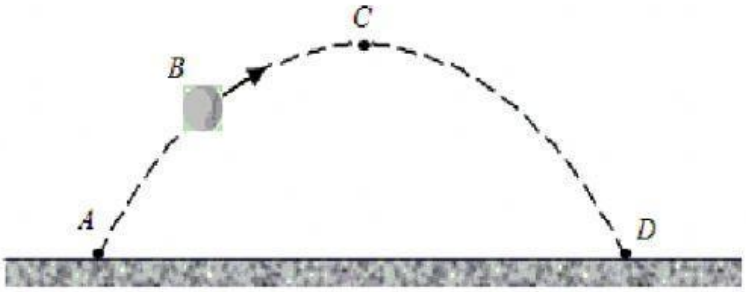
Projectile Motion Conceptual Questions

1. A tennis ball is thrown upward at an angle from point *A*. It follows a parabolic trajectory and hits the ground at point *D*. At the instant shown in the figure, the ball is at point *B*. Point *C* represents the highest position of the ball above the ground.



   a) At which point does the ball has the minimum speed?
   b) If point C is 50 m above the ground, what is the vertical displacement of the ball when it reaches point D?
   c) While in flight, how do *x*–component and *y*–component of the velocity of the ball are compared at point B and point C?
      A. The velocity components are non–zero at point B and zero at point C.
      B. The *x*–components are the same; the *y*–component at point C is zero.
      C. The *x*–components are the same; the *y*–component at point C has a larger magnitude than at point B.
      D. The *x*–component at point C is larger than at point *B*; the *y*–component at point *B* points upward while it points downward at point C.

2. A ball is thrown vertically upward from the surface of the Earth. The ball rises to some maximum height and falls back toward the surface of the Earth. Which of the following statements regarding the velocity and acceleration of the ball is **TRUE** if air resistance is neglected?
   A. As the ball rises, its acceleration vector points downwards.
   B. The speed of the ball is constant for the whole journey.
   C. Velocity and acceleration of the ball is zero when the ball is at its highest point.
   D. Velocity and acceleration of the ball always point in the same direction.

3. An object is thrown vertically upwards with a velocity of *u* near the surface of the Earth. Before it reaches its maximum height, what would be the directions of displacement, velocity and acceleration of the object?
   Direction of :
   i. displacement :
   ii. velocity :
   iii. acceleration :

4. In the absence of air resistance, if an object were to fall freely near the surface of the Earth,
   A. its acceleration would gradually decrease until it moves with a maximum velocity.
   B. its acceleration would remain constant.
   C. it would fall with a constant speed.
   D. its acceleration would be zero.

5. Which of the statement below is **TRUE** for an object moving in a projectile motion with initial velocity u directed at an angle θ from horizontal.
   A. The horizontal component of velocity is zero at the highest point of its flight.
   B. The horizontal component of velocity is u at the highest point of flight.
   C. The vertical component of velocity is zero at the highest point of its flight.
   D. The vertical component of velocity is u at the highest point of flight.