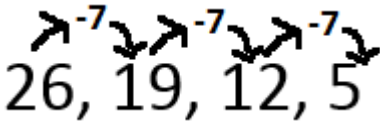


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Activity Sheet	
Gr 5 - Lesson #4	Ultrasonic Sensor – Driving Patterns
Date:	Name(s):

<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>Patterns can be powerful tools to predict what will happen in the future.</p> <p>Numbers often form patterns, and by seeing how they are growing or shrinking, you can tell what is going to come next.</p> <p>An example would be: 2, 4, 6, 8..... You can probably see that this pattern is growing by 2 each time, and the next number will be 10.</p> <p>Patterns can shrink also, for example: 26, 19, 12, 5... This pattern may take a bit more thinking, but it is shrinking each time by 7.</p> <p>A good method to figure out either of these patterns out is to find the <b>difference</b> between the <u>first number</u> and <u>second number</u>, and then see if the pattern continues.</p> <p>Looking at the same pattern from before: 26, 19, 12, 5 ... We take 26-19 and find it = <b>7</b>. And then test it for the next number. 19-7=<b>12</b>. Since 12 fits the pattern we're likely on the right track.</p> <div style="text-align: center;">  </div>

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Use this method to find the pattern, and continue it 2 more times.

26, 20, 14, \_\_, \_\_

3, 7, 11, 15, 19, \_\_, \_\_

Below is a table describing a robot's movement. It first moves towards and then away from a fixed object, each time at smaller and smaller distances (kind of like a bouncing spring slowing down).

Trip	Towards	Away
1	50cm	40cm
2	45cm	35cm
3	40cm	30cm
4	35	25
5	30	20
6	25	15

How does the distance towards change each trip?

-5cm (or shrinks by 5)

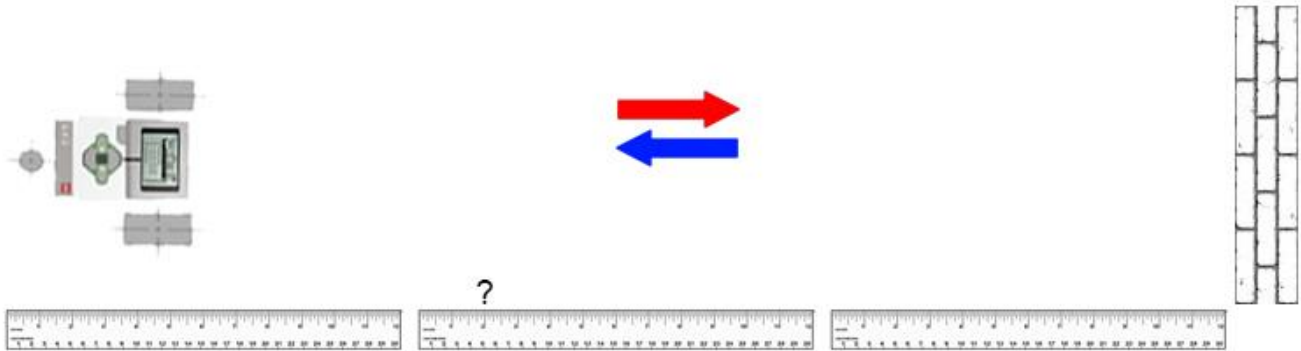
How does the distance away change each trip?

-5cm

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### Predict and Plan

Based on the previous chart. Circle the approximate area where you think the robot will end up (Close to the middle, the wall, or where it started).



### Demonstrate/Design/Discover

- ✓ Program your robot to move in the way described in the table you just completed.
- ✓ Make sure to start your robot off at least 60cm away from a flat object (such as the cuboid, or a wall).
- ✓ Place a small object to mark where you think your robot will end up.

**Tips:** Sometimes programs with lots of blocks can be hard to fix when something goes wrong. Feel free to use lights so you know what part of the

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code your robot is doing, which can help you locate problems in your code.

**Record**

How close was your estimate?

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How did you make your guess?

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**Questions**

Question 1 Math	Was it difficult to guess where the robot would end up?
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It is difficult to guess just looking at the numbers but adding them up gives a fairly simple result.

Question 2 Robotics	Assuming the robot's sensor was likely off a tiny bit each time, what do you think the final effect was of these many sensor based movements.
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As the robot, continued, the small error it made each time added up also, and got worse over time.

Question 3 Coding	Why do you think the coding activity used a 1 second wait block?
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The 1 seconds allows the robot to settle before the next command increasing accuracy.

Question 4 Math	What is a mathematical way to calculate the robots final destination? Hint* Going forward can be the positive direction, and backwards the negative direction.
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By adding up the distance towards and subtracting the ones away.

Question 4	Where would the robot be if it took another 3 trips (trip 9)?
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Math	
90cm (forward)	

<p>Extension Coding and Science</p>	<p><b>Extension 1:</b></p> <p>Looking at where the robot ends up after <u>each trip</u>, what is the pattern? Where would the robot be after trip 123?</p> <p>1,230cm (12.3m)</p> <p><b>Extension 2:</b></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Journey #</th> <th>Distance Towards</th> <th>Distance Away</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>40</td> <td>35</td> </tr> <tr> <td>2</td> <td>30</td> <td>23</td> </tr> <tr> <td>3</td> <td>20</td> <td>21</td> </tr> <tr> <td>4</td> <td>10</td> <td>19</td> </tr> </tbody> </table> <p>For the chart above?</p> <p>How does the distance towards change each trip?</p>	Journey #	Distance Towards	Distance Away	1	40	35	2	30	23	3	20	21	4	10	19
Journey #	Distance Towards	Distance Away														
1	40	35														
2	30	23														
3	20	21														
4	10	19														

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	5	0	-
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How does the distance away change each trip?

Using a ruler (or addition and subtraction), predict where the robot will end up after journey 5.

Test your results with your robot!

2cm towards

