

Freefall Examples

1. An object is thrown up 25 m/s. How high up does it go?
On the diagram at the right, this example is from A to C.

Variables:

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

$$V_i = 25 \text{ m/s}$$

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

$$\Delta y = \text{_____}$$

Equation:

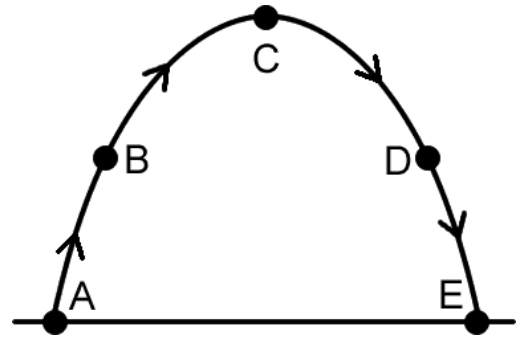
$$v_f^2 = v_i^2 + 2a\Delta y$$

$$0^2 = 25^2 + 2(-9.8)\Delta y$$

$$0 = 625 - 19.6\Delta y$$

$$-625 = -19.6\Delta y$$

$$31.9 \text{ m} = \Delta y$$



2. An object is dropped from 18 m. How long does it take for it to hit the ground? *On the diagram: from C to E.*

Variables:

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

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

$$\Delta y = -18 \text{ m}$$

$$t = \text{_____}$$

Equation:

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

$$-18 = 0t + \frac{1}{2}(-9.8)t^2$$

$$-18 = 0 - 4.9t^2$$

$$\frac{-18}{-4.9} = t^2$$

$$t^2 = 3.67$$

$$t = 1.9 \text{ sec}$$

3. An object is thrown up 30 m/s. How much time does it take for it to get back to the ground? *On diagram: from A to E.*

Variables:

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

$$V_i = 30 \text{ m/s}$$

$$V_f = -30 \text{ m/s}$$

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

$$t = \text{_____}$$

Equation:

(Since you have all 5 variables you can use any equation, so use the easiest one)

$$v_f = v_i + at$$

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$$-30 = 30 - 9.8t$$

$$-60 = -9.8t$$

$$\frac{-60}{-9.8} = t$$

$$t = 6.1 \text{ sec}$$