The European Union

The **European Union** (**EU**) is an economic and political union of 27 member states which are located primarily in Europe. Committed to regional integration, the EU was established by the Treaty of Maastricht in 1993 upon the foundations of the European Communities. With over 500 million citizens, the EU has 21% of the world's economy, making it the third largest economy in 2009.

The EU has developed a single market through a standardised system of laws which apply in all member states, and ensures the free movement of people, goods, services, and capital, including the abolition of passport controls by the **Schengen Agreement** between 22 EU states. It enacts legislation in justice and home affairs, and maintains common policies on trade, agriculture, fisheries and regional development. Sixteen member states have adopted a common currency, the **Euro**, constituting the Euro zone. The Euro started off on 1st January 2002. Malta adopted the Euro on 1st January 2008.

The EU traces its origins from the **European Coal and Steel Community** formed among six countries (Belgium, Netherlands, Luxemburg, Italy, France and West Germany) in 1951 and the Treaty of Rome formed in 1957 by the same states. Since then, it has grown in size through enlargement, and in power through the addition of policy areas to its remit. The last amendment to the constitutional basis of the EU came into force in 2009 and was the Lisbon Treaty, by virtue of which the Charter of Fundamental Rights of the European Union was elevated to legally binding status.

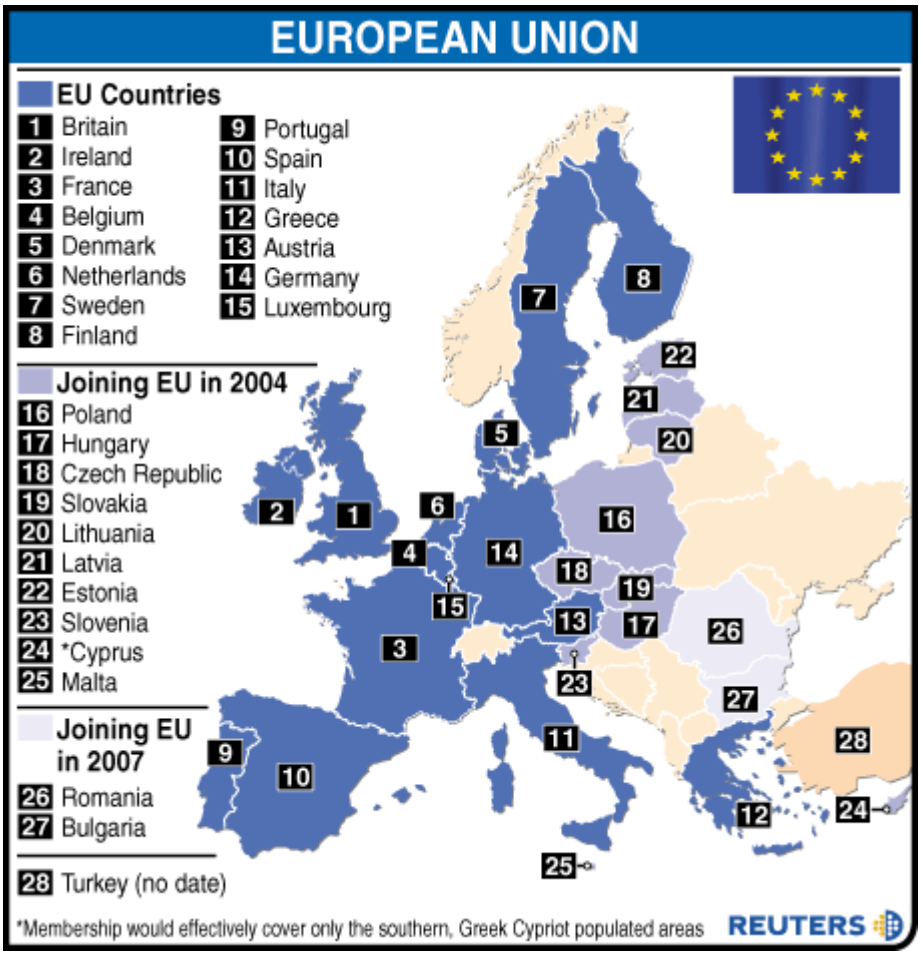


Figure 1: The European Union, showing the dates at which there were the most recent enlargements.

HW: Write down the Capital cities of each of the countries shown on the map.

E.g.

1. **Britain: London**
2. **Ireland: Dublin**
3. **France: Paris**

Factors Affecting Climate

Learn these four key points and you will be able to explain any type of climate.

.

Latitude

- Latitude is how far north or south a place is from the equator. Solar energy is concentrated at the equator. This explains why tropical climates are always hot.
- Towards the North and South Poles solar energy is spread out and is filtered by its longer, oblique-angled journey through the Earth's atmosphere. This explains why it gets colder towards the North and South Poles.

Figure 1: Sunlight concentration on Earth surface.

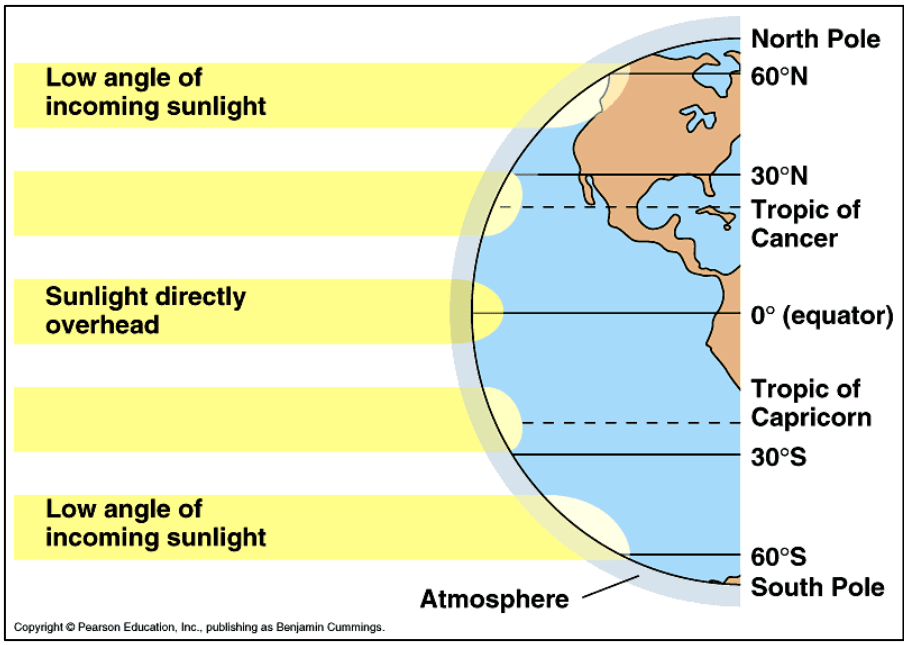
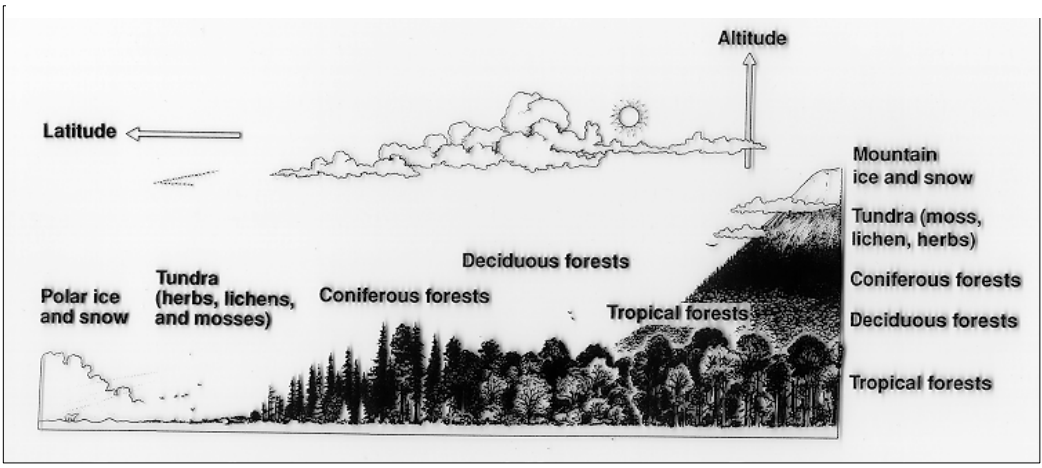


Figure 2: Vegetation change with altitude and temperature.



Altitude

- Altitude describes the height above sea level.
- Solar energy (heat) is absorbed by gases in the atmosphere. The atmosphere becomes thinner as altitude increases. This means that temperatures fall by 1°C every 100m.
- High land causes relief rainfall.

Prevailing winds

- The most frequent winds are called prevailing winds.
- Polar winds bring cold weather.
- Tropical winds bring warm weather.
- Sea winds bring precipitation.
- Land winds bring dry weather.

Figure 3: Prevailing winds on Britain.

Distance from sea

- The sea has a moderating influence on climate.
- In summer the sea takes a long time to heat up - cooling the surrounding area.
- In winter the sea takes a long time to cool down - warming the surrounding area.
- Warm ocean currents flow from tropical areas warming up the surrounding area.
- Cool ocean currents flow from the poles. They may lower temperatures and bring fog.

What Factors Affect Climate?

What is the difference between weather (it-temp) and climate (il-klima)?

Weather

Weather is the day to day condition of the air. It includes temperature, precipitation and wind.

Weather report – Today's weather

Sky conditions

_____

Wind direction and strength

_____

Temperature_____

Rainfall_____

Climate

The climate of a place is the average of the weather over many years.

E.g. England has cool summers and mild winters

Malta

_____

_____

_____

There are four main factors affecting climate – **Latitude (kemm il-post hu il-boghod mil- Equator), Distance from the sea, Prevailing winds (l-iktar rih li jonfoh spiss) and Relief (height- kemm il-post hu l-fuq mill-livel tal-bahar).**

(a)Latitude

(b)Distance from the sea

(c)

(d) Prevailing wind

(e) Height

The European Union

D S Y N A F E T S U B D S P H

N P N O I C I W E U K N D O U

A A A A E A E N L T D A N R N

L I M E U D T G L N P L A T G

E N R I E S A I Y A M O L U A

R G E N T R T M R G N P R G R

I E G R I A U R R B Q D E A Y

A L P A L I L U I U N J H L A

F I J U G K O Y Y A O J T Q T

R U K L B B S U R P Y C E O L

A X E A M L L I T H U A N I A

N B S E V A I N E V O L S T M

C L X M Q O C C E S T O N I A

E U F T D A L A I N A M O R O

L A T V I A R S D E N M A R K

AUSTRIA
BELGIUM
BRITAIN
BULGARIA
CYPRUS
DENMARK
ESTONIA
FINLAND
FRANCE
GERMANY
GREECE
HUNGARY
IRELAND
ITALY
LATVIA
LITHUANIA
LUXEMBOURG
MALTA
NETHERLANDS
POLAND
PORTUGAL
REPUBLIC
ROMANIA
SLOVAKIA
SLOVENIA
SPAIN
SWEDEN

What is the Equatorial Climate? Pg 8-9

This is the climate found around the equator. The Equatorial climate is hot and wet throughout the year. There are no seasons and each day is very similar to the next.

The weather in the equatorial climate belt is very predictable, and is repeated day after day for most of the year. The sun rises (at 6am) and sets (at 6pm) always at the same time. Conditions are calm, with very little wind. With the high temperatures reached (up to 33°C), there is high evaporation and this causes large amounts of water vapour to rise in the air. These cool and condense to form cumulus, and later cumolo-nimbus clouds. Rain falls by 3pm.

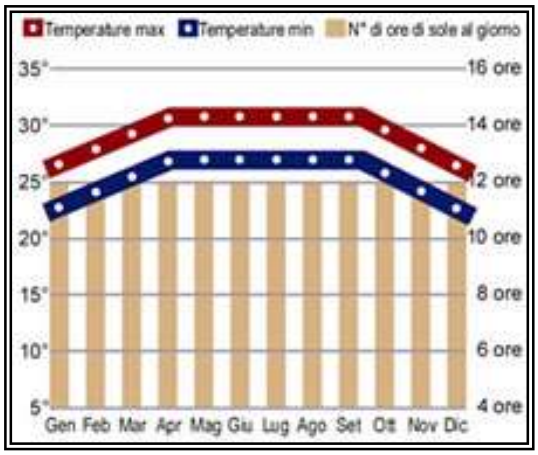


Figure 4 Climate graph for an equatorial location

The equatorial climate is found within 5° North and South of the Equator. The two main areas where it is found are the huge river basins of the Amazon in South America and the Zaire in Africa.

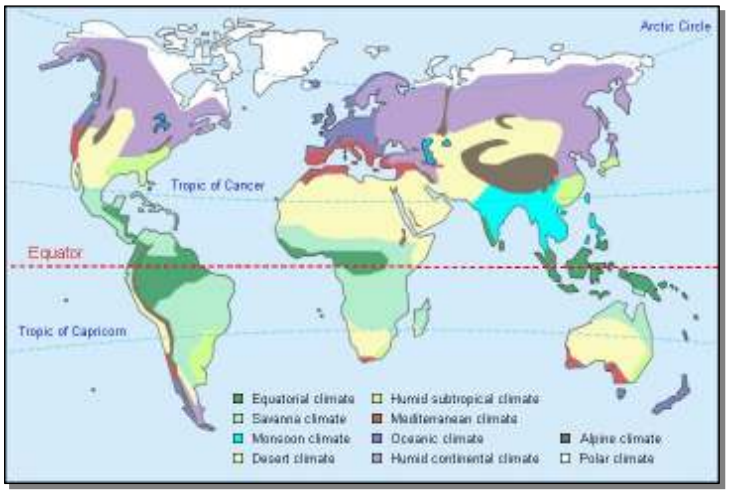


Figure 5 Map Showing different climate types. Equatorial climate is found on the equator.

The major factor which affects this climate is its latitude. The sun is overhead throughout the year. This gives high temperatures and is responsible for the convectional rainfall. There is no prevailing wind and the air is calm apart from during thunderstorms.

Altitude has an effect on the climate itself. Where there are mountains high enough, such as Mount Kenya and Mount Kilimanjaro in Africa and Cotopaxi and Chimborazo in South America, the temperature is cold enough for ice to lie there all year round.

HW – Pg 9 Questions 1, 2, 3, 4.

What are Tropical Rainforests? Pg 10-11

The tropical rain forests grow in equatorial climates. They are the densest forests and provide the most luxuriant vegetation on earth. One third of the worlds' trees grow there.

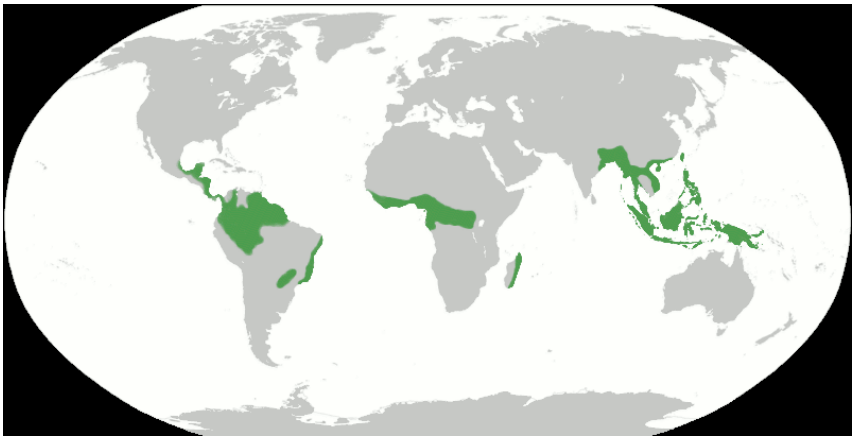


Figure 6: Map showing areas with equatorial and tropical rainforests

Many of the trees are hardwoods, such as mahogany, greenheart and rosewood. The vegetation has had to adapt to the high temperatures and the heavy rainfall. Many of the trees and plants have proved to be of value to man – over one third of our medicines come from plants found in the rainforests. For example, a periwinkle plant has been found to be successful for treating leukaemia in children.

Figure 2: A periwinkle flower

The rainforests are populated by relatively small animals – large ones would find it difficult to pass between the small spaces between the large trees. Some species live in the **canopy** (fejn l-iktar li hemm sigar). Others live in the **under-canopy**, on the forest floor, or in the many swamps and rivers.

Adaptations by vegetation to the equatorial climate	**Adaptations by fauna to the equatorial rainforest**
Trees can grow to over 40m to reach sunlight	Bright colours – indicate the animal is poisonous
Forest looks evergreen as the trees continue growing all year round.	Camouflage – e.g. tiger's stripes. To conceal the animal better
Leaves have drip tips to shed the heavy rainfall	Small size – difficult to catch, better mobility amongst the trees
Tree trunks are straight and branchless to as to grow as tall as possible.	Very varied diets e.g. monkeys can subsit on many different fruits
Forest floor is dark and damp. Very few plants can grow there as it is too dark.	Extreme specialisation – survival of some ants on one single tree species
Dense undergrowth develops where there are openings and sunlight can penetrate.	
Rivers flood for several months each year	
Fallen leaves soon rot in the hot, wet climate	
Trees have large buttress roots to give support ot the trunks.	

Desert Climates

For a place to be considered a desert, it must have an annual precipitation of less than 250mm a year. Temperature does not define whether the place is a desert or not!!

In the hot deserts, there is a big difference between day and night temperatures. As the hot deserts rarely have any cloud, the sun easily heats the ground during the day and temperatures can reach 50°C. At night, with no cloud cover to keep the heat, temperatures often fall near to freezing. Hot deserts have just two seasons a year – very hot summers and warm winters.

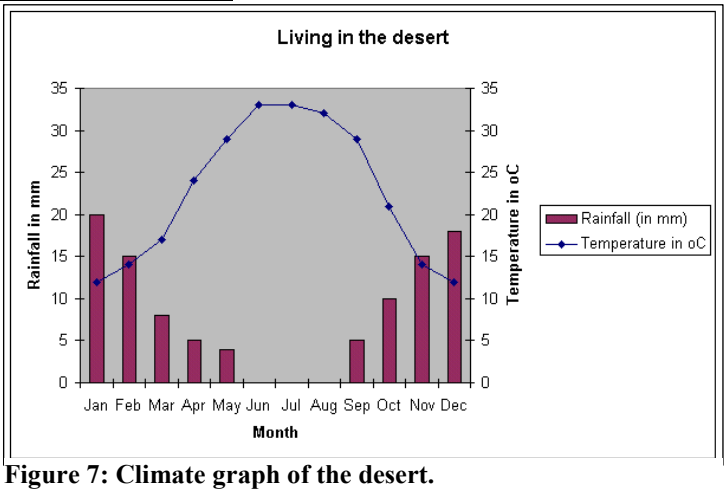


Figure 7: Climate graph of the desert.

Table 1: Factors affecting the Sahara Desert climate.

	Why does the Sahara get hot summers?	***Why are its winters much cooler?***
Latitude	The sun is overhead at this time of the year.	The sun is still high in the sky, but is no longer overhead.
Distance from the Sea	Land areas heat up rapidly. It is a long way from any cooling effect of the sea.	Land areas lose heat rapidly. It is a long way from any warming effect of the sea.
Prevailing wind	Blows from the warm land.	Blows the cool land.

Table 2: Why is the Sahara so Dry?

Why is the Sahara So Dry?	
Prevailing wind	Blows from the land. No moisture to pick up and so too dry to form clouds or give rain.
Descending Air	Air descends and warms up. As there is no condensation, skies remain cloudless and the weather stays dry.

The Sahara is the world's largest desert.

Desert climates occur in places where air is descending. In deserts the descending air gets warmer, causes evaporation and gives cloudless skies.

Prevailing winds do not bring rain as they come from the land. When the rain does fall, it comes in heavy, convectional storms. Some places get two or three storms in a single month, and go without rain for two or three years.

Figure 8: World map showing the three different desert types.

Places that have a hot desert climate are found:

- In the centre or on the west coast of settlements
- Usually between latitudes 10° and 30° north or south of the Equator
- Where prevailing winds come from the dry land.

How do Plants and Wildlife survive in tropical Deserts?

The biggest problem to living in desert areas is the lack of water – drought. Plants and wildlife have had to adapt to looking for and storing water. This means that they have had to adapt to living in drought conditions.

Adapt

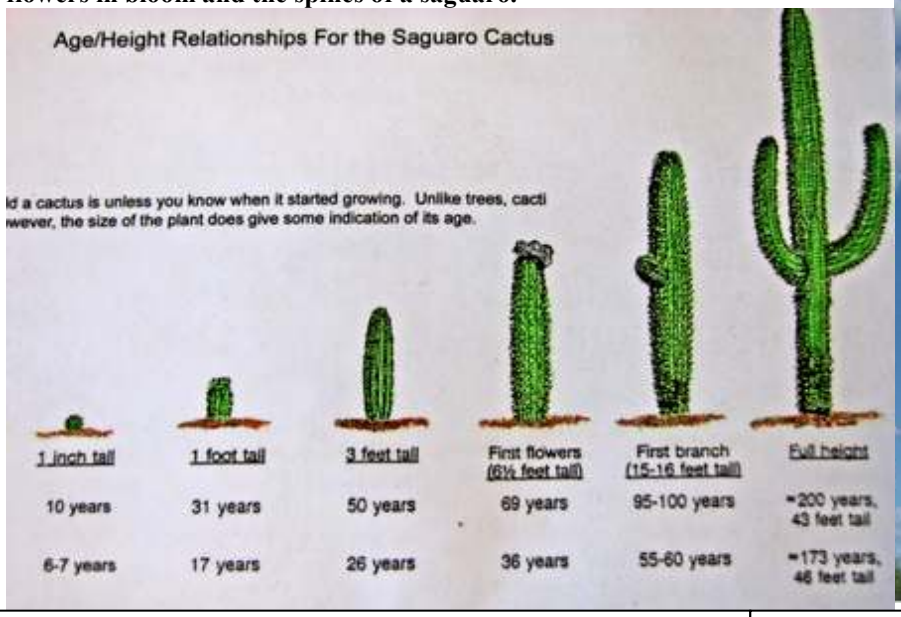
_____

Drought

_____

Many plants have to lie dormant for long periods. Dormant means that a plant is resting and is inactive. Plants also try to stay as much away as possible from other plants. However, as soon as it rains, the plants will all suddenly come back to life. The desert is said to "Bloom".

Figure 1: Development of a saguaro cactus, a mature saguro, saguaro flowers in bloom and the spines of a saguaro.



Plants have adapted to the desert drought in the following ways

- **long and shallow roots – to absorb rain water quickly,**
- **some plants can store water in bulbs on their roots – in this way they have a supply of water away from the sun's heat and evaporation,**
- **cacti have fleshy stem to store water,**
- **seeds lie dormant until it rains,**
- **thorns instead of leaves to reduce transpiration**
- **thick waxy skin to reflect some of the sun's heat and reduce loss of moisture.**

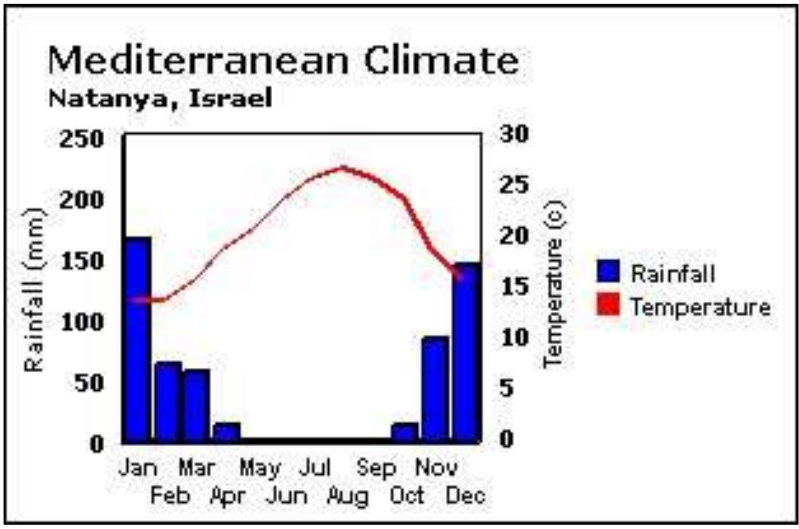
Wildlife has adapted to the desert drought in the following ways

- **Many species are nocturnal – they are active only at night.**
- **Some burrow into the sand to avoid the daytime heat.**
- **The Gerenuk antelope never drinks but gets all its water from plants upon which it feeds.**
- **Lizards and snakes are cold-blooded and so need bask in the sun to move more quickly and they can stand high temperatures.**

The camel can live in the hot deserts due to the following adaptations –

- **Can store water and food for long journeys.**
- **They can close their eyes, nose and mouth in a sandstorm.**
- **They have large pads on their feet for walking over sand and stones.**
- **Their tough, leathery mouths let them eat the few thorny plants which grow in the desert.**
- **Their thick coats insulate them from the strong desert heat.**
- **Their body temperatures can vary from 34ºC and 41ºC without the need of sweating.**

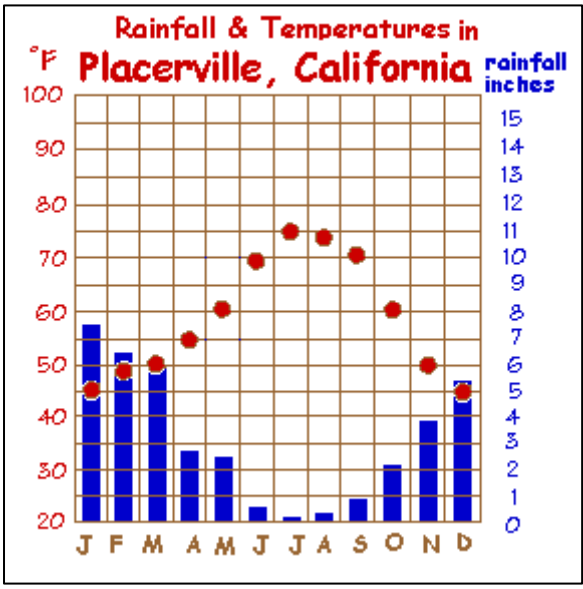
What is a Mediterranean Climate?



The Mediterranean Climate has two very different seasons. In summer the weather is hot and dry, while in winter it is warm and wet.

Why are summers hot and dry?

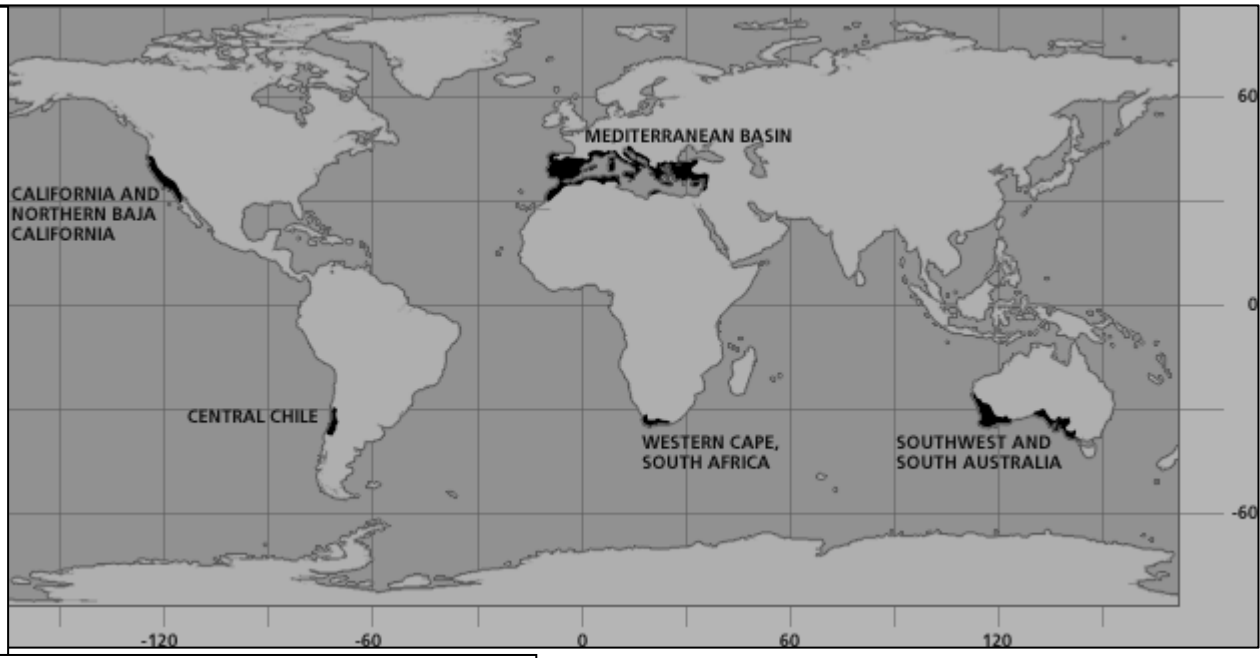
- Summers are hot because the high angle of the sun in the sky.
- The prevailing wind blows from the land.
  As the land is hot at this time of the year, the wind will bring hot weather.
- The prevailing wind blowing over the land is also dry, and so it does not rain.



Why are winters warm and wet?

- Although the sun is still high in the sky, it is lower than in summer. This gives warm days.
- The sea, which warmed up during the summer, looses its heat slowly over the winter, keeping places near to the coast warm.
- The prevailing wind blows over the sea in winter. This brings warm and moist air.
- As the air rises over the coastal mountains, it gives large amounts of relief rainfall.

The name Mediterranean is given to climates in several parts of the world.



The map shows that the this type of climate is usually found

- **On the west coast of continents**
- **Between latitudes 30º and 40º north and south of the Equator**

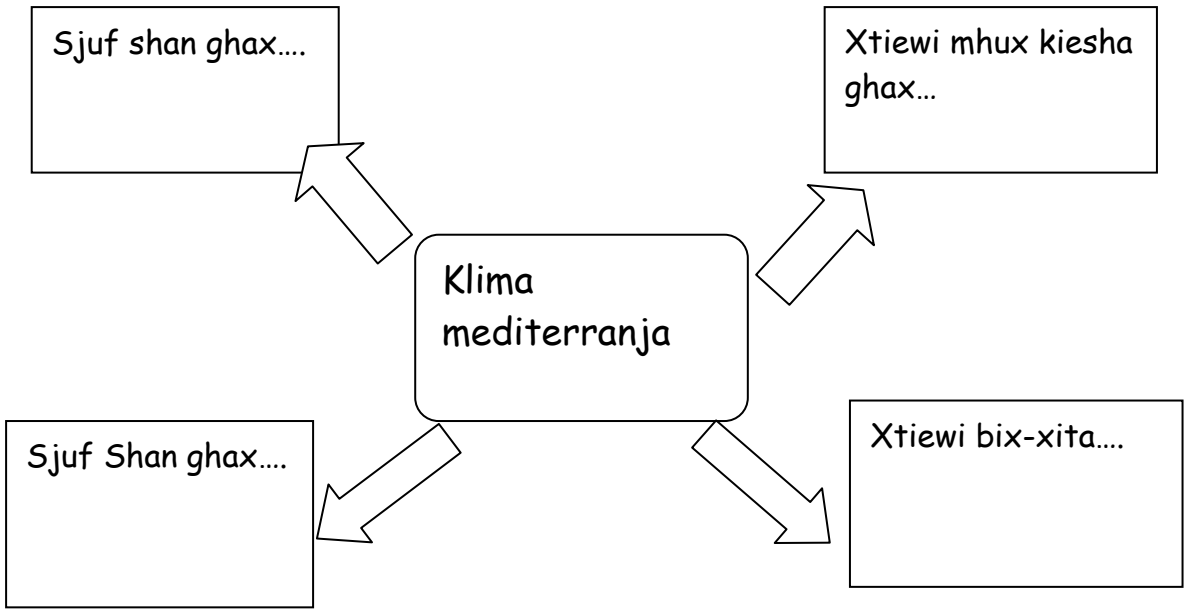
Il-Klima tal-Mediterran

1) Immarka fuq il-mappa tad-dinja l-postijiet li ghandhom klima Meditterranja.

2b) Kompli is-sentenzi billi izzid minn din il-lista

- ... l-irjieh prevalenti jonfhu mil-art.
- .... ix-xemx titla gholja fis-sema.
- .... l-effet moderanti tal-bahar

1. .... l-irjieh prevalenti jonfhu mil-bahar.



Maltese Ecosystems

Organisms, together with the environment they inhabit, constitute an ecosystem. Malta has a number of major ecosystems, which are widespread, and a number of minor ecosystems, which are rare. Ecosystems can be classified according to their vegetation.

The most typical vegetation of the Mediterranean is dominated by hard leaved evergreen trees and shrubs. **Woodland**, as with trees such as the Evergreen Oak and the Aleppo Pine, is the most developed type of vegetation. In Malta, this vegetation type as virtually exterminated following the arrival of humans on the islands. Only some remnants remain, with small patches of Evergreen Oak. Some of these trees, still existing at Wardija, are possibly between 500 and 900 years old.

Another ecosystem is the **Maquis**. It is characterised by small trees and large shrubs, such as Carob, Olive, Bay Laurel (rand) and climbers such as the Ivy, and large herbs such as the Bear's Breaches (Hannewija). Maquis is typically found on the sides and bottoms of deeper valleys and at the base of cliff formations, where human influence is minimal. Maquis is the product of degradation by humans of the Woodland ecosystem.

Figure 9: Garigue area at Siggiewi

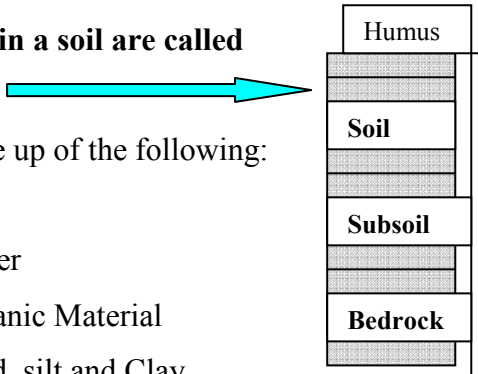
The **garigue** is an ecosystem which develops on large expanses of limestone bearing lots of small holes and fissures. Here one finds dense, low-growing aromatic shrubs, such as the Mediterranean Thyme, highly adapted to surviving in the hot and dry summer months. Garigue is the result of strong degradation of the Maquis, and this usually entails massive losses of soil. The garigue is tied to the Karst landscape, and as such in the Maltese Islands it is found only on the Upper and Lower Coralline Limestone strata.

The **steppe** is characterised by herbaceous plants especially grasses, legumes and tuberous and bulbous species such as the Squill and Asphodel. The steppe is derived from maquis and garigue which have been degraded through various causes, including fire and grazing. There are many different kinds of steppe – e.g. clay slope steppe.

Soil

Soil takes a long time to form. It is usually less than one meter in depth. There are many types of soil. Each soil depends upon the climate of a place, the vegetation which grows there and the type of underlying rock. In many places the natural soil has been altered by human activities such as farming and forestry.

The layers in a soil are called horizons.



Soil is made up of the following:

1. Air
2. Water
3. Organic Material
4. Sand, silt and Clay

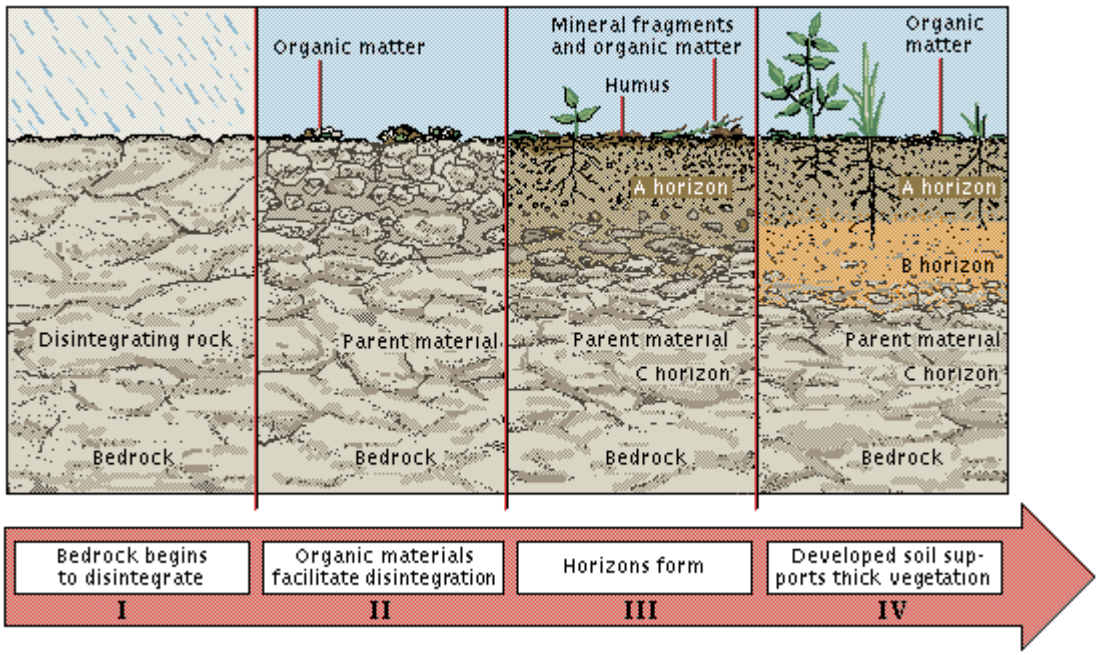
Soil Formation

Soil is formed from the weathering of the rock surface due to chemical weathering. The surface breaks down into smaller pieces. Moss starts growing in this material, and when it dies it becomes organic matter. Over time a thin layer of soil forms. This allows larger plants to grow, which continue to break down the rock and create new soil. Decaying plant matter in the soil makes the soil richer and trees and plants can now grow more quickly.

Soil has a number of characteristics – Soil Moisture, Soil Temperature, Infiltration Rate, soil pH, Texture, Structure, Colour and Depth.

Soil Moisture: Soil moisture is a measure of how much water there is in the soil. Soil

Soil Texture: Soil texture is the material composition of the soil type. All soils are made up of sand, silt and clay. A soil dominated by sand is called a Sandy Soil, a soil dominated by silt is called a Silty Soil and a soil dominated by clay is called a Clayey soil. When a soil has many small pores, such as is the case with clayey soils, they can hold a lot of water. However, when holding a lot of water, the soil needs a lot of heat to increase in temperature. When a soil has less pores (but larger ones), such as a sandy soil, the soil holds less water, is more easily warmed up and becomes drier much faster.



Depth: This is found by measuring the distance between the ground surface and the top of the underlying rock. The deeper the soil, the more water it can hold.

Organic Content: The remains of dead leaves, roots, plants and animals can often be seen in the soil. These rot away to form humus. Humus is rich in goodness which helps plants and crops to grow.

Colour: Humus affects the colour of the soil. The more humus the soil has, the darker it becomes.

Soil Types in the Maltese Islands

Maltese soils are characterized by their close similarity to the parent rock material, their relatively young age, the ineffectiveness of the climate in producing soil horizon development, and the great importance of human activities in modifying them. Using the Kubiena classification system, Maltese soils are of three main types:

⇒ **Terra Soils** which are relic soils formed during the Pleistocene and which are little affected by the present climate. They are mature and extensively weathered, have low calcium carbonate content, and are also low in organic matter. Terra soils develop on karstland.

⇒ **Xerorendzinas** which are immature soils with a high calcium carbonate content and low in organic matter. These develop on weathered Globigerina Limestone and on valley deposits.

⇒ **Carbonate Raw Soils** which are also immature and which have a very high calcium carbonate content and are very low in organic matter. These develop on weathered quaternary sandstones, Greensand, the lower beds of the Upper Coralline Limestone, Blue Clay and on Globigerina Limestone.

Moreover, there are soil complexes formed through human agency: either by mixing of powdered rock with already existing soil at the time fields were laid out, or by the addition of rock debris to soil during reclamation of disused quarries, or by mixing domestic waste with soil for use in land reclamation or by mixing of different soil types transported from different localities

Soil Erosion

Soil Erosion – The removal of soil from one place and its deposition to another. This is done mainly by

- **Water**
- **Wind**

Around the world, soil erosion is mainly controlled by vegetation – trees and plants growing on it. Whenever the vegetation is lost, the soil goes with it soon after. Plants and trees both help to protect the soil from the effects of strong winds and lots of rain.

In Malta soil erosion is controlled mainly by terrace walls *(hitan tas-sejjieh).* These help to retain *(jzommu)* soil from going down the slopes due to rain water.

Wind-blown soil erosion in Malta is prevented by the plants that are grown on the soil. If the fields are not tended *(mahduma)* the soil will get blown away by the wind. Wind erosion is also minimised by the rubble walls due them blocking the soil particles being blown at a low level.

Erosion is greatest on steep slopes and when the soil is uncovered.

Erosion is least where there is a thick cover of vegetation.

Plants and trees give shelter from the wind and their roots hold together the soil particles.

Causes of soil erosion

1. **Overgrazing –** when too many animals are kept in the same area they will eat all the grass. This leaves the soil bare to wind and water erosion.

2. **Up and down ploughing** – on a steep hill, farmers find it easier to plough up and down the hill rather than across it. Water gets into the furrow and goes straight down the slope. The furrows first turn into rills and then when deepened more than 30cm into gullies.

3. **Deforestation** is the cutting down of trees from forests. Cutting down the trees removes the protective cover of the trees' leaves from the rain water and the binding effect of the tree's roots.

4. **Soil exhaustion** - Sometimes the soil is overused – so much that no plants want to grow on it. As it is now bare to the effect of water and wind, it will quickly be removed.

Reducing soil erosion *	**Effects of soil erosion***
Contour ploughing – ploughing across the hillside	**Soil loss hampers food production**
Crop rotation – reduces soil exhaustion by giving it time to recuperate some nutrients	Buildings covered by soil blown by the wind
Keeping dead stalks/plants on soil surface after harvesting	**Land becomes desert and unusable.**
Maintenance of rubble walls	Sudden flash floods
Planting of trees around field border	Roads blocked by blowing soil

Conclusion

Soil erosion is the removal of soil by wind or water. Where leaves intercept the rainfall and roots bind the soil together, erosion is slow. Where people and animals have removed the vegetation cover, soil erosion can be a serious problem.

Global Warming

The world around us has been warming up. For as long as temperature has been recoreded, the ten hottest years have been between 1990 and 2005. 2005 is the hottest year on record. This process is known as **Global warming**. Global warming is thought to be the result of the Greenhouse Effect.

In the greenhouse effect, the sun's shortwave radiation enters into the atmosphere and is absorbed by the earth. The earth radiates back some of it in the form of longwave radiation, which is able to pass through the atmosphere. When there is an increase of the greenhouse gasses, the longwave radiation is unable to pass through it and thus the heat continues to build up inside the atmosphere. This is heating up the atmosphere, and the world.

Our atmosphere is made up of

- 70% Nitrogen
- 21% oxygen
- 3% Carbon dioxide
- Rest – other gasses.

Carbon dioxide and some of the other gasses, such as methane, are called Greenhouse Gasses. These are the gasses able to absorb the longwave radiation mentioned above.

Carbon dioxide is increasing in the world's atmosphere due to the burning of fossil fuels. These produce a lot of carbon dioxide when burned to produce energy.

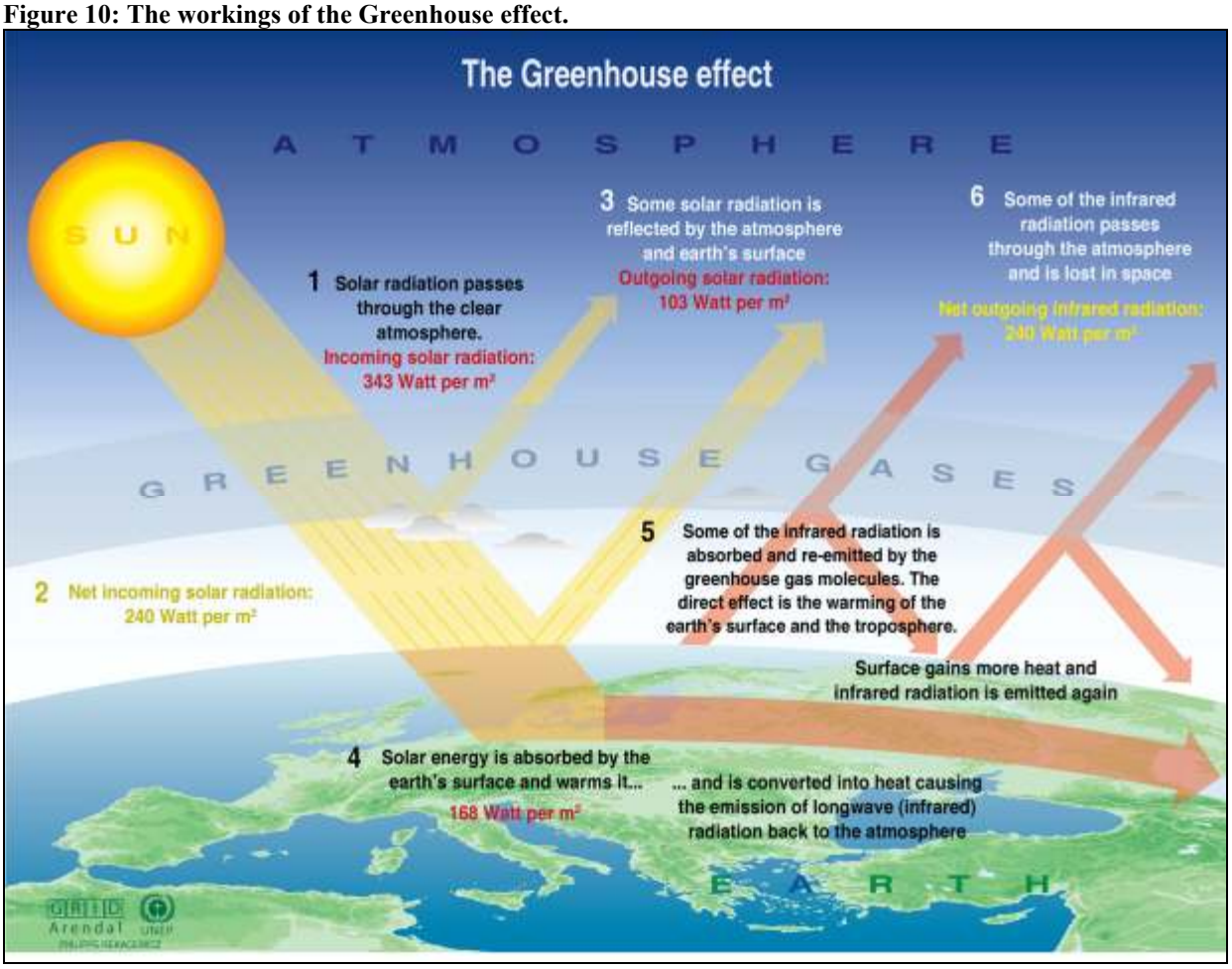
Some of the effects of global warming include

- The melting of ice in glaciers and on Antarctica and Greenland.
- Rising sea levels due to the melted ice.
- Low lying areas would be flooded
- Stronger storms and longer droughts could be experienced
- Hot regions may become hotter, and dry regions could become dryer.
- Tropical diseases will move towards the poles
- Advancement of deserts.

Other notes – **Global Warming**

The atmosphere around the world has almost always helped to warm up the planet, by absorbing some of the sun's heat, and keeping it in. this has helped to keep the planet warm. This was done by means of what are known as greenhouse gasses. One of the gasses responsible for this is carbon dioxide (CO_2). This process is called the Greenhouse Effect.

Figure 10: The workings of the Greenhouse effect.



Man is burning a lot of fossil fuels, thus releasing a lot of CO2. This is heating up the atmosphere more than it should. This process is called Global Warming. Too much warming leads to the melting of polar ice and so to rising sea levels and changes in the world's climate.

Other changes include:

- Stronger Storms
- Areas producing crops will decrease production
- New areas will start producing crops
- Tropical diseases will move towards the poles
- Advancement of deserts.

The Earth

The **Earth** was formed around 4.6 billion years ago from a ball of gas created after the explosion of a star.

1. **Minerals** formed as the gas condensed and iron sank to the earth's **Core**.

2. The Earth's surface cooled and **igneous** rocks formed a hard outer **crust**.

3. The gases released from volcanoes created the **atmosphere**.

The earth became one of nine planets which orbit the sun in our solar system.

The Earth's Structure.

The earth is divided into four layers.

1. **Crust** – a layer of solid rocks around the outside of the Earth. The crust varies in thickness from 5km to 9km. It is broken into huge slabs of rock called tectonic plates.

2. **Mantle** – a layer of semi-molten rock. At over 1200C the rocks are hot enough to melt, but they remain solid or semi-liquid because of the immense pressure.

3. **Outer Core** – a layer of molten rock reaching temperatures of over 5000C. Movements of molten rock in the outer core cause the earth's magnetic field.

4. **Inner core** – at the Earths centre is a solid ball of nickel and iron. The core reaches temperatures of 5500C due to radioactive decay.

Draw Cross-section of the Earth below

Plate Tectonics

The earth's crust is broken up into huge slabs of rock called tectonic plates. There are seven major plates and 12 smaller plates.

There are two different types of tectonic plates:

- **Oceanic plates** – made of basalt, a dense igneous rock. Oceanic plates occur under the seas and oceans are only 5km to 10km thick.

- **Continental plates** – made of granite, a less dense igneous rock. Continental plates form the world's continents and are between 25km and 90km thick.

Both oceanic and continental plates are less dense than the rock in the mantel. This means they are able to float on top of the mantle and move slowly aournd the outside of the Earth.

How do tectonic plates move?

1. Heat from the Earth's core rises as convection currents.
2. Convection currents cause the mantle rock to move very slowly.
3. Movements in the mantle rock drag along the tectonic plates.
4. Tectonic plates move at a rate of about 5 cm each year. This is about the same rate as your fingernails grow.

Movements of tectonic plates result in **earthquakes** and **volcanic** eruptions along **plate boundaries.**

Questions

How many tectonics plates have been identified?

Which type of tectonic plate is the thickest?

Which type of tectonic plates is the densest?

What type of rock forms oceanic plates?

What makes tectonic plates move?

Earthquakes – Causes

An earthquake is a series of **seismic waves** (shock waves) caused by **tectonic plates** moving suddenly. Earthquakes happen mainly at the boundaries between tectonic plates.

What causes Earthquakes?

1. Pressure builds up in the crustal rocks as tectonic plates push together (**destructive** and **collision** boundaries), pull apart (**constructive** boundaries) and slide past each other (**conservative** boundaries).
2. The crustal rocks suddenly deform and snap along a **fault line** underground called the **focus**.
3. The stored energy is released in a series of **seismic waves** which travel outwards towards the earth's surface. The point on the Earth's surface directly above the focus is called the **epicentre**.
4. the seismic waves cause the earth's crust to shake violently for anything from a few seconds to a couple of minutes, though some earthquakes can be much longer (e.g. Lisbon, 1798 was around 10 minutes long).

How are earthquakes measured?

Earthquakes are recorded using an instrument called a **seismometer**. This is a very sensitive microphone which picks up vibrations in the Earth's crust. These vibrations are then plotted on a **seismograph**. The strength of an earthquake is measured on the **Richter Scale**. The damage done by the earthquake is recorded measured by the **Mercalli Scale**.

Questions - Earthquakes

What is the correct term for the shock waves released during an earthquake?

_____

_____

What is the name for the point underground where crustal rock snaps during an earthquake?

_____

What is the name of the center of the Earthquake on the Earth's Surface?

_____

What instrument is used to record Earthquakes?

_____

Arrange the following sentences in the correct order to show how earthquakes happen

A	Crustal rocks snap along a fault line.	
B	Tectonic Plates push Together	
C	Energy is released as seismic waves	
D	Pressure builds up in the crustal rocks	

Earthquakes – Effects

Every year over 6000 earthquakes are recorded around the world. Luckily most of them do little damage, but occasionally a massive earthquake brings death and destruction to an area.

The consequences of earthquakes can be divided into **primary, secondary and long-term effects.**

Primary effects – dangers caused immediately the earthquake happens.

- Seismic waves cause buildings to collapse. Some people are killed immediately.
- Bridges and elevated structures, such as roads, collapse, crushing cars.
- Objects, such as signs and glass fall from buildings, injuring people below.

Secondary effects – hazards faced after the earthquake.

- People trapped in collapsed buildings need to be rescued.
- Fires break out as gas escapes from broken pipes.
- Water supply is cut off due to broken water mains.
- Tsunamis may sweep over coastal areas.

Long-term effects

- Psychological and emotional problems that affect victims and rescuers.
- Unemployment due to destruction of offices and factories.
- Homelessness affects those whose houses were destroyed.
- Economic problems for the government

Questions – Earthquake effects

1. How many earthquakes are recorded every year?

   _____

2. What is the name of a giant sea wave caused by an earthquake?

   _____

3. Why are some people unemployed following a major earthquake?

   _____

   _____

4. Arrange the following questions into primary (P), Secondary (S) or long-term (L) effects.

A	Buildings Collapse	
B	People trapped in collapsed buildings	
C	Rescuers need counselling	
D	People move in with relatives	
E	People killed by falling glass	
F	Buildings are burned down	

Volcanoes – Causes

There are two main types of volcano that you need to know about. However, these are further subdivided into other categories.

Shield volcanoes –

Shield volcanoes are formed on **constructive plate boundaries**. Lava erupts to fill the gap formed when two tectonic plates pull apart. Shield volcanoes are low and wide because of the **thin, runny lava** that flows a long way before it cools.

Composite Volcanoes –

Composite volcanoes are formed on **destructive plate boundaries**. Ocean crust melts as it is pushed down into the hot mantle below. The melted rock forces its way back up through the crust and erupts on the surface. Composite volcanoes erupt ash and **thick, viscous lava** so they are built up in layers.

Volcano causes - Questions

1. Where is the lava store before it erupts from a volcano?

_____

2. What is the name of the pipe running through the middle of the volcano?

---

3. What is the name of the hole at the top of a volcano?

_____

4. Name an example of a shield volcano. _____

5. Name an example of a composite volcano. _____

6. Complete the sentences below using the following words**: wide, constructive, narrow, ash, destructive.**

a) Shield volcanoes occur on _____ plate boundaries.
b) Composite volcanoes occur on _____ plate boundaries.
c) Composite volcanoes are formed from layers of _____ and lava.
d) Shield volcanoes have a _____ base.
e) Composite volcanoes have a _____ base.

Volcano Effects

Pyroclastic Flow – a cloud of red-hot gas, ash, volcanic debris and steam blasts down the side of the volcanoe at over 190km/hr destroying everything in its path.

Mudflow – volcanic ash mixes with rainwater or melted snow and ice, to deadly, fast-flowing rivers of mud. Mudflows can travel for many kilometers per hour downhill. When mudflows stop they set like concrete, burying people, and buildings.

Lava flow — rivers of molten rock flow down the sides of a volcano. Shield volcanoes erupt runny lava at 1200°C, which flows very fast. Composite volcanoes erupt thick lava at 800°C, which moves at about walking pace.

Ash fall — millions of tons of rock and lava are blasted into the atmosphere before falling to the ground as ash. Ash buries buildings, roads and crops leaving an area uninhabitable for a long time.

Toxic clouds — volcanoes release poisonous gases in the form of clouds, such as carbon monoxide, which settle over an area, where all the people and animals can die due to lack of oxygen.

So, why do people still live near to volcanoes?

Despite all these dangers, 360 million people around the world still live around volcanoes. The benefits they find include –

- Weathered ash and lava produce very fertile soil which is excellent for farming. This soil is in many cases clayey, and thus is able to retain moisture.
- Hot water is freely available from natural springs.
- Geothermal energy can be used to produce electricity.