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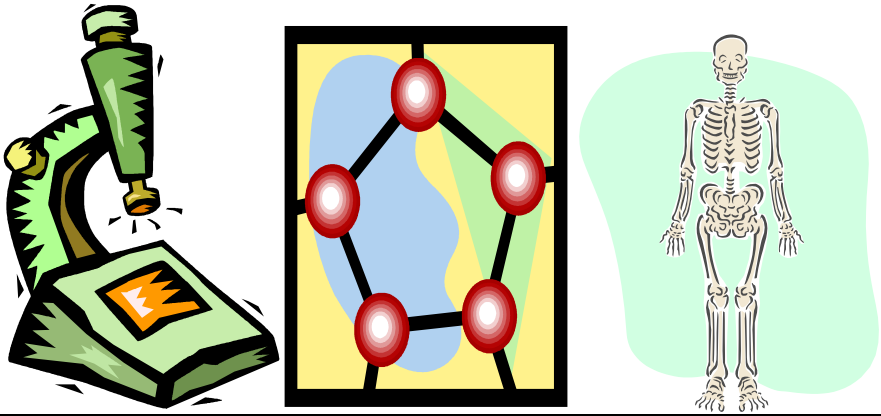
Presents

Guts and Gore

Biology



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Activity 1: Germinating Seeds

This activity aims to introduce a basic understanding of plants and how they grow. Also it gives the student the chance to grow some plants and learn how to look after the plant.

A seed is a miracle waiting to happen. The embryo comes pre-packaged with a food supply and the vital genetic information needed to become a plant just like its parents. Seeds exist in a state of dormancy, absorbing oxygen, giving off carbon dioxide, and slowly using up their stored food reserves. During this process the seed continually monitors the external environment waiting for ideal conditions specific for the particular seed. Once the ideal conditions occur, the seed breaks dormancy and germinates. The seedling gathers energy through its leaves by the process of photosynthesis and absorbs nutrients and water from the soil through the roots. Our goal is to provide the optimal environment for germination and seedling growth.

Sun flowers are an extremely good flower to grow as they do so very quickly into an impressive looking flower, with very little work involved.

Materials

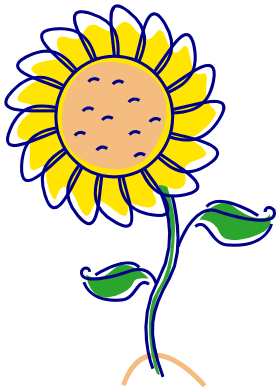
Long flower pot, bag of compost, sunflower seeds.[1]

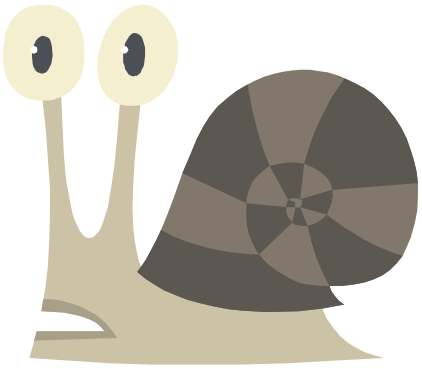
[1] **The moon is one million times drier than the Gobi Desert.**

Procedure

1. Fill the flower pot about ¾ full with the compost
2. Place the sunflower seeds into the pot together in clumps of 2 or 3.
3. Keep the clumps of seeds about 10 cm apart from the next clump.
4. Once bedded in to the compost, water the seeds thoroughly ensuring the soil is completely moist.
5. Place the seeds on a window sill that gets a lot of direct sunlight.
6. Within a couple of weeks the seeds will begin to sprout and then grow very quickly.
7. Ensure at all stages of growth that the plants are properly watered. When growing, the flowers will wilt if they do not have enough water, if this happens simply water them and they will come back up.
8. When the plants get to about 2 ft tall they will have to be dug up and transferred to individual pots or into the earth. [2]
9. When taking up the plants you will notice a substantial root system under the soil. Take care in tearing the plants apart.
10. When re-planting the flowers, place them in direct sunlight and deep down into the earth for support (at least 10-12 inches). If possible support the plant against a wall of with a support stick.
11. Now you plant will grow very quickly and begin to flower once it gets to a certain height. Keep an eye to make sure they are properly watered.
12. The seeds from the sunflowers can be harvested for eating or indeed to plant new flowers for next year.
13. Keep an eye out for snails, they will eat the plant otherwise.

[2] **Diamonds are the hardest substance known to man.**



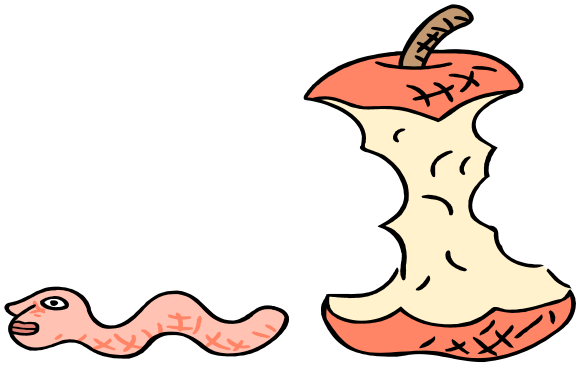


Sunflower is the common seed name for the genus *Helianthus*. The sunflower is native to North America, and was used by early North American Indians for food and pressed to make hair oil. Meal from processed seed has been used for livestock feed. Today, whole seeds are used for oil, bird seed and snacks. The seeds are a rich source of calcium plus 11 other minerals. The 50 percent fat composition is mostly polyunsaturated linoleic acid. [3]

[3] **The seeds of an Indian Lotus tree remain viable for 300 to 400 years.**

Activity 2: Breeding Earthworms

This activity is designed to allow children to look at earthworms in everyday life and simply to give them a basic appreciation for the earthworms important role in nature. An earthworm can grow only so long. A well-fed adult will depend on what kind of worm it is, how many segments it has, how old it is and how well fed it is. An *Lumbricus terrestris* (common earthworm) will be from 90-300 millimeters long. A worm has no arms, legs or eyes. There are approximately 2,700 different kinds of earthworms. Worms live where there is food, moisture, oxygen and a favourable temperature. If they don't have these things, they go somewhere else. In one acre of land, there can be more than a million earthworms. The largest earthworm ever found was in South Africa and measured 22 feet from its nose to the tip of its tail. Worms tunnel deeply in the soil and bring subsoil closer to the surface mixing it with the topsoil. Slime, a secretion of earthworms, contains nitrogen. Nitrogen is an important nutrient for plants. The sticky slime helps to hold clusters of soil particles together in formations called aggregates.



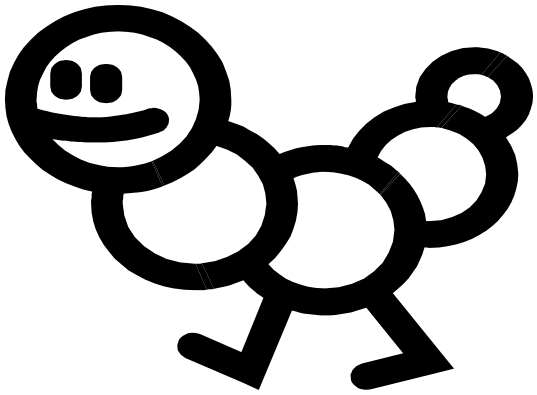
Materials

Plastic see through jar (sweet containers in shop), earth, some waste food.[4]

[4] **A Boeing 707 uses four thousand gallons of fuel in its take-off climb.**

Procedure

1. Place some drainage holes in the bottom of the jar for drainage. Fill the container almost to the top with earth, ensuring the earth is not compacted.
2. ensure the earth is moist but not overly watered.
3. Place some dead leaves and bits of waste fruit on top of the soil.
4. Put the worms into the jar and let them take their course.
5. Wrap the jar in black paper.
6. Each day take the paper off and look at the channels left by the worms in the soil. Ensure you add water each day. Watering can is the best way to prevent over application of the water.
7. Replace the leaves and food when they are gone.[5]



[5] **No matter its size or thickness, no piece of paper can be folded in half more than 7 times.**

Activity 3: Sunlight and Plants

This activity is aimed at explaining to children the importance of plants in this world and hence how important sunlight is for plants. The activity will give a clear demonstration to the students regarding how plants work in a very simple, and user friendly manner.

Plants produce carbohydrates through photosynthesis. For the process they use carbon-dioxide, water and the energy of sunshine. As a result, oxygen is released and water is evaporated. Plants play a very important role in sustaining the eco-system of the Earth, as they constantly reproduce oxygen during sunlight hours. However, to improve the air inside a room simply with plants, you would need a huge surface of leafs.

In this experiment we remove sunlight to see the effect it has on a plant. This will be done two ways. Firstly be removing all sunlight from one plant and secondly, by removing sunlight from parts of plants, i.e., covering leaves.

Materials

3 identical green leafed variety of plants. Tin foil.

Procedure

1. Ensure the three plants are properly watered and bedded before commencing the experiment.[6]

[6] **Every year in the US, 625 people are struck by lightning.**

2. Place one plant in a spot, usually a windowsill, which receives large amounts of sunlight.
3. Place one plant into a press, to remove sunlight penetration.
4. One the third plant, cover some of the leaves in tin foil and leave next to the plant one in the sunny spot.

5. Treat all plants the same, e.g., watering, but do not take the 2nd plant out of the press or remove the tinfoil from the 3rd plant.
6. After 1 week examine the three plant, note the differences. Plant one should be growing healthily, plant 2 should be starting to die, and the parts of the leaf covered should start to be discoloured on the third plant.
7. Repeat again after two weeks. By now the difference will be extremely noticeable.

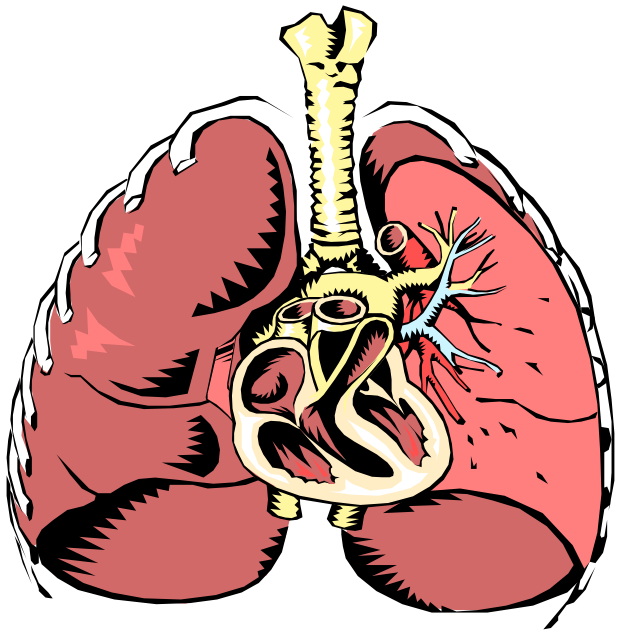
Children will now understand the importance of sunlight in keeping plants healthy.[7]

[7] **House flies have a lifespan of two weeks.**

Activity 4: How the Lungs Work

This activity explains the basic principles behind how the lungs function. It introduces the human body systems to the student, which they will always find interesting. The lungs provide a very large surface area (the size of a football field) for the exchange of oxygen and carbon dioxide between the body and the environment.

A slice of normal lung looks like a pink sponge filled with tiny bubbles or holes. These bubbles, surrounded by a fine network of tiny blood vessels, give the lungs a large surface to exchange oxygen (into the blood where it is carried throughout the body) and carbon dioxide (out of the blood). This process is called gas exchange. Healthy lungs do this very well.



To breathe in (inhale), you use the muscles of your rib cage- especially the major muscle, the diaphragm. Your diaphragm tightens and flattens, allowing you to suck air into your lungs. To breathe out (exhale), your diaphragm and rib cage muscles relax. This naturally lets the air out of your lungs.[8]

[8] **The North Atlantic gets 1 inch wider every year.**

Materials

Large clear plastic bottle, 3 small balloons, insulating tape, 2 pieces of equal sized plastic tubing, scissors.

Procedure

1. Secure the two pieces of plastic tubing using the insulating tape.

2. Attach a balloon to an end of each piece of plastic tubing using the insulating tape.

3. Cut the end off a plastic bottle (you may need an adult to help you with this).

4. Place the balloons and plastic tubing inside.

5. Seal the plastic tubing into the neck of the bottle using the insulating tape.

6. Tie a knot in the third balloon.

7. Carefully cut it in half crossways.

8. Gently stretch the knotted part of the balloon over the lower end of the bottle and pull it around the sides.

9. Now hold the balloon by its knot.

10. The lower balloon represents the diaphragm. Pull it down as though you were inhaling.

11. Air from outside rushes in and makes the two balloons expand, just like the real lungs in your chest.

12. Release the knotted balloon as though you were breathing out. The air is pushed out of the lungs and tubing at the neck.[9]

[9] **Emus and kangaroos cannot walk backwards.**

Activity 5: The Cows Heart

This activity gives the students a chance to see an actual heart. This activity is a good time to introduce how the heart work and how important it is that we maintain our heart. The beauty of the cows heart is that it is a larger version of the human heart. The sheep heart is fairly much the same size as the human heart and can be shown to demonstrate the size of the human heart. Wear rubber gloves when handling the heart.

Your heart is a muscular organ that acts like a pump to send blood throughout your body all the time.

Your heart is at the centre of your circulatory system, which delivers blood to all areas of your body. An electrical system regulates the heart and uses electrical signals to contract the heart's walls. When the walls contract, blood is pumped into your circulatory system.

Your circulatory system is made up of a network of blood vessels, such as arteries, veins, and capillaries. The vessels in this network carry blood to and from all areas of your body. A system of inlet and outlet valves in your heart's chambers works to ensure that blood flows in the right direction.

Your heart is vital to your health and nearly everything that goes on in your body. Without the heart's pumping action, blood can't circulate within your body.[10]

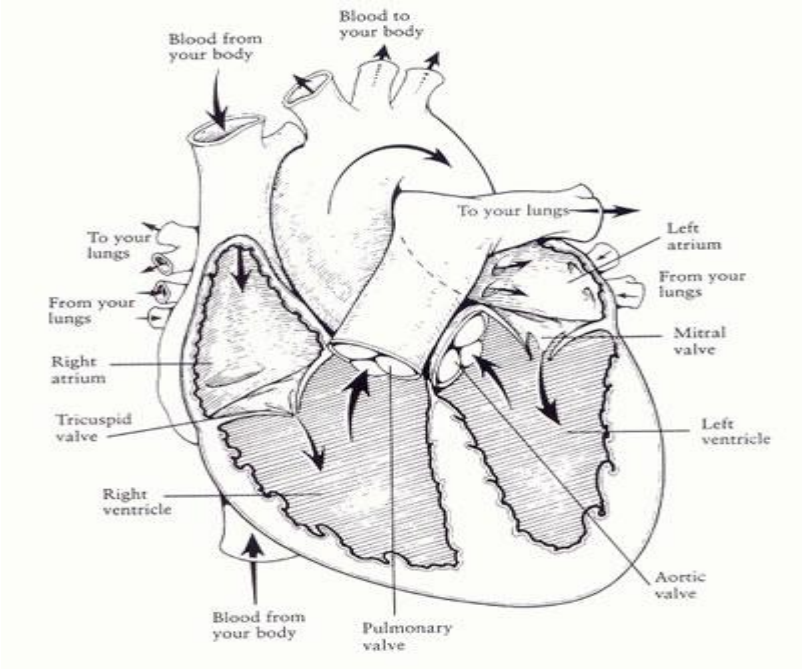
[10] **House flies have a lifespan of two weeks.**

Your blood carries the oxygen and nutrients that your organs need to function normally. Blood also carries carbon dioxide, a waste product, to your lungs to be passed out of your body and into the air. A healthy heart supplies the areas of your body with the right amount of blood at the right rate needed to function normally. If disease or injury weakens your heart, your body's organs won't receive enough blood to function normally.

How to stay fit and strong????

1. Exercise regularly
2. Don't smoke at all
3. Drink alcohol in moderation when your over 18
4. Eat well, don't eat too many takeaways, eat plenty of fish
5. Keep your weight in check.

There is no real procedure to this activity just to discuss the heart and show them what the heart looks like. Below show a diagrammatic drawing of the heart to allow you to show the various parts of the heart if your comfortable with cutting it up. However you can still show the main veins and arteries in the body.[11]



[11] **The human body has enough fat to produce 7 bars of soap.**

Activity 6: Things That Make Snot

This is a fun activity presented in a humorous way the kids would enjoy. The students will learn why our body produces mucus and what is actually does. Finally the activity will finish with a slime/snot producing experiment.

To better understand snot and boogers, lets start with mucus. Mucus is thick, sticky, slimy and a good thing. Mu-u-u-u-cus! Mucus is so important that it's found all over nature. Inside your nose, it's a thick, sticky, wet pudding-like gunk that coats your skin and hairs. Mucus is made by, mucus membranes. Your body has mucus membranes in all sorts of places: the stomach, intestines, nose, lungs, eyes, mouth, and the urinary tract all contain mucus membranes that secrete mucus. For now, we will "pick the nasal membranes and mucus" as our topic of interest. Mucus becomes very important with every breath that you take.

Each time that you take a breath, there are three very important things that happen.

1. The air that you breathe in is cleaned by tiny hairs in your nose, trapping little bits of dirt and dust and germs that come in through your nose.

2. As you breathe, the air is made slightly wet. Your nose having damp passages does this.

3. The next thing that takes place when air enters your nose is that the air is warmed. This happens because the blood flows through the lining of the nose and gives off heat.[12]

[12] **A cockroach can live for several weeks without its head.**

Even though these three actions are to keep you healthy, germs can sometimes get into your respiratory system. The germs start growing in your nose, throat and lungs. *You have a cold!*

When you have a cold the linings of your nose and / or throat swell. Thick, clear liquid called mucus forms and its purpose is to wash away the germs. The mucus builds up and blocks the air passages. This is what causes a stuffy nose and a cough.

Snot: "Snot", is just another word for mucus. Snot is beautiful human slime. When bits of stuff get stuck in your nose hairs, it's the mucus or snot that surrounds the stuff and traps it.

Boogers: Boogers are dried-up snot and dirty nose debris. They can be small, slimy lumps or big, dry, brown clumps. Either way, boogers are filled with the junk that's in the air you breathe. Dust, pollen, germs, sand, fungi, smoke, small particles from outer space! The good thing about your mucus is that it helps trap all this junk and keep it from getting close into your lungs.

Function:

It seems like the main function of mucus, snot, boogers, whatever you want to call it is to trap particles, junk in the air inhaled through the nose and keep our lungs clean. Exhaling through the nose helps to expel, to push out the mucus with the trapped dirt in it. Our nose really acts like a vacuum cleaner for the air, and blowing our nose is like emptying the bag.

Procedure

1. Heat 1/2 cup water just until it boils. Remove the heat.
2. Sprinkle in 3 envelopes of unflavored gelatin. Let it soften a few minutes and stir with a fork.
3. Add enough corn syrup to make 1 cup of thick glop.
4. Stir with the fork and lift out the long strands of gunk.
5. As it cools, you'll need to add more water, spoonful by spoonful.[13]

[13] **Healthy nails grow about 2 cm each year. Fingernails grow four times as fast as toenails.**

Activity 7: Milk Jug Skeletons

The purpose of this activity is to introduce the concept of the skeleton to the students. It will allow them to understand how the skeleton works, and why we need our skeleton. It finishes by allowing the students to make their own plastic skeletons.

Bones have two purposes. Some, like your backbone, provide the structure which enables you to stand erect instead of lying like a puddle on the floor. Other bones protect the delicate, and sometimes soft, insides of your body. Your skull, a series of fused bones, acts like a hard protective helmet for your brain. The bones, or vertebrae, of your spinal column surround your spinal cord, a complex bundle of nerves. Imagine what could happen to your heart and lungs without the protective armour of your rib cage!

When you were born, you had over 300 bones. As you grew, some of these bones began to fuse together. The result? An adult has only 206 bones! You need muscles to pull on bones so that you can move. Along with muscles and joints, bones are responsible for you being able to move. Your muscles are attached to bones. When muscles contract, the bones to which they are attached act as levers and cause various body parts to move.

You also need joints which provide flexible connections between these bones. Your body has different kinds of joints. Some, such as those in your knees, work like door hinges, enabling you to move back and forth. Those in your neck enable bones to pivot so you can turn your head. Still other joints like the shoulder enable you to move your arms 360 degrees like a shower head.[14]

[14] **There are 60,000 miles (97,000 km) in blood vessels in every human.**

Materials

• 8 or 9 clean, plastic gallon jugs

• String

• Scissors

• Craft knife (optional - for parents use only!)

• Glue gun (for parents use)

• One-hole punch

Procedure

HEAD: Choose a jug with a pair of indentations opposite the handle and turn it upside down. In the corner, opposite the handle, cut out a large, smiling mouth, centred under the indented "eyes." Make two small slits in the top of head and tie a loop of string through them for hanging the finished skeleton.

CHEST: Cut a vertical slit down the centre of a right-side-up jug, directly opposite the handle. Cut and trim away plastic to make the rib cage. Glue the head and chest together at the "neck" by connecting the spouts of the two jugs with a thick band of hot glue. Hold the jugs together for a few minutes until the glue cools.

SHOULDERS: Cut off two-jug handles (leaving a small collar on the ends) and attach them to the chest section with hot glue. Punch a hole at one end of each shoulder.

HIPS: Cut all the way around a jug, about 4½ inches up from the bottom. Take the bottom piece and trim away a small smile shape from each side to make a four-cornered shape. Punch holes in two opposite corners.

WAIST: Cut out two spouts, leaving a ½ inch collar on each. Glue the spouts together and let dry. Hot-glue the waist to the bottom of the chest and to the top of the hip section.

ARMS AND LEGS: Cut eight long bone shapes from the corner sections of three jugs (cut into the curved shape of the jug to make the bones even more realistic). From four of these bones, cut out the center to make lower limbs (forearms and shins). Punch a hole through the ends of all eight bones. Use string to tie two arm sections to each shoulder and two leg sections to each hip.

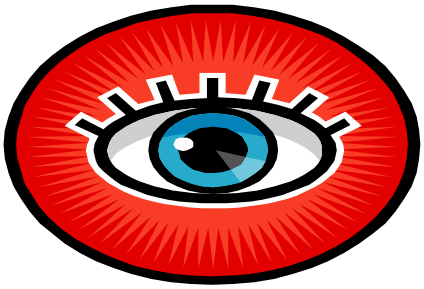
HANDS AND FEET: Let kids trace their hands and feet onto the side of a jug, then cut out the shapes. Punch holes in the hands and feet, and tie them onto the arms and legs.[15]

[15] **Ants do not sleep.**

Activity 8: Dissection of the Cows Eye

This activity will aim to introduce the students to how the eye works and to the various parts of the eye. As demonstrator it will be up to you if you feel comfortable cutting up the eye.

The eye processes the light through photoreceptors located in the eye that send signals to the brain and tells us what we are seeing. There are two types of photoreceptors, rods and cones. These photoreceptors are sensitive to the light. Rods are the most sensitive to light and therefore provide gray vision at night. Cones are mainly active in bright light and enable you to see colour. There are 100 million rods compared to the 3 million cones located in your retina. The photoreceptors help you adjust to night and day. For example, if you walk inside from the sun, you can not initially see anything. This is due to the activity of the cones and the lack of activity of the rods. The rods become activated and adapted to the dim light, resulting in gray images formed in the dark. The same thing happens when you leave a dark movie theatre during the day. The rods are mainly activated and the cones have to adjust to sunlight when you leave the theatre.



Materials

Cow eye, dissecting pan, dissecting kit, safety glasses, lab apron, and gloves

Procedure

1. Obtain a cow eye, place it in your dissecting pan, & rinse the eye with water.
2. Rotate the eye until the larger bulge or tear gland is on the top of the eye. The eye is now in the position it would be in a body as you face the body.
3. On the outside of the eye, locate the following parts: [16]

[16] **Shark's teeth are literally as hard as steel.**

- fat- surrounds the eye & cushions it from shock
- tear or lacrimal gland - forms a bulge on the top outer area of the eye & produces tears to wash the surface of the eye
- tear ducts - tubes to carry the tears from the gland to the eye
- optic nerve - a white cord on the back of the eye about 3mm thick just toward the nasal side; carries messages between the eye & brain
- muscles - reddish, flat muscles found around the eye to raise, lower, & turn (right & left) the eye

4. Turn the eye so that it is facing you & examine these structures on the front surface of the eye:

- eyelids - two moveable covers that protect the eye from dust, bright light, and impact
- sclera - this is the tough, white outer coat of the eye that extends completely around the back & sides of the eye
- cornea - a clear covering over the front of the eye that allows light to come into the eye (preservative often makes this appear cloudy)
- iris - round black tissue through the cornea that controls the amount of light that enters the inner part of the eye (may be colored in humans)
- pupil - the round opening in the center of the eye that allows light to enter and whose size is controlled by the iris

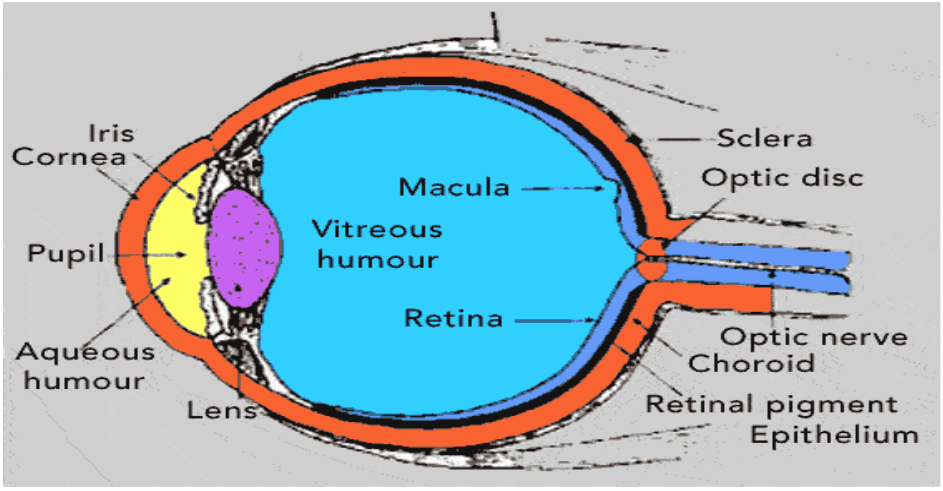
5. Place the eye in the dissecting pan so it is again facing you. Using your scalpel, pierce the white part of the eye or sclera just behind the edge of the cornea. Make a hole large enough for your scissors.
6. Using your scissors, carefully cut around the eye using the edge of the cornea as a guide. Lift the eye & turn it as needed to make the cut and be careful not to squeeze the liquid out of the eye.
7. After completing the cut, carefully remove the front of the eye and lay it in your dissecting pan.
8. Place the back part of the eye in the pan with the inner part facing upward[17].

[17] **The largest eggs in the world are laid by a shark.**

9. Locate the following internal structures of the eye:

- cornea - observe the tough tissue of the removed cornea; cut across the cornea with your scalpel to note its thickness
- aqueous humor - fluid in front the eye that runs out when the eye is cut
- iris - black tissue of the eye that contains curved muscle fibers
- ciliary body - located on the back of the iris that has muscle fibers to change the shape of the lens
- lens - can be seen through the pupil; use your scalpel & dissecting needle to carefully lift & work around the edges of the lens to remove it
- vitreous humor - fluid inside the back cavity of the eye behind the lens
- retina - tissue in the back of the eye where light is focused; connects to the optic nerve; use forceps to separate the retina from the back of the eye & see the dark layer below it. [18]

Use the diagram below to help you identify the parts of the eye.



[18] **Most people blink about 17,000 times a day.**

Activity 9: How Fit Are You

This activity is aimed at getting students to think about fitness and how important staying fit and healthy is, and could probably be run after activity 5. This activity could be carried out as a PE lesson, so the kids are learning and don't even know it.

Fitness in a nutshell, is a general state of good health, usually as a result of exercise and nutrition. We can get exercise from all manner of activities from long distance running to doing the hoovering. At a young age, kids have a natural fitness and energy about them, but they will only keep this fitness if they eat properly. Activity 5 discussed how to keep a heart healthy by eating correctly. If they don't eat the right food there bodies will become tired, the person won't want to run around and will put on weight. They will find themselves not able to run as fast as they could, they won't be as strong as they were, and may even find themselves not getting as good a mark in their exams.

Fitness is essential in everyday life and everyone should aim to get at least 30 minutes of proper exercise a day by running, cycling, fast walking, swimming, weight training etc.

A good test of fitness is carried out by measuring the pulse after exercise and then seeing how long it takes for the pulse to return to its normal level after training.

Procedure

1. Take pulse rate at rest (30 secs x 2)
2. Run as fast as you can for 400 m
3. Take pulse rate straight after the run.
4. Take pulse rate every minute after that[19]

[19] **Armadillos, opossums, and sloth's spend about 80% of their lives sleeping.**

5. The longer it takes for a persons pulse to return to its original rate, the less fit they are.

Your pulse measures how fast your heart is beating. Each time your heart beats it sends blood out of your heart into your arteries. Your pulse is like a wave or a ripple through your arteries that you can feel with every heart beat. We call the number of pulse beats we feel in one minute a pulse rate.[20]

Age Group	Pulse Rate
Babies	120 - 150
2 to 6 years old	90 - 120
Children	85 - 100
Teenage	70 - 100
Adult	60 - 100

[20] **The cosmos contains approximately 50,000,000,000 galaxies.**

Activity 10: The Biology Quiz

1. How many chambers are in the heart? 4
2. What is the black spot in the centre of the eye called? Pupil
3. What is the biggest bone in the human body? Femur or Thighbone
4. What is the biggest land animal on the planet? Elephant
5. What is the life span of a fly? 2 weeks
6. What is Irelands only reptile? The Lizard
7. How many hairs can be found on our heads? 100,000
8. How many bones in an adult body? 206
9. What is the biggest muscle in the body? Gluteus maximus (backside)
10. How much of the brain is made up of water? 80%

[21]

[21] **Lake Baikal is the deepest lake in the world.**