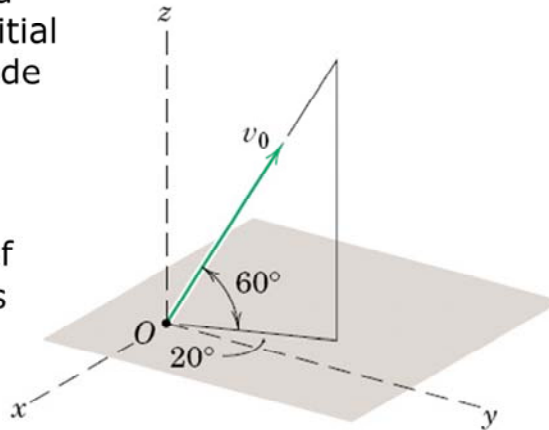


Question of the Day

A projectile launched from point O with initial **velocity** of magnitude of $v_0 = 600$ ft/s.

Compute the **x**-, **y**-, and **z**-components of **velocity** 20 seconds after launch.



ME 231: Dynamics

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$$v_{z_0} = 600 \sin 60^\circ = 520 \text{ ft/sec}$$

$$v_{xy_0} = 600 \cos 60^\circ = 300 \text{ ft/sec}$$

$$v_z = v_{z_0} - gt = 520 - 32.2(20) = \underline{-124.4 \text{ ft/sec}}$$

$$v_{xy} = v_{xy_0} = 300 \text{ ft/sec} = \text{constant}$$

$$v_x = -v_{xy} \sin 20^\circ = -300 \sin 20^\circ = \underline{-102.6 \text{ ft/sec}}$$

$$v_y = v_{xy} \cos 20^\circ = 300 \cos 20^\circ = \underline{282 \text{ ft/sec}}$$

$$d_{xy} = v_{xy} t = 300(20) = 6000 \text{ ft}$$

$$x = -d_{xy} \sin 20^\circ = -6000 \sin 20^\circ = \underline{-2050 \text{ ft}}$$

$$y = d_{xy} \cos 20^\circ = 6000 \cos 20^\circ = \underline{5640 \text{ ft}}$$

$$z = v_{z_0} t - \frac{1}{2} g t^2 = 520(20) - 16.1(20)^2 = \underline{3950 \text{ ft}}$$

$$a_x = a_y = 0, \quad a_z = -g = -32.2 \text{ ft/sec}^2$$