more than 50 computer programs for students' education. Managed team of more than 10 developers.

# EDUCATION:

2000	CUNY, Graduate Center, Project management	
1977-1978	Educational Leadership Program, Moscow, Russia	
1967-1973	MS in Mathematics, Moscow Pedagogical State University, Russia	
	Qualification – Secondary School Teacher of Mathematics.	

# PROFESSIONAL ACTIVITIES:

- International Conference on "The Unity of Mathematics", Cambridge, MA (2003)
- ACM / IEEE Computer Society, Professional Development Seminar, UML, Princeton (2001)
- Invited speaker at Moscow, Russia, and State conferences in education (1980-1985)

# PUBLICATIONS:

Over 15 publications, including papers in conference proceedings and "New research in psychology" journal, textbook for university students. Edited two textbooks for college students.

Coached and played soccer in Europe and United States for 20 years.

#### JOSEF NOVOTNY

42 Ledgewood Road, Framingham, MA 01701 josef novotny@hotmail.com

#### SUMMARY:

Software Engineer with 20 years experience in computer-aided design, algorithm development, scientific applications software development, and image processing.

# **PROFESSIONAL EXPERIENCE:**

2000 - present Software Developer **KTI**, Wellesley Hills, MA Implemented and tested AARON, art screensaver that utilizes artificial intelligence to continuously create original paintings on PC screen. Currently works on Cyber Artist, program that utilizes artificial intelligence, neural networks, multithreading, and fractals to create original paintings on PC screen.

1999 - 2000Consultant SAO, Cambridge, MA Designed, implemented, and tested point spread function (PSF) including image retrieval, general binning, and image rotation for CHANDRA X-ray telescope.

- 1997 1998 Senior Software Engineer
- Designed, implemented, and tested compression utility for the Situation Data Display program of Australian air • traffic control system.
- Designed and implemented testing module for personal rapid transit (PRT) system.

1995 - 1997 Senior Software Engineer

- Coded, tested, and maintained FoxCAE utilities that transfer data between I/A, real time process control system, and FoxCAE, tool for quick configuration and graphic depiction of control systems.
- Designed, implemented, and tested optical package that uses optical disk drive for periodic storing of real time data.

1994 - 1995Senior Software Engineer

• Designed, implemented, and tested BID/DISPATCH 2.0, on-line, real-time software system enabling efficient and accurate entry, tracking, and reporting of information in integrated environment.

1988 - 1994 Senior Software Engineer

#### Computervision Inc., Bedford, MA Specialized in fixing memory leaks and memory overwrites in CADDS geometry code.

- Designed, implemented, and tested enhancement enabling regeneration of 2D-profiles in other than front view using variational geometry.
- Coded interface module enabling data exchange between PrimeDesign and MEDUSA to permit users to utilize • advanced PrimeDesign modeling and MEDUSA drafting features.

# EDUCATION:

SPECIAL SKILLS

Speaks German and Czech. Holds soccer coaching D license.

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1987	M.S. in Engineering
1977	M.S. in Civil Engineering

MIT, Cambridge, MA Czech Institute of Technology, Brno, Czechoslovakia

Raytheon Co., Marlboro, MA

Foxboro Co., Foxboro, MA

Multisystems Inc., Cambridge, MA

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# Victoria Vainer

2820 Bloomingdale Ave. Vairico, FL 33594 (813) 655-4115 vainervi@aol.com

#### SUMMARY:

Over 15 years of teaching experience in high schools and colleges in Russia and in USA teaching Literature, History of Arts and Literature, and History of Theater. Author of an original course of History of the Arts and Literature for college students with major in physics and computer sciences as well as an original course of the History of Russian Literature and Theater for middle and high school students.

#### **PROFESSIONAL EXPERIENCE:**

1998 – present	Multi-discipline Teacher, Academic Achievement Center, Seffner, FL Teaching literature, social sciences, basic math skills to gifted students with learning disabilities (2-12)	
1997 – 1998	Visiting Professor, Department of Linguistics and Languages, Michigan State University Created syllabi for teaching Second and Third-Year Russian through culture	
1996 – 1997	<ul> <li>Teaching Assistant, Integrative Studies in Arts and Humanities, Michigan State University</li> <li>Participated in creating syllabi for the courses on Jewish American Culture and the Modern City</li> <li>Delivered lectures to groups of 25 students</li> <li>Led seminars and discussions, helped students to develop their writing skills, evaluated course papers</li> </ul>	
1994 – 1995	<ul> <li>Teaching Assistant, Department of Linguistics and Languages, Michigan State University</li> <li>Created a syllabus for teaching Second-Year Russian and Conversational Russian through culture</li> </ul>	
1992 – 1993	<ul> <li>Teacher of Russian Literature and Drama, Moscow Lyceum, Russia</li> <li>Created a course on the History of Russian Literature and Theater for middle and high school students</li> </ul>	
1990 – 1993	Editor, Literary Criticism Department <i>"Dionysus</i> ", an International Magazine on Theater and Arts; Moscow, Russia	
1988 – 1993	<ul> <li>Assistant Professor, Moscow Institute of Physics and Technology;</li> <li>Department of Arts and Humanities</li> <li>Created courses on the History of the Arts and Literature for students with major in physics and computer science</li> </ul>	
EDUCATION:		
1998	Master of Arts in Comparative Literature Michigan State University; East Lansing, MI	
1983	ABO in Theater Moscow State Institute of Theater, Russia Major – Theater Criticism	
1970	Master of Arts (Summa cum Laude) Moscow State University, Russia Major – Journalism	

# **Biography Information for the Advisory Board Members**

# Robert Kaplan

Robert Kaplan has taught mathematics to people from six to sixty, most recently at Harvard University. He has founded and directed the mathematics programs at various secondary and primary schools, including the Sage School for gifted children in Foxboro, Ma. In 1994, with his wife Ellen, he founded The Math Circle, a program, open to the public, for the enjoyment of pure mathematics. It now has over 200 students and is opening branches across America and Great Britain. He has also taught Philosophy, Greek, German, Sanskrit and Inspired Guessing. He is the author of *The Nothing That Is: A Natural History of Zero* (Oxford 1999), and with his wife, *The Art of the Infinite: The Pleasures of Mathematics* (Oxford 2003), They are both now writing Out of the Labyrinth: Mathematics Set Free (Oxford, to appear in 2004). They live in Cambridge, MA.

# Ellen Kaplan

Although Ellen Kaplan was a classical archaeologist through graduate school at Harvard and in Germany, she has taught Biology, Greek & Latin, and the History of many places and times. She began teaching Mathematics to integrate an all-male department, but was so delighted by the breadth and depth of the field that she ended up co-founding the Math Circle with her husband, illustrating his book, *The Nothing That Is* (Oxford 2000), and writing *The Art of the Infinite* (Oxford 2003) with him. They are now writing together *Out of the Labyrinth: Mathematics Set Free* (about their Math Circle - to be published by Oxford in 2004), and with her son Michael is writing a book for Viking on probability: Dancing with the Data.

# ATTACHMENT 11 – CURRICULUM FOR GRADES 10-12

	10 <sup>th</sup> grade		
Math	<u>Algebra.</u> Elements of Combinatorics and Probability: Permutation with/without repetition. Combinations. Experimental and Mathematical probability. Probability of the sum of events. Conditional probability. Probability of the product of events. Overview of sets of numbers, functions and graphs. Solving equations/inequalities. Exponential and Logarithmic functions, equations and inequalities. Sequences and Series. Patterns and sequences. Principle of Math Induction. (PMI). Arithmetic/Geometrical Sequence, its properties, sum. Proving properties of progressions by PMI. The notion of a series. Examples of convergent and divergent series. Geometrical progression.		
Physics	Electricity and Magnetism. Electrostatics: Coulomb's Law, electric field, Gauss's Law, electric potential, capacitance. Current and circuits, resistance, Kirchhoff's Rules. Magnetostatics: magnetic field, Lorentz Force, Hall Effect, Ampere's Law. Magnetodynamics: Faraday's Law of Induction, Lenz's Rule, Inductors, transformers, magnetic dipoles and magnets.		
D	Programming techniques, Computer Programming IV. Engineering Design, use of Computer-Aided Design (CAD) systems, Network Operating Systems.		
IT/CS/E	Construction technologies: forces of tension, compression, shear, and torsion. Engineering properties of materials used in structures. Fluid Energy, Thermal Energy, Electrical Energy and Power Systems. Components of a communication system, applications of laser and fiber optic technologies. Manufacturing Technologies: processes of casting and molding, forming, separating, conditioning, assembling, and finishing.		
Chemistry	<u>Organic chemistry.</u> Organic compounds. Carbon atom, properties, bonding. Structural formulas. Saturated and unsaturated compounds. Homologous series, their properties and reactions, occurrence in nature: hydrocarbons, alkenes, alkynes, aromatic ring hydrocarbons, alcohols, organic acids, aldehydes, ketones, ethers, and polymers.		
Biolog	Human anatomy and physiology. Systems and functions: locomotion (skeleton, muscles), nutrition, skin, respiration (respiratory system, cellular respiration, gas exchange), excretion, regulation (nervous system), endocrine system, transport system (circulation and absorption), cardiovascular system.		
English	Grade 10 English Language Arts will further develop skills of literary and linguistic analysis and writing. Students will critique each other's essays from the point of view of tight argument and precise use of grammar; they also will share creative writing and work increasingly on developing their own authorial voices. In-class discussion of literature will focus on techniques to establish the voice of both author and characters, and also on the formal aspects of prosody and poetics. As in lower grades, books will expose students to the work of authors from a variety of cultures, time periods, and cultures. Vocabulary development will include discussion of English etymology and its relationship to spelling, and also an introduction to lexicography; the class will work collaboratively on a class lexicon, focusing on slang words the students use among themselves. Students will share their creative writing aloud and collaborate in the performance of a class play.		
History	HISTORY OF MODERN WORLD. PART TWO. c. 1815-c. 1918. Europe 1815-1847. Political reaction and liberal-radical opposition. The growth of nationalism. New cultural trends. Romanticism. First Industrial revolution. New technologies and the rise of working class. Workers movement and socialism. Revolutions of 1848-1849. Europe 1850-1878. The U. S. 1815-1860. The U. S. during Civil War and Reconstruction. Europe and US 1879-1914. Latin American countries. Sub-Saharan Africa before and during the heyday of European colonialism. North Africa and the Middle East, India, China, Japan and Korea, South-East Asia, Australia and the Pacific before WW I. World War One.		

European Literature of 19th century. French, German, British Romanticism. European realism. Jane Austin. Dickens. Balzac. Russian literature of 19thcentury: Leo Tolstoy, Feodor Dostoyevsky, Anton Chekhov.

	11 <sup>th</sup> Grade		
Math	<u>Algebra.</u> Elements of statistics. Organizing data: diagrams and tables. Frequency and cumulative frequency. Midrange. Quartiles and Percentiles. Measures of Dispersion. Deviation from the mean, Variance, Standard Deviation. The Normal Distribution and standard normal curve. The idea of the Central Limit theorem. Sampling and Estimation: Random, Systematic and Stratified sample. Standard error of the mean. Introduction to Calculus: The limit of a sequence and its properties. The limit of a function. Graph interpretations of the limits. The notion of a continuous function.	Space Geometry. Three possible arrangements of a plane and a line and their properties. Parallel and perpendicular planes. Distances in the space between points, lines and planes. Polyhedrons, their elements, kinds, sections. Prism, Parallelepiped/cube, Pyramid, regular polygons. The Euler theorem. Evolvement (unfolding) of a polyhedron. Basic Solids of Revolving. Conic sections. Sphere. Volume of Solids. Combination of two solids. Polyhedral inscribed in/circumscribed about a solid of revolving.	
Physics	Waves and Particles. Mechanical waves. Electro-magnetic wa electromagnetic wave, polarization. Physical optic: light as a w Geometrical optics: light rays, mirrors, lenses, optical instrume relativity of time and length, mass and energy. Structure of the principle, quarks and leptons. Concepts of Quantum Mechanic photon, Heisenberg's uncertainty principle, particle-wave duali	ves: electromagnetic oscillations, traveling ave, refraction, interference, diffraction. nts. Special Relativity: the speed of light, atom, the electron, the photon, Pauli's exclusion is: the Photoelectric Effect, momentum of the ty.	
CS	Computer Programming V, Object Oriented Design (OOD) and Computer Graphics. Computer Database.	Programming (OOP). Internet programming II,	
Chemistry	Kinetics and equillibrium. Rate of chemical reactions, energy c equilibrium and phase change. Law of chemical equilibrium, en Entropy. Electrochemistry. Acids and bases, electrolytes. pH, t Electrodes. Redox equations.	hange, activation energy, catalyst. Phase quilibrium constant. Spontaneous reactions. itration. Redox. Galvanic and electrolytic cells.	
Biology	Genetics: Mendelian principles, gene-chromosome theory, dor intermediate inheritance, independent assortment, gene linkag approaches to genetic data, Punnett Square. Sex determinatic sexuality. Mutations: chromosomal alterations, gene mutations animal and plant breeding. Introduction to biochemistry.	ninance, segregation and recombination, le, crossing over, multiple alleles. Statistical in in humans. Different theories of human s, mutagenic agents. Genetic application to	
English	Grade 11 English Language Arts will continue to develop writin Students will practice in-class essay writing as well as perfectin revisions. Editing will focus on smooth transitions as well as ca Writing assignments will include research and preparation of b to study the distinctions among various styles, registers, and d language use appropriate to different settings, such as an inter- distinct from a college interview or an interview for a summer ju will focus on point of view and on the relationship of imagery, s mood. Creative writing assignments will focus on noticing the e- writing. Vocabulary development will include making notes on communities and developing definitions of words specific to the learning words from written contexts. Students will share their performance of a class play.	ng skills and literary and linguistic analysis. Ing their home-written essays through careful areful argumentation and accurate grammar. ibliography and footnotes. Students will continue ialects of English and role play the different rview for a job in a corner grocery store as ob with a software company. Literary discussions symbolism, and poetics to theme, tone, and effects of imagery and sound play in student language usage in the students' home ese environments, as well as exercises in creative writing aloud and collaborate in the	

ture History	HISTORY OF MODERN WORLD, c. 1919-c. 2003. Russian revolution and the rise of Soviet Union, 1917-1939. Europe between democracy and totalitarianism, 1918-1939. The rise of fascism. The U. S. between the wars, 1919-1941. Industrial boom of the 1920s. Great Depression. Franklin Delano Roosevelt and New Deal. Culture and science in Europe and North America, 1900-1939. Immigration of European scientists, thinkers and artists to the U. S. before WW II. Asia, Africa, Latin America1918-1939. World War Two, 1939-1945. Bipolar world 1946-1975. Cold War, Decolonization, European Integration. The U. S. history 1946-1975. World history, 1976- 2001. The U. S. history, 1976-2001. The World and the U. S. history after September 11, 2001. European Literature of 20 <sup>th</sup> century. Franz Kafka, The Metamorphosis Bertold Brecht. Antoine de Saint- Exupăry's The Little Prince. American Literature of 20 <sup>th</sup> century. John Steinbeck's The Grapes of Wrath, Of
Literat	Mice and Men. J. D. Salinger Catcher in the Rye. Faulkner. Ernest Hemingway.
	12" UIDUE Math - Physics - Computer Science specialization
Math	Solving different kinds of algebraic and transcendental equations/inequalities. Functions (inverse, composite, Polynomial, Rational, Exponential, Logarithmic, Trigonometry. Properties of functions. Representing a function and its properties by a graph in a coordinate plane. Calculus. Limits and continuity. Differentiation and the Derivative. Application of a derivative. Indefinite and Definite Integration.
Physics	<u>Special Projects:</u> Students will choose a topic to study individually and will present a talk at the end of the term. Examples: Classical physics: chaotic dynamics, from Newton's Gravity to Kepler's Laws, from Kinetic Theory to equation of state, Water waves, Instability in fluids. Modern topics: Wave guides, Diffraction of microwaves, Fiber optics, Photonics, Gravitational lensing. Advanced topics: Foundations of General relativity, Particle ZOO and the Standard Model, De Broglie waves, Black Holes, Superconductivity, Meissner Effect.
IT/CS	Computer Science theory and other advanced topics.
	Bio-Chemical specialization
Chemistry	Nuclear chemistry. Natural and artificial radioactivity. Isotopes. Nuclear energy, fusion, fusion reactions. Solid state chemistry, crystallography, crystal growth. Modern methods of matter analysis: electron microscopy, X-ray diffraction, nuclear resonance. New materials design.
Biology	Biochemistry and molecular biology. Organic compounds in living organisms and their functions. 9 life processes in living things from biochemical point of view. Genetics theory. The central dogma (DNA- RNA- protein). DNA replication, genetic control of cellular activities: RNA, proteins encoding. Protein synthesis and modifications. Genetic research: cloning, genetic engineering. Population genetics. Evolution theory. Comparative cytology, biochemistry, anatomy and embryology. Human genetics, medical genetics. Modern evolution theory. Heterotrop hypothesis (origin of life): primitive life forms, heterotroph to autotroph, anaerobe to aerobe, evolution of eukaryotes.
	Humanities specialization
History	Electives and Projects. Some examples: History of everyday life. European Intellectual History. U. S. History. History of International Relations. Jewish History. Russian History.
Literature	Electives and Projects. Some examples: European Literature, U. S. Literature, Russian literature, Jewish Literature, The history of Drama, and others.

Grade 12 English Language Arts will continue to develop the writing and analytic skills introduced in the previous grades. Students will continue to polish their essay writing skills both in homework and in-class assignments. They will write one long research paper, and help each other to critique and edit their work. Literary discussions will continue to explore point of view and voice as well as the use of language and imagery to establish mood and tone. Creative writing assignments will focus on developing individual voice. Language study will include part-of-speech testing and the finer points of grammar. As in lower grades, books will expose students to the work of authors from a variety of cultures, time periods, and cultures, but there will be greater student input into the selection of books for class discussion. Vocabulary development will include internet research into changing language patterns, such as the introduction and spread of technical vocabulary, the gradual disappearance of hyphens, and effect of increased cultural contact on words borrowed from foreign languages. Students will share their creative writing aloud and collaborate in the performance of a class play.