

## **Space revision notes**

### **The Big Bang theory**

This theory gives an explanation of how the Universe began around 14 billion years ago –

- All the matter and energy in the Universe was concentrated in one tiny location. This made it extremely dense and extremely hot.
- This speck of matter became unstable and started to expand very rapidly.
- As the matter expanded it cooled, and it started to become organised into neutrons and protons which would form the first chemicals – helium and hydrogen.
- The matter started to come together due to gravity forming stars and galaxies.
- When more complex chemicals arose, planets and moons started to form.
- The Universe is still expanding and may go on doing so for ever.

### **Organisation**

- All the matter and energy we know of makes up the Universe.
- The Universe is organised into millions of galaxies. Our galaxy is the Milky Way.
- Each galaxy is made up of millions of stars.
- Some stars have planets orbiting them.
- Our star is Sol, the sun. The sun, with all its planets, make up the solar system.
- Some planets have moons orbiting round them.

### **Our solar system**

The planets which make up our solar system are ( as you come from the sun) –

- Mercury
- Venus
- Earth
- Mars
- Jupiter
- Saturn
- Uranus
- Neptune
- Pluto (which has now been re-classified as a dwarf planet)

The closer it is to the sun, the hotter the planet is. The further from the sun, the colder it is.

There is a pattern of size; planets get larger as you go from the sun and then small as you get further away from it. Jupiter is the largest. Saturn has obvious rings. Different planets orbit the sun at different speeds and rotate at different speeds. Gravity is also different on the different planets.

You should know about at least one planet in detail and know them in order from the sun.

### **Gravity**

- Gravity is an invisible force which pulls large objects together. On Earth, all objects are pulled towards the centre of the Earth.
- Mass is the quantity of matter which an object contains and is measured in grams or kilograms. Mass never changes whether you are on Earth, in space or on another planet.
- The force of gravity on Earth is 10 Newtons (N) for every kilogram.
- The weight is the force of gravity on an object.
- Since the force of gravity on Earth is 10 Newtons per kilogram, a 5 kg mass would have a weight of 50 N.
- In space, there is no gravity, so objects have no weight.
- On different planets, an object's weight depends on its mass and the force of gravity on that planet.
- If the force of gravity on Planet X was 6 N per kg, a 5 kg mass would have a weight of 30N.
- On the moon, gravity is much smaller than on Earth.

### **Friction**

Friction is a force between two surfaces which tries to stop movement. Friction often produces heat. Friction can be useful or a problem.

The force of friction depends on –

- Mass – the bigger the mass, the bigger the more friction
- Surface area – the bigger the surface area the more friction
- Type of surface – the rougher the surface, the more friction.

There are several ways that friction can be reduced –

- Rollers and ball bearing reduce the surface in contact, so they reduce friction
- Lubricants are slippery liquids which go between surfaces to help them move with less friction.
- Wax can be used to make surfaces smooth to reduce friction

You should be able to give or recognise examples of situations or machines which work by friction or which work better by having friction reduced.

### **I can –**

- Compare values; planet diameters, distance from the sun etc.
- Calculate weight from the force of gravity and mass
- Compare friction forces
- Read a spring balance in Newtons
- Use appropriate units for force, mass, gravity and distance in space
- Draw tables and graphs from data
- Explain why I think there is or is not life somewhere in the Universe

