1. A ball rolls over the edge of a table with unknown horizontal velocity. The height of the table is 1.6 m and the horizontal range of the ball from the base of the table is 20 m. How long doe it take for the ball to hit the ground?

A) 0.29 s   B) 0.57 s   C) 1.14 s   D) 2.0 s   E) 9.8 s

Taking the origin at the point on the table where the ball leaves the table, the equation of motion in for y(t) is $y = -\frac{1}{2} gt^2$. Setting y=-h and solving for t gives t=0.57 s

Correct answer is B

2. A bullet is fired with a certain velocity at an angle ϑ above the horizontal at a location where g = 10.0 m/s². The initial x- and y-components of velocity are 86.6 m/s and 50.0 m/s respectively. What is the initial velocity?

A)   86.6 m/s   B) 50.0 m/s   C) 36.6 m/s   D) 100 m/s   E) 136 m/s

$V^2 = V_x^2 + V_y^2 = (86.6^2 + 50^2)$ m²/s² → V = 100 m/s   **Correct answer is D**

3. Same as question 2…. How long does it take for the bullet to get to the highest point of its trajectory?

A) 5.0 s   B) 10.0 s   C) 15.0 s   D) 20.0 s   E) None of the above

Equation for vertical velocity is $V_y = V_{0y} - gt$.

At the top, $V_y = 0$ → $t = V_{0y}/g = 50/10 = 5$ m/sec   **Correct answer is A**

4. Same as question 2.... What is the angle ϑ

A) 45.0º   B)60.0º   C)30.0º   D)90.0º   E)75.0º

$$V_{oy} = V_{ox} * \tan \vartheta \rightarrow \vartheta = \tan^{-1}(V_{0y}/V_{0x}) - \tan^{-1}(50/86.6) = 30º$$

Correct Answer is C

5. A rock is thrown at some angle above the horizontal with a certain velocity. It reaches its highest point and starts falling down. What is the velocity of the rock at the highest point of its trajectory?

A) 0   B) 9.8 m/s   C) It's equal to its initial horizontal velocity.

D) It's equal to its initial vertical velocity.   E) It's equal to its initial velocity.

At the top, the vertical component of velocity is 0. The horizontal component of velocity is the same as the initial horizontal component of velocity because there is no horizontal acceleration. Thus, the velocity is in the horizontal direction and the **correct answer is C**