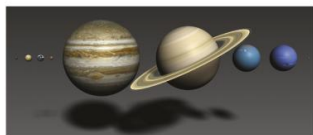


## 4.2 The Solar System

### Learning objectives

After this topic you will be able to:

- name the objects in the Solar System
- describe some similarities and differences between the planets of the Solar System.



▲ These are NASA images of the planets of the Solar System.

### Remember that order!

Before Pluto was renamed a dwarf planet, people used to remember the order of the planets using this mnemonic:  
My Very Easy Method Just Speeds Up Naming Planets. A mnemonic uses first letters to make up a sentence. Make up your own mnemonic for the planets as they are now: M, V, E, M, J, S, U, N.



### Key Words

ellipse, asteroid, Mercury, Venus, Mars, terrestrial, gas giant, dwarf planet, gravity

**No-one has ever seen all of the Solar System at once because it is too big. Scientists have used observations to build a model of the Solar System.**

### What's in our Solar System?

Starting from the Sun and moving outwards the Solar System contains four inner planets and four outer planets. All of the planets orbit the Sun. Each orbit is a slightly squashed circle called an **ellipse**. Between the orbits of Mars and Jupiter there is an **asteroid belt**.

**A State the number of planets in the Solar System.**

### The planets

The inner planets, **Mercury, Venus, Earth, and Mars**, are all **terrestrial** planets; they are made of rock. The conditions on the planets are very different. Mercury does not have an atmosphere. At night the temperature drops to  $-170\text{ }^{\circ}\text{C}$  and during the day it can reach  $430\text{ }^{\circ}\text{C}$ . Venus has an atmosphere of carbon dioxide that traps energy from the Sun.



◀ The Curiosity rover on Mars takes a picture of itself.

The outer planets are called **gas giants**; they are made mainly of gases such as hydrogen and helium. All of the gas giants are very cold and are much bigger than the inner planets.

Many of the planets have moons in orbit around them. Saturn has 60 moons but Earth has only one.

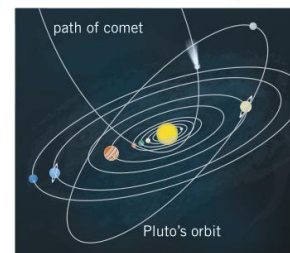
Planet	Diameter (km)	Distance from Sun (million km)	Distance from Sun	Temperature ( $^{\circ}\text{C}$ )
Sun	1 391 000	–	–	–
Mercury	4879	58	3.2 light-minutes	$-180$ to $430$
Venus	12 104	108	6.0 light-minutes	465
Earth	12 756	150	8.3 light-minutes	$-89$ to $58$
Mars	6787	228	12.7 light-minutes	$-82$ to $0$
Jupiter	142 800	778	43.3 light-minutes	$-150$
Saturn	120 660	1427	1 light-hour 19 light-minutes	$-170$
Uranus	51 118	2871	2 light-hours 39 light-minutes	$-200$
Neptune	49 528	4498	4 light-hours 10 light-minutes	$-210$

**B List the planets in size order, starting with the smallest.**

### The asteroid belt

There are thousands of pieces of rock in the asteroid belt. Some are tiny specs of dust but one is large enough to be called a **dwarf planet**. Ceres is the only dwarf planet inside the orbit of Neptune.

### Outside the Solar System



◀ This diagram shows how the orbits of Pluto and a comet are different to the orbits of the planets.

Pluto used to be called a planet but in 2006 it was renamed a dwarf planet. Beyond Pluto's orbit is a region called the Kuiper Belt. Astronomers think that most comets come from outside our Solar System in a region called the Oort Cloud, beyond the Kuiper Belt.

### How did our Solar System form?

Scientists think that **gravity** pulled the gas and dust together to form our Sun about 5 billion years ago. They think planets formed from a disc of gas and dust surrounding the Sun. Astronomers are looking for evidence from observations of other clouds of gas and dust to see if they can detect planets forming.

### Fantastic Fact!

Venus spins in the opposite direction to all the other planets in the Solar System.

### Summary Questions

- Copy and complete the sentences below.  
There are \_\_\_\_\_ inner and \_\_\_\_\_ outer planets in the Solar System. The band of dust and rocks between Jupiter and Mars is called the \_\_\_\_\_. Pluto is a \_\_\_\_\_ planet. Scientists think that most comets come from a region outside the Solar System called the \_\_\_\_\_.  
(5 marks)
- State one similarity and one difference between the inner and outer planets.  
(2 marks)
- Compare planets and asteroids.  
(2 marks)
- Describe and explain the link between distance from the Sun and temperature of the planets. Explain why Venus is the odd planet out.  
(6 marks)