

Two Dimensional motion

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Motion in two dimensions: In two dimensions, it is necessary to use vector notation to describe physical quantities with both magnitude and direction. Define displacement, velocity and acceleration as vectors in two dimensions.

The formula for horizontal motion is

$$D = VT$$

The formula for vertical motion is

$$D = \frac{1}{2}at^2$$

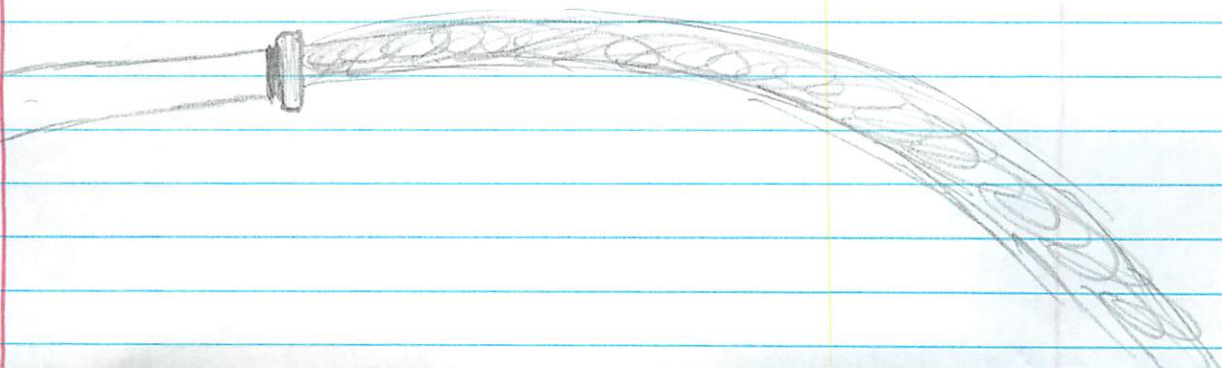
Sample Problem 1. An airplane accelerates down a runway at 3.20 m/s^2 for 32.8 s until it finally lifts off the ground. Determine the distance traveled before takeoff.

$$a = +3.20 \frac{\text{m}}{\text{s}^2} \quad t = 32.8 \text{ s} \quad v_i = 0 \text{ m/s} \quad d = ?$$

$$d = v_i \cdot T + 0.5 \cdot a \cdot T^2$$

$$d = (0 \text{ m/s}) \cdot (32.8 \text{ s}) + 0.5 \cdot (3.20 \text{ m/s}^2) \cdot (32.8 \text{ s})^2$$

$$d = 1720 \text{ m}$$



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$$\begin{aligned}
 & 100 = 100 + 35.8 \cdot 100 \\
 & 100 = 100 + 3580 \\
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