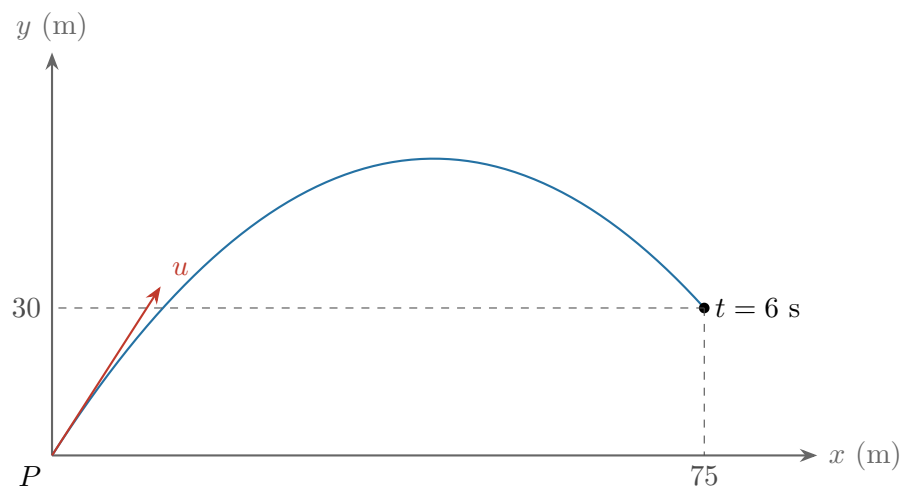


Part (b)

Game plan: We find the horizontal and vertical components of the initial velocity separately. We then combine them to find the initial speed.

Step 1: Draw the motion and choose directions

Take rightwards and upwards as positive. Let θ be the angle of projection above the horizontal.



Step 2: Use the horizontal displacement

There is no horizontal acceleration, so

$$75 = (u \cos \theta)(6), \quad u \cos \theta = 12.5 \text{ m s}^{-1}.$$

Step 3: Use the vertical displacement

Constant acceleration	Logbook Page 50
$s = ut + \frac{1}{2}at^2.$	

Vertically, $s = 30$, $a = -9.8$ and $t = 6$:

$$\begin{aligned} 30 &= (u \sin \theta)(6) - \frac{1}{2}(9.8)(6)^2, \\ 6u \sin \theta &= 30 + 176.4 = 206.4, \\ u \sin \theta &= 34.4 \text{ m s}^{-1}. \end{aligned}$$

Step 4: Combine the perpendicular components

$$\begin{aligned} u^2 &= (u \cos \theta)^2 + (u \sin \theta)^2 \\ &= 12.5^2 + 34.4^2 = 1339.61, \\ u &= \sqrt{1339.61} \approx 36.6 \text{ m s}^{-1}. \end{aligned}$$

Final Answer
The initial speed is 36.6 m s⁻¹ .