ave. = 4.7
σ = 3.3

Physics 11
Spring 2026

Name Answer Key

Quiz #2: Motion in One Dimension

Problem 1 (2 points)
A rock is thrown vertically upward from the surface of the earth. The rock rises to some maximum height and falls back toward the surface of the earth. Which one of the following statements concerning this situation is true if air resistance is neglected?

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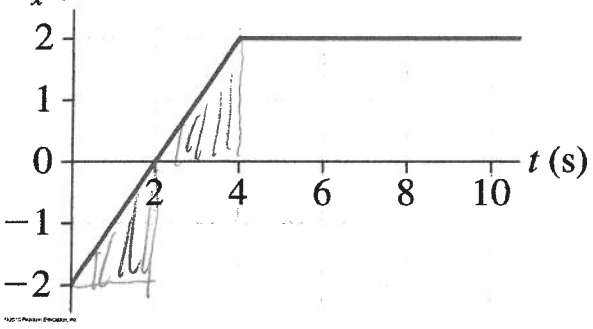
a) As the ball rises, its acceleration vector points upward. → $\vec{a}$ always points downward
b) The acceleration of the ball is zero when the ball is at its highest point. → $a_y = -9.80\ m/s^2$
c) The speed of the ball is negative while the ball falls back toward the earth. → speed always +
d) The velocity and the acceleration always point in the same direction. → on way up $\vec{v}\uparrow$ $\vec{a}\downarrow$
(e) None of the above.

Problem 2 (3 points)
The graph below shows the velocity as a function of time of a mutant banana slug slithering about UCSC. **(a)** What is the banana slug's acceleration at t = 1 s? **(b)** What is the slug's displacement between t = 0 s and t = 10 s?



(a) $\vec{a} = \frac{\Delta \vec{v}}{\Delta t}$

$\vec{a} = \frac{2\ m/s - (-2\ m/s)}{4s - 0s}$

$\vec{a} = 1\ m/s^2$

(b) displacement Δx = area under curve of v_x vs. t

area between $t = 0s$ and $t = 4s$ = 0m

area = $(6s)(2\ m/s)$ = 12 m

between $t = 4s$ and $t = 10s$

Problem 3 (5 points)
Super Joe, using his incredible Physics knowledge, starts from rest and accelerates at a spectacular rate of 12.0 m/s^2 for a distance of 375 m. He then uses his awesome powers to slow down at the rate of –7.50 m/s^2 until he comes to rest. **(a)** What is the total distance traveled by Super Joe? **(b)** How long was SJ in motion, from start to stop?

Part 1:

X_o	X	V_{ox}	V_x	a_x	t
0m	375m	0 m/s	?	12.0 m/s^2	?

$$V_x^2 = V_{ox}^2 + 2a_x(x - x_o) \quad (V_{ox} = 0,\ x_o = 0) \rightarrow V_x^2 = 2a_x x$$

$$V_x = \pm\sqrt{2a_x x} \rightarrow V_x = \sqrt{2(12.0\,m/s^2)(375\,m)}$$

$$V_x = 94.9\ m/s$$

$$V_x = V_{ox} + a_x t \quad (V_{ox} = 0) \rightarrow t = V_x/a_x = \frac{94.9\ m/s}{12.0\ m/s^2} \rightarrow t = 7.91\ s$$

Part 2:

X_o	X	V_{ox}	V_x	a_x	t
375m	?	94.9 m/s	0 m/s	-7.50 m/s^2	?

$$V_x = V_{ox} + a_x t \quad (V_x = 0) \rightarrow t = -\frac{V_{ox}}{a_x} = -\frac{(94.9\ m/s)}{-7.50\ m/s^2}$$

$$t = 12.7\ s$$

$$X - X_o = \tfrac{1}{2}(V_{ox} + V_x)t \quad (V_x = 0) \rightarrow X = X_o + \tfrac{1}{2}V_{ox}t$$

$$X = 375\,m + \tfrac{1}{2}(94.9\,m/s)(12.7\,s) \rightarrow X = 978\,m$$

(a) $\boxed{X = 978\ m}$

(b) total time = 7.91s + 12.7s = $\boxed{20.6\,s}$