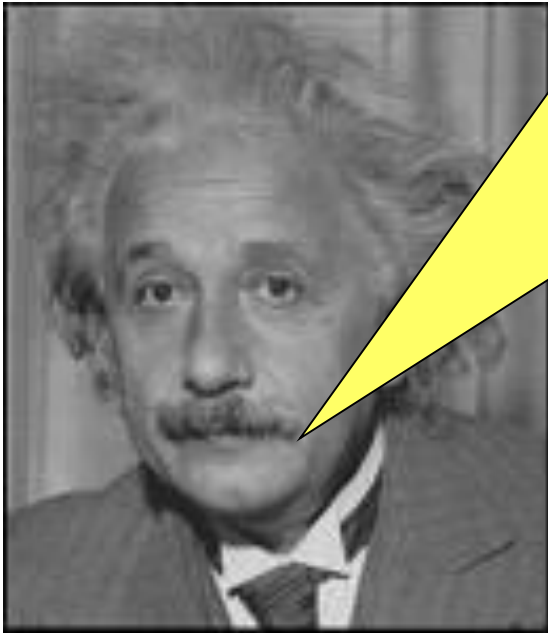


Do now!

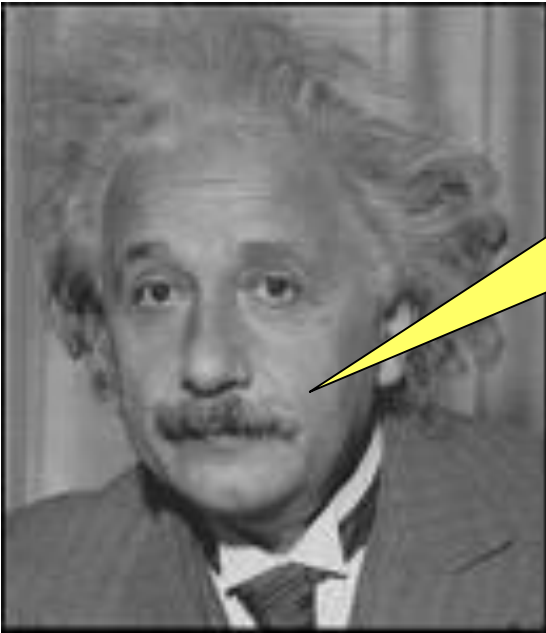


Can you continue the questions we started last lesson? (Don't forget to stick the sheets in too)

Can you also write your name in your textbook (in pen)?

Do now!

On each table are a list of statements about gravity. In your groups can you decide which are true and which are false?



True or false?

- If the earth stopped spinning we would float into space.
- There is no gravity on the moon.
- NASA have an anti-gravity room where gravity can be turned off and people can float.
- It is possible to shield the force of gravity by using lead or other materials.
- Isaac Newton discovered gravity.
- Nottingham Forest won the Champions league in 1979 and 1980.
- You have no mass in space.
- There is no gravity in space because you are far from the earth.
- Weight is measured in kilograms.
- There is no gravity in space because space is a vacuum.
- If we could suck all the air out of the classroom, we would float around.

All false!

Only this one is true!

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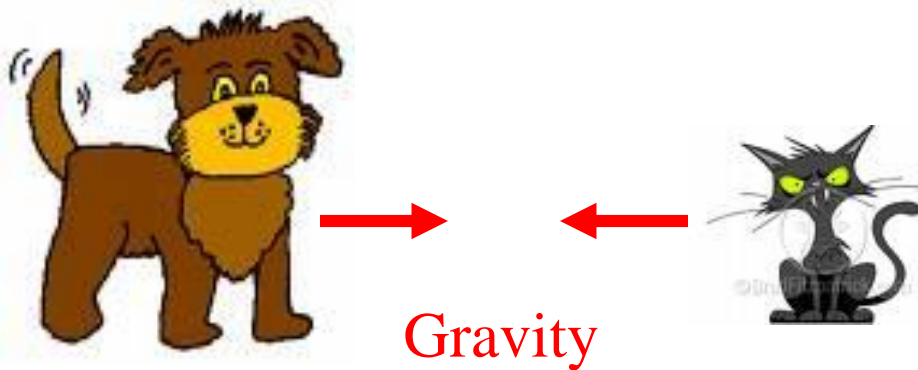
Gravity

What is gravity?



Gravity

Gravity is a force between ALL objects!



Gravity

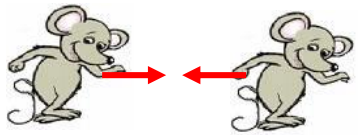
Gravity is a very weak force.



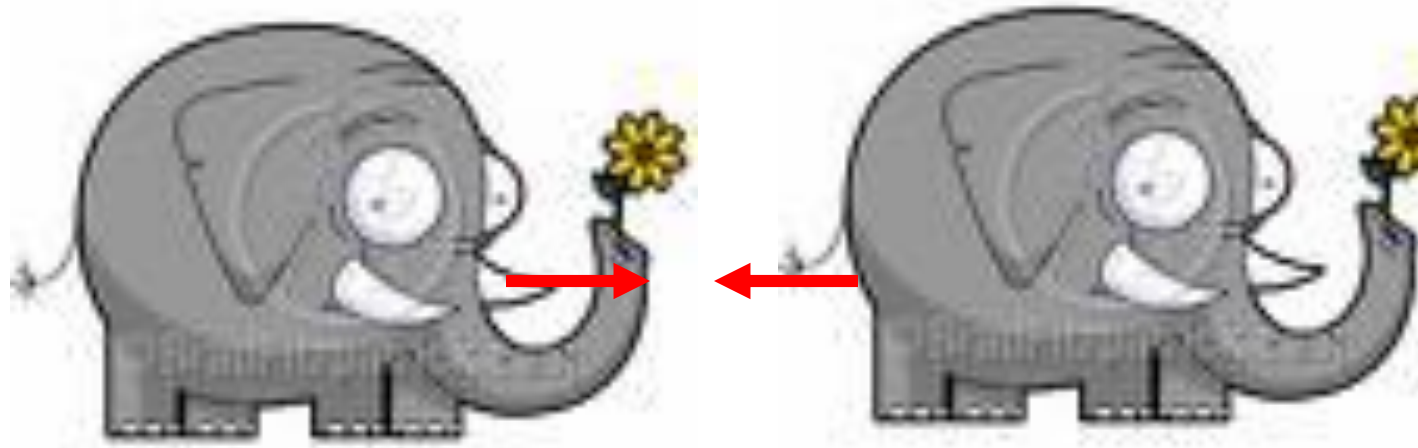
The force of gravitational attraction between Mr Porter and his wife (when 1 metre apart) is only around 0.0000004 Newtons!

Gravity

The size of the force depends on the mass of the objects. The bigger they are, the bigger the force!



Small attractive force



Bigger attractive force

Gravity

The size of the force also depends on the distance between the objects.



Gravity

We only really notice the gravitational attraction to big objects!



Hola! ¿Como estas?

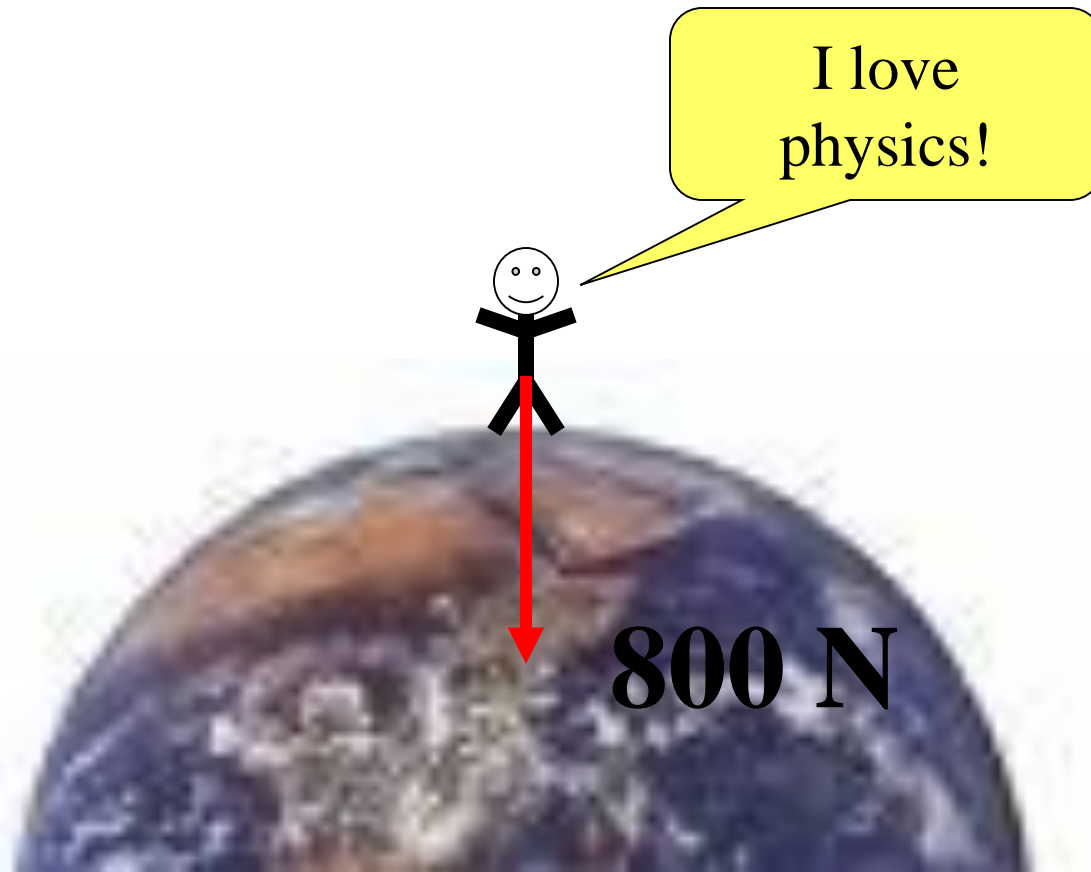
Gravity

The **force** of gravity on something is called its **weight**. Because it is a **force** it is measured in **Newtons**.



Gravity

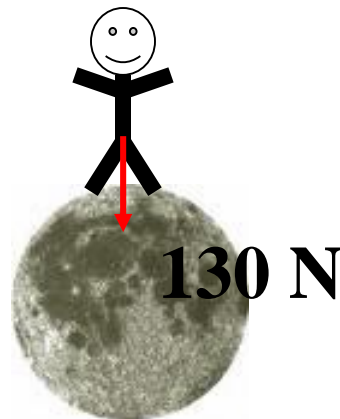
On the earth, Mr Porter's weight is around 800 N.



Gravity

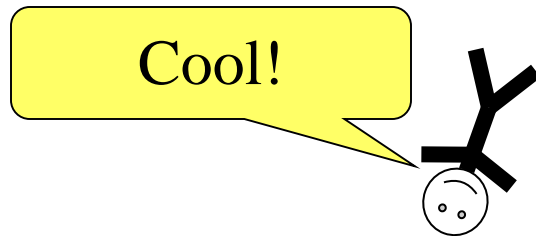
On the moon, his weight is around 130 N.

Why?



Gravity

In deep space, far away from any planets or stars his weight is almost zero. (He is weightless). Why?



Mass

Mass is a measure of the amount of material an object is made of. It is measured in **kilograms**.



Mass

Mr Porter has a mass of around 77 kg. This means he is made of 77 kg of blood, bones, hair and poo!



77kg

Mass

On the moon, Mr Porter hasn't changed (he's still Mr Porter!). That means he still is made of 77 kg of blood, bones, hair and poo!



Gravity

In deep space, Mr Porter still hasn't changed (he's still Mr Porter!). That means he still is made of 77 kg of blood, bones, hair and poo!

I feel sick!



77kg

Mass and weight

Mass is a measure of the amount of material an object is made of. It is measured in kilograms.



Weight is the force of gravity on an object. It is measured in Newtons.



Calculating weight

The force of gravity on one kilogram is called the **gravitational field strength**. It is measured in **Newtons per kilogram (N/kg)**

Calculating weight

To calculate the weight of an object you multiply the object's **mass** by the **gravitational field strength** wherever you are.

$$\text{Weight (N)} = \text{mass (kg)} \times \text{gravitational field strength (N/kg)}$$

Example

The gravitational field strength on earth is around 10 N/kg. What is your weight if your mass is 45 kg?

Weight (N) = mass (kg) x gravitational field strength (N/kg)

Weight (N) = 45 kg x 10 N/kg

Weight = 450 N

