

Homework #2 Answers

1. Ball on planet

$$v_o = \sqrt{2aH} = 20 \text{ m/s}$$

$$t = \sqrt{\frac{2H}{a}} = 2.5 \text{ s}$$

2. Dragon rider

$$h = \frac{v_0^2}{2g} + H = 31.8 \text{ m}$$

$$t = \frac{v_0}{g} + \sqrt{\left(\frac{v_0}{g}\right)^2 + \frac{2H}{g}} = 3.2 \text{ s}$$

$$v_y = -\sqrt{v_0^2 + 2gH} = -25 \text{ m/s}$$

3. Car and truck

$$t = \frac{2v_c}{a_T}$$

$$x = \frac{2v_c^2}{a_T}$$

$$v_T = 2v_c$$

4. Helicopter

$$v_1 = a_1 t_1 = 50 \frac{\text{m}}{\text{s}}$$

$$h = \frac{1}{2} a_1 t_1^2$$

$$H = h + \frac{v_1^2}{2g} = \frac{1}{2} a_1 t_1^2 + \frac{(a_1 t_1)^2}{2g} = 378 \text{ m}$$