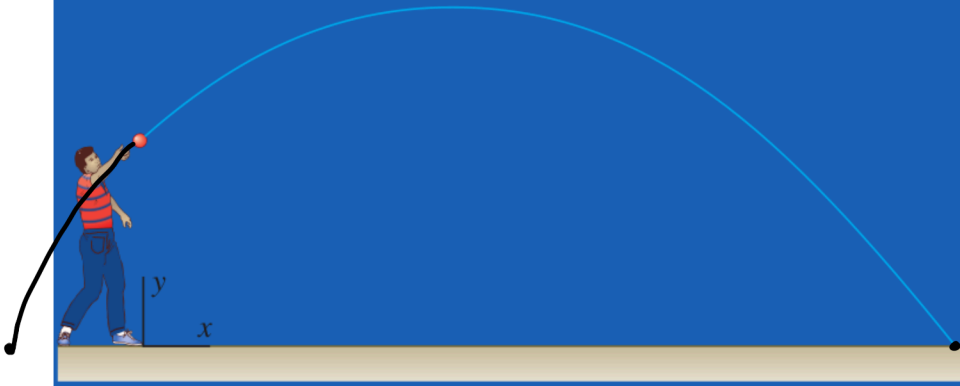


A ball is thrown so that the motion is defined by the equations $x = 5t$ and $y = 2 + 6t - 4.9t^2$, where x and y are expressed in meters and t is expressed in seconds. Determine (a) the velocity at $t = 1$ s, (b) the horizontal distance the ball travels before hitting the ground.



$$\vec{P}(t) = 5t\mathbf{i} + (2 + 6t - 4.9t^2)\mathbf{j}$$

$$\begin{aligned}\vec{V}(t) &= \frac{d\vec{P}(t)}{dt} = 5\mathbf{i} + (6 - 2 \cdot 4.9t)\mathbf{j} \\ &= 5\mathbf{i} + (6 - 9.8t)\mathbf{j}\end{aligned}$$

$$\vec{V}(1\text{s}) = 5\mathbf{i} + (6 - 9.8(1))\mathbf{j}$$

$$\boxed{\vec{V}(1\text{s}) = 5\mathbf{i} - 3.8\mathbf{j} \text{ m/s}}$$

$$2 + 6t - 4.9t^2 = 0$$

$$\frac{-6 \pm \sqrt{6^2 - 4(-4.9)(2)}}{2(-4.9)} = \frac{-6 \pm \sqrt{75.2}}{-9.8} = 1.49, -0.27 = t$$

$$x = 5t$$

$$x = 5 \cdot 1.49 = \boxed{7.49 \text{ m}}$$