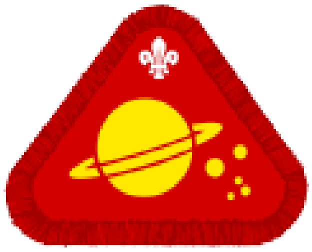
ASTRONOMER



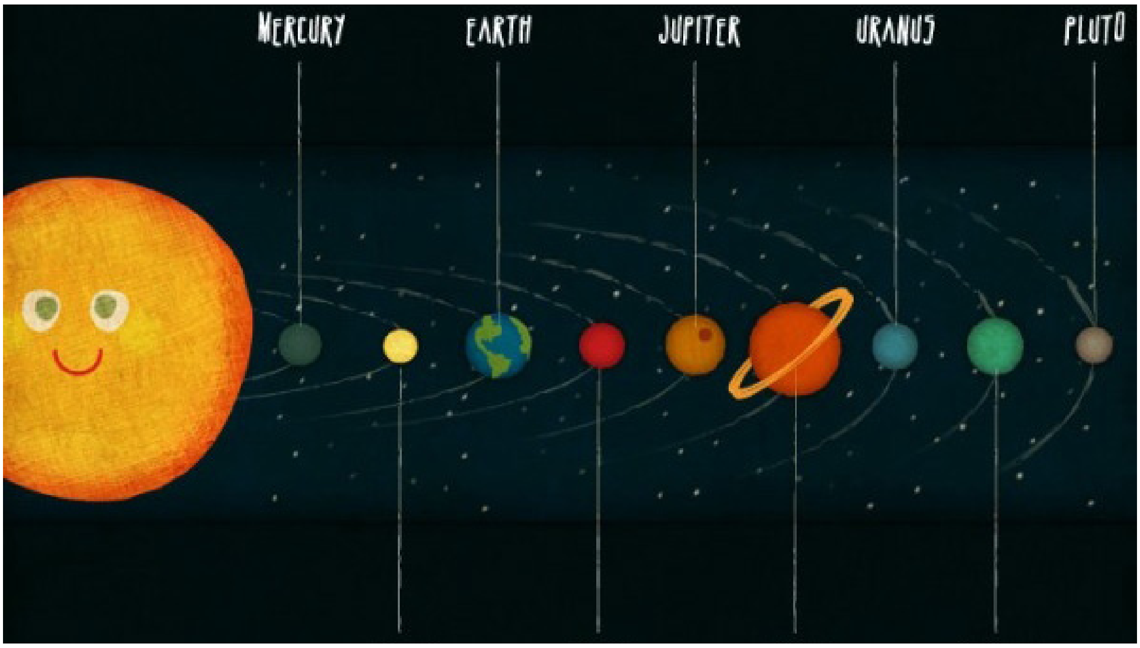
Requirements:

1. Know the names of the planets in the solar system. Draw or make a model of the solar system.
2. Know how the earth moves in space around the sun and how this causes night and day and a change in seasons.
3. Find out and present some information about two of the following: comets, Northern Lights, meteorites, asteroids, space exploration, eclipses or constellations.
4. Find out and present some information about a famous astronomer
5. Participate in a sky night watch and discuss this activity and your observations with your Leader

IMPORTANT:
Never look at the sun either directly or with binoculars or through a telescope as this could damage your eyes.

Leader's Explanation:

What are the planets of the solar system?

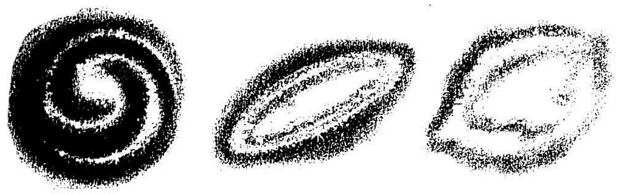


Planet Name	Diameter	Length of Year	No. of moons
Mercury	4,878km	88 Earth Days	0
Venus	12,103Km	225 Earth Days	0
Earth	12,756km	365 Earth Days	1
Mars	6,794km	687 Earth Days	2
Jupiter	142,800km	11.9 Earth Years	62
Saturn	120,000km	29.5 Earth Years	62
Uranus	52,400km	84.0 Earth Years	27
Neptune	49,400km	164.8 Earth Years	14

The first four planets are known as the Inner Planets. The remaining four are called the Outer Planets.

What is a Galaxy?

A Galaxy is an enormous group of stars held together by gravity. Our galaxy, the Milky Way, is in the shape of a spiral. Other galaxies are elliptical or irregular. There may be 100 billion galaxies in the universe. Many of them are grouped together in clusters, with huge areas of space in between.



Spiral Galaxy   Elliptical Galaxy   Irregular Galaxy

What are Shooting Stars?

Shooting stars are meteors, made of particles of rock and dust, that shine brightly as they burn up in the Earth's upper atmosphere.

What is an Eclipse?

Eclipses happen for a brief period when the Moon, Earth and Sun are in line. A lunar eclipse happens when the Earth lies between the Moon and the Sun, blocking off the light to the Moon, so that the Moon seems to vanish. A solar eclipse occurs when the Moon blocks the Sun's light from the Earth, so that the sun seems to disappear.

Why does the Moon change shape each month?

Of course, the Moon does not really change shape – it just seems as though it does. The Moon orbits the Earth once every 27.3 days, a lunar month. The Moon has no light of its own but, as it moves around, it is lit by the Sun. Only the part of the Moon that is both turned towards the Earth and lit by the Sun is visible on Earth. The amount of the Moon's surface that can be seen changes as the Moon's position changes.

When did space exploration begin?

The first artificial satellite, Sputnik 1, was launched by the USSR in October 1957. That same year, a dog called Laika was the first living creature to travel in space in Sputnik 2. It was the USSR again that put the first human in space in 1961, when Yuri Gagarin travelled in Vostok 1. In 1969, US astronauts were the first to land on the Moon in Apollo 11.

Why do we have leap years?

The year is not an exact number of days but about 365 ¼ days. By adding an extra day to the calendar every four years, we ensure that the year does not gradually become out of step with the seasons.

Summer and Winter

1. When the North Pole is tilted towards the sun and the South Pole tilted away, people in the southern part shiver in winter's cold, while those in the northern part enjoy summer.
2. Three months later, the North Pole begins to slant away from the sun and cool down. This is the northern autumn. The South Pole gets more light than it did in winter. This causes spring in the South.
3. After another three months the North Pole is tilted away from the sun, and the South Pole is tilted towards it, causing winter in the North and summer in the South.
4. Finally, the North Pole tilts towards the sun again, bringing spring to the north. Autumn begins in the south.

BIRD LOVER

Requirements:

1. Describe the physical characteristics of a bird. These should include information about feathers and their functions; mouth and beak and feet and claws and why these are different according to the species and its needs; sight; eggs and hatching; nests and where and how they are built and their uses. This information can be presented in the form of a chart or power point presentation using labelled diagrams.

Choose any 1 of the following:

2. Know the names of some Maltese birds which are protected by law in the Maltese Islands. Present pictures or diagrams.

3. Present some information about a particular bird which interests you. Include a diagram.

4. Know the names of some birds which migrate over the Maltese Islands and the reason why birds migrate.

Leader's Explanation:

What makes an animal a Bird?

Birds are the only living animal with feathers. They have many more characteristics that make them unique in the animal kingdom.

BRAINY BIRD FACTS

FEATHERS

If it has feathers, then it is a bird! Birds are the only living creatures with feathers. Made of keratin like reptiles scales and your nails, feathers provide warmth, balance, flight, flotation, color to attract a mate, color and pattern for camouflage, and protection from weather elements.

WINGS

The shape of a bird's wings can tell a lot about where it lives, what it eats, and how it catches prey. Pointed wings indicate a fast flier. Large, broad wings are common among big soaring birds, while birds that manouver around trees have short, broad wings.

BONES

Most birds have strong, flexible skeletons of hollow or semi-hollow bones with many air spaces. This helps them to weigh less. For birds that spend a lot of time in the air, this is very important. Diving birds are an exception. They have solid bones that aid them in torpedoing through the water.

EARS

Under a bird's cheek feathers on each side of their head are holes that lead to their ear drums.

Owls have ears a different levels; one ear is higher on the head than the ear on the other side of its head. This allows the owl to triangulate sound - to pick up sound at slightly different times and use the information to zero in on a mouse in the grass or even under the snow.

EYES

Cardinals have monocular vision. They can see two pictures at the same time because their eyes are at the sides of their head. This allows them to watch for predators in two directions at once.

Owls have binocular vision. Their eyes are pointed forward giving them super distance vision.

Cooper's hawks have monocular, binocular, and telescopic (larger image) vision!

BEAK / BILL

A clue to what and how a bird eats is in its beak (bill) shape and length. A pelican's bill works like a fish net. A mallard's bill works like a strainer. A cardinal's beak works like a nutcracker.

CROP & GIZZARD

Birds do not have teeth. Some bird species store their food in a sack near their esophagus called a crop. Food then goes into the gizzard where it is ground up. Some birds eat gravel or eggshells that stay in their gizzard and aide in grinding up hard to digest food. Yum!

FEET

Most birds have four toes. How the toes are arranged is a clue to how a bird moves and where it lives. Webbed feet are for paddling water and putting on the brakes in flight. Ducks, geese and swans have webbed feet.

Long sharp talons are for catching and carrying prey. Hawks, eagles, osprey and owls have talons.
Three toes forward and one toe backward is for perching. American Robins and Northern Cardinals are perching birds.
Two toes forward and two toes backward is for climbing and clinging to tree trunks. Woodpeckers, nuthatches and creepers have this unique arrangement.

LUNGS

Have you ever seen a bird out of breath? Probably not. Unlike our lungs where air flows in and out, birds have lungs that the air flows through. Bird lungs also have special balloon-like air sacs that can spread out into other parts of their body. Oxygen transfers to the blood all of the time. No huffing and puffing in the bird world!

WARM BLOODED

You, your pet dog, and all other mammals are warm-blooded. Birds are warm-blooded too. A bird turns the energy calories in food into energy to keep their body warm.

Birds, especially small birds, eat a lot of food calories to give their inner furnace enough fuel to stay warm. In the winter this can be a challenge for birds that stay in the north rather than migrating to warmer areas.

OIL GLAND

To keep its feathers in good condition, a bird spreads oil on its feathers. It gets the oil from the uropygium gland above its rump. The bird rubs oil on its beak, then spreads the oil over its feathers. Cleaning and arranging feathers in this way is called "preening."

EGGS

Bird eggs are laid by females and incubated for a time that varies according to the species; a single young hatches from each egg. Average clutch sizes range from one (as in condors) to about 17 (the grey partridge). Clutch size may vary latitudinally within a species. Some birds lay eggs even when the eggs have not been fertilized; it is not uncommon for pet owners to find their lone bird nesting on a clutch of infertile eggs, which are sometimes called wind-eggs.

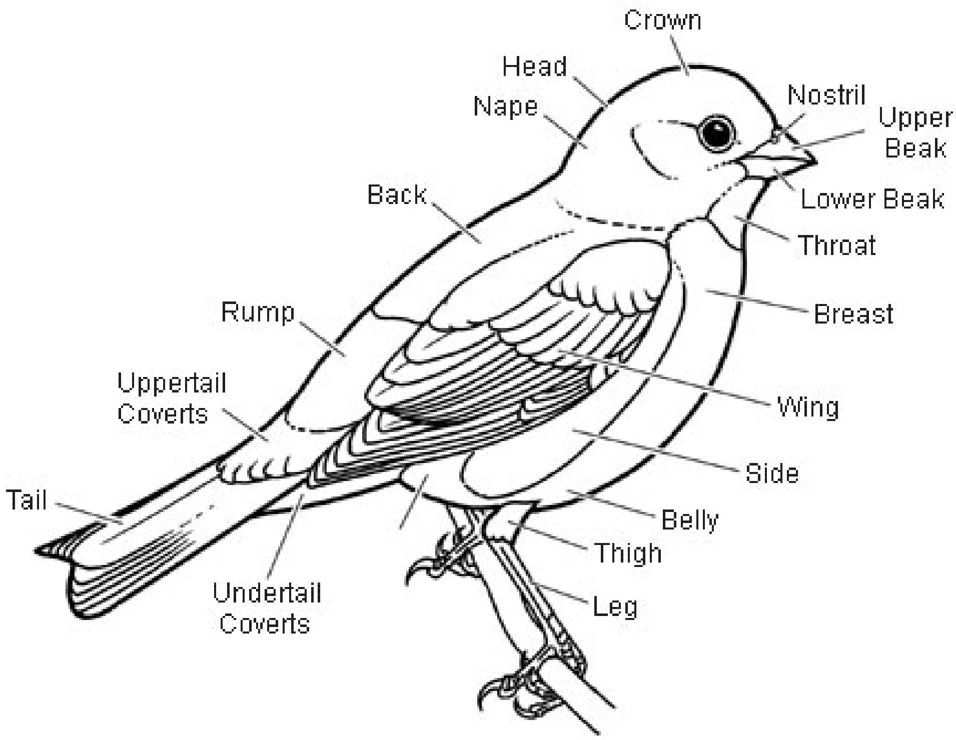
NESTS

In many species the male bird's skill at nest building is a sign of his suitability as a mate; he invests huge effort in the task. Males of the European house wren build up to 12 nests to attract females. They will continue to build new nests until a female is happy with the construction.

Not all birds build nests. Andean Condors lay their eggs on the sandy or gravel surface of a natural cave high in the mountains. Other species will modify a nest site only slightly by scraping the surface of the ground or adding a few sticks or leaves around the eggs.

HATCHING

After 2 or 3 weeks, most songbirds are usually ready to leave the nest. Other birds, such as raptors, may stay in the nest for as long as 8 to 10 weeks. In contrast, precocial birds spend hardly any time in the nest and are often seen wandering in search of food alongside their parents only hours after hatching.



Why do birds migrate?

The reasons are complex and not fully understood. But a simple explanation is food and a safe place to breed. Birds which breed in the summer in the extreme north such as the Arctic benefit from an abundance of food as plants and insect life flourish in the long daylight hours; and because few large permanent predators can survive the harsh winter. Many birds that breed in the Arctic simply lay their eggs on the ground. Being able to fly, they can avoid the harsh winter conditions, and be the first to arrive to enjoy the summer benefits.

BIRD MIGRATION

Migration Routes

Europe's birds breed in spring and summer, raising their young when food is plentiful and the weather hospitable. In autumn, as the cold sets in and food sources dry up, Europe's birds migrate to warmer climates where food supplies are more abundant and the weather is more hospitable. These wintering grounds can be as far as South Africa, or as close as southern Europe; in fact several species over-winter in Malta including the Common Starling, Robin and White Wagtail among others.

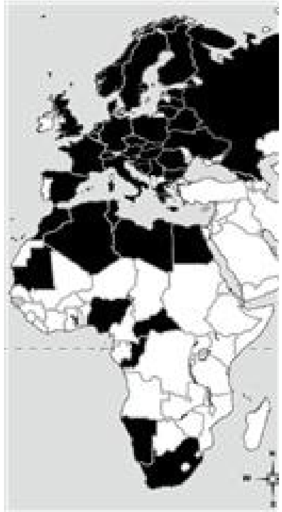
Image showing the three main flyways used by migratory soaring birds. Source: Born to Travel Campaign/VBN.

Birds migrate using three main routes; the east via Spain and Gibraltar, the west via the Bosporus (Istanbul) and Turkey, and the central Mediterranean over the Italian peninsula and the Central Mediterranean islands including the Maltese archipelago.

In spring birds leave their wintering grounds and head north for thebreeding season. Not all the birds which reached the wintering grounds will have survived to leave for home. Of the birds which start the migration, not all will reach their breeding grounds due to severe conditions during migration. Therefore, those birds which do make it to Europe are the survivors of the bird world, the birds on which the future of the species depends.

The Importance of Malta

Ringing studies have revealed links between Malta and 48 other countries, from as far north as Norway and as far south as South Africa.



Birds travelling over Malta come from at least 48 other countries. Source: BirdLife Malta.

Malta is located on the central Mediterranean flyway, one of the three main flyways used by birds to travel between Africa and Europe. This is the only route where birds must cross a large body of water on their migration. When flying over land, birds such as raptors glide on rising bodies of hot air, however over the sea these birds need to expend a lot of energy beating their wings in flight. This is very exhausting and makes the few islands where birds can stop, feed and regain their strength invaluable as resting and refueling spots. The same is true for smaller migratory species that use these areas to seek refuge from sudden storms or high winds. The Maltese archipelago is one of the few places on this route where birds can do so.

If some of the resting bird species find suitable habitat and conditions, they may decide to end their migration and use Malta as their wintering ground. On the other hand, birds returning northward from Africa may decide to stay in Malta to breed. Amongst the species that end their northern migrations in Malta and remain to breed are Little Ringed Plover, Common Swifts and Barn Swallows among others.
Malta has 29 breeding bird species – some resident year-round and some found only during the breeding season.

Historically the islands have been host to many more regularly breeding species, including the Serin, Linnet, Common Kestrel, Peregrine Falcon, Barn Owl and Eurasian Jackdaw, among others. However, intense illegal hunting and/or trapping has led to the local disappearance of these target species.

BOOK READER

Requirements:

1. Produce a list of eight books you have read recently. Then out of these, choose four and tell the examiner something about them. At least one of these books should be in English and one in Maltese and are to include at least one factual.

Note: *The 4 books must be of a reasonable standard, taking the Cub Scout's age and development into account.*

2. Show that you understand how to care for books.
3. Show that you can use a dictionary, an encyclopedia, and a telephone directory.
4. Explain to the examiner how the books in a library are set out and how you would find a specific fiction book.

BOTANIST

Requirements:

1. Grow a plant in a pot. This plant could be either a flower or a vegetable or a fruit or a herb. Take it to the pack meeting to show to the other cubs and explain how you grew it.

Choose four of the following alternatives:

2. How do plants grow? Why are light and water essential to plants? Present a labelled diagram to demonstrate this process.

3. What is the job of the roots?

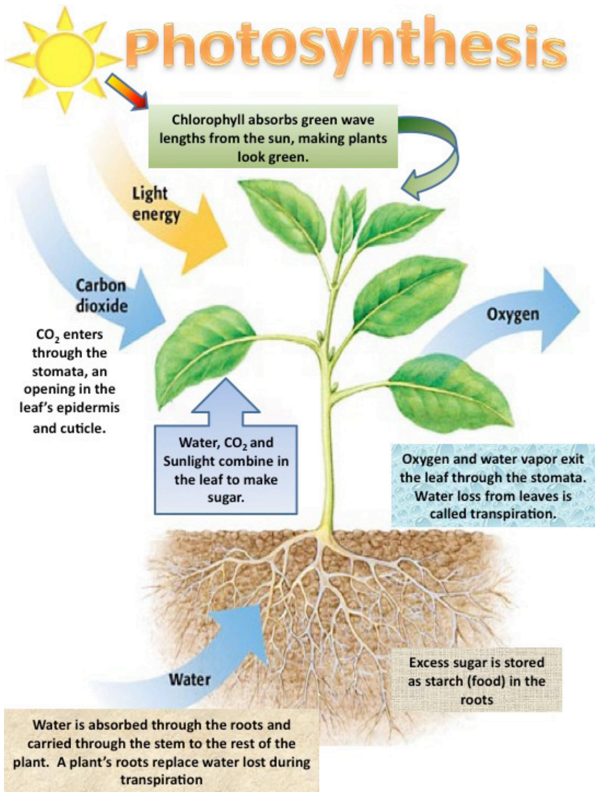
4. What happens to the water a plant absorbs?

5. How can plants live in the desert?

6. How can we tell the age of a tree?

7. Why are plants important to man?

Leader's Explanation:



How do plants live and grow......

What is Photosynthesis?
Photosynthesis may sound like a big word, but it's actually pretty simple. You can divide it into two parts: "Photo" is the Greek word for "Light," and "synthesis," is the Greek word for "putting together," which explains what photosynthesis is. It is using light to put things together. You may have noticed that all animals and humans eat food, but plants don't eat anything. Photosynthesis is how plants eat. They use this process to make their own food. Since they don't have to move around to find food, plants stay in one place, since they can make their food anywhere as long as they have three things.

The three things are Carbon Dioxide, Water, and Light. You have probably heard of Carbon dioxide. It is a chemical that is in the air. Every time you breathe in, you breath in a bunch of chemicals in the air, including oxygen and carbon dioxide. Carbon dioxide is also one of the chemicals that causes global warming. But we'll get to that in a little bit. Here's what photosynthesis looks like:

Carbon Dioxide + Water + Light ----> Sugar + Oxygen

Plants breathe, just like us. They even have little openings that can look like mouths, but they are too small for us to see without a microscope. When we breathe in, we want to breath in oxygen. Plants want to breathe in Carbon Dioxide. Plants also drink. This is why you need to water plants or they will die. They use their roots to suck water up into their bodies, and their little mouths to breath in the carbon dioxide. Once they have both of these things, all they need is light. Leaves are made up of a bunch of tiny cells, where this happens. Inside the cells are tiny little things called chloroplasts. Chloroplasts are what makes leaves green, and they are also what takes the carbon dioxide, the water, and the light, and turns them into sugar and oxygen.

The sugar is then used by the plants for food, and the oxygen is breathed out into the atmosphere. This process as a whole is "photosynthesis."

Why are plants important?

If there were no plants, there could not be animal life on earth. All animals either eat plants or eat other animals that in turn eat plants themselves. In this way every living thing on Earth indirectly gets its energy from the Sun, although only plants can convert the Sun's light into a usable form.

What is the job of the roots?

Roots have two important jobs. One is to keep the plant in position, that is they act as an anchor. They grow down and spread out in the ground. They stop the wind from blowing down the plant and rain water from washing it away. Also, tiny hairs on the roots absorb water and minerals from the soil and these are then carried to all parts of the plant.

How do plants live in the desert?

Plants which live in the desert are special ones. They have very deep roots that spread out far below the surface and so catch every drop of water that might fall. Most desert plants store up all the water they can get. Some plants eg. the barrel cactus can swell up to hold a water store. Other plants slow their living between rains but then, when it rains, they burst into life and quickly produce seeds before it gets dry again. Desert plants have few stomata. This helps them save water which is precious. Many desert plants have lots of thorns. These prevent animals from eating them and also make shadows which helps keep a plant cooler and make it less liable to evaporation.

How can we tell the age of a tree?

A tree grows from the inside outwards. Each year a layer of new wood grows near the centre of the trunk. As the layers build up, the older layers are pushed outwards and the trunk gets thicker. By counting the number of rings inside a cut tree trunk, you can tell how old a tree is. An apple tree may live for 100 years , an oak tree for 1000 years and an olive tree for 3000 years.

What happens to the water a plant absorbs?

This water rises through the stem, enters the leaves and evaporates from tiny openings (like the human pores) called stomata. As water is lost through transpiration more water is drawn up by the roots. Water also helps the plant keep its shape. Plants with an adequate supply of water are stiff and firm. When the plant does not have enough water it becomes soft and droops/wilts. Perform an experiment to demonstrate transpiration (eg. a plant enclosed in a transparent plastic bag from the pot upwards becomes misty after some time) or the capillary action in a plant's stem (eg. a pale coloured flower will change colour when dipped in a coloured solution and left for some time.)

Why are plants important to men?

Humans and animals do the exact opposite of photosynthesis. They breathe in oxygen and breathe out carbon dioxide. This means that we give plants more carbon dioxide, and they give us more oxygen. Without plants we wouldn't be able to survive, but there is enough carbon dioxide in the atmosphere that plants would still exist without us!

The atmosphere is full of carbon dioxide. Carbon dioxide is a greenhouse gas, meaning that if it is in the atmosphere, it holds heat close to the earth, which makes our planet warm. If we didn't have carbon dioxide, we wouldn't be a warm planet, we would be cold like the moon. If we had too much carbon dioxide, we would be like Venus, which is a really hot planet. Plants keep our atmosphere from getting too much carbon dioxide and heating up by turning a lot of it into oxygen.

Many plants produce special substances in their roots, leaves, flowers, or seeds that help them to survive. For example, some plants make nasty-tasting substances to defend themselves against plant-eating animals. Since earliest times, people have gathered these substances to create herbal medicines to treat certain diseases. Many of the powerful drugs used in modern medicines originated in plants. Today's plant-based drugs treat a range of diseases, from headaches to cancer.

PLANT PRODUCTS
MANUFACTURING PAPER
TAPPING RUBBER
FIELD OF LAVENDER
TIMBER FOR CONSTRUCTION
HENNA FOR HANDS
NATURAL FIBRES

As well as food and medicines, plants provide other useful products. Many plant cells form **NATURAL FIBRES** that strengthen and support the plant. The same properties make them perfect for textiles and paper. Timber from trees is used to build boats, houses, and furniture. Palm leaves are woven into baskets, hats, and mats. People also extract perfumed oils and natural dyes from the flowers and leaves of certain plants.

CAMPER

Requirements:

1. With other Cub Scouts, camp under canvas for at least three nights (not necessarily on the same occasion).
2. Help pack your kit for a week-end camp (and make sure that you bring everything back home again). Make sure that you have your NAME on all your equipment including your clothes.
3. Help pitch and strike a tent and know how to care for it.
4. At camp help to prepare, cook and serve a meal. Help to clear afterwards. If possible this should be done outdoors.
5. Know the basic health and safety rules for camp and how to prepare for tent and kit inspection.
6. Take part in at least one of the following activities while at camp: a camp fire, a Scout's Own, a wide game, a joint activity with other Cub Scouts on site, a good turn for the site.
7. Help to tidy up the camp site before you leave or take part in any other suitable activity.

COLLECTOR

Requirements:

1. Make a collection of similar items for example; coins, telecards, key chains, stamps. The interest is to span at least over a period of three months. The collection should be substantial and added to regularly.

2. Label and display your collection.

3. The Cub Scout should be able to say why the collection is interesting and talk about it in front of the pack together with a presentation of some background information.

COMPUTER

Requirements:

Choose 4 of the following requirements:

1. Know the various parts of a computer system and demonstrate what each is used for: keyboard, screen, printer, mouse etc.
2. Describe at least five uses to which a computer can be put in everyday life.
3. Make a list of programs you have used recently and be prepared to talk about them to the examiner.
4. Know about e-mail use.
5. Know how to search for information either on an electronic encyclopedia or on the internet.

COOK

Requirements:

1. Know the basic rules of safety and hygiene in the kitchen and the reasons for them.
2. Discuss with the examiner the advantages and disadvantages of different methods of preparing and cooking food and the importance of a balanced diet.
3. Plan a two-course meal for at least two people. This should include the preparation of the shopping list of the necessary ingredients and you should do the shopping with the help of an adult.
4. Show that you understand the meaning of food labeling (the nutritional values, the difference between expiry and best before dates, the list of ingredients which reflects the composition, proportions etc.)
5. Set the table in a welcoming way. Use your imagination and be creative with your decorations. These could include tablemats, napkin rings, place-names, a printed menu and table decorations.
6. Cook and serve the meal. You can eat with your guests.
7. Afterwards wash everything up and put everything away.

N.B. *Item 5 can be omitted if the Cub has gained the Home Help Badge.*

Leader's Explanation:

Handy hints for healthy cooking:

- Wash and boil vegetables in large pieces as there are fewer surfaces from which nutrients can be lost
- Cook vegetables in a small amount of water, using a pan with a tightly fitting lid
- Place vegetables in boiling water so they will take less time to cook and fewer nutrients will be destroyed.
- Save the water in which vegetables have been cooked, and use it to make a soup, sauces or gravy.
- Choose lean cuts of meat and trim off visible fat to cut down the amount of saturated fat.
- Grilling is preferable to frying, as the food's fat content is reduced and not increased.
- Stir frying retains nutrients in vegetables, as they are cooked quickly without water.

Cooking in different ways:

Baking:
Food is cooked by the dry heat of an oven. Many flour-based goods like bread and cakes are baked. Some meat dishes like casseroles can be baked. Fruits and vegetables like apples and potatoes can also be baked.

Boiling:
This is a common way of cooking vegetables and fruit. They are heated in boiling water in a saucepan.

Frying:
Small pieces of food are cooked in fat in a long handled pan over a source of heat. Frying adds calories to food because as it cooks, the food absorbs some of the fat.

Shallow frying:
Food is cooked in a small amount of fat. Bacon and eggs are fried by this method.

Stir frying:
Food is cut into very small pieces and cooked at extremely high temperatures in a very little fat. The food must be stirred all the time to prevent burning.

Grilling:
Small, tender pieces of meat, fish and some vegetables can be grilled. The food is placed on a rack, very close to a source of heat either above of below the food. The food must be turned so that both sides are cooked. Barbecuing is a form of grilling.

Micro waving:
Food in a microwave oven is cooked by short radio waves. The waves move through the food making it heat up from inside. Food cooks very quickly in a microwave oven.

Roasting:
Roasting is a form of baking. It usually describes the way a piece of meat is cooked. Roasting meat is usually placed in a pan and left uncovered in the oven to cook.

Simmering:
Foods which are simmered are heated in water that is kept just below boiling point. Eggs and combinations of egg and milk, like custard can be simmered. Meat may be cooked this way (this is also called stewing or braising) as well as vegetables of the pan and bean family.

Steaming:
The food is put on a rack in a saucepan. A little water is added – not enough to reach the rack. The lid is put on and as the water heats the food cooks in the steam from the boiling water. Steaming is the best way of cooking vegetables if you want to keep the nutrients.

Food labeling:

Food labeling regulations require labels to provide detailed information about food. For example, most food must be marked with a date. This helps retailers to keep their stocks up to date and helps us to use foods while still fresh and at their best.

Expiry Dates - The term "expiry" date really means the date mark that is placed on food to indicate the date when the food is at its best. There are two main types of date marks, the "use by" and the "best before".

Use By - The "use by" date marks apply to those foods which are highly perishable and have a short shelf life

Best Before - The "best before" date marks apply to foods that have a longer shelf life.

No labeling - There are some foods which need not be labeled, like for instance hens' eggs and wines. There are other foods that are exempted from some of the labeling requirements.

What food labels tell us:

We now have a large variety of foods available in the shops. Some food is no longer the simple unprocessed food. Food that is especially made to last longer and increase convenience and availability has usually undergone more complex processing. So it is very important that enough information is shown on the label to help us choose what to buy.

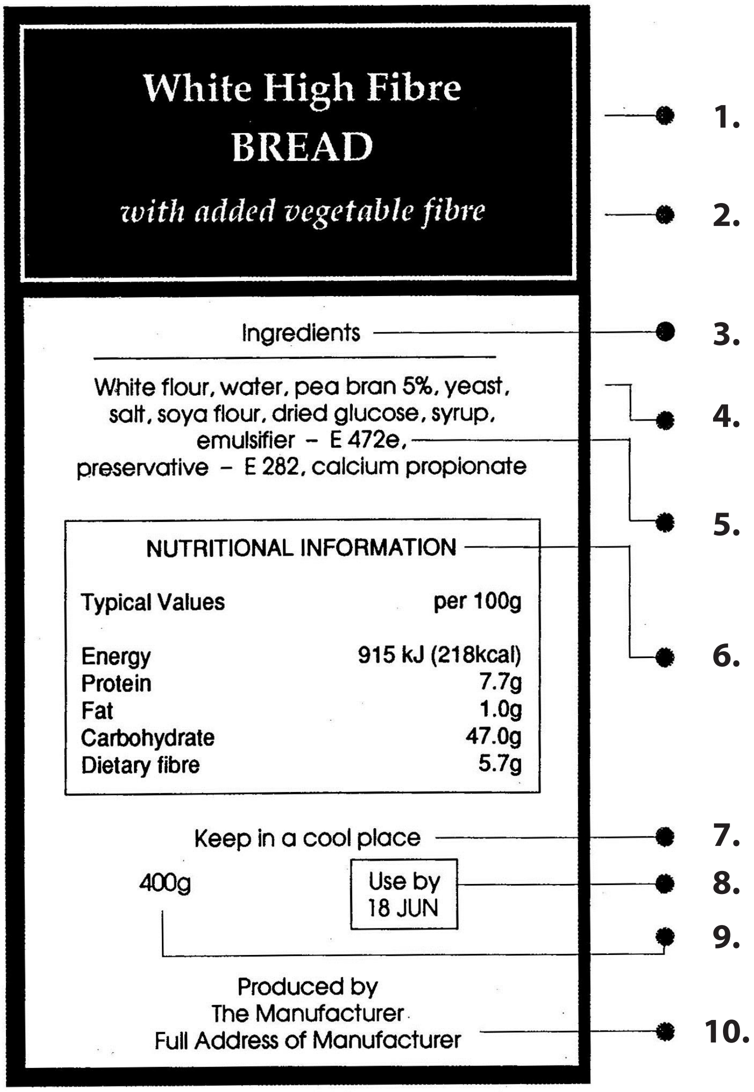
Food labels can tell us quite a lot. The ingredients' list can help us judge a product's value for money and compare it with other products. Date marking tells us how long a product will be at its best if we follow the storage instructions. Nutrition labeling makes it easier to choose a healthier, more balanced diet.

The Labeling and Presentation of Foodstuffs Regulations (Malta 1992), require labels to provide detailed information about food. The main points that we will see on a label are:

- The name and description of the food
- The ingredient, including any additives
- The date mark
- Usage and storage instructions
- The weight, volume or number of items in the pack
- The name and address of manufacturer, packer or seller
- Country of origin

In addition labels may show:

- Nutrition information
- Claims about particular benefits of food
- Special marks regarding suitability for certain people having special dietary needs such as coeliac or vegetarians



1. The name or description of the food
2. When the label on food makes a claim like this, emphasizing the presence of a particular ingredient, the label must declare the amount of the ingredient in the food
3. Ingredients (including additives) are listed in order of weight. We can use this list to compare products for value, or to avoid ingredients we do not like
4. Most additives must be listed, saying what their job is. Percentage values next to ingredients show how much of that particular ingredient there is, if an emphasis on it appear on the label.
5. The food company can use the name, or the "E" number (identification number recognized by the European Community), or both when listing additives.
6. Nutrition information is optional but will need to be given if a claim, such as "high in fibre" or "low in fat" is made. In this case the label will need to show the amount per 100ml or 100grams of product. Many labels show this already.
7. Storage and use instructions must be given, if needed to help in the best use of the product.
8. The date mark must appear on the product (unless it is exempted)
9. The net contents of the food must be given. This can be expressed as weight, volume or number.
10. The name and address of the manufacturer, packer or seller must be given. The county of origin of imported food must also be indicated.

Meet the Nutrients:

Protein is an important nutrient. It is used by your body to form the cell tissue that helps you grow. It also repairs and replaces parts of your body which wear out. Large amounts of protein are found in meat, fish, nuts, eggs, cheese, milk and dried peas and beans. Smaller amounts are found in cereals such as bread and rice.

Carbohydrate foods provide the fuel your body needs to give you plenty of energy to live, work and play. Starches are carbohydrates. They are found in bread, potatoes, cereals, rice and pasta. Sugars are also carbohydrates. These occur naturally in many fruits, and refined sugar is added to many foods such as cakes and soft drinks.

Fats give you energy just as proteins and carbohydrates do. They also help to build the cells that make up your body. Some fats are easily recognizable. You find them as cooking oil, butter, ghee, margarine or lard. But the fat in many foods is not always obvious. Nuts, biscuits, sausages and cheese all contain fats.

CRAFTSMAN

Requirements:

Choose 3 of the following.

1. Make a puppet. This could be made out of socks, sleeves, paper plates, plastic bottles, peanuts, paper bags, cloth, cardboard etc.
2. Create a scene in a box e.g. outer space, underwater, the inside of a doll's house, a puppet theatre, a television etc.
3. Design and draw a mask out of a paper plate, cardboard, paper bag or any other material.
4. Make a decorative article or gift from any material of your choice which might include wood, glass, cane, cloth, cardboard, salt dough, shells or stones, papier-mâché or other odds and ends.
5. Make a useful article for home or Pack using for example a toy box, a Christmas decoration, a desk tidy, a wall tidy, a letter rack or a paper-napkin holder.
6. As an individual or as a group, make a model of an area you know or design an imaginary adventure playground, wildlife park, zoo, campsite, historic area or any other site. You could use cardboard or wood for the base, toothpicks or string for fences, plasticine or modeling clay for hills etc.

ENTERTAINER

Requirements:

Choose four (4) from the following:

1. Take part in a stunt or short play.
2. Make a simple musical or rhythm instrument and use it as an accompaniment to a song or with other cubs.
3. Sing two songs.
4. Perform three conjuring tricks.
5. Tell, act or mime a story.
6. Play a melody on a musical instrument.
7. Perform a puppet play using puppets which you have made.
8. Go carol singing or participate in a campfire sing- song.

Note: *Other forms of entertainment of comparable standard are acceptable if they are agreed upon by the examiner beforehand. This badge could be done on an individual or collective basis.*

EXPLORER

Requirements:

1. Describe to the examiner the preparations required for a one day outing e.g. cost of outing, correct clothing, footwear, first aid kit and food. You should know the Highway Code and Country Code.
2. Take part in two Cub Scout outdoor activities.
3. Build a simple shelter.
4. Know the open-fire safety features and the reasons for these safety rules. Show that you are doing your best to keep them.
5. Build and light a fire outdoors, make a hot drink and clean up the area before you leave.
6. Show that you know how to interpret a simple map and its legend.
7. Find your way to a place in your town, village or nearby countryside 1 kilometer away by following directions given to you by the examiner. These directions should include; compass directions or trekking signs, landmarks or a combination of these.

HEALTH AND FITNESS

Requirements:

1. Visit or meet ONE of the following and find out how they help people to stay fit and healthy: doctor, dentist, physiotherapist, nutritionist, fitness instructor or any other suitable person.

2. Make a poster about good health and hang it on your Six's board.

3. Discuss with the examiner how some of the following can damage your health: lack of exercise, lack of personal hygiene, smoking, drinking and an unhealthy diet.

4. Record all the things you have done in a week which have contributed to your personal hygiene and cleanliness.

5. Start a regular activity that will help you to keep fit and healthy for at least three months, like swimming, walking, running or any kind of sport.

HOME HELP

Requirements:

1. Under adult supervision cook some bacon or sausages, boil or fry or make a scrambled egg, prepare and cook some potatoes and prepare a salad.
2. Lay a table correctly and serve a simple meal and also display your knowledge and practice of table manners. (This can be done in conjunction with 1 above.)
3. Wash up afterwards and show how to go about cleaning a saucepan, cutlery, glassware, etc.
4. Wash and iron your Group scarf.
5. Sew on a badge or button.
6. Make a bed.
7. Clean windows.
8. Clean and tidy a room.
9. Over a period of one month take over a new job at home e.g. shopping, sweeping and washing the floor or helping to prepare lunch for school.

N.B. *Item 1& 2 & 3 can be omitted if the Cub has gained the Cook's Badge. To be passed under arrangements made by a badge examiner at the Headquarters or during a camp. A confirmation note from the Cub Scout's parents is not acceptable except for item no. 9.*

LOCAL HISTORIAN

Requirements:

1. Pay a visit to a national monument. Look up some information about the site and present your findings to the Pack.

Now choose any three of the following alternatives:

2. Find out about a famous person who lives/d in or near your town /village, or visit and find out about a famous old building, monument, or another place of historical interest. Prepare a chart (or power point presentation) and discuss what you have found out with the examiner.
3. Write down some information about the history of your town/village. This should include the origin of the name of your town or village, the meaning of its coat-of-arms and a diagram of the latter.
4. Talk to a local and find out about what she/he did at your age and what changes she/he has seen in your area over the past years.
5. Choose two different locations in your area such as a building, a street, a monument, a public garden and find out how they got their names.

MAP READER

Requirements:

1. Know and explain the principal symbols used on a 1:25,000 scale O.S. map of your locality. Be able to pin point your home and Pack Den.
2. Make a model of an 80 metre hill, showing the contour layers at regular intervals.
3. Use the knowledge acquired in items 1 and 2 and describe what you would see along a 5 kilometer stretch of road set by the examiner on any 1:25,000 scale map.
4. Set a map and know how to use a compass.
5. Go for a short hike using a map.

NATURALIST

Requirements:

1. Know the Country Code.
2. Visit the Natural History Museum or watch a documentary about wild animals and speak about what you saw with your leaders.

Choose four (4) of the following alternatives:

3. Present some information including diagrams, pictures or photographs about 2 local plants and 2 insect species.
4. Take part in an expedition or outing involving nature study and keep a log of it. Drawings and/or photos should be included.
5. Find information about 3 local species which are in danger of extinction. These species can include both flora and fauna.
6. Look after a patch of garden or use pots for planting for at least three months. Know what tools are needed and how to use and look after them. Plant and grow something in your garden suitable for the time of the year. Keep record of your work and progress.
7. Light, water and carbon dioxide are the three essential things green plants need to grow. Why are these three elements so important? (This refers to Point 2 of Botanist Badge).
8. Prepare some bark rubbings or some leaf rubbings. Use these rubbings to make a poster or an album indicating the names of the leaves or trees. Just as people are distinguished by their fingerprints so are trees.
9. Keep a colony of ants or insects in a container and keep a record of your observations over a period of a few weeks.

Leader's Explanation:

Light, water and carbon dioxide are the three essential things green plants need to grow.

Why are these three elements so important?
Light from the sun is absorbed by a green substance in the leaves called chlorophyll. Using sunlight as energy, chlorophyll changes water and carbon dioxide gas from the air into sugar. This sugar is the plant's food. The process by which plants make their own food is known as photosynthesis. Photo means light and synthesis means putting together. As photosynthesis happens, oxygen is given off into the air. If you keep plants in the dark ,they will be unable to make chlorophyll and become very pale. A healthy leaf is green because it is filled with chlorophyll. Leaves which do not get enough light turn pale and yellowish because the chlorophyll can't work without sunlight. That is why a plant grows towards a source of light.

You can also try this experiment: (i) Put a plant in the dark and leave it for about a week. In an attempt to reach some light, they will go on growing upwards, produce yellow and weak leaves, become very spindly and eventually die if left in the dark. (ii) If a mat is left on a lawn or part of a leaf is covered with foil to prevent light reaching it, it will turn pale after some time.

Water: Plants absorb water from the soil through the roots. This water passes along the stem and into the leaves. Plants cannot live without water. They use it for making food and also as a skeleton. The water blows out the plant cells like air in a balloon and the cells collapse if water is lost. Cells which are full of water are stiff and firm. Water helps not only the leaf but also the whole plant to keep its shape. When the plant doesn't have enough water, the cells are empty and the plant droops. However plants also lose a great amount of water through tiny pores on the underside of their leaves. These pores are called stomata from a Greek word meaning mouth. These stomata allow carbon dioxide in and oxygen out. As water is lost, more is taken in by the roots. In this way, there is a continuous flow of water from the roots to the leaves. This process of water evaporation from the leaves into the air is known as evapo-transpiration.

You can also try this experiment: (i) Put a thick stick of celery or any other stem with a light coloured flower in a jar with water coloured with ink or food colouring. In an hour or so, you will see thin red lines up the stem and soon the leaves or flowers will be tinged with red. If you slice the stem you will see red dots. These are the tubes through which the coloured water has passed up the stem. This experiment demonstrates the capillary action in the stem. (ii) Enclose a plant or part of a branch from a tree in a transparent plastic bag from the pot upwards. After some time the bag becomes misty. Similarly, water molecules from the grass will evaporate and form water vapour in a glass which has been placed upside down on the grass on a sunny day. These experiments demonstrate transpiration.

Carbon dioxide; A plant takes in carbon dioxide from the air. Using energy from the sun, it changes this gas and water into sugar, which is the plant's food. A plant gives off oxygen that is essential to humans.

Bark rubbings and Leaf rubbings:

To prepare a bark-rubbing tie a strong paper around the tree and rub with crayon wax. For the leaf rubbings collect different leaves (if possible with large veins and ribs). Lay them upside down on a piece of paper. Put another piece of paper on top and hold it steady with one hand. Using the side of a wax crayon rub evenly over the leaves. The shape of the leaf will gradually emerge.)

A power point presentation re Maltese Flora & Fauna, together with endangered species (points 3 and 5) is available in the Resources Section.

OUR EARTH

Requirements:

Choose four (4) of the following alternatives:

1. When and how was the earth born? Where in the universe is the earth found?
2. What is inside the earth? Draw a labelled diagram showing the inner core, the outer core, the mantle and the crust. What are these layers made up of?
3. What are lines of latitude and longitude? What is the equator and where is it found?
4. Tell the examiner the names of the continents, the oceans and some important seas (including the Mediterranean Sea). Point these out on a world map.
5. Know the existence of the three types of volcanoes – active, dormant and extinct and the difference between them. Draw a labelled diagram showing the inside of a volcano. Mention the names and whereabouts of two well-known volcanoes.
6. How and why do earthquakes occur? How is the intensity of an earthquake measured?
7. Do a model or a drawing to show the earth's position in the universe together with the other planets – the solar system.

N.B. *Item 7 can be omitted if the Cub has gained the Astronomer Badge.*

Leader's Explanation:

How was the Earth born?

Why is the earth shaped like a ball? Most scientists think that the answer to this question is part of the story of how the earth was born. The story began millions and millions of years ago with a gigantic, spinning cloud in space. Eventually, this spinning cloud turned into the Sun. The small clouds which remained detached from the sun turned into the planets we know today.

As Earth's gravity pulled more and more dust and gas in, everything became squeezed together – tighter and tighter. This made the ball grow hotter and hotter. It became so hot that the bits of dusts in it, which were mostly rock and metal dust, were melted together. The Earth became a glowing ball.

The outside of the earth didn't stay hot. It began to cool. When melted rock cools, it becomes hard. So the outside of the Earth became rock hard, as it is today. However, the inside hasn't cooled off. The rock under the Earth's surface is still extremely hot and parts of the middle are still liquid.

Of course there are lots of stories about how the earth was born. But no one was alive then, so no one actually knows exactly what happened.

Inside the Earth:
The centre of the Earth is about 6,400 km beneath your feet. That means it's nearly 13,000 km to the other side of the world. Even if anyone invented a machine that could dig that far, it wouldn't be able to go through the middle of the earth. The earth's middle is made of rock so hot that is has melted!!

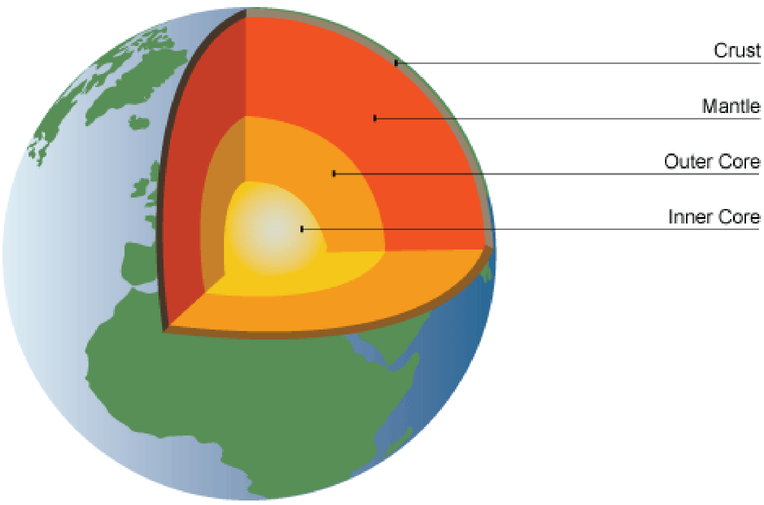
Long ago, when the outside of the earth cooled down, it became like a shell of rock. We call this the crust. The oceans and continents lie on top of the crust. Under the oceans the crust is only about eight kms thick, but on dry land the crust is on average about k60 kms thick.

Underneath the crust is another layer of rock called the mantle. The mantle is made up of a different kind of rock from the crust. It is about 2,900 kms thick. The deeper the mantle goes, the

hotter it gets. At its bottom it is hot enough to melt iron.

Beneath the mantle is a layer of melted metal – metal that is so hot it's like thick syrup. This layer is called the outer core. Scientists think that the outer core is made of iron and nickel and is about 2,250 kms thick.

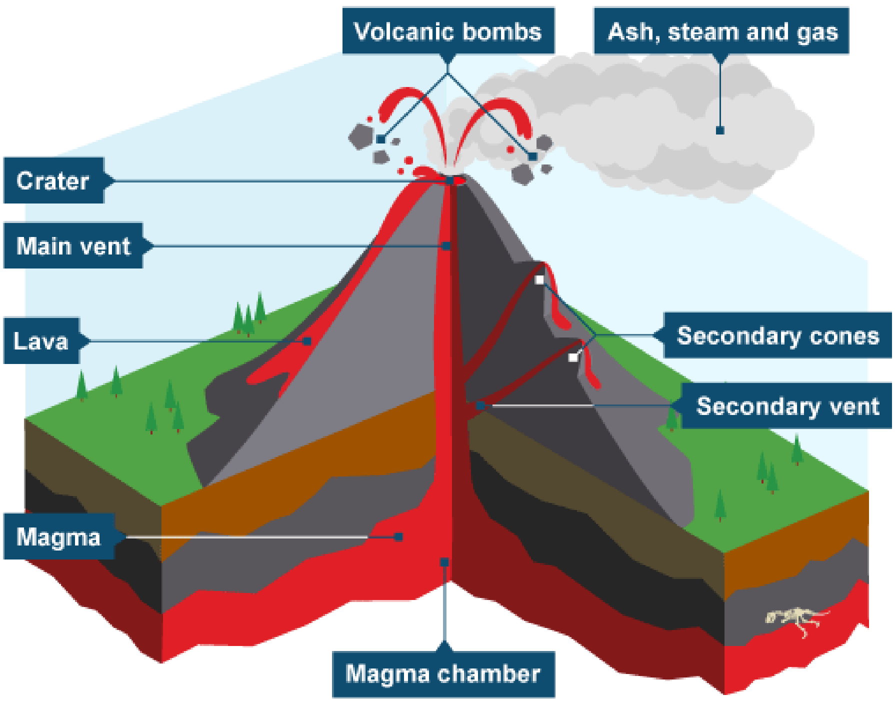
At the centre of the earth is the inner core. It's a solid ball of hot metal about 1200 kms thick. That's what's inside the earth.



Volcanoes:
A volcano is a special kind of mountain that actually builds itself. Scientists think that far down in the earth, where it is fiercely hot, there are pockets of melted rock. It is thought that the pressure of gas pushes this melted rock, called magma, up out of the ground. Once magma comes out of the ground it is known as Lava. Lava may be thick like syrup or as thin as watery soup, but it cools into a black, gritty rock. It is the rocks that build the volcano. As the lava pours out of the earth, it piles up into the shape of a cone, with a tunnel running down its middle. The more lava that come out, the higher and wider the volcano gets. Volcanoes can erupt in different ways. One type shoots a stream of glowing lava high into the air like a giant, fiery fountain. Another shoots out solid chunks of red-hot rock and cinders. Some volcanoes pour rivers of lava through cracks in their sides. And some blow themselves to pieces!

There are several thousand volcanoes in the world. Most of them are extinct – that means they do not erupt any more. Some others are dormant, which means sleeping, and although they are silent at the moment, they may erupt again at any moment. Only about 500 volcanoes are active all the time. Most of these active volcanoes are under the sea. Their effects are usually not noticed on land.

One interesting aspect of volcanic eruptions is that surrounding areas are covered rapidly in molten rock or ash, sometimes preserving the animals, plants and structures underneath. Archaeologists have been able to study life in Roman times, for example, by examining the remains of Pompeii, in Italy, buried when Vesuvius erupted in AD 79.



Famous Volcanoes

Mount Vesuvius

Mt. Vesuvius, the active volcano that looms over the Bay of Naples in southern Italy, has erupted well over 30 times that we know of. And yet its most famous eruption took place all the way back in A.D. 79, when a multiday eruption of lava and ash covered the cities of Pompeii and Stabiae in ash. Pliny the Younger, author of the only surviving eyewitness account, described a sudden explosion followed by blankets of ash that fell on people as they tried to escape. The total number of Vesuvius' victims will most likely never be known, but archeologists are aware of at least 1,000.

Krakatoa

In 1883, the volcano on the Indonesian island of Krakatoa erupted with 13,000 times the power of an atomic bomb. The sound of the spewing smoke and rock was reportedly heard thousands of miles away, as far as islands off the eastern coast of Africa. Hundreds in a nearby Sumatran town died almost instantly when flaming ash incinerated their homes, and many more were washed away by subsequent megatsunamis. An estimated 36,000 or so perished in total. Krakatoa itself then slumped into the boiling depths of the ocean, but a new island at the site was spotted in 1927, and it still occasionally spits lava into the sky. It's been dubbed Anak Krakatoa, or Child of Krakatoa.

Mount Pinatubo

When Mount Pinatubo erupted in 1991, the amount of sulfuric ash it sent into the stratosphere cooled global ground temperatures by 1°F for the next two years. To be fair, it hadn't erupted for six centuries, so there was some catching up to do. A year before the eruption, a 7.8-magnitude earthquake struck about 60 miles northeast of Pinatubo, causing landslides and an increase in steam emissions from one of the volcano's geothermal areas, ultimately setting the stage for the 1991 explosion. While the eruption resulted in more than 700 deaths, many scientists predicted the explosion, thus saving the lives of an estimated 5,000. Still, the eruption produced one of the most dramatic environmental scenes ever witnessed. With ash that rose 22 miles into the sky, it is considered the second largest volcanic eruption of the 20th century.

Mount St. Helens

Mount St. Helens was getting ready to burst for nearly two months before it exploded, not to mention the more than 120 years it lay dormant. While the eruption was anticipated, the manner in which it occurred was completely unprecedented. At 8:32 a.m. on May 18, 1980, a 5.1-magnitude earthquake triggered a sideways blast that swept the mountain's north face away into a cascading landslide that shot hot ash and stone out some 15 miles at speeds of at least 300 m.p.h. At the same time, a mushroom-shaped plume of ash shot 16 miles into the air, eventually covering three states. Complete darkness blanketed Spokane, Wash., a city about 250 miles northeast of the volcano. When the ash came down it fell in the form of black rain that literally coated the residents of Washington, Idaho and parts of Montana with a fine gray powder. Fifty-seven people and thousands of animals were killed, and some 200 square miles of trees were obliterated. In 1982, Congress and President Ronald Reagan designated the surrounding land as the Mount St. Helens National Volcanic Monument.

Mount Tambora

The Volcanic Explosivity Index goes up to 8. On that scale, the 1815 eruption of Mount Tambora rates a very destructive 7. The explosion took place on the island of Sumbawa (then in the Dutch East Indies, now in Indonesia) and plunged the region into darkness, but its effects were anything but isolated. Tens of thousands of people were killed by the apocalyptic eruption, subsequent tsunamis and ensuing starvation and disease. The largest volcanic eruption in recorded history changed the world's climate so much (even crops in Europe and North America failed) that 1816 became known as "the year without a summer." Tambora itself shrank several thousand feet and traded its peak for a massive crater at its summit.

Earthquakes:

The Earth's Crust is made up of 15 pieces or "plates", which float on the molten rock below. The places where these plates meet are called faults. Along the lines of faults, the plates move and push against each other. Sometimes this causes a violent shock, with waves of tremors moving out and shaking the Earth's surface.

Earthquakes are very difficult to predict. Scientific instruments attempt to detect early signs, and the behavior of birds and animals may give warning of a shock, but none of these methods is currently foolproof.

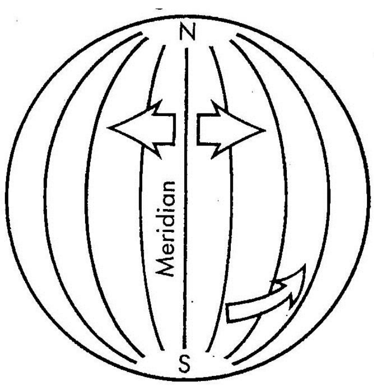
How are earthquakes measured?
The size of the shock waves from an earthquake is measured on the Richter scale. No earthquake has ever measured more than 9 on this scale. However, the size of the shock wave cannot tell us how much damage the earthquake has done. That depends on many factors, such as the kind of soil on which buildings are constructed, how they are built and so on. The effects of earthquakes are measured on the Modified Mercalli scale. The highest point on this scale is 12, which describes the total destruction of all buildings but has luckily rarely been reached.

What is a TSUNAMI?
A Tsunami is a huge tidal wave caused by an undersea earthquake. It is dangerous to shipping and can also cause damage on land when it breaks over the coast.

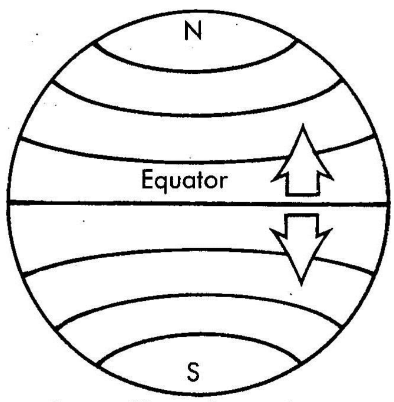
Latitude and Longitude:

Lines of latitude and longitude are imaginary lines drawn on a map. Lines of latitude go across the map. The one we know best runs round the middle of the world. It is called the Equator. This divides the world into northern and southern hemispheres. The lines of latitude running above the equator are called north, and those underneath it are called south.

Lines of longitude go down the map. One, which goes through Greenwich, England, is called the Meridian. The lines of longitude to the left of the meridian are called West and those to the right are called East. All the lines are measured in numbers called degrees.



Lines of **longitude** are drawn **down** the globe



Lines of **latitude** are drawn **across** the globe.

The Continents and the Oceans:

The Seven Continents

Continents make up the largest landmasses on the planet earth. A continent is larger than an island and is usually made up of multiple countries. There are
seven continents in the world although some people do combine Europe and Asia into the single continent Eurasia and others combine North and South America into the American continent.

Africa

While Africa is first alphabetically, it is second in both population and size among the Earth's continents. About 1 billion people live in the 54 countries in Africa. This is about 15 percent of the world's population living on 20 percent of the total land area. The equator passes through the center of the continent with largely tropical climates. The northern and the southern portion of Africa have more temperate conditions. Africa is also noted as the birthplace of mankind. The oldest fossil evidence of Homo sapiens was found in the eastern part of the continent.

Antarctica

Antarctica holds a number of firsts among the continents of Earth. The continent is the most southern of the seven continents and includes the South Pole. It is also the least populated with less than 5,000 residents. Antarctica is known as the coldest landmass and has few native plants or animals. Much of the landmass is covered with permanent glaciers.

Asia

Asia covers nearly 9 percent of the earth's surface making it the largest of the continents. It is also the home to the most people with an estimated population of 4.3 billion. Asia is defined as the eastern portion of the Eurasia continent with the Ural river and mountains serving as the dividing line between Europe. Asia contains some of the oldest civilizations in the world including the Chinese and Japanese nations. The continents large population makes it an important part of the world economy. Asia includes the Saudi Arabia peninsula with the oil-rich countries including the United Arab Emirates and Kuwait. The continent also includes the manufacturing centers of India and Japan and Hong Kong, which is a leading banking and corporate center.

Australia
The continent of Australia includes the mainland of the country Australia and the island nations of New Guinea, Tasmania, and Seram. During ice ages, when much of the world's water was frozen in glaciers, the Australian mainland was connected by land bridges to these islands. Australia has a wide variety of animals and plants many of which are unique in the world. The continent first was inhabited by man nearly 45,000 years ago. European inhabitants came onto the Australian landmass in the 1700s. Australia is the most isolated and remote continents and has been least influenced by migrations of people, plants, and animals.

Europe
The western portion of the Eurasian continent is known as Europe. It is noted as one of the smallest of the continents, with 7 percent of the world's landmass. However, Europe is home to about 11% of Earth's population and is the second most densely populated continent, with 134 people per square mile, behind Asia's 203 people per square mile. Europe, by definition, includes the continental mainland ending in the east at the Ural Mountains in Russia. Europe also includes islands such as Iceland, Sicily, and the British Isles. The British Isles consist of the large island that is home to England, Scotland, and Wales, and is called Great Britain; the British Isles also include the small island that contains Northern Ireland and the Republic of Ireland, and several much smaller surrounding islands. People have been living in Europe for about 100,000 years. Around 2000 B.C., Indo-European settlers came and brought the language that most modern European languages are descended from. The ancient Greek and Roman civilizations flourished there, from which we get much of our learning and culture. In the 5th and 6th centuries, the Germanic tribes swept over most of Europe, and their descendants shaped the modern countries of Scandinavia and west and central Europe. By this time the Roman Empire had become Christian, and eventually all of Europe became Christian, for reasons of both faith and economics. Many diverse and interesting elements went into shaping the Europe that we know today

North America
The North American continent includes the Latin American regions that serve as a connection between North and South America. North America makes up about 17 percent of the world's landmass and is home to about 8 percent of the people. This population of about 529 million people are situated in about 23 independent countries. The earliest human inhabitants in North America were from Asia and crossed into Alaska over the Bering land bridge during an ice age. The arrival of Europeans occurred in the mid-1600s. This population is now dominant in North America.

South America
The South American continent is the southern portion of the larger American continent. The equator passes through the continent offering a tropical climate for much of the landmass with temperate conditions possible in the south. The indigenous people of South America may have migrated south from North America although the majority of its current 371 million residents are of European descent. The population is largely along the Pacific and Atlantic coasts with large portions of the inland regions hosting small and widely spread populations. South America includes the Andes Mountains which comprise the longest range of peaks in the world. The continent is home to llamas and alpacas that originally were wild but became domesticated nearly 5,000 years ago. Colonization efforts by Spanish and Portuguese explorers ultimately lead to the prevalence of those languages on the South American continent.

Oceans

While there is only one global ocean, the vast body of water that covers 71 percent of the Earth is geographically divided into distinct named regions. The boundaries between these regions have evolved over time for a variety of historical, cultural, geographical, and scientific reasons.
Historically, there are four named oceans: the Atlantic, Pacific, Indian, and Arctic. However, most countries - including the United States - now recognize the Southern (Antarctic) as the fifth ocean. The Pacific, Atlantic, and Indian are known as the three major oceans.
The Southern Ocean is the 'newest' named ocean. It is recognized by the U.S. Board on Geographic Names as the body of water extending from the coast of Antarctica to the line of latitude at 60 degrees South. The boundaries of this ocean were proposed to the International Hydrographic Organization in 2000. However, not all countries agree on the proposed boundaries, so this has yet to be ratified by members of the IHO. The U.S. is a member of the IHO, represented by the NOS Office of Coast Survey.

How many seas are there in the world?
Even then the ancients later believed that there were only 7 seas, the Mediterranean, the Caspian, the Adriatic, the Red Sea, the Black Sea, the Persian Gulf and the Indian Ocean. The number of oceans in the world varies on how you look at it.

Why do they call it the seven seas?
The ancient Romans called the lagoons separated from the open sea near Venice the septem maria or seven seas. Most current sources state that "seven seas" referred to the Indian Ocean, Black Sea, Caspian Sea, Adriatic Sea, Persian Gulf, Mediterranean Sea, and the Red Sea.

Are there 7 seas?
The Seven Seas include the Arctic, North Atlantic, South Atlantic, North Pacific, South Pacific, Indian, and Southern Oceans. The exact origin of the phrase 'Seven Seas' is uncertain, although there are references in ancient literature that date back thousands of years.

Oceans and Seas

The following table lists the world's oceans and seas, according to area and average depth, including the Pacific Ocean, Atlantic Ocean, Indian Ocean, Southern Ocean, Mediterranean Sea, Arctic Ocean, Caribbean Sea, Bering Sea, and more.

Name	Area		Average depth		Greatest known depth		Place of greatest known depth
	sq. mi.	sq. km	ft.	m	ft.	m	
Pacific Ocean	60,060,700	155,557,000	13,215	4,028	36,198	11,033	**Mariana Trench**
Atlantic Ocean	29,637,900	76,762,000	12,880	3,926	30,246	9,219	**Puerto Rico Trench**
Indian Ocean	26,469,500	68,556,000	13,002	3,963	24,460	7,455	**Sunda Trench**
Southern Ocean[1]	7,848,300	20,327,000	13,100–16,400	4,000–5,000	23,736	7,235	**South Sandwich Trench**
Arctic Ocean	5,427,000	14,056,000	3,953	1,205	18,456	5,625	**77°45'N; 175°W**
Mediterranean Sea[2]	1,144,800	2,965,800	4,688	1,429	15,197	4,632	**Off Cape Matapan, Greece**
Caribbean Sea	1,049,500	2,718,200	8,685	2,647	22,788	6,946	**Off Cayman Islands**
South China Sea	895,400	2,319,000	5,419	1,652	16,456	5,016	**West of Luzon**
Bering Sea	884,900	2,291,900	5,075	1,547	15,659	4,773	**Off Buldir Island**
Gulf of Mexico	615,000	1,592,800	4,874	1,486	12,425	3,787	**Sigsbee Deep**
Okhotsk Sea	613,800	1,589,700	2,749	838	12,001	3,658	**146°10'E; 46°50'N**
East China Sea	482,300	1,249,200	617	188	9,126	2,782	**25°16'N; 125°E**
Hudson Bay	475,800	1,232,300	420	128	600	183	**Near entrance**
Japan Sea	389,100	1,007,800	4,429	1,350	12,276	3,742	**Central Basin**
Andaman Sea	308,000	797,700	2,854	870	12,392	3,777	**Off Car Nicobar Island**
North Sea	222,100	575,200	308	94	2,165	660	**Skagerrak**
Red Sea	169,100	438,000	1,611	491	7,254	2,211	**Off Port Sudan**
Baltic Sea	163,000	422,200	180	55	1,380	421	**Off Gotland**

The Solar System

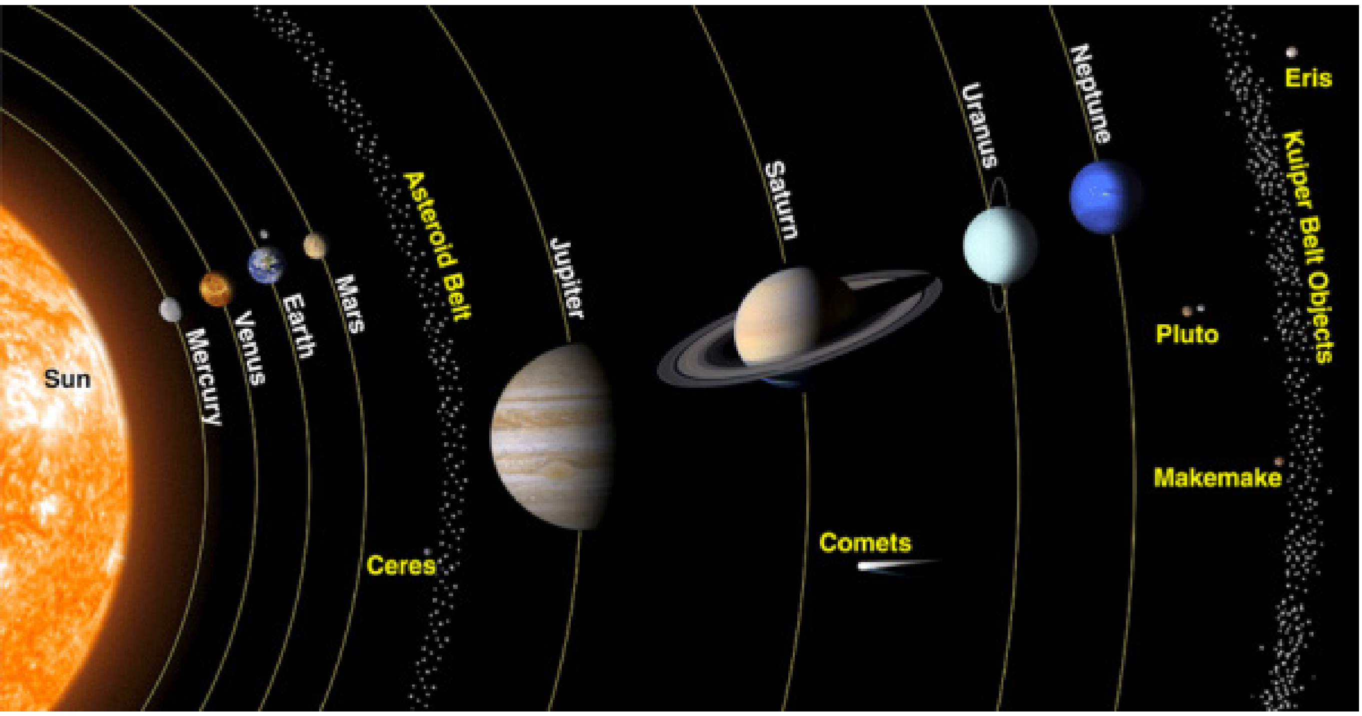
The term "solar system" refers generally to a star and any objects under the influence of its gravitational field. The solar system that includes Earth consists of the star known as the sun, a number of planets, an asteroid belt, numerous comets and other objects. Earth's position in this roughly disk-like arrangement provides the opportunity for life, as known to humankind, to arise.

Arrangement of the Solar System

The solar system includes eight planets and one planetoid, or dwarf planet -- Pluto. The inner four planets -- Mercury, Venus, Earth and Mars -- are called terrestrial planets; these are smaller, solid and "Earth-like." The outer four -- Jupiter, Saturn, Uranus and Neptune -- are termed Jovian planets; they are large, mostly gaseous and are "Jupiter-like." Pluto was declassified as a planet in 2006, as it more strongly resembles an oversized comet than anything else.

Earth in the Greater Scheme

Earth is the third planet from the sun and orbits at an average distance of 93 million miles, meaning that it takes sunlight about eight minutes to arrive. As you move outward from the sun, the planets are spaced increasingly farther apart. Jupiter is about five times as far from the sun as earth, while Nene is some thirty times farther.



OUR ENVIRONMENT

Requirements:

1. Participate in a clean-up
2. Show knowledge of some local and international organization (eg. E.C.O., Nature Trust, W.W.F., Greenpeace etc.) Which work in favour of the environment. Present some written information about one of them.

Choose three (3) of the following:

3. Know what is meant by the ozone layer, acid rain, global warming and the greenhouse effect. Where possible produce diagrams to illustrate these terms.
4. Describe some causes of pollution in the air, water and on land. What are the effects of pollution? What can we do to reduce pollution? Draw diagrams or produce some pictures to illustrate polluted environments or the effects of pollution.
5. What is a food chain? Describe its importance in the balance of nature. What is the meaning of the web of life? Describe how by destroying habitats, certain species are threatened with extinction and how destroying one animal or plant species will affect others along its chain as no incident is isolated. Draw one example of a food chain.
6. What do we mean by recycling? What are its benefits? What materials can be recycled?
7. What are renewable and non-renewable sources of energy? Which kinds of fuel will not run out in time? Draw diagrams or produce some pictures illustrating some energy sources.

Leader's Explanation:

Ozone Layer:

Without the Sun's light and heat, the Earth's surface would be dead and lifeless. But the Sun's radiation isn't all good news. If the Earth moved too close to the Sun, we'd get too hot! If it moved away, we'd get too cold. If the Earth were to tilt too far on its axis, climate changes would be extreme.

Give or take the odd Ice-age, we don't have to worry about these factors. However we do have to worry about what's happening to the Earth's Atmosphere. This works like a combination of sun-glasses and sun-tan lotion to shield the Earth's surface from excessive and harmful radiation from the Sun. The atmosphere is a vast chemical and optical filter.

What's the Ozone Layer?

The Ozone Layer is a global sun-filter that is formed when the Sun's ultra-violet radiation hits the upper atmosphere. At high altitude the Sun's intense ultra violet radiation converts oxygen into ozone, as this conversion takes place most of the Sun's harmful ultra violet energy is absorbed. The Ozone Layer is about 15 miles (24 kilometres) above the Earth's surface and protects life on Earth from most of the Sun's ultra-violet radiation.

What's the problem with Ultra Violet Radiation?

Too much of the wrong kind of UV radiation may cause burning, skin-cancer, cataracts and blindness. It can also kill crops and damage wild-life and vegetation. Some still reaches the surface of the Earth but life has evolved to cope. We can go sun-bathing as long as we don't stay out in the Sun for too long or we use sun-protective creams and clothes. Outdoor workers develop harder, thicker skin. Tropical people have evolved sun-resisting skin pigments, clothing and life-styles that enable them to cope. Even so, sun-burn and skin cancer is still a problem. It would be a hundred times worse if it were not for the Ozone Layer.

What's all the fuss about?

Our cars and factories are polluting the atmosphere and breaking up the Ozone Layer. It is becoming a less-effective filter. Over the poles, in Spring and Summer, the Ozone Layer is breaking down completely. Elsewhere, it is thinning. More harmful ultra-violet radiation is breaking through the atmosphere and causing medical and ecological damage. If this goes on, the incidence of skin-cancer, certain eye-diseases and other conditions will increase very significantly. International agreements are being made to try to limit the use of ozone-depleting chemicals. The problem is that more and more of us want to drive cars and enjoy a consumer life-style. The downside of world economic development is its effect upon the natural world.

Acid Rain:

Refer to Silver Arrow – Air Pollution

Global Warming:

Greenhouse Effect:

Food Chain:

Web of Life:

Renewable and Non-Renewable source of energy:

Why is the earth shaped like a ball? Most scientist think that the answer to this question is part of the story of how the earth was born. The story began million and millions of years ago with a gigantic, spinning cloud in space. Eventually, this spinning cloud turned into the Sun. The small clouds which remained detached from the sun turned into the planets we know today.

PEOPLE AND PLACES

Requirements:

Choose three (3) of the following:

1. Select two (2) countries and find out something about their customs, traditions and religions. Present charts with information about the climate, what the people look like, the currency used, any famous landmarks or tourist attractions, typical crafts, natural resources etc. Drawings and/or pictures should be included alongside the written information.
2. Draw the flags of five countries. Write down the names of their capital cities and know of the geographical position of these countries.
3. Give the examiner some information about an organization which helps people in need - because of poverty, a natural disaster (floods, draught, earthquakes), hunger or disease.
4. Find out something about Scouting in another country. What uniform is worn? What badges are gained? Where do they meet? What are the ages of the members? If possible make contact with a Scout group from another country to obtain this information.
5. Find a pen friend. Exchange information by letters or by e-mail and talk about your pen friend during a Pack Meeting.

N.B. *No matter where we come from, the colour of our skin, the language we speak or the religion we believe in - we are all people of one world.*

WEATHER LORE

Requirements:

1. Keep a weather log for at least two weeks and record your findings in the form of a chart. In this chart/table, describe the sky in the morning, at noon, and in the evening. Take your readings at the same time each day for better comparison.

Choose any three of the following alternatives:

2. Show basic knowledge of how weather works. What is wind and how does it rain? Draw a diagram of the water cycle (indicate evaporation, condensation and precipitation). Carry out a simple experiment to demonstrate the water cycle.
3. What is air pressure? Carry out two experiments to prove these statements – e.g. comparison between identical inflated and deflated balloons on a balance and how water spurts out of a plastic bottle which is perforated in three different positions along its height.

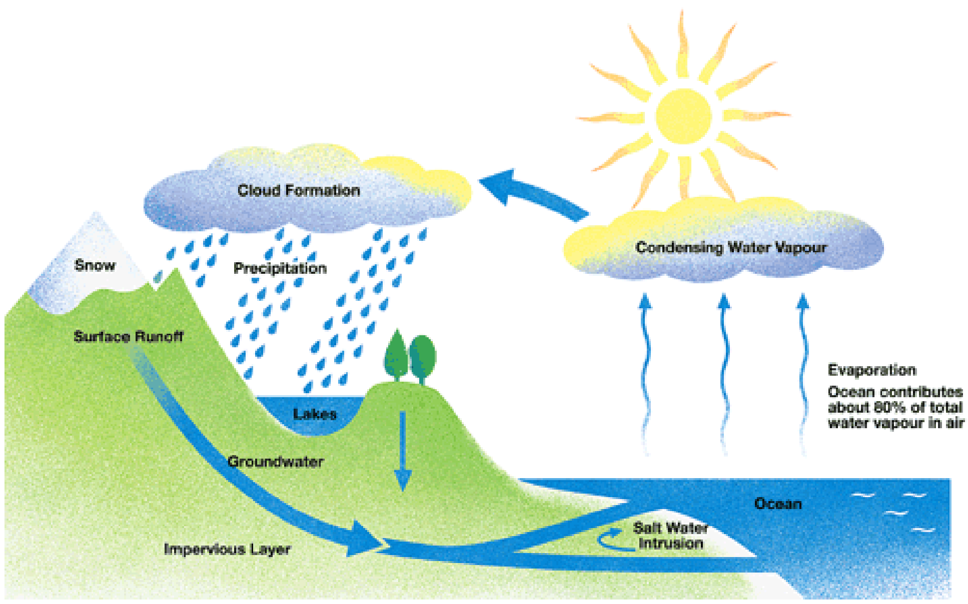
4. What instruments are used to measure weather in a weather station: temperature, air pressure, rainfall, hours of sunshine, force and direction of the wind, humidity?
5. Draw some international weather symbols used by meteorologists. Examples are symbols for sunny with cloudy intervals, drizzle, rainy, thunder, fog and dew.
6. Know some basic information about the Beaufort Scale. What is it used for? Who created this scale?
7. Why is it important for aircraft and ships to know weather conditions?
8. Know the names and shapes of three different types of clouds. .

N.B. *Meteorology is the study of the Earth's atmosphere and weather. A meteorologist is a scientist who studies meteorology. These words come form the Greek word "meteora" which means "things in the sky".*

Leader's Explanation:

The Water Cycle (also known as the hydrologic cycle) is the journey water takes as it circulates from the land to the sky and back again.

The Sun's heat provides energy to evaporate water from the Earth's surface (oceans, lakes, etc.). Plants also lose water to the air (this is called transpiration). The water vapor eventually condenses, forming tiny droplets in clouds. When the clouds meet cool air over land, precipitation (rain, sleet, or snow) is triggered, and water returns to the land (or sea). Some of the precipitation soaks into the ground. Some of the underground water is trapped between rock or clay layers; this is called groundwater. But most of the water flows downhill as runoff (above ground or underground), eventually returning to the seas as slightly salty water.

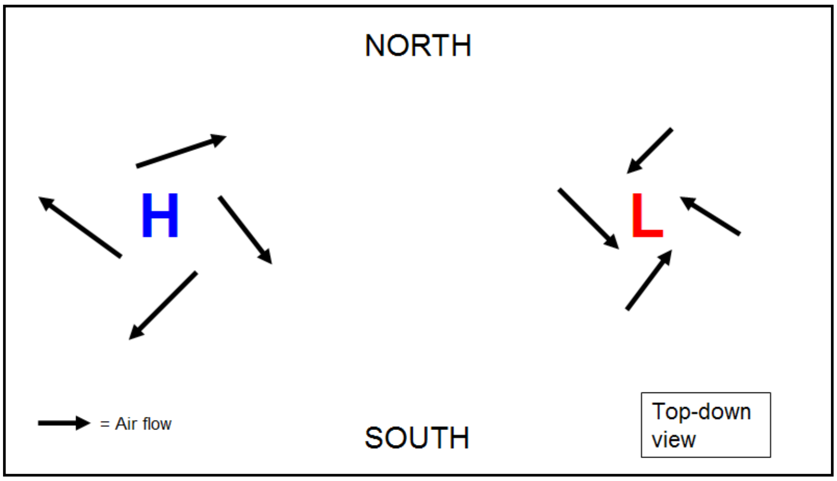


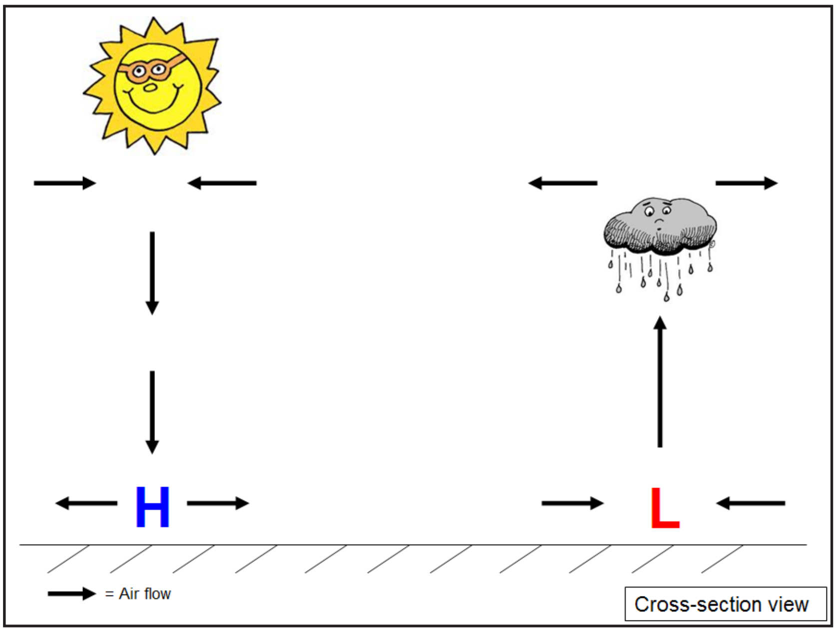
INTEREST BADGES

AIR PRESSURE

If you are a regular viewer of weather broadcasts, chances are you've heard the following from your local TV meteorologist: "plenty of sunshine is in store today as high pressure is in control over the area." Or: "expect rain to spread into the area as a low pressure system approaches." It is well established that high pressure is generally associated with nice weather, while low pressure is generally associated with cloudy, rainy, or snowy weather. But have you ever wondered why? In order to understand the types of weather conditions generally associated with high and low pressure systems, we must think "vertically." The motion of air in the atmosphere above our heads plays a large part in the weather we experience here at earth's surface. Basically, air cools as it rises, which can cause water vapor in the air to condense into liquid water droplets, sometimes forming clouds and precipitation. On the other hand, sinking air is associated with warming and drying conditions. So the first important point to keep in mind is rising air = moistening, sinking air = drying.

So what does this have to do with high and low pressure? Well, as you may have guessed, high pressure is associated with sinking air, and low pressure is associated with rising air. But why? The answer has to do with the typical air flow around high and low pressure. Physically, it seems to make sense to have air flow from high pressure to low pressure. For reasons I won't get into in this post, the airflow (due to the Earth's rotation and friction) is directed slightly inward toward the low pressure center, and slightly outward away from the high pressure center:





The slightly inward moving air in low pressure causes air to converge and since it can't move downward due to the surface, the air is forced upward, leading to condensation and precipitation as discussed earlier. The opposite occurs with high pressure. Air is moving away from the high pressure center at the surface (or "diverging") so as a result, air from above must sink to take its place. The surface flow is accompanied by the opposite behavior at upper levels of the atmosphere, as depicted in this schematic diagram:

Now there is much more to it than just high pressure = nice weather and low pressure = bad weather (otherwise I would be out of a job!), but hopefully after reading this, you have a better understanding of why meteorologists talk about pressure systems.

WEATHER INSTRUMENTS

Weather instruments are used to take measurements of temperature, wind, humidity, and rainfall, as well as other atmospheric factors which describe the local weather and climate. Different types of instruments are used to measure different parameters and there are many types to choose from. The variables measured with these types of instruments are wind speed and direction, pressure, humidity, temperature, and precipitation, including rain and snow.

Thermometer

A thermometer is an instrument used to measure temperature. Thermometers are used to measure outside and inside temperature, body temperature, oven temperature, and food temperature. Most thermometers measure by direct contact with the air, although infrared thermometers use sensors to detect infrared radiation coming off of surfaces and estimate temperature that way (similar to the way night-vision goggles work). A common thermometer is the mercury thermometer used outside residential areas. The volume of the mercury changes as the outside temperature changes. The volume of the liquid expands as it heats up, representing an increase in temperature, and the liquid contracts when it cools down, representing a decrease in temperature. At modern weather stations an electronic temperature sensor is used to measure the outside air temperature. The temperature sensor on this device is contained within a vented unit which allows air to flow freely across the sensor and measure the temperature while keeping the thermometer shaded from the direct heating of the sun.

Anemometer

An anemometer is a type of weather instrument that measures wind speed. Some of these instruments measure both wind speed and wind direction. Anemometers are common at weather stations. A cup anemometer is a type of instrument that uses three or four hemispherical cups mounted on horizontal arms on a vertical rod. The wind pushes the cups and causes the arms to rotate at a rate proportional to the wind speed. A windmill anemometer is a common instrument used at weather stations to obtain the wind speed. A wind vane is used as part of the anemometer to determine the wind's direction. As the wind flows over the windmill, the speed and direction of the wind can be measured with this instrument. Some scientific anemometers use the speed of sound to measure the wind speed more precisely in three dimensions. Wind direction is always given by where the wind is coming from, so that a west wind is blowing from the west and going towards the east.

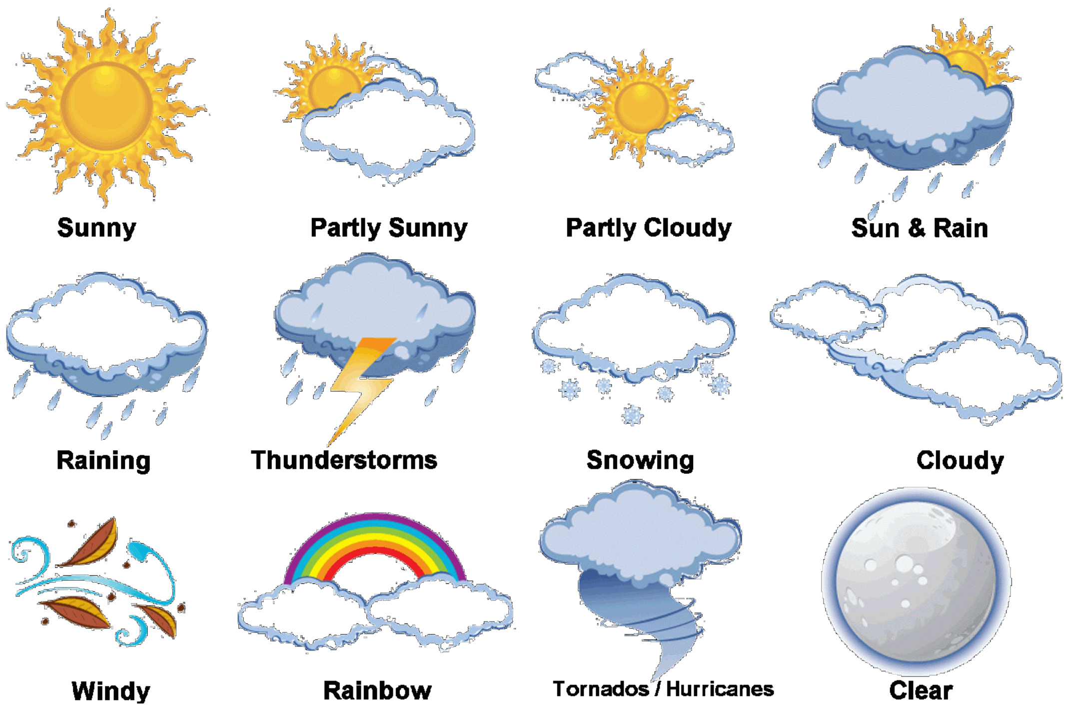
Hygrometer

A hygrometer is an instrument used to measure relative humidity. Humidity is the measure of the amount of moisture in the air. A psychrometer is an example of a hygrometer. A psychrometer uses two thermometers to measure relative humidity; one measures the dry-bulb temperature and the other measures the wet-bulb temperature. (When you come out of your shower in the morning, your skin cools to the wet-bulb temperature and you feel a chill until the water evaporates.) The wet-bulb thermometer contains water in the base that evaporates and absorbs heat which decreases the temperature reading. To determine the relative humidity, the temperatures are taken from the dry-bulb thermometer and the temperature difference between the wet and dry bulb thermometers. From these measurements, a table is used to find the relative humidity at a certain location. A sling psychrometer is a common instrument used by meteorologists to determine the relative humidity. This instrument is swung around while being held. There are also a variety of other humidity sensors which work automatically to measure the water content and relative humidity of the atmosphere.

A rain gauge is an instrument used to measure the amount of liquid precipitation over a certain length of time. In its simplest sense, a rain gauge is nothing more than a can which collects water which falls from the sky as rain. The depth of the rain can be measured with a ruler. In the United States precipitation is usually measured and reported in hundredths of inches. Rain gauges are placed in open areas where there are no obstructions. Rain gauges do have limitations. During hurricanes, high winds make liquid measurements in rain gauges impossible. Also, when the temperature approaches freezing (0°C), liquid may freeze around the rain gauge and block the opening. A common type of rain gauge used at weather stations is the heated tipping bucket. This rain gauge melts frozen precipitation around the opening and keeps the precipitation in liquid form when it enters the bucket. As rain enters the funnel of the tipping bucket rain gauge, the rain drips into one of the two buckets that are balanced on a pivot below the funnel. When the bucket tips, it triggers a reed switch which sends data back to the weather station on the amount of precipitation in the bucket. However, the heating element can cause evaporation of small amounts of rain before it gets to the measuring funnel. Also, the tipping bucket can jam or overflow in high-intensity rain like thunderstorms, which can cause errors in the precipitation amount.

Barometer

Atmospheric pressure is measured by barometers. An aneroid barometer, one of the most common types, uses a sealed can of air to detect changes in atmospheric pressure. As the atmospheric pressure goes up, it pushes in on the can, and the can is slightly reduced in volume, moving an indicator needle towards higher pressure. If the atmospheric pressure goes down, the can expands slightly and the needle indicates lower pressure. Some barometers in the past used special graph paper to track changing pressure over time; now, they report electronic signals to a computer, which plots the trends of pressure on computer monitors.



Force	Description	Conditions	Wind speed (mph)
0	Calm	Smoke rises vertically	0
1	Light air	Smoke drifts	1-3
2	Light breeze	Leaves rustle; vane moved by wind	4-7
3	Gentle breeze	Leaves in constant motion; light flag extend	8-12
4	Moderate breeze	Raises dust and loose paper; small branches move	13-18
5	Fresh breeze	Small trees sway; crested wavelets on inland water	19-24
6	Strong breeze	Large branches in motion; whistling in telegraph	25-31
7	Moderate gale	Whole trees in motion	32-38
8	Fresh gale	Breaks twigs off trees; impedes walking	39-46
9	Strong gale	Slight structural damage to buildings	47-54
10	Whole gale	Large branches broken; some trees uprooted	55-63
11	Storm	Large trees uprooted	64-72
12	Hurricane	Widespread damage occurs	73+

BEAUFORT SCALE

In 1805, Sir Francis Beaufort, a rear admiral in the British navy, created the Beaufort Wind Scale to describe the wind's effect on sailing ships. He used knots to indicate the speed of the wind. This chart shows wind speed in miles per hour, based on the conversion of 1 knot = 1.15 miles per hour.

Clouds

Clouds are visible indicators and are often indicative of future weather. For clouds to form, there must be adequate water vapour and condensation nuclei, as well as a method by which the air can be cooled. When the air cools and reaches its saturation point, the invisible water vapour changes into a visible state. Through the processes of deposition (also referred to as sublimation) and condensation, moisture condenses or sublimates onto miniscule particles of matter like dust, salt, and smoke known as condensation nuclei. The nuclei are important because they provide a means for the moisture to change from one state to another.

Basic cloud types.

Cloud type is determined by its height, shape, and behaviour. They are classified according to the height of their bases as low, middle, or high clouds, as well as clouds with vertical development.

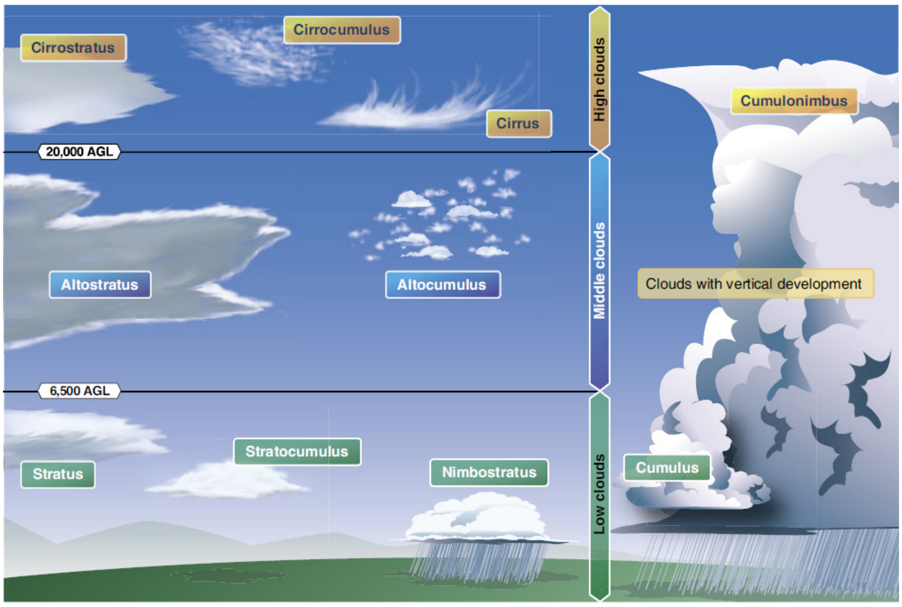
Low clouds are those that form near the Earth's surface and extend up to 6,500 feet AGL. They are made primarily of water droplets, but can include supercooled water droplets that induce hazardous aircraft icing. Typical low clouds are stratus, stratocumulus, and nimbostratus.

Fog is also classified as a type of low cloud formation. Clouds in this family create low ceilings, hamper visibility, and can change rapidly. Because of this, they influence flight planning and can make visual flight rules (VFR) flight impossible.

Middle clouds form around 6,500 feet AGL and extend up to 20,000 feet AGL. They are composed of water, ice crystals, and supercooled water droplets. Typical middle-level clouds include altostratus and altocumulus. These types of clouds may be encountered on cross-country flights at higher altitudes. Altostratus clouds can produce turbulence and may contain moderate icing. Altocumulus clouds, which usually form when altostratus clouds are breaking apart, also may contain light turbulence and icing.

High clouds form above 20,000 feet AGL and usually form only in stable air. They are made up of ice crystals and pose no real threat of turbulence or aircraft icing. Typical high level clouds are cirrus, cirrostratus, and cirrocumulus.

Clouds with extensive vertical development are cumulus clouds that build vertically into towering cumulus or cumulonimbus clouds. The bases of these clouds form in the low to middle cloud base region but can extend into high altitude cloud levels. Towering cumulus clouds indicate areas of instability in the atmosphere, and the air around and inside them is turbulent. These types of clouds often develop into cumulonimbus clouds or thunderstorms. Cumulonimbus clouds contain large amounts of moisture and unstable air, and usually produce hazardous weather phenomena, such as lightning, hail, tornadoes, gusty winds, and wind shear. These extensive vertical clouds can be obscured by other cloud formations and are not always visible from the ground or while in flight. When this happens, these clouds are said to be embedded, hence the term, embedded thunderstorms.



To pilots, the cumulonimbus cloud is perhaps the most dangerous cloud type. It appears individually or in groups and is known as either an air mass or orographic thunderstorm. Heating of the air near the Earth's surface creates an air mass thunderstorm; the upslope motion of air in the mountainous regions causes orographic thunderstorms.

Cumulonimbus clouds that form in a continuous line are nonfrontal bands of thunderstorms or squall lines.
Since rising air currents cause cumulonimbus clouds, they are extremely turbulent and pose a significant hazard to flight safety. For example, if an aircraft enters a thunderstorm, the aircraft could experience updrafts and downdrafts that exceed 3,000 fpm. In addition, thunderstorms can produce large hailstones, damaging lightning, tornadoes, and large quantities of water, all of which are potentially hazardous to aircraft.