

- LEVEL:** Middle School/High School
- NUMBER OF TEAMS:** One (1) team per school can participate at the MESA Day state competition. Three (3) teams can participate at MESA regional events.
- TEAM MEMBERS:** Two (2) to Four (4) Students per Team
- OBJECTIVE:** Students will participate in teams to replicate a drawing. Part of the team will need to code the directions while the other part will follow the directions to recreate a drawing.
- Students will also solve questions involving cryptography.
- MATERIALS:** All materials will be provided by MESA.
- RESOURCES:**
- The code used for this problem will come from studio.code.org/s/express
 - The teacher section of <http://Cryptoclub.org> has resources for the types of cryptography that will be used.

TESTING PARAMETERS:

1. Team members will be broken into 2 groups: Coders and Artists that are kept in separate rooms. They may not communicate in any way except by code written by the Coders
 - a. Groups will consist of a maximum of 2 people.
 - b. Coders will write the code for the Artists to follow
 - c. Artists will follow the code that the Coders write to recreate a drawing
2. Coders will be provided a drawing printed on graph paper, a ruler, and a protractor. They will have at most 1 hour to write the code that the artists will follow.
3. The artist will follow the code exactly as written.
4. Total time to complete the drawing will be recorded and counted as part of the score.
5. All turns, if used, must be in terms of degrees (i.e. 90 degrees, 180 degrees, etc.)

JUDGING:

1. Judges will separate the teams into Coders and Artists
2. Judges will provide coders with the materials. Coders will be allowed to use their Engineering Design Notebook to take notes.
3. Time will start for, at max, a 1 hour coding session. Coders can use only commands from Code.org's code studio (see example 1).
 - a. All coding must start with the "when run" command
 - b. User defined commands can only contain two words (i.e. solve puzzle)
 - c. User defined commands may identify and set variables (i.e. set timer to 30 seconds)
4. While coders are creating the code, artists will be asked to solve a set of cryptography questions. Questions will ask students to use a Caesar, Additive, Substitution, or Multiplicative cipher to either encode or decode a message.
5. When the Coder has finished or time has expired, they will hand their code to the judge.
6. Judges will then bring the team together and the artists will be given materials to draw including a black sheet of graph paper, a pencil, a ruler, a protractor, and an eraser. The artist will also be given the code created by their team member.
7. If at any point, the artist is confused they may stop and ask the coder a clarifying question. Only yes

or no questions may be asked. The timer will not stop for these pauses.

8. The team will have a maximum of 60 minutes to complete the drawing.
9. The total time will be recorded.

SCORING CRITERIA:

1. Coders (see rubric):
 - a. Efficiency of code (Use of loops, While statements, etc.)
 - b. Accuracy of Code
 - c. Readability of Code
2. Artists:
 - a. Following the code
 - b. Time to complete course drawing
 - c. Answers to cryptography questions
3. Total Score will be Total Rubric Score x 1000 / Time in seconds

School: _____

Student Names: _____

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Design Testing:

CODE	5	4	3	2	1
Code Efficiency (x2)	Team uses complex coding skills (Loops, If-Else statements, etc.) successfully	Team uses complex coding skills (Loops, If-Else statements, etc.) with limited success	Team uses basic coding skills successfully	Team uses basic coding skills with limited success	Code does not work.
Accuracy	The Artist is able to completely recreate the picture with no errors	The Artist is able to recreate the picture with 1 or 2 small errors	The Artist is able to recreate the picture with at most 5 minor errors	The Artist is able to partially recreate the picture with at most 2 major errors	The Artist is not able to recreate the picture without more than 2 major errors.
Code Readability (x2)	No unnecessary code is present	Coder uses meaningful variable names and good layout	The code is well laid out	The code is laid out with some spaces that are difficult to read.	Poor quality of code
Number of Cryptography questions correct (x5)					
Total Score					

Total Time (seconds): _____

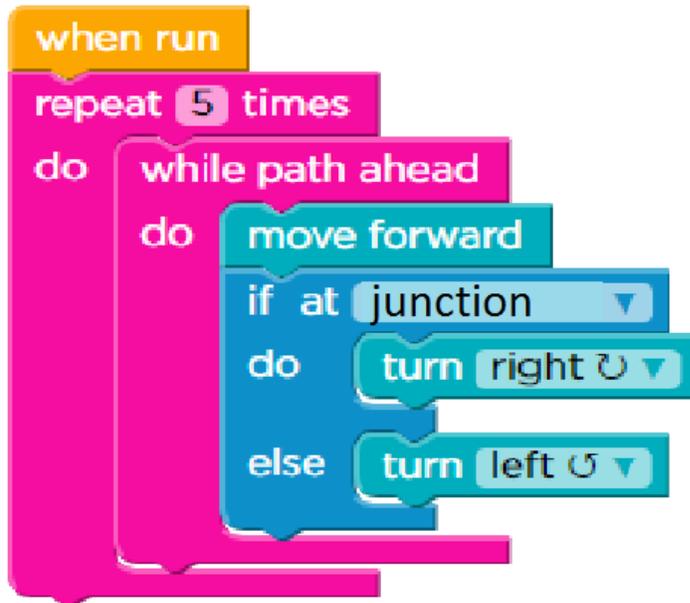
Final Score (Rubric score x 1000/Time in seconds) (rounded to nearest hundredth): _____

Lead Judge Signature: _____

Student Signature: _____

Comments/Suggestions:

Example 1



- When Run
 - Repeat 5 Times
 - Do While path ahead do
 - Move forward
 - If at junction
 - Do Turn right
 - Else Turn left

What it does:

1. Start Program
2. Let's computer know it will do this program 5 times
3. Checks to see if there is a path in front
 - a. If yes, continue to step #4
 - b. If no, the program stops.
4. Move forward
5. Checks to see if there is a junction of a 2nd path.
 - a. If yes, it will turn right
 - b. If no, it will turn left
6. Returns back to step #3 to repeat the cycle