Robotics Expo 2011 [Pre CEENBoT]

Team Name: _____ **Date:** _____ **Age:** _____

First Name: _____ **Last Name:** _____

City/Town: _____ **Zip Code:** _____

Parent/ Guardian Name: _____ _____
First Last

Demographics

1. (A) (B)
2. (A) (B) (C) (D) (E) (F) (G)

Part I. Knowledge

1.	(A)	(B)	(C)	(D)
2.	(A)	(B)	(C)	(D)
3.	(A)	(B)	(C)	(D)
4.	(A)	(B)	(C)	(D)
5.	(A)	(B)	(C)	(D)
6.	(A)	(B)	(C)	(D)
7.	(A)	(B)	(C)	(D)
8.	(A)	(B)	(C)	(D)
9.	(A)	(B)	(C)	(D)
10.	(A)	(B)	(C)	(D)
11.	(A)	(B)	(C)	(D)
12.	(A)	(B)	(C)	(D)
13.	(A)	(B)	(C)	(D)
14.	(A)	(B)	(C)	(D)
15.	(A)	(B)	(C)	(D)
16.	(A)	(B)	(C)	(D)
17.	(A)	(B)	(C)	(D)
18.	(A)	(B)	(C)	(D)

Part II. Workplace Skills

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1.	(5)	(4)	(3)	(2)	(1)
2.	(5)	(4)	(3)	(2)	(1)
3.	(5)	(4)	(3)	(2)	(1)
4.	(5)	(4)	(3)	(2)	(1)
5.	(5)	(4)	(3)	(2)	(1)
6.	(5)	(4)	(3)	(2)	(1)
7.	(5)	(4)	(3)	(2)	(1)
8.	(5)	(4)	(3)	(2)	(1)
9.	(5)	(4)	(3)	(2)	(1)
10.	(5)	(4)	(3)	(2)	(1)
11.	(5)	(4)	(3)	(2)	(1)
12.	(5)	(4)	(3)	(2)	(1)
13.	(5)	(4)	(3)	(2)	(1)
14.	(5)	(4)	(3)	(2)	(1)
15.	(5)	(4)	(3)	(2)	(1)
16.	(5)	(4)	(3)	(2)	(1)
17.	(5)	(4)	(3)	(2)	(1)
18.	(5)	(4)	(3)	(2)	(1)
19.	(5)	(4)	(3)	(2)	(1)
20.	(5)	(4)	(3)	(2)	(1)
21.	(5)	(4)	(3)	(2)	(1)
22.	(5)	(4)	(3)	(2)	(1)

Part III. Attitudes towards STEM

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1.	(5)	(4)	(3)	(2)	(1)
2.	(5)	(4)	(3)	(2)	(1)
3.	(5)	(4)	(3)	(2)	(1)
4.	(5)	(4)	(3)	(2)	(1)
5.	(5)	(4)	(3)	(2)	(1)
6.	(5)	(4)	(3)	(2)	(1)
7.	(5)	(4)	(3)	(2)	(1)
8.	(5)	(4)	(3)	(2)	(1)
9.	(5)	(4)	(3)	(2)	(1)
10.	(5)	(4)	(3)	(2)	(1)
11.	(5)	(4)	(3)	(2)	(1)
12.	(5)	(4)	(3)	(2)	(1)
13.	(5)	(4)	(3)	(2)	(1)
14.	(5)	(4)	(3)	(2)	(1)
15.	(5)	(4)	(3)	(2)	(1)
16.	(5)	(4)	(3)	(2)	(1)

Part IV. Interest in Future Careers

	Very Interested	Somewhat Interested	Neutral	Somewhat Uninterested	Very Uninterested
1.	(5)	(4)	(3)	(2)	(1)
2.	(5)	(4)	(3)	(2)	(1)
3.	(5)	(4)	(3)	(2)	(1)
4.	(5)	(4)	(3)	(2)	(1)

Robotics Expo 2011 [Pre CEENBoT]

Completely darken the bubble on the ANSWER SHEET for the best answer to the question.

Like this: ● Not like this: ✓ ✗ /

Demographics:

1. Gender:
   A. Male
   B. Female

2. Ethnicity:
   A. Asian/Pacific Islander
   B. Native American
   C. Hispanic/Latino
   D. Black/African-American (non-Latino)
   E. White (non-Latino)
   F. Multi-Racial
   G. Other

Part I. Knowledge.

1. In order to follow a delayed sequence of set movements, without direct user control, a robot must be _____
   A. controlled by a remote.
   B. computerized.
   C. programmed.
   D. trained.

2. A programming "loop" does which of the following?
   A. Starts the program code
   B. Stops the program code
   C. Performs multiple functions
   D. Repeats a section of program code

3. A computer program consists of _____ that tells the computer to do something.
   A. sensors
   B. code
   C. lights
   D. robots

4. Which of the following enables a robot to investigate and react to its environment?
   A. Tires
   B. Sensors
   C. LCD panels
   D. Mechanical arms

5. What is a computer program?
   A. Computer generated text
   B. The hardware that controls a computer
   C. Instructions written in a language a computer understands
   D. Language that is built into a robot

6. Which of the following is a wireless connection?
   A. Bluetooth
   B. RCX
   C. USB
   D. Serial port

7. When programming your robot, a switch block or if/else/then statement is used to _____
   A. ask a question.
   B. stop the program.
   C. speed up the program.
   D. repeat the code.

8. Which of the following is an example of multi-tasking?
   A. Having your robot move forward on a table
   B. Having your robot turn to the left for 2 seconds
   C. Having your robot measure a distance as it identifies an object to lift
   D. Having your robot use its light sensor

9. The process of refining an instrument, like your robot, so that it is as accurate as possible by collecting information about how far your robot will travel in a given amount of time and using the information to estimate how long it will take the robot to go a given distance is called _____
   A. a ratio.
   B. the Pythagorean Theorem.
   C. a threshold value.
   D. calibration.

Amie and Cody are engineers working to design a robot that will be able to plant trees in a fruit production orchard with apples, apricots, oranges and/or peaches. They need your help to apply the steps of the Engineering Design Process. Answer the questions below to provide your assistance.

Image of an apple orchard from Kelowna Land and Orchard Company Ltd. (KLO) in British Columbia, Canada. Image from http://media-cdn.tripadvisor.com/media/photo-s/00/11/f9/0a/orchard-at-kelowna-land.jpg used without permission.

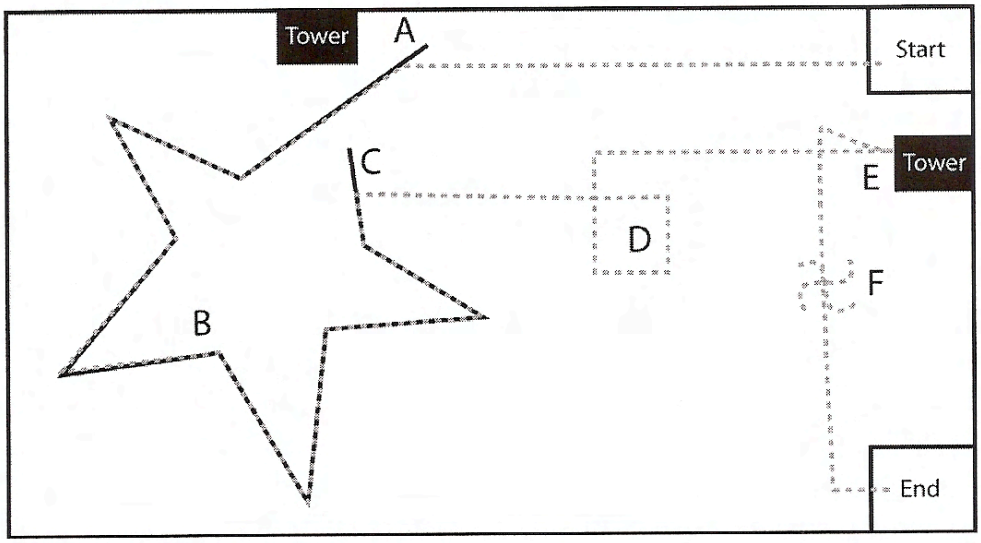
10. Which of the following would not be part of the problem that Amie and Cody need to solve in order to begin designing their robot?
   A. The robot must be able to sense differences in sound.
   B. The robot must be able to avoid obstacles such as large rocks and existing trees.
   C. The robot must be able to go to a specific location, using GPS.
   D. The robot must be able to dig a hole.

11. As a part of the design process, Amie and Cody visit an engineering library to look at existing patents. Which step in the Engineering Design Process are they doing?
   A. Identify the problem
   B. Research the problem
   C. Select a solution
   D. Construct a prototype

12. Amie and Cody are reviewing the possible solutions to select one to test by building a prototype. Which of the solutions below do you think is **most** important to the project?
   A. The robot should able to carry a human operator for long distances.
   B. The robot should be on tracks to cover diverse terrains.
   C. The robot should have a camera so the operators can see what it is doing from anywhere with an Internet connection.
   D. The robot should have a robotic mechanical component that can do tasks such as dig the hole, place the tree and replace the soil.

13. Which of the following strategies would be important to evaluating Amie and Cody's solution?
    A. Testing the prototype by planting trees in different orchard settings or environments
    B. Asking other engineers on your team to review their design and prototype
    C. Check the design with specialized computer software to find potential flaws
    D. All of the above

Use the obstacle course shown to answer the robot programming questions below. The dashed line(s) shows the path of the robot. The solid line is a black electrical tape one inch wide.



14. Which sensor is most likely used to navigate the robot between points A and C?
    A. Light
    B. Sound
    C. Touch
    D. Ultrasonic

15. Which of the marked points on the image above corresponds to the pseudocode shown here:
    Loop 4 times – Forward one tire rotation, Turn ninety degrees right
    A. Point B
    B. Point D
    C. Point E
    D. Point F

16. Which of the marked points in the image above corresponds to the pseudocode shown here:
    Wait until touch, reverse two wheel (720 degrees) rotations
    A. B
    B. D
    C. E
    D. F

17. Which of the sensors listed would most likely not be used to complete this challenge?
    A. Light
    B. Sound
    C. Touch
    D. Rotation

18. Which pseudocode is the most reliable way to program the robot at point C (find the tower and then turn, using an ultrasonic sensor) in the image above?
    A. Forward 2.3 wheel rotations to the tower
    B. Forward 828 degrees to the tower
    C. Forward 1.6 seconds to the tower
    D. Forward until 15 inches from the tower

Part II. Workplace Skills

We want to know how well the robotics competition helps you to develop certain skills. Please respond to the items below in terms of how you contributed to your team in solving the robotics challenge and in preparing the team project and documentation.

Statement	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
1. I am able to brainstorm (come up with) a number of possible strategies to accomplish the robotics challenge.	5	4	3	2	1
2. I use a step by step process to solve problems.	5	4	3	2	1
3. I make a plan before I start to solve a problem.	5	4	3	2	1
4. I try new methods to solve a problem when one does not work.	5	4	3	2	1
5. I am able to explain my ideas and findings to my team.	5	4	3	2	1
6. I am comfortable presenting results produced by my team to the judges.	5	4	3	2	1
7. I am able to interact professionally with the contest officials.	5	4	3	2	1
8. I am able to come up with creative ideas to help solve problems.	5	4	3	2	1
9. I carefully analyze a problem before I begin to develop a solution.	5	4	3	2	1
10. I am patient with my teammates.	5	4	3	2	1
11. In the competition I realize that it is often necessary to work with different people.	5	4	3	2	1
12. I like being part of a team that is trying to solve a problem.	5	4	3	2	1
13. I am able to help my team to accomplish the task within the allocated time frame.	5	4	3	2	1
14. Compromising with other team members is sometimes necessary to accomplish our goals.	5	4	3	2	1
15. I am able to share responsibility with my teammates.	5	4	3	2	1
16. Whatever my role in the competition I am able to follow through on the tasks needed to help to complete our team activity.	5	4	3	2	1
17. I am able to work with the team to help to prioritize, plan and manage the work to achieve the desired results.	5	4	3	2	1
18. I am an active participant in our team.	5	4	3	2	1
19. In order to solve a complex problem I break it down into small steps.	5	4	3	2	1
20. I am able to demonstrate leadership on selected tasks to help support my team.	5	4	3	2	1
21. Other team members are able to count on me to get something done.	5	4	3	2	1
22. When working in teams I ask my teammates for help when I run into a problem or don't understand something.	5	4	3	2	1

Part III. Attitudes towards Science, Technology, Engineering and Math

Statement	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
1. It is important for me to learn how to conduct a scientific investigation.	5	4	3	2	1
2. It is important for me to learn about robotics.	5	4	3	2	1
3. It is important for me to learn how to use appropriate tools and techniques to gather, analyze and interpret data.	5	4	3	2	1
4. It is important for me to learn how to use mathematical formulas to help solve practical problems.	5	4	3	2	1
5. It is important for me to learn how to make accurate measurements to help solve mathematical problems.	5	4	3	2	1
6. It is important for me to be able to record measurements and calculations into tables and charts.	5	4	3	2	1
7. It is important for me to learn how to collect and interpret data to verify a prediction or hypothesis.	5	4	3	2	1
8. It is important for me to understand basic engineering concepts (e.g. design tradeoffs, speed, torque) related to building and moving a robot.	5	4	3	2	1
9. It is important for me to learn how to program a robot to carry out commands.	5	4	3	2	1
10. I like learning new technologies such as robotics.	5	4	3	2	1
11. I like using the scientific method to solve problems.	5	4	3	2	1
12. I like using mathematical formulas and calculations to solve problems.	5	4	3	2	1
13. I am confident that I can program a robot to move forward two wheel rotations (i.e. 720 degrees) and then stop.	5	4	3	2	1
14. I am certain that I can build a LEGO or similar robot by following design instructions.	5	4	3	2	1
15. I am certain that I can fix the software program for a robot that does not behave as expected.	5	4	3	2	1
16. I am confident that I can program a LEGO or similar robot to follow a black line using a light sensor.	5	4	3	2	1

Part IV. How interested are you in each of the jobs below for possible future careers?

Job	Very Interested	Somewhat Interested	Neither Interested nor Uninterested	Somewhat Uninterested	Very Uninterested
1. Scientist	5	4	3	2	1
2. Engineer	5	4	3	2	1
3. Mathematician	5	4	3	2	1
4. Computer or Technology Specialist	5	4	3	2	1