

(12)

Kinematics

3.12 A stone is thrown vertically upwards with a velocity of 20 ms^{-1} . Find the maximum height reached by the stone and the total time of flight.

DATA:

Initial velocity = 20 ms^{-1}

Final velocity = 0 ms^{-1}

Gravity = $g = -10 \text{ ms}^{-2}$ (thrown upward)

(a) Height = ?

(b) Time = ?

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SOLUTION:

(a) For height :-

$$2gh = v_f^2 - v_i^2$$

$$h = \frac{v_f^2 - v_i^2}{2g}$$

$$h = \frac{(0)^2 - (20)^2}{2(-10)}$$

$$h = \frac{-400}{-20}$$

$$h = 20 \text{ m}$$

(b) For time

$$v_f = v_i + gt$$

$$0 = 20 + (10)t$$

$$(10)t = -20$$

$$t = \frac{-20}{10}$$

$$t = -2$$

$$t = 2$$

$$\text{Total } t = 2 + 2$$

$$\text{Total } t = 4 \text{ secs}$$