Name: Answer Key Period: _____

Practice Physics Final Exam – Standards 21–24

1) The acceleration of gravity on the Moon is only one-sixth of that on Earth. If you hit a baseball on the Moon with the same effort (and at the speed and angle) that you would on Earth, the ball would land 1) A

A. 6 times as far.
B. the same distance away.
C. 36 times as far.
D. one-sixth as far.

if the acceleration is 1/6 that on Earth then it will accelerate to the ground six times slower allowing it to fly six times further.

$x_2 = x_1 + v_1 t + \frac{1}{2} a t^2$

2) A ball thrown horizontally from a point 24 m above the ground, strikes the ground after traveling horizontally a distance of 18 m. With what speed was it thrown? 2) H

F. 6.1 m/s
G. 7.4 m/s
H. 8.1 m/s
J. 8.9 m/s

$y_1 = 24\text{m}$, $y_2 = 0\text{m}$, $a = -9.8\text{m/s}^2$, $t = ?$, $v_{1y} = 0\text{m/s}$, $v_{1x} = ?$

$y_2 = y_1 + v_{1y}t + \frac{1}{2}at^2$

$0 = 24 + 0(t) + \frac{1}{2}(-9.8)t^2$

$-24 = -4.9t^2$

$4.897 = t^2$

$t = 2.21\text{sec}$

$x_1 = 0\text{m}$, $x_2 = 18\text{m}$, $v_1 = ?$, v_2, $a = 0$, $t = 2.21$

$x_2 = x_1 + v_1 t + \frac{1}{2}at^2$

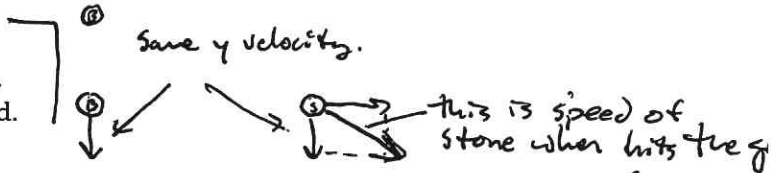
$18 = 0 + v_1(2.21) + \frac{1}{2}(0)(2.22)^2$

$18 = v_1(2.21)$

$v_1 = 8.14\text{m/s}$

3) A stone is thrown horizontally from the top of a tower at the same instant a ball is dropped vertically. Which object is traveling faster when it hits the level ground below? 3) A

A. the stone
B. the ball
C. It is impossible to tell from the information given.
D. Neither, since both are traveling at the same speed.



4) Neglecting air resistance, the vertical component of a projectile's acceleration is always 4) G

F. positive
G. negative
H. zero

we define going towards the ground as the negative direction.

5) On a calm day (no wind), you can run a 1500-m race at a velocity of 4.0 m/s. If you ran the same race on a day when you had a constant headwind which slows your speed by 2.0 m/s, the time it would take you to finish would be 5) D

A. 9000 s.
B. 1125 s.
C. 250 s.
D. 750 s.

$v_1 = 2\text{m/s}$, $v_2 = 2\text{m/s}$, $x_1 = 0\text{m}$, $x_2 = 1500\text{m}$, $a = 0\text{m/s}^2$, $t = ?$

$x_2 = x_1 + v_1 t + \frac{1}{2}at^2$

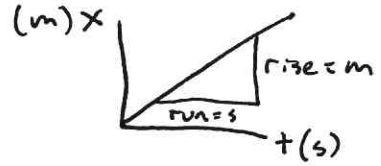
$1500 = 0 + 2(t) + \frac{1}{2}(0)t^2$

$1500 = 2t$

$750\text{sec} = t$

6) On a position vs. time graph, the slope of the line represents the object's 6) G

F. position
G. velocity
H. acceleration
J. time



$\frac{\text{rise}}{\text{run}} = \frac{m}{s} = \text{velocity}$

7) A bullet is fired horizontally, and at the same instant a second bullet is dropped from the same height. Ignore air resistance. Compare the times of fall of the two bullets. 7) A

A. They hit at the same time.
B. The dropped bullet hits first.
C. The fired bullet hits first.
D. cannot tell without knowing the masses

Both the bullet dropped and bullet fired are under the same acceleration due to gravity.

8) Neglecting air resistance, the horizontal component of a projectile's acceleration is always 8) H

F. positve
G. negative
(H. zero)

There is no force acting on a projectile horizontally to cause an acceleration horizontally.

9) A girl throws a rock horizontally, with a velocity of 10 m/s, from a bridge. It falls 20 m to the water below. How far does the rock travel horizontally before striking the water? 9) B

A. 24 m
(B. 20 m)
C. 16 m
D. 14 m

$y_1 = 20\,m$, $y_2 = 0\,m$, $v_{1y} = 0\,m/s$, $v_{2y} =$, $a_y = -9.8\,m/s^2$, $t = ?$

$y_2 = y_1 + v_{1y}t + \frac{1}{2}at^2$

$0 = 20 + 0(t) + \frac{1}{2}(-9.8)t^2$

$-20 = -4.9t^2$

$4.08 = t^2$

$2.02 = t$

$x_1 = 0\,m$, $x_2 = ?$, $v_{1x} = 10\,m/s$, $v_{2x} = 10\,m/s$, $a_x = 0\,m/s^2$, $t = 2.02\,sec$

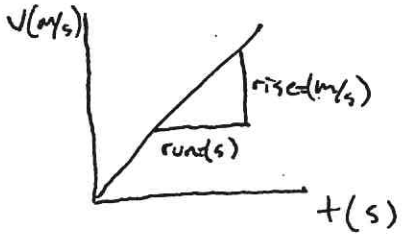
$x_2 = x_1 + v_1t + \frac{1}{2}at^2$

$x_2 = 0 + 10(2.02) + \frac{1}{2}(0)(2.02)^2$

$x_2 = 20.2\,m$

10) On a velocity vs. time graph, the slope of the line represents the objects's 10) H

F. position
G. velocity
(H. acceleration)
J. time



$\frac{\text{rise}}{\text{run}} = \frac{m/s}{s} = m/s^2 = \text{acceleration}$

1. Harry and Angela look from their balcony to a swimming pool below that is 12 meters from the bottom of their building. They estimate the balcony is 25 meters high.

a) If they jumped off the balcony horizontally, how long would it take them to hit the pool?

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

What do you know?	$y_1 = 25\ m$ $\quad V_{1y} = 0\ m/s$ $\quad a_y = -9.8\ m/s^2$ $y_2 = 0\ m$ $\quad V_{2y} = ?$ $\quad t = ?$
What formula?	$y_2 = y_1 + V_{1y}t + \frac{1}{2}a_y t^2$
Substitute in values	$0 = 25 + 0(t) + \frac{1}{2}(-9.8)(t^2)$
Calculations	$\frac{-25}{-4.9} = \frac{-4.9\,t^2}{-4.9}$ $\sqrt{5.1} = \sqrt{t^2}$
Answer	$t = 2.26$ sec

b) How fast they would have to jump horizontally to succeed in reaching the pool?

Express your final answer in m/s. Show all of your work for full credit.

What do you know?	$x_1 = 0$ $\quad V_{1x} = ?$ $\quad a_x = 0\ m/s^2$ $x_2 = 12$ $\quad V_{2x} = ?$ $\quad t = 2.26$
What formula?	$x_2 = x_1 + V_{1x}t + \frac{1}{2}a_x t^2$
Substitute in values	$12 = 0 + V_{1x}(2.26) + \frac{1}{2}(0)(2.26)^2$
Calculations	$\frac{12}{(2.26)} = \frac{V_{1x}(2.26)}{(2.26)}$
Answer	$V_{1x} = 5.3\ m/s$