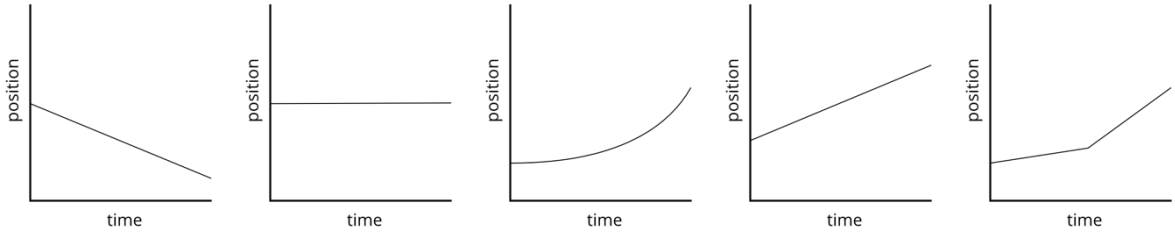
Pace Tracer 1
Position Versus Time Lab

Pre-Lab

Before you start the lab, use the five graphs to answer the given questions.



1. Which graph(s) represent an object moving in the positive direction? _____
2. Which graph(s) represent an object moving in the negative direction? _____
3. Which graph(s) represent an object object that is stopped? _____
4. Which graph(s) represent an object that suddenly changes speed? _____
5. Which graph(s) represent an object that gradually changes speed? _____

Getting Ready

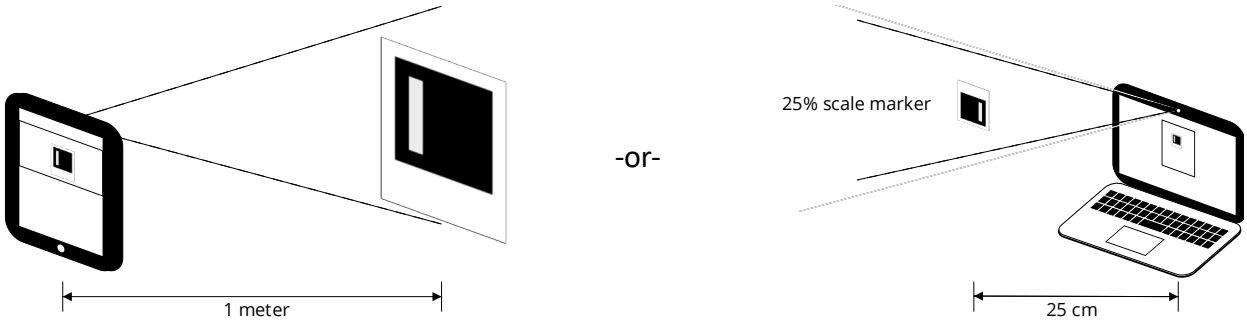
Navigate to the **Pace Tracer 1** Interactive at The Physics Classroom website:
https://www.physicsclassroom.com/Physics-Interactives/1-D-Kinematics/Pace-Tracer

Navigational Path:

www.physicsclassroom.com ==> Physics Interactives ==> 1D Kinematics ==> Pace Tracer 1

If not already done, obtain a marker and tape it to the wall. You can point your phone or tablet at the marker and walk. The camera of your device detects the marker and determines your position. Alternatively, you can print the quarter-size marker (25% scale) and hold it as you move in front of a computer. The camera of the computer will detect the marker and determine your position as you walk.

Tap the screen to start. Grant the page access to your camera to detect your motion.
Using a phone or tablet: stand 1 meter from the marker and tap on **Calibrate**.
Using a computer: stand 25 cm from the monitor and click on **Calibrate**.



Select a graph and begin. Tap **Go** and start moving to match the graph. Observe that your position is plotted as you move. The percentage of the target graph that you match is displayed on the screen. An 80% match earns you the **Trophy**. Repeat as many times as needed by tapping **Reset**. If you wish to select a new graph, return to the list using the small menu in the bottom left of the camera view. Earn as many trophies as you can.

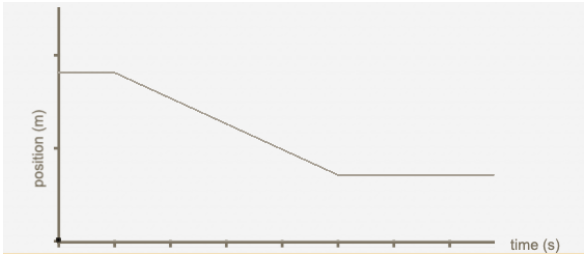
Your teacher may have more specific instructions regarding the requirements of the lab.

Post-Lab Analysis

Describe each section of each graph with the following terms:

"walking backward" / "stopped" / "walking forward"
"slowing down" / "at a constant speed" / "speeding up"

Graph 1



0 - 1 s: stopped

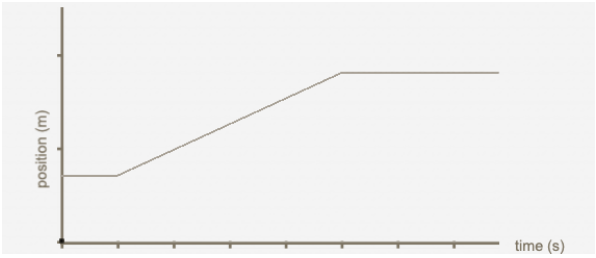
1 - 5 s: _____

_____

5 - 8 s: _____

_____

Graph 2



0 - 1 s: stopped

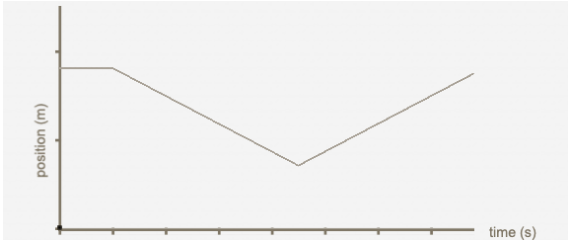
1 - 5 s: _____

_____

5 - 8 s: _____

_____

Graph 3



0 - 1 s: _____

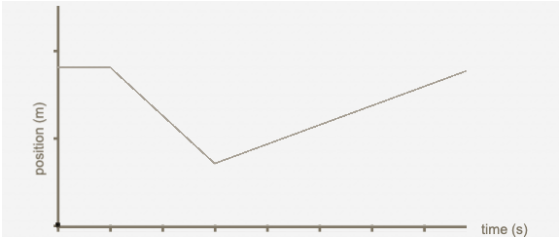
1 – 4.5 s: _____

_____

4.5 - 8 s: _____

_____

Graph 4



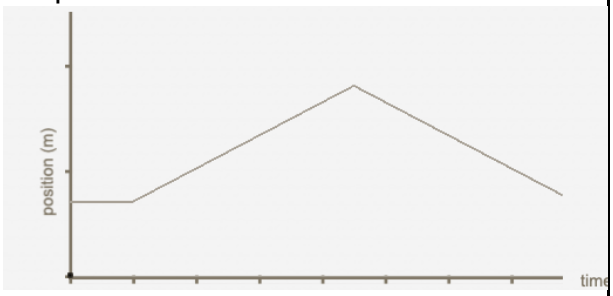
0 - 1 s: _____

1 - 3 s: _____

_____

3 - 8 s: _____

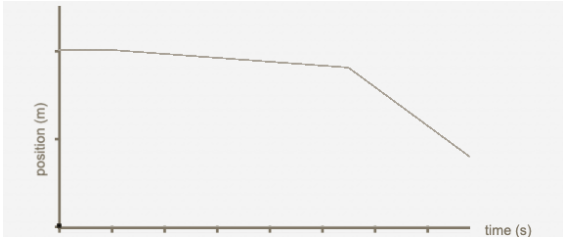
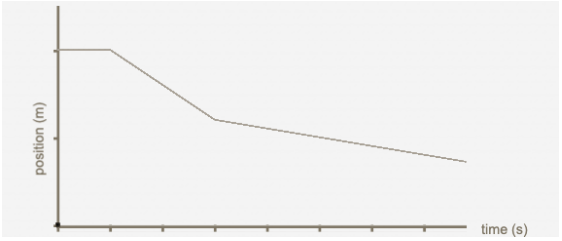
_____

Graph 5	Graph 6
	
0 - 1 s: _____ 1 – 4.5 s: _____ _____ 4.5 - 8 s: _____ _____	0 - 1 s: _____ 1 – 3 s: _____ _____ 3 - 8 s: _____ _____

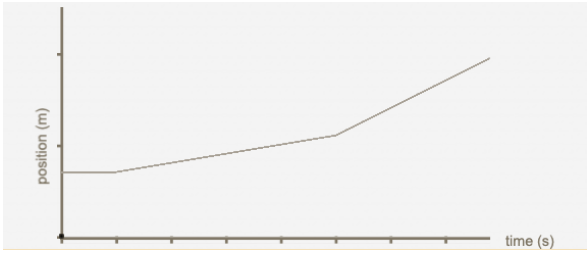
6. What is different between Graph 3 and Graph 4?

7. In Graph 4, what is different between 1 – 3 seconds and between 3 – 8 seconds?

8. What is different between Graph 3 and Graph 5?

Graph 7	Graph 8
	
0 - 1 s: _____ 1 – 6 s: _____ _____ 6 - 8 s: _____ _____	0 - 1 s: _____ 1 – 3 s: _____ _____ 3 - 8 s: _____ _____

Graph 9



0 - 1 s: _____

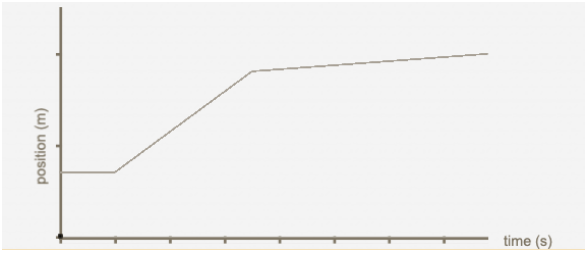
1 – 5.5 s: _____

_____

5.5 - 8 s: _____

_____

Graph 10



0 - 1 s: _____

1 – 3 s: _____

_____

3 - 8 s: _____

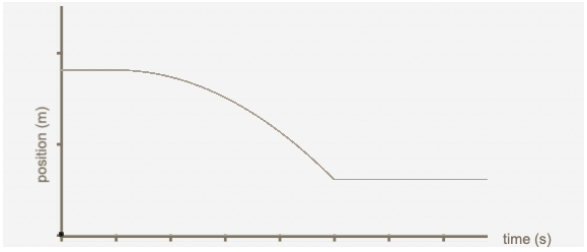
_____

9. What is different between Graph 7 and Graph 8?

10. In Graph 8, what is different between 1 – 3 seconds and between 3 – 8 seconds?

11. What is different between Graph 7 and Graph 9?

Graph 11



0 - 1 s: _____

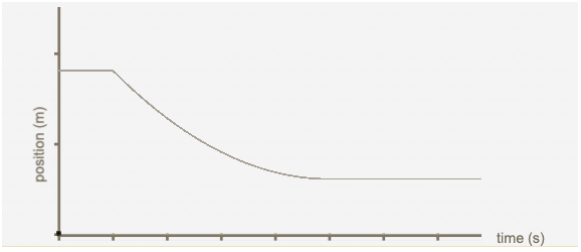
1 – 5 s: _____

_____

5 - 8 s: _____

_____

Graph 12



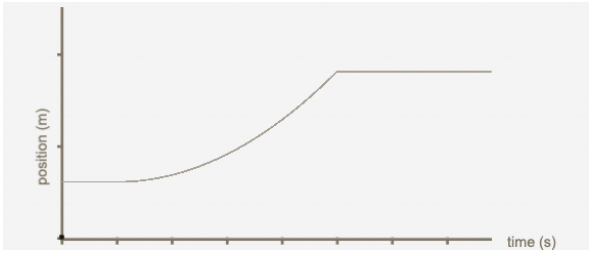
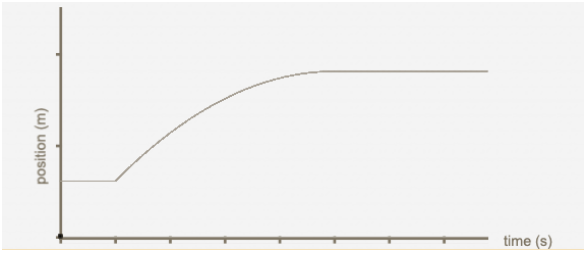
0 - 1 s: _____

1 – 5 s: _____

_____

5 - 8 s: _____

_____

Graph 13	Graph 14
	
0 - 1 s: _____	0 - 1 s: _____
1 – 5 s: _____	1 – 5 s: _____
_____	_____
5 - 8 s: _____	5 - 8 s: _____
_____	_____

12. In Graphs 11 and 13 you start at rest and gradually speed up. What do you need to do differently in Graphs 12 and 14?

13. What do you notice is different in the shapes of the graphs in Graphs 11 – 14 compared to all of the previous graphs? What does this difference indicate for the motion? Be thorough.