

# SPACE:

## Scale of the universe:

### 1. Astronomical Unit (AU):

- **Measurement used to express DISTANCES within a SOLAR SYSTEM**
- **1 AU = 150 000 000 km or  $1.5 \times 10^8$  km**

**Questions: Workbook pg. 157, ex. 7&10**

### 2. Light year (ly):

- **Measurement used to express DISTANCES between STARS.**
- **Light travels at a speed of  $3 \times 10^8$  m/s.**
- **A light year is how far light travels in 1 year, so a light year is a measurement of DISTANCE, not time!**

**What is the value for 1 light year?**

### 1. Questions: Workbook pg. 157, ex. 8

### 2. In 1987, an explosion of the SN1987A star was observed. It was located 170 000 ly away from our planet.

a) How many km separated kilometres separated Earth and SN1987A when it exploded?

b) How long ago did this explosion occur?

Location of the Earth in the universe:

- Earth is located in a solar system that is a part of the Milky Galaxy. There are many other galaxies in the universe.
- About 4.6 billion years ago, our solar system was created from a cloud of gas and dust.
- The sun formed at the centre of the cloud, and slowly the planets form around it.

Sir Isaac Newton developed the **LAW OF UNIVERSAL GRAVITATION** (there is a force of attraction between everything). It is this force of attraction aka **GRAVITY** that holds our planets and solar system together. **GRAVITY** is what holds everything together!

The **SUN** is our source of energy, without it we cannot live. Its diameter is **1 390 000 km**.

Here is a list of planets, starting with the one closest to the sun.

Name	Average Distance from Sun (km)	Surface Type	Diameter at Equator
Mercury	<b>58 500 000</b>	<b>Rock</b>	<b>4 878</b>
Venus	<b>108 000 000</b>	<b>Rock</b>	<b>12 104</b>
Earth	<b>150 000 000</b>	<b>Rocks and liquid water</b>	<b>12 756</b>
Mars	<b>228 000 000</b>	<b>Rock</b>	<b>6 794</b>
Jupiter	<b>780 000 000</b>	<b>Gas</b>	<b>142 800</b>
Saturn	<b>1 431 000 000</b>	<b>Gas</b>	<b>120 000</b>
Uranus	<b>2 878 500 000</b>	<b>Gas</b>	<b>51 120</b>
Neptune	<b>4 509 000 000</b>	<b>Gas</b>	<b>49 528</b>

#### HOMEWORK: **SCALING THE UNIVERSE**

1. Convert each planets average distance from the sun and its diameter to units of **AU**.
2. If **1 AU = 10 mm** on your ruler, draw a scaled version of our solar system on a piece of paper and colour the planets in.

# EARTH

Geologists divide the geologic time scale into the following 4 (starting from past to present):

1. Precambrian time: 4 billion years ago, first signs of life
2. Paleozoic era: invertebrates with hard shells
3. Mesozoic era: dinosaurs
4. Cenozoic eras: monkeys and humans

Life forms became increasingly complex from the Precambrian to today.

## **Prehistoric Life & its extinction:**

The element iridium, which is rare on Earth but common in meteorites, is found in a thin layer all around the world. Geologists believe that a large meteorite struck the Earth, sending a cloud of dust into the air and blocking out the sun for months. This event caused a mass extinction of life on Earth.

Fossils provide evidence of prehistoric life. Fossils formed when organisms died and became buried in sediment. In most cases, only the hard parts of organisms, such as bones and teeth, became fossilized.

Scientists who study fossils are called paleontologists. Fossils give us many clues about the history of life on Earth.

**EVOLUTION:** (Charles Darwin) Changes to a species over a period of long time.

**NATURAL SELECTION:** Survival of the fittest; reproduce offsprings with traits that will help them to survive

**STRATIGRAPHIC LAYERS:** Layers within rocks that can help us to determine when certain species existed. Fossils located in the same layer, will exist at the same time. Fossils in the deeper (lower layers) existed before the ones in the higher layers.

**CARBON DATING:** After a living organism dies, it starts decaying and losing carbon-14 element. The longer the organism has decayed (died), the less carbon14 there is and vice-versa.