



# Cogan Scholars Programme

## Science Award

This document contains the syllabus for the Cogan Scholars: Science Award.

You will need to study all the information presented here.

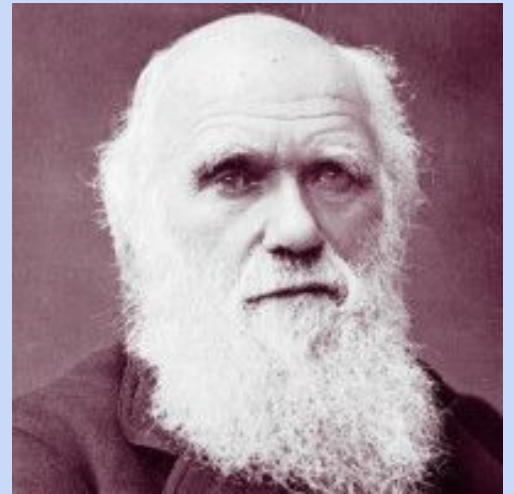
Staff will help you develop the study skills you need in order to memorize, retain and recall this information.

Once you are confident you can recall this syllabus tell your teacher and they will give you your undergraduate test.

Once you have passed you will receive a badge and be known as a Cogan Scholar!

**Charles Darwin** was an English scientist and was most well known for his theory of evolution.

- Born: 12<sup>th</sup> February 1809, The Mount, Shrewsbury
- Died: 19<sup>th</sup> April 1882, Down House, Downe
- Family: He was born into a wealthy and influential family.



# Charles Darwin

Charles Darwin's father was a doctor and he really wanted Charles to study medicine at university.

Charles started to train to be a doctor, but he was afraid of the sight of blood, and switched to studying the classics.

However, Charles soon realised that his real passion was for geology (the study of the Earth and rocks) and botany (plant biology).

- In 1831 Darwin set sail on the HMS Beagle, a naval survey ship. Darwin was there to collect plant and animal specimens from the countries and islands the ship visited.
- The voyage took five years. For Charles Darwin, the most important part of the journey was the time spent in the Galapagos Islands. These islands are the home to plants and animals that can't be found anywhere else in the world.
- Darwin started to study other animals and plants, and he began to piece together his theory of natural selection which explains how populations evolve.
- Darwin didn't publish his findings straight away because he knew that they would be extremely controversial and upset many people.
- On the Origin of Species finally came out in 1859. It was a massive talking point because it challenged the truth of the creation story found in the Bible.

## What impact did he make?

- Today, Darwin's theory of natural selection has been accepted (by most people) as scientific fact, and new fossil discoveries are constantly adding to our knowledge of the different stages of evolution.
- Darwin's appears on UK £10 notes, and a statue of him has been placed in the main hall of London's Natural History Museum.
- More than 120 species have been named after Darwin.

# The Telescope



A telescope is an instrument used to see objects that are far away. Telescopes are often used to view the planets and stars. Some of the same optical technology that is used in telescopes is also used to make binoculars and cameras.

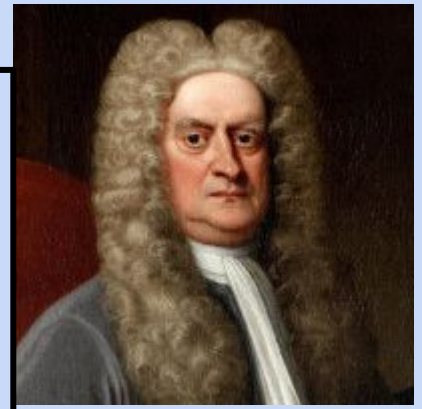
- Light gathering ability – The better a telescope can gather light, the better you will be able to see far away stars and faint objects in the night sky. This feature is usually determined by the size of the aperture of the telescope. The larger the aperture, the more light the telescope can gather.
- Magnification – The magnification of a telescope describes how much larger the telescope can make objects appear.
- There are two main types of telescopes. One type uses lenses to magnify the image. Telescopes that use lenses are called refracting telescopes. The other type uses mirrors to focus the light of the image. These telescopes are called reflecting telescopes.
- The first telescope invented was a refractor invented by Dutch lensmaker Hans Lippershey in 1608. Galileo made some improvements and first used the telescope for astronomy.
- In the late 1600s, Isaac Newton developed the reflecting telescope. By using mirrors instead of lenses.
- One of the most famous telescopes in the world today is the Hubble Space Telescope. This telescope was put into orbit around the Earth in 1990 by the Space Shuttle. Being outside the Earth's atmosphere allows the Hubble to view outer space without background light. This has enabled it to take some amazing pictures of far away stars and galaxies.

## Fun Facts about Telescopes

- The successor to the Hubble Telescope is the James Webb Space Telescope. It was launched in 2018.
- The first telescopes were used by sea merchants and the military.
- Most observatories are built on mountaintops where the air is thinner and cleaner.
- A lot of astronomers today work remotely from the actual telescope. They control the telescope using computers over the internet.
- The largest refracting telescope in the world is located at Yerkes Observatory in Wisconsin.

Sir Isaac Newton discovered gravity about 300 years ago. The story is that Newton saw an apple fall out of a tree.

When this happened he realised there was a force that made it occur, and he called it gravity.



# Gravity

- Gravity attracts all objects towards each other. Gravity has been around since the very beginning of the universe, and it works the same way everywhere in the universe, on all kinds of different objects, of all different sizes .
- Gravity is very important to our everyday lives. Without Earth's gravity we would fly right off it. We'd all have to be strapped down all the time. If you kicked a ball, it would fly off forever. While it might be fun to try for a few minutes, we certainly couldn't live life on Earth without gravity.
- Gravity also is important on a larger scale. It is the Sun's gravity that keeps the Earth in orbit around the Sun. Life on Earth needs the Sun's light and warmth to survive. Gravity helps the Earth to stay just the right distance from the Sun, so it's not too hot or too cold. Gravity guides the growth of plants and other vegetation.
- The Earth is a giant magnet. Its magnetic field is like a bar magnet at its centre.
- Ocean tides are caused by the gravity of the moon.
- We don't actually "feel" gravity. We only feel the effects of trying to overcome it by jumping or when we fall.
- Gravity always pulls, it never pushes.
- Your mass stays the same if you could travel from planet to planet, but your weight would vary depending on how the gravity of that planet pulls on you. Mars is smaller and has less mass than Earth. As a result you would weigh less on Mars.



## Europa: A Moon of Jupiter

Could it be a place where life exists?



Europa is one of the many moons that orbit the planet **Jupiter** . It is about the same size as Earth's moon.

Europa was discovered by **Galileo Galilei** in **1610** . He also found three other large moons of Jupiter.

### What does Europa look like?

- Europa is covered in **ice**—its surface is smooth and shiny like an icy skating rink.
- It has **brown lines and cracks** , which are caused by movement in the ice.
- Scientists believe there may be a huge **ocean of water** under the ice!

### Could there be life?

Europa is one of the **best places in our Solar System** to look for signs of **alien life** .

- The ocean beneath the ice might be warm enough to support tiny living things, like microbes.
- No life has been found yet, but space missions are being planned to find out more!

### How do we explore Europa?

- No humans have been to Europa, but spacecraft like **Galileo** and **Juno** have flown close to it.
- NASA is building a new mission called the **Europa Clipper** to explore the moon more closely.
- Europa is the **sixth-largest moon** in the Solar System.
- A day on Europa (how long it takes to spin once) is about **3.5 Earth days** .
- It's so cold there that the temperature can drop to **-160°C** !

### Why do scientists care about Europa?

Europa helps scientists learn about:

- **Where life might exist** beyond Earth
- **How planets and moons form**
- What it's like deep under the ice

#### Glossary:

- **Orbit** – the path one object takes around another in space
- **Surface** – the outside or top layer
- **Ice Crust** – a layer of frozen water
- **Microbes** – tiny living things too small to see without a microscope

## Task

Use your notes on each section to remember your facts before sitting the scholar exam - you can not bring the fact files with you, but you can bring your notes!