

Year 12 Physics
Quick Quiz: Projectile Motion

1. Explain why, for a projectile launched horizontally, having only the time flight is sufficient to calculate the height from which a projectile was launched.

Launched horizontally means $v_{0v} = 0$. Since a_v is known ($-g$)
the height (vertical displacement) is $s_v = \cancel{v_{0v}t} + \frac{1}{2}a_v t^2$

2. Consider two projectiles launched at the same speed and angle. One is a tennis ball, one is a shotput.

State two differences between the balls and explain the effect each has on the force of air resistance of the ball.

① Tennis ball is furry but shotput is smooth of
 \therefore more air caught in tennis ball \therefore more force

② Shotput is larger \therefore more projected area \therefore more force

NOT mass (heavier/lighter) - that only affects acceleration not force

3. Calculate the time of flight for an object launched at a speed of 10 ms^{-1} and an angle of 30° above the horizontal, if it lands at a speed of 18 ms^{-1} at an angle of 61° below the horizontal.

$$v_{0v} = 10 \sin 30^\circ = 5.0 \text{ ms}^{-1}$$

$$v_v = 18 \sin(61^\circ) = -16 \text{ ms}^{-1}$$

$$v_v = v_{0v} + a_v t$$

$$\therefore v_v - v_{0v} = a_v t$$

$$\therefore t = \frac{v_v - v_{0v}}{a_v} = \frac{-16 - 5}{-9.8} = 2.1 \text{ s}$$