

## 4 Projectile Motion

Worksheet A: Applying the Readings

Name \_\_\_\_\_

AP/Inquiry Physics

Write the letter corresponding to the best answer in the blank at the left of each question.

- \_\_\_\_\_ 1. Which of the following would **NOT** be considered a projectile?
- A cannonball fired towards a distant castle.
  - A cannonball rolling down a slope.
  - A cannonball fired straight outward from a castle wall.
  - A cannonball after it rolls off the edge of a cliff.
- \_\_\_\_\_ 2. The horizontal component of a projectile's velocity is independent of...
- the vertical component of its velocity.
  - the range of the projectile.
  - time.
- \_\_\_\_\_ 3. In the absence of air friction, which component of a projectile's velocity will not change as the projectile moves?
- vertical
  - horizontal
  - both vertical and horizontal
- \_\_\_\_\_ 4. At the instant a ball is thrown horizontally with a large force, an identical ball is dropped from the same height. Which ball hits the ground first?
- the projected ball
  - the dropped ball
  - neither - they hit simultaneously
- \_\_\_\_\_ 5. A ball is thrown up and forward into the air. At the very top of the ball's trajectory, its actual velocity is...
- entirely vertical.
  - entirely horizontal.
  - both vertical and horizontal.
  - zero.
- \_\_\_\_\_ 6. In the absence of air resistance, the angle at which a projectile will go the farthest is...
- $75^\circ$
  - $60^\circ$
  - $45^\circ$
  - $30^\circ$
- \_\_\_\_\_ 7. A ball thrown in the air will never go as far as physics ideally would predict because...
- one can never throw the ball fast enough.
  - gravity is acting.
  - ideally the ball would never land.
  - air friction slows the ball.
- \_\_\_\_\_ 8. At what part of a trajectory does an upwardly hurled projectile have minimum speed?
- When it is first projected.
  - Half-way to the top.
  - At the top of its trajectory.
  - When it returns to the ground.
- \_\_\_\_\_ 9. A cannonball is launched from the ground at an angle of 30 degrees and a speed of 20 m/s. Ideally (no air resistance) the ball will land on the ground with a speed of...
- 40 m/s
  - 20 m/s
  - 10 m/s
  - 0 m/s
- \_\_\_\_\_ 10. A bullet fired horizontally hits the ground in 0.5 second. If it had been fired with a much higher speed in the same direction, it would have hit the ground (neglecting the Earth's curvature and air resistance) in...
- less than 0.5 s
  - more than 0.5 s
  - 0.5 s

- \_\_\_\_\_ 11. A projectile is fired horizontally above the surface of the moon (which has no atmosphere). The projectile maintains its horizontal component of speed. This is because the object...
- is not acted upon by **any** forces after it is fired.
  - is not acted on by **horizontal** forces after it is fired.
  - has no vertical speed to begin with.
  - is not acted upon by gravity.
- \_\_\_\_\_ 12. An object is dropped and falls freely to the ground with an acceleration of  $1 g$  ( $1 g = 9.8 \text{ m/s}^2$ ). If it is thrown upward at an angle instead, its free-fall acceleration would be...
- $0 g$
  - $1 g$  downward
  - $1 g$  upward
  - larger than  $1 g$
- \_\_\_\_\_ 13. A ball is hurled into the air at an angle of  $30$  degrees and lands on a target that is at the same level as that where the ball started. The ball will also land on the target if it is thrown at an angle of...
- $40$  degrees
  - $45$  degrees
  - $55$  degrees
  - $60$  degrees
- \_\_\_\_\_ 14. A rifle with a muzzle velocity of  $100 \text{ m/s}$  is fired horizontally from a tower. Neglecting air resistance, where will the bullet be  $1.00$  second later?
- $50.0 \text{ m}$  downrange
  - $98.0 \text{ m}$  downrange
  - $100. \text{ m}$  downrange
  - $490 \text{ m}$  downrange
- \_\_\_\_\_ 15. After a rock that is thrown straight up reaches the top of its path and is starting to fall back down, its **acceleration** is (neglecting air resistance)...
- greater than when it was at the top of its trajectory.
  - less than when it was at the top of its trajectory.
  - the same as when it was at the top of its trajectory.

16. Suppose that you are an accident investigator and you are asked to determine whether or not the car was speeding before it crashed through the rail of the bridge and into the mudbank, as shown. The speed limit at the bridge is  $50 \text{ mph}$  or roughly  $22 \text{ m/s}$ . What is your conclusion? Show your work.

