Calvert County Public Schools

STEM

Extra-Curricular Activities

Overview

Computer Bowl

What is the Computer Bowl?
Encouraging the programmers of tomorrow is the goal of the Southern Maryland High School Computer Bowl sponsored by Southern Maryland Electric Cooperative (SMECO). With information technology firmly embedded in daily life, electric utilities like SMECO depend heavily on computer equipment to help keep the lights on for their customers. Utilities also depend on technology experts who know how to create and maintain software programs that ensure that all computerized systems run efficiently.

What are the components of the game? Up to 4 members can be on a team. Each team is given a written test covering all things related to computers followed by a 2 hour time period to successfully write as many programs as possible. More points are given to harder programs.

Who can participate?
Students in grades 9-12

How often does the team meet?
Teams meet weekly during one hour lunch or after school.

When are the competitions held?
The SMECO computer bowl is generally held on the first Saturday in March at North Point High School. All Southern Maryland schools are invited. Each school can bring a maximum of 3 teams. The top teams here win cash prizes, scholarships to the College of Southern Maryland, and sometimes great tech gadgets (in 2014, each member of the winning team from HHS received a Samsung tablet).

Destination Imagination

What is Destination Imagination (DI)?

The Destination Imagination program encourages teams of learners to have fun, take risks, focus and frame challenges while incorporating STEM (science, technology, engineering, and mathematics), the arts and service learning. The purpose of DI is to inspire and equip students to become the next generation of innovators and leaders. Annually, the program offer seven new standards-based Challenges in STEM, Improv, Visual Arts, Service Learning, and Early Learning. Each Challenge is open-ended and enables student teams to learn and experience the creative process from imagination to innovation. Academic tournaments take place around the world where teams have the opportunity to present their solutions to trained appraisers. Students have fun and gain confidence in their ability to solve any challenge. In working to solve our Challenges, teams learn 21st century skills (creativity, critical thinking, collaboration, communication, citizenship and courage) to build on their unique strengths.

What are the components of DI?

Up to 7 members can be on a team. Each year, the team chooses from seven new Challenges. Each of the Challenges is developed by a team of educators and industry experts who target a particular area of the curriculum and its related standards of content and performance. The areas of focus include: Technical, Scientific, Fine Arts, Improvisational, Structural and Service Learning. There is also a non-competitive Early Learning Challenge that allows participants to develop social and problem solving skills.

Who can participate in DI?

Any students from kindergarten-12th grade

How often does the team meet?

DI teams generally meet once a week after school.

When are the competitions held?

The regional DI competition is generally held in April. The national DI competition is generally held in May.

Junior FIRST LEGO League

What is Junior FIRST LEGO League? Focused on building an interest in science and engineering in children ages 6-9, Junior *FIRST*® LEGO® League (Jr.FLL®) is a hands-on program designed to capture young children's curiosity and direct it toward discovering how science and technology impact the world around them. This program features a real-world challenge, to be explored through research, critical thinking and imagination. Guided by adult coaches and the Jr.FLL Core Values, team members work with LEGO elements and motorized parts to build ideas and concepts and present them for review.

What are the components of Junior FIRST LEGO League? Teams consist of 2 to 6 children and are guided by at least two adult coaches. Each yearly Challenge is based on a different theme and has two main parts, the LEGO Model and the *Show Me* Poster. During the season teams will:
- Conduct research about the current Challenge theme.
- Build a LEGO Model based on the Challenge instructions that contains both a simple machine and a motorized part.
- Display their findings on a *Show Me* poster.

Who can participate in Jr. FLL?
Elementary students ages 6-9

How often does the teams meet?
Teams generally meet once a week after school.

When are the competitions held?
Jr. FLL do not hold competitions, instead, they hold a Jr. FLL Expo. This allows all teams to showcase what they have learned and all teams leave with an award. The Expo generally takes place in May.

CSM LEGO Robotics

What is LEGO Robotics?
LEGO Robotics is an extra-curricular activity designed to capture children's curiosity and direct it toward discovering the wonders of science, technology, engineering and mathematics. This activity features a real-world scientific concept to be explored through research, teamwork, construction, and imagination. CCPS in collaboration with the College of Southern Maryland uses the Mindstorm LEGO Robotics Systems as the competition platform. Each year a new challenge is announced by CSM. Once the competition is announced, teams must build robots to compete in the challenge and complete a research project related to the challenge.

What are the components of the LEGO Robotics?
Teams up to 10 members work to complete the following components:
* A **research project** related to the year's theme
* A **technical interview** where the team describes their programs and demonstrates their robot's ability to execute one or more of the assigned competition missions.
* A **competitive session** where the team's robot executes as many missions as possible in a timed, head-to-head competition against another team in a very noisy environment.
* A **teamwork** score – which can vary from a specific monitored exercise to judges observing the team's behavior throughout the event, and anywhere in between.

Tournament Structure
The tournament is divided into two parts: qualifying rounds and championship rounds. In qualifying rounds, each team will get three matches to demonstrate their robot on the challenge field.

At the end of the qualifying rounds, the teams are ranked based on their highest scored match.

The top eight teams will advance to the championship rounds. The championship rounds are played using the single-elimination style. The winner of the final match is crowned the "Tournament Champion".

Who can participate in LEGO Robotics?
Elementary grades 4 and 5
Middle Schools grades 6, 7, and 8

How often does the teams meet?
Teams generally meet once a week after school.

When are the competitions held?
CCPS Mock Competition is generally held in March. CSM Regional competition is generally held in April

MATHCOUNTS

What is Math Counts?
Math Counts is a national middle school coaching and competitive mathematics program that promotes mathematics achievement through a series of fun and engaging "bee" style contests.

What are the components of Math Counts?
MATHCOUNTS competition are designed to be completed in approximately three hours by a team of four students or six individual students per school.

The **SRRINT** Round (40 minutes) consists of 30 problems. This round tests accuracy, with the time period allowing only the most capable students to complete all of the problems. Calculators are not permitted.

The **TARGET ROUND** (approximately 30 minutes) consists of 8 problems presented to competitors in four pairs (6 minutes per pair). This round features multistep problems that engage Mathletes in mathematical reasoning and problem-solving processed. Problems assume the use of calculators.

The **TEAM ROUND** (20 minutes) consists of 10 problems that team members work together to solve. Team member interaction is permitted and encouraged. Problems assume the use of calculators.

The **COUNTDOWN ROUND** is a fast-paced oral competition for top-scoring individuals (based on scores in the Sprint and Target Rounds). In this round, pairs of Mathletes compete against each other and the clock to solve problem. Calculators are not permitted.

Who can participate in Math Counts?
Any student in grades 6, 7 or 8

How often does the team meet?
Math counts teams generally meets once or twice a week after school.

When is the competition held?
The County competition is held in February.

Math Challenge

What is Math Challenge?
Math Challenge is a local challenge sponsored by SMECO to build the math skills of elementary students.

What are the components of Math Challenge?
Math Challenge is the elementary version of Math Counts and follow the general guidelines of Math Counts.

> The **SRRINT** Round. This round tests accuracy, with the time period allowing only the most capable students to complete all of the problems. Calculators are not permitted.

> The **TARGET ROUND**. This round features multistep problems that engage Mathletes in mathematical reasoning and problem-solving processed. Problems assume the use of calculators.

> The **TEAM ROUND**. Team member interaction is permitted and encouraged. Problems assume the use of calculators.

> The **COUNTDOWN ROUND** is a fast-paced oral competition for top-scoring individuals (based on scores in the Sprint and Target Rounds). In this round, pairs of Mathletes compete against each other and the clock to solve problem. Calculators are not permitted.

Who can participate in Math Challenge?
Elementary students in grades 4 or 5.

How often does the team meet?
Math challenge teams generally meet once a week after school.

When is the competition held?
The County competition is held in March.

Mathematics Engineering Science Achievement (MESA)

What is MESA?

MESA is a STEM (science, technology, engineering, and math) initiative, works to identify and support students statewide in order to prepare them to matriculate and graduate from a two-year and/or four-year college or university with a degree in science, technology, engineering, or mathematics. Maryland MESA seeks to target students who are traditionally underrepresented in these fields—specifically minority and female students.

Through participation in Maryland MESA, students develop academic and leadership skills, improve their academic performance, and gain confidence in their ability to compete professionally.

What are the components of MESA?
Elementary School
Effective Communication -4-6 member team – Each team will create a compelling public service announcement to raise awareness for a global or local issue or concern.

SCRATCH – 2-4 member team - Scratch is a software language developed by MIT to be used as an introductory teaching tool for computer programming. Scratch makes it easy for students to create and share interactive stories, animations, games, music, and art, via the Scratch website. By creating Scratch projects students will learn important problem solving skills and be exposed to higher level mathematic and computational processes, which will foster a deeper understanding of the programming process.

Storybook Theme Park Ride – 2-4 member team - The objective of this project is expose student to the engineering process through the design and construction of a *functional* model theme park ride based on a storybook of the team's choosing. The ride must be designed to safely carry a nickel, 2 pennies, and a dime (hereafter referred to as "people" or "passengers") through two consecutive test runs.

Balsawood Bridge – 3-4 member team - The objective of this competition is to design and construct the most efficient balsa wood bridge that maximizes the strength-to-weight ratio *(Efficiency)*.

Middle School
Effective Communication - 4-6 member team – Each team will create a compelling public service announcement to raise awareness for a global or local issue or concern.

Alice – 3-4 member team - Alice is an innovative 3D programming environment that makes it easy and fun for students to learn the fundamental constructs of object-oriented programming through the creation of animated movies and simple video games. Designed to be a teaching tool for introductory computing, it uses 3D graphics and a "drag-and-drop" interface to facilitate a more engaging, less frustrating first-time programming experience.

Prosthetic Arm – 2-4 member team - The Prosthetic Arm Challenge involves the development of a low-cost prosthetic device to complete a set of pre-defined tasks.

Basswood Bridge – 3-4 member team **-** The object of this contest is to design, construct, and test the most efficient bridge within the required specifications. Model bridges are intended to be simplified versions of real-world bridges, which are designed to accept a load in any position and permit the load to travel across the entire bridge.

High School

Effective Communication - 4-6 member team – Each team will create a compelling public service announcement to raise awareness for a global or local issue or concern.

Cyber Robot Challenge – 3-4 member team - Student teams will use the Python programming language to program a *virtual robot* to navigate through a series of *computer networks* executing a mission.

Prosthetic Arm – 2-4 member team - The Prosthetic Arm Challenge involves the development of a low-cost prosthetic device to complete a set of pre-defined tasks

Basswood Bridge – 3-4 member team **-** The object of this contest is to design, construct, and test the most efficient bridge within the required specifications. Model bridges are intended to be simplified versions of real-world bridges, which are designed to accept a load in any position and permit the load to travel across the entire bridge.

Who can participate?
Any student in grades 3 through 12.

How often does a team meet?
MESA clubs generally meet once or twice a week after school

When are the competitions held?
Calvert County Local Competition is held in early April. The state competition is held in early May. The National Competition is held in mid-late June.

FIRST Robotics

What is FIRST Robotics?
For Inspiration and Recognition of Science and Technology (FIRST) Robotics is the varsity competition that combines the excitement of sport with the rigors of science and technology. Under strict rules, limited resources, and time limits, teams of 25 students or more are challenged to raise funds, design a team "brand," hone teamwork skills, and build and program robots to perform prescribed tasks against a field of competitors. It's as close to "real-world engineering" as a student can get. Volunteer professional mentors lend their time and talents to guide each team.

What are the components of the game?
The *FIRST* Robotics Competition challenges teams of young people and their mentors to solve a common problem in a six-week timeframe using a standard "kit of parts" and a common set of rules. Teams build robots from the parts and compete in games designed by Dean Kamen, Dr. Woodie Flowers, and a committee of engineers and other professionals.

FIRST redefines winning for these students by rewarding teams for excellence in design, demonstrated team spirit, gracious professionalism and maturity, and the ability to overcome obstacles. Scoring the most points is a secondary goal. Winning means building partnerships that last.

There is no typical or *FIRST* mandated team structure. *FIRST* does require each team to assign adults to the official team roles of Main, Alternate and Shipping Contact - other than that, you are free to structure your team as best suits you! Most teams comprise 25 students (there is no maximum) and can be made up of one or more high schools or youth organization(s). We also have home-schooled teams that compete.

CCPS FIRST Robotics team is a county wide team that meets at Huntingtown School.

Who can participate in VEX Robotics?
Any high school student.

How often does the teams meet?
CCPS FIRST team is a county wide team that meets at Huntingtown Schools. Meeting days varies and changes during each phase of the competition. The FIRST team may meet two or three times a week during the design stage of the competition.

When are the competitions held?
The qualifier is held in December and Regional competition is held in April.

VEX Robotics

What is VEX Robotics?
VEX Robotics is the largest and fastest growing middle and high school robotics program globally with more than 10,000 teams from 32 countries playing in over 750 tournaments worldwide. The program seeks to increase student interest and involvement in science, technology, engineering and mathematics (STEM) by engaging students in hands-on sustainable and affordable curriculum-based robotics engineering programs across the U.S. and internationally.

CCPS works collaboratively with the College of Southern Maryland and participates in the CSM League Challenges in preparation for the VEX Robotics Competition.

What are the components of VEX Robotics?
Each year, an exciting engineering challenge is presented in the form of a game. Students, with guidance from their teachers and mentors, build innovative robots and compete year-round in a variety of matches. In addition to learning valuable engineering skills, students gain life skills such as teamwork, perseverance, communication, collaboration, project management, and critical thinking. The VEX Robotics Competition prepares students to become future innovators with 95% of participants reporting an increased interest in STEM subject areas and pursuing STEM related careers.

Tournament Structure
The tournament is divided into two parts: qualifying rounds and championship rounds. In qualifying rounds, each team will play in approximately 5-7 matches during each ranking session (league play days). Because normally a match consists of two alliances (one "red" and one "blue") of two robots each going head to head, the teams are assigned a random partner to form the alliance and will go against two randomly assigned robots forming the opposing alliance.

At the end of the qualifying rounds, the teams are ranked based on their win percentage. The top ranked team at the conclusion of the qualifying rounds will automatically earn the Excellence Award and qualify for the World Championship. To be eligible for the Excellence Award, and to play in the championship rounds (League Championship), teams must play in all of their scheduled ranking sessions.

The top eligible teams will advance to the championship rounds. The championship rounds start with each team selecting one other team (from the rest of the field of eligible teams) to join them as an alliance in the championship rounds. For 3 team alliances, the alliance captains will pick one more team to join their alliance. Once the alliances are set, the championship rounds will begin. The number of alliances (eight 3-team alliances or sixteen 2-team alliances) will be decided prior to start of the league championship.

The championship rounds are played using the single-elimination style with the winner of each round determined using the best of three matches. The alliance winners of the final match are crowned the "Tournament Champions", and the runner-up alliance teams are crowned the "Tournament Finalists".

Who can participate in VEX Robotics?
High School Students

How often does the teams meet?
Teams generally meet once or twice a week after school.

When are the competitions held?
The League challenges are help once a month in October, November, December, and January. The Regional Competition is held in February. The State Competition is held in March. The World Championship is held in April.