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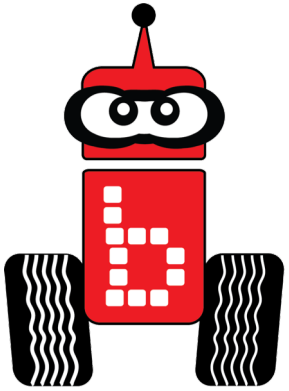

Flowcharts

KIPR Module 2

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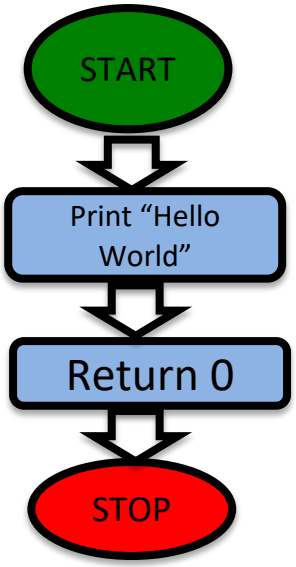
Learning About Flowcharts

Computer Scientists and Engineers create a diagram showing the flow of their program prior to actually writing any code.

They call this kind of diagram a **flowchart**...



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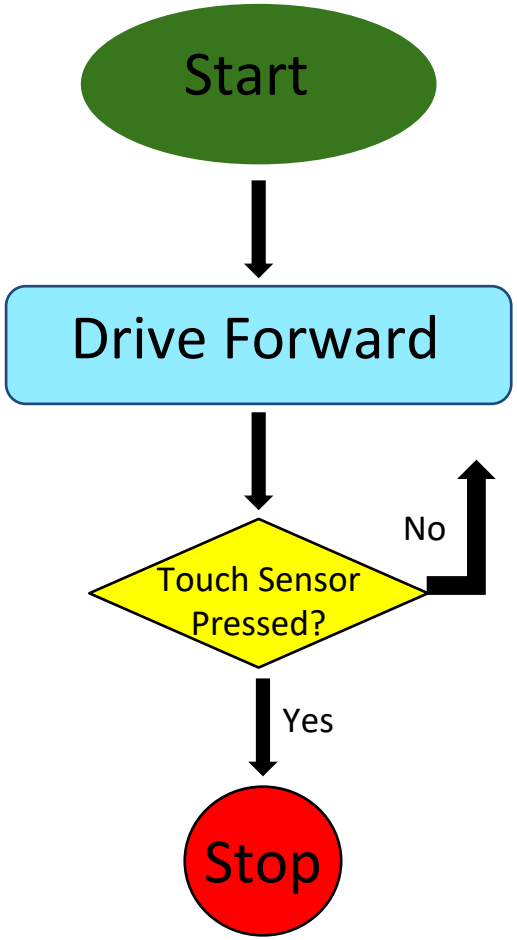
Learning About Flowcharts

What do you notice about this flowchart?



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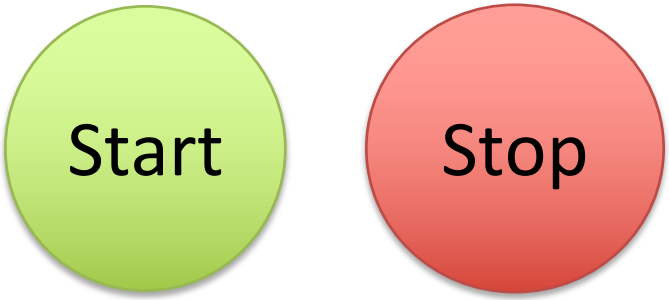
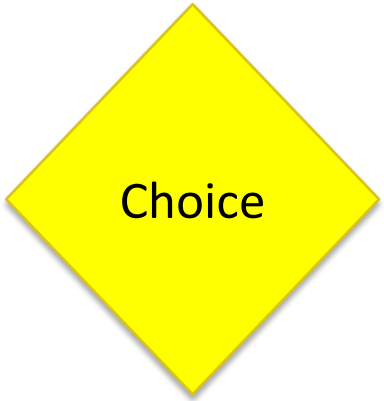
Learning About Flowcharts

Flowcharts have a standard set of shapes and colors that are universally used so that everyone can understand what they mean.



The start and the stop shapes show where the program starts and stops



Yellow diamonds represent a choice or decision based on a question. This must be at least a yes/no decision.

These rectangular blocks represent actions in the program

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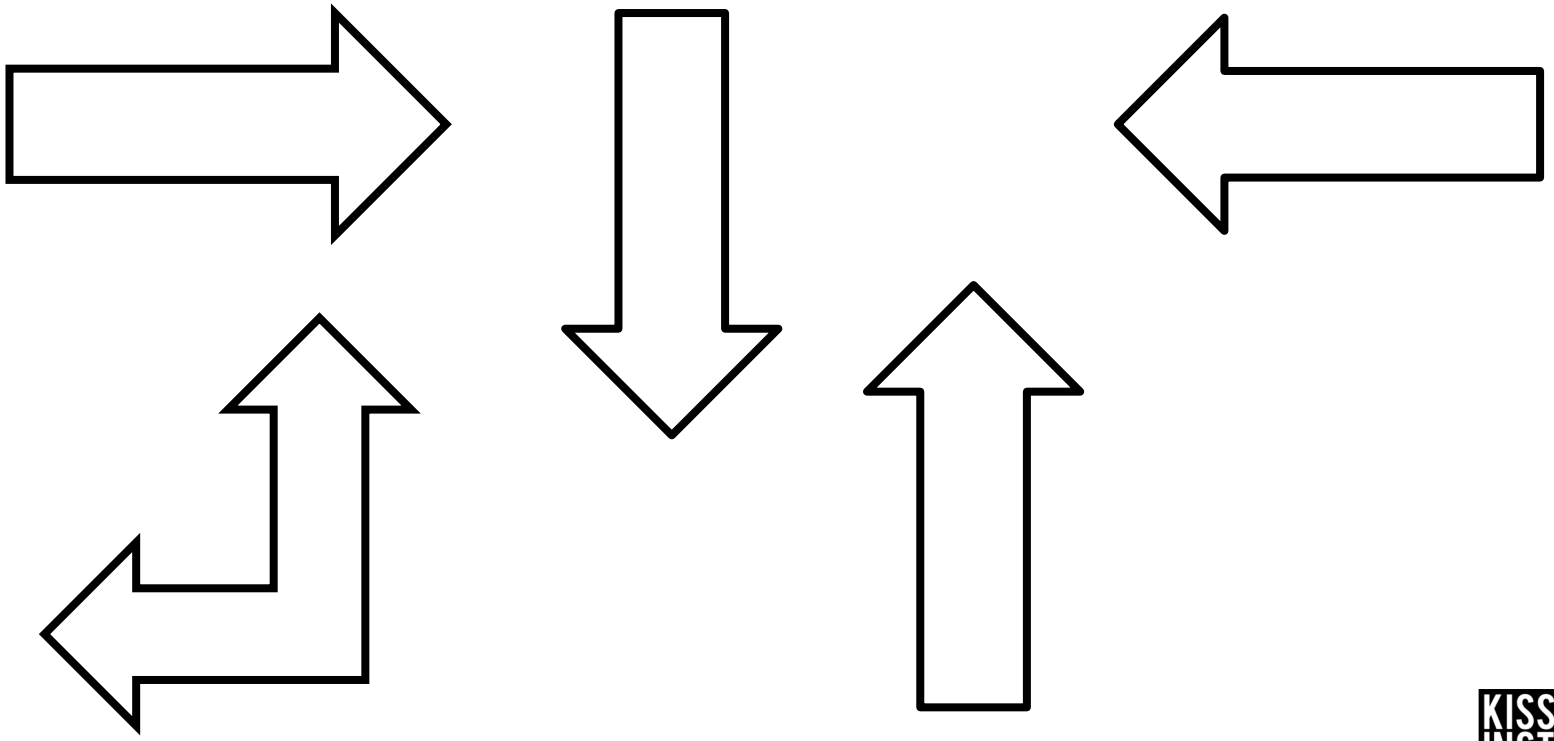
Learning About Flowcharts

Arrows are used in flowcharts to show the direction, or flow, of the program.



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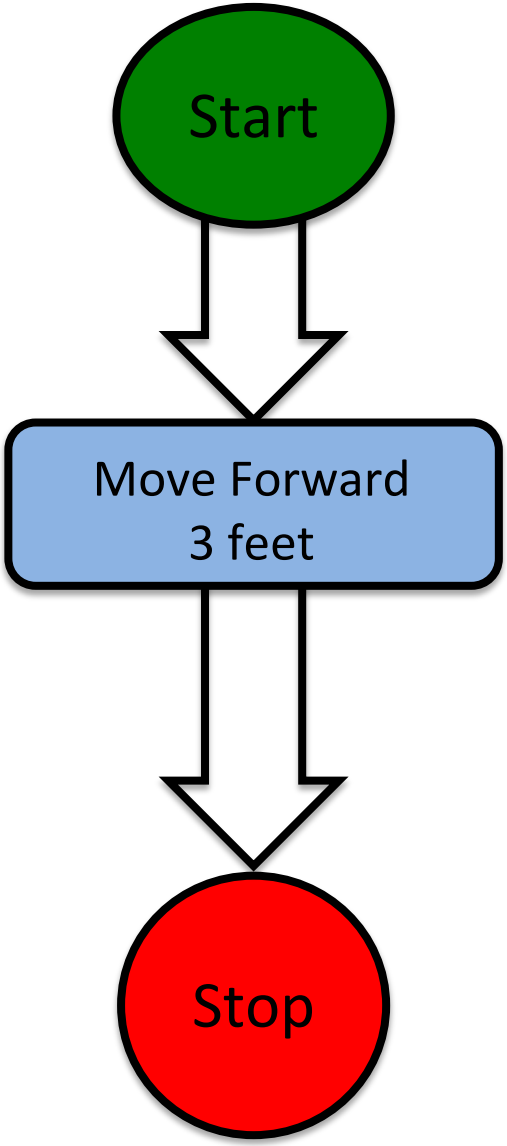
Learning About Flowcharts

How to Read a Flowchart:



Start the program

…then…

...moves forward 3 feet…

…then…

The program is done

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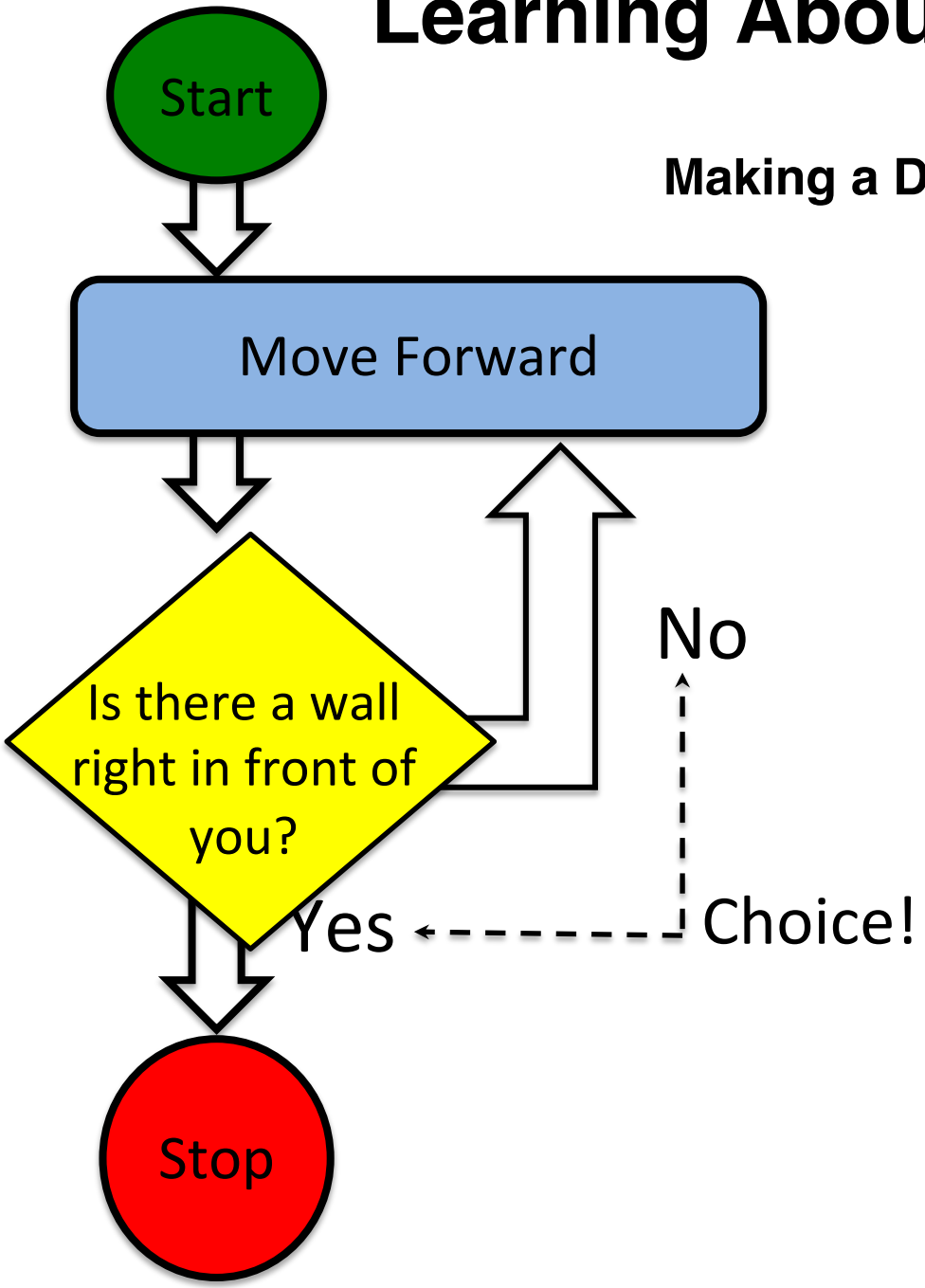
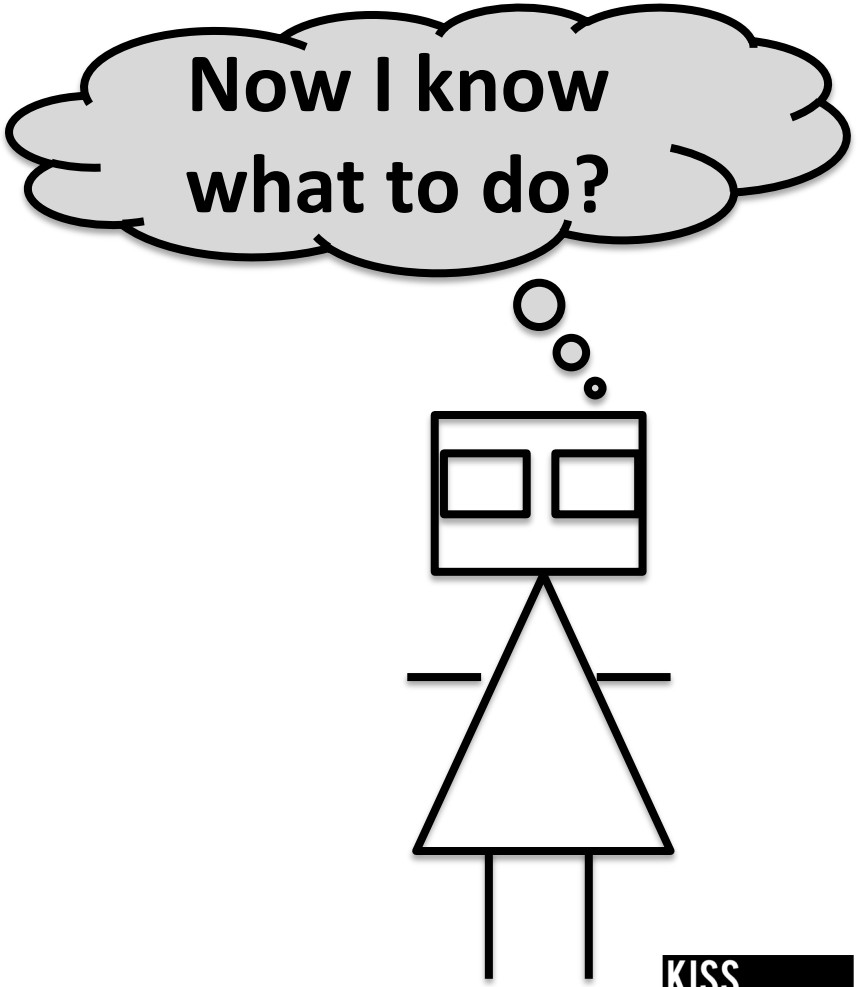
Learning About Flowcharts



Making a Decision:



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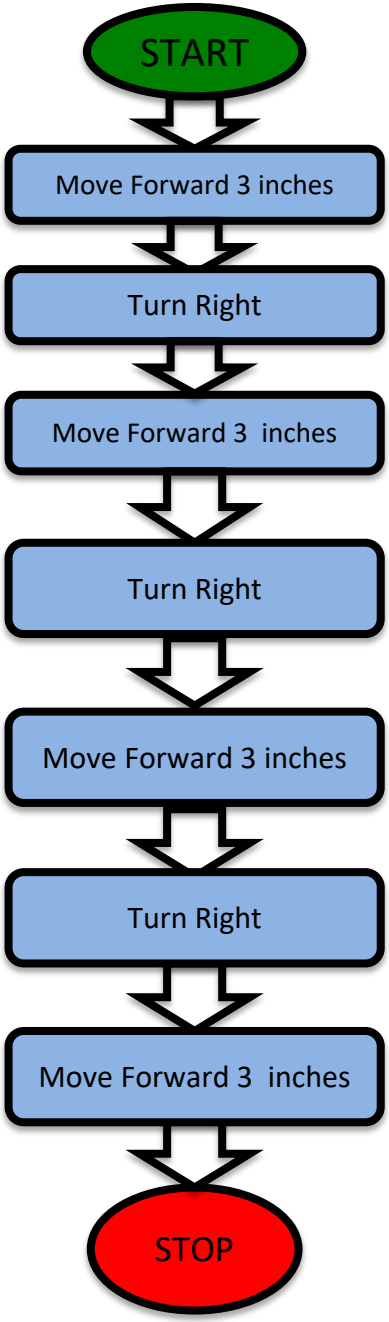
Flowchart Activity



Activity 2.1
Materials: science/engineering/robotics/digital notebook, writing utensil

Activity:

1. In your notebook draw the path you think your robot will follow from the flowchart.

2. Compare your path to your friends.

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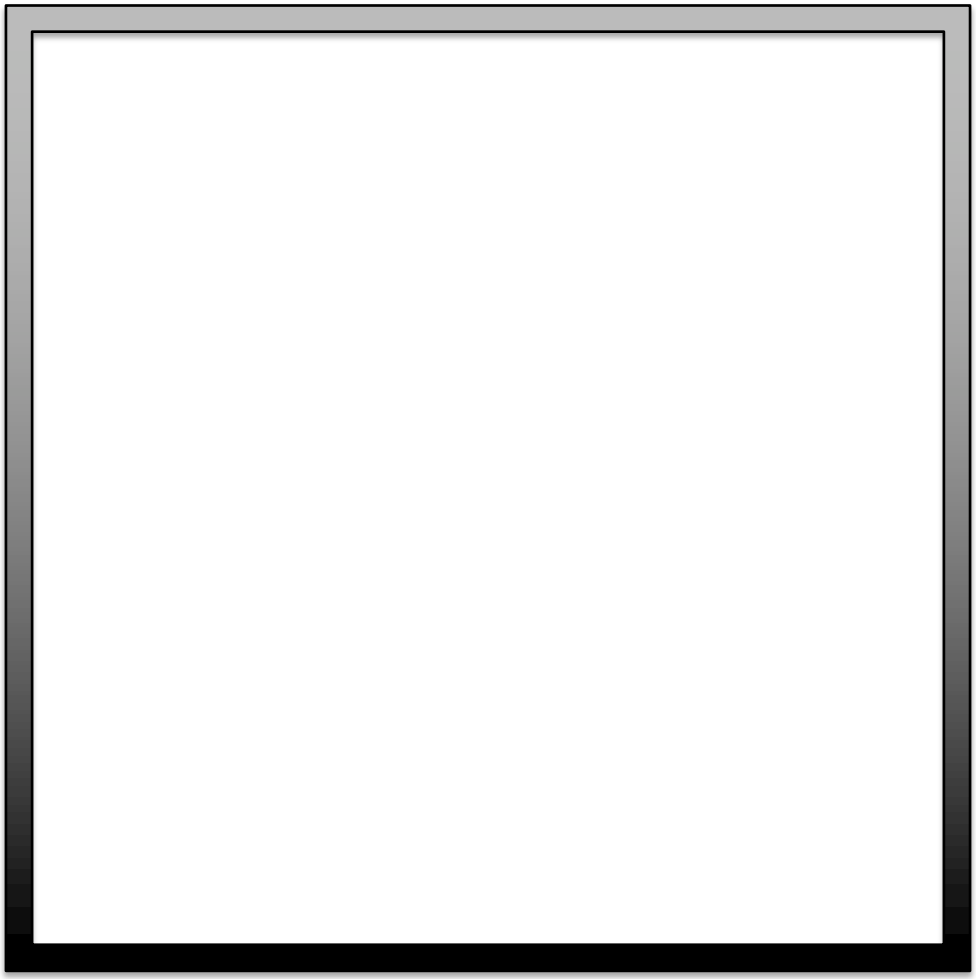
Did you get a square?



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Flowchart Activity

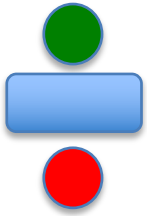
Activity 2.2

Materials: printed symbols OR interactive board OR students drawing
scissors it out on paper

Activity:

1. Have students or groups cut out the symbols. Use the cutouts to make a flowchart of a program that

a. Has your robot START.
b. Has your robot move forward 3 feet.
c. Has your robot STOP.



2. After completing their flowchart, have students share their answers.

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Flowchart Activity

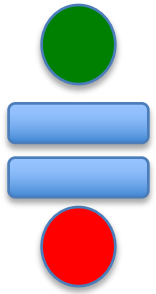
Activity 2.3

Materials: printed symbols OR interactive board OR students drawing
scissors it out on paper

Activity:

1. Have students or groups cut out the symbols. Using the symbol cutouts make a flowchart of a program that:

a. Has your robot START
b. Has your robot move forward 3 feet
c. Has your robot move backward 3 feet
d. Has your robot STOP



2. After completing their flowchart, have students share.

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Flowchart Activity

Activity 2.4

Materials: science/engineering/robotics/digital notebook
writing utensil
Diagram A.

Activity:

1. Students will create a flowchart using common symbols based on Diagram A.

2. Create a flowchart using the arrows and symbols that describes the robot's path.

3. Give the flowchart to a friend. Have the friend draw out the path of the robot following the flow chart.

4. If errors occur, re-write your flowchart and have your friend execute it again.

5. Elbow partners should share what they learned from this activity. Attention to detail is important!

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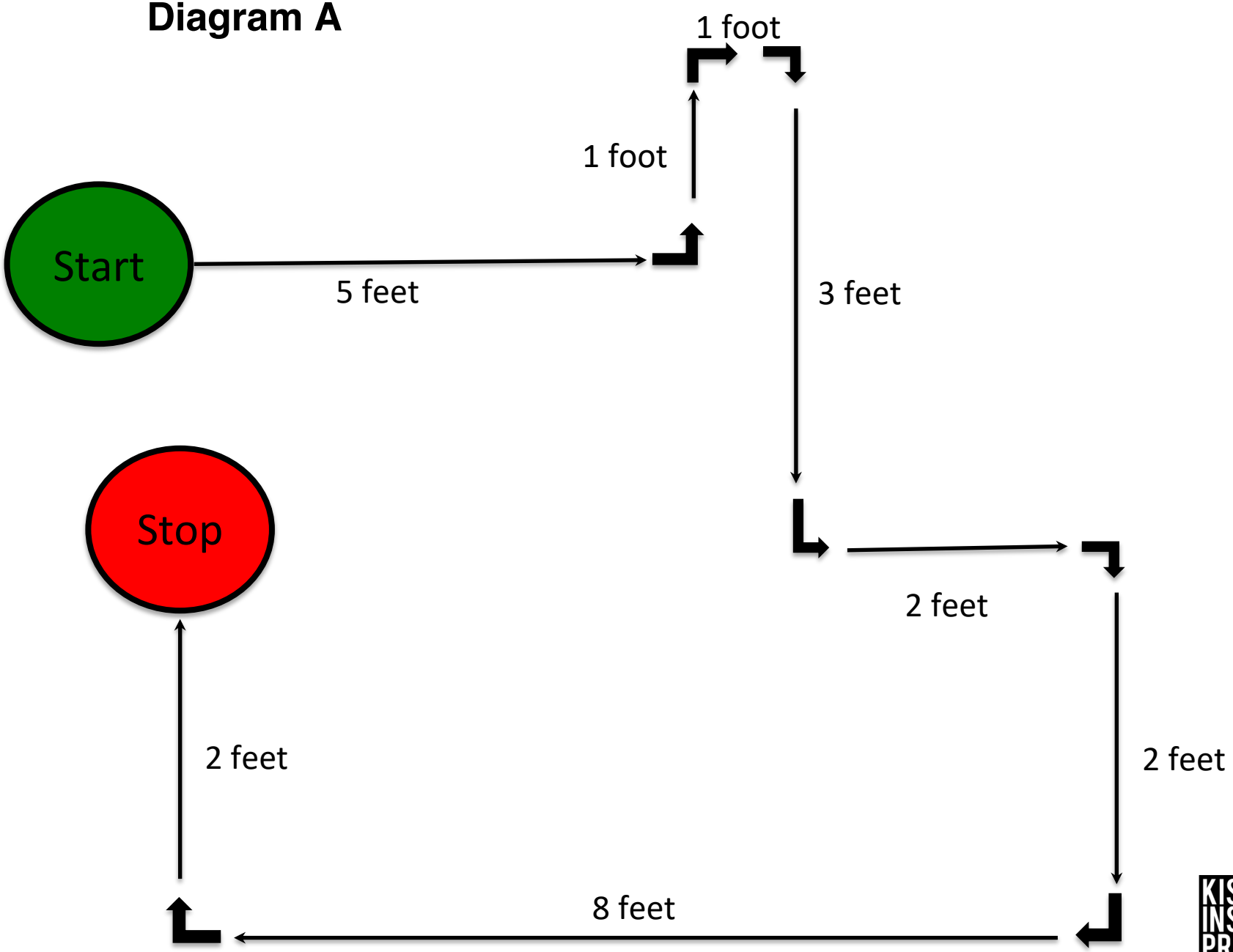
Diagram A



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Flowchart Activity

Activity 2.5

Materials: science/engineering/robotics/digital notebook
writing utensil
Diagram B

Activity:

1. Students will create a flowchart using common symbols based on Diagram B. Create a flowchart/program using the arrows and symbols that describes the robot's path.

2. Give the flowchart to a friend. Have the friend draw out the path of the robot following the flow chart.

3. If errors occur, re-write your flowchart/program and have your friend execute it again.

4. Elbow partners explain what they learned from this activity. Attention to detail is important here!

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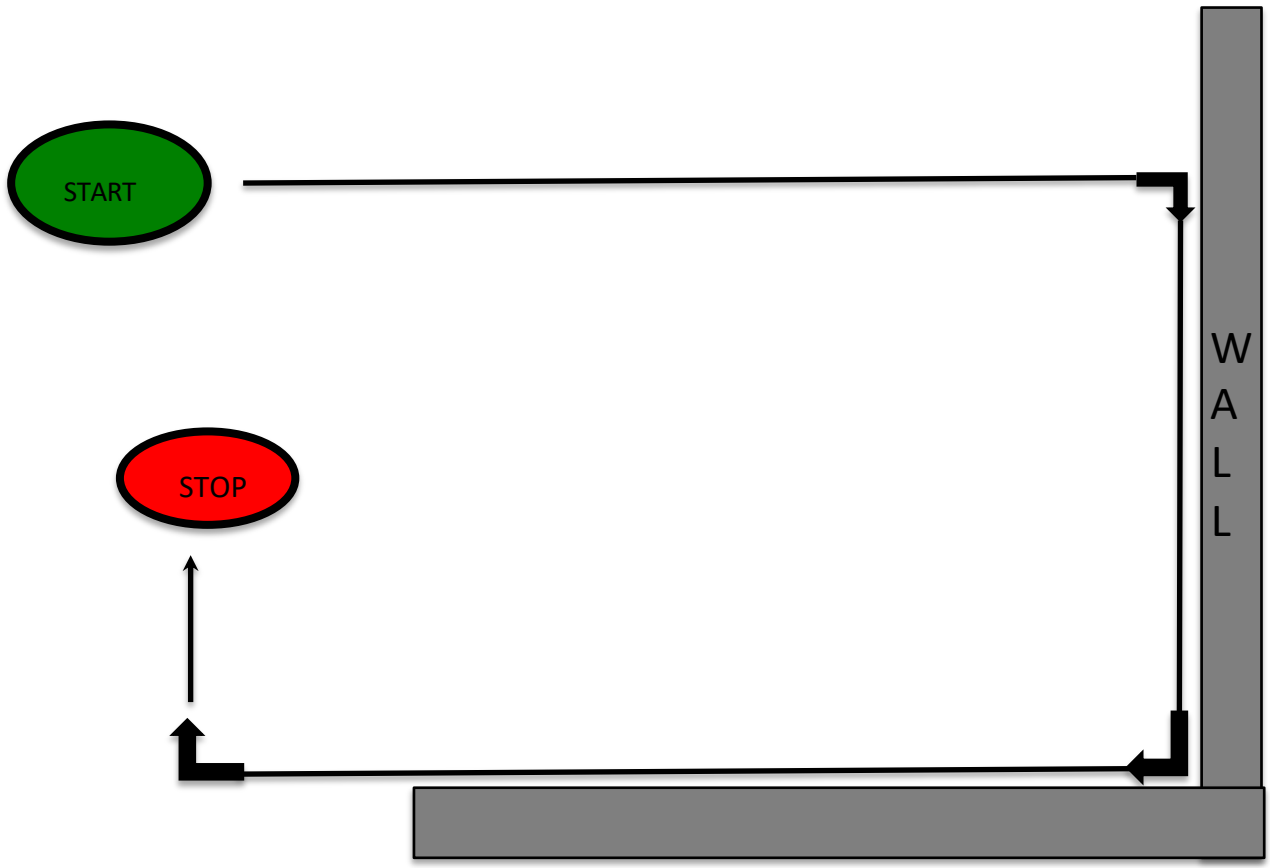
Diagram B



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Flowchart Activity

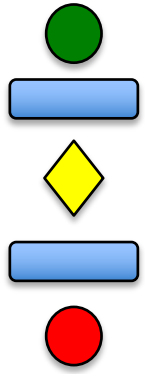
Activity 2.6

Materials: science/engineering/robotics/digital notebook
writing utensil
colored pencils, crayons, or markers (green, blue, yellow, and red)

Activity:

1. Draw your own flowchart of a program that:

- **a.** Has your robot START.
- **b.** Has your robot move forward.
- **c.** Has your robot make a decision with two choices. (YES or NO)
- **d.** Has your robot STOP.



2. Share your flowchart with your elbow partner.

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Flowchart Activity

Activity 2.7
Materials: science/engineering/robotics/digital notebook
writing utensil
colored pencils, crayons, or markers (green, blue, yellow, and red)

Activity:
1. Draw your own flowchart for a program that includes at least one decision.
2. Give your flowchart to a friend and have them draw the robot path.
3. Did the flowchart create the path you expected? Why or why not?
4. Elbow partners share what they learned from this activity. Attention to detail is important!

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Be the Robot!

Activity 2.8
Materials: large posters/sticky notes
markers

Goals

- This activity allows students to practice programming a robot.
- They will learn why it's important to give very specific instructions if they want the robot to understand them.
- To facilitate the student's understanding of pre-thinking and planning the logic of providing directions to the "robot".
- To help students understand how to construct a flowchart.
- Use a flowchart to spot errors in logic (it didn't work, where is the problem?)

Activity:

1. Have students read the following definitions for autonomous vs. remote control.
2. Students do a gallery walk with the headings of Autonomous, Semi Autonomous, and Remote Control and post examples of items on each poster.
3. Students will walk around and visit each poster.
4. Share findings and reflect.

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Be the Robot!

Autonomous vs. Remote Control

Definitions:

Autonomous - Moves around the environment without a person controlling it

Semi Autonomous - Some control by a person; some movement on its own

Remote Control - Does not move on its own; must be controlled by a person

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Be the Robot!

Activity 2.9
Materials: a piece of paper per student, writing utensils

Activity:

1. Write a program/directions that will move your "Robot" (teacher) through an obstacle course, (room). To move forward you must tell each leg to move and how far.

- *Alternative: As a whole group: Give verbal directions that will move your Robot*

2. Execute the program (list of directions) by having the robot (teacher) follow the program.

- If errors occur, re-write (brainstorm) your program and execute it again
- Continue until your robot (teacher) has executed the program and made it through the obstacle course
- Have students explain to their elbow partners what they learned from this activity; attention to detail, explicit directions, must know left from right, etc.

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Be the Robot!

Activity 2.10
Material: cups
paper
writing utensils

Activity:
Complete activity 2.9 using cup stacking

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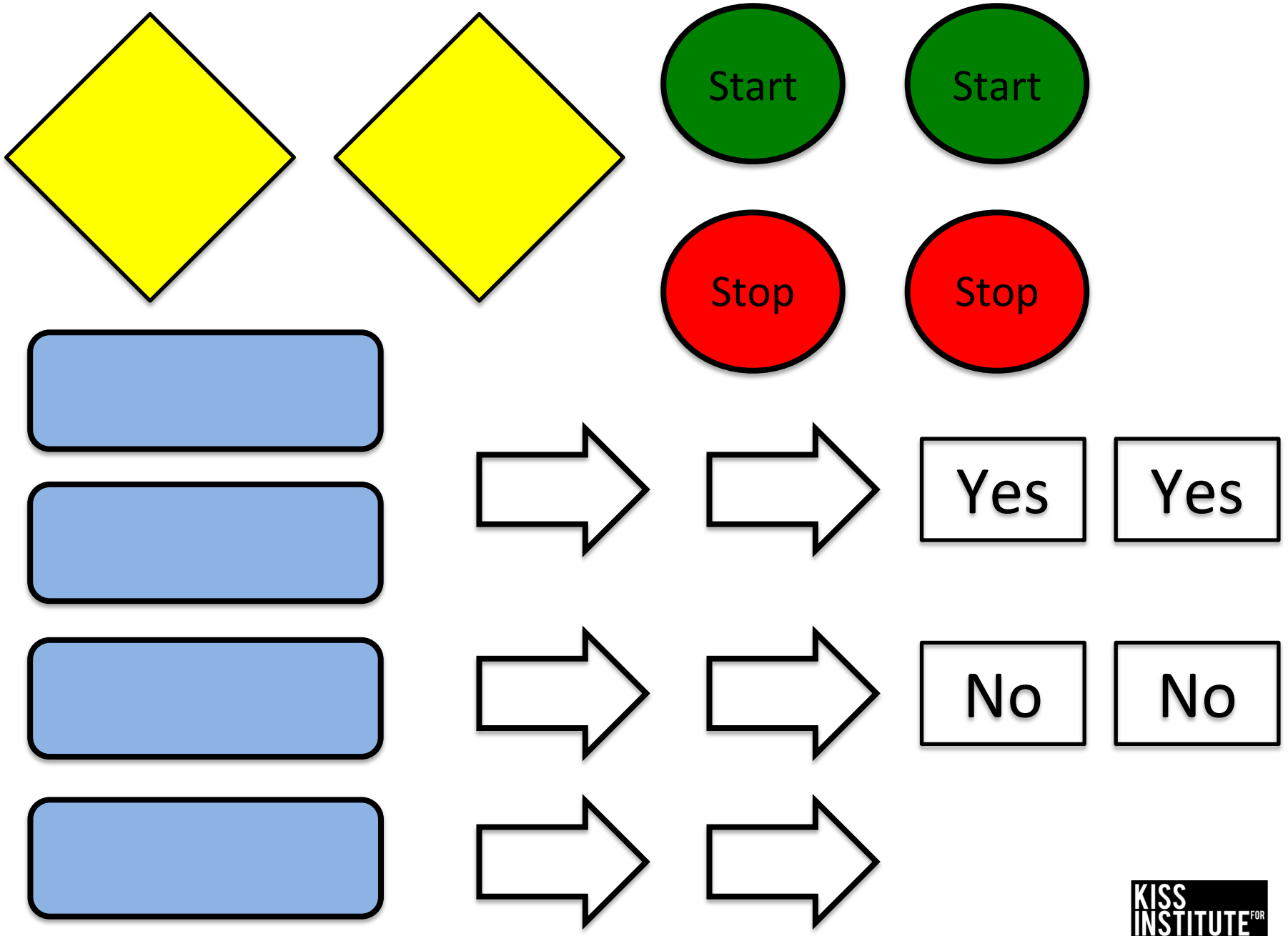

These pieces can be printed from the "Printable Resources" page.

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Assessments and Rubrics

Suggestions: *Understanding* rubric

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