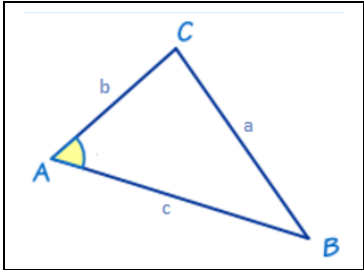


First Lego League Curriculum - Ontario

Activity Sheet	
Gr 7 - Lesson #5	Stop at Angle – Unique Triangles
Date:	Name(s):

<b>Check That I'm Done</b> <input checked="" type="checkbox"/>		
<input type="checkbox"/> Commented on my code	<input type="checkbox"/> Modify it task	<input type="checkbox"/> Coding Challenge

Learn
<p>Describing shapes accurately is important in many fields including engineering and graphic design.</p> <p>There are many ways to communicate the exact measurements of a triangle for example. Some may be more useful than others, and some may not be enough information to make sure you've explained the shape completely.</p> <div style="text-align: right;">  </div> <p>Here are some examples communicating the measurements of the same triangle.</p> <ol style="list-style-type: none"> <li>1) Side a is 53cm, side b is 50cm and side c is 70cm .....OR you could say</li> <li>2) Side b is 50cm, Angle A is <math>49^\circ</math>, side c is 70cm .....OR you could say</li> <li>3) Angle A <math>49^\circ</math> is angle B <math>45^\circ</math> is Angle C is <math>86^\circ</math> .....OR you could say</li> <li>4) Angle A <math>49^\circ</math> is angle B <math>45^\circ</math> is, Side is c is 70cm</li> </ol>

First Lego League Curriculum - Ontario

**Predict and Plan**

Are all of these methods just as good as one another? Write below if you think one is better than the others, or if one may cause problems. Explain your thinking.

---



---

**Demonstrate/Design/Discover**

- ✓ Given are the 3 necessary dimensions to draw **4 different** unique triangles.
- ✓ Each one is communicated to you in a slightly different way. All give you three pieces of information. We've used rotations instead of centimeters to make your life easier.
- ✓ Using the Gyro sensor, create a driving program that traces out each angle.

Triangle Number	Dimensions
1	S: Side a is 1.5 rotations S: Side b is 2.0 rotations S: Side c is 2.5 rotations
2	S: Side a is 2.7 rotations A: Angle B is 19° S: Side c is 1.5 rotations
3	A: Angle A is 35° A: Angle B is 45° A: Angle C is 100°
4	A: Angle A is 70° A: Angle B is 50° S: Side c is 3.2 rotations



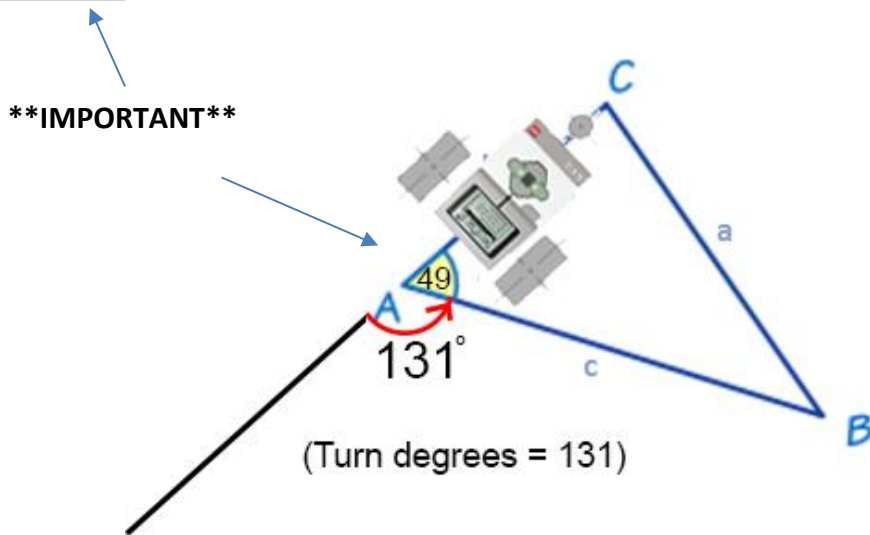
- ✓ By attaching a washable marker to the front of your robot (using an elastic or masking tape) and using a large paper surface (made either by taping together smaller sheets, or using chart paper) have your robot draw each shape using your programs from before. Finish off

First Lego League Curriculum - Ontario

the last side of the triangle by hand to make your angle into a triangle.

- ✓ When you've done this successfully for each angle, cut them out neatly. Number them 1-4. (The corners of your triangles may not look sharp but you can finish them off by hand before cutting).

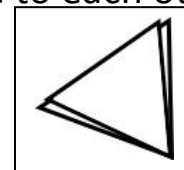
Tips: To make an angle that is  $49^\circ$  you must turn your robot  $180-49 = 131$  to make the turn.



**Record**

Find another group who has all four large paper triangles cut out. Put them on top of each other and compare just how close they are to each other.

Circle each option below to record your observations.



- Triangle 1: Almost Identical --- Close --- A Bit Off --- No Where Close
- Triangle 2: Almost Identical --- Close --- A Bit Off --- No Where Close
- Triangle 3: Almost Identical --- Close --- A Bit Off --- No Where Close
- Triangle 4: Almost Identical --- Close --- A Bit Off --- No Where Close

First Lego League Curriculum - Ontario

Questions	
Question 1 Robotics	Referring only to your robots, what are some reasons your triangles may differ from another groups?
The gyro sensor is not perfectly accurate, and sometimes is off by a few degrees. Also, depending on where you put the marker, it may change the results a little bit. Slippage should not be a huge factor as the gyro sensor is independent of the wheels.	
Question 2 Math	Was there any triangle that was very different to those of another group?
#3 will likely be the most different (due to no scale given)	
Question 3 Math	Referring back to your predictions in the “Predict” section, which method (1-4) lead the most different triangles. Why was this so?
Method number 3 only gives you the shape of the triangle but not the size. Therefore, every triangle will have a different scale.	
Question 4 Math	Which triangle was the easiest to construct? Why?
Question 5 Math	The methods we used can be described in short form as SSS, SAS (Side Angle Side), AAA, and AAS. Which ones always communicate a unique triangle.
AAA is the only method that does not communicate a unquare triangle, because it can have any size. The others always make the exact same triangle as three pieces of information is all you need.	



**First Lego League Curriculum - Ontario**

<p>Extension Coding and Math</p>	<p><u>Coding:</u></p> <p>Automate the process using variables and math blocks so all you have to enter is the angles and the side lengths and the robot draws the triangles all by itself.</p> <p><u>Math:</u></p> <p>After drawing a triangle, program your robot to draw the mirror image of the same triangle flipped along a line of symmetry.</p>
--	--