

Please follow the Individual Revision guidelines provided during the Collaborative Reflection workshop in the Week 5 Problem Session.

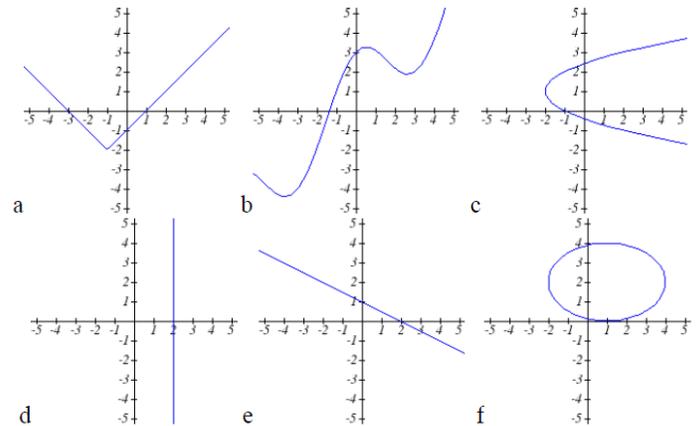
1. Consider the following tables. For each question below, **explain your reasoning**. Your response should address what a function is.

- Which table(s) could be a function from  $x$  to  $y$ ?
- Which table(s) could be a function from  $y$  to  $x$ ?
- Which table(s) could be a one-to-one function from  $x$  to  $y$ ?

A		B		C		D	
x	y	x	y	x	y	x	y
-3	-5	-1	-5	-4	-2	0	-3
1	2	1	1	2	3	-3	3
6	2	6	5	4	6	-3	4
8	9	9	7	8	7	8	7
15	14	1	2	12	12	11	15

2. Consider the following graphs. For each question below, **explain your reasoning**. Your response should address what a function is.

- Which graph(s) could be a function from  $x$  to  $y$ ?
- Which graph(s) could be a function from  $y$  to  $x$ ?
- Which graph(s) could be a one-to-one function from  $x$  to  $y$ ?

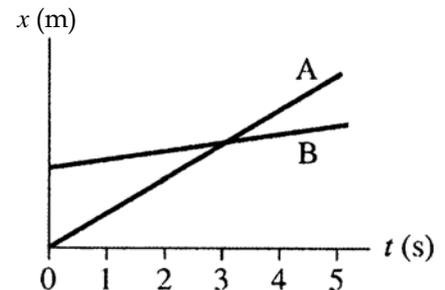


3. A quadratic **must have** how many of each of the following? How many of each of the following **can** a quadratic have? **Explain your reasoning**.

vertex       $x$ -intercept       $y$ -intercept      root

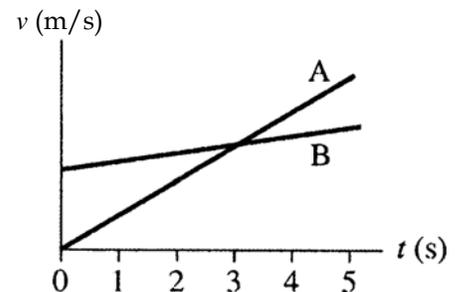
4. The **position vs. time** graphs for two particles A and B traveling in straight lines in the same direction are shown. For each question below, **explain your reasoning**. Your response should address the connections between position, displacement, velocity, and acceleration on a position vs. time graph.

- At  $t = 3$  s, which particle is **further ahead**?
- Between 0 s and 3 s, which particle **traveled the largest distance**?
- At  $t = 3$  s, which particle has the **larger speed**?
- At  $t = 3$  s, which particle has the **larger acceleration**?

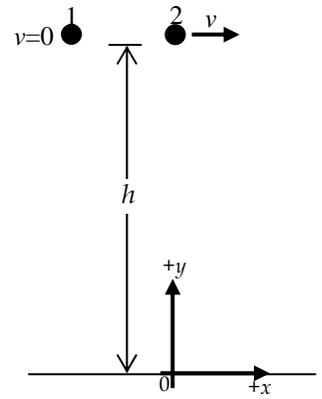


5. The **velocity vs. time** graphs for two particles A and B traveling in straight lines in the same direction are shown. At  $t = 0$ , both particles are at the same location. For each question below, **explain your reasoning**. Your response should address the connections between velocity, acceleration, displacement and position on a velocity vs. time graph.

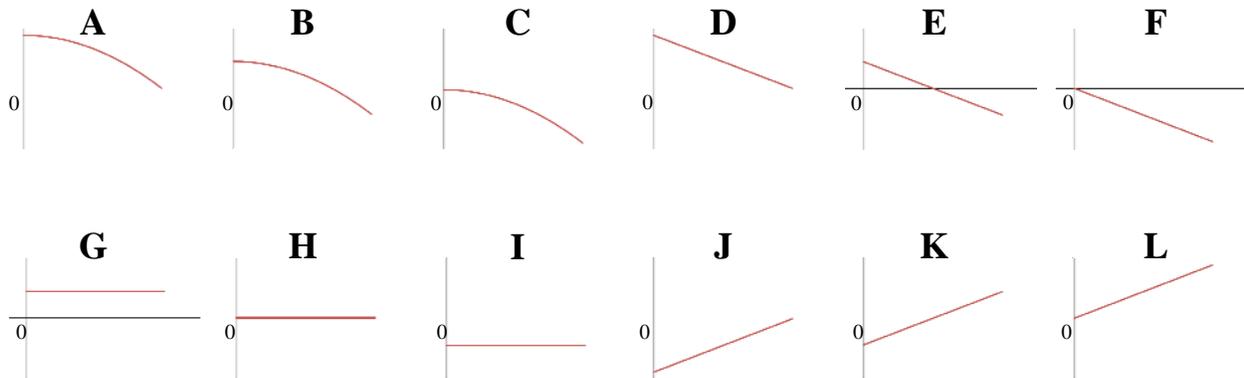
- At  $t = 3$  s, which particle has the **larger speed**? How do you know?
- At  $t = 3$  s, which particle has the **larger acceleration**?
- Between 0 s and 3 s, which particle **traveled the largest distance**?
- At  $t = 3$  s, which particle is **further ahead**?



6. Two identical steel marbles are released from height  $h$  above the floor at the same time. Marble 1 is released from rest. Marble 2 is launched with horizontal velocity  $v$ . Note the coordinate system and origin indicated on the figure. Neglect air resistance. For each question below, **explain your reasoning. Please pay attention to which marble and which component is being asked about in b) - e).**



- Which marble hits the ground first?
- Consider **Marble 1**, released from rest. Which graphs best represent Marble 1's **y-components** of acceleration, velocity, and position?
- Now, consider **Marble 2**, launched horizontally with speed  $v$ . Which graphs (if any) for Marble 2's **y-components** of acceleration, velocity, and position are **different** from Marble 1?
- Consider **Marble 2** again, launched horizontally with speed  $v$ . Which graphs best represent Marble 2's **x-components** of acceleration, velocity, and position?
- Now, consider **Marble 1**. Which graphs (if any) for Marble 1's **x-components** of acceleration, velocity, and position are **different** from Marble 2?
- Marble 2**, launched horizontally with speed  $v$ , takes 0.25 seconds to hit the floor after being launched. Marble 2 travels a horizontal distance of 0.75 m between being launched and hitting the ground. Determine the launch speed  $v$  of Marble 2.



- An object moved in a straight line with constant acceleration. At 2 s, its velocity was 4 m/s. At 4 s, its velocity was 0 m/s. Determine the object's displacement between 2 s and 4 s.
- Determine an equation for a quadratic with  $x$ -intercepts (2,0) and (-5,0) and  $y$ -intercept (0,3).
- Cell phone Plan A charges a monthly fee of \$30 *plus* \$0.10 per minute. Plan B charges \$0.20 per minute with no monthly fee. How many minutes would you have to use in a month in order for Plan A to be preferable to Plan B?
- A motorcycle moving at constant speed 20 m/s on a straight road passes a stationary police car. At that instant, the police car begins to move with constant acceleration 4 m/s<sup>2</sup> in the same direction as the motorcycle. Determine when the police car passes the motorcycle.
- A rocket, launched with an initial speed of 39.2 m/s, travels straight up and down. Neglecting air resistance, its height (in meters) as a function of time (in seconds) between when it is launched and when it lands is given by  $y = -4.9t^2 + 39.2t$ .
  - Determine the maximum height of the rocket and its total travel time (from launch to land).
  - Determine when the rocket is at a height of 34.3 m.

12. A farmer plans to enclose two pens with fencing, as shown. She has 600 feet of fencing available. Determine the dimensions of the pen which maximize the enclosed area.

