

Acceleration Quiz Review

1. A person is standing at a window 142 m above the ground. Leaning outside she throws her Blackberry® upwards with a velocity of 33 m/s.



a. Calculate the maximum height above the ground of the obsolete Blackberry®.

$$d_0 = 142 \text{ m [up]} \quad d_f = ?$$

$$v_0 = 33 \text{ m/s [up]}$$

$$a = -9.81 \text{ m/s}^2 \text{ [up]}$$

$$v_f = 0 \text{ m/s}$$

$$v_f^2 = v_0^2 + 2a(d_f - d_0)$$

$$0^2 = (33)^2 + (2)(-9.81)(d_f - 142)$$

$$0 = 1089 - 19.62(d_f - 142)$$

$$0 = 1089 - 19.62d_f + 2786$$

$$-3875 = -19.62d_f$$

$$\rightarrow \frac{-3875}{-19.62} = d_f$$

$$197 \text{ m} = d_f$$

b. Calculate the length of time for the phone to be traveling downward with a speed of 55 m/s.

$$d_0 = 142 \text{ m [up]}$$

$$a = \frac{v_f - v_0}{t}$$

$$a = -9.81 \text{ m/s}^2 \text{ [up]}$$

$$v_0 = 33 \text{ m/s [up]}$$

$$-9.81 = \frac{-55 - 33}{t}$$

$$v_f = -55 \text{ m/s [up]}$$

$$t = ?$$

$$-9.81t = -88$$

$$t = \frac{-88}{-9.81}$$

$$t = 9.0 \text{ s}$$

c. Calculate the velocity of the Blackberry® when it is 25 m above the ground.

$$d_f = 25 \text{ m [up]} \quad a = -9.81 \text{ m/s}^2 \text{ [up]}$$

$$d_o = 142 \text{ m [up]} \quad v_f = ?$$

$$v_o = 33 \text{ m/s [up]}$$

$$v_f^2 = v_o^2 + 2a(d_f - d_o)$$

$$v_f^2 = (33)^2 + 2(-9.81)(25 - 142)$$

$$v_f^2 = 1089 - 19.62(-117)$$

$$v_f^2 = 1089 + 2295$$

$$v_f^2 = 3384$$

$$v_f = \pm \sqrt{3384}$$

$$v_f = -58 \text{ m/s}$$

downward

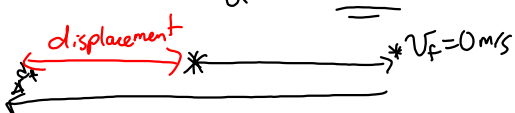
2. A fighter jet initially flying 175 m/s [E] accelerations to 315 m/s [W]. This happens in 27 seconds. Calculate the distance traveled by the plane in that time.

$$v_0 = 175 \text{ m/s [E]} \quad \text{Find acceleration}$$

$$v_f = -315 \text{ [E]}$$

$$t = 27 \text{ s} \quad a = \frac{v_f - v_0}{t}$$

$$= \frac{-315 - 175}{27}$$

$$a = -18.1 \text{ m/s}^2$$


A horizontal line with an arrow pointing right labeled v_0 and an arrow pointing left labeled $v_f = 0 \text{ m/s}$. A red double-headed arrow above the line is labeled "displacement".

Dist East

$$d_f = ? \quad v_f = 0 \text{ m/s}$$

$$d_0 = 0$$

$$v_f^2 = v_0^2 + 2a(d_f - d_0)$$

$$0^2 = (175)^2 + 2(-18.1)(d_f)$$

$$0 = 30625 - 36.2d_f$$

$$\frac{-30625}{-36.1} = d_f$$

$$846 \text{ m} = d_f$$

↑
East

Dist West $v_f^2 = v_0^2 + 2a(d_f - d_0)$

$$d_0 = 0 \text{ m}$$

$$d_f = ?$$

$$v_0 = 0 \text{ m/s}$$

$$v_f = -315 \text{ m/s}$$

$$(-315)^2 = 0 + 2(-18.1)d_f$$

$$99225 = -36.2d_f$$

$$\frac{-99225}{-36.2} = d_f$$

west

$$d = |\text{East}| + |\text{West}|$$

$$= 846 \text{ m} + 2741$$

$$\boxed{\text{dist} = 3587 \text{ m}}$$

Attachments

moving-man_all.jar