ACED Festival
Architecture, Construction, Engineering + Design

@ACEDfest & enter the photo competition #BuildMy209
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**EVENT CALENDAR**

**FRI 2**

**Student Events**  
*8am to 3 pm*

**GRADES**  
K-2  
Shape Walk  
Paper House  
Paper Airplanes

3-5  
New Stockton Box City  
Geo-Dome  
Shake Table Tower

6-8  
Miracle Mile Tour  
Egg Box Launch  
ACED Talk

9-12  
Hard Hat & Downtown Tour  
“If You Build IT” Film  
Robotics Navigation  
Waterfront Survey

**Design Awards Gala**

**Cocktail Hour 5:30pm**  
**Presentation 6:30pm**

**Location:** UOP De Rosa Center  
3601 Pacific Avenue, Stockton CA

**Refreshments | Key Note Speaker | Awards**

**Student Admission FREE**  
**Public Admission $5**

**SAT 3**

**“If You Build IT” Film**

**Reception 5:30 pm**  
**Feature Film 6:30 pm**

**Location:** West Forum, Delta College  
5151 Pacific Avenue, Stockton, CA

**Presentation | Activities | Refreshments**

**Admission FREE**

In Collaboration with Stockton Unified School District, Lincoln Unified School District, San Joaquin County Office of Education, and San Joaquin Delta Community College, AIA Sierra Valley and numerous local Businesses and Organizations: Students, grades K-12, will have opportunities to explore ideas of design, architecture, engineering, and construction through a range of hands-on activities, tours, and lectures. Each activity is catered to fit the students’ grade levels and interest in specific topics as well as allowing individuals to explore their imagination and creativity to create and think innovatively. The futures of architecture, construction, engineering and design lie in the minds of young students that can bring fresh and cutting edge ideas to the world. Not only will students learn the tools to design their own futures, but also the tools to build the futures of the design world.

Enjoy a special evening celebrating design excellence! Learn about the award-winning projects from the architects who designed them. From architecture and construction, to engineering and design, these projects have truly ACED all aspects of their work. Event includes drinks, appetizers, and abundant sources of inspiration!

Directed by Patrick Creadon, IF YOU BUILD IT follows designer-activists Emily Pilloton and Matthew Miller to the rural and poorest county in North Carolina: Bertie County. Here they lead 10 students to transform their community through a year-long, full scale design and build project while fighting the struggles of the change-resistant school board. IF YOU BUILD IT offers a compelling and hopeful vision for a new kind of classroom in which students learn the tools to design their own futures.
Everything in the built environment is the result of solving problems to help people live, work, grow, learn, and travel. These solutions or projects are designed and constructed by a team. Each team member brings special skills to assist in solving problems. The architects, engineers and designers work together to design the solution and to develop the drawings and specifications used by the contractor to construct the project, whether it is a park, a home, an office building, or a school.
The lessons in this packet expose your students to the fun and wonders of architecture, construction, engineering, and design. They will be using their imagination, senses, and hands to explore the built environment and the community, to solve problems and to learn concepts that are the building blocks integral to the disciplines of architecture, construction, engineering, and design.
**Goals**

- To learn about basic geometric shapes
- See shapes in everyday environments

**Supplies**

- Paper
- Scissors
- Glue

**Activity**

Give students a variety of shapes on different colored construction paper or ask that they cut the shapes out of the paper. Name all of the shapes and turn the shapes in different directions so that the students can recognize the shapes in different orientations. Walk through the school or better yet, through a neighborhood. Show the students how the shapes make up parts of the buildings, playground features, houses, cars etc. Then let the students find and point out shapes in their environment.

**Extensions**

Using the shapes the students cut, arrange and glue shapes on a sheet of paper into something they saw on the “shape walk” (e.g. car, house, playground equipment)
Goals
Δ Use a 2D material to build a 3D structure

Supplies
Δ House & Castel templates are provided in the Handout section of the Curriculum Packet
Δ Paper (house templates)
Δ Scissors
Δ Glue/Tape
Δ Color pencils or crayons

Activity
Using a single sheet of square paper, students can create a small paper house to decorate. Discussion can center around window or door features normal incorporated, roof design, building materials, etc. Using construction paper, students will explore and recreate the design features specific to castles and consider other architectural examples with specific functions.

Extensions
Δ Add 2D or 3D features to the house with paper shapes.
Δ Create a building without using a template.
Goals

△ To explain aero engineering concepts and how altering the shape of a paper airplane changes its performance.
△ To allow self-guided exploration of creation and engineering

Supplies

△ Airplane templates are provided in the Handout section of the Curriculum Packet
△ Paper

Activity

To begin, some basic scientific principles will be introduced including: Airplane Forces (which describes what pulls planes in different directions) and Bernoulli’s Principle. Using sheets of paper, students are then able to re-create different given paper airplane designs. Each time testing and observing how each of the different designs affects the paper plane’s flight.

Extensions

Repeat the exercise, but challenge the students to alter one of the learned paper airplane designs in order to compete in order to span a certain distance, or pass through a certain obstacle.
ACED FESTIVAL STUDENT ACTIVITIES
NEW STOCKTONBOX CITY

Goals
△ To work in teams to create a spontaneous city from recyclable materials.
△ To analyze the city and reconstruct in a more conscious and deliberate way.

Supplies
△ Downtown Grid (using chalk or colored tape)
△ Variety of building materials (plastic, cardboard, tubes, egg cartons, paper)
△ Tape and Glue
△ Scissors

Activity
Using a city downtown grid mapped out on the floor, give the students a task to re-build the City of Stockton. Ask them what places they should have in Downtown Stockton and where they would like that place to be. Each team of students can gather the “building supplies” they will need to create a building. Then each team places there model in the “box city”. Each team can present their building; what kind of building it is, it’s features, why they built it, why they placed it in a particular location etc.

Extensions
Add other features (e.g. landscape elements, transportation, etc)
Goals

Δ To demonstrate the structural strength of the triangle, and how structures created from a combination of triangles can be self-supporting, and strong!

Δ To show how the triangle can be put together to create both 2 dimensional shapes (hexagons, squares, etc) or jointed together to create 3 dimensional spaces.

Supplies

Δ Geodesic dome instructions are provided in the Handout section of the Curriculum Packet

Δ Newspaper

Δ Tape, stapler

Activity

In groups, roll newspaper into tubes, decorate them, and assemble the tubes into a tessellated dome. Use plenty of tape or staples to reinforce the joints of where the tubes connect to each other. After completing the dome, test the self-supporting structure under additional weight by adding magazines to the top of the dome. Triangles are a shape that can be tessellated, or arranged to form a tiling pattern. Have students predict what other shapes can be tessellated (hexagons, squares). Cut the shapes out of paper and test their predictions.

Extensions

Add tension rings around the bottom of the dome or divide some or all of the triangular panels into smaller triangles.
Goals
Δ To understand how materials and form give structure strength.
Δ Learn about forces released in an earthquake and how buildings resist these forces

Supplies
Δ Shake Table instructions are provided in the Handout section of the Curriculum Packet
Δ Shake Table: 2 boards, several rubber balls, 2 rubber bands
Δ Towers: wood sticks, tape, marshmallows

Activity
Create a shake plate for testing the stability of skyscrapers. Students can compare the difference between towers of differing heights and base size and discuss other ideas to improve building stability. Students then build towers out of toothpicks and mini-marshmallows. Place them on the shake table and see how they endure the shaking, to simulate the effect of earthquakes on towers and built structures.

Extensions
See what team can build the tallest & strongest structure
Goals
△ Learn about history of Stockton and Architecture throughout buildings
△ Learn about architectural features and what they signify

Supplies
△ Tour Route and Architectural Features/Style guide is provided in the Handout section of the Curriculum Packet
△ Pencil or Pen

Activity
Groups of students will be guided on a walking tour of Tuxedo Park neighborhood. The guides will illustrate the architecture of the homes; discussing the styles that the buildings represent, the time period they were built, features that are common or specific between certain buildings and styles.

Extensions
Have each student sketch a memorable or favorite architectural feature
Goals
△ To design a structure that will protect a raw egg from breaking when launched
△ To understand the relationship between physics and structure

Supplies
△ Container: cardboard, newspaper, styrofoam, cotton, feathers, cloth, bubble wrap etc.
△ Glue, tape, rubber bands, scissors
△ Eggs

Activity
Build a “container” using provided materials. The overall size of the structure is not to exceed 6”x6”x12”. When students are ready, seal and raw egg inside a small plastic bag and place inside the structure. One by one launch the containers at the designated location. After each is launched check to see which eggs survive the launch. Discuss and compare the successful designs (materials, shapes, design, and protective environments for the egg).

Extensions
△ Do a 2nd launch of the surviving eggs containers!
△ Translate the discussion about the egg containers protective environment to observations about protective environments for humans (buildings, cars etc)
**Goals**

Δ Learn about exciting careers in Architecture, Construction, Engineering and Design.

Δ Opportunities for students to ask questions to experts in the field.

**Activity**

A panel of experts in the areas of Engineering and Design will provide insight about their educational backgrounds and highlights of their professional careers, Teachers and students will have opportunities to ask questions following each talk.

**Extensions**

Have students do a research and presentation project about an ACED career of their choice.
Goals
Δ To give students an inside look at construction methods, the structural engineering of a building
Δ To explore the roles of individuals of the design team, Engineers, Inspectors, Trades, Project manager, Forman etc.

Supplies
Δ NONE

Activity
An up close tour of the construction site of the new Stockton Courthouse hosted by Turner Construction. Groups of students will be taken into the current and undergoing construction site of the new courthouse with a guide. The guide will discuss building construction methods, structural design, and the importance of incorporation of different types of design and engineering to complete a building. Students will be able to see the progression of construction for a structure and see how all people on a construction site engage with each other and the project on a daily basis.

Extensions
Sketch or photograph an interesting feature of the building. Share on #BuildMy209
Goals

Δ Learn about Stockton’s history through notable downtown buildings and features

Supplies

Δ Tour Route and Guide is provided in the Handout section of the Curriculum Packet

Activity

A guided tour of buildings, history and architecture of Stockton’s skyline. The guides will illustrate the architecture of the buildings, and high rises in the Downtown area; discussing the styles that the buildings represent, the time period they were built, features that are common or specific between certain buildings and styles. Students will learn about the importance of the areas construction to the overall growth and development of the City of Stockton.

Extensions

Sketch or photograph and interesting feature. Share on #BuildMy209
Goals
Δ To gain inspiration from teenagers, that with the help from dedicated teachers, it is possible to transform yourself and your community through Architecture, Construction, Engineering, and Design.

Activity
A film about an architecture education program at a high school in a struggling rural community and the lives this program has impacted and transformed.

Extensions
Discuss what problems exist in your community and how they can be solved through Architecture.
Goals

Δ To design, build, and program a robot to navigate a fixed course.
Δ To apply practical math and scientific concepts while learning design, mechanical construction, and computer programming.

Supplies

Δ Fixed course, scoring rubric and table is provided in the Handout section of the Curriculum Packet
Δ Students must bring their own robots

Activity

The students’ task is to program an autonomous mobile robot of their choice to navigate a determined fixed course. Students may participate individually or in groups of two. The robot must be brought to the competition and it must navigate the entire course independently without being remotely controlled. It is recommended that it is programmed before the competition and only small modifications to be made on the day of competition. Each linear line segment is 18” (1.5 ft) long. The semi-circle has a diameter of 24” (2 ft). The course will be taped on the hallway floor at the competition area; however, you MUST bring your own robot and a laptop if you wish to modify your code on the competition day. Each robot will be given an official score based on accuracy of the requirements given by the course. Practice runs are given within a 60 min time period, and the students are allowed two official runs, with the higher of the two your official score.
Goals
Δ To learn basic surveying techniques
Δ Use total stations to survey a given area

Supplies
Δ Total Station (will be provided)

Activity
A crash course in surveying hosted by San Joaquin Delta College in the downtown area. Surveying is the first step in the construction phase of any project. You have to lay it out right, or it’s ALL wrong. The instructor will discuss surveying techniques and equipment and the importance of a good survey. Students will apply their knowledge by using total stations to measure angles and distances.

Extensions
Δ Use a tape to measure a property boundary or other desired distances
Δ To calculate angles, measure distances of the sides of triangles then calculate interior angles
SNAP TO WIN

1. FOLLOW ACEDFEST ON INSTAGRAM
2. TAKE A PHOTO OF THE BUILT ENVIRONMENT AND UPLOAD TO INSTAGRAM WITH THE HASHTAG: #BuildMy209
3. PHOTO WITH THE MOST LIKES WILL WIN GRAND PRIZE
4. TOP 3 PHOTOS JUDGED BY PANEL WIN PRIZES

CELEBRATE THE BUILT ENVIRONMENT AND ITS IMPORTANCE, MEANING, OR INSPIRATION TO OUR COMMUNITY. BE CREATIVE. BE INSPIRATIONAL.
# ACTIVITY SCHEDULE

**ACED Festival 2015**  
Architecture, Construction, Engineering + Design

**ACTIVITY**  
**SCHEDULE**  
**GRADES 9-12**

<table>
<thead>
<tr>
<th>ACTIVITIES &amp; LOCATION</th>
<th>TIME</th>
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<tbody>
<tr>
<td><strong>ARRIVE</strong></td>
<td>8:30</td>
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| **COURTHOUSE HARD HAT TOUR**  
STOCKTON COURTHOUSE &  
DOWNTOWN STOCKTON TOUR  
DOWNTOWN STOCKTON |  |  |  |  |  |  |  
| **IF YOU BUID IT” FILM**  
WEBER |  |  |  |  |  |  |  
| **WATER FRONT SURVEY**  
WEBER |  |  |  |  |  |  |  
| **LUNCH** |  |  |  |  |  |  |  
| **ROBOTICS COMPETITION** |  |  |  |  |  |  |  

**AIA SIERRA VALLEY**
Please clearly letter or type all information

School Name:  

Instructor:  

Instructor mobile phone number:  

Number of Participating Students:  

Number of Chaperones, Teachers, Administrators etc:  

TOTAL NUMBER OF PARTICIPANTS:  
(add the total of students and other participants)

PARTICIPANTS OF ROBOTICS COMPETITION:  

Names of Participating Students  
First and Last Names

This event is available to the first 120 students to sign up. Once the event is at capacity, a waitlist will be available. This entry form must be received by 4:00 PM on Friday, September 18. Entry forms should be mailed or delivered to:

Ward H. Andrus, Ed.D.  
Director, Ed. Services, Career and Technical Education  
Stockton Unified School District  
701 N. Madison St., Stockton, CA 95202  
Phone: (209) 933-7115 ext. 2734  
Email: wandrus@stocktonusd.net

All questions concerning registration, competition, or sponsorship opportunities, should be directed to Ward Andrus
ACTIVITY HANDOUTS

PAPER HOUSE
PAPER AIRPLANES
GEODESIC DOME INSTRUCTIONS
SHAKE TABLE INSTRUCTIONS
MIRACLE MILE TOUR ROUTE & GUIDE
DOWNTOWN TOUR ROUTE & GUIDE
ROBOTICS COURSE AND SCORING RUBRIC AN TABLE
Instructions:
1. Cut along solid lines
2. Fold along dashed lines
3. Cut out black sections
Cinderella Dresser-top Castle Template

- front turrett: cut 2 from white paper
- turret trim: cut 2 from blue paper
- balcony door: cut from blue paper
- entrance: cut from white paper
Paper Airplane Templates Included

- Arrow
- Classic Dart
- Condor
- Delta
- Dragonfly

Additional templates can be found at funpaperairplanes.com
Arrow

This plane is easy to fold and flies straight and smooth. Add a small amount of up elevator for long level flights.

Orient the template with the "UP" arrow at the top of the page. Then, flip the paper over onto its backside, so that you cannot see any of the fold lines.

Pull the top right corner down toward you until fold line 1 is visible and crease along the dotted line. Repeat with the top left corner.
Fold the right side over again and crease along fold line 2. Repeat with the left side.

Fold the tip down toward you and crease along fold line 3.

Now, flip the paper over. Then, fold the left side over onto the right side and crease along fold line 4 so that the outside edges of the wings line up.

Fold the wings down along fold lines 5. Partially open the folds you just created so that the wings stick out straight. Cut two slits, one inch apart, along the back edge of each wing for elevator adjustments. Add wing dihedral by tilting the wings up slightly away from the fuselage. The wings will have a slight “V” shape when viewed from the front. Read the Introduction for more information about dihedral. Now you are ready to fly!
This plane is the classic schoolyard dart. It has short, compact wings and will fly straight as an arrow. It generally needs some up elevator along the back wing edges to fly properly.

Orient the template with the “UP” arrow at the top of the page. Then, flip the paper over onto its backside, so that you cannot see any of the fold lines.

Pull the top right corner down toward you until fold line 1 is visible and crease along the dotted line. Repeat with the top left corner.

Fold the top point down toward you until fold line 2 is visible and crease along the dotted line.
Fold the top left and top right corners down and toward you and crease along fold lines 3.

Fold the tip up and over the two diagonal folds along fold line 4 to secure them in place.

Flip the plane over and fold the right side over onto the left side as shown along fold line 5 so that the outside edges of the wings line up. Also make sure the diagonal folds do not become untucked from the tip you folded up in the previous step.

Fold the wings down along fold lines 6 and the winglets up along fold lines 7. Add wing dihedral by tilting the wings up slightly away from the fuselage. The wings will have a slight “V” shape when viewed from the front. Cut two slits, one inch apart, along the back edge of each wing to make elevator adjustments. Start out by trying some up-elevator. You are ready to fly!
Condor

This plane produces tremendous lift at low speed, giving it a very low glide slope. It is an excellent indoor flier and will coast across the room on slow, smooth glides.

Orient the template so that the “UP” arrow is at the top of the page. Then flip the paper over so that none of the fold lines are showing.

Fold the top left corner down toward you until fold line 1 becomes visible. Crease along the dotted line and repeat with the top right corner.

Fold the nose down until fold line 2 becomes visible and crease along the dotted line.
Fold the outside wing edges in and crease along fold lines 3.

Fold the right half of the plane over the left half and crease along fold line 4 so that the outside edges of the wings line up.

Fold the wings down along fold lines 5 and the winglets up along fold lines 6. Add wing dihedral by tilting the wings up slightly away from the fuselage. The wings will have a slight “V” shape when viewed from the front. Add elevator slits along the back edge of the wings to adjust the flight if necessary. You are ready to fly!
Delta

This plane flies fast and straight. It is easy to fold and a great all around flier. Add some up elevator if necessary to produce stable flights.

Orient the template so that the “UP” arrow is at the top of the page. Then flip the paper over so that none of the fold lines are showing.

Fold the top left corner down toward you until fold line 1 becomes visible. Crease along the dotted line and repeat with the top right corner.

Fold the left side over again and crease along fold line 2. Repeat with the right side.
Fold the nose down and toward you along fold line 3.

Fold the right half of the plane over the left half along fold line 4 so that the outside edges of the wings line up.

Fold the wings down along fold lines 5 and the winglets up along fold lines 6. Add wing dihedral by tilting the wings up slightly away from the fuselage. The wings will have a slight “V” shape when viewed from the front. You are ready to fly!
This unusual plane gets its name from its two sets of nearly symmetrical wings that resemble a dragonfly when viewed from the top. This plane is very aerobatic, and will tend to loop if thrown hard outdoors.

Begin by folding toward you along the first fold line. Continue folding this strip over itself until you reach the stop line. Make firm creases with each fold.

After you reach the stop line, flip your paper over and fold it in half fold line 2, so that the two flat sides of the paper are touching.

Cut along cut line 3 while keeping the paper folded tightly together to ensure that both wings match perfectly.
Fold the wings down along fold lines 4.

Fold the front winglets up along fold lines 5 and the back winglets down along fold lines 6. Add wing dihedral by tilting the wings up slightly away from the fuselage. The wings will have a slight “V” shape when viewed from the front. You are ready to fly!
What You Will Need
- many newspapers
- masking tape
- pencils (for rolling tubes)
- measuring tape
- markers, glitter, beads, and glue for decorating

Directions
1. Stack three flat sheets of newspaper together. Starting in one corner, roll the sheets up together as tightly as you can to form a tube. When you reach the other corner, tape the tube to keep it from unrolling. Repeat until you have 65 tubes.
2. Now cut down the tubes to make 35 "longs" and 30 "shorts." Longs: Cut off both ends of a tube until it is 71 centimeters long. Use this tube as a model to create 34 more longs. Be sure to mark all the longs clearly in some way, such as with colored tape, so you can tell them apart from the shorts. Decorate the tubes if you like. Shorts: Cut off both ends of another tube until it is 66 cm long. Use this tube as a model to create 29 more shorts. Decorate the tubes if you like.
3. First, tape 10 longs together to make the base of the dome.
4. Tape a long and a short to each joint. Arrange them so that there are two longs next to each other, followed by two shorts, and so on, as shown.
5. Tape the tops of two adjacent shorts together to make a triangle. Tape the next two longs together, and so on all the way around.
6. Connect the tops of these new triangles with a row of shorts. (The dome will start curving inward.)
7. At each joint where four shorts come together, tape another short sticking straight up. Connect this short to the joints on either side with longs, forming new triangles.
8. Connect the tops of these new triangles with a row of longs.
9. Finally, add the last five shorts so that they meet at a single point in the center of the dome. (You might need to stand inside the dome to tape them together.)

To test your dome’s strength, see how many magazines you can load on top.
What You Will Need
- Cardboard or plywood
- Tennis balls (or golf balls or marbles)
- Rubber bands

Directions
Enclose a few golf balls, tennis balls, marbles or tubing within two pieces of cardboard or plywood and secure with three rubber bands as shown in the picture below.

The challenge will be to find a method for standardizing the intensity of the vibrations.
1. Either assign one student from each group or one student from the class to develop 2 different vibration levels.
2. The teacher to develop the standard and perform all the tests.
COMMON ARCHITECTURAL STYLES

NEIGHBORHOOD WALKING TOUR

COLONIAL REVIVAL

- SYMMETRICAL FACADE
- DORMERS
- GABLED ROOF
- CLASSICAL ENTRY PORCH
- COLUMNS

TUDOR REVIVAL

- EXAMPLE 1
  - CROSS GABLES
  - STEEPLY-PITCHED EAVES
  - STONE OR BRICK TRIM
  - DECORATIVE WINDOWS

- EXAMPLE 2
  - OVERLAPPING GABLES
  - STUCCO OR BRICK WALLS
  - VARIED EAVE LINE HEIGHTS

- EXAMPLE 3

CLASSICAL REVIVAL

- EXAMPLE 1
  - GABLED OR HIPPED ROOF
  - FULL HEIGHT CLASSICAL PORTICO
  - CLASSICAL COLUMNS

- EXAMPLE 2
  - HIPPED ROOF
  - HIPPED DORMERS
  - CLASSICAL COLUMNS

- EXAMPLE 3
**Queen Anne**

**Example 1**
- Steeply pitched roof
- Decorative wood work
- Asymmetrical facade

**Example 2**
- Porch with spindle work brackets or classical

**Prairie School**
- Low pitched hipped roof
- Wide boxed eaves
- Hipped porch
- Square columns

**Bungalow W/Craftsman**
- Gabled roof
- Gabled porch
- Simple columns

**Shotgun**
- One room in width: front to back
- One-story
- Front gabled roof
- May have decorative details

**Mission/Spanish Colonial Revival**
- Red tile roof
- Arch ed openings
- Stuccoed walls

**Folk Victorian**
- Roof may be gabled or hipped
- Porch with spindle-work detail or jigsaw cut trim
- Symmetrical facade
Where are the most interesting architectural elements located in your neighborhood?
(please answer in space above next to sample elements)
AIA SIERRA VALLEY

1. San Joaquin Valley and Recovery (Emergency Services) © 1945, 2006. San Joaquin Valley, California. A study designed to replace the ^last^ recover}' Shock' in the valley. The building was located in the center of the county and was designed to be a focal point for community planning.

2. Medical-Dental School, 1947. 242 A. Sutter Street, The Medical-Dental School building was originally designed for the use of medical and dental professionals. The building's design reflects the principles of the "School of Dental Medicine." The building was later transformed into a college, and is now known as the Medical-Dental School at the University of California.

3. Housing Department, 1947. 511 A. Sutter Street. The Housing Department building was designed to house the headquarters of the California Housing Authority. The building's design reflects the principles of "Modernism." The building was later transformed into a college, and is now known as the Housing Department at the University of California.

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ACE’d Robotics Competition

Goals

1. To design, build, and program a robot to navigate a fixed course.
2. To apply practical math and scientific concepts while learning design, mechanical construction, and computer programming.

The students' task is to program an autonomous mobile robot of their choice to navigate a determined fixed course. Students may participate individually or in groups of two. The robot must be brought to the competition and it must navigate the entire course independently without being remotely controlled. It is recommended that it is programmed before the competition and only small modifications to be made on the day of competition. Each linear line segment is 18" (1.5 ft) long. The semi-circle has a diameter of 24" (2 ft). The course will be taped on the hallway floor at the competition area; however, you MUST bring your own robot and a laptop if you wish to modify your code on the competition day. Each robot will be given an official score based on accuracy of the requirements given by the course. Practice runs are given within a 90 min time period, and the students are allowed two official runs, with the higher of the two your official score.
Scoring (20 points):
Make sure that you have enough battery power to last the entire course. Servos will not run properly with weak batteries.

1. The robot can move in a straight line from point A to point B: 6 points
2. The robot can make the 90° left turn and continue from point B to point C: 4 points
3. The robot can make the 45° right turn and continue from point C to point D: 4 points
4. The robot can continue from point D to point E in a semi-circle: 6 points
5. The robot must follow the path. That is, wherever the robot is, the tape under it should not be visible from the top. Deviation from the path will cause point deductions.
6. Bonus points: At the end, 2 bonus points if the center of the robot stops exactly on top of point E; 1 point if any part of the robot is on top of point E.

<table>
<thead>
<tr>
<th>Path</th>
<th>Points allowed</th>
<th>First Run</th>
<th>Second Run</th>
</tr>
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<tbody>
<tr>
<td>A to B</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B to C</td>
<td>4</td>
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<tr>
<td>C to D</td>
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</tr>
<tr>
<td>D to E</td>
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<td>Bonus</td>
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