

## UNIT 4

## MASS, WEIGHT AND GRAVITY.

### Activities

1.- Calculate the gravitational force with which two objects of 1 000 kg and 5 000 kg separated by a distance of 1 m attract each other.

2.- Calculate the gravitational force with which the Earth attracts a person of 50 kg.

3.- What is the value of the acceleration due to gravity,  $g$ , on the Moon if its mass is  $7.2 \times 10^{22}$  kg and its radius is 1738 km? Will an object fall faster or slower than on Earth?

4.- Ask and answer the following questions with a partner.

- If a woman had a mass of 60 kg, what would her mass on the Moon be? (gravity of the Moon is  $1.67 \text{ m/s}^2$ )
- What would the same woman's weight be on the Moon in N and in kp?
- What would be the mass of an object that weighs 1 N on Earth?
- What would the same object's weight be on Mars? (gravity on Mars is  $4.8 \text{ m/s}^2$ )

5.-  Listen and repeat.

- $g = 9.8 \text{ m/s}^2$
- Weight = mass x gravitational acceleration
- 9.8 newtons = 1 kilopond

6.-  Listen, repeat and underline the stress in your exercise book.

*Kilogram-force      kilopond      newton      gravitational acceleration      instantaneous*

7.-  Are the following sentences true or false? Listen and check.

- If we multiply a mass in kg by an acceleration of gravity in  $\text{m/s}^2$ , the result is a weight in N.
- A person who has a mass of 50 kg, weight 50 kp on Earth.
- An astronaut weighs less on the Moon because she has lost weight during the trip.
- A dynamometer and a balance (or a scales) are used to measure mass.
- When we say that an object weighs 30 kg we are referring to its mass not its weight.

8.- Are the following sentences true or false. Explain your answers in your exercise book.

- To change from newtons into kiloponds you have to divide by 9.8.
- One newton is the weight on Earth of an object with a mass of 102 g.
- The Earth attracts all objects to its surface with the same force regardless of their mass.
- The Earth transmits the same acceleration to all the objects on its surface regardless of their mass.