

4.2 Position, Velocity, and Acceleration

Calculus

Name: _____

CA #1

1. A particle moves along a line so that its position at any time $t \geq 0$ is given by the function

$$s(t) = t^3 - 8t^2 + 20t - 16$$

where s is measured in meters and t is measured in seconds.

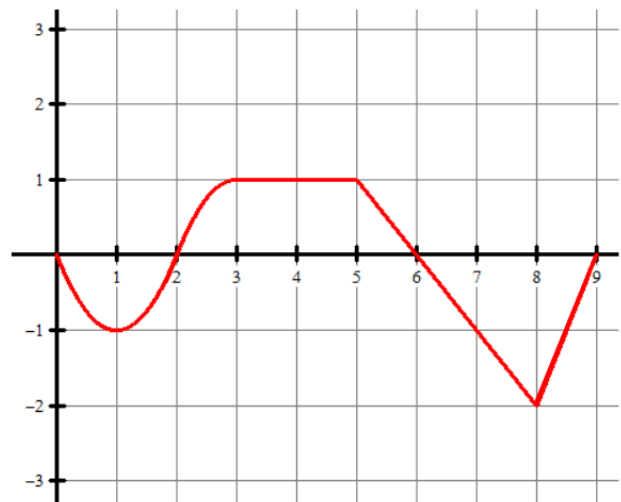
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|--|--|
| a. Find the instantaneous velocity at any time t . | b. Find the acceleration of the particle at any time t . |
| c. When is the particle at rest? | d. What is the displacement of the particle for the first 3 seconds? |

2. A rock thrown vertically upward from a 7 meter alien on the moon at a velocity of 48 meters per second reaches a height of $s(t) = 7 + 48t - 0.8t^2$ meters in t seconds.

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|--|--|
| a. Find the rock's velocity and acceleration as functions of time. | b. How long did it take the rock to reach its highest point? |
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3. A particle P moves on the number line. The graph $s = f(t)$ shows the position of P as a function of time t .

- a. When is P moving to the left?
- b. When is P moving to the right?
- c. When is P standing still?



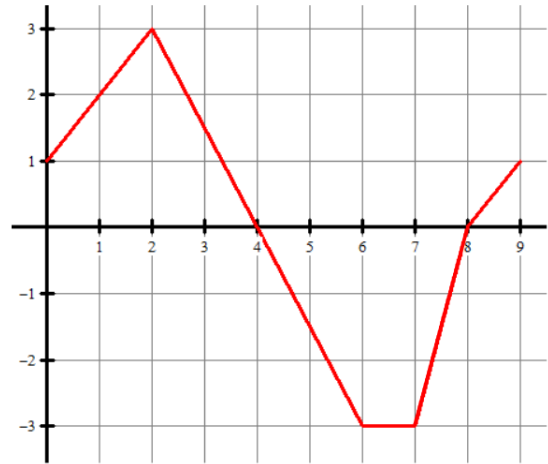
4. The figure shows the velocity $v = \frac{ds}{dt} = f(t)$ of a body moving along a coordinate line in meters per second.

a. When does the body reverse direction?

b. When is the body moving at a constant speed?

c. What is the body's maximum speed?

d. At what time interval(s) is the body slowing down?



Answers to 4.2 CA #1

1a. $v(t) = 3t^2 - 16t + 20$	1b. $a(t) = 6t - 16$	1c. $t = \frac{10}{3}$ and 2	1d. 15
2a. $v(t) = 48 - 1.6t$ $a(t) = -1.6$	2b. $t = 30$ seconds	3a. (0,1) and (5,8)	3b. (1,3) and (8,9) 3c. (3,5)
4a. $t = 4$ and 8	4b. (6,7)	4c. 3 meters per second	4d. (2,4) and (7,8)