

(Frameworks Code)

Solve the following problems. Use the correct problem set-up.

Weight Problems:

$$W = m a_g$$

$$V_f = A_g \cdot T$$

1. A car has a weight of 2300 N on Earth. What is its mass?

Given:  
 $W = 2300 \text{ N}$   
 $m = ?$   
 $a_g = 9.8 \text{ m/s}^2$

Soln:  $W = m a_g$   
 $m = \frac{W}{a_g}$

$$m = \frac{2300 \text{ N}}{9.8 \text{ m/s}^2}$$

$$m = 234.7 \text{ Kg}$$

2. What is the weight of a 75 kg rock on Earth?

Given:  
 $W = ?$   
 $m = 75 \text{ Kg}$   
 $a_g = 9.8 \text{ m/s}^2$

Soln:  $W = m a_g$   
 $= (75 \text{ Kg})(9.8 \text{ m/s}^2)$

$$W = 735 \text{ N}$$

3. What is the weight of the same rock as in the previous question if it were on the moon? Remember the acceleration due to gravity on the moon is 1/6 of that on Earth.

Given:  
 $W = ?$   
 $m = 75 \text{ Kg}$   
 $a_g = 1.6 \text{ m/s}^2$

Soln:  $W = m a_g$   
 $= (75 \text{ Kg})(1.6 \text{ m/s}^2)$  or  $(735 \text{ N})(\frac{1}{6})$   
 $= 120 \text{ N}$

$$W = 120 \text{ N}$$

4. What is the acceleration due to gravity on Jupiter if a 55 kg object has a weight of 1401.4 N?

Given:  
 $a = ?$   
 $m = 55 \text{ Kg}$   
 $W = 1401.4 \text{ N}$

Soln:  $W = m a_g$   
 $a_g = \frac{W}{m}$

$$a_g = \frac{1401.4 \text{ N}}{55 \text{ Kg}}$$

$$a_g = 25.5 \text{ m/s}^2$$

5. How much does a 33.5 kg object weigh on Earth?

Given:  
 $W = ?$   
 $m = 33.5 \text{ Kg}$   
 $a_g = 9.8 \text{ m/s}^2$

Soln:  $W = m a_g$   
 $= (33.5 \text{ Kg})(9.8 \text{ m/s}^2)$

$$W = 328.3 \text{ N}$$

Free Falling Problems:

6. Find the final velocity of a free falling object after it has been accelerating for 12 seconds.

Given:  
 $V_f = ?$   
 $a_g = 9.8 \text{ m/s}^2$   
 $t = 12 \text{ sec}$

Soln:  $V_f = A_g \cdot T$   
 $= (9.8 \text{ m/s}^2)(12 \text{ sec})$

$$V_f = 117.6 \text{ m/s}$$

7. How long will it take a free falling object to reach a speed of 63.5 m/s?

Given:  
 $t = ?$   
 $a_g = 9.8 \text{ m/s}^2$   
 $V_f = 63.5 \text{ m/s}$

Soln:  $V_f = a_g \cdot T$   
 $t = \frac{V_f}{a_g}$   
 $t = \frac{63.5 \text{ m/s}}{9.8 \text{ m/s}^2}$

$$t = 6.5 \text{ s}$$

8. A rock is dropped off of a tower and is in free fall for 5.5 s. How fast was it moving as it hit the ground?

Given:  
 $a_g = 9.8 \text{ m/s}^2$   
 $V_f = ?$   
 $t = 5.5 \text{ s}$

Soln:  $V_f = A_g \cdot T$   
 $= (9.8 \text{ m/s}^2)(5.5 \text{ s})$

$$V_f = 53.9 \text{ m/s}$$

9. Find the acceleration of a free falling object if it reaches a final velocity of 49 m/s in 5 s.

Given:  
 $a = ?$   
 $V_f = 49 \text{ m/s}$   
 $t = 5 \text{ s}$

Soln:  $V_f = a_g \cdot T$   
 $a_g = \frac{V_f}{T}$   
 $a_g = \frac{49 \text{ m/s}}{5 \text{ s}}$

$$a_g = 9.8 \text{ m/s}^2$$

10. A water balloon was dropped out of a hot air balloon. How long does it take to reach a speed of 25 m/s?

Given:  
 $V_f = 25 \text{ m/s}$   
 $a_g = 9.8 \text{ m/s}^2$   
 $t = ?$

Soln:  $V_f = a_g \cdot T$   
 $T = \frac{V_f}{a_g}$   
 $T = \frac{25 \text{ m/s}}{9.8 \text{ m/s}^2}$

$$T = 2.65$$