

2F Solutions page 64 Falling Objects

#1

$$\Delta y = 239\text{m}$$

$$a = -3.7\text{m/s}^2$$

$$V_f = ?$$

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

$$\Delta t = ?$$

$$a) V_f^2 = V_i^2 + 2a(\Delta y)$$

$$V_f^2 = 0 + 2(-3.7\text{m/s}^2)(-239\text{m})$$

$$V_f^2 = 1768.6\text{m}^2/\text{s}^2$$

$$\sqrt{V_f^2} = \sqrt{1768.6\text{m}^2/\text{s}^2}$$

$$[V_f = 42.1\text{m/s}]$$

* Δy is neg.

because
~~of~~ object
is moving
South.

← Square
root

$$b) \Delta y = V_i(\Delta t) + \frac{1}{2} a (\Delta t)^2$$

$$-239\text{m} = 0 + \frac{1}{2} (-3.7\text{m/s}^2) (\Delta t)^2$$

$$-239\text{m} = -1.85\text{m/s}^2 (\Delta t)^2$$

$$129.19\text{m}^2/\text{s}^2 = (\Delta t)^2 \quad \leftarrow \text{Square Root}$$

$$\sqrt{129.19\text{m}^2/\text{s}^2} = \sqrt{(\Delta t)^2}$$

$$[\Delta t = 11.4\text{sec}]$$

* Δy is
neg. moving
south.

#2) $\Delta y = -25\text{m}$

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

$v_f = ?$

$a = -9.8\text{m/s}^2$

$\Delta t = ?$

$v_f^2 = v_i^2 + 2a(\Delta y)$

$v_f^2 = 0 + 2(-9.8\text{m/s}^2)(-25\text{m})$

$v_f^2 = 490\text{m}^2/\text{s}^2$

$[v_f = 22.1\text{m/s}]$

$\Delta y = v_i(\Delta t) + \frac{1}{2}a(\Delta t)^2$

$-25\text{m} = 0 + \frac{1}{2}(-9.8\text{m/s}^2)(\Delta t)^2$

$-25\text{m} = -4.9\text{m/s}^2(\Delta t)^2$

$5.1\text{m/s}^2 = (\Delta t)^2 \quad \checkmark \text{ square root}$

$[\Delta t = 2.26\text{s}]$

2F solutions page 64 Falling Objects

#3. a) $v_i = 8 \text{ m/s}$

$v_f = ?$

$a = -9.8 \text{ m/s}^2$

$\Delta y = 0 \text{ m}$

$$v_f^2 = v_i^2 + 2 a (\Delta y)$$

$$v_f^2 = (8 \text{ m/s})^2 + 2 (-9.8 \text{ m/s}^2)(0 \text{ m})$$

$$v_f^2 = 64 \text{ m}^2/\text{s}^2 + 0 \quad \checkmark \text{ Square root}$$

$$\sqrt{v_f^2} = \sqrt{64 \text{ m}^2/\text{s}^2}$$

$$[v_f = \pm 8 \text{ m/s}]$$

b)

~~$$v_f = v_i + a (\Delta y)$$~~

$$v_f = v_i + a (\Delta t)$$

$$-8 \text{ m/s} = 8 \text{ m/s} + -9.8 \text{ m/s}^2 (\Delta t)$$

$$-16 \text{ m/s} = -9.8 \text{ m/s}^2 (\Delta t)$$

$$[1.63 \text{ s} = \Delta t]$$