AP Calc AB						
Motion Matching	Lab					

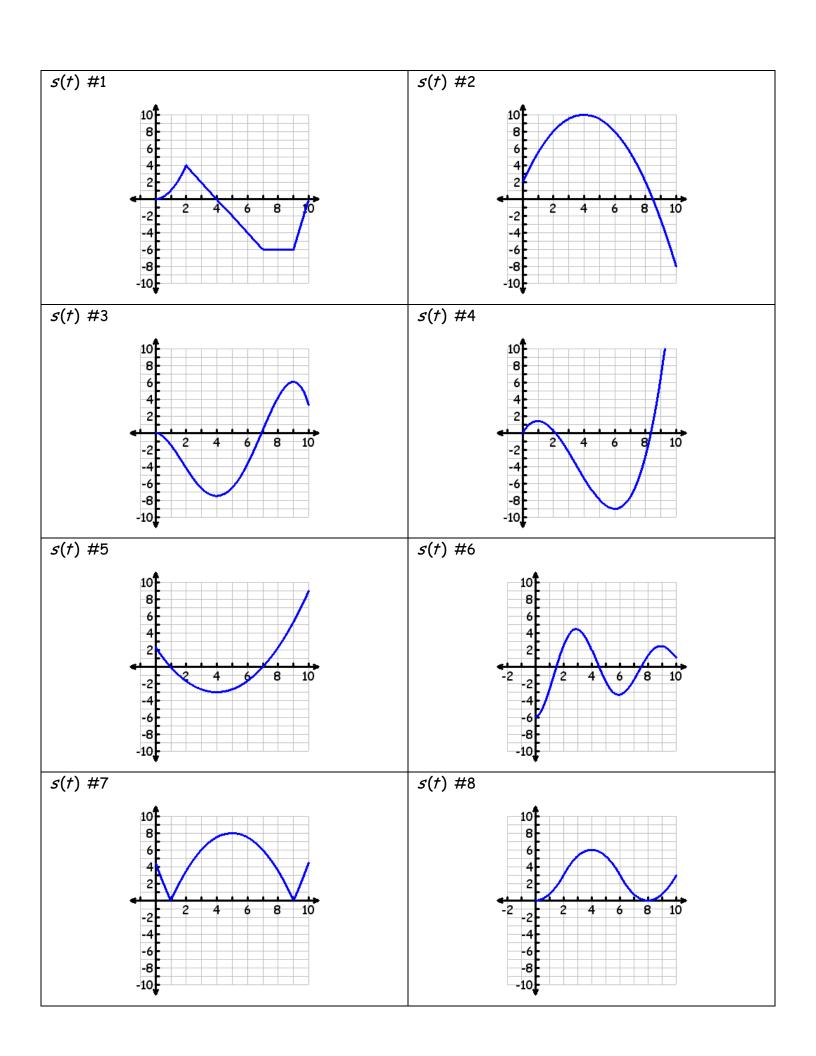
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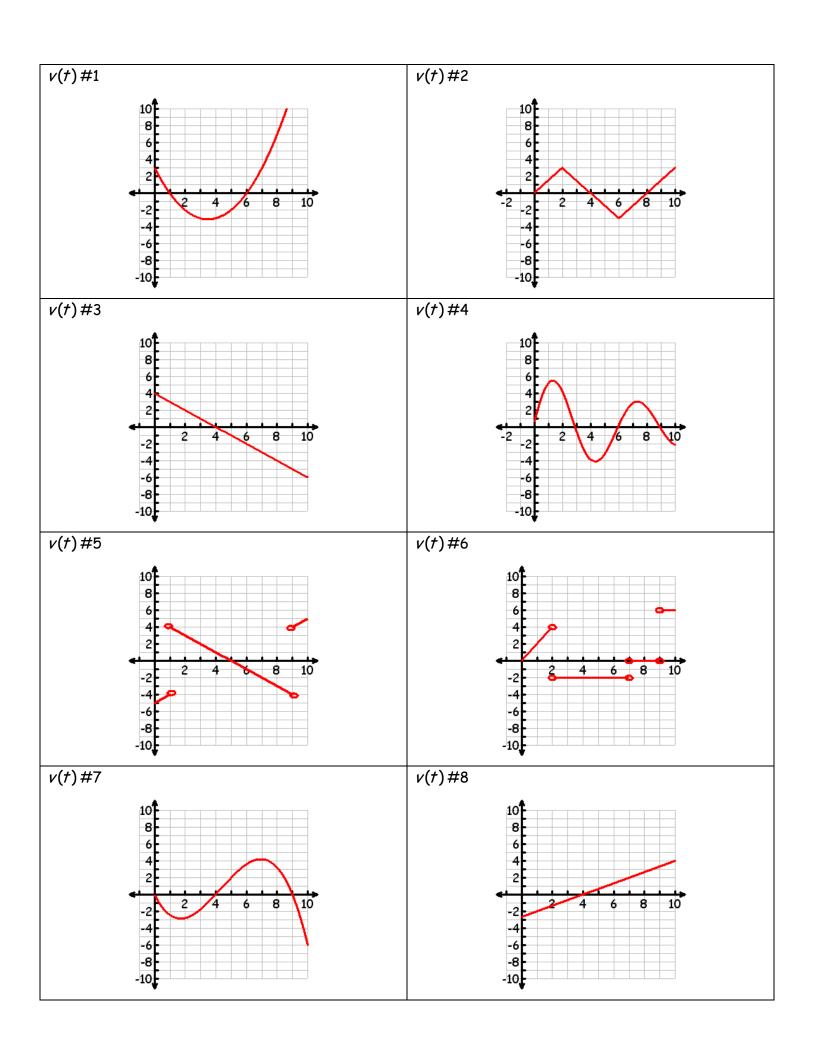
Introduction: In this lab, you will be considering 8 different particles that are moving along the x-axis. Your group will have four sets of cards: position graphs, velocity graphs, acceleration graphs, and motion descriptions. You will be matching each particle's position, velocity, and acceleration graphs along with a description of the motion. In addition, you will complete some analysis questions about the motion of each particle.

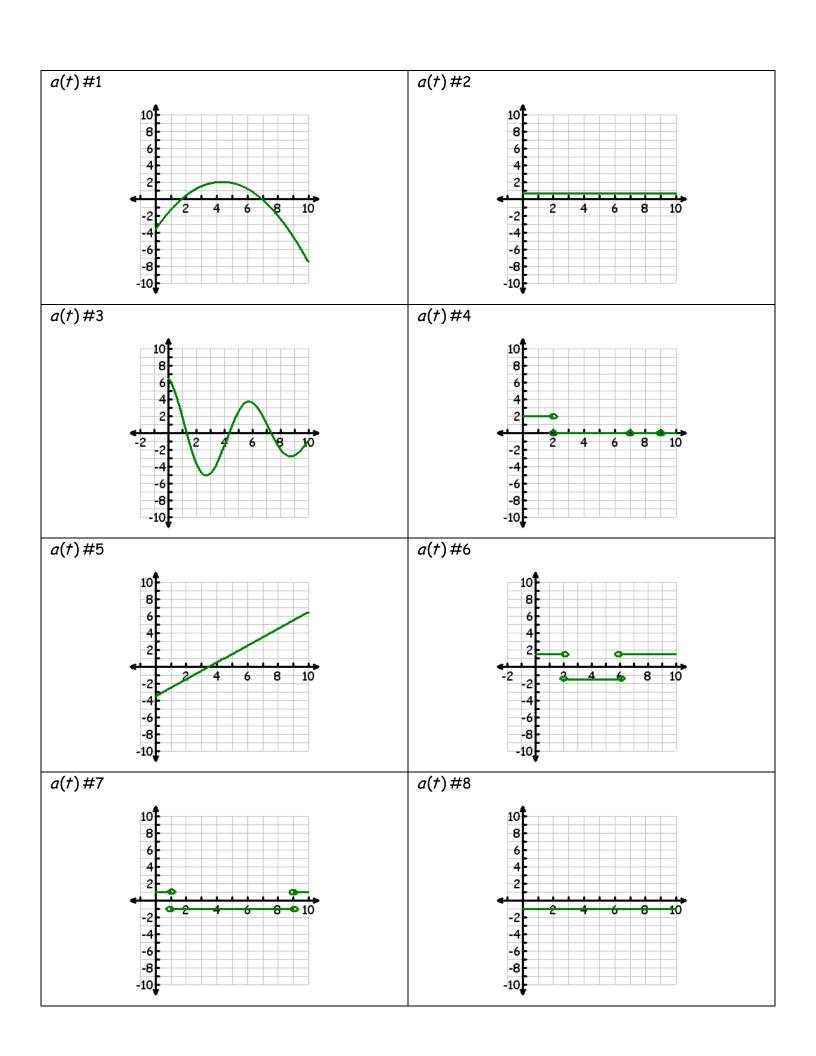
Directions:

- Complete the matching and record your answers in the chart below.
- Check your results of the matching with the teacher.
- Once your matching has been verified, complete the additional analysis questions.

Position Graph	Velocity Graph	Acceleration Graph	Description
	_	_	







Description #1	Description #2
This particle starts its trip 6 units to the left of the origin.	This particle is at rest on the interval (7, 9).
Description #3	Description #4
This particle slows down on the intervals (2, 4) and (6, 8).	The acceleration of this particle is positive throughout the entire trip.
Description #5	Description #6
This particle changes direction at $t=4$ and $t=9$.	The velocity of this particle is decreasing on the interval (1, 9).
Description #7	Description #8
This particle moves to the left from $t = 4$ to $t = 10$.	The velocity of this particle is increasing on the interval (3.5, 10).

Motion Lab Analysis Questions

1.) For the particle with position function s(t)#1, explain why the velocity is undefined at the times t = 2, t = 7, and t = 9.

2.) For the particle with position function s(t)#2, determine the particle's average velocity and average acceleration over the interval [0, 10].

3.) For the particle with position function s(t)#3, determine when the particle is moving to the right, moving to the left, and at rest. Justify your answer.

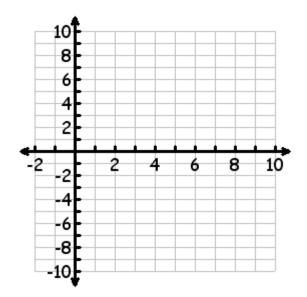
4.) For the particle with position function s(t)#4, determine when the particle is speeding up and slowing down. Justify your answer.

5.) For the particle with position function s(t) # 5, the position function is given algebraically by $s(t) = \frac{1}{3}(t-1)(t-7)$. Find the total distance traveled over the interval [0, 10].

6.) For the particle with position function s(t)#6, how many times does the particle change direction on the interval [0, 10]? Explain your reasoning.

7.) For the particle with position function s(t)#7, write piecewise functions for the velocity and acceleration of the particle.

8.) For the particle with position function s(t)#8, sketch a graph of the particle's speed on the axes below.



Motion Matching Lab Teacher Answer Key

Position Graph	Velocity Graph	Acceleration Graph	Description
1	6	4	2
2	3	8	7
3	7	1	5
4	1	5	8
5	8	2	4
6	4	3	1
7	5	7	6
8	2	6	3