Main Event: EV3 Robot C Challenge

Event Description:

Teams of 2-4 students will create a robot, using the EV3 kit provided. On the day of competition, they will write Robot C line code that will allow the robot to navigate a course that will be revealed at the event.

Common Core Standards and 4C's:

Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own ideas clearly and persuasively. Creativity, Collaboration, Communication and Critical Thinking.

Designing and Programming your Robot:

Design Specifications:

Your robot will need to be able to navigate a course consisting of the following:

- Forward motion
- Backwards motion
- Right turns
- Left turns
- Spins

Additionally, the robot needs to be able to sense an obstacle using a front-mounted touch sensor. The robot should be able to execute a reverse command immediately following contact with an obstacle.

Course Layout:

On the day of the event, students will have a course design assigned to them. The course will be modular and variable, yet will always have the same elements. Students should expect a series of segments that require forward motion, right turns, left turns, and moving in reverse. The course will have a stationary wall that requires a bump-sensor response. Upon bumping the object, the robot will proceed to a final home base and execute a 360-degree spin.

Technical Requirements:

- Vehicles must be constructed entirely with LEGO pieces.
- The entire robot must fit behind the starting line, 12" from the edge of the course.
- The robots may only be controlled by writing Robot C line code.
- Time will start as soon as the course is revealed.
- Teams will not have a pre-set time allocation…but must complete the challenge in 20 minutes or less.
- ONLY registered students are allowed to touch the robot and computer that is used. (If a situation such as laptop failure arises, then the coach can inform a contest official and receive approval before entering the team competition area.)
- Live student problem-solving is the spirit of this competition.

Scoring:

Scores will be a combination of the points awarded from successfully completing segments of the course AND from the time it takes to finish.

	Max	Formula
Executing the bump & reversing	10	
Arriving at home base	10	
Executing a 360 degree spin in home base	10	
Time from start of programming until end of task	40	First Place Time / Team's Recorded Time x 40 = Team's TOTAL TIME
Points from Design Document	30	
TOTAL POINTS	100	

EV3 Robot C Challenge Design Document

Overview:

Students will create a document outlining the process of designing, testing and coding their robot. There will be three main sections: Specifications, Programming, and Testing. The document will be submitted and scored prior to the tournament and will be worth 30 points. Design Documents must be converted to a PDF file before uploading to the Robot C Challenge Design Document Submission Portal on Teams no later than 11:59 pm on March 3, 2018.

Specifications:

In this section students will list the dimensions of their robot (length, width, height) as well as a list of the primary components they used (motors and sensors). They will also include pictures of their robot.

Programming:

Programming will be divided into two subsections: pseudocode and code, and flowchart. Students will explain how they programmed their robot to complete a sample maze. They should state what program they used, discuss specific settings, and choices in code commands. They will also include screenshots of the program and pseudocode, and a flowchart outlining the process.

Testing:

In the final section, students will describe the testing of their robot and what modifications they made to the robot structure and/or code to improve its speed and accuracy. This should include physical changes to the robot such as changing the wheels or redesigning the robot as well as digital changes to the code and program.

Sample Data Table:

We only included times of trials that were completed successfully, with the robot going from start to finish through a sample maze.

Trial	Time	Adjustments
1	4:57	First successful completion of the course.
2	3:42	Increased the speed of the motors to 90%
3	3:30	Used larger wheels on the robot.
4	3:10	Shortened turn time so that the robot stays center on course
5	2:57	Added turn time so that the robot completes a 360-degree spin at the end

Getting Help:

Visit the Tournament of Technology Teams site to see a sample Design Document and our new YouTube Channel to view tutorials to help prepare and practice.

Flow charts explained: https://www.mindtools.com/pages/article/newTMC_97.htm

Use the Google Drive app Lucid chart to easily make effective flow charts

Contact Philip Siechert at Philip.Siechert@fresnounified.org or Alaina Tudman Alaina.wood@fresnounified.org if you have any further questions regarding this event.

Robot C Challenge Scoring Rubric

Team Name:_____

Category	Exemplary	Proficient	Partially Proficient	Incomplete	Points
Pseudocode	**10 points**	**6 Points**	**2 points**	**0 Points**	
Pseudocode is written clearly and efficiently in the correct format	Pseudocode is clear, understandable, and readable. It is organized into as few steps as necessary and is easily converted into code. It begins with the proper // format	Pseudocode is clear, understandable, and readable. It is organized into steps though there are extra steps not needed for successful completion of the task. It can easily be turned into code.	Pseudocode is difficult to understand and is unorganized. In its present form, it is not easily turned into code.	No evidence of pseudocode	
Code	**10 points**	**6 Points**	**2 points**	**0 Points**	
Code is written in natural language, following all syntax, spelling and capitalization rules. Code is written efficiently.	Code is free of grammar and syntax errors. The code written allows the robot to complete the task in the fewest steps possible	Code is free of grammar and syntax errors. The code written allows the robot to complete the task but with extra steps	Code has grammar and/or syntax errors preventing the robot from completing the task. The code is missing steps to complete the task.	No evidence of code	
Flow Chart	**5 points**	**3 Points**	**1 point**	**0 Points**	
Flow chart is drawn to represent the code and pseudocode used. Flowchart box styles are used appropriately.	Flow chart accurately reflects code and pseudocode written. The correct box styles are used for each step/process.	Flow chart mostly reflects code and pseudocode written. The correct box styles are used most of the time	Flow chart does not reflect the code and pseudocode, correct box styles are not used	No evidence of flow chart	
Testing	**5 points**	**3 points**	**1 point**	**0 Points**	
The testing section describes in detail trials, tests, and modifications to the robot structure and/or code. It includes a table with trial data.	Testing section describes in a paragraph all modifications made to the robot structure and/or code and includes a table with a minimum of four trial times and modifications to robot.	Testing section describes in a paragraph some modifications made to the robot structure and/or code, and includes a table with a minimum of four trials.	Testing section is lacking either the paragraph description or the table.	No evidence of testing section.	
				Total Score (30 max)	