

Position, Velocity & Acceleration

Numberbender | WORKSHEET



Name: _____ Date: _____ Score: _____

Find velocity and acceleration from the position function. Show all work.

CALCULUS I Worksheet #72

<p>For #1 – 5, find velocity and acceleration, if s represents the position of the body at any time t.</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: auto;"> $v = \frac{ds}{dt}$ $a = \frac{dv}{dt} = \frac{d^2s}{dt^2}$ </div>	
1.	$s = t^2 - 4t + 3$
2.	$s = 2t^3 - 5t^2 + 4t - 3$
3.	$s = 3 + 4t - t^2$
4.	$s = (2t + 3)^2$
5.	$s = gt^2 + v_0t + s_0$ (g, v_0, s_0 constants.)
6.	<p>A particle projected vertically upward with a speed of $160 \frac{ft}{sec}$ reaches an elevation $s = 160t - 16t^2$ at the end of t seconds.</p> <p>(a) How high does it rise? (b) How fast is it traveling when it reaches an elevation of 256 feet going up; and again when it reaches that elevation coming down?</p>
7.	<p>A particle moves along the x-axis in such a way that its acceleration at time t for $t > 0$ is given by $a(t) = \frac{3}{t^2}$. When $t = 1$, the position of the particle is 6 and the velocity is 2.</p> <p>(Hint: This is an initial value problem from first semester)</p> <p>a) Write an equation of the velocity, $v(t)$, of the particle for all $t > 0$. b) Write an equation for the position, $x(t)$, of the particle for all $t > 0$. c) Find the position of the particle when $t = e$.</p>
8.	<p>Let f be the function defined by $f(x) = \begin{cases} x^3 & \text{for } x \leq 0, \\ x & \text{for } x > 0. \end{cases}$</p> <p>Which of the following statements about f is <u>true</u>?</p> <p>A) f is an odd function B) f is discontinuous at $x = 0$ C) f has a relative minimum D) $f'(0) = 0$ E) $f'(x) > 0$ for $x \neq 0$</p>
9.	<p>Let R be the region in the first quadrant enclosed by the graph of $y = (x + 1)^{1/3}$, the line $x = 7$, the x-axis, and the y-axis. The volume of the solid generated when R is revolved about the <u>x-axis</u> is given by</p> <p>A) $\pi \int_0^7 (x+1)^{2/3} dx$ B) $\pi \int_0^7 (x+1)^{1/3} dx$ C) $\pi \int_0^2 (x+1)^{2/3} dx$ D) $\pi \int_0^2 (x+1)^{1/3} dx$ E) $\pi \int_0^7 (y^3 - 1)^2 dy$</p>

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Answer key — for instructor use only.

Answers:

1. $v = 2t - 4$, $a = 2$	2. $v = 6t^2 - 10t + 4$, $a = 12t - 10$	3. $v = 4 - 2t$, $a = -2$
4. $v = 8t + 12$, $a = 8$	5. $v = 2gt + v_0$, $a = 2g$	6a. 400 ft. b. $v_{\text{up}} = 96 \frac{\text{ft.}}{\text{sec}}$, $v_{\text{down}} = -96 \frac{\text{ft.}}{\text{sec}}$
7a. $v = \frac{-3}{t} + 5$ b. $x = -3 \ln t + 5t + 1$ c. $x(e) = 5e - 2$	8. E	9. A