8. A 2-kilogram block rests at the edge of a platform that is 10 meters above level ground. The block is launched horizontally from the edge of the platform with an initial speed of 3 meters per second. Air resistance is negligible. The time it will take for the block to reach the ground is most nearly
   (A) 0.3 s   (B) 1.0 s   (C) 1.4 s   (D) 2.0 s   (E) 3.0 s

9. A diver initially moving horizontally with speed v dives off the edge of a vertical cliff and lands in the water a distance d from the base of the cliff. How far from the base of the cliff would the diver have landed if the diver initially had been moving horizontally with speed 2v?

   (A) d   (B) $\sqrt{2d}$ (C) 2d   (D) 4d   (E) can't be determined without knowing the height of the cliff

10. A truck traveled 400 meters north in 80 seconds, and then it traveled 300 meters east in 70 seconds. The magnitude of the average velocity of the truck was most nearly
    (A) 1.2 m/s   (B) 3.3 m/s   (C) 4.6 m/s   (D) 6.6 m/s   (E) 9.3 m/s


11. A projectile is fired with initial velocity v_0 at an angle θ_0 with the horizontal and follows the trajectory shown above. Which of the following pairs of graphs best represents the vertical components of the velocity and acceleration, v and a, respectively, of the projectile as functions of time t?
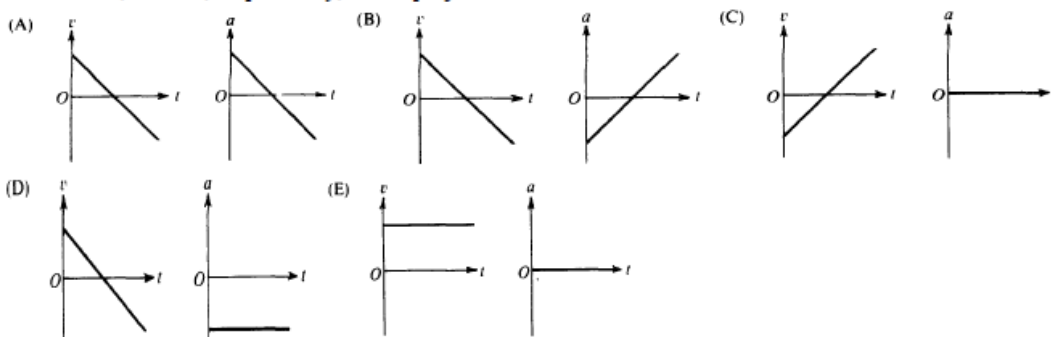
12. An object is released from rest on a planet that has no atmosphere. The object falls freely for 3.0 meters in the first second. What is the magnitude of the acceleration due to gravity on the planet?
    (A) 1.5 m/s^2 (B) 3.0 m/s^2 (C) 6.0 m/s^2 (D) 10.0 m/s^2 (E) 12.0 m/s^2

Questions 13 – 14
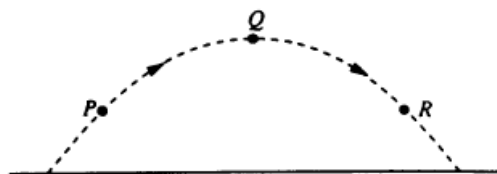
A ball is thrown and follows the parabolic path shown above. Air friction is negligible. Point Q is the highest point on the path. Points P and R are the same height above the ground.

13. How do the speeds of the ball at the three points compare?
    (A) $v_P < v_Q < v_R$ (B) $v_R < v_Q < v_P$ (C) $v_Q < v_R < v_P$ (D) $v_Q < v_P = v_R$ (E) $v_P = v_R < v_Q$

14. Which of the following diagrams best shows the direction of the acceleration of the ball at point P?

(A)   (B)   (C)   (D)   (E)