

A rock is thrown up from the edge of a 275 m high cliff at 25.4 m/s. (a) What is its final velocity when it hits at the base of the cliff? (b) How long is it in the air? (A diagram will help.)

$$\Delta y = -275 \text{ m}$$

$$v_{yi} = 25.4 \frac{\text{m}}{\text{s}}$$

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

$$v_{yf} = \underline{\hspace{1cm}} \frac{\text{m}}{\text{s}}$$

$$t = \underline{\hspace{1cm}} \text{ s}$$

$$v_{fy}^2 = v_{iy}^2 + 2a\Delta y$$

$$v_{fy} = \sqrt{(25.4 \frac{\text{m}}{\text{s}})^2 + 2(-9.8 \frac{\text{m}}{\text{s}^2})(-275 \text{ m})}$$

$$\text{a) } \boxed{v_{fy} = -77.7 \frac{\text{m}}{\text{s}}}$$

$$v_{fy} = v_{iy} + at$$

$$t = \frac{v_{fy} - v_{iy}}{a}$$

$$= \frac{-77.7 \frac{\text{m}}{\text{s}} - 25.4 \frac{\text{m}}{\text{s}}}{-9.8 \frac{\text{m}}{\text{s}^2}}$$

$$\text{b) } \boxed{t = 10.5 \text{ s}}$$

A rock is thrown down from the edge of a 165 m high cliff at 35.2 m/s. (a) What is its final velocity when it hits at the base of the cliff? (b) How long is it in the air? (A diagram will help.)

$$\Delta y = -165 \text{ m}$$

$$v_{yi} = -35.2 \frac{\text{m}}{\text{s}}$$

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

$$v_{yf} = \underline{\hspace{1cm}} \frac{\text{m}}{\text{s}}$$

$$t = \underline{\hspace{1cm}} \text{ s}$$

$$v_{fy}^2 = v_{iy}^2 + 2a\Delta y$$

$$v_{fy} = \sqrt{(35.2 \frac{\text{m}}{\text{s}})^2 + 2(-9.8 \frac{\text{m}}{\text{s}^2})(-165 \text{ m})}$$

$$\text{a) } \boxed{v_{fy} = -66.9 \frac{\text{m}}{\text{s}}}$$

$$v_{fy} = v_{iy} + at$$

$$t = \frac{v_{fy} - v_{iy}}{a}$$

$$= \frac{-66.9 \frac{\text{m}}{\text{s}} - (-35.2 \frac{\text{m}}{\text{s}})}{-9.8 \frac{\text{m}}{\text{s}^2}}$$

$$\text{b) } \boxed{t = 3.23 \text{ s}}$$

