




First Lego League Curriculum - Ontario

Activity Sheet	
Gr 5 - Lesson #6	Stop at Line – Telling Time
Date:	Name(s):

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

Learn	
<p>The clock face has been around for thousands of years, and until very recently has been the most common way to tell the time.</p> <p>Sundials may have been the first clocks, and are a natural effect of the sun casting a shadow as it moves across the sky.</p> <p>We have used gears to improve the clock, but have kept this circular display.</p> <p>Other gauges and meters work in much the same way, and understanding how they work helps us understand these readings.</p> <p>The clock is really two meters in one, the current hour AND the current minute.</p> <p>Knowing that these hands rotate to the right, if the hour hand reaches and passes a number you know that it is at least that hour. The 10th hour in this</p>	  

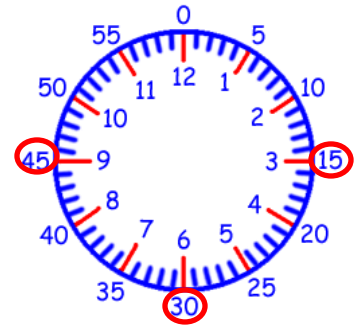
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example.

The minute hand is longer so you can tell the difference but takes a bit of math, and or memory to read it correctly (as the minutes aren't shown on most clocks).

Each hour marker is **also** 5 minutes that the minute hand has travelled. Memorising at least a few of these minute markers makes reading a clock faster.

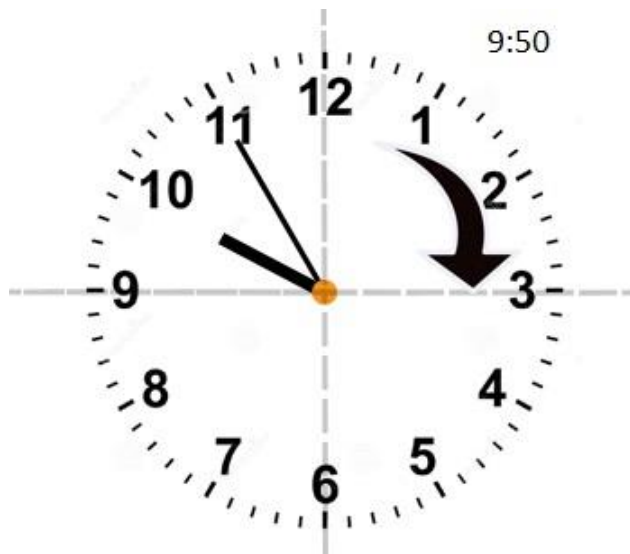
Also, because a clocks hand always turns at a consistent speed, it takes twice as long to get to the 30min mark as it does to the 15min mark.



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Predict and Plan

One of these clocks is in correct. Both are displaying the same time, but something is off. Write about which clock is incorrect and how you know.

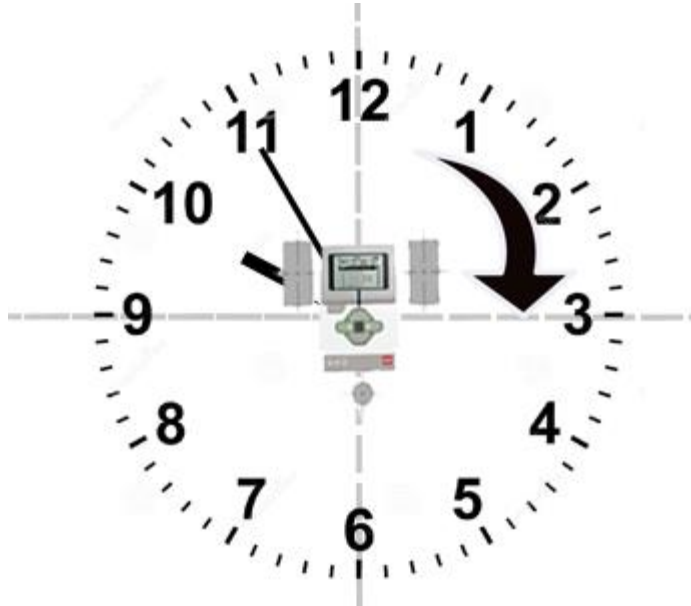


Demonstrate/Design/Discover

- ✓ Using the pages at the end of the worksheet, tape your large clock together, and cut out the hour and minute hands. Assemble the clock with a push pin in the center (or simply with some tape).
- ✓ Create a program that spins your robot on the spot, and then stops when it sees a black line. (You will need to figure out both the turn,

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and the threshold value). Make sure it's working before moving on.



- ✓ Next figure out how long your robot takes to spin one hour marking around your clock at 50% power. (You can do this by timing one rotation and dividing it by 12).
- ✓ Fill out the chart below using first predictions, and then testing with your robot.

Time On Clock	Time to spin and stop on hour hand (prediction)	Time to spin and stop on hour hand (actual)
9:50		
7:00		
5:30		
4:47		

*make sure to set the clocks hour hand exactly where it should be, not just exactly on the hour

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- ✓ Now it's time to bring in the minute hand. Create a program that rotates until it sees a black line, puts the indicator light to red (without stopping) and waits again until it sees another black line and then stops. Demonstrate this to your teacher. The flow chart below will help you.



- ✓ Time permitting, make new estimates for each of the times in the table and test them out.

Tips: Choosing the correct light value is very important for consistent results. The best light values are exactly in between the white and the dark.



For example, if dark is 20% and light is 60%, the best light value is 40%. Using port view on the robots brick can tell you the light reading in real time.

Record

Time for one full rotation at 50% power? _____

Time for 5 minutes worth of rotation? _____ (above ÷ 12)

Questions

Question 1 | When is the hour hand exactly on one of the numbers?

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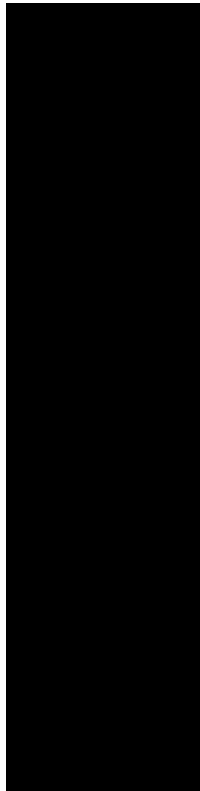
Math	Where will the minute hand be?
Only when it just turns to the hour and the minute hand is on the 12.	
Question 2 Math	Explain in detail how you made your “time to spin and stop on hour hand (prediction)” on the table.
Ex: It took 0.2 sec to spin 1hr worth around the clock, so 9:50 was almost $0.2 \times 10 (20)$, so we guessed it would take 18 seconds.	
Question 2 Math	How close were estimates? Explain why you think your worst estimate was so different then the reality.
Question 3 Math	Do you currently have an easy time setting a clock to the right time? Explain what you find challenging (if anything).
Question 4 Coding	Why do you think we used 50% power instead of 100% power? Use the word sensor in your answer.
Going slower gave the sensor more time to check and see the line. Going too fast may have made the robot miss. It also made estimating times a little bit easier.	
Extension Coding and Science	Program your robot to set the clock to the right time using a combination of the front arm, and the “wait for seconds” block. Work backwards from your experimental results to put the hour hand in the correct position for each of the times in the table.



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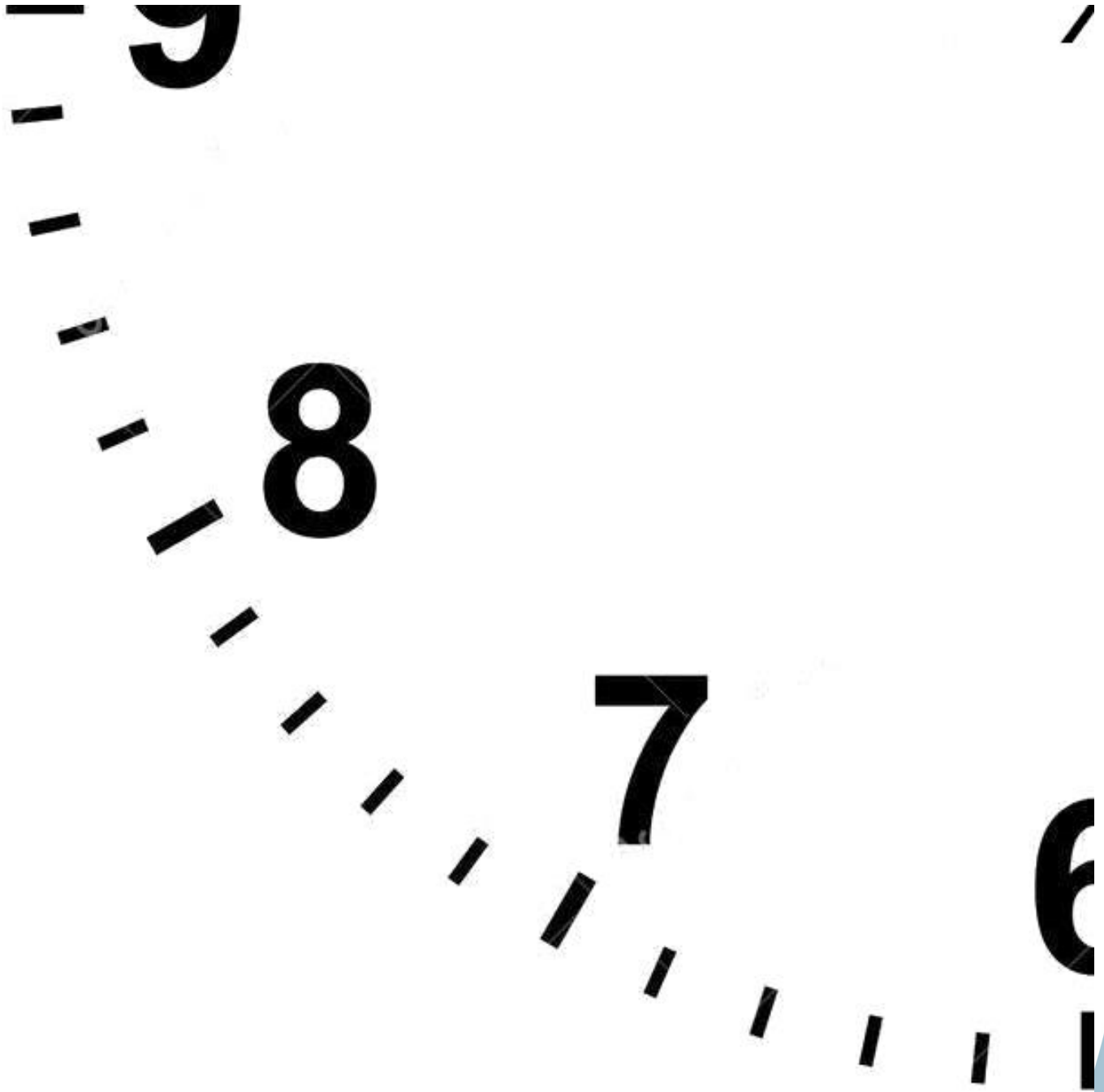


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