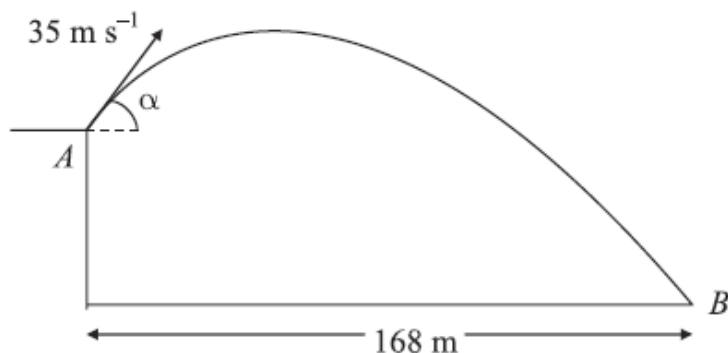A golf ball P is projected with speed 35 m s^{-1} from a point A on a cliff above horizontal ground. The angle of projection is α to the horizontal, where $\tan \alpha = \frac{4}{3}$. The ball moves freely under gravity and hits the ground at the point B, as shown in the diagram.

(a) Find the greatest height of P above the level of A. **(3)**

The horizontal distance from A to B is 168 m.

(b) Find the height of A above the ground. **(6)**

(c) find the speed of P as it hits the ground at B. **(3)**

A golf ball P is projected with speed 35 m s^{-1} from a point A on a cliff above horizontal ground. The angle of projection is α to the horizontal, where $\tan \alpha = \frac{4}{3}$. The ball moves freely under gravity and hits the ground at the point B, as shown in the diagram.

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6. (a)	$0 = (35 \sin \alpha)^2 - 2gh$ $h = \underline{40 \text{ m}}$	M1 A1 A1 (3)
(b)	$x = 168 \implies 168 = 35 \cos \square . t \quad (\implies t = 8s)$ At $t = 8$, $\quad y = 35\sin\alpha \times t - \dfrac{1}{2}gt^2 \quad (= 28.8 - \frac{1}{2}.g.8^2 = -89.6 \text{ m})$ Hence height of $A = \underline{89.6 \text{ m}}$ or 90 m	M1 A1 M1 A1 DM1 A1 (6)
(c)	 $\frac{1}{2}mv^2 = 1/2.m.35^2 + mg.89.6$ $\implies v = \underline{54.6 \text{ or } 55 \text{ m s}^{-1}}$	M1 A1 A1 (3)