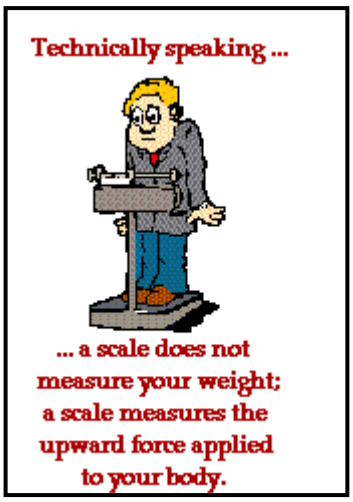
Grade 8 Natural Science Worksheet

Weight and Mass

The earth attracts all objects with a mass towards the centre of the earth. Mass is defined as the amount of matter a substance is made of. When we stand on the bathroom scale we are actually determining our mass (measured in kilograms, kg) and not our weight. Weight can be defined as the force with which are bodies are attracted to the earth. This force is called the force of gravity and is measured in newtons (N) after Sir Isaac Newton. We can calculate our weight since we know that on earth all bodies experience an acceleration due to gravity (g) of approximately 10 $m.s^{-2}$. This value changes on different planets as it is dependent on the mass and size of the planet.



The following formula can be used to calculate weight:

$F_G = m \times g$

- F_G: weight (N)
- m: mass (kg)
- g: acceleration due to gravity

Answer the following questions and show all calculations:

A man stands on the bathroom scale and the reading is 85 kg.

1. What is this man's mass? [2]
2. What is this man's weight? [4]

This man then climbs in a space shuttle and arrives at Planet Arariuna, where the acceleration due to gravity is half that of the earth's.

3. What is the man's mass on this planet? [2]

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4. What is the man's weight on this planet? [4]

The man meets an alien on the planet and invites him to come back with him to visit earth. The only problem is that the space shuttle has mass restrictions. The maximum load that the shuttle can carry (man + alien) is 100 kg. The alien looks pretty small so it doesn't seem to be a problem but they determine the weight of the alien to be 50 N.

5. Will the alien be able to go to earth in the space shuttle? [8]

[20 marks]

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Suggested Solutions

Question number	Possible marks	Solution
1	2	85✓kg✓
2	4	F_G = m x g ✓ F_G = 85 x 10 ✓ ✓ F_G = 850 N ✓
3	2	mass = 85 kg ✓✓
4	4	F_G = m x g ✓ F_G = 85 x 5 ✓✓ F_G = 425 N ✓
5	8	F_G = m x g ✓ 50 = m x 5 ✓✓ m = 10 kg ✓ Total mass = 85 kg + 10 kg ✓ = 95 kg ✓✓ Yes, the alien will be able to visit earth, as the total combined mass is less than 100 kg. ✓