

Pascack Valley Regional High School District

**Pascack Hills High School, Montvale, New Jersey
Pascack Valley High School, Hillsdale, New Jersey**

Course Name: Discrete Math

Born On: August, 2017
Previous Revision: August, 2020
Current Revision: August, 2023
Board Approval: 8/28/23

COURSE DESCRIPTION: Discrete Math

Discrete Math is a half-year, 2.5 credit course that is designed to equip students with skills that will be beneficial in their daily lives and futures. *Discrete Math* focuses on real-life applications, and topics of study will include geometry, financial mathematics, and probability. 11th and 12th grade students enrolled in Discrete Math and Statistics I have the option of earning college credit by registering with William Paterson University at a reduced price but at student expense. Please note that dual enrollment is not required, and that the course will have the same requirements and expectations whether or not students elect to register for college credit.

All mathematics courses in the Pascack Valley Regional High School District *are* designed to address multiple learning styles and needs, and accommodations and modifications are made for students with disabilities, multilingual students, students at risk of failure, gifted and talented students, and students with 504 plans. Students are encouraged to analyze data using tools and models to make valid and reliable claims (9.4.12.IML.3), and various technologies are integrated throughout the curriculum, including scientific calculators, graphing calculators, specialized software, and various Internet programs and subscriptions. These tools enrich the curriculum by giving students' access to additional mathematical representations, and they also help to differentiate by providing students with additional options to engage with mathematical tasks.

The Pascack Valley Regional High School Mathematics Department integrates 21st century life and career skills across its courses, with the dual goal of informing students about careers and fields of study that use mathematics (9.3.ST.5, 9.3.ST-ET.5 and 9.3.ST-SM.2), and helping students improve the quantitative, mathematical, and statistical reasoning skills they will need to be effective producers and consumers of quantitative information in their everyday lives (9.2.12.CAP.2). Mathematics courses address the *New Jersey Student Learning Standards for Career Readiness, Life Literacies and Key Skills*, with a particular emphasis on demonstrating the ability to reflect, analyze and use creative skills and ideas (9.4.12.CI.1), investigating new challenges and opportunities for personal growth, advancement and transition (9.4.12.CI.3), identifying problem-solving strategies used in the development of an innovative product or practice (9.4.12.CT.1), and explaining the potential benefits of collaborating to enhance critical thinking and problem solving (9.4.12.CT.2). Mathematics courses also address the *New Jersey Student Learning Standards for English Language Arts Companion Standards*, with a particular focus on following complex multistep procedures (RST.9-10.3/RST.11-12.3), determining the meaning of symbols, key terms, and other domain-specific words and phrases (RST.9-10.4/RST.11-12.3), and translating quantitative or technical information expressed in words into visual forms and translating information expressed visually or mathematically into words (RST.9-10.7). Similarly, the mathematics department seeks to support students by providing them with opportunities to use quantitative, statistical, and mathematical reasoning in interdisciplinary contexts, in contexts that are meaningful to students, and in contexts that attend to the contributions and perspectives of historically marginalized groups. Specifically, mathematics courses will look to incorporate, when appropriate, contributions and experiences of people from the LGBTQ+ community and individuals with disabilities, and references to issues of social and cultural relevance, including climate change.

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Content/Topic:	Key Learning Items/Concepts and Pacing Guide	Observable Proficiencies and Skills:	NJSLs	Formative, Summative, Benchmark, and Alternative Assessments	Core Instructional and Supplemental Materials/ Modifications and Accommodations
<p>Unit I – Geometric Construction</p> <p>Time: 4 weeks (See next column for specific time frames)</p> <p>Content Statement: Students will be able to plan, design, and create a scaled model for a real-life construction project.</p> <p>Enduring Understandings: Area and volume are key mathematical understandings that are used in construction.</p> <p>Scaled drawings are a key tool in the design of a construction project.</p>	<p>1. (5 days) Planning</p> <ul style="list-style-type: none"> Area of figures Volume of figures Brainstorm idea for construction project Rough sketch of layout <p>2. (10 days) Calculating/Designing</p> <ul style="list-style-type: none"> Blueprints Determining pricing and cost of materials <p>3. (5 days) Construction/Creating</p> <ul style="list-style-type: none"> Building scale model <p>Content-specific modifications and accommodations - use multiple representations and technology to support conceptual understanding</p>	<p><i>Explain volume formulas and use them to solve problems</i></p> <p><i>Understand similarity in terms of similarity transformations</i></p>	<p>NJSLS Content Standards</p> <p>G-GMD 1 G-GMD 3 G-GMD 4 G-SRT 1</p> <p>NJSLS SMP</p> <p>MP1. Make sense of problems and persevere in solving them MP2. Construct viable arguments and critique the reasoning of others MP3. Reason abstractly and quantitatively MP4. Model with mathematics MP5. Attend to precision MP6. Use appropriate tools strategically MP7. Look for and make use of structure MP8. Look for and express regularity in repeated reasoning</p>	<p>Students will be assessed regularly throughout this course, with a focus on both conceptual understanding and procedural fluency.</p> <p>Assessment tools may include the following:</p> <ul style="list-style-type: none"> - quizzes (F) - tests (S) - performance tasks (F/S) - projects (S) - homework (F) - discussions (F) - journals (F) - Form A, B, or C benchmark (B) - alternative assessments (A) - Construction 	<p>Selection of primary sources <i>Suggestion(s):</i> Texts: teacher-created resources(on grade level); Advanced Algebra with Financial Applications (advanced); Deltamath (remediation, on grade level, and advanced) - Online business websites (Lowe’s, Home Depot) - Online examples of blueprints/layout</p> <p>Modifications and Accommodations: Students with special needs: Teachers and support staff will attend to all modifications and accommodations listed in students’ IEPs and 504s. Teachers will incorporate manipulatives, extra time, alternative assessments, scaffolding, spiraling, technology, and flexible grouping to support student learning. Multilingual students: Teachers and support staff will work to support multilingual students in their first language and in English, providing materials and/or resources to support students’ understanding. Students will be given additional time, as appropriate, and translation tools will be utilized as needed.</p>

	<p>- encourage students to use hands-on materials or technology to best support individual learning</p> <p>Interdisciplinary/additional connections</p> <p>- consider applications in engineering</p> <p>- encourage students to draw on interests and experiences to design diverse structures</p> <p>- consider structures that who better withstand impacts of climate change</p>		<p>NJSLS for ELA Companion Standards</p> <p>RST.9-10.3 RST.9-10.4 RST.9-10.7 RST.11-12.3 RST.11-12.4</p> <p>NJSLS-CLKS - 21st Century Life and Careers</p> <p>9.4.12.CI.1 9.4.12.CI.3 9.4.12.CT.1 9.4.12.CT.2</p> <p>- Technology 9.4.12.IML.3</p> <p>- Career Education 9.2.12.CAP.2 9.3.ST.5 9.3.ST-ET.5 9.3.ST-SM.2</p> <p>NJSLS – CSDT 8.1.12.DA.1 8.1.12.DA.5 8.1.12.DA.6 8.1.12.AP.1 8.2.12.ETW.2</p>	<p>Project (S)</p> <p>- Rough sketch (F)</p> <p>- Blueprints (F)</p> <p>- Calculations (F)</p> <p>- Budget/ Material Costs (S)</p> <p>- Final Presentation (S)</p>	<p><u>Students at risk of school failure:</u> Formative and summative data will be used to monitor student success, and students at risk of failure will receive additional supports and services, which may include parent consultation, extra help, and differentiation strategies, including small group instruction, group work, scaffolding, and spiraling.</p> <p><u>Gifted and Talented Students:</u> Students who excel in their mastery of course standards will be further challenged with more complex tasks, extensions of concepts and skills, and extended problem solving and critical thinking opportunities.</p>
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<p>Discrete Math: This half-year, 2.5 credit course is designed to equip students with skills that will be beneficial in their daily lives and futures. This course will focus on real-life applications, and topics of study will include geometry, financial mathematics, and probability.</p>					
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<p>Unit II – Financial Literacy</p> <p>Time: 10 weeks (See next column for specific time frames)</p> <p>Content Statement: Students will be able to utilize mathematical models and apply them to business applications that they will encounter in their post secondary life.</p> <p>Enduring Understandings: Understanding pay stubs, including taxes and contributions, is a key element of successful budgeting.</p> <p>An understanding of exponential growth, volatility, and the impact of fees can</p>	<p>1. (2 days) Select a career and research annual starting salary</p> <p><u>Then research the following..</u></p> <p>2. (2-4 days) Tax deductions from salary (pay stubs); use percentages from given teacher pay stub to find their own deductions from their base salary</p> <p>3. (7-10 days) Credit cards spreadsheet project</p> <p>4. (4-6 days) Credit score</p> <p>5. (2-4 days) Loans (simple and compound); include compound interest and simple interest problems.</p> <p>6. (6-8 days) Car payments - Research and purchase</p>	<p><i>Construct and compare linear, quadratic, and exponential models and solve problems</i></p>	<p>NJSLS Content Standards</p> <p>F-LE 1 F-LE 2 F-LE 3</p> <p>NJSLS SMP</p> <p>MP1. Make sense of problems and persevere in solving them MP2. Construct viable arguments and critique the reasoning of others MP3. Reason abstractly and quantitatively MP4. Model with mathematics MP5. Attend to precision MP6. Use appropriate tools strategically MP7. Look for and make use of structure MP8. Look for and express regularity in repeated reasoning</p> <p>NJSLS for ELA Companion Standards</p> <p>RST.9-10.3 RST.9-10.4 RST.9-10.7 RST.11-12.3</p>	<p>Students will be assessed regularly throughout this course, with a focus on both conceptual understanding and procedural fluency. Assessment tools may include the following:</p> <ul style="list-style-type: none"> - quizzes (F) - tests (S) - performance tasks (F/S) - projects (S) - homework (F) - discussions (F) - journals (F) - Form A, B, or C benchmark (B) - alternative assessments (A) - Budget assignment (S) - Credit Card Project (S) 	<p>Selection of primary sources <i>Suggestion(s):</i> Texts: teacher-created resources(on grade level); Advanced Algebra with Financial Applications (advanced); Deltamath (remediation, on grade level, and advanced)</p> <ul style="list-style-type: none"> - Microsoft Excel - Career websites - KBB <p>Modifications and Accommodations: Students with special needs: Teachers and support staff will attend to all modifications and accommodations listed in students’ IEPs and 504s. Teachers will incorporate manipulatives, extra time, alternative assessments, scaffolding, spiraling, technology, and flexible grouping to support student learning. Multilingual students: Teachers and support staff will work to support multilingual students in their first language and in English, providing materials and/or</p>

<p>support a deeper understanding of savings.</p> <p>Mathematical modeling and analysis can be used to better understand borrowing (for things like cars, loans, credit cards, etc.).</p>	<p>new car - Determine car payment and include in budget</p> <p>7. (10-15 days) Research for final monthly budget - utility expenses - leisure expenses (left over) - rent for apartment</p> <p>8. (Time Permitting) Research ideas and budget for vacation</p> <p>Content-specific modifications and accommodations - use multiple representations and technology to support conceptual understanding - use Excel, calculator, or online calculators to support conceptual understanding of financial applications</p> <p>Interdisciplinary/additional connections - explore finances in different disciplines - draw on diverse student interests and experiences when exploring financial literacy</p>		<p>RST.11-12.4</p> <p>NJSLS-CLKS - 21st Century Life and Careers 9.4.12.CI.1 9.4.12.CI.3 9.4.12.CT.1 9.4.12.CT.2</p> <p>- Technology 9.4.12.IML.3</p> <p>- Career Education 9.2.12.CAP.2 9.3.ST.5 9.3.ST-ET.5 9.3.ST-SM.2</p> <p>NJSLS – CSDT 8.1.12.DA.1 8.1.12.DA.5 8.1.12.DA.6 8.1.12.AP.1 8.2.12.ETW.2</p>		<p>resources to support students’ understanding. Students will be given additional time, as appropriate, and translation tools will be utilized as needed.</p> <p><u>Students at risk of school failure:</u> Formative and summative data will be used to monitor student success, and students at risk of failure will receive additional supports and services, which may include parent consultation, extra help, and differentiation strategies, including small group instruction, group work, scaffolding, and spiraling.</p> <p><u>Gifted and Talented Students:</u> Students who excel in their mastery of course standards will be further challenged with more complex tasks, extensions of concepts and skills, and extended problem solving and critical thinking opportunities.</p>
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<p>Unit III – Probability</p> <p>Time: 4 weeks (See next column for specific time frames)</p> <p>Content Statement: Students will be able to interpret and analyze major mathematical concepts behind probability based applications.</p> <p>Enduring Understandings: Probability can be used to understand how choices can be made to maximize advantages or minimize disadvantages.</p> <p>Expected value uses the principles of probability to</p>	<p>1. (2 days) Law of averages/Law of large numbers</p> <p>2. (5 days) Fundamental counting principles and other counting problems</p> <p>3. (2 days) Determine simple probabilities using cards/dice/spinners/other randomly generated tools</p> <p>4. (3 days) Determine compound probabilities using cards/dice/spinners/other randomly generated tools</p> <p>5. (4 days) Explore difference between experimental and theoretical probabilities</p> <p>6. (1 day) Probability misconceptions</p>	<p><i>Understand independence and conditional probability and use them to interpret data</i></p> <p><i>Calculate expected values and use them to solve problems</i></p>	<p>NJSLS Content Standards</p> <p>S-CP 1 S-CP 2 S-MD 1 S-MD 2 S-MD 3 S-MD 4</p> <p>NJSLS SMP</p> <p>MP1. Make sense of problems and persevere in solving them MP2. Construct viable arguments and critique the reasoning of others MP3. Reason abstractly and quantitatively MP4. Model with mathematics MP5. Attend to precision MP6. Use appropriate tools strategically MP7. Look for and make use of structure MP8. Look for and express regularity in repeated reasoning</p> <p>NJSLS for ELA Companion Standards</p>	<p>Students will be assessed regularly throughout this course, with a focus on both conceptual understanding and procedural fluency. Assessment tools may include the following:</p> <ul style="list-style-type: none"> - quizzes (F) - tests (S) - performance tasks (F/S) - projects (S) - homework (F) - discussions (F) - journals (F) - Form A, B, or C benchmark (B) - alternative assessments (A) - Game Project (S) 	<p>Selection of primary sources <i>Suggestion(s):</i> Texts: teacher-created resources(on grade level); Advanced Algebra with Financial Applications (advanced); Deltamath (remediation, on grade level, and advanced)</p> <ul style="list-style-type: none"> - Core Math Tools - Probability tools (spinners, cards, dice) - Random number generator (TI, Excel) <p>Modifications and Accommodations: Students with special needs: Teachers and support staff will attend to all modifications and accommodations listed in students’ IEPs and 504s. Teachers will incorporate manipulatives, extra time, alternative assessments, scaffolding, spiraling, technology, and flexible grouping to support student learning. Multilingual students: Teachers and support staff will work to</p>

<p>calculate long-term value.</p>	<p>7. (Time permitting) Mutually exclusive vs Not mutually exclusive</p> <p>8. (4 days) Find expected value of games/business concepts based on probabilities of certain outcomes</p> <p>9. (10 days) Ability to understand gaming and game project</p> <p>Content-specific modifications and accommodations - use multiple representations and technology to support conceptual understanding - incorporate online tools and resources for visualization and calculation</p> <p>Interdisciplinary/additional connections - explore probabilistic nature of business, science, sports, and other fields - explore probabilistic nature of climate change</p>		<p>RST.9-10.3 RST.9-10.4 RST.9-10.7 RST.11-12.3 RST.11-12.4</p> <p>NJSLS-CLKS - 21st Century Life and Careers 9.4.12.CI.1 9.4.12.CI.3 9.4.12.CT.1 9.4.12.CT.2</p> <p>- Technology 9.4.12.IML.3</p> <p>- Career Education 9.2.12.CAP.2 9.3.ST.5 9.3.ST-ET.5 9.3.ST-SM.2</p> <p>NJSLS – CSDT 8.1.12.DA.1 8.1.12.DA.5 8.1.12.DA.6 8.1.12.AP.1 8.2.12.ETW.2</p>		<p>support multilingual students in their first language and in English, providing materials and/or resources to support students’ understanding. Students will be given additional time, as appropriate, and translation tools will be utilized as needed.</p> <p><u>Students at risk of school failure:</u> Formative and summative data will be used to monitor student success, and students at risk of failure will receive additional supports and services, which may include parent consultation, extra help, and differentiation strategies, including small group instruction, group work, scaffolding, and spiraling.</p> <p><u>Gifted and Talented Students:</u> Students who excel in their mastery of course standards will be further challenged with more complex tasks, extensions of concepts and skills, and extended problem solving and critical thinking opportunities.</p>
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