A model rocket with a mass of 1.4kg is launched straight up at a speed of 43m/s.

4. What is its potential energy at the maximum height? 5. What is the rocket's maximum height? 6. What is the rocket's speed at a height of 47.17m?

Solution:

Let:

$m = 1.4\ kg$

$v_0 = 43\ m/s$

$h = 47.17\ m$

$E_p - ?$

$H - ?$

$v_h - ?$

$E_p = mgH,\ were\ g = 9.8\ m/s^2\ gravitational\ acceleration$

$H = \frac{1}{2}gt^2, v = gt => t = \frac{v}{g}$

$$\boldsymbol{H = \frac{v^2}{2g}}$$

$$\boldsymbol{H = \frac{43^2}{2*9.8} = 94.34\ m}$$

$$\boldsymbol{E_p = 1.4 * 9.8 * 94.34 = 1294.35\ J}$$

$$\boldsymbol{v = v_0 - gt, t = \sqrt{\frac{2h}{g}} =>}$$

$$\boldsymbol{v = v_0 - \sqrt{2gh}}$$

$$\boldsymbol{v_h = 43 - \sqrt{2 * 9.8 * 47.17} = 12.6\ m/s}$$

Answer: $E_p = 1294.35\ J,\ H = 94.34\ m,\ v_h = 12.6\ m/s.$