4.2 Position, Velocity, and Acceleration

Calculus Name: _____ **CA #2**

1. The position, in meters, of a body at time $t \geq 0$ measured in seconds is $s(t) = t^3 - 6t^2 - 36t$. Find the body's acceleration each time the velocity is zero.

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2. The data in the table gives selected values for the velocity, in meters per minute, of a particle moving along the *x*-axis. The velocity *v* is a differentiable function of time *t*.

time, t	0	2	6	9	12
velocity, $v(t)$	-4	2	5	-3	-6

a. At $t = 0$, is the particle moving to the right or left? Justify.

b. Is there a time during the time interval $0 \leq t \leq 12$ minutes when the particle is at rest? Justify.

c. Use the data from the table to approximate $v'(4)$. Use appropriate labels.

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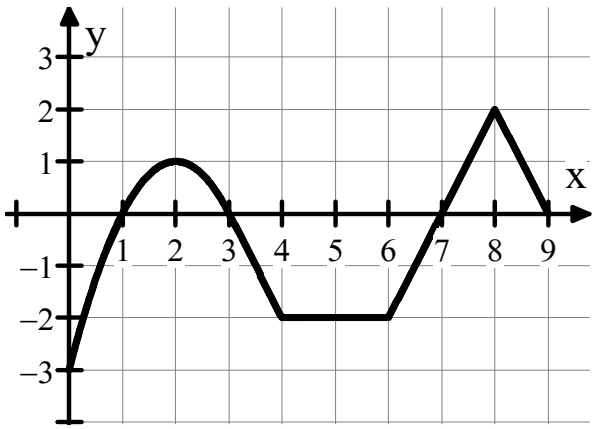
3. A particle *P* moves on the number line. The graph $s = f(t)$ shows the position of *P* as a function of time t. The graph is a piecewise function that is quadratic from $0 \leq t \leq 3$, and then linear from $3 \leq t \leq 9$.

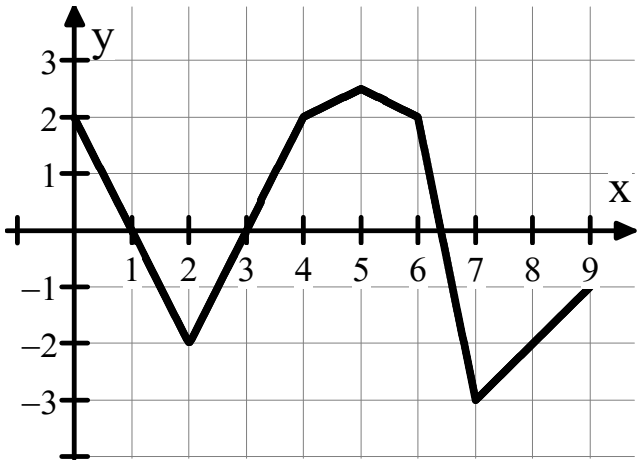
a. When is *P* moving to the left?

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 #2

1. 24 meters per second^2	2a. Left because velocity is negative	2b. Yes, between (0,2) and (6,9) sign changes so it must cross zero.	2c. $\frac{5-2}{6-2} = \frac{3}{4}$ meters per minute^2
3a. (2, 4) and (8, 9)	3b. (0, 2) and (6, 8)	3c. $t = 2$ and $(4, 6)$	
4a. $t = 1,\ 3$ and ≈ 6.5	4b. Never	4c. 3 meters per second	4d. (0,1), (2,3), (5, 6.5), and (7, 9)