Name: Answer key Period: _____

Practice Physics Final Exam – Standards 8–19

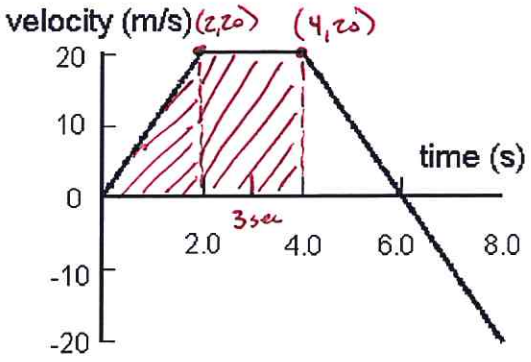


FIGURE 2–2

1) In Fig. 2–2, what is the acceleration at 3.0 s? 1) A

A. 0
B. 2.0 m/s^2
C. –2.5 m/s^2
D. 10 m/s^2

slope $= \frac{(y_2 - y_1)}{(x_2 - x_1)} = \frac{(20-20)}{(4-2)} = \frac{0}{2} =$ 0 m/s^2

2) In Fig. 2–2, what is the displacement from 0 to 4.0 s? 2) H

F. 20 m
G. 80 m
H. 60 m
J. 40 m

area of $\Delta = \frac{1}{2}bh = \frac{1}{2}(2)(20) =$ 20m

area of $\square = lw = (2)(20) =$ 40 m

total area = 20 + 40 = 60m

3) An object is thrown upward with a speed of 11 m/s on the surface of planet X where the acceleration due to gravity is –5.5 m/s^2. How long does it take for the object to return to where it is thrown? 3) A

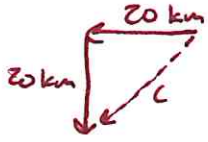
A. 4.0 s
B. 2.0 s
C. 2.5 s
D. 3.5 s

$x_1 = 0$ m
$x_2 = 0$ m
$V_i = 11$ m/s
$V_2 = -11$ m/s ← comes down at same velocity it went up at
$a = -5.5$ m/s^2
$t = ?$

$V_2 = V_1 + at$
$-11 = 11 + (-5.5)t$
$-11 \quad -11$
$\frac{-22}{-5.5} = \frac{-5.5t}{-5.5}$ $t =$ 4 sec

4) A car travels 20 km West, then 20 km South. What is the magnitude of its displacement? 4) F

F. 28 km
G. 40 km
H. 20 km
J. 0 km



$a^2 + b^2 = c^2$
$20^2 + 20^2 = c^2$
$400 + 400 = c^2$
$800 = c^2$
28.29 = c km

5) A ball is thrown straight up, reaches a maximum height, then falls to its initial height. Make a statement about the direction of the velocity and acceleration as the ball is coming down. 5) D

A. Its velocity points upward and its acceleration points downward.
B. Its velocity points downward and its acceleration points upward.
C. Both its velocity and its acceleration point upward.
D. Both its velocity and its acceleration point downward.

6) A car starting from rest moves with constant acceleration of 2.0 m/s^2 for 10 s, how far does it travel? 6) J

F. 300 m
G. 500 m
H. 200 m
J. 100 m

$X_1 = 0\,m$
$X_2 = ?$
$V_1 = 0\,m/s$
$V_2 =$
$a = 2\,m/s^2$
$t = 10\,sec$

$X_2 = X_1 + V_1 t + \frac{1}{2}at^2$
$X_2 = 0 + (0)(10) + \frac{1}{2}(2)(10)^2$
$X_2 = 0 + 0 + 100$
$X_2 = 100\,m$

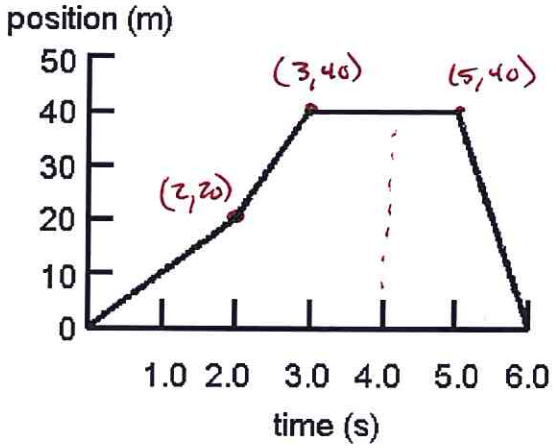


FIGURE 2–1

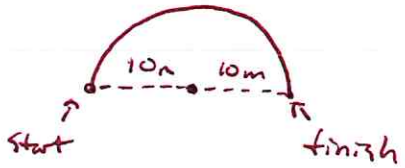
7) In Fig. 2–1, what is the velocity at t = 4.0 s? 7) A
A. 0
B. 20 m/s
C. –40 m/s
D. 10 m/s

$\text{slope} = \frac{(y_2 - y_1)}{(x_2 - x_1)} = \frac{(40-40)}{(5-3)} = \frac{0}{2} = 0\,m/s$

8) In Fig. 2–1, what is the velocity at t = 2.5 s? 8) H
F. 0
G. 10 m/s
H. 20 m/s
J. 30 m/s

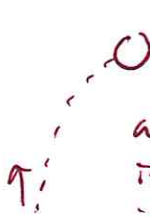
$\text{slope} = \frac{(y_2 - y_1)}{(x_2 - x_1)} = \frac{(40-20)}{(3-2)} = \frac{20}{1} = 20\,m/s$

9) A runner runs halfway around a circular path of radius 10 m. What is the displacement of the jogger? 9) A
A. 20 m
B. 10 m
C. 5 m
D. 0



$10 + 10 = 20\,m$

10) Suppose a ball is thrown straight up. Make a statement about the velocity and the acceleration when the ball reaches the highest point. 10) H
F. Its velocity is not zero and its acceleration is zero.
G. Both its velocity and its acceleration are zero.
H. Its velocity is zero and its acceleration is not zero.
J. Neither its velocity nor its acceleration is zero.

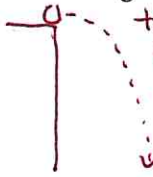


at the peak, the velocity is zero and the acceleration is constant ($-9.8\,m/s^2$)

11) A stone is thrown horizontally with an initial speed of 20 m/s from the edge of a cliff that is 80 meters high. How long does it take the stone to hit the ground? 11) C

A. 2.02 seconds
B. 3.03 seconds
C. 4.04 seconds
D. 5.05 seconds

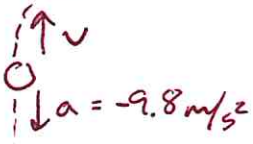
$x_1 = 80m$
$x_2 = 0m$
$V_1 = 0 m/s$
$V_2 =$
$a = -9.8 m/s^2$
$t = ?$



$x_2 = x_1 + V_1 t + \frac{1}{2} a t^2$
$0 = 80 + 0(t) + \frac{1}{2}(-9.8)(t^2)$
$-80 = -4.9 t^2$
$16.32 = t^2$
$t = 4.04 sec$

12) Suppose a ball is thrown straight up, reaches a maximum height, then falls to its initial height. Make a statement about the direction of the velocity and acceleration as the ball is going up. 12) H

F. Both its velocity and its acceleration points downward.
G. Its velocity points downward and its acceleration points upward.
H. Its velocity points upward and its acceleration points downward.
J. Both its velocity and its acceleration point upward.



13) A car travels at 15 m/s for 10 s. It then speeds up with a constant acceleration of 2.0 m/s2 for 15 s. At the end of this time, what is its velocity? 13) C

A. 375 m/s
B. 30 m/s
C. 45 m/s
D. 15 m/s

$x_1 = 0m$
$x_2 = ?$
$V_1 = 15 m/s$
$V_2 = ?$
$a = 2 m/s^2$
$t = 15 sec$

$V_2 = V_1 + at$
$V_2 = 15 + (2)(15)$
$V_2 = 45 m/s$

14) An object is thrown upward with a speed of 12 m/s on the surface of planet X where the acceleration due to gravity is –1.5 m/s2. How long does it take for the object to reach the maximum height? 14) G

F. 14 s
G. 8.0 s
H. 16 s
J. 11 s

$x_1 = 0m$
$x_2 = ?$
$V_1 = 12 m/s$
$V_2 = 0 m/s$
$a = -1.5 m/s^2$
$t = ?$

$V_2 = V_1 + at$
$0 = 12 + (-1.5) t$
$-12 = -1.5 t$
$8 sec = t$

15) A stone is thrown horizontally with an initial speed of 10 m/s from the edge of a cliff. A stop watch measures the stone's trajectory time from the top of the cliff to the bottom to be 4.3 s. What is the height of the cliff? 15) D

A. 22 m
B. 77 m
C. 43 m
D. 91 m

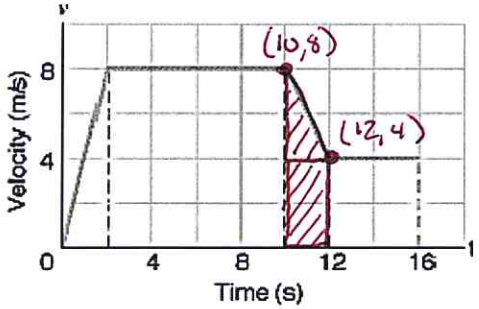
$x_1 = ?$
$x_2 = 0m$
$V_1 = 0 m/s$
$V_2 = ?$
$a = -9.8 m/s^2$
$t = 4.3 sec$

$x_2 = x_1 + V_1 t + \frac{1}{2} a t^2$
$0 = x_1 + (0)(4.3) + \frac{1}{2}(-9.8)(4.3)^2$
$0 = x_1 + 0 + (-90.601)$
$90.601 m = x_1$
$91. m = x_1$

16. A runner starts from rest and has an acceleration of 1.5 m/s^2. If she runs for 12.6 seconds, how far has she traveled?

Express your final answer in meters. Show all of your work for full credit.

What do you know?	$X_1 = 0m$ $V_1 = 0 m/s$ $a = 1.5 m/s^2$ $X_2 = ?$ $V_2 = ?$ $t = 12.6$ sec
What formula?	$X_2 = X_1 + V_1 t + \frac{1}{2}at^2$
Substitute in values	$X_2 = 0 + (0)(12.6) + \frac{1}{2}(1.5)(12.6)^2$
Calculations	$X_2 = 0 + 0 + \frac{1}{2}(1.5)(158.76)$ $X_2 = 119.07$
Answer	$X_2 = 119.07 m$



17. a. Based on the graph above what is the object's displacement from 10 to 12 seconds?

area of $\Delta = \frac{1}{2}bh = \frac{1}{2}(2)(4) = 4m$

area of $\square = lw = (2)(4) = 8m$

$4m + 8m = \boxed{12m}$

b. Based on the graph above what is the object's acceleration from 10 to 12 seconds?

$$\text{slope} = \frac{(y_2 - y_1)}{(x_2 - x_1)} = \frac{(4-8)}{(12-10)} = \frac{-4}{2} = \boxed{-2 m/s^2}$$

c. Based on the graph above, describe in words the object's motion from 0-16 seconds.

- object starts at rest
- increases its velocity at a constant positive acceleration for 2 sec.
- travels at a constant velocity (8 m/s) for the next 8 sec.
- At 10 sec the velocity decreased at a constant negative acceleration for 2s
- travels at a constant velocity (4 m/s) for the last 4 sec.