

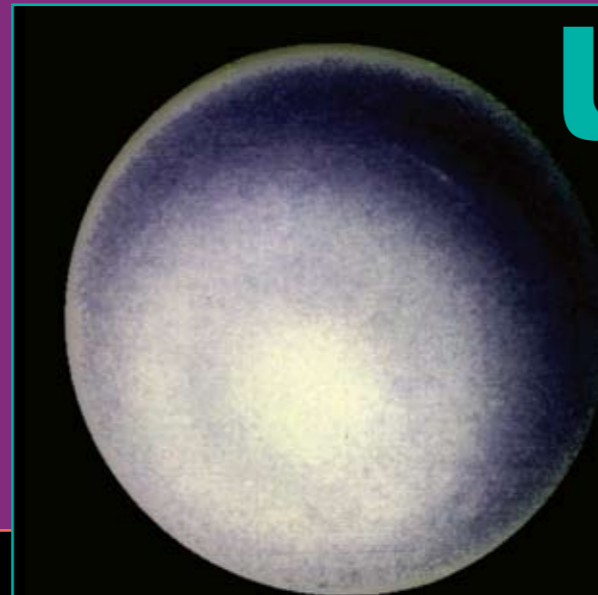


# THE FARAWAY PLANETS

Neptune and Pluto are so far away that we cannot see them from Earth without a telescope. Even Uranus is hard to see with the naked eye.

## 1. A long voyage of discovery

We did not know very much about the distant planets until quite recently. In 1986 a spacecraft called Voyager 2 was sent far into space. It flew past Neptune and Uranus and sent photographs back to Earth. A spacecraft called 'Horizons' will reach Pluto in 2015



Uranus

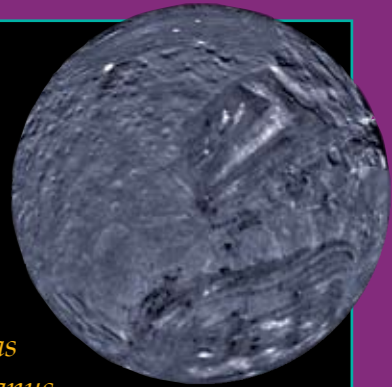
# URANUS

## 2. Uranus, a distant cloudy planet

If you look at Uranus through a telescope you can see a pale, blue-green disk with moons and rings around it. There is a cloudy atmosphere on Uranus. This cloudy atmosphere is made up of hydrogen, helium and methane gas. Beneath the clouds most of Uranus is made of gas. Astronomers think that long ago, when our Solar System was being formed, Uranus collided with an object about the size of Earth. After the collision, left-over bits and pieces of this object formed the moons and rings around Uranus.

## 3. William and John Herschel

William Herschel was a famous British astronomer. In 1781 he discovered a new planet called Uranus. Herschel was the first person to see a moon near Uranus in 1787. He identified thousands of double stars and nebulae in the Northern Hemisphere, as well as the shape of the Milky Way galaxy. Herschel worked with his sister Caroline, who also discovered many comets. Herschel's son, John worked in Cape Town from 1834-1838. He continued his father's work, discovering double stars and nebulae in the Southern Hemisphere.



Miranda, one of Uranus' moons. It shows a grooved, rocky surface which is not found anywhere else in the Solar System.

# PLUTO

## 5. Pluto, a cold, pink place

Pluto is the smallest of all the planets. It's also the coldest planet. Pluto has a thin, cold atmosphere. The atmosphere on Pluto is mainly made up of methane and nitrogen gas, which gives Pluto a pinkish colour. It is so cold on Pluto that the gas is frozen into snow and frost.

Most of the time Pluto is the furthest planet from the Sun. If you look carefully at the Solar System diagram, you will see where Pluto's orbit goes inside Neptune's orbit. So, for 20 years of its orbit, Pluto travels closer to the Sun than Neptune does. One of Pluto's moons is called Charon. It is about half the size of Pluto.

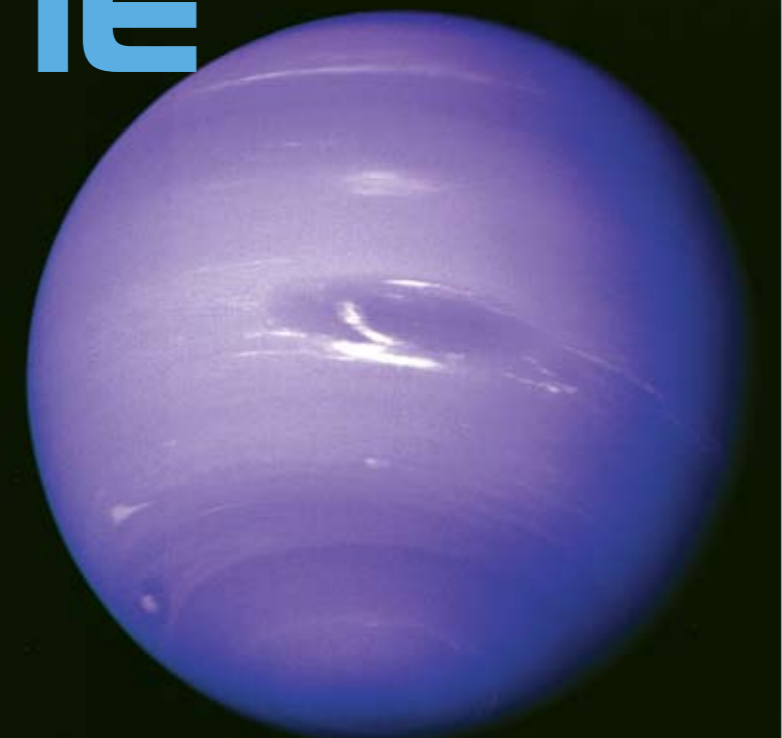


Pluto and one of its moons, Charon

# NEPTUNE

## 4. Neptune, the blue planet

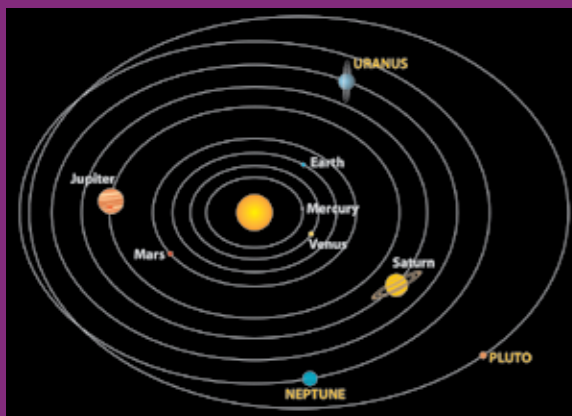
In August 1989 photographs from the Voyager 2 spaceship showed that Neptune looked like a big, blue ball with different markings around it. The markings are bands of clouds. The inside of Neptune may have a small rocky core, but most of the planet is probably covered with a deep ocean of water. It also has an atmosphere of hydrogen and helium gas. In the top layer of Neptune's atmosphere, there is methane gas. The methane gas probably gives Neptune its blue colour. Neptune is probably the windiest place in the Solar System. Storm winds blow violently across the planet at about 1400 kilometres per hour.



Neptune, the blue planet. Neptune's Great Dark Spot, is a giant violent storm! You can see it in the middle of this picture that Voyager 2 took in 1989. Since then the spot has disappeared.

## COOL FACTS

	Uranus	Neptune	Pluto
Size (diameter)?	51 000 km	48 600 km	2 300 km
How far from the Sun?	2,9 billion km	4,5 billion km	4,4-7,4 billion km
How fast does it travel around the Sun?	6,8 km/second	5,4 km/second	4,7 km/second
How long is the day and night?	17 Earth hours 14 minutes	16 Earth hours 7 minutes	6 Earth days and 9 hours
How long is the year?	84 Earth years	165 Earth years	248 Earth years
How many moons and rings?	At least 27 moons and 11 rings	13 moons and 5 rings	3 moons



Where are Neptune, Uranus and Pluto in our Solar System? See Neptune and Pluto's orbits.



## ACTIVITY 1. About the planets

Learning area: Natural Sciences

### Find and interpret information

- Look at the card to find answers to these questions about Neptune, Uranus and Pluto:
  - How have astronomers been able to study these planets?
  - Why are these planets so cold?
  - What are the similarities between these three planets?
  - What are the differences between these three planets?
  - Which planet is the coldest?
  - Which planet has the most moons?
  - How long is a day and night on Pluto?
  - Why is a year on these planets so long?
  - Which planet travels the fastest around the Sun?
  - Why does the distance to the Sun change in a Pluto year?
  - What are the differences in the colours of the planets?
  - Why are they different colours?
  - What is special about the way Uranus spins?
- Use the card to make up your own questions about Neptune, Uranus and Pluto. Write down your questions and give them to a friend to find the answers.

## ACTIVITY 3. Space travel

Learning areas: Economic and Management Sciences (EMS), Languages and Arts and Culture

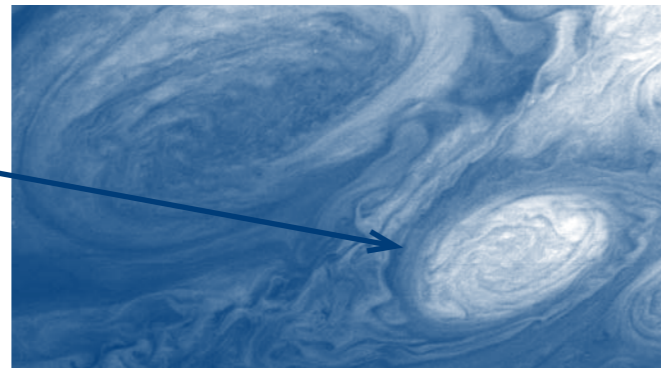
### Describing and imagining famous places in the Solar System

Imagine you could travel through space and visit some of the amazing features like the rings of Saturn or the Great Red Spot on Jupiter! Pretend that you are living in 2050. Imagine that space travel is very common because people have found a way of travelling very fast across long distances. You are a tour guide who organizes trips to the far planets.

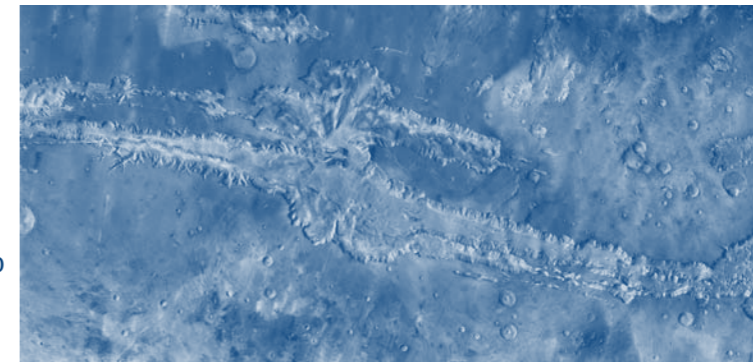
- Look at the list of amazing sites in our Solar System below.
- Write a tourist brochure or a pamphlet (or make a big poster) that advertises a voyage in a spaceship to one or more of these sites.

- **A big crater on Mercury called the Caloris Basin**  
This crater is the hottest place in the Solar System at midday.

- **The Great Red Spot on Jupiter**  
A huge violent storm, which is 3 times larger than Earth.



- **The footprint of Neil Armstrong on the Moon**  
This was the first time a human being set foot on another object in space. The footprint has been there since 1969. And it will still be there in millions of years' time because there is no wind or water to erode it away.



- **Valles Marineris, Mars**  
The biggest valley on Mars is called Valles Marineris. This valley is many kilometres deep.

- **The largest volcano on Mars is called Olympus Mons**

It is 25 kilometres high (3 times higher than Mount Everest), and nearly 500 kilometres wide (which is longer than the distance from Cape Town to George).

- **The Great Cliff of Miranda**

Miranda is the 11th moon of Uranus. A cliff on Miranda is over 10 kilometres high (Mount Everest is only 8 kilometres high and Table Mountain is just over 1 kilometre high). The gravity is so low that if you jumped off it would take you 5 minutes to fall from the top of the cliff to the bottom.

- **Life on Earth**

Earth is the only planet with life on it. Living creatures come in millions of different shapes and sizes ranging from tiny bacteria to huge blue whales.

*Adapted from Project Astro Resource Notebook, Astronomical Society of the Pacific*

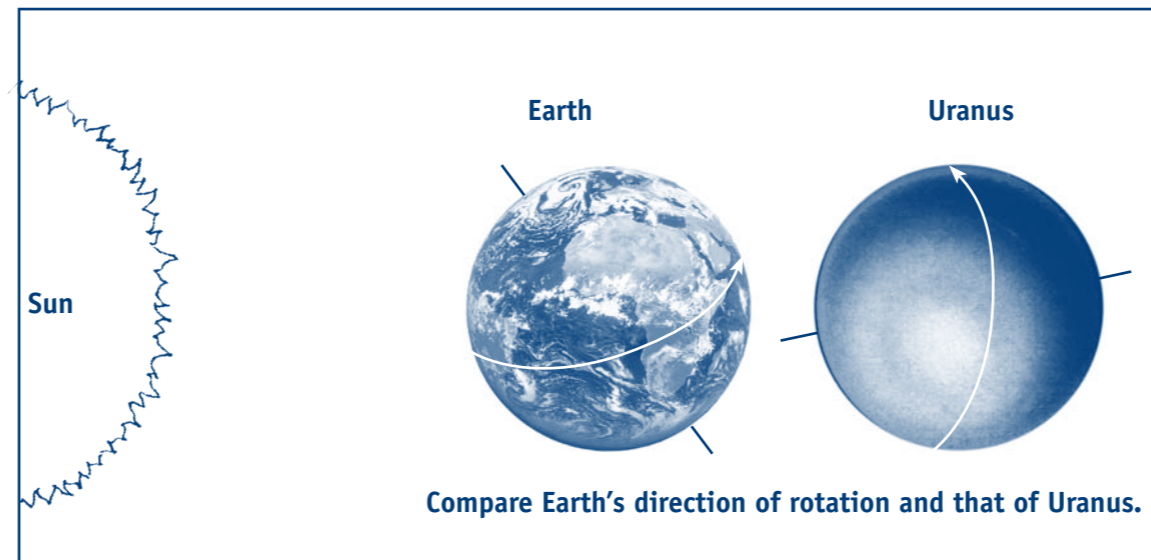
## ACTIVITY 2. Gas geysers on Triton

Learning area: Arts and Culture

### Imagining and drawing

One of Neptune's moons is called Triton. Triton has geysers (fountains) of nitrogen gas which spray up to 8 kilometres into the atmosphere. (That is as high as Mount Everest – the highest mountain on Earth.) Strong winds blow these gas geysers about 100 kilometres sideways. Scientists tell us that Triton has the coldest surface in the Solar System. The nitrogen gas freezes immediately into ice.

- Can you imagine how Triton could look with its geysers?
- Make a drawing of this picture you have imagined.



## DID YOU KNOW?

Uranus slips sideways through the sky ... The way that a planet spins in relation to the sun (the tilt of the planet) influences the seasons on that planet. Uranus orbits around the Sun, and spins almost lying on its "side". For many years, one pole will point towards the Sun, and the other pole will be in cold and darkness.