

Answers

Acceleration Quiz Review



1. $v_0 = 33 \text{ m/s}$
 $a = -9.81 \text{ m/s}^2$
 $d_0 = 142 \text{ m}$
 $v_f = 0$

a)

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

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

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

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

$$0 = 3875 + -19.62d_f - 3875$$

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

$$198 \text{ m} = d_f$$

b) $t = ?$

$v_f = -55 \text{ m/s}$
 $v_0 = 33 \text{ m/s}$
 $a = -9.81 \text{ m/s}^2$

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

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

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

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

$$t = 8.975$$

c) $v_f = ?$

$v_0 = 33 \text{ m/s}$
 $d_0 = 142 \text{ m}$
 $d_f = 25 \text{ m}$
 $a = -9.81 \text{ m/s}^2$

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

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

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

$$v_f^2 = 1089 + 2296$$

$$v_f^2 = 3385$$

$$v_f = 58.2 \text{ m/s}$$

$$2. \quad v_0 = 175 \text{ m/s [E]}$$

$$v_f = 315 \text{ m/s [W]} (-315)$$

$$a = 15 \text{ m/s}^2 \text{ [W]} (-15)$$

distance east

$$v_0 = 175$$

$$v_f = 0$$

$$a = -15$$

$$d_0 = 0$$

$$d_f = ?$$

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

$$0^2 = (175)^2 + 2(-15)(d_f - 0)$$

$$0 = 30625 - 30d_f - 30625$$

$$\frac{-30625}{-30} = \frac{-30d_f}{-30}$$

$$1021 \text{ m} = d_f$$

distance west

$$v_0 = 0$$

$$v_f = -315$$

$$a = -15$$

$$d_0 = 0$$

$$d_f = ?$$

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

$$(-315)^2 = 0^2 + 2(-15)(d_f - 0)$$

$$99225 = 0 + (-30)(d_f)$$

$$\frac{99225}{-30} = \frac{-30d_f}{-30}$$

$$-3308 \text{ m} = d_f$$

$$\text{total} = 1021 + 3308$$

$$= 4329 \text{ m}$$

$$3. v_0 = 120 \text{ km/h [E]}$$

$$a = -5.6 \text{ m/s}^2$$

$$v_f = 90 \text{ km/h [E]}$$

$$t = ?$$

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

$$-5.6 = \frac{90 - 120}{t}$$

$$-5.6t = \frac{-30}{t}$$

$$\frac{-5.6t}{-5.6} = \frac{-30}{-5.6}$$

$$t = 5.4 \text{ s}$$

4.



$$v_0 = 25 \text{ m/s (up)}$$

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

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

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

$$t = ?$$

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

$$-9.81 = \frac{0 - 25}{t}$$

$$-9.81t = \frac{-25}{t}$$

$$\frac{-9.81t}{-9.81} = \frac{-25}{-9.81}$$

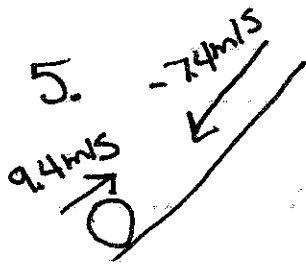
$$t = 2.5 \text{ s}$$

$$b) d_f = d_0 + v_0 t + \frac{1}{2} a t^2$$

$$d_f = 0 + (25)(2.5) + \frac{1}{2}(-9.81)(2.5)^2$$

$$d_f = 0 + 62.5 + -30.7$$

$$d_f = 31.8 \text{ m}$$



$$v_f = -7.4 \text{ m/s}$$

$$v_0 = 9.4 \text{ m/s}$$

$$a = ? \text{ (Find 1st)}$$

$$d = ?$$

$$t = 3.0 \text{ s}$$

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

$$a = \frac{-7.4 - 9.4}{3.0}$$

$$a = \frac{-16.8}{3.0}$$

$$a = -5.6 \text{ m/s}^2$$

now find d

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

$$-88.36 + 54.76 = (-7.4)^2 = (9.4)^2 + 2(-5.6)(d_f - 0)$$

$$\frac{-33.6}{-11.2} = \frac{-11.2 d_f}{-11.2}$$

$$3 \text{ m} = d_f$$

6. $d_f = 2.62 \text{ m}$

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

$$v_0 = ?$$

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

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

$$0^2 = v_0^2 + 2(-9.81)(2.62 - 0)$$

$$0 = v_0^2 + -51.40 + 51.40$$

$$\frac{51.40}{1} = v_0^2$$

$$\sqrt{51.40} = v_0$$

$$7.2 \text{ m/s} = v_0$$

7. $a = -3.90 \text{ m/s}^2$

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

$$d_f = 290 \text{ m}$$

$$v_0 = ?$$

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

$$(0)^2 = v_0^2 + 2(-3.90)(290 - 0)$$

$$0 = v_0^2 + -2262$$

$$\frac{2262}{1} = v_0^2$$

$$\sqrt{2262} = v_0$$

$$47.5 \text{ m/s} = v_0$$

$$8. \quad v_0 = 85 \text{ km/h [E]}$$

$$v_f = 110 \text{ km/h [W]}$$

$$t = 45 \text{ s}$$

$$a = \frac{v_f - v_0}{t} = \frac{-110 - 85}{45} = -4.33 \text{ km/h/s [E]}$$

distance east

$$v_0 = 85 \text{ km/h}$$

$$v_f = 0$$

$$a = -4.33 \text{ km/h/s}$$

$$d_0 = 0$$

$$d_f = ?$$

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

$$(0)^2 = (85)^2 + 2(-4.33)(d_f - 0)$$

$$-7225 = 7225 - 8.66 d_f - 7225$$

$$\frac{-7225}{-8.66} = \frac{-8.66 d_f}{-8.66}$$

$$834 \text{ m} = d_f$$

distance west

$$v_0 = 0$$

$$v_f = -110$$

$$a = -4.33$$

$$d_0 = 0$$

$$d_f = ?$$

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

$$(-110)^2 = (0)^2 + 2(-4.33)(d_f - 0)$$

$$12100 = 0 - 8.66 d_f$$

$$\frac{12100}{-8.66} = \frac{-8.66 d_f}{-8.66}$$

$$-1397 \text{ m} = d_f$$

direction does not matter w distance

$$d_{\text{total}} = 834 + 1397$$

$$= 2231 \text{ m}$$