

# Home Work

4) A ball is thrown upward with an initial velocity of  $10.0 \text{ m/s}$  from the top of a  $50.0 \text{ m}$  tall building.

a) With what velocity will the ball strike the ground? ( $y$  is the displacement)

$$v^2 = v_0^2 - 2gy$$

$$\Rightarrow v^2 = (+10.0 \text{ m/s})^2 - 2(9.80 \text{ m/s}^2)(-50.0 \text{ m})$$

$$\Rightarrow v^2 = 1.08 \times 10^3 \text{ m}^2/\text{s}^2$$

$$\Rightarrow v = \sqrt{1.08 \times 10^3 \text{ m}^2/\text{s}^2}$$

$$\Rightarrow v = \pm 32.9 \text{ m/s}$$

$$\Rightarrow v = -32.9 \text{ m/s}$$

b) How long does it take the ball to strike the ground?

From  $v = v_0 - gt$ , we have

$$t = \frac{v_0 - v}{g} = \frac{[(+10.0 \text{ m/s}) - (-32.9 \text{ m/s})]}{9.8 \text{ m/s}^2}$$

$$= \frac{42.9 \text{ m/s}}{9.8 \text{ m/s}^2} = 4.388$$

2) A stone is dropped freely in the river from a bridge. It takes 5 s to touch the water surface in the river. Calculate:

1) the height of the bridge from the water level.

$$u = 0$$

$$g = 9.8 \text{ ms}^{-2}$$

$$t = 5 \text{ s}$$

From equation of motion,  $h = ut + \frac{1}{2}gt^2$

$$\Rightarrow h = 0 \times 5 + \frac{1}{2} \times 9.8 \times (5)^2$$

$$= 9.8 \times \frac{25}{2} = 122.5 \text{ m.}$$

2) <sup>the</sup> Distance covered by stone in the last second  
( $g = 9.8 \text{ ms}^{-2}$ )

Distance covered in last second,  ~~$s(t) = u + \frac{g}{2}(2t)$~~

$$s(t) = u + \frac{g}{2}(2t-1)$$

$$= 0 + \frac{1}{2} \times 9.8(2 \times 5 - 1)$$

$$= 44.1 \text{ m.}$$