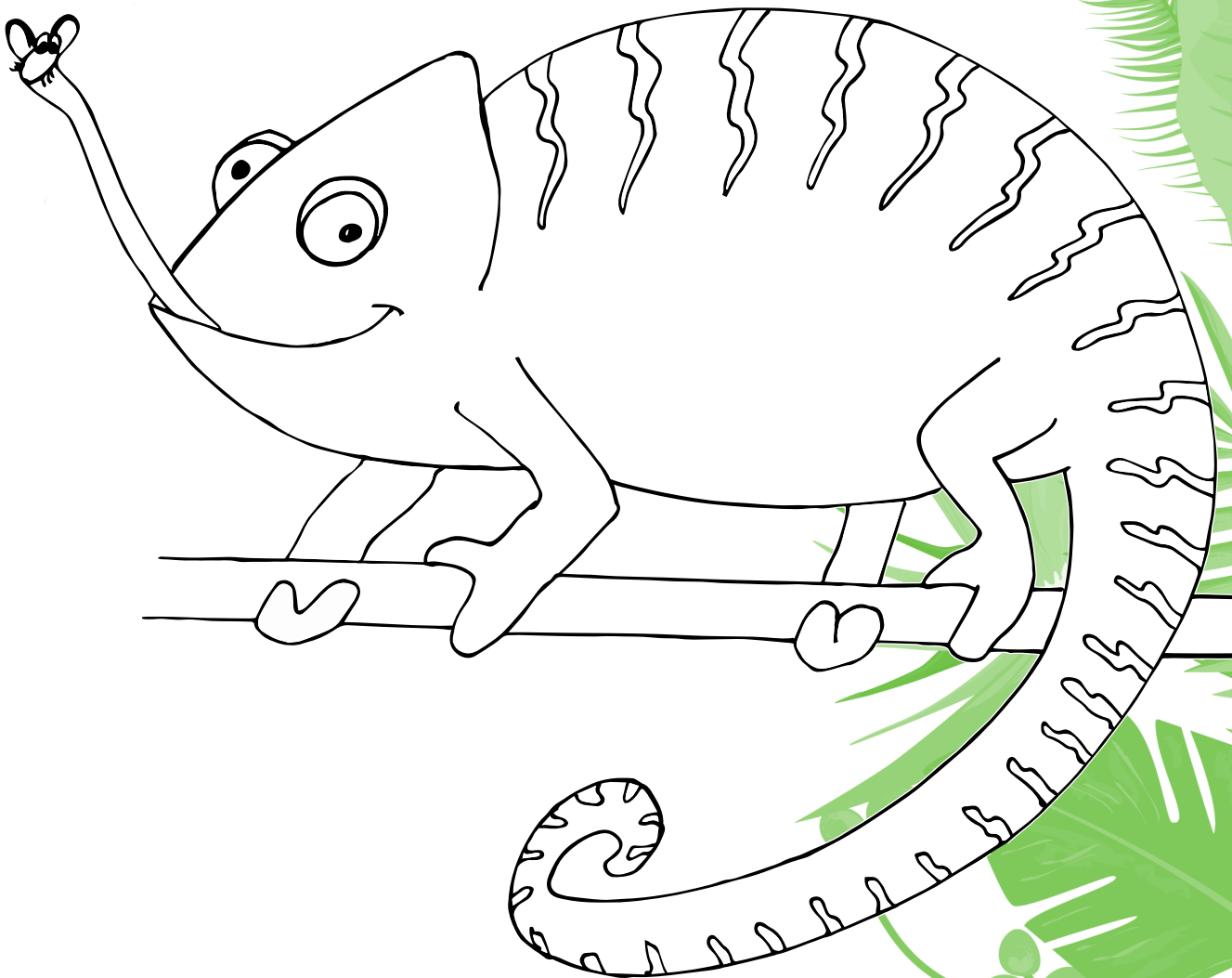


# BIOLOGY & GEOLOGY

1

Content and Language Integrated Learning • CLIL

ESO



**educàlia**  
editorial

# BIOLOGY & GEOLOGY

---

1

Content and Language Integrated Learning  
CLIL

Primera edición, 2017

Autora: María Gómez Benito

Maquetación: Ángela Fernández Carretero e Isabel Caparrós Lucas

Ilustraciones: María Gómez Benito

Ilustraciones de la cubierta: María Gómez Benito y Winkimages

Edita: Educàlia Editorial

Imprime: SERVICECOM

ISBN: 978-84-16663-22-4

Depósito legal: V-737-2017

Printed in Spain/Impreso en España.

Todos los derechos reservados. No está permitida la reimpresión de ninguna parte de este libro, ni de imágenes ni de texto, ni tampoco su reproducción, ni utilización, en cualquier forma o por cualquier medio, bien sea electrónico, mecánico o de otro modo, tanto conocida como los que puedan inventarse, incluyendo el fotocopiado o grabación, ni está permitido almacenarlo en un sistema de información y recuperación, sin el permiso anticipado y por escrito del editor.

Alguna de las imágenes que incluye este libro son reproducciones que se han realizado acogiendo al derecho de cita que aparece en el artículo 32 de la Ley 22/18987, del 11 de noviembre, de la Propiedad intelectual. Educàlia Editorial agradece a todas las instituciones, tanto públicas como privadas, citadas en estas páginas, su colaboración y pide disculpas por la posible omisión involuntaria de algunas de ellas.

Educàlia Editorial

Avda de les Jacarandes 2 loft 327 46100 Burjassot-València

Tel. 960 624 309 - 963 768 542 - 610 900 111

Email: [educaliaeditorial@e-ducalia.com](mailto:educaliaeditorial@e-ducalia.com)

[www.e-ducalia.com](http://www.e-ducalia.com)

## UNIT 1 THE UNIVERSE



7

### Content

1. The Universe	9
1.1 Welcome to the Universe. The Big Bang	9
1.2. Stars and galaxies	10
1.3. Our galaxy: the Milky Way	11
2. The Solar System	13
2.1. What makes up the Solar System	13
2.2. The planets	14
2.3. Dwarf planets	19
2.4. Small bodies of the Solar System	20
3. Distances in the Universe	21
4. Space exploration	22
Vocabulary & Grammar section	24

## UNIT 2 EARTH AND MOON



25

### Content

1. The Earth-Our planet	25
1.1. The spheres of the Earth	27
1.2. The seasons	28
2. The Moon-Our satellite	30
2.1. Phases of the Moon	30
2.2. Tides	35
3. Eclipses	36
Vocabulary & Grammar section	41

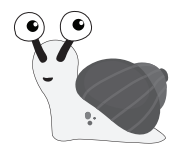
## UNIT 3 ATMOSPHERE



43

### Content

1. The atmosphere	45
1.1. Components of the atmosphere	45
1.2. Layers of the atmosphere	45
2. Atmosphere phenomena	47
2.1. Winds and atmospheric pressure	47
2.2. Clouds and precipitation	48
3. Atmospheric pollution	50
3.1. Pollutants and sources	50
3.2. Greenhouse Effect and Global Warming	51
3.3. Acid Rain	54
3.4. Ozone layer hole	55
Vocabulary & Grammar section	59



## UNIT 4 HYDROSPHERE



61

### Content

1. Water, a special substance	63
1.1. The properties of water	63
1.2. Water on Earth	64
1.3. The water cycle	66
2. Water pollution	69
2.1. Ways of polluting water	69
2.2. Drinking, sewage and purified water	70
3. Water scarcity	72
3.1. Saving water	72
4. Practical problem- a purifying water device	74
Vocabulary & Grammar section	75

## UNIT 5 GEOSPHERE

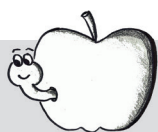


77

### Content

1. The geosphere	79
1.1. The layers of the Earth	79
2. Minerals	80
2.1. Mineral properties	80
2.2. Mineral classification	83
3. Rocks	85
3.1. Rock classification	85
3.2. Fossilization and fossils	87
4. Mining	89
5. Uses of minerals and rocks	89
Vocabulary & Grammar section	90

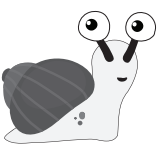
## UNIT 6 BIOSPHERE



91

### Content

1. Characteristics of living things	93
1.1. The three vital functions	93
2. Cells	94
2.1. Prokaryotic versus eukaryotic cells	95
2.2. Plants and animal eukaryotic cells	96
2.3. Cell organelles	97
3. Living things classification	98
3.1. The 5 Kingdoms	98
3.2. Classification of living things	98
3.3. Scientific names (Genus and species)	100
Vocabulary & Grammar section	101



## UNIT 7 SIMPLEST LIVING THINGS



103

### Content

1. Monera Kingdom	105
1.1. Characteristics, structure and classification	105
1.2. Nutrition and reproduction	106
2. Protoctist Kingdom	107
2.1. Characteristics, structure and classification	107
2.2. Nutrition and reproduction	109
3. Fungi Kingdom	110
3.1. Characteristics, structure and classification	110
3.2. Nutrition and reproduction	112
3.3. Algae + Fungi = Lichens	113
4. Viruses	114
5. Effects of simplest living things	114
Vocabulary & Grammar section	117

## UNIT 8 PLANTS



119

### Content

1. Plant Kingdom	121
1.1. Characteristics and parts of plants	121
1.2. Photosynthesis	122
1.3. Carnivorous plants	125
2. Plants classification	127
2.1. Non-flowering plants: Mosses and Ferns	127
2.2. Flowering Plants: Gymnosperms and Angiosperms	127
3. Plants reproduction	130
4. Describing leaves and recognising trees	134
Vocabulary & Grammar section	137

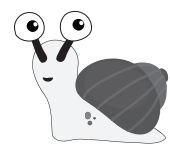
## UNIT 9 INVERTEBRATES



139

### Content

1. Animal Kingdom	141
1.1 Invertebrates	141
2. Simplest invertebrates: Porifera and Cnidaria	141
3. Worms: Platyhelminthes, Nematodes and Annelids	142
4. Molluscs: Gastropods, Bivalves and Cephalopods	144
5. Arthropods: Crustaceans, Myriapods, Arachnids and Insects	146
5.1. Moulting and metaporphosis	149
6. Echinoderms	150
Vocabulary & Grammar section	154



## UNIT 10 VERTEBRATES



155

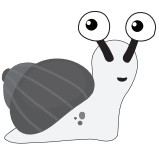
Content	
1. Vertebrates	157
2. Fish	157
2.1. Cartilaginous and bony fish	158
3. Amphibians	159
3.1. Anura and urodela	159
3.2. Metamorphosis	160
4. Reptiles	161
5. Birds	163
6. Animals	164
6.1. Monotremes, marsupials and placentals	165
Vocabulary & Grammar section	168

## UNIT 11 ECOSYSTEMS



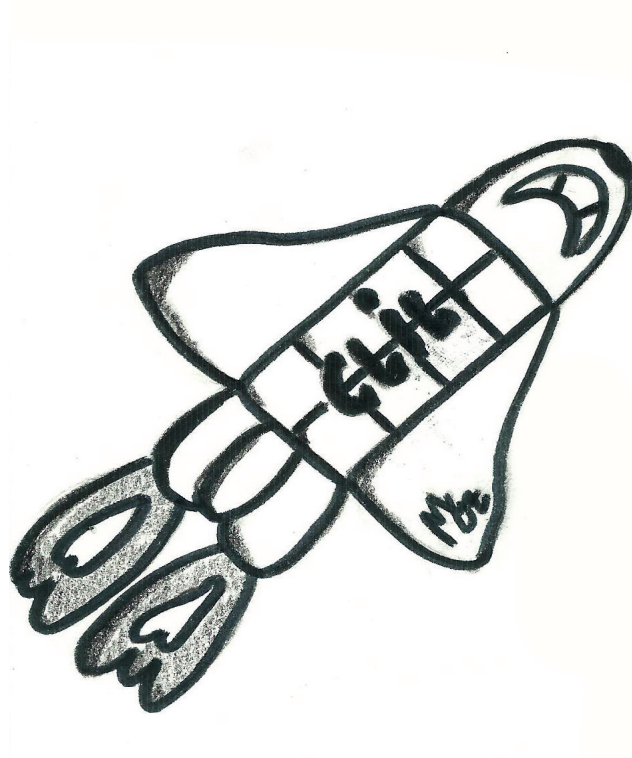
169

Content	
1. Components of ecosystems	171
2. Trophic relations in an ecosystem	172
2.1. Food chains and food webs	173
2.2. Matter and energy transfer	174
3. Pyramids to describe ecosystems	176
4. Biotic relationships in ecosystems	177
5. Major terrestrial and aquatic ecosystems	179
5.1. Terrestrial Ecosystems	179
5.2. Aquatic Ecosystems	181
Vocabulary & Grammar section	182



# UNIT 1

## THE UNIVERSE



### CONTENT

#### 1. THE UNIVERSE

- 1.1. Welcome to the Universe. The Big Bang
- 1.2. Stars and galaxies
- 1.3. Our galaxy: the Milky Way

#### 2. THE SOLAR SYSTEM

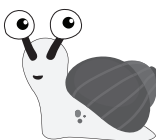
- 2.1. What makes up the Solar System
- 2.2. The planets
- 2.3. Dwarf planets
- 2.4. Small bodies of the Solar System

#### 3. DISTANCES IN THE UNIVERSE

#### 4. SPACE EXPLORATION

### LANGUAGE

*There is/there are \_\_\_\_\_ It is made up of*  
*Comparatives and superlatives*





Before beginning with the Unit, answer the following questions:

**What do I know about the Universe?**

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_

**What do I want to learn about the Universe?**

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_

Once you have finished the Unit, answer the following questions:

**What have I learnt about the Universe?**

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_

**What did I like the most?**

1. \_\_\_\_\_
2. \_\_\_\_\_

**What did I like the least?**

1. \_\_\_\_\_
2. \_\_\_\_\_

Remember to write down all the new vocabulary and grammar in the vocabulary and grammar section at the end of the unit.





## Reading comprehension- THE BIG BANG THEORY

Most astronomers believe the Universe began in a Big Bang about 14 billion years ago. At that time, the entire Universe was inside a bubble that was thousands of times smaller than a pinhead. It was hotter and denser than anything we can imagine. Then, it suddenly exploded. The Universe we know was born. Time, space and matter all began with the Big Bang. In a fraction of a second, the Universe grew from smaller than a single atom to bigger than a galaxy. And it is still growing and expanding today.

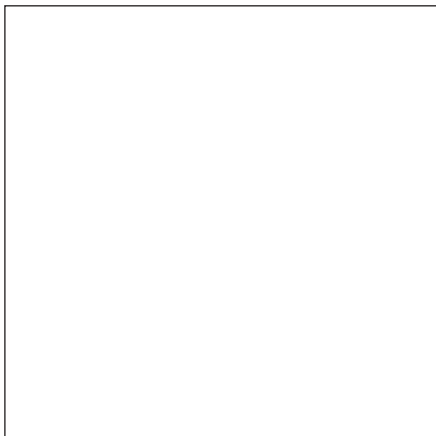
As the Universe expanded and cooled, energy changed into particles of matter and anti-matter. These two opposite types of particles can destroy each other, but some matter survived forming particles called protons, electrons and neutrons. Only three minutes after the Big Bang, the temperature dropped below 1 billion degrees Celsius. It was cool enough for protons, electrons and neutrons to come together and form the first atoms (hydrogen and helium). These atoms formed the first nebulae, where stars were born.

### 2. Answer the questions:

a) Look for synonyms of the following words in the text:

- explosion \_\_\_\_\_
- air sac \_\_\_\_\_
- speed \_\_\_\_\_
- contrary \_\_\_\_\_
- live out \_\_\_\_\_

b) Research what an atom is and make a drawing of a hydrogen and helium atom



c) True or false? If false, correct them.

- The universe was smaller than a pinhead before the Big Bang \_\_\_\_\_
- The universe is not growing anymore \_\_\_\_\_
- In the universe there is anti-matter \_\_\_\_\_
- The universe Big Bang took thousands of years to happen \_\_\_\_\_
- The Universe is mostly made up of hydrogen and helium \_\_\_\_\_

### 1.2. Stars and constellations

When you look at the sky on a clear night you can see lots of stars. Some are smaller, some are bigger. Some stars bright more than others. Stars, as people, born, grow, live and finally die.

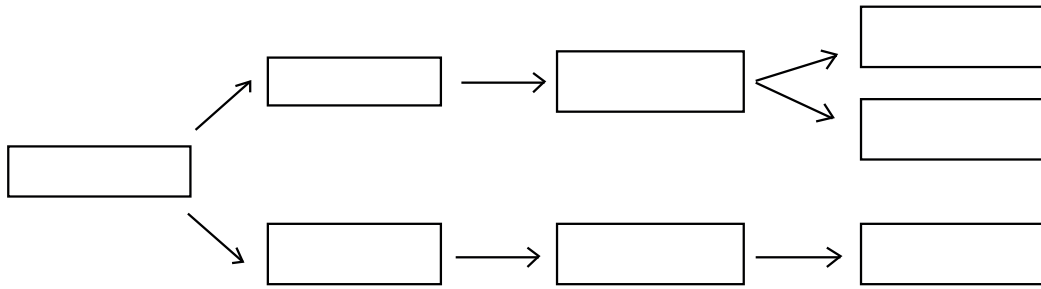
#### Life of a star

Stars are formed in clouds of gas and dust known as nebulae. Nuclear reactions that occur inside them provide energy to make stars bright. If the star is big and has much fuel to burn, it will transform into a massive star first, a red supergiant next. When its fuel is close to finish, the star will explode as a supernova, and its matter can disappear leaving a black hole behind.



On the other hand, an average star can be formed if it has less fuel. As it burns its fuel, it will transform into a red giant, and finally, when its fuel is close to finish, into a white dwarf.

**3. Complete the diagram with information from the text**



What does it mean “on the other hand”?

---

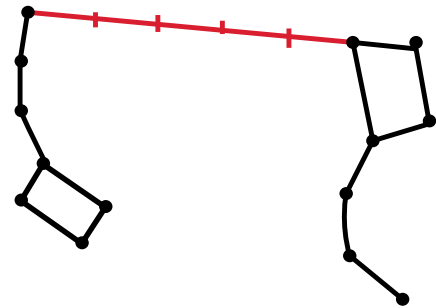


---

Between all stars in the sky, some are more famous than others. The North Star or Polaris is maybe the most famous of all. It is always on the North Pole and can help you to find your way at night.

**How can I find Polaris on the sky?**

First you have to locate the Big Dipper, which is part of the Ursa Meior (Great Bear) constellation. To identify the North Star, imagine a line connecting the two stars that make up the back of the Big Dipper and add five times that distance. There, you will find the North Star, which is part of the Ursa Minor Constellation.

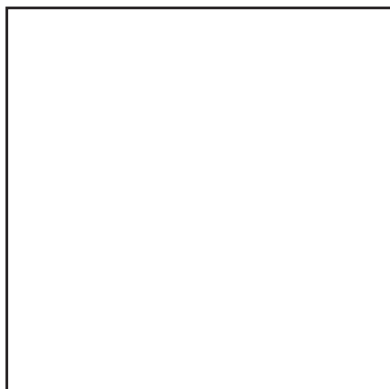


Point out where Polaris is in the drawing.

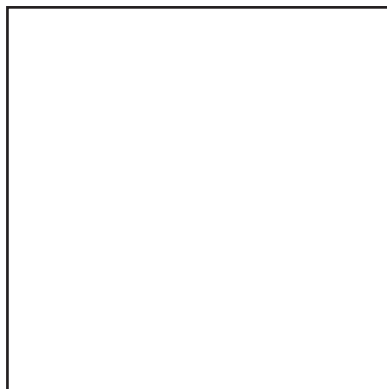
**1.3. Galaxies. The Milky Way**

There are billions of galaxies in the Universe. While some are very big, others are very small. While some are very old, others are young. They can show different shapes (spiral, elliptical and irregular).

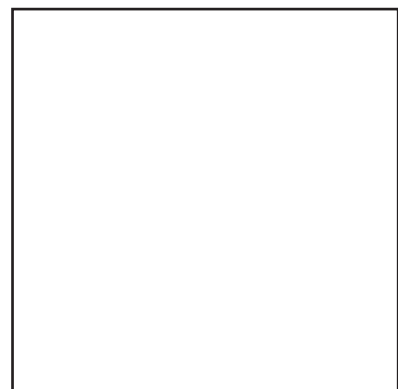
**4. Surf the net and make a drawing of each type of galaxy. Look for the name of a real galaxy showing this shape.**



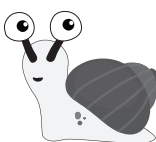
Spiral galaxy: \_\_\_\_\_



Elliptical galaxy: \_\_\_\_\_



Irregular galaxy: \_\_\_\_\_





## 2. THE SOLAR SYSTEM

### 2.1. What makes up the Solar System

Our Solar System includes:

- The Sun.
- 8 planets and their satellites: Mercury and Venus (no satellites), Earth (Moon), Mars (Fobos and Deimos), Jupiter, Saturn, Uranus and Neptune (the 4 of them have many satellites).
- 3 dwarf planets: Pluto, Ceres and Eris.
- Comets like the Halley's comet.
- Asteroids (located in the asteroid belt between Mars and Jupiter).
- Meteors and meteorites.

5. *Look for images and information on the net and make a drawing of the Solar System.*



## 2.2. The planets

Learn how to pronounce the different planets. Listen to [The planets Song](#).

Now, listen to what each planet is telling to you about itself and write it down- [The Solar System Song](#).

**The Sun:**

---

---

---

**Mercury:**

---

---

---

**Venus:**

---

---

---

**Earth:**

---

---

---

**Mars:**

---

---

---

**Jupiter:**

---

---

---

**Saturn:**

---

---

---



Uranus:

---

---

---

Neptune:

---

---

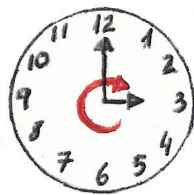
---

### To revolve- revolution

All planets revolve/orbit the Sun (turn around the Sun). This movement is called revolution. The time it takes is called a year. All planets revolve anticlockwise.

### To rotate-rotation

Planets rotate/spin around its axis (turn around themselves). This movement is called rotation. The time it takes is called a day. All planets rotate anticlockwise, except Venus. Venus rotates clockwise. Uranus spins on its side.



clockwise



anticlockwise

6. Translate the following sentences into Spanish:

Earth revolves / orbits the Sun. Earth spins / rotates around its axis.

---

All planets orbit anticlockwise.

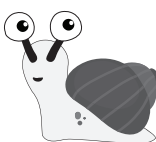
---

The movement of revolution takes a year. The movement of rotation takes a day.

---

Venus spins clockwise. Uranus rotates on its side.

---





# THE PLANETS OF THE SOLAR SYSTEM

GROUP: \_\_\_\_\_

OUR PLANET IS \_\_\_\_\_

*Complete the following sentences with information about your planet. (Do not forget to draw a nice picture to show your classmates).*

Our planet is called \_\_\_\_\_ after my the mythological god of \_\_\_\_\_

It is the \_\_\_\_\_ (position) from the Sun.

It takes \_\_\_\_\_ (time) to revolve the Sun and (time) to rotate on its axis. So a year lasts for (time) and a day for \_\_\_\_\_

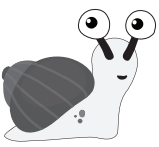
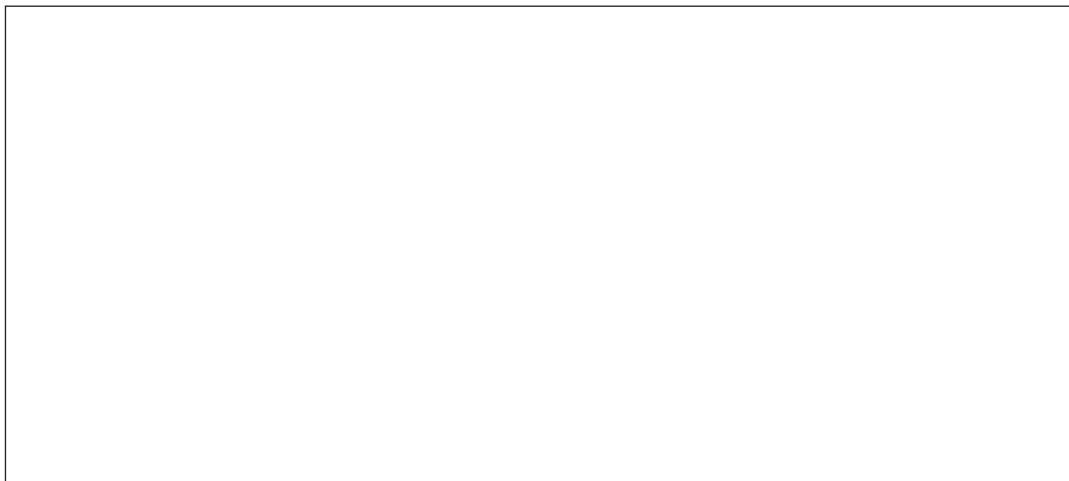
The average temperatures of your planet are: during the day \_\_\_\_\_, and during the night \_\_\_\_\_

It has \_\_\_\_\_ (number) moons and \_\_\_\_\_ (number) rings.

Something special about our planet is that \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

The appearance of our planet is:





7. After you have heard your class mates talking about their planets, answer the following questions. Which planet \_\_\_\_\_.

- takes the longest to orbit the Sun? \_\_\_\_\_
- is the fastest to orbit the Sun? \_\_\_\_\_
- has the longest days? \_\_\_\_\_
- has the shortest days? \_\_\_\_\_
- has the most satellites? \_\_\_\_\_
- is closest to the Sun? \_\_\_\_\_
- supports life? \_\_\_\_\_
- is the largest in the Solar System? \_\_\_\_\_
- spins on its axis in the opposite direction? \_\_\_\_\_

8. If you live on Venus, will the Sun rise in the East and set on the West?

---

---

---

9. Why is a "day" on Venus longer than a "year"?

---

---

---

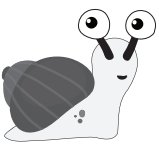
10. Complete with the correct comparative or superlative form of the right adjective:

close short heavy low long cold

- Uranus has a \_\_\_\_\_ surface temperature than the Earth
- On day on Venus is \_\_\_\_\_ than one day on Earth
- Mercury is the \_\_\_\_\_ planet to the Sun
- An Earth year is \_\_\_\_\_ than a Mars year
- Jupiter is very big. It is the \_\_\_\_\_ planet
- Neptune is the \_\_\_\_\_ planet

Write the opposite adjectives to the ones above.

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____



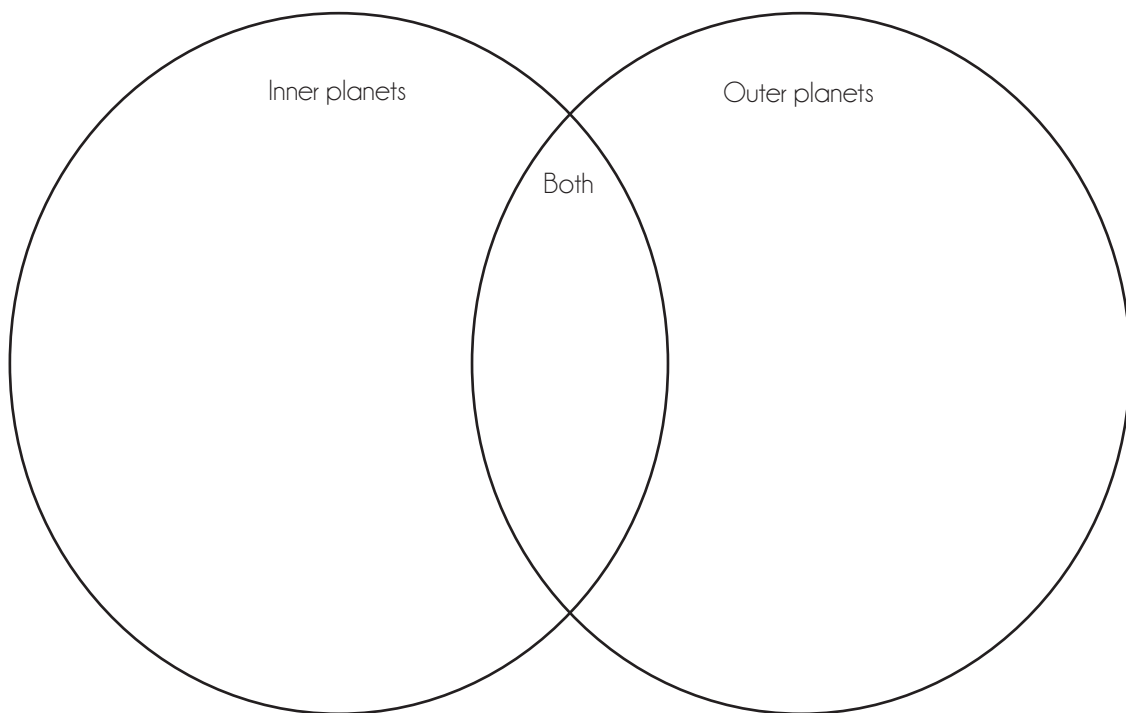
According to what you have learnt, the 8 planets of the Solar System are divided into:

- **Inner planets:** Mercury, Venus, Earth and Mars
- **Outer planets:** Jupiter, Saturn, Uranus and Neptune.

In between both groups, there is the \_\_\_\_\_.

**11. Complete the following Venn diagram with the things both groups of planets have in common and the differences between them. Here you have some things to compare:**

- ◇ distance to the Sun
- ◇ size
- ◇ composition
- ◇ number of satellites
- ◇ rings
- ◇ temperature

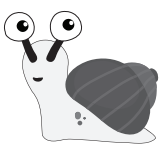


### 2.3. Dwarf planets

A planet is a celestial body that meets three conditions:

- orbits the sun.
- has gravity and a round shape.
- follow an orbit and do not share it with other bodies.

Dwarf planets only fulfil the first two, so they are not considered planets. There are three: Pluto, Ceres (one asteroid located in the asteroid belt) and Eris.



12. Surf the net and find the names of other dwarf planets existing in our Solar System.

---

---

---

---

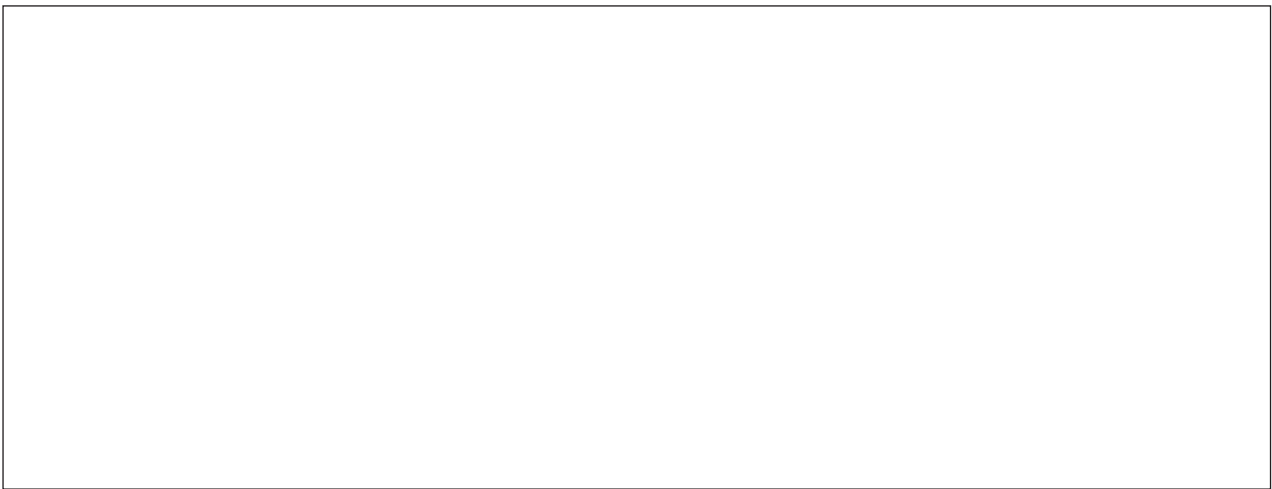
---

## 2.4. Small bodies of the Solar System

In our Solar system, there small bodies that cannot be called planets. They include:

- Asteroids: rocky bodies of different sizes that orbit the Sun in the asteroid belt.
- Meteoroids: asteroids whose orbit crosses that of Earth and can crash into it.
- Meteors: meteoroids that enter the Earth's atmosphere and disintegrate and burn up. Usually they come from the tail of a comet and they leave a visible trail in the sky. They are known as **shooting stars**, and many of them produce a **meteor shower**.
- Meteorites: meteoroids that enter the Earth's atmosphere and do not disintegrate reaching the Earth's surface, where they pulverize and cause craters.
- Comets: Bodies made up of rock, cosmic dust and ice that orbit the Sun with an elliptical and inclined orbit. When they pass near the Sun, the heat evaporates the frozen core of the comet releasing gas and dust which leave a trail looking like a spectacular long tail.

Make a drawing of each one in order to better remember what each of them is



13. When can we see a famous meteor shower known as "lágrimas de San Lorenzo"? Research what causes it.

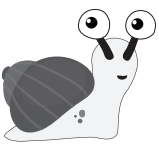
---

---

---

---

---



### 3. DISTANCES IN THE UNIVERSE

The universe is very big, so we cannot always use meters or km to express distances. We use special units like Astronomical Units (AU) and light-years.

#### *What is an Astronomical Unit (AU)?*

It is the distance between the Earth and the Sun= 150.000.000 km

**Example:** Calculate the number of AU between the Earth and Jupiter (628,743,036 km)

#### *What is a light year?*

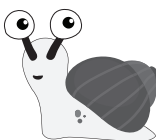
It is the distance light travels in a year. Light makes 300.000 km every second. This makes 9.460.000.000.000 km a year.

**Example:** Calculate the number of light years between the Earth and Neptune (4.400.000.000.000 km)

**14.** *If a star is at 10 light years from Earth, this means its light arrives to Earth after 10 years. If the star dies, when will we notice it?*

- when it dies
- a year before
- a year after
- 10 years after.

*Calculate the distance of this star to Earth in km and AU.*



15. The distance between Earth and Sun is 8 minutes-light. What does this mean?

---

---

---

16. Alfa centauri, the closest star to Earth, is at a distance of 4,367 light-years. Calculate its distance in AU.

## 4. SPACE EXPLORATION

Today, different devices are used to study and learn more about the space. Learn the differences between them:

- Artificial satellites: man-made objects sent into space to remain in orbit around the Earth. They are used for many purposes: communication, meteorology, broadcasting, navigation, etc.
- Space probes: man-made robots launched at specific target planets. They are equipped with cameras and scientific instruments.
- Space shuttles: man-made space craft with engines designed to remain in orbit in space for a time and then return to Earth.
- Space stations: man-made special bases put into orbit around the Earth where astronauts can live for extended periods of time.

17. Decide which type of device the following objects are. Surf the net for more information:

- Curiosity \_\_\_\_\_
- Meteosat \_\_\_\_\_
- Sputnik \_\_\_\_\_
- International Space Station \_\_\_\_\_
- Global Positioning System \_\_\_\_\_
- Apollo 11 \_\_\_\_\_
- Hispasat \_\_\_\_\_
- Opportunity \_\_\_\_\_







# VOCABULARY & GRAMMAR

## VOCABULARY SECTION

Nouns:


Adjectives:


Verbs:


## GRAMMAR SECTION