BASIC SCIENCE AND HEALTH EDUCATION LESSON

NOTES

TERM I.

SUMMARY OF THE TOPIC FOR TERM 1

THEME: 1. The world of living things

TOPICS: a). Classification of Animals

2. Matter and Energy

b) sound Energy

3. The Human Body

c) circulatory system

4. Human health

d) Alcohol, Smoking and drugs in Society.

THEME: THE WORLD OF LIVING THINGS

1. TOPIC: CLASSIFICATION OF LIVING THINGS

CONTENT

a. mCharacteristics of living things

THEY FEED

- Various livingthings feed in different ways ie

Organism	Mode of feeding	Types of nutrition
Fungi like yeast , moulds, mushrooms , puffballs etc	Saprophytically	Saprophytic nutrition
Parasites like tape worms, hook worms, ticks , lice , mites etc	Parasitically	Parasitic nutrition
Plants	Autotrophucally By making their own food by the help of sunlight	Autotrophic nutrition
Animals	Hetetrophically - Some are animals feed directly on already made food by plants ie herbivores , omnivones , carnivores	Heterotrophic nutrition

b. DIFFERENCES IN FACING BETWEEN PLANTS AND ANIMALS

Plants	Animals
They make their own food by the help of sunlight (Autotrophically)	The food on already made food by plants (Heterotrophy)

THEY GROW.

- What is growth?
- It refers to increase in height and weight of an organism.

c. DIFFERENCES IN GROWTH BETWEEN ANIMALS AND PLANTS

Animals	Plants
Growth occurs equally on all parts of the body	Growth occurs only at the tips of roots and shoots

THEY REPRODUCE

- Reproduction is the process by which living organisms multiply or increase in numbers as they give birth young ones (offspring)

THEY MOVE

Mainly living organisms like animals move (locamote) to different places for some reasons.

Reason why animals move from one place to another ➢

To look for food (pasture) and water.

- To look for shelter
- To run away from their enemies (protection)
- To look for mates (for mating)
- Looking for their young ones.

THEY EXCRETE

Excretion is the removal of waste products from the body.

d. WHY DO LIVINGTHINGS EXCRETE?

To get rid of waste products from their bodies.

THEY RESPIRE

Respiration is the process by which body uses food and oxygen to reduce energy. How do organisms benefit from respiration?
They get energy

TYPES OF RESPIRATION

i) Aerobic respiration is the type of respiration which involves use of oxygen
ii) Anaerobic respiration is the types of respiration which doesn't involve use of oxygen
iii) They respond to stimuli

Animals and plant respond differently circumstances in the environment for survival, examples of stimuli toad, head, light, pain, gravity, water etc

Living things are divided into five kingdoms namely;

- Animal Kingdom
- Plant Kingdom
- Prokaryotal (Bacteria Kingdom)
- Protoctista (single celled organisms)
- Fungi Kingdom

Animal Kingdom

2. CLASSIFICATION OF ANIMALS

why to classify animals?
Animals are classified for easy identification
for easy study.
Characteristics used for classifying animals

- External features such as color, size, shape number of legs, hair on the body etc.
- It different mode of reproduction, respiration and movement

Animals are classified into two groups

- Vertebrates
- Invertebrates

Vertebrates

Vertebrates are animals with a back bone /vertebral column (spine)

- The back bone protects the spinal cord.
- All vertebrates have an endo skeleton

Groups of vertebrates

Vertebrates are classified into five groups;

- Mammals
- Birds
- Reptiles
- Fish
- Amphibians

Vertebrates are also grouped into two;

i. Warm bloode(homoeothermic)
ii. Cold blooded (poikilothermic

Warm blooded

i) Mammals
ii) ii) Birds

Cold blooded

i) Fish
ii) Reptiles
iii) Amphibians

MAMMALS

Mammals are vertebrates which have mammary glands and for their body.

Characteristics of mammals

- Mammals are warm blooded
- They have fur on their bodies
- Most of them give birth to living young ones.
- They feed their young ones on breast milk
- They breathe through the lungs.
- Their hearts are divided into four chambers

Groups of mammals

- Primates (most advanced /fingered mammals)
- Ungulates (hoofed mammals)
- Carnivorous mammals (flesh eaters)
- Rodents (gnawing mammals)
- Insectivorous (insect eaters)
- Pouched mammals (marsupials)
- Flying mammals (chiroptera)
- Egg laying mammals (monotremes)
- Sea mammals (cetaceans)

Primates (fingered mammals)

These are the most intelligent group of mammals.

Characteristics

- They are the most intelligent group of mammals.
- They use front limbs for holding and hind limbs for walking.
- They have five fingers on each hand and five toes on each foot.
- They are omnivorous i.e. they feed on both flesh and vegetables.
- They have well developed set of all the four types of teeth i.e. incisors, canines, premolars and molars (32 teeth)

Examples of primates

Man, monkeys, apes, gorillas, baboon, bush baby, chimpanzee, orangutan.

Ungulates (hoofed mammals)

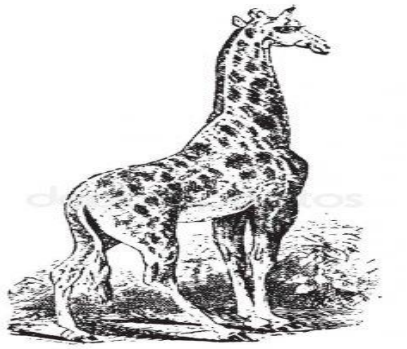
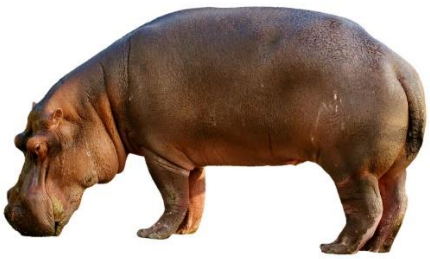
All mammals in this group are herbivorous i.e. they feed on vegetation.

Ungulates are divided into two sub-groups

i) Even toed ungulates

ii) Odd toed ungulates

Diagram for toes.

Even toed ungulates	Odd toed ungulates
	

Even toed ungulates

They include; Okapi, deer, pigs, cattle, giraffe, sheep, antelopes, hippopotamus

Even toed ungulates are subdivided into two;

i) Ruminants

ii) Non ruminants

Ruminants

These are ungulates with four stomachs and chew cuds. Most of them have horns which they use for protection.

Examples

- Cattle
- Goats
- Sheep
- Camel

Antelope etc.

Non ruminants

- These are ungulates which do not chew cud but have a complete dentition.
- They have well developed canines which they use for protection

They are single stomached. (Have one stomach)

Examples include;

Pigs, hippopotamus, warthog.

Odd toed ungulates

The number of toes is always odd e.g. one in horse, donkey, Zebra and three in elephant and Rhino.

Carnivorous mammals

Characteristics of carnivorous animals

- They are strong mammals
- They have well developed canine teeth for tearing flesh of their prey.
- They have sharp claws for holding, killing and tearing their prey.
- They have a very good speed, good sense of smell, keen eye sight and good hearing.
- This is why they even hunt at night.
- Their feet have soft pads therefore thus can run after their prey without making noise.

Carnivorous mammals are divided into two families;

a) Dog family – Face resembles that of a dog
b) Cat family – face resembles that of a cat.

Examples of the dog family include; Domestic dog, hyena, jackal, fox etc.
Examples of the cat family include; lion, leopard, tiger, cheetah, man goose, domestic cat.
Some carnivorous are scavengers e.g. hyena, jackal.

- Animals in dog family are scavengers.
- Animals in cat family are predators.

Gnawing mammals (Rodents)

- These are mammals which have well developed incisors used for biting and chewing powerful and rapidly.
- They don't have canines.
- Most rodents are herbivores (vegetarians)

Examples include; Rats, squirrels, mice, rabbits, hares, porcupines, guinea, pigs and moles.

Insect eating mammals (insectivores)

- These are mammals which feed on insects.
- They have a sensitive snout and strong claws for digging.
- They are nocturnal i.e. they hunt at night and sleep during day.
- Examples include; Hedgehog, elephant shrew, Aardvark.
- A hedgehog is an animal with spines on its body. When threatened, it rolls itself up into a ball.

Flying mammals (chiroptera)

Bats are the only true flying mammals.
They have a fold skin attached to the fore limb which act as wings.
There are three main types of bats;

a) Insect eating bats: These are helpful to man because they eat many harmful insects like mosquitoes.
b) Fruit eating bats:
c) Blood sucking bats (vampires) they suck blood from large animals like horses, cows, buffaloes etc. bats are nocturnal i.e. they hunt and sleep during day. They can find their food at night in complete darkness by using echoes from the sound they produce.

Pouched mammals (marsupials)

Examples of these include; Kangaroo, Koala bear and Wallabies
Marsupials are found in Australia and south America.

Egg laying mammals (monotremes)

- These are the most primitive in the class of mammals because;
- They resemble birds and reptiles in that they lay eggs and also have beaks similar to those of birds.
- They have characteristics of birds, mammals and reptiles.
- Monotremes are regarded as mammals because they feed their young ones on milk from the mammary glands and for the care they give to their young ones after hatching.
- Examples include; the duck billed platypus and the spiny anteater (echidna) of Australia

Sea mammals (cetaceans)

- These are mammals which live in the sea.
- They don't have gills but they breathe by means of lungs
- They have a layer of fats under the skin called blubber to keep them warm.
- They have a high level of intelligence next to primates
- They have mammary glands
- They give birth to living young ones and suckle them on milk from the mammary glands.
- Most sea mammals have fur.

Examples include; Blue whale, Sperm whale, porpoises and seals

BIRDS

Characteristics of birds

- Their body is streamlined i.e. pointed at the front and back.
- Their bodies are covered with feathers which they molt every year.
- Their bones are hallowing i.e. do not have bone marrow.
- They have scales on their legs
- They are warm blooded
- They breathe by means of lungs Their
- front limbs are modified as wings
- They have no teeth but have horny beaks.
- Their eyes have three lids the lower, upper and nictating
- membrane. They lay shelled eggs which are fertilized internally.
- They care for their young ones. Many of them can fly.
-

External features of a bird

Features, alimentary canal of a bird, reproduction in bird Refers to P.5 (term work)

- Feeding habitants in birds
- Birds have no teeth
- They have a horny beak
- The shape of the beak varies with the type of the food eaten.

Classification of birds

- Birds have a number of special adaptation feathers.
- They are grouped avoiding to the type a beak and feet (claws) they have.
- Some birds are grouped according to the type of food they eat.

Some of the groups are;

- Birds of prey Perching
- birds
- Scratching birds
- Swimming birds
- Wading birds
- Flightless (walking) birds
- Climbing birds
- Scavenger birds

1. Birds of prey

- They are carnivorous birds that hunt and kill their prey.
- They eat rats, fish, mice, lizard, chicken etc
- They have strong eye sight to spot their even when they are flying.
- They have strong sharp, hooked beaks for tearing the prey.
- They have strong sharp curved talons (claws) for gripping and killing the prey.

Examples include; Hawks, eagles, vultures, secretary birds, owls, kites, falcons, king fisher etc

Structure of the beak and claws



Perching birds

- Birds in his group have;
- Split feet and walking legs.
- Back ward pointing toe suitable for holding a perch.
- They have one toe pointing backward and three toes pointing forward.

Types of perching birds

i) Seed eaters

These have short strong conical beaks suitable for breaking up seeds e.g. pigeon, doves, weaver bird's finches etc

Structure of the beak and foot

ii) Insect eaters

They have stoat short beaks for picking up the insect from the back of trees.
Examples include; Sparrows, robins, swallows, and swift, bee eaters etc.
Swallows and swifts have short and wide open beaks which help them to catch insects even when flying.

iii) Honey sucker/nector eater

Those have thin long beaks which are slightly curved.
Example, The sun bird.

Structure of the beak



Fruit eater

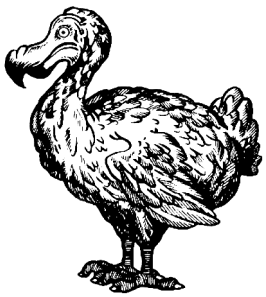
Those have a long stoat beak for collecting fruits
Example, Horn bill
Structure of the beak

Scratching birds

- These birds feed on seeds and insects which they find by scratching the earth.
- They have short, strong, firm pointed beaks for picking up things from the ground.
- They have strong feet with thick toes and blunt nails.
- They can walk easily
- Their body is heavy and wings are weak.

Examples include; domestic fowls i.e. chicken, turkey, guinea fowl.

Structure of the beak and foot



Swimming birds

- They have webbed feed which act like paddles
- They have broad breast bone.
- Their skin has many oil glands which produce oil to protect their body against water.
- They have beaks with small cross plates on the margins which help them to sieve food from the mud.
- Examples include; Ducks, swans, geese, penguins, seagulls, pelicans

Structure of the food and beak



Flightless birds

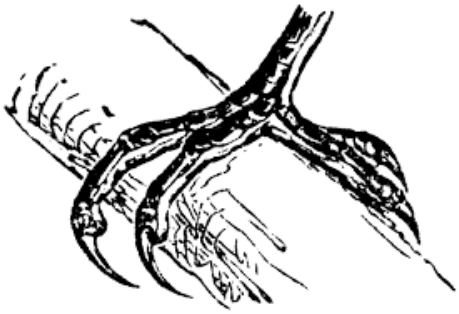
- These are birds which are unable to fly but can run very fast.
- They have weak and small wings compared to the body size.
- An ostrich is the largest and fastest flightless bird. It runs faster than a horse.

Examples include; Kiwi, penguins, ostriches, emu, rhea, and cross away.

Climbing birds

- They have two toes pointed forward and other two backwards.
- This arrangement helps them in climbing to look for seeds and insects.
- They live in trees and run about on branches of trees.
- Examples include; A parrot, a wood pecker.

The structure of the beak and foot





Scavenger birds

- These birds feed on flesh killed by other animals, rotten meat and fish.
- They usually have beaks similar to those of bird's prey.
- They are useful because they clear most of the dead decaying matter which may otherwise be a source of many diseases.

Examples include; vulture crows, and marabou storks

The ways in which birds are adapted for flying

- They are streamlined to reduce friction so that they can move through air easily. They
- have hallow bones which reduce weight and their back bones are fused (joined) to give them rigidity.
- They have strong attachment of their powerful and strong front muscles which are used for moving wings
- Their fore limbs are modified into wings
- They have no pinna to abstract the flow of
- air.

They have good eye sight to see well from long distances and judge the distance accurately

- They have a nictitating membrane which cover the eye and protect them against moving air during flight.
- Their bodies are covered with flight feathers.
- They have a quick digestive system

NB: some domestic fowls are unable to fly high because they have bone marrow which make them heavy.

Advantages of birds

- They are source of food
- The feathers are used for decorations like o hats, suits, hand bags in staffing mattress
- Bones are used for making glue.
- Some birds kept for customary purpose like making sacrifices and paying dowry.
- They are source of income to farmers.
- They attract tourist
- Some birds pollinate flowers like the sunbirds, they pollinate when collecting nector.
- Some help to clean our environment like the vultures, craws and marabour storts.

Disadvantages of birds

- Many birds damage our crops by eating seeds, like millet, rice, maize, sorghum etc many birds are pests
- Some birds cause accident to runaways at the airport.
- They make a lot of noise like the floas and mites

REPTILES

Most reptiles are a viparous animals i.e. they animals which lay eggs viviparous animals are animals which produce living young ones

Characteristics of reptiles

- The cold blooded animals
- They breathe by mean of lungs
- Their waste proof is covered with scales
- Their teeth are similar
- They have a three clambered heart i.e. two a auricles and one ventricle
- With exception of snakes, they have four limbs with claws.
- They have external ears. The tympanic membrane (ear drum) is usually situated below the surface of the body.
- They lay eggs which are fertilized internally. The shells of eggs are either leathery or quite hard made of calcium carbonate.
- They usually don't look after their young ones.

Classification of reptiles

Reptiles are divided into the following groups

i) Snakes
ii) Lizards
iii) Turtles, tortoises, and terrapins
iv) Crocodiles and Aligators

Snakes

- They have no limbs
- They are carnivorous animals
- Their eyes are without eye lids but each eye is protected by a immovable transparent membrane

- They have a forked tongue which acts as a sense organ for smell and taste.
- They have a large number of ribs and vertebrates.
- They shed (moult) their skin after a certain period.
- Their backward pointed teeth prevent the prey from escaping from the mouth.
- Some snake have poison fangs which have a deep canal through which poison passes.
- The ribs and large scales on the underside of their body also help them to move.
- They hide or move away when disturbed.

Classification of snake

Snakes are grouped into three main groups namely;

- Poisonous snakes
- Constrictors
- Non-poisonous snakes

Poisonous snakes

They have two long teeth called fangs near the front of the mouth to inject venom.

Example of poisonous snakes the Cobra (white bite /spit poison)

- Mamba (black /green)
- Puff udder /night udder
- Viper

Diagram of a poisonous fangs of a snake.



Non poisonous snakes

- These do not have fangs and the venom poison.
- They have solid uniform teeth.
- They kill their prey by crashing and suffocating using their strong muscles.
- The lick the prey to make them smooth and slippery and swallow them whole.

Examples of constrictors

- The Python
- Anaconda
- Boa constrictor

How is venom important?

- To produce antivenoms.

First aid for the snake bite

- Apply black stone on the injured part to suck the poison after making cuts
- Stay quiet and rest the bitten part so that the venom does not spread.
- Tie a bandage /tourniquet between the heart and the bitten part to limit the flow of poisoned blood to the heart.

- Cut between the fang marks and suck out the venom if you do not have wounds in the mouth.
- Take the victim to the nearest health unit to receive anti venom injection. How to tell that a person has been bitten by poisonous snake.

It leaves two fang marks on the bitten area through which some blood dozes

LIZARDS

They have four limbs and tails which can grow when its cut.

Examples of lizards

- Sinks
- Geckos
- Chameleons
- Agama lizards
- Monitor lizards
- Iguana lizards

Chameleons are slow moving reptiles which protect themselves by changing colour. (camouflaging)

They use their long sticky tongues to capture their prey.

They hatch their eggs inside the body and lay young ones

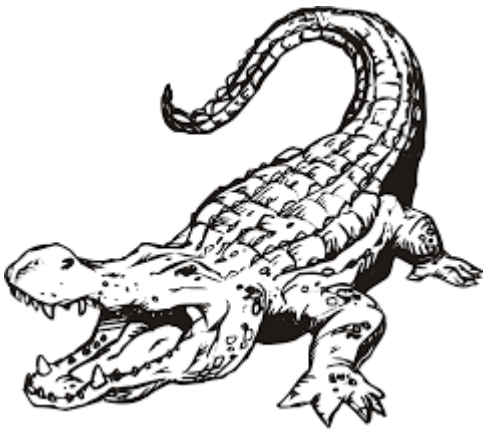
Tortoises, tortles, terrapins

- These are reptiles that have hard shells on their backs
- Turtles and terrapins have their feet modified into flippers for swimming in water.
- Tortoises move by walking using their strong legs.
- They all lay their eggs in sand on the bank of water.

Crocodiles and alligators

- They are the largest of reptiles
- They live in water and come out to sleep in the sand o the banks.
- They have strong tails for swimming and attacking their enemies /prey
- They have raws of teeth in their long jaws for gripping their prey
- They produce by laying eggs which are buried un sand at the bank of lakes or rivers.

Diagram of a crocodile.



Importance of reptiles to man

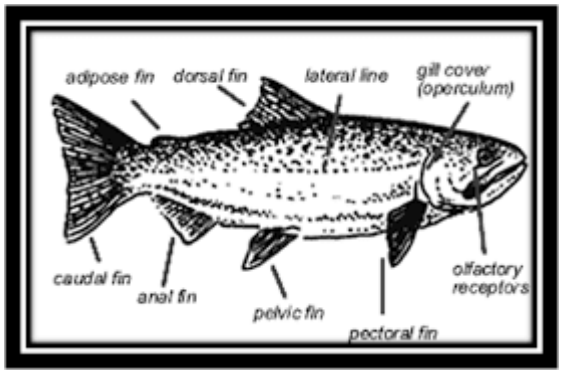
- They have good skins which is for making drums, belts, and shoes.
- Their skins can be sold as trophies to get income/money.
- They are sources of food to man.
- Some reptiles like geckos and lizards help to eat disease vectors like mosquitoes in the house.
- They are used for study and research
- Some like crocodiles act as tourist attraction

Fish belongs to the group of vertebrates called pisces

Characteristics of fish

- They live in water
- They breathe through gills
- They lay eggs which hatch into fires
- Their eggs are fertilized by the male from outside the female's body. In water (external fertilization)
- Most have scales on their body except cattle fish.
- They have fins for swimming and protection
- They are cold blooded vertebrates
- They feed on plants and animals in water.

The structure of the fish.



Functions of parts of a fish

Types of fish

There are three types of fish

- Bonny fish
- Cartilaginous fish
- Lung fish

Bonny fish

Examples of bonny fish are; Nile perch, Tilapia, herrings, trout, salmons.

- They have no eye lids.
- They have swim bladder which helps to keep them float or to
- sink. Their gills are protected by gill cover or operculum.
- Their bodies are covered by overlapping scales.

Cartilaginous fish

- Their skin is tough and shinny
- They have gills slits instead of gill cover.
- They have mostly cartilage instead of bones in their skeletons
- They do not have swim bladder.

Examples of cartilaginous fish

- Dog fish
- Skates
- Rays

Lung fish

- They breathe through gills in water and by swim bladder when gills cannot supply enough oxygen.
- They live in dirty pools, swamps or rivers.
- They have long and thin pelvic and pectoral fins.
- They hibernate in dry seasons.

Examples of lung fish

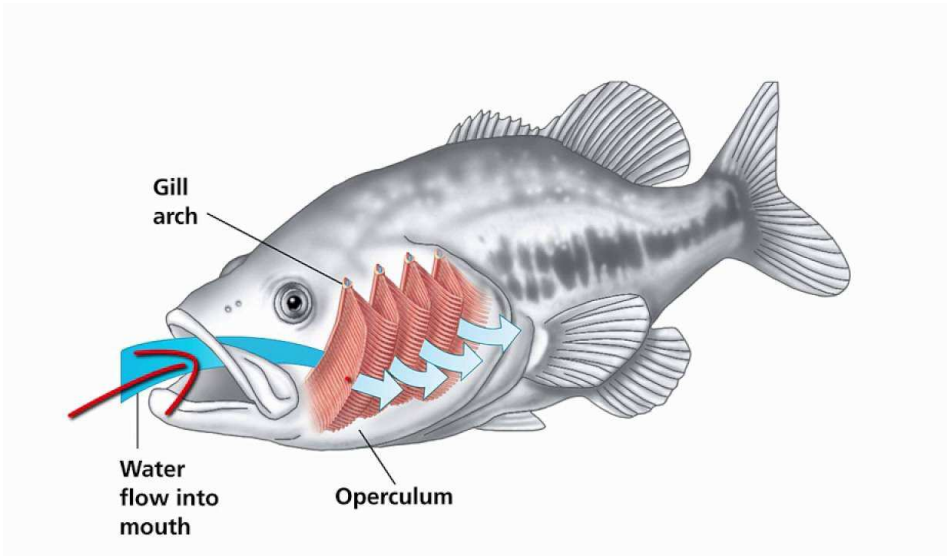
The common lung fish/mamba

- Epiceratodus
- Diponi

Breathing in fish

- Fish breathe in dissolved oxygen in water.
- Water containing oxygen moves through the mouth and passes out over the gills which absorb the oxygen in the water.
- Gill rackers trap solid particles or dirt to prevent damage to the gills.
- The gill bars are spread out the gills to prevent interlocking.
- Gill filaments are many in order to give large surface area to absorb a lot of oxygen dissolved in water for respiration.

Diagram showing the breathing mechanism of a fish.



How is fish adopted to living in water?

- Its streamlined body helps it to move easily in water.
- Fins help it to move in water and stop it from rolling.
- They have gills for breathing in water.

- They have lateral lines to detect sound waves (hearing) or danger.
- Their scales and colour provide protection.
- Its slippery scale protects it from predators and helps in reducing viscosity (friction in water)
- Some have electric organs which give out high voltage of electric shock to its enemy.
- Some fish inject poison into their enemies.

Uses of fish to man

- They are kept as pets in aquarium for decoration
- Their bones are used to make glue
- They are sources of employment e.g. fish mongers.
- They can be used for research and learning.
- Some are used as medicine e.g. silver fish.

AMPHIBIANS

These are cold blooded vertebrates that can live both in water and on land

Characteristics of amphibians

- They are cold blooded vertebrates
- They reproduce by laying eggs
- They undergo external fertilization i.e. the male sheds sperms on the eggs outside the female's body as they are being laid in water.
- They have no external ear lobes.
- Their eggs are usually laid in egg spawns.
- They have scaleless skin
- Their heart is three chambered.

Examples of amphibians

Frogs, toads, Newts, salamandas, axolotis, effs blind worm (ocaecellians)

Differences between a frog and a toad

- Frogs mostly live in water while toads mostly live on land.
- Frogs have smooth slippery skins while toads have warty rough skins.
- Toads lay eggs in long ribbon spawns while frogs lay eggs in mass spawns.
- Frogs have fully webbed hind feet while toads have partly webbed feet.
- Frogs breathe through their lungs and moist skin while toads breathe through their lungs.
- Tadpoles of frogs are brown while tad poles of toads are black.

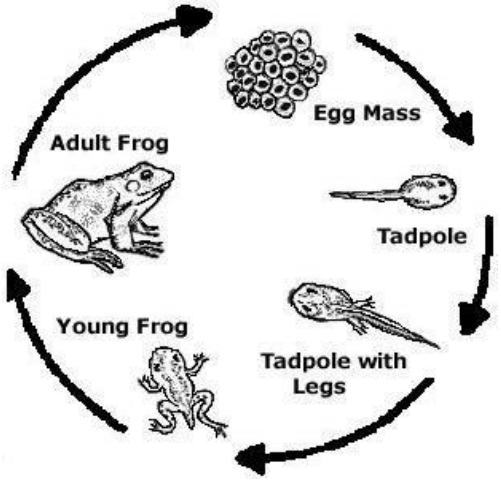
Feeding in frogs

- They feed on small insects and worms
- They use their long sticky tongues to trap their prey.

Reproduction in amphibians

- The male and female mate.
- The female lays eggs and the male sheds sperms over them to fertilize them (external fertilization).
- The eggs develop and after about two weeks hatch into tadpoles.
- The tadpoles undergo several changes to full develop into an adult.
- This takes about three months.

Diagram to show life cycle of an amphibian.



INVERTEBRATES

These are animals without a back bone.
They are multicellular animals.

Classes of invertebrates.

- Coelenterates.
- Echinoderms
- Sponges
- Worms
- Molluscs
- Arthropods or arthropoda

a) Coelenterates

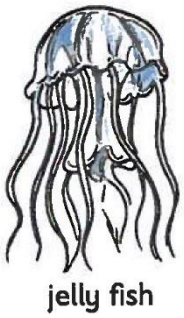
- They have cylindrical bodies with only one opening which acts as the mouth and the
- anus.
- They have stinging cells on the tentacles surrounding the openings.

They live in water.

Examples of coelenterates

- Corals
- Jelly fish
- Hydra
- Sea anemone.

Diagram showing an example of coelenterates fish.



b) Echinoderms

The have spiny skins and tube feet.
They pump liquid into their feet to make them expand.

Examples of Echinoderms

- Star fish
- Sea urchins
- Sea lilies
- Sea cucumbers

Diagram showing an example of Echinoderms



starfish

Sponges

- Sponges are a collection of individual cells organized into one body on the sea floor.
- They cannot move about but remain stuck on the sea floor.
- They suck in sea water and filter out tiny pieces of food.
- They breathe and feed through the holes in their bodies.

c) Molluscs

- These are invertebrates with soft and un segmented bodies covered by a protective shell or mantle.
- They live on land and flesh water or salty water.
- Some molluskcs do not have shells like octopus.
- Mollusks reproduce by laying eggs.

Examples of mollusks

- Octopus and squids (the largest and most intelligent) .They move by jet propulsion - Snails and Slugs
- Oysters
- Cuttle fish
- Clams
- Mussel

Snails live on land and water
They feed on plants, while others are carnivorous
Slugs are similar to snails but do not have shells.

E) WORMS

- These are thin, long and soft bodied invertebrates.
- Some live in soil or water while others are parasites living inside other animals
- They breathe through their moist skins They lay eggs.
-

Groups /types of worms

- They are divided into three groups namely;
- Segmented worms (annelids)
- Round worms (nematodes)
- Flat worms (platy helminthes)

a) Segmented worms

These are worms whose bodies are divided into rings or segments.
They mostly live in soil and water.
Examples
Leeches
Bristle worms
Earth worms

Characteristics of segmented worms.

They live in soil and eat soil or decayed vegetation.
They are hermaphrodite i.e. has both male and female productive organs
They help to aerate the soil by making tunnels which also help to improve soil drainage. They help in the formation of humus in the soil.

Diagram showing common segmented worms.



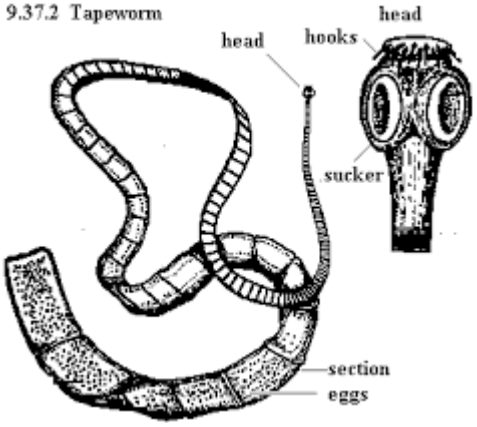
b) Flat worms

They have flattened and segmented bodies.
Many of them are parasites of man and other animals.

Examples of flat

- worms Tape worms
- Pond flat worms
- Liver flukes

Diagram of a tape worm



Tape worms feed on digested food in the small intestines.
Liver flukes suck blood from animals.
Diagram showing common flat worms

c) Round worms

- These are groups of worms with cylindrical bodies.
- Some are parasites in man and other animals and plants while others live in water. They
- are pointed on both ends.

Common examples of round worms

- Hook worms
- Eel worms
- Pin worms
- Thread worms
- Ascaris

- Hook worms enter our bodies by penetrating through the skin of bare feet.
- They feed on digested food in blood by sucking blood.
- They enter our bodies by drinking water which is contaminated with hook worms.
- Bathing water which is contaminated with hook worms.

F) ANTHROPODS / ANTHROPODA.

These are invertebrates with segmented and jointed legs.

Characteristics of arthropods

- They have jointed legs
- They have hard external skeleton called exo-skeleton (cuticle)
- They can shed their cuticles through the process of molting if growth is to occur.
- They have segmented bodies.

Groups or classes of arthropods

- Myriapods
- Arachnids
- Crustaceans
- Insects

Myriapods

These are arthropods with many jointed legs.
Their bodies are segmented with each segment having atleast a pair of legs.
There are two groups of myriapods

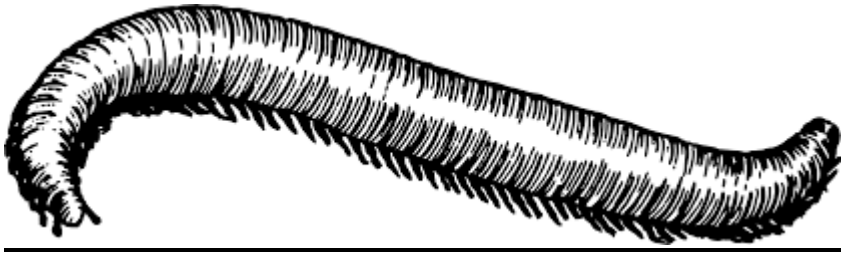
1. Centipedes (chilopoda)

- These have one pair of legs in each segment and a pair of
- antennae The front legs are modified to form poison claws. They
- are carnivorous.

2. Millipedes (diplopoda)

These have two pairs of legs in each segment.
They curl or coil to protect themselves or produces bad smell.

Diagram showing common myriapods.



b) Crustaceans

- These are arthropods which have hard and crust like exo-skeleton.
- They have jointed legs
- Their bodies are divided into two main parts i.e. the cephalo thorax and the abdomen.
- They breathe through gills or their skin.

Examples crustaceans

- Crabs
- Cray fish
- Lobsters
- Prawns
- Sand hoppers

Uses of crustaceans

- They are eaten as food by man.
- Some are used as baits in fishing industry.

c) Arachnids

These are arthropods with four pairs of legs and their bodies are divided into two main body parts. (cephalothorax and abdomen)

Characteristics of archnids.

- They breath through book lungs.
- They have five pairs of legs.
- Their bodies are divided into two parts.

Characteristics of arachids.

- They produce through book lungs.
- They have five pairs of legs.
- Their bodies are divided into two parts.

Examples of arachnids

Spiders

They have special organ at the end of their abdomen called spinnerettes for spinning their webs.

They breathe through **books lungs**

They use their webs for movement, building their nets, trapping their prey and finding their way back.

They reproduce by laying eggs.

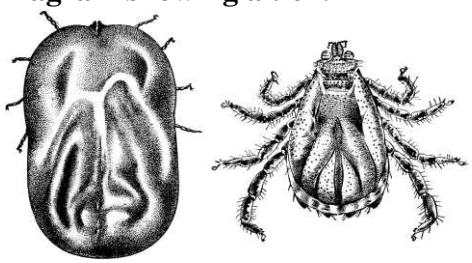
ii. Ticks

They live on the skin of animals

They feed on blood

They spread many diseases in domestic animals e.g. East coast fever, red water, heart water, and typhus fever in humans.

Diagram showing a tick.



iii. Scorpions

They have a large tail with a poisonous sting
Their front legs are modified into pincers
They do not lay eggs but give birth to young ones.

iv. Mites

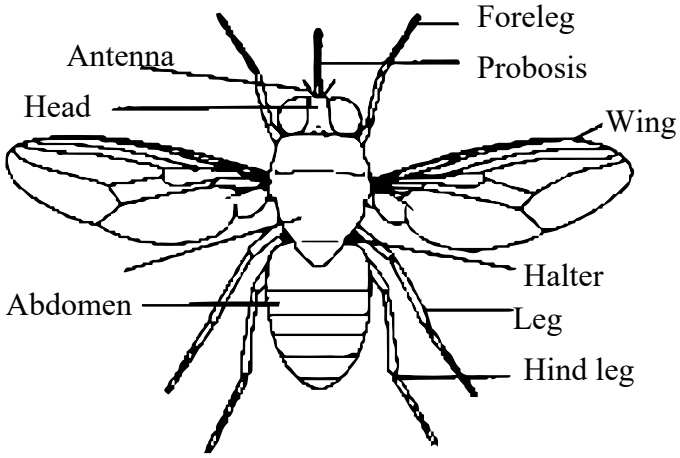
Insects

These are arthropods with 3 (three) main body parts or jointed legs.

Characteristics of insects

- They have three main body parts (Head, thorax, abdomen)
- The head contains; compound eyes, mouth parts and feelers.
- The thorax carries three pairs of legs, the wings.
- The abdomen contains the spiracles, ovipositors and stings in some insects
- They have three pairs of jointed legs.
- They have an exo-skeleton called Cuticles
- They have a pair of feelers or antennae
- They have a pair of compound eyes
- They reproduce by laying eggs
- They breathe through spiracles.

Diagram showing parts of an insect



Functions of parts of an insect i.

Mouth parts

Proboscis is a tube for sucking food in insects like mosquitoes, house flies, bees, tsetseflies etc.
Mandibles are used for chewing in insects like grasshoppers, locusts, cockroaches, beetles, etc

ii. **Antennae/ feelers**

These are used as sense organ for touch, smell detecting sound (hearing) and detecting changes in temperature, humidity and finding direction.

iii. Wings for flying
iv. Compound eyes for seeing
v. Halteres in housefly for balancing during flight.
vi. Spiracles for breathing

Life cycle of insects
There are two types of life cycle in insects
Complete metamorphosis
Incomplete metamorphosis

Complete metamorphosis
This is a life cycle of some insects which go through four stages of development namely;
Eggs – Larva – Pupa – Adult

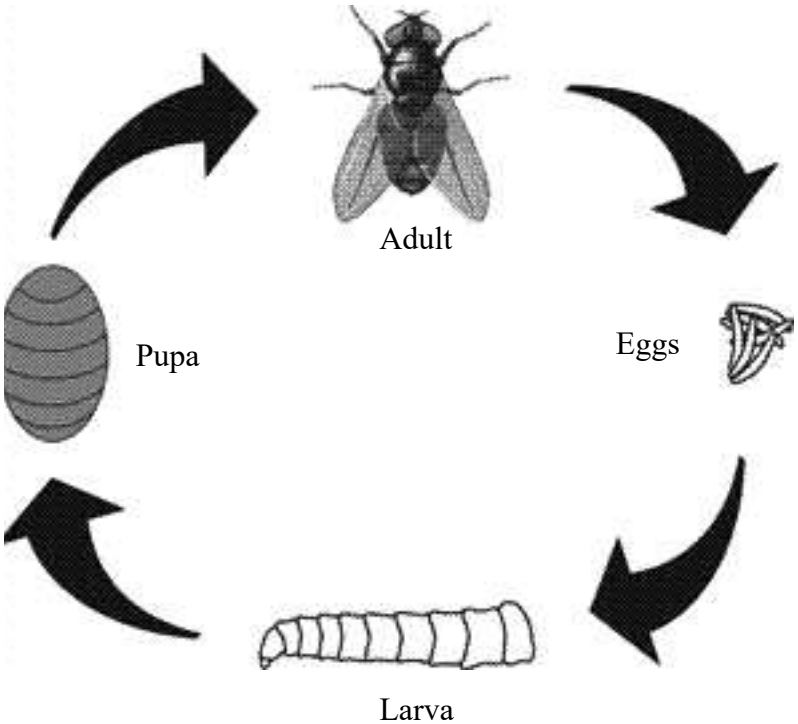
Examples of insects which undergo complete metamorphosis
- Houseflies
- Mosquitoes
- Butterflies
- Bees
- Moth
- Wasps

Life of a housefly
Adults lay eggs in batches of 100-150 eggs in manure heap, rotting bodies, exposed food or feaces.
The eggs hatch into larva called maggots after a day.

NB: Some flies such as blue bottle fly hatch the eggs from inside the body and lay
- maggots.
- Maggots feed on decaying matter, grow quickly and turn into pupa after 4-6 days.
- The pupa does not feed but grows from inside the pupa a case called Cocoon.

The adult crawls out of the pupa after about 4-5 days.

Diagram showing the life cycle of a housefly



Dangers/economic importance of houseflies

- They carry germs on their body, saliva or mouth parts, which cause the following diseases; diarrhea, dysentery, cholera, typhoid, trachoma, red eyes.
- They help to reduce the volume of feaces in latrines which get filled up quickly.

MOSQUITOES

There are three main types of mosquitoes namely anopheles, mosquito, Culex mosquito, aedes/ tigers mosquito.

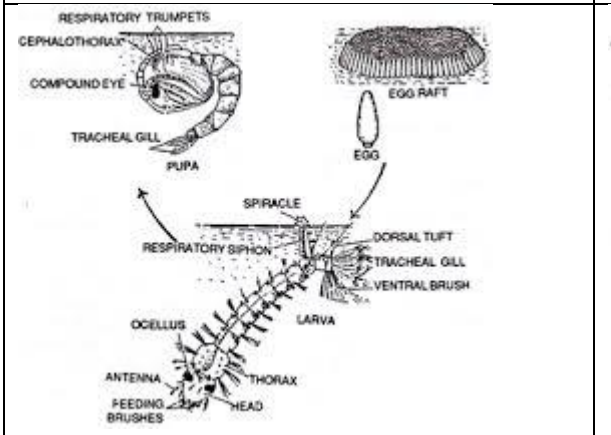
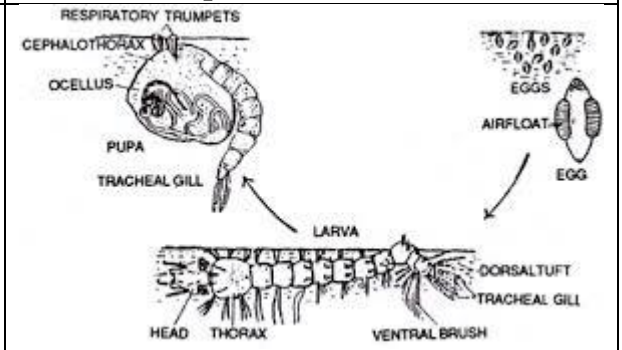
i. Anopheles mosquitoes

Female anopheles mosquitoes spread a protozoan called plasmodia which causes malaria in man.
Culex mosquitoes spread worms called Filaria which causes elephantiasis
Aedes/ tiger mosquitoes spread a virus causes dengue fever and yellow fever in human beings.

Life history of mosquitoes

Adult mosquitoes lay eggs in stagnant water.
After 2-3 days the eggs hatch into larva called wiggler which breathe through a spiracle on the tail end called Siphon.
The larva develop into called Tumblors which breathes through a pair of spiracles called breathing trumpets
After 2-3 weeks from eggs a fully grown adult comes out of the pupa.

Diagram showing life cycle of anopheles and culex mosquitoes

culex	anopheles
	

Difference between anopheles and culex mosquitoes

Anopheles	Culex
Lays eggs with an air float	Lays eggs in crafts /custers
The larva lies parallel to the water surface when breathing.	The larva lies at an angle to the water when breathing.
Adult lies in a sloppy position when at rest/.	Adult lies horizontally when at rest.

Ways of controlling mosquitoes

- Drain stagnant water around homes.
- Burry old fins, broken pots, or bottles where mosquitoes can breed.
- Clear all bushes around homes where mosquitoes can
- hide Spray adult mosquitoes with insecticides.
- Sleep under insecticide treated nets.
- Keep fish in dams or reserves of water to eat mosquitoes, larva.
- Close doors and windows early in the evening
- Apply repellants on the body to drive away mosquitoes
- Burn mosquito coils to clave away mosquitoes
- Plant trees /flowers that can repel mosquitoes in the compound.

Butterflies and moth

- They undergo complete metamorphosis
- Female lays eggs mainly on the underside of the leaves
- Eggs hatch into larva / caterpillars which feed on leaves
- The larva spins a cocoon around itself and changes into pupa/chrysalis which does not move or eat i.e. it is dormant.
- When the adult is full grown, it breaks the pupa case and comes out.

Advantages of butterflies and moths

- They help in pollinating flowers of farmer's crops. We
- get silk breads from the cocoons of some butterflies.
- Caterpillars are eaten in some societies as food.

Disadvantages of butterflies and moths

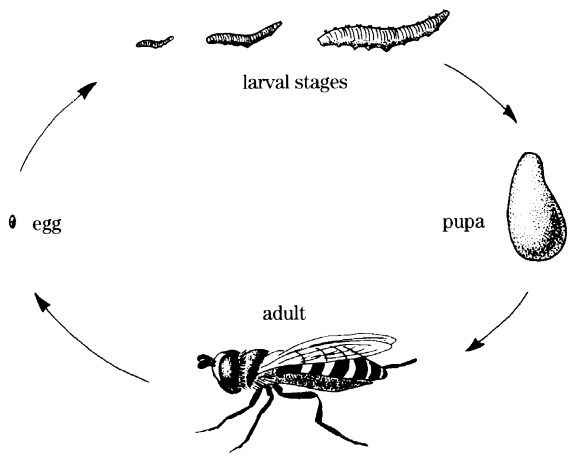
- Their larva /caterpillars feed on leaves of crops / plants destroying them (crop pests)
- Caterpillars have bristle hairs which can burn and cause irritation itching or wounds o the skin.

Incomplete metamorphosis

This is a life cycle which involves three stages i.e.
Eggs – Nymph – Adult (imago)

The adult female lays eggs in the soil in an egg sac (pouch)
After a few days the eggs hatch into Nymphs
After several changes / moulting, the nymph develops wings and becomes a fully adult.

Diagram showing incomplete metamorphosis



Examples of insects which undergo incomplete metamorphosis
i. Cockroaches
ii. Grasshoppers viii. Damselflies
iii. Ticks ix. Dragon flies
Bed bugs x. White aunts iv. Termites xi. Aphids
v. Praying mantis xii. Fleas vi. Walking sticks
vii. Kaytidis

Protoctista kingdom (single called organism)

- These are groups of very simple living organism which are single (unicellular one
- called. They have a nucleus enclosed in a membrane They are neither plants, fungi, nor
- animals.
- They live in fluids (liquids) or in other organisms because they do not have protection against drying.

Examples of protoctista
Algae
Euglena

a) Algae

- They have chlorophyll and make their own food
- They mostly reproduce by means of spores.
- They do not have roots, stems and leaves.
- They appear in different colours e.g. blue, green, red.
- They grow on and within the soil, wood, moist rocks.

Examples of algae

- Spirogyra
- Sea weeds
- Fucus

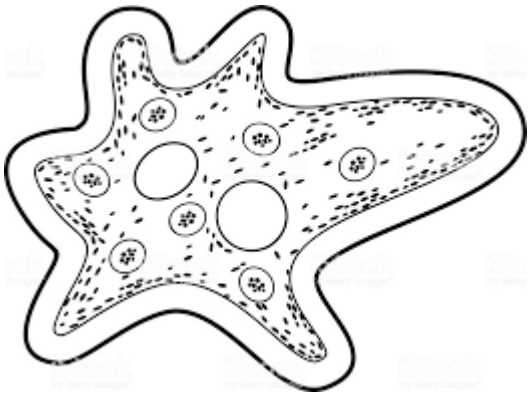
Uses of algae

- It is used as food by man and other animals such as fish.
- They add oxygen to water which is breathed in by water animals.
- They are used in making fertilizers
- **Protozoa**
- These are groups of single celled organisms which have a nucleus and the cytoplasm.
- They do not have chlorophyll but capture their food or engulfing using pseudopodia
- They are microscopic
- They are found in water and o land in damp places and in body of animals as parasites.
- They reproduce by means of pseudopodia e.g. amoeba while other by cilia e.g. paramecium

Examples of protozoa

- Amoeba
- Paramecium
- Plasmodium
- Trypanosome

Illustration of amoeba.



c) Euglena

- This is a unicellular organism which has both plants and animal features.
- It has chlorophyll and produces its own food.
- It can move from one place to another very quickly for protection like an animal using its flagellum.
- It is microscopic and lives in ditches and ponds.

KING KINGDOM

These are simple organisms that lack chlorophyll and exist as a mass of threads called hyphea or mycelim.

HOW DO FUNGI FEED?

They feed saprophytically.

- They live as parasites on other living things or on dead and decaying body.
- They grow where there is moisture.
- They reproduce by means of spores except yeast which reproduce by budding.

Common examples of fungi

- Mushrooms
- Toadstools
- Bracket fungus
- Yeast
- Moulds
- Mildews
- Puffballs

Moulds

Examples of moulds.

- Rhizopus.
- Penicillium.

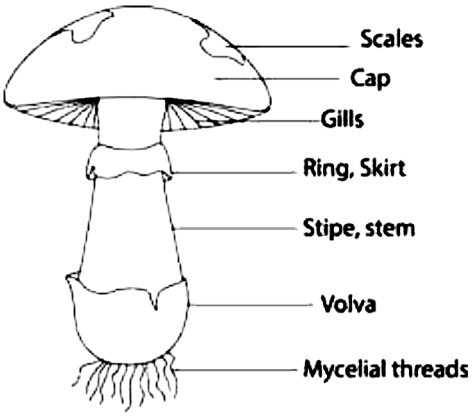
Importance of moulds.

- Making of penicilm drugs of penicillium.

Places where moulds are found.

- Decaying matter
- Cheese
- Moist bread
- Old leather
- Horse dung

Illustration to show the structure of mushroom and functions of each part.



Advantages of fungi

- Some fungi cause decay and helps in formation of soil.
- Some fungi are eaten as food by man. Eg mushroom
- Some are used in making medicine eg penicillium moulds for making penciline.
- Yeast help in flavouring cheese , formation of beer and spirit making bread source of vitamin B and fermenting tobacco.

Disadvantages of fungi

- Some fungi are poisonous to man.
- Fungi cause a number of disease in animals ring worm , eczema, athletics foot , liver cancer and finger / toe nail formation
- Fungi cause diseases in plants eg: potato blight , maize .
- Cancer and finger / toe nail formation - Some fungi cause food to go bad.
- Some fungi cause food poisoning

CARE FOR AND PROTECTION OF VERTEBRATES AND INVERTEBRATES

- Animals like humans , birds need care and protection. They can be cared through the following ways.
- Train trainable animals
- Treat sick domestic animals and clean the house they stay in.
- Gazette areas for both domestic and wild animals as game parks and game reserves to prevent extinction and endangering animal species.
- Regular vaccination of animals
- Enforcing strict laws that grown pollution , poaching and destruction of bio diversity

Theme: MATTER AND ENERGY
FORMS OF ENERGY
What is energy?
Energy is the ability of the body to do work.

Energy exists in the following forms (types)
i. Sound energy
ii. Heat energy
iii. Light energy
iv. Mechanical energy
v. Nuclear (Atomic energy)
vi. Solar energy
vii. Chemical energy viii. Electrical energy

N.B: Kinetic and potential energy are types / kinds of mechanical energy.

THEME: SOUND ENERGY.

Sound is a form of energy that stimulates the sense of hearing (that enables us to hear) Use of sound

- For communication
- Entertainment
- For protection
- For evidence in courts of law
- Helps to promote culture ie traditional folk sing and folk tales.

TYPES OF SOUND.

i. Loud sound
ii. Soft sound
iii. High sound
iv. Low sound.

Sources of sound

Natural sources

- Animals. E.g ababy crying, a cock crowing, a dog barking etc.
- Wind
- Storm
- Volcanic eruption

Artificial sources

Musical instruments e.g bells, radios, raffles, trumpets etc

How is sound produced?

Sound is produced by vibration (when an object vibrates)

What is a vibration?

A vibration is a to and fro motion which is continuously repeated.
Or Vibration is the movement of up and down of molocules.

Ways how living things produce sound

- Human beings produce sound by the vibration of their vocal cords. Vocal cords are found in the voice box. When air passes over them, they vibrate and produce sound.
- Crickets produce sound by rubbing their wings against the hind legs.
- Birds sing by the help of their rings of cartilage.
- Bees and mosquitoes produce sound by flapping their wings rapidly.

Transmission of sound

How does sound travel?

Sound travels in sound waves. It travels through the following media:

- Air
- Water
- Solid materials

N.B sound does not travel through vacuum because there is no matter to conduct.

- The speed of sound in air is 330m/sec
- The speed of sound in water is 500m/s.
- The speed of sound in metals (solids) is 4800m/sec
  - Sound doesn't travel in vaccum because there is no matter for conduct found.

Therefore

i. Sound travels fast in gases
ii. Sound travels faster in liquids.
iii. Sound travels fastest in solids.

Factors affecting the speed of sound

- Temperatures
- Wind
- Altitude
- Heat

EFFECTS OF TEMPERATURE AND WIND ON SOUND

- Sound travels more clearly during day , waves move close to the ground. - At night temperatures are lower ir (it is cool)
- When it is hot , sound waves rise higher above the ground.
- Wind carry sound further if it is blowing the same direction; but if it is blowing against the sound it obstructs

Frequency

This is the number of vibrations per second. / number of oscillations made by a particle per second.

Pitch

This is the highness or lowness of sound. / is the sharpness or mildness of sound.

What determines the pitch of sound?

- Size of a vibrating object.
- Length of a vibrating object.
- Thickness of the string producing sound.
- Tension
- Frequency

CALCULATIONS ON SOUND

NB: The speed of sound in air is 330 metres per second

Examples

1. If a man heard a gun shot after four seconds. How far was he from the firing point?

Distance = speed x time taken

D = (330m x 4) metres

D = 1320 metres

2. It took 3 seconds to hear echo of a man chopping wood. How far was the man from a choing place?

$D = \frac{S \times T}{2}$

D = (330 x 3) metres
2
D = 990
D = 495m

NB : We divide by 2 because there are two sets of sound waves ie orginal waves and the reflected waves (Echo)

3. Amooti was standing across the valley , which was 660m away from the cliff if he shouts , how lonmg will it take to hear the echo. T = D x 2
S
2

T = 660m x 2
330m/s
1

T = (2 x 2) second
= 4 seconds

4. Okello was standing 165m away from his father who called him by clapping. How long did it take him to hear the clapping?

T = D
S

T = 165m
330m/s T = 0.5 sec

Volume

It is the loudness or softness of sound. / Is the magnitude or intensity of a certain sound.
Ampilitude is a factor of volume of sound.

Echo

Is the reflected sound (the bouncing back of sound waves)
Echo is formed when sound is reflected by an object..

Uses of echo in nature.

- It helps bats to find their way and locate food.
- It helps sailors to detect the depth of the sea or ocean.
- Fisherman use echo to locate shoals of fish before letting down their nets.
- Pilots use echo surrounding from thick clouds, mountains etc to avoid accidents.

DISADVANTAGES OF ECHOES IN NATURE

Echoes are troublesome especially in empty halls
They cause repeated sounds and noise
Soft, porous surfaces absorb sound.

How do we prevent echoes?

In cinema halls,broadcasting studios and conference or theatre halls the walls are covered using soft boards,thick and heavy curtains that absorb sound.
Qn. How do we prevent eco of sound.

MUSICAL INSTRUMENTS

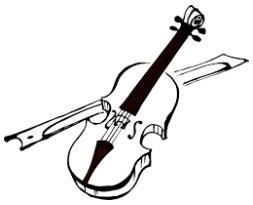
They are classified into three:
String instruments
Wind instruments
Percussion instruments

String instruments (chordophones)

These produce sound by vibration of their strings when plucked.

The pitch of sound in string instruments can be increased by loosening or tightening the strings

Examples

Bow harp (Adungu)	Harp	Violin	Guitar
			

Wind instruments (Aerophones)

These produce sound by vibration of air blown inside them.

Their pitch is determined (increasing) by reducing the size the smaller the instrument the higher the pitch. Examples

- Records
- Whistles
- Trumpet
- Panpipes
- Flute etc

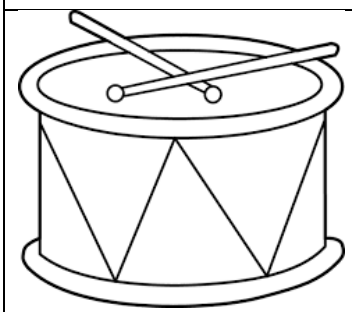
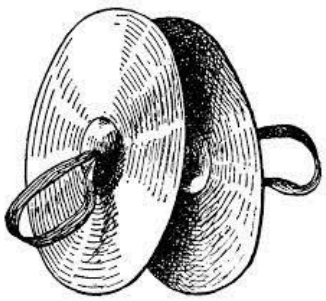
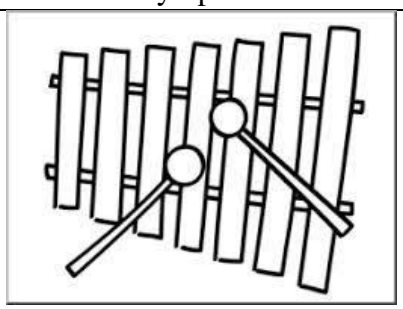
Diagrams

PERCUSSION INSTRUMENTS

These produce sound by vibration of movable parts on the or column of air inside them.

Their pitch can be increased by reducing the size of the area struck or increasing the tightness

Examples

Drum	Shakers	Xylophone
		

Methods of storing sound energy

Devices used in storing sound.

Sound can stored inform of :-

a) by writing music (Solfa notation)

This is a form of writing music using syllables on staves

b) Recording sound can be stored on record players dicks , compact disks , computers etc

Devices used to store sound / Recording devices.

- Memory cards
- VCDs
- DVDs
- Magnetic tapes
- Projectors
- Tape recorders
- Mobile phones - Flash card
- Computer discs
- Ipods
- Film strips etc

Devices used to reproduce

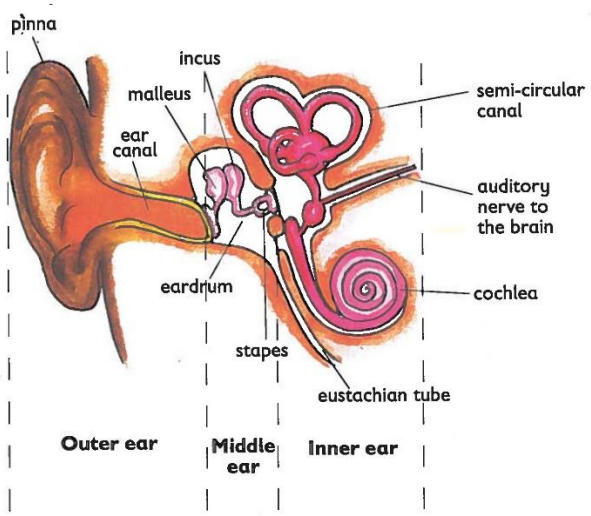
- **sound** record players radio
- cassettes tap recorders video
- decks Film projectors.
- DVD players
- Computers
- Mobile phones
- Grammar phone

Ways of reproducing stored sound.

- By using record players
- By using radio cassettes
- By using tap recorders
- By using video decks
- By using film projectors.
- By using DVD players
- By using Computers
- By using Mobile phones
- By using Grammar phone

THE MAMMALIAN EAR

The structure of the mammalian ear.



The ear is divided into three:

i. Outer ear
ii. Middle ear
iii. Inner ear

The middle ear

It consists of:

i. Ear drum
ii. Ossicles
iii. Eustachian tube.

The inner ear

It consists of:-

- Semi circular canal
- The cochels
- Auditory nerves

It is fluid filled.

Common diseases of the ear

i. Otitis externus
ii. Otitis internus

N.B Disorder may be foreign bodies and any harm caused by an accident.

Uses of wax found in the ear

- It traps dust and some foreign bodies in the ear
- It cleans the ear canal
- It protects the ear against infections , wax contains chemicals that kill germs

CARE FOR THE EAR.

i. Avoid using sharp objects to clean the ear. Sharp objects break and damage the eardrum.
ii. Use soft materials to clean the ear. iii. Have regular health examination iv. Remove excess wax from the external ear that can cause temporary deafness by blocking the eardrum.
v. Clean your ear with clear water and soap regularly.

COMPARING THE HUMAN EAR WITH ORGANS OF EARING IN OTHER ANIMALS

HEARING IN FISH

Fish use lateral line to detect and pick up sound vibrations in water

HEARING IN SNAKES

Snakes do not have actual ears , but they have inner ear systems such as cochlea in mammals. In snakes the cochlea is connected to jaw bones , this makes it sensitive to ground vibrations by the help of jaw bones connected to cochlea.

HEARING IN BIRDS

Birds have a ruff of feathers called **auriculars** which they use to detect sound in the environment .

Hearing in insects

- Some insects like mosquitoes collect sound vibrations using their antennae. (feelers)
- Others like caterpillars , butterflies and moths use small hairs called **setae** found on their body surfaces to pick sound vibrations

NB : Adult butterflies also detect sound vibrations through **veins on their wings**

Hearing in amphibians

There are three orders of the living amphibians. These are

- The apoda – the legless and worm like type such as caecilians
- The urodella – the tailed forms such as mud puppies , Newts and salamanders
- The Anura – the taillerss form such as frogs and toads. NB: All amphibians have ears

The hearing organ for amphibians is called the amphibians papilla

THEME 3: THE CIRCULATORY SYSTEM

The term blood circulation refer to the movement of blood from the heart to all body parts

Blood circulation is very important in the following ways

- It supplies food and oxygen to all parts of the body
- It removes waste products such as carbon dioxide out of the body to the excretory organs,

TYPES OF BLOOD CIRCULATION

SINGLE BLOOD CIRCULATION

- It is the types of circulation when blood moves through heart once eg. in fishes.

DOUBLE BLOOD CIRCULATION

- It's a type of circulation when blood goes to the heart twice before it goes to all body parts eg in mammals.

BLOOD

Blood is a tissue fluid with suspended cells that moves in and around the body.

Compositions of blood

- Red blood cells (erythrocytes)
- White blood cells (leucocytes)
- Platelets (thrombocytes)
- Plasma

1. RED BLOOD CELL

- There are about 30 million red blood cells in the human body.
- They contain a red pigment called haemoglobin that contains iron.
- They are made in red bone marrow of short bones like sternum, scapula, ribs, vertebra and pelvis.
- They don't have a nucleus.
- Their function is to transport oxygen in the body.

ADAPTATIONS OF RED BLOOD CELLS TO THEIR FUNCTION

- They have haemoglobin which enables them carry more oxygen molecules.
- They are produced in large number.
- They have no nucleus that provides a large surface area to carry more oxygen.
- NB : When oxygen combines with heamoglobin it forms oxyhaemoglobon

Qn. Draw the structure of a red blood cell.

Note : The red blood cells are destroyed by the plasmodia germs that causes malaria. Sickle cell also deforms the normal shape of the red blood cells hence making them unable to carry their function.

WHITE BLOOD CELLS

- These are larger than read blood cells.
- They have a nucleus and no haemoglobin
- They are made in the bone marrow , lymph nodes and the spleen.
- Their main function is to fight against disease germs

How do white blood cells defend the body against disease germs?

- By engulfing and digesting germs - Producing anti bodies against the germs.

Adaptation of white blood cells to their functions It has a nucleaus which controls cell activities It has cytoplasm that helps it to engulf germs.

NOTE : The HIV / AIDS destroys the white blood cells.

Qn. Draw the structure of a white blood cells

PLATELETS

- Are made in the red bone marrow. Their function is to help in clotting of blood. - Blood clotting occurs in presence of vitamin K and Calcium

PLASMA

This is the liquid part of blood consisting of the following

- Water
- Blood protein
- Dissolved food
- Mineral salts
- Urea
- Carbondioxide
- Hormones
- Insulin (prevents diabetes)etc

FUNCTIONS OF BLOOD

- It carries digested food and oxygen to all body parts
- It carries waste waste products from the body parts to excretory organs. - It transports carbondioxide from the body tissues to the lungs - It distributes heat to the body .
- It carries hormones to different body parts.
- Defends the body against infections.

BLOOD GROUPS

There are four blood group.

A

AB

B

O

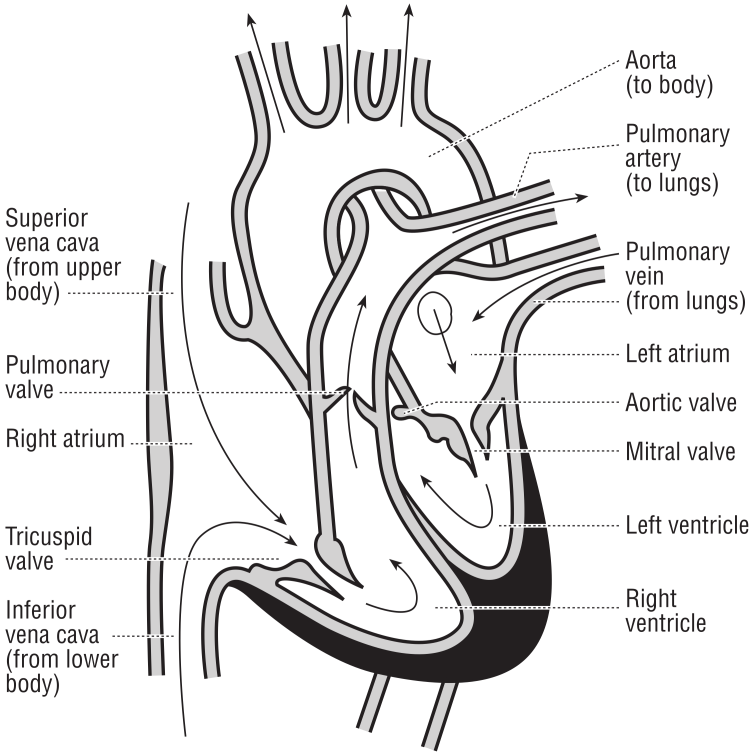
NB : AB is a universal recipient while O is a universal donor

BLOOD TRANSFUSION

Is the transfer of tested and screened blood from one person to another. The scientist who discovered blood groups was Sir Karl Landsteiner.

THE HEART

The structure of the heart and functions of each part

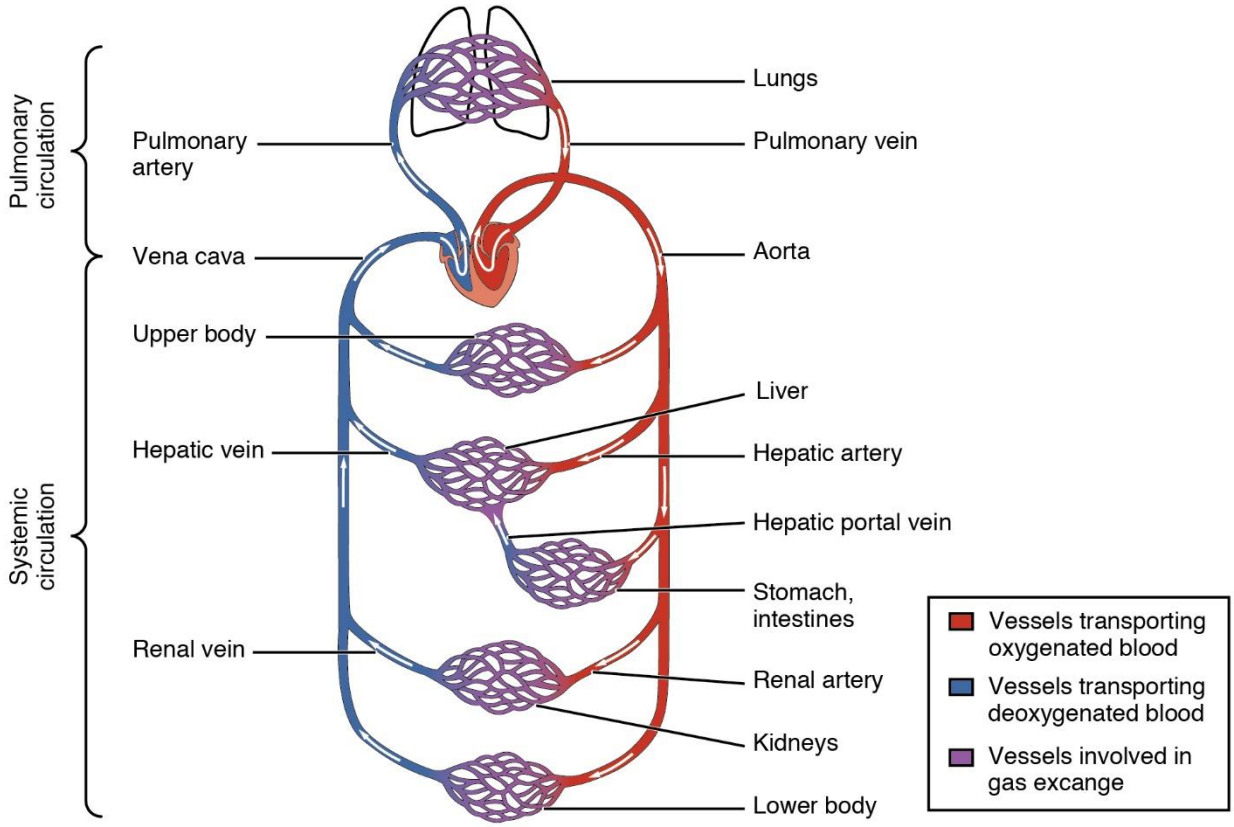


- The heart is divided in to four chambers
- The upper chambers are called atria (atrium) and the lower chambers called ventricles.
- The heart is made up special muscles called cardiac muscles - The main function of the heart is pump blood to all body parts.

OTHER ORGANS RELATED TO THE CIRCULATION OF BLOOD

- The lungs – its where diffusion of gases takes place.
- The kidneys - filters blood
- The liver – regulates blood sugar

THE DIAGRAM TO SHOW CIRCULATION OF BLOOD



BLOOD VESSELS

This is a network of tubes transporting blood in the body.

There are three blood vessels

- Arteries
- Veins
- Capillaries

ARTERIES

- Arteries are blood vessels that transport blood away from the heart to the body.
- They have thick walls
- They have a small lumen

Qn. Draw a diagram showing the walls of the artery.

VEINS

- These are blood vessels that carry blood towards the heart.
- They have thin walls
- They have a wider lumen.
- They have valves to prevent the back flow of blood.

Qn. Draw a structure of a VEIN

CAPILLARITIES

- These are the smallest blood vessels
- They connect arteries and veins
- Exchange of body materials take place in capillaries.
- They have thin walls

Qn. Draw a structure of the carries

DIFFERENCES BETWEEN ARTERIES , VEINS AND CAPILLARIES

Arteries	Veins	Capillaries
They carry oxygenated blood except the pulmonary artery	They carry de – oxygenated blood except the pulmonary vein	Exchange of materials between blood and body and body cells takes places
They have thick and muscular walls	They have thin and less muscular walls	They have a very thin wall which has tiny holes or pones in it.
They carry blood away from the heart	They carry blood towards the heart	They link arteries and veins
Blood flows under high pressure	Blows flows under low pressure	Blood flows under very low pressure
They have a narrow lumen	They have a wide lumen	They have a narrower lumen
They have no valves	They have values	They have no valves

Increasing the volume of blood in circulation

- Eating a balanced diet
- Blood transfusion
- Taking a lot of fluids and taking iron supplement tablets

Diseases and disorders of the circulatory system
They are classified into three groups namely.

- Diseases of blood
- Diseases of the heart - Hereditary diseases

Diseases of blood	Diseases of the heart	Hereditary disease
- Leukemia (blood cancer) - Hypertension (high blood pressure) - Malaria - AIDS - Anaemia - Sickle cell anemia - Low blood pressure - Blood clot (thrombosis)	- Coronary heart disease - Heart attack (cardiac arrest) - Heart stroke (cerebro vascular Accident , CVA)	- Haemopholia - Sickle cell anaemia

Other disorders

A) ARTIOSCLEROSIS

This is the hardening and thickening of the walls of the arteries

PREVENTION AND CONTROL OF THE CIRCULATORY DISEASES

- Proper feeding ie eating food that make a balanced diet.
- Having regular and health vaccine
- Eating meals of low fat content
- Performing regular physical exercises
- Going for medical checkup.
- Avoid taking alcohol.

IMPORTANCE OF HAVING REGULAR BODY EXERCISES

- Help the heart to pump more blood to the body.
- They reduce the level of fats in the body.
- Help to strengthen the muscles of the heart.
- They reduce the risk of getting heart diseases
- Joints becomes more flexible.
- Digestion of food is carried out quickly and easily.
- Promotes proper functioning of body system
- It makes the body fit.

HIV / AIDS AND BLOOD

- AIDS is caused by HIV
- The Virus destroys the white blood cells in the body.
- The body becomes weak and cannot fight disease germs

HIV stand for
Human
Immuno – deficiency
Virus

AIDS stands for
A - Acquired - means for from
I - Immune – means protected against
D - Deficiency – Lack of
S - Syndrome - It means a combination of signs and symptoms.

HOW HIV / AIDS IS SPREAD

- Through unprotected sexual intercourse with an infected person.
- Through sharing unsterilized skin piecing with an infected person.
- From mother to child. (MCT)

a) at birth
b) through breast feeding
c) from mother to unborn child

- Through unscreened blood transfusion

Signs and symptoms of HIV / AIDS

- Prolonged dry cough
- Wide spread itching and skin rash
- Prolonged diarrhoea
- Oral thrush
- It is a white coating develops in the mouth
- Persistent fever.
- General body weakness
- Loss of appetite
- Excessive sweating at night
- Herpe zoster (kisipi)

EFFECTS OF HIV / AIDS

INDIVIDUAL

a) **Loss of immunity** as the virus destroys the white blood cells , the individual is attacked by several diseases. The disease germs take advantage of the weakened body.

These diseases which attack a weakened body are called secondary or opportunistic infections

b) Loss of income
c) AIDS leads to depression , frustration and worries to an individual.
d) An individual can be abandoned by the friends due to fear of the disease
e) The infections causes death.

FAMILY

- Some children in the family may be infected with HIV / AIDS
- Reduction on the labour force in the family
- Children become orphans when parents die.
- Loss of family property
- Family members are separated when different relatives take care of them.
- The family may experience shortage of basic needs in case the AID victims are parents

COMMUNITY

- Loss of skilled man power
- Causes child headed families - Break down of social order / families.
- Shortage of productive population
- It leads to low economic development

PREVENTION AND CONTROL OF HIV / AIDS

- Abstinence from sex until marriage
- Having an HIV test before people get married
- Having only one long sexual partner
- Proper use of condoms
- Screening blood for transfusion
- Health words should wear protective gloves to avoid contact with blood - Encouraging and emphasizing sex education to children

ALCOHOL, SMOKING , AND DRUGS IN THE SOCIETY

THEME 4: HUMAN HEALTH

ALCOHOL IN SOCIETY

What is alcohol?

Alcohol is a colorless liquid substance that makes people drunk when they drink too much of it. It is contained in many drinks like beers, wines and spirits.

Types of alcohol

There are two types of alcohol namely

- Methanol
- Ethanol

Methanol is found mostly in home distilled alcohol.

- It is very dangerous and poisonous and many cause blindness or death.
- It is mainly used as a fuel or for sterilizing medical instruments.
- Ethanol is contained in all alcoholic drinks that are consumed. It
- can also be used as fuel.

Production of alcohol

Common alcoholic drinks are made from juices of bananas, pineapples, sugar cane, maize, millet, sorghum, rice, barley, cassava, potatoes.

Yeast is added to the mixture of water and these food substances to speed up fermentation.

Methods of producing alcohol

i. Fermentation
ii. Distillation

Fermentation is the process by which sugar in juice is turned into alcohol with the help of yeast.

- Fermented fruit juices make wine.
- Fermented starch mixture from grains or cereals from beer.

Examples of drinks produced locally by fermentation

- Mwenge bigere - from bananas
- Malwa (ajon) - from millet/ sorghum
- Kwete - from cassava / maize
- Munanansi - from pineapples
- Omurambi - from sorghum
- Beer - from oats and barley.

Distillation

- This is the process by which we get alcohol from fermentation.
- The alcohol in the fermented juice is heated and it evaporates.
- The alcohol vapour is then condensed and collected.

How distillation of alcohol is done.

- Crude alcohol is boiled to produce alcohol vapour.
- The vapour is cooled (condensed) to get liquid alcohol with the help of cold water of a condenser.
- The liquid alcohol now called distillate is passed through a coiled delivery tube in to a clean container i.e. bottles or jerry cans.
- The delivery tube is usually coiled to increase the surface area for condensation of alcohol in the condenser. (cold water)

Uses of alcohol

- For drinking
- Making medicines
- For disinfecting wounds
- For sale to get money
- Used during cultural functions
- Used in making cosmetics and perfumes

Alcoholism is a condition where an individual depends on alcohol for normal functioning of the body.

Alcoholic is a person who depends on alcohol for normal functioning of the body or a person who is addicted to alcohol.

Addiction is a condition in which a person has a very strong desire to take alcohol every day.

Effects of alcohol on the community

- May lead to job neglect causing low productivity.
- May cause traffic accidents at home, suicidal behavior.
- High crime rate in the society e.g rape, defilement, robbery etc.
- Can lead to increase of certain diseases in the community e.g AIDS.
- Alcoholics become public nuisance.
- Nation may lose very important people
- Loss of income tax base due to less production.

Reasons why people drink alcohol

- Idleness
- Frustration
- Peer pressure
- The desire to pass time, with friends.
- Family back ground and social environment
- To show that they are rich.
- People's culture in ceremonies/ celebrations
- Misleading adverts on T.V, radio, magazines
- To forget their problems.
- Influence by people one admires e.g. parents, teachers etc.
- Used in making nail varnish solutions
- Used as fuel
- Used to sterilize instruments in hospitals.

Effects of alcohol on people (immediate effects)

- Slows down the action (function) of the brain.
- People who are not used to drinking a lot of
- alcohol vomit when they drink a lot of it.
- People get easily annoyed after drinking a lot of
- alcohol. People who are drunk become forgetful
- People who are drunk lose respect for laws.

People who are drunk lose balance.

Long term effects

- Loss of appetite
- Peptic ulcers
- Liver diseases
- Leads to self-neglect
- Loss of jobs
- The pancreas may swell.
- Too much and constant drinking may cause hand tremors

Effects of alcohol to a family

- Leads to family neglect Leads
- to poverty in a family.
- It causes spouse and child abuse.
- Leads to bad behavior among children.
- It causes violence in homes.

How to avoid alcoholism

- Avoid bad peer groups
- Never believe in advertisements which praise alcohol as a good drink.
- Never drink alcohol to overcome a problem.
- Join groups whose members do not take alcohol.
- Engage in activities which help you to append free time properly.
- Take your parents and other people's warning about the dangers of alcohol seriously.

Uganda laws on alcohol

- People under 18 years of age are not allowed to drink alcohol in public places.
- No one is allowed to drive a vehicle when he is drunk.
- Home distillation of alcohol is forbidden
- No one is allowed to transport or sell home distilled alcohol.
- Public places that use alcoholic drinks are allowed to operate up to a limited time.

SMOKING

Smoking is the drawing in smoke from burning tobacco through the mouth.

A smoker is a person who smokes tobacco frequently.

Chemicals contained in tobacco

- Nicotine
- Tar

Smoking is either active or passive

Active smoking is that one in which the smoker takes in smoke directly from cigarette or smoking pipe.

Passive smoking is the type of smoking in which a nonsmoker breathes in air containing tobacco smoke.

Active smoker: A person who takes in smoke from a cigarette or a smoking pipe.

Passive smoker: A person who breathes in air containing tobacco smoke.

Reasons why people smoke.

- To pass time
- To concentrate on what they are doing
- To feel warm
- To fit in a group (peer influence)
- To feel confident
- To look mature
- To look attractive

Effects of smoking on the human body

- Leads to respiratory diseases such as;
- Lung cancer
- Emphysema
- Bronchitis
- Heart attack (coronary heart disease)
- Peptic ulcers
- Cancer of the mouth and throat.

How to avoid smoking

- Do not believe in advertisements about cigarette
- smoking. Know that there is no good reason for
- smoking Avoid joining groups smokers.
- Keep yourself busy for example by reading a novel, or doing any other meaningful activities such as playing games etc.

Life skills to safeguard against smoking.

- Keep away from people who smoke
- Never allow any body to convince you to smoke.
- Gather more information on dangers of smoking from health workers.
- Report your friends who smoke to the teachers or their parents for advice.
- Like games and sports during your free time.
- Never use your money to buy cigarettes.

DRUG ABUSE AND DRUG MIS –USE

A drug is a chemical substance which affects the way one's mind and how the body

- works.
- It can either help or harm the body system.
- Drugs are either in manufactured from of raw materials

Raw drugs are either in the form of plants and animal parts or extracts from animal or plants.

- If drugs are manufactured and tested in laboratories they are called laboratory manufactured drugs.

Characteristics of laboratory manufactured drugs

- They are carefully made and tested.
- Their strength, stability and purity is known.
- They are the same for each quantity.
- Their effect on human health is known,
- They are packaged and properly protected
- They are well labeled
- They have expiry and manufactured dates.

Examples of laboratory manufactured drugs

- Aspirin
- Chloroquine
- Quinine
- Fansidar
- Panadol
- Coartem
- Mabendazole

Characteristics of traditional drugs.

- They are made of raw plants and animals.
- Their strength, purity and stability changes.
- They are of different quantities
- Their effects on human health is not known.
- They are not well labeled
- They are not well packaged.

Examples of traditional drugs.

- Mululunza
- Kigagi
- Bombo
- Eusuk
- Asimiri

Essential drugs

Essential drugs are drugs needed to cure and prevent common diseases affecting the majority of people in an area or country.

Qualities of essential drugs

- They should be affordable to make the cost of treatment manageable.
- They should be accessible and available whenever needed.
- They should be effective to cure, prevent and control diseases.
- They should be safe when the correct dosage is used.
- They should have a satisfactory value for money.

Examples of essential drugs

- Cough mixture
- Chloroquine
- Paracetamol
- Piriton
- Penicilion
- ORS
- Tetracyline

Drug prescription

This refers to health workers written information on how a drug should be used.

If a drug is taken without a prescription, the patient will either take under or over dose.

Over dose

This is the taking in of more medicine than is required.

An overdose is dangerous to the body because it can lead to poisoning or death.

Under dose

This is when one takes fewer drugs than the required

The major disadvantage of an under dose is that it causes drug resistance.

Advantages of drug prescriptions.

- It helps the patient to know the correct drug.
- Its dosage relation to age, weight and duration of treatment
- Prevent over doe which is harmful and poisonous to the body
- Prevents and controls misuse of drugs

Drugs of dependence

These are drugs which cause addiction after prolonged use.
An addition to a drug is a strong disease that one feels uncomfortable when he / she does not use the drug.

Drugs of dependency

This is the continuous use of drugs on a regular basis after the body of the user. It can also be the illegal use of the drug.

Common drugs of dependency

- Marijuana
- Khart or miraa
- Cocaine
- Glue
- Aviation fuel
- Heroin
- Alcohol
- Tobacco
- Paint thinner.

Why people abuse drugs

- Some people abuse drugs to overcome fear
- Due to peer influence
- To keep a wake or sleep
- Due to good advertisement
- To pass time
- To feel warm
- To get energy
- To concentrate on what they are doing.
- To gain more appetite.

Effects of drugs of dependence to an individual

- Brain damage
- Loss of appetite
- Insomnia (inability to sleep)
- Job neglect
- Self neglect
- Low immunity to disease

Effects to the family

- Family neglect
- Family aggression and violence
- Criminal acts like defilement and rape
- Poverty
- It sets a bad example to the children

Effects to the community

- It leads to increased accidents
- Criminal behavior
- Poor job performance

Life skills that can help you to avoid drugs

- Desist from bad peer groups.
- Through counseling and guidance.
- Follow good morals from elders.
- Spending leisure time constructively by engaging in productive activities.
- Reading good material which is useful to life.

Life skills to safe guard against alcohol, smoking and drug dependency

What is a life skill?

- What is life skill?

It is personal and social skill that enables a person to function confidently and competently in order to fit in a community.

Self-awareness

- Know yourself
- Care for yourself to avoid drug abuse
- Make choices which you think are consistent and of value.
- Avoid associating with wrong groups
- Say No to people influencing you to use drugs

Coping with stress

- In this situation, try to be firm a problem and be ready to contain it.
- - Try accept positive advices with patience
- Some people tend to drink / smoke as means of reducing stress

Self esteem

- Accept yourself as you and believe in your self
- Have good discipline
- Appreciate your self
- Peer resistance
- Avoid bad company

Assertiveness

- Be open and give reasons for all your decisions.
- Insist on the fact that wrongs things are wrong.
- Be straight forward and honest with yourself.

Decision making

- Make a choice with good results
- Bad decision may affect your life in future

Leisure time

- Involving yourself in meaningful activities during free time.

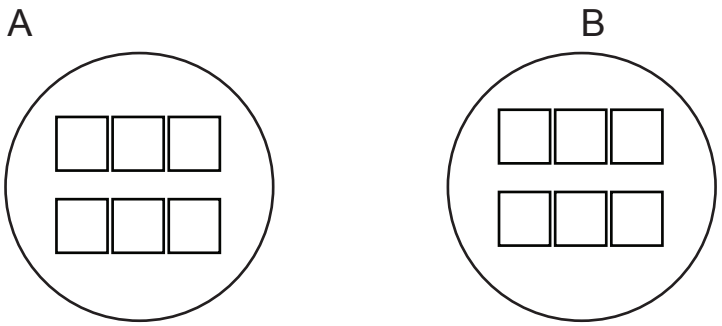
P.6 MATHEMATICS LESSON NOTES
THEME 1: SETS

a). Equal and Equivalent sets.

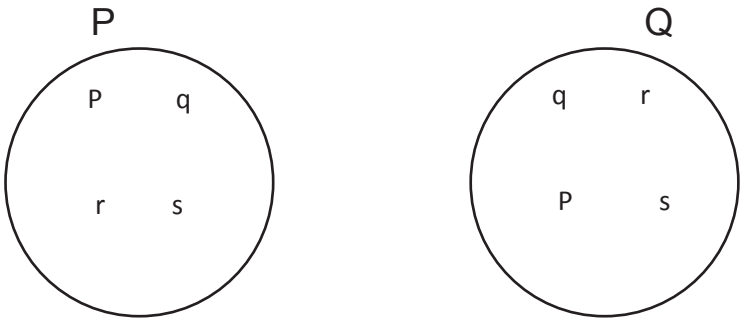
i). Equal sets: These are sets which have the same type of same number and members.

ii) Equivalent sets: These are sets which have the same number of members, but may have different types of members.

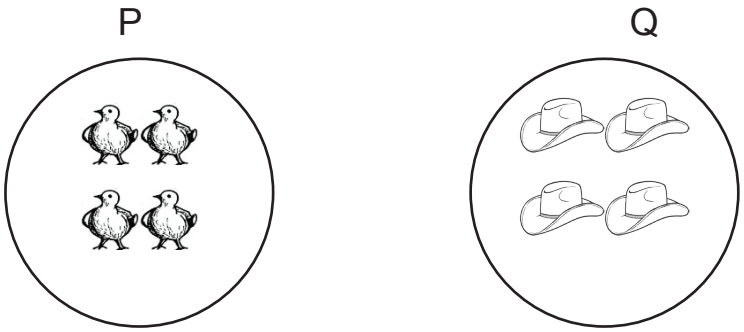
Equal sets.



b).



Equivalent sets



UNIVERSAL SETS AND SUBSETS

Given the elements of set D and E the

∑ = (universal set)

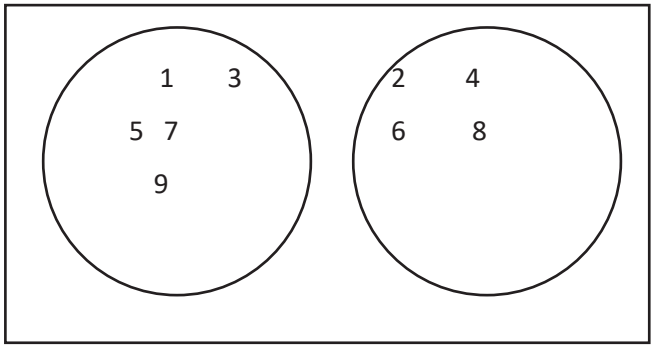
∑ = (1,2,3,4,5,6,7,8,9)

For natural numbers, the universal set consists of the set of odd numbers as well as the set of even numbers.

w = (1,2,3,4,5,6,7,8,9)

O = (1, 3,5,7,9)

E= (2,4,6,8)



Set O and set E are subsets of set ∑
(universal set)

E.g. If we call the school a universal set, all the things or group of things inside it are called subsets.

The symbol for universal se is ∑ and that of subsets is **C**

.thus ∑ = (1,2,3,4,5,6,7,8,9) and k = (2,5,9) then k^1 = (1,3,4,6,7,8)

Note that K and k^1 are subsets of £

∑

•

• •

B^1 = {a, b, e, f}

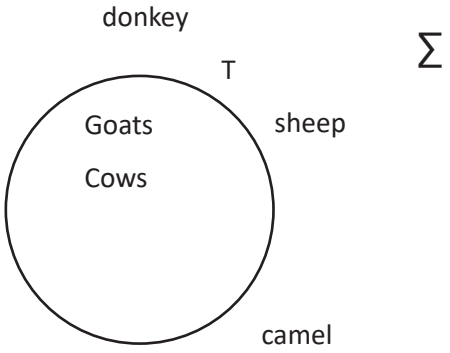
Example 1

In the diagram below, what are the members of

a). ∑= (donkey, sheep, goats, cows, camels)

c). T= (goats, cows)

d). T^1 = (donkey, sheep, camel)

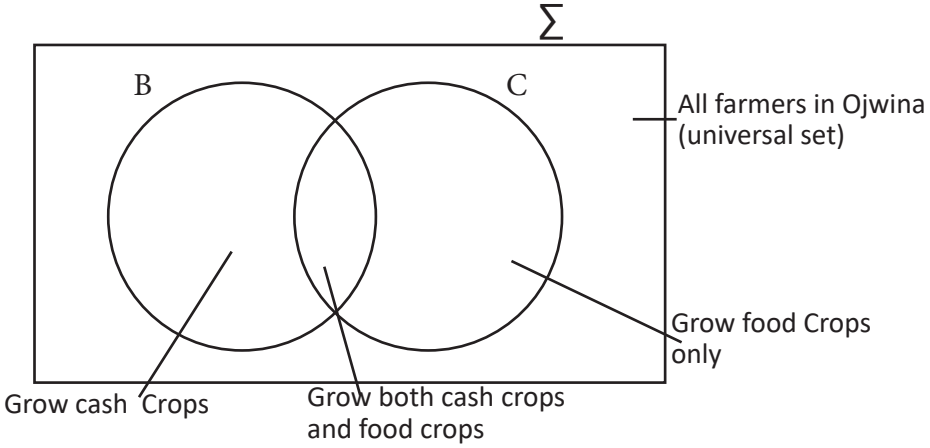


Example 2 Given that

A= (All farmers in Qwina village)

B= (farmers who grow cash crops in Ojwina)

Represent the information on a Venn diagram.



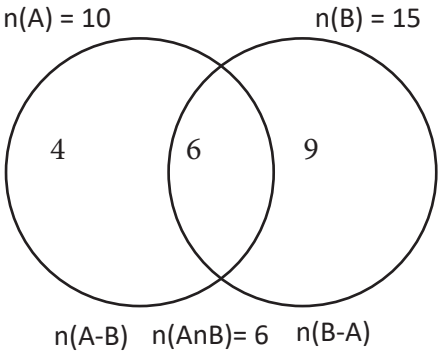
Set B and set C are both part of (contained in) set A .

A is a mother set (universal set) of B and C .

Example 2: Given that n(A) = 10, n (B) = 15 and n(AnB) = 6

a) Draw a Venn digram

b) Find i) n(A-B) ii) n(B- A)



From the number of elements of B subtract the intersection

(10-6) = 4

From the number of elements of B subtract the intersection

(15-6) = 9

Pupils□∑, teachers □∑ and workers □∑

Example 1

Set R = { 2,5} list the subsets of R . R is the universal set.

Solution: Subsets are : { }, { 2 }, { 5 }, { 2,5}

Thus { } □ R, {2 } □ R, { 5} □ R, { 2,5} □ R

Example 2: Set P = {a, b, c} list the subsets of P

Solutions are: { } □ P, {a} □ P , { b} □ P

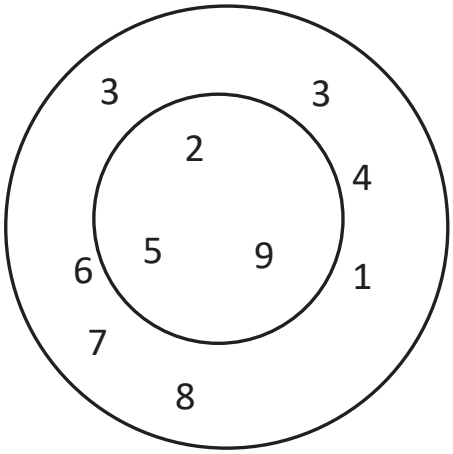
{ c} □ P, { a,b } □ P { a,c } □ P

{ b, c} □ P , { a,b,c} □ P

□ A set of 3 members has 8 subsets.

Complement of a set.

Let K = {3,6,9} set of multiples of 3 less than ten.



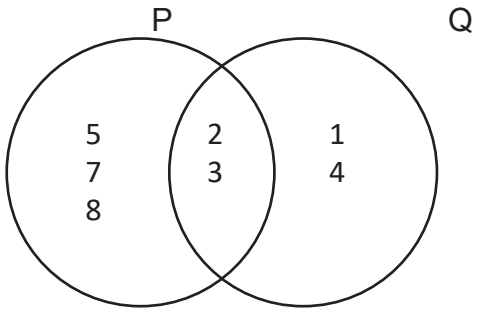
∑ has members
{1,2,3,4,5,6,7,8,9}

K = {2, 5, 9}

The set of all members inside ∑ but outside K is called complement of set K

Difference of sets

The Venn diagram below shows sets P and Q



The difference between P and q is written as P-Q and is the set { 5,7,8} i.e the members in P and not in Q . The difference between P and Q is written as Q-P and is the set { 1,4} i.e the members in Q and not in P.

Note: The members 2 and 3 are in both sets P and Q we say that

(PnQ) = { 2, 3}

Example 1

If A = { a,b,c,d,e,f,g}

And B = { b,e,d,h,i,j}

a) Represent the information on A Venn diagram.

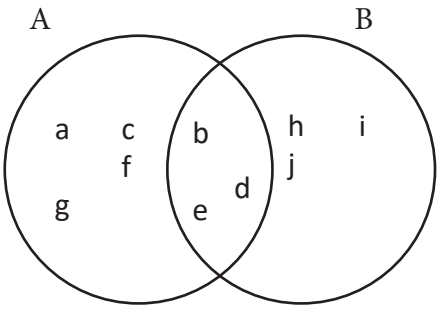
b) what is A-B

c) What is B-A

d) What is n(AnB)

Solution

n(o)=40



b) A-B = { a, c, f, g}
c) B-A = { h, i, j}
d) AnB = { b, d, e}

Using the Diagram to solve problems

Example 1

Primary six class in a school in Arua has 67 pupils, 37 of these pupils like water melon and 40 like oranges, some of the pupils like both fruits.

a). How many pupils like both fruits?

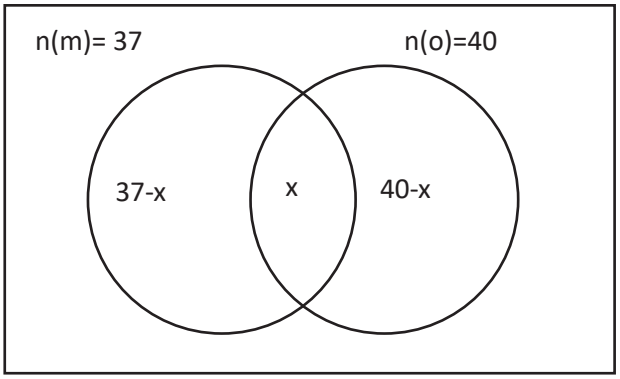
b). How many pupils like oranges only?

c) How many pupils like water melon only.

d). How many pupils like one fruit only?

e). Represent the above information in a Venn diagram.

n(∑)=67



37+ 40- x = 67
77- x = 67+ x
77-67 = x
10 = X

OR

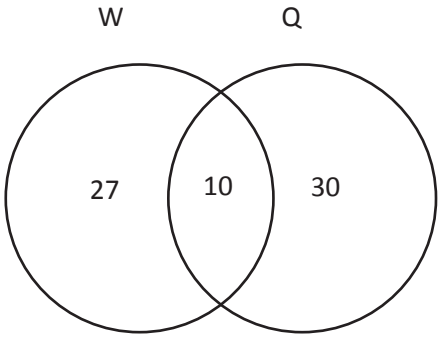
or 37+ 40
77
No of children in class= 67
77- 67 = 10
n(m)n(o) = 10

b). Orange only = 40- 10 = 30

e) . Water melon only = 37- 10 = 27

d) One fruit only is 27+ 30 = 57

e).



1. Probability

Probability is the measure of value or likelihood of an event happening.

Example 1

A mother wants to go to the market. She notices that there are dark rainy clouds and strong wind blowing. She needs to decide whether to carry an umbrella. What would you advice the mother to do?

Solution:

The chance of raining are _____(high/low)

Example 2

A child is sleeping in a bed covered with a mosquito net . the chances that the mosquito will bite are _____ (high)/low)

Example 3

What is the probability of getting a head { face with an animal} when a coin is tossed.?

Probability = ½

Example 4

What is the probability of a red color setting on the floor,when the spinner is thrown, green, blue

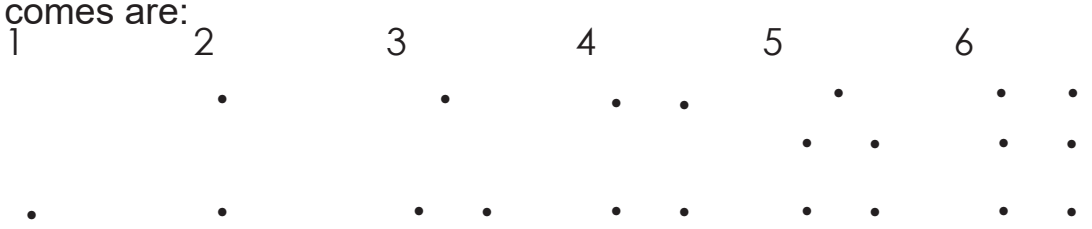
Events are 4 {red, yellow, green, blue} red is 1 out of 4

Probability of red = $\frac{\text{red}}{\text{red, yellow, green, blue}}$

Red is 1 out of 4

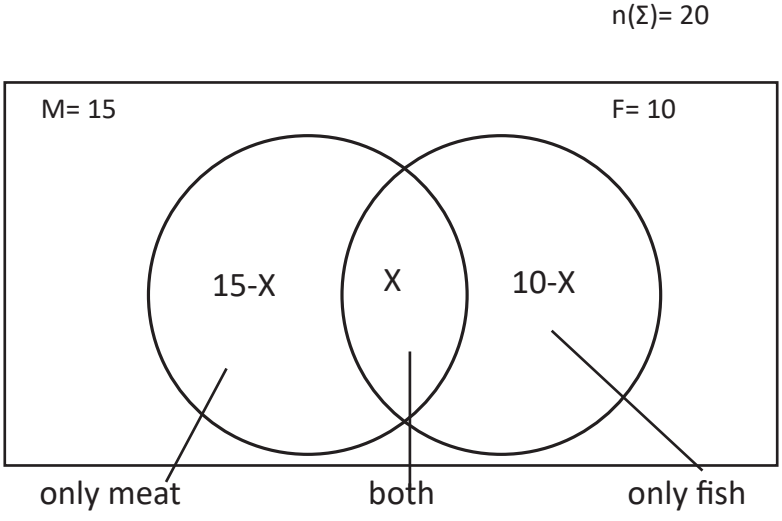
Example 5

What is the probability of a six showing up when the die is cast? Possible outcomes are:



Example 6

In a class of 20 pupils, 15 ate meat(M), 10 eat fish (F), 2 do not eat the two, but X eat both what is the probability of choosing at a random a pupil who eats both.



Set for math = 15

15 + 10-x + 2 = 20

27-X = 20

27-x +x = 20 + x

27- 20 = X

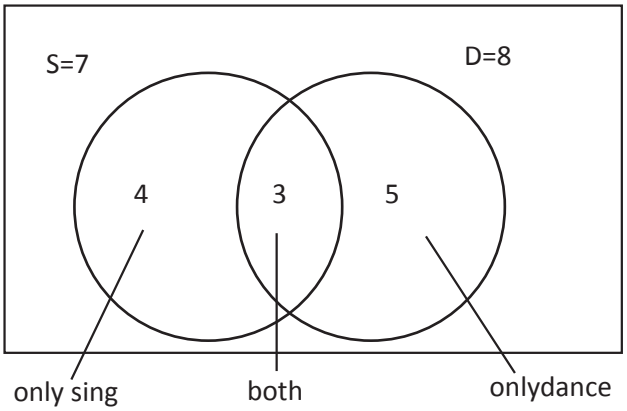
7= X

Probability = $\frac{\text{n (expected both)}}{\text{n (total in class)}}$

= 7/20

Example 7

In a troupe of 12 members, 7 can sing (S), 8 can dance (D) , and 3 can both sing and dance. What is the probability of choosing a member that can only dance?



a) Probability = $\frac{\text{n (expected only dance)}}{\text{n (total in the troupe)}}$

= $\frac{8-3}{12}$ = $\frac{5}{12}$

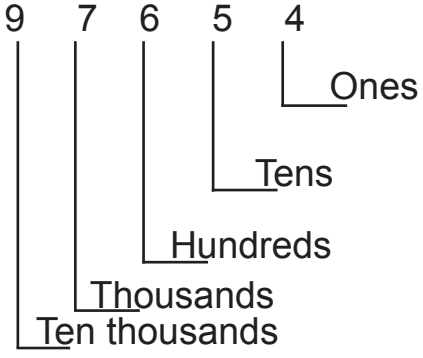
3. NUMERATION SYSTEMS AND PLACE VALUES.

a). <u>Place value of numbers</u>

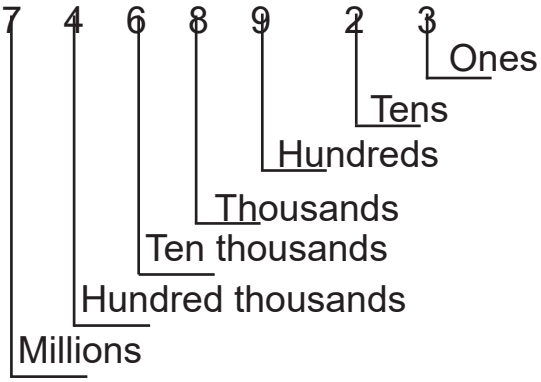
Here in each example which we are going to give, each digit has its place value.

Place values help us identify which figures have greater values than others.

Example 1



Example 2



OR

	MILLIONS			THOUSANDS			UNITS		
	H	T	O	H	T	O	H	T	O
					9	7	6	5	4
			7	4	6	8	9	2	3
			2	4	3	0	9	5	6
						2	2	6	8

VALUE OF NUMBERS

9 4 3 8 7 2 5

	MILLIONS			THOUSANDS			UNITS		
PLACE VALUE	H	T	O	H	T	O	H	T	O
DIGIT			9	4	3	8	7	2	5
VALUE			9X1000000 = 9000000	4X100000 = 400000	3X10000 = 30000	8X1000 = 8000	7X100 = 700	2X10 = 20	5X1= 5

Example 1
Find the value of 4 in the numerator 64567

64567

Place value => thousands

The value is 4X1000

= 4000

NB To get the value, multiply the number by the place value.

Example 2

What is the value of each digit in the number 1,725,084.

Place value	millions	Hundred thou-sands	Ten thou-sands	thou-sands	hun-dred	tens	ones
Digits	1	7	2	5	0	8	4
	1x1000000	7x100,000	2x10000	5x1000	0x100	8x10	4x1
Values	1,000,000	700,000	20,000	5000	0	80	4
	2	8	3	5	6	7	9
value	200,000	800,000	30,000	5000	600	70	9

The value of 1 is 1,000,000

The value of 7 is 700,000

The value of 2 is 20,000

The value of 5 is 5000

The value of 0 is 0

The value of 8 is 80

The value of 4 is 4

b.What is the value of 6 in the second number above in the table.

2,835,679

└Hundreds (6x100) = 600

Expanded form of numbers using values.

Example 1

Expand 6845

=6Thousands+8Hundreds+4Tens+5Ones

= (6x1000)+(8x100)+(4x10)+(5x1)

= 6000 + 800 + 40 + 5

Example 2

Express 97386 in expanded form.

97,386 =

=9 Ten Thousands+7Thousands+3Hundreds+8Tens+6Ones

= (9x10000)+(7x1000)+(3x100)+(8x10)+(6x1)

= 90000 + 7000 + 300 + 80 + 6

Expanded using place values.

Example 1

Express 16,430 in expanded form using place values.

16,430 =

TEN TH	TH	H	T	0
1	6	4	3	0

(1x10,000) +(6x1000) +(4x100) +(3x10) +(0x1)

Example 2

Write 426, 078 in expanded from.

HTH	TTH	TH	H	T	0
4	2	6	0	7	8

(4x100,000) +(2x10,000) +(6x1000) +(0x100) +(7x10) +(8X1)

Finding the expanded number.

Example 1

Write 2,000,000 + 600, 000 + 7,000

2,000,000
  600,000
+ 7,000
2,607,000

Example 2

Express (7x1,000,000) + (5X100,000) + (6x100) + (2x10) + as a single number.

=7000000+ 500000+ 600+ 20

7,000,000
  500,000
  600
+ 20
7,500,620

Writing numbers in words

Example 1

Write the number 2,058,676 in words and then read it.

M	HTH	TTH	TH	H	T	0
2	0	5	8	6	7	6

Two million fifty-eight thousand sixty seventy-six

Example 2

Take the digit in the number 6,035,248 and without repeating any digit arrange them to make:

a) the largest number possible

b) the smallest number possible

Solution

a).The largest number starts with the digit with the highest value (8) and ends with the smallest (0) largest number possible is 8,654,320

⇨ 8,654,320

b). The smallest number possible first write the smallest number then write all the 0 (s) after it and proceed to the larger digit ending with the smallest number possible 2,034,568

Writing numbers in figures

Example 1

Write the number five million one hundred seventy-two thousand nine hundred forty-three in figures.

Five million	=> 5,000,000
One hundred seventyTwo thousand	=> 172, 000
Nine hundred	=> 900
Forty	=> 40
Three	=> 3

The number is 5, 172,943

Example 2

Write in figures: Three million two hundred sixty – five thousand eight hundred fifty-two.

Three million => 3,000,000

Two hundred sixty-five thousand => 265,0000

Eight hundred => 800

Fifty-two => 52

The number is 3,265,852

Roman numerals

1=I	CX= 110
2=II	CXX== 120
3=III	CXXX= 130
4=IV=IIII	CXL = 140
5=V	CC= 200
6=VI	CCC= 300
7=VII	CD = 400
8=VIII=IIX	D= 500
9=IX=VIIII	DC= 600
10=X	DCCC= 800
20=XX	CM= 900
30=XXX	M= 1500
40=XL	MM= 2000
50=L	1000= M
60=LX	2000= MM
70=LXX	3000= MMM
80=LXXX	4000= IVM
90=XC	5000= VM
C= 100	6000= VIM

Example 1

Write the hindu Arabic numerals for

a). CCLXVII

CC+ LX + VII

200+ 60+ 7

267

b) CMIV

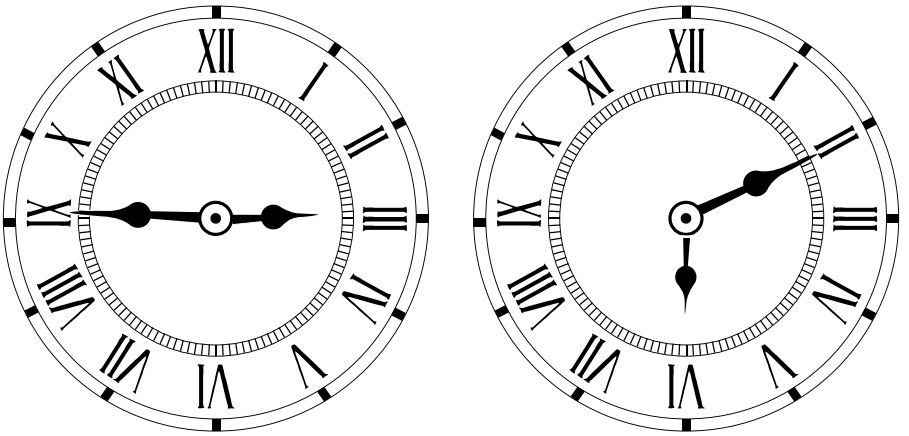
CM + 0 + IV

900 + 0 + 4

904

Example 2

Read and write down the time on each of the clock faces below in Hindu Arabic



Note:

C= 100

D= 500

CM= 900

CD= 400

XL = 40

XC= 90

(These are most confusing numbers)

4. DECIMALS

We need to know, what is the difference between natural numbers and whole numbers.

N= {1,2,3,4,5,6 --------}

W= {0,1,2,3,4,5--------}

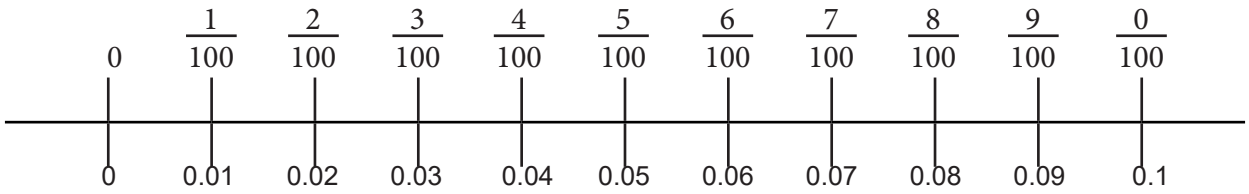
The difference is natural number begin with one (1) while whole number begins with Zero (0).

Fractions

FRACTIONS	NAMES	DECIMAL
$\frac{1}{10}$	One tenths	0.1
$\frac{2}{10}$	Two tenths	0.2
$\frac{3}{10}$	Three tenths	0.3
$\frac{7}{10}$	Seven tenths	0.7
$\frac{10}{10}$	One whole number	1
$\frac{2}{100}$	Two hundredths	0.02
$\frac{8}{100}$	Eight hundredths	0.08

Alternatively

We can now look at the number lie decimal numbers / decimal fractions between 0 and 0.1.



Note when 0.1 is divided further into 10 each part is one hundredth of a whole unit.

E,g $\frac{10}{100} = \frac{1}{10} = 0.1$

Exercise: Page 42 and 43

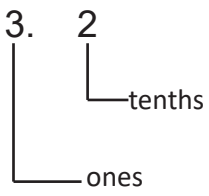
In primary mathematics 200 pupils book 6

New edition MK.

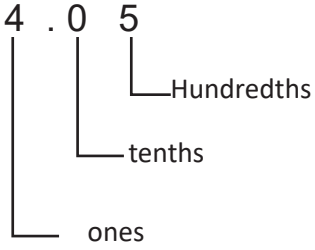
Place value of decimal.

Example 1

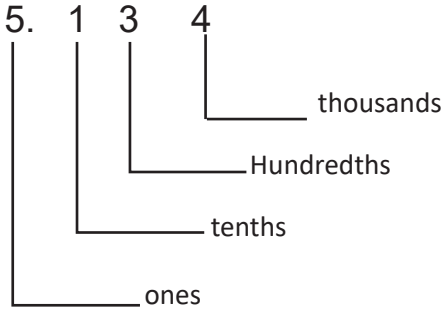
3.2



Example 2



Example 3

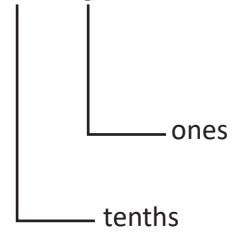


Example 1 what is the value of each digit in number

Number Place value value.

4. 6 6x = 6x0.1 = 0.6

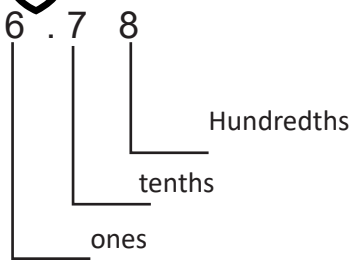
4 ones = 4x1 = 40



Example 2

What is the value of each numeral in 6.78

Number place value value.



8 hundredth = $\frac{8}{100}$ = 0.08

7 tenth = $\frac{7}{10}$ = 0.7

6 0nes = 6x1 = 6

Writing wholes and decimals in figures.

Example 1

Thirty-six and four tenths

Thirty-six …… 36.0

Four tenths ……. 0.4

36.4

Example 2

One hundred twenty and fourteen hundredth

One hundredth twenty 120.00

Fourteen hundredths + 0.14

120.14

Example 3

Twenty-six and fifty-two thousand

Twenty-six 26. 00

Fifty-two thousand +00. 52

26. 052

Example 4

Eight nine and more hundred four thousand

Eight nine ……89.000

One hundred four ……..... + 0.104

89.104

Writing decimals in words

Example 4

Eight nine and more hundred four thousand.

Eight nine ……89. 000

One hundred four …… +0.104

89.104

Writing decimals in words

Example 1

Write the following in words

i) 4.8

ii) 15.07

iii) 0.125

iv) 18.014

Solution i) 4 => four

0.8 => eight tenths

4.8 => four and eight tenths

ii) 15.07

15 => fifteen

0.07=> seven hundredths

15.07 => fifteen and seven hundredth

ROUNDING OFF WHOLE NUMBERS.

. Round off to the nearest tens.

i) 24 => 24 => 20

ii) 41 => 41 => 40

iii) 442 => 440

iv) 558 => 560

v). 861 => 860

2. Round off to the nearest hundreds

i) 586 => 500 or 600

ii) 952 => 1000

iii) 8923 => 8900

iv) 2563 => 2600

v) 1287 => 1200

Note: If the figure on the right of the required place value is less than 5 i.e { 0,1,2,3,4} leave the figure in the required place value unchanged.

If the figure on the right of the required place value is 5 or greater that i.e {5,6,7,8,9} and 1 to the figure in the required place value

Round off decimal fractions

Example 1

Round off 4.37 to the nearest whole number

4 . 3 7

Three tenths and 3 is les than 5

Ones (required place value)

So 4.37 becomes 4

Or 4 .3 7

+ 0

4. 0 0

Ii) 29.973 to the nearest tenths.

+1

30.000

⇨ 30.0 zero represents the place value required in the above number.

ii) 29.973 to the nearest hundredth.

29.973

0

29.970

v) 40.498 to the nearest hundredths

40.498
+1
40.500

40.50

5. ROMAN SYSTEM

Numeration systems and place value in romans

1=I	
2=II	
3=III	
4=IV=IIII	
5=V	
6=VI	
7=VII	
8=VIII=IIX	
9=IX=VIIII	
10=X	
11=XI	
12=XII	
13=XIII	
14=XIV	
15=XV	
16=XVI	
17=XVII	
18=XVIII	
19=XIX	
20=XX	
21=XXI	
22=XXII	
23=XXIII	
24=XXIV	
25=XXV	
26=XXVI	
27=XXVII	
28=XXVIII	
29=XXIX	
30=XXX	
31=XXXI	
32=XXXII	
33=XXXIII	

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34=XXXIV	
35=XXXV	
36=XXXVI	
37=XXXVII	
38=XXXVIII	
39=XXXIX	
40=XL	
41=XLI	
42=XLII	
43=XLIII	
44=XLIV	
45=XLV	
46=XLVI	
47=XLVII	
48=XLVIII	
49=XLIX	
50=L	
51=LI	
52=LII	
53=LIII	
54=LIV	
55=LV	
56=LVI	
57=LVII	
58=LVIII	
59=LIX	
60=LX	
61=LXI	
62=LXII	
63=LXIII	
64=LXIV	
65=LXV	
66=LXVI	
67=LXVII	
68=LXVIII	
69=LXIX	
70=LXX	
71=LXXI	
72=LXXII	
73=LXXIII	
74=LXXIV	
75=LXXV	
76=LXXVI	
77=LXXVII	
78=LXXVIII	
79=LXXIX	

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80=LXXX	
81=LXXXI	
82=LXXXII	
83=LXXXIII	
84=LXXXIV	
85=LXXXV	
86=LXXXVI	
87=LXXXVII	
88=LXXXVIII	
89=LXXXIX	
90=XC	
91=XCI	
92=XCII	
93=XCIII	
94=XCIV	
95=XCV	
96=XCVI	
97=XCVII	
98=XCVIII	
99=XCIX	
100=C	

Roman and Hindu Arabic Numerals

Hindu Arabic	1	5	10	50	100	500	1000
Romans	I	V	X	L	C	D	M

Expressing Hindu-Arabic numerals as Roman Numerals

Example 1

75 = 70 + 5

75 = LXX + V

LXXV

II) 555= 500 + 50 + 5

555 = D + L + V

DLV

III) 445 => 400 + 40 + 5

CD = CD + XL + V

CDXLV

V) 785 => 700 + 60 + 5

DCC+ LX+ V

DCCLXV

Changing Roman numerals to Hindu.

Example 1

Write in Hindu Arabic

i) LXXV=

L = 50

XX= 20

V= 5

⇨ 75

II) CCCXCIX

CCC= 30

XC= 90

IX = 69

⇨ 399

Example

A man earned sh. CMXCV. How much money was it in Hindu Arabic numerals?

CMXCV => CM = 900

XC = 90

V= 5

Sh = 995

Exercise

i) Mary has CDXXV cows . Write the number of cows in Hindu – Arabic numerals.

CDXXV => CD + XX + V

400 + 20 + 5

⇨ 425 cows

ii) There are CMXC pupils in a school. How many pupils are there in Hindu Arabic numerals?

OPERATION ON NUMBERS.
6. Addition :

M	HTH	TTh	Th	H	T	O
1	2	3	4	6	7	8
+	2	1	4	2	1	0
1	4	4	8	8	8	8

Add => 8 + 0 = 8

Tens 7+ 1= 8

Hundreds 6+ 2 = 8

Thousands 4+ 4= 8

Ten thousands 3+ 1= 4

Hundred thousand 2+2= 4

Exercise =>

a). 11 345
+ 16 78

b). 23, 456
+ 3, 145

c). 8,097, 056
1, 048, 087

d). 970, 695
+ 409, 708

Subtraction

Example 1

=> 120, 186
- 20, 123
100, 063

Example

52331856
1345102
3,888,084

Multiplication.

Example 1

143x18

```
   143
 x 18
------
  1144
+ 143
------
 2574
```

Example 2

Multiply

```
    1324
   x 132
   ------
    2648
   3972
+ 1324
------
 174768
```

Composition numbers (more about multiplication)

Example 1.

A min bus carries 24 people every trip. How many people will it carry if it makes 12 trips?

Each trip	24 people
12 trips	(24x12) people
	288 people

Example 2

A company has 850 workers who earn sh. 5460 each a day. How much does the company spend on wages every day?

NO. of workers = 850

Each gets = 5460 shs

Wages Everyday = 5460 x 850

= 4,641,000 shs.

Addition and multiplication of numbers

Example 1

Simplify 3x4+5

Since 3x4 = 12

Therefore 3x4+5

12+5

17

Method B

Simplify 5+(4x3)

5 + 12

17

Example 2

Work out

13 + (5x4) + 17

13 + 20 + 17

33 + 17

50

Example 3

Work out

(4x7) + (9x3)

28 + 27

55

Note:

Where addition and multiplication operations are used, begin with the multiplication operation.

Exercise

i) Expand the following using the operation
e.g 5x3
5+5+5=15

ii) 4x6

iii) 3x7

iv) 3x14

2. Calculate the following

i. 3+ 8x4

ii. 5x9+6

iii. 18x7+12

iv. 3x7+8x9

v. 12x4+6+9x2

OPERATIONS ON NUMBERS IN DIVISION

Example 1

Divide 1976 by 13

```
      152
   ┌─────
13 │1976
   - 13
     67
    -65
     26
    -26
      00
```

side work

13x1 = 13

13x2 = 26

13x3 = 39

13x4 = 52

13x5 = 56

13x6 = 78

Example 2

Divide 6360 by 120

```
       53
   ┌─────
120│6360
   - 600
     360
    - 360
      00
```

side work

120x1 = 120

120x2= 240

120x3= 360

120x4= 480

120x5 = 600

120X6= 72

Exercise

Work out

i. $17\overline{)5984}$

ii. $25\overline{)5325}$

iii. $83\overline{)54780}$

iv. $110\overline{)1320}$

v. $230\overline{)76590}$

ESSAY NUMBERS/ WORD PROBLEMS IN DIVISION.

Example 1

On a farm 14,136 kg of tomatoes were picked in a month of 31 days. What was the average weight of tomatoes picked every day?

```
      456
   ____
31 | 14136
   - 124
     173
   - 155
      186
    - 186
      00
```

31x1=31
31x2= 62
31x3= 93
31x4= 124
31x5= 155
31x6=186

146 tomatoes picked.

Exercise:

1. A petrol station manager bought 2200 liters of motor oil. If she put equal amount of oil in 440 drums. How many liters of oil were in each drum?

2. A factory produces 375,000 cups, if 250 cups were picked in each carton, how many cartons do they produce every day.?

3. A truck can carry 520 bricks. How many trips will it make to carry 17,680 bricks?

NUMBER PATTERNS AND SEQUENCES

Divisibility tests

Divisibility test of 2

Any number is divisible by two if it ends with 0 or Even numbers

{ 0,2,4,6,8}

Divisibility test of 3

Any number is exactly divisible by 3 if the sum of its digits is divisible by 3

e.g. 144=> 1+4+4

=> 9 (9 is divisible by 3)

Divisibility test for 4

number is divisible by 4 if its two last digits are divisible by 4 and ends up with 0.

Divisibility test for 5

A number is exactly divisible by 5 when it ends up with 5 and 0 only.

Exercise

1) Choose numbers divisible by 2
   i). 20
   ii). 57
   ii). 198
   iii). 39
   iv). 755.

2. List only those numbers which are exactly divisible by 3

i.) 55

ii.) 77

iii.) 99

iv.) 768

v.) 536

3. Find and write only those numbers that are exactly divisible by 4

i.) 8500

ii.) 16840

iii.) 37

iv.) 62

v). 1441

4. Write down numbers divisible by 5 or multiples of 5 less than 60

i). 5, 10, 15, 20, 25, 30 ---------- --------- ------- --------

ii). 175, 1960, 43133 --------- ---------- ------- -------- -----

TRIANGULAR NUMBERS

These are numbers that when you add consecutive numbers from one the sum is always a **triangular number.**

Therefore, Triangular numbers = {

1= 1

1+2 = 3

1+2+3= 6

1+2+3+4= 10

1+2+3+4+5= 15

{1,3,6,10,15,21,28,36, __ ____ ____ ____ ____}

Example 1.

What is the sum of the first 7 counting numbers?

1 +2 + 3 + 4 + 5 +6 +7

= 3 + 7 + 11 + 7

= 10 + 18

= 28

Example 2

By use of formula

$n(\frac{n+1}{2})$

n= number of members.

number of members = 7

$7(\frac{7+1}{2})$

$7(\frac{8}{2})$

= 28

Exercise

1) What is the sum of all numbers from 1 to 10
2) Fill in the missing numbers

i) { 1, _____ 6, 10, _____, _____}

ii) 2, 3,5, _____, _____, _____

3) What is the sum of the third and sixth triangular numbers?
4) Use the formula $n(\frac{n+1}{2})$ to get

a) the 30^{th} triangular number

b) the sum of all numbers from 1 to 50

5 How many sticks will the next grouping have?

I III IIIIII IIIIIIIII

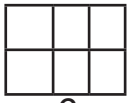
Rectangular numbers

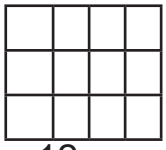
The numbers of squares used to form a rectangle are rectangular number

Therefore, Rectangular numbers are

{ 2,6,8,10,12,14,15,18,20---- ------ ------ --------}


= 2


= 6


= 12

Square numbers.

1x1= 1

2x2=4

3x3=9

4x4=16

5x5=25

6x6=36

1,4,9,16,25, ___ ____ ____ ____

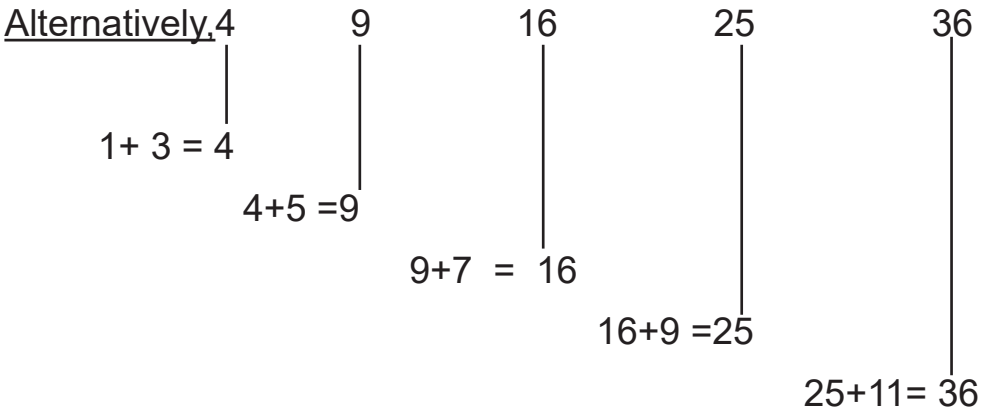
Example 1

Use an array / patterns of 5 of square

1x1	2x2	3x3
0	00	000
1	00	000
	4	000
		9

NB A square shape has an equal number or rows and columns.

Square numbers: 1, 4, 9, 16, 25, 36, 49, ----- -------- ---------- -----



Here we add odd numbers to the next square numbers.

Method 2

1	=1
1+3	=4
1+3+5	=9
1+3+5+7	=16
1+3+5+7+9	=25
1+3+5+7+9+11	=36
1+3+5+7+9+11+13	=49

Exercise

i). Find the value of the unknown

a) 1x1= a

b) 2x2= K

c) 4xk= 16

d) 81= pxp

e) 13xb= 169

f) YxY = 25

2. Work out the following

a) 6^2 = K

b) K= 9^2

c) 12^n = 144

d)20^n = 400

e) 10^t = 100

f) 169 = K^2

3. What is the square of:

a) 11

b) 12

c) 19

d) 20

e) 17

<u>Whole numbers and counting numbers.</u>

Whole numbers are counting numbers that begin from 0 (Zero)

0, 1, 2, 3, 4, 5, 6, _____ _____ _____ _____ ____

Even and odd numbers

Whole numbers

0	1	2	3	4	5	6	7	8	n
0x2	1x2	2x2	2x3	2x4	2x5	2x6	2x7	2x8	2x9

Multiply given numbers by 2

Even numbers

0	2	4	6	8	10	12	14	16	2xn
0+1	2+1	4+1	6+1	8+1	10+1	12+1	14+1	16+1	2n

Add 1

Odd numbers

1	3	5	7	9	11	13	15	17

2n+1

NB. When a whole number is multiplied by 2(double) an Even number is obtained.

Even number = {0, 2, 4, 6, 8, 10, 12 ___ _____ _____ ___}

When a whole number is multiplied by 2 and 1 is added to the product, an Odd number is obtained.

Note

If n is a whole number then a whole number times 2

= 2n = even number

A whole number times 2 pus 1

= 2n + 1 = odd numbers.

Exercise

a) List elements in a set of even numbers below 20

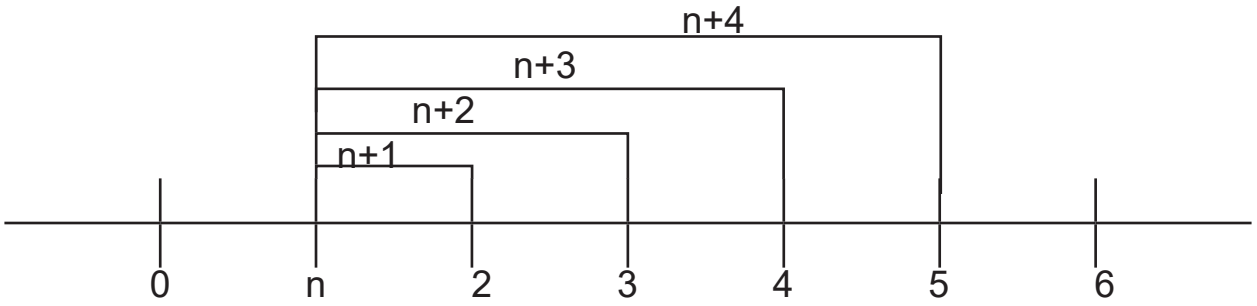
b) What is the first even numbers?

c) List all prime even numbers between 0 and 10

d) Write a set of even numbers which are both divisible by 3 and 5 found between 0 and 50

Finding consecutive counting numbers

Study the number line bout consecutive counting numbers.



If the first consecutive counting number is n then the second consecutive counting number is n+1

The third consecutive counting number is n+2 etc.

Example 1

The sum of three consecutive counting numbers is 36. What are these numbers (if the 1st is n) The 2nd = (n+1) The 3rd = (n+2)

The sum of the 3 numbers

n+n+1+n+2 = 36

3n+3 -3= 36-3

~~3~~n= ~~33~~

~~3~~ ~~3~~

n = 11

Note: Finding consecutive even numbers

Even numbers =>0, 2, 4, 6, 8

Therefore, n, n+2, n+4, n+6, n+8, etc.

Example 1

The sum of the three consecutive Even numbers is 24 list the three numbers.

First number = n

Second number = n + 2

Third number = n+4

Therefore => n + (n+2) + (n+4) = 24

n + n + n + 2 + 4 = 24

3n + 6 - 6 = 24 - 6

$\frac{3n}{3} = \frac{18}{3}$

n = 6

n+2 = 6+2 = 8

n+4 = 6+4= 10

The numbers are 6,8 and 10

Example 2

The sum of 4 consecutive odd numbers is 32 what are the numbers.

Let the number be X

X

X+2

X+4

X+6

X+X+2+X+4+X+6 = 32

4X+ 12-12 = 32-12

$\frac{4X}{4} = \frac{20}{4}$

X= 5

□ x = 5

X+2 = 5+2 = 7

X+4 = 5+4 = 9

X+6 = 5+6= 11

Numbers are 5,7,9,11

Example 3

The sum of 3 consecutive even numbers are 78. If two of the numbers are 24 and 26 what is the third number.

Let the first number be n

n + 24 + 26 = 78

n+ 50-50 = 78- 50

n= 28

Exercise

Attempt the following questions

1. Find the 3 consecutive even numbers whose total is 42

2. The sum of 3 consecutive even numbers is 36. Find the third number if two of them are 12 and 14

3. Find the 4 consecutive odd numbers whose total is 88

4. Find the set of three consecutive even numbers whose sum is 216

5. The sum of 4 consecutive even numbers is 172. Find the fourth numbers if the 3 numbers are 40, 42, 44

Prime Numbers

Prime these are numbers which have two factors one and its self.

prime numbers between 1 and 100

2, 3, 5, 7, 11, 13, 17, 19, 23,

29, 31, 37, 41, 43, 47, 53, 59,

61, 67, 71, 73, 79, 83, 89, and 97.

Composite numbers.

These are numbers with more than 2 factors

e.g 4, 6, 9, 10, 12, 14, 15, 16, 18, 20 ___ ____ ___ ____ ___

Factors

In the operation

3x4 =12

5x4= 20

Therefore 3 and 4 are factors of 12 where as 5 and 4 are factors of 20

e.g List the factors of 10

This means all the number that can be divided by 10

1x10

2x5

F_{10} = { 1,2,5,10}

F_{24} = 1x24

2x12

3x8

4x6

⇨ {1,2,3,4,6,8,12,24}

Common factors

Example: Find the common factors of 18 and 24

F_{18} = 1x18

2x9

3x6

{1, 2, 3, 6, 9, 18}

F_{24} = 1x24

2x12

3x8

4x6

{1,2,3,4,6,8,12,24}

Common factors => { 1, 2, 3, 6}

In other words F_{18} n F_{24} = { 1, 2, 3, 6}

Exercise.

Find the common factors of

a) 8 and 28

b) 12 and 54

c) 15 and 56

d) 28 and 63

e) 30 and 36

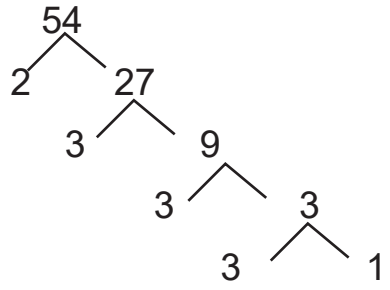
Prime Factors

Example 1 Find the prime factors of 54

Ladder method

2	54
3	27
3	9
3	3
	1

Factor tree method.



So the prime factor of 54

= { 2^1 x3^3} or { 2_1 3_1 3_2 3_3}

Note: factors of 54 = {1, 2, 3, 6, 9, 27, 54}

All those numbers which divide 54 are its factors but prime factors are the prime numbers which divide 54

Example 2: Find the prime factors of 60

2	60
2	30
3	15
5	5
	1

{2_1 2_2 3_1 5_1}

Note: There two are methods of presenting the answers.

Either by set notation or power form { $2^2x3^1x5^1$}

Exercise

Find the prime factors of the following.

i) 40

ii) 45

iii) 84

iv) 280

v) 660

vi) 420

vii) 120

Finding the prime factorized number

Example 1

Find the number which is prime factorized to get

{ 2_1 2_2 2_3 3_1 }

= 2x2x2x3

= 4x6

=24

Example 2

Find the number whose factorization is

= $2^{3,}$ 32, 5^1

= 2x2x3x3x5

= 4x9x5

=36x5

=180

Exercise

Find the numbers whose factorization are given below.

i) $2_{1,}$ $2_{2,}$ 2_3

ii) $2_{1,}$ 3_1 5_1

iii) 2_1, 2_2, $3_{1,}$ 3_2

iv) 2^2 x 2^2 x 5^1

v) 2^1x 3^2 x 5^2

vi) $2^1 \times 5^1 \times 11^1$

vii) $\{2^4 \times 3^2\}$

viii) $\{2^2 \times 5^2\}$

ix) $2^2 \times 5^1 \times 7^1$

x) $(2^2 \times 3^3)$

Find the unknown prime numbers

Example

The prime factor of 60 are 2x2xpx5. Find P

2x2x5xp = 60

4x5xp = 60

$\frac{20p}{20} = \frac{60}{20}$

P = 5

Alternatively

2	60
2	30
3	15
5	5
	1

2x2x3x5

Find The Unknown Prime Factors

Exercise

Prime factorize and find the missing numbers.

i) The prime factorization of 30 is 2xXx5. What is the value of X

ii) The prime factorization of 36 is $2^2 \times X^2$. Find the value of X

iii) The prime factorization of 90 is P x 3^2 x 5. Find p.

iv) Prime factorization of 90 is P$x3^2$x5. Find P

v) Prime factorization of 100 is 2^2X K. Find K

vi) The prime factorization of 100 is 2^2x k. Find K

vii) The prime factorization of 120 is 2x2x2xmxn. Find m and n

viii) The prime factorization of 144 is a^4xb^2. Find the value of a and b

Value of powers of numbers.

Example 1

Find the value of 2^4

2^4 => (2x2) x(2x2)

⇨ 4x4

⇨ 16

Example:

What is the value of 7^3?

7^3 => 7x7x7

= 49x7

=343

Exercise.

Find the value of the following

i) 2^3

ii) 3^4

iii) 6^2

iv) 11^3

v) 4^2

vi) 9^3

vii) 3^2

viii) 10^3

ix) 8^4

x) 5^4

Expressing a number as a product of another given number.

Example

Write 32 in powers of 2

2	32
2	16
2	8

2	4
2	2
	1

⇨ 2x2x2x2x2

$= 2^5$

Example 2. Write 64 in powers of 4

4	64
4	16
4	4
	1

Exercise:

Attempt the following

i) Express 64 in powers of 2
ii) Express 49 in powers of 7
iii) Express 216 in powers of 6
iv) Express 729 in powers of 9
v) Express 729 in powers of 3
vi) Express 2401 in powers of 7
vii) Express 1331 in powers of 11
viii) Express 125 in powers of 5
ix) Express 625 in powers of 5
x) Express 169 in powers of 13

Finding more values of numbers from given powers

Example 1

Find the value of x^2 if x= 6

$X^2 = XxX$

$X^2 = 36$

The value of $x^2 = 36$

Example 2

What is the value of $2p^2$ if p= 4

$2p^2 = 2xpxp$

And p= 4

⇨ 2x4x4

⇨ 8x4

⇨ 32

Exercise

Attempt the following.

i) Find the value of y^2 if y= 3

ii) Find the value of $2x^2$ if x= 3

iii) Find the value of $7m^4$ if m= 1

iv) If t= 9 what is the value of t^2

v) If t= 9 what is the value of $3t^2$

vi) If $4x^2$ =y Find y if x= 3

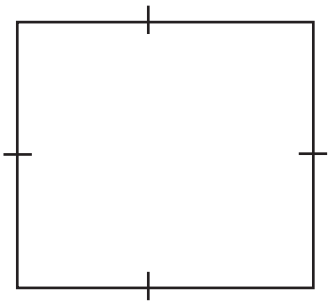
vii) If $9m^3$ = p. Find p if m= 3

viii) If w= 7. What is the value of $2w^{3?}$

ix) Given that m=6, what is the value of $3m^2$

x) Given that b= 10. What is the value of $8b^{4?}$

v)



The Area of the figure is $49cm^2$.
What is the value of x

<u>Addition Of Numbers In Power Form.</u>

Example 1. Find the value of 4^3 $x3^2$

= (4x4x4) + (3x3)

= (16x4) X9

= 64x9

= 73

Example 2

Find the value of $2^3 + 3^2+5^0$

$2^3 + 3^2+5^0 = (2x2x2)+ (3x3)+ 1$

$= 8+9+1$

⇨ 18

Exercise

Find the value of y

i) $2^2 + 3^2$

ii) $4^2 + 3^2$

iii) $6^2 + 2^5$

iv) $2^2 + 3^2 + 3^2$

v) $3^4 + 4^2 + 2^1$

<u>Reprsenting Prime Numbers On The Venn Diagram.</u>

Example: use Venn diagram to show factors of 36 and 30

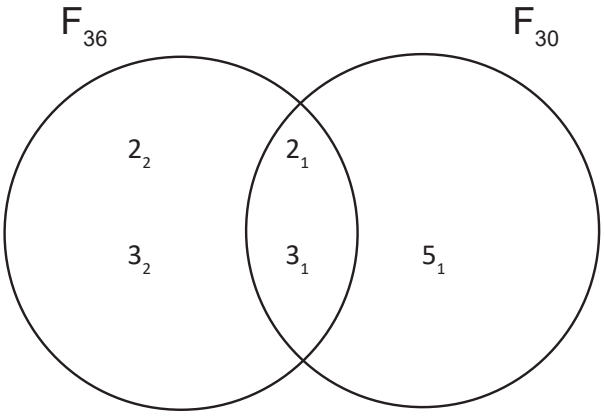
Step 1 Prime factorize the numbers.

2	36
2	18
3	9
3	3
	1

2	30
3	15
5	5
	1

$F_{36} = 2_1, 3_1, 3_2$ $F_{30} => 2_1, 3_1, 5_1$

Step 2: Find the common prime factors.



Exercise:

Attempt the following

i) Draw a Venn diagram to present the prime factors for the following pairs of numbers.

a). 24 and 30

b). 30 and 48

c). 36 and 54

ii) Express the set notation form and show on a Venn diagram.

a). 2×3^1 and $3^2 \times 5$ b). $2 \times 3^2 \times 7$ and $2^2 \times 3 \times 5$

c). $2^2 \times 5^2$ and 5×11^2

Finding the greatest common factors (G.C.F) and (L.C.M) lowest common multiple.

Example 1 Find the G.C.F and L.C.M of 8 and 12 using a Venn diagram.

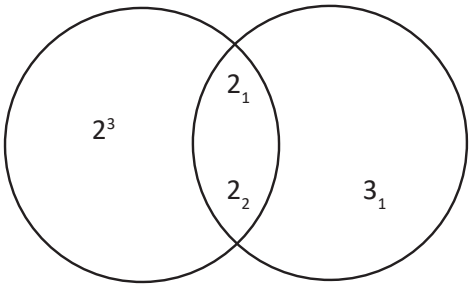
2	8
2	4
2	2
	1

2	30
3	15
5	5
	1

$F_8 = (2_1)(2_2)\ 2_3$ $F_{12} = (2_1)(2_2)\ 3_1$

Common factors = $\{ 2_1\ 2_2\}$ so $F_8 \cap F_{12}$

F_8 F_{12}



The GCF of 8 and 12
= (2x2)
= 4

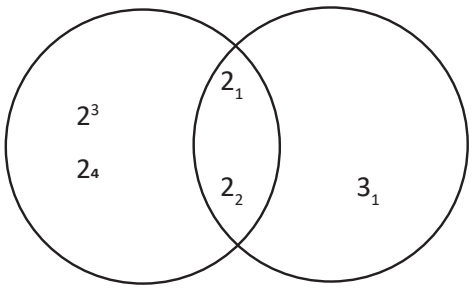
$F_8 \cup F_{12} = \{ 2 \times 2 \times 2 \times 3\}$
= 24

Note: The product of the prime factors in the intersection gives the GCF while that of the prime factors in the union gives the L.C.M

Exercise

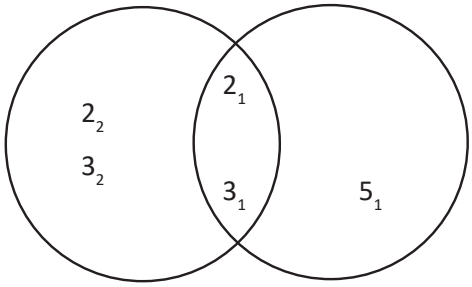
Study the Venn diagram and answer the questions that follow.

1. F_{16} F_{12}



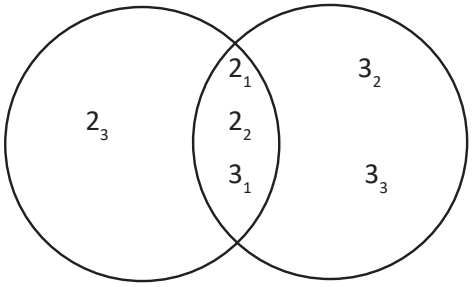
Find i) F_{16} n F_{12}
ii) Find the GCF of 16 and 12
iii) F_{16} U F_{12}
iv) The L.C.M of 168 and 112.

2. F_{36} F_{30}



What is i) F_{36} n F_{30}
ii) The GCF of 36 and 30
iil) F_{36} U F_{30}
iv) The LCM of 36 and 30

F_{24} F_{108}



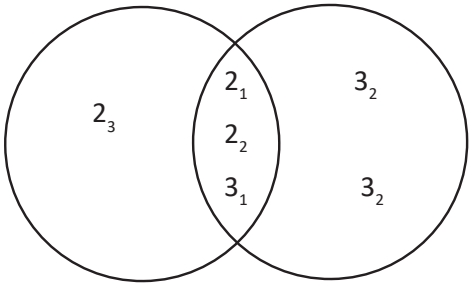
What is i) F_{24} n F_{108}
ii) The GCF of 24 and 108
iii)F_{24}U F_{108}
iV) The LCM of 24 and 108

Finding the unknown values in a Venn diagram.

Example 1

Find the value of X and Y, GCF and LCM

F_x F_y



Factors of x => (2x2)x(2x3)

=> 4 x 6

=> 24

Factors of y => (2x2)x(3x3x3)

=> 4 x 9 x 3

=> 36 x 3

=> 108

GCF of x and y => Fx n Fy

⇨ 2x2x3

⇨ 12

GCF of x and y => Fx U Fy

⇨ 2x2x2x3x3x3

⇨ 4x6x9

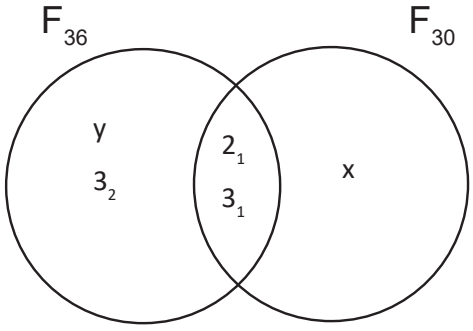
⇨ 24x9

⇨ 216

Example 2

Find the values of x and y

GCF and LCM



To find x => 2 x3x**X** = 30

⇨ $\frac{6\mathbf{X}}{6} = \frac{30}{6}$

X= 5

To find y => y x 3 x 2 x3

⇨ Y x 18

⇨ $\frac{18y}{18} = \frac{36}{18}$

Y= 2

GCF = F_{36} n F_{30}

= 2x3

=6

LCM => F_{36} u F_{30}

⇨ 2x3x2x3

⇨ 6x6x5

⇨ 36x 5

⇨ 180

3.The intersection set for the two numbers A and B is { 2, 3}

If A-B = { 2_2 , 3_2} and B-A = { 5}

Find the value of

i) A

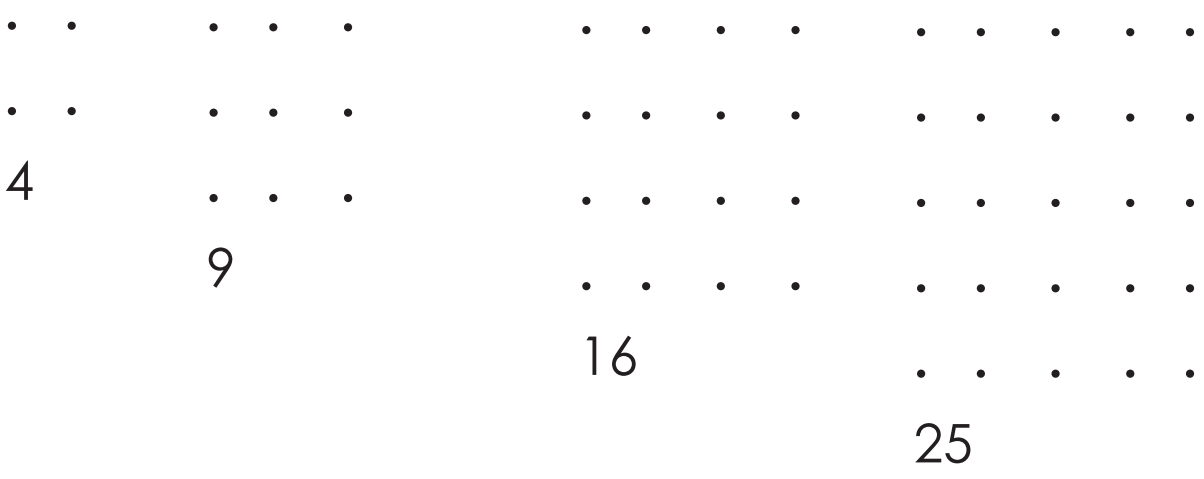
ii) B

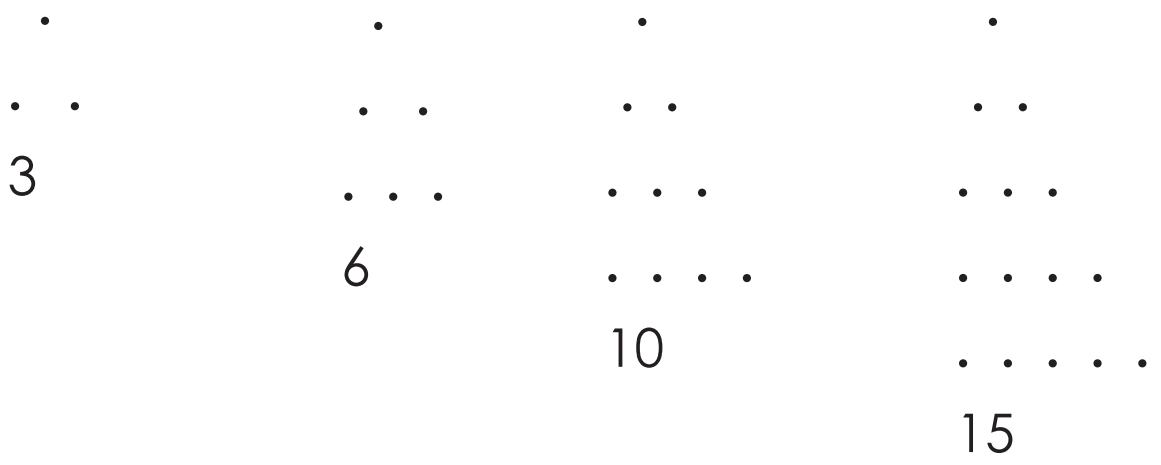
iii) Find the LCM of A and B

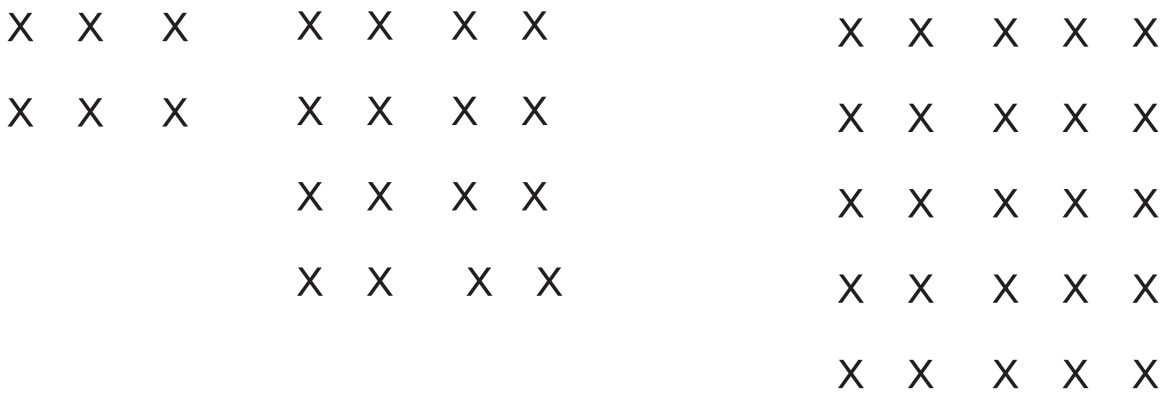
iv) Find the GCF of A and B

More patterns and sequences

How many objects will be in the next arrangement?







Note : A pattern is a regular arrangement of lines, shapes, colors e.t.c

The order may be due to addition or multiplication on division or subtraction.

Example 1

Find the next two numbers in the sequence 6, 7, 8, 9, 10, 11

+1 +1 +1 +1 +1

Exercise

Find the next two numbers in the sequence below.

1. 1, 2, 3, 4, 5, 6, _____, _____
2. 14, 13, 12, 11, _____, _____
3. 20, 18, 15, 11, _____, _____
4. 2, 9, 16, 23, ___, _____
5. 10, 17, 24, 31, _____, _____

Example 2

Find the next two numbers in the sequence

2, 4, 6, 8, 10, 12, _____, _____
+2 +2 +2 +2 +2 +2 +2

Example 2

Find the next two numbers in the sequence of square numbers.

1, 4, 9, 16, 25, _____, _____

1^2 2^2 3^2 4^2 5^2 6^2 7^2

Example 3

1. Find the next two numbers in the sequence

   a). 7, 9, 11, 13, _____, _____

Exercise Find the next two numbers in the sequence

a) 7, 9, 11, 13, _____, _____

b) 68, 66, 64, 62, _____, _____

2. Find the next prime numbers in the sequence.

   a. 2, 3, 5, 7, _____, _____

   b. 47, 53, 59, _____, _____

   c. 19, 23, 29, 33, _____, _____

3. Find the next triangular number.

   a). 1 ,3, 6, _____, _____

   b). 10, 15, 21, _____

   c). 28, 36,45 , _____

   d). 55, 66, 78, ___

   e). 81, 64, 49, 36, 25, _____

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4. Find the missing square numbers in the sequence below.

a). 144, 121, 100, _____, _____

b). 1, 4, 9, 16, _____

c). 81, 64, 49 , 36, 25, _____

Square numbers and square roots.

1 x 1= 1

2 x 2= 4

3 x 3= 9

4 x 4= 16

5 x 5 = 25

6 x 6= 36

7 x7 = 49

8 x 8 = 64

9 x 9 = 81

10 x 10 = 101

11 x 11= 121

12 x 12 = 144

Note: When a number is multiplied by itself, the result is a square number. The number that is multiplied to get a square number is the square root.

e.g

3 x 3 = 9

Square number

Square root

4 x 4 = 16

Square number

Square root

Example

Find the square root of 64

(use prime factors method)

2	64
2	32
2	16
2	8
2	4
2	2
	1

$\sqrt{64} = \sqrt{(2x2)} \times \sqrt{(2x2)} \times \sqrt{(2x2)}$

$\sqrt{64} = 2x2x2$

$= 8$

Example 2. Find the square root of 144

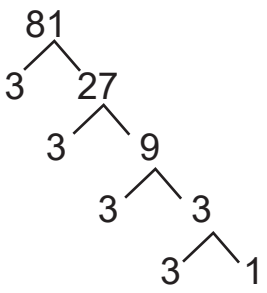
2	144
2	72
2	36
2	18
3	9
3	3
	1

$\sqrt{144} = \sqrt{((2x2) \times (2x2) \times (2x3))}$

$\sqrt{144} = 2 \times 2 \times 3$

$= 12$

Example of square root of 81



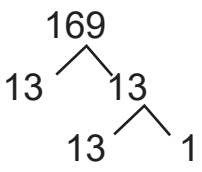
$\sqrt{81} => \sqrt{((3x3) \times (3x3)}$

$\sqrt{81} => 3x3$

$=> 9$

Example 4

Find the square root of 169



$\sqrt{169} \Rightarrow \sqrt{(13 \times 13)}$

$= 13$

Exercise

Use prime factors method to find the square roots.

a). 36 b).81 c).144 d).196 e). 289 f).2500

Example 1 Find the square of ½

⇨ ½x½

⇨ ¼

ii. 1 $\Rightarrow 1\frac{1}{5} \times 1\frac{1}{5}$

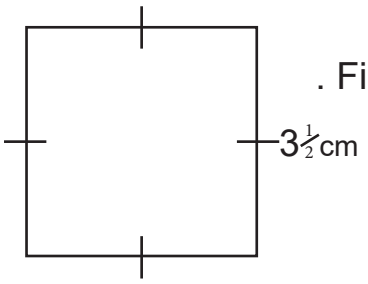
⇨ $\frac{6}{5} \times \frac{6}{5}$

⇨ $\frac{36}{25}$

Exercise.

Find the square of each of the following

a) $\frac{1}{3}$ b) $\frac{2}{3}$ c).$3\frac{2}{3}$ d).$5\frac{2}{3}$



. Find the area of the sequence in cm^2

3. One of the sides of a square is $\frac{5}{8}$ cm
4. Each side of a square field is $2\frac{3}{4}$ of a km. Find the area of the whole field.
5. Work out $3\frac{1}{4} \times 3\frac{1}{4}$
6. Simplify 7×7

Finding square roots of the fractions

Example 1

Find the square root of $\frac{1}{9}$

i). $\sqrt{\frac{1}{9}} = \sqrt{(\frac{1x1}{3x3})}$

$= \frac{1}{3}$

ii). $\sqrt{\frac{1}{16}} = \sqrt{(\frac{1x1}{4x4})}$

$= \frac{1}{4}$

iii). $\sqrt{\frac{36}{81}} = \sqrt{(\frac{6x6}{9x9})}$

$= \sqrt{\frac{36}{81}}$

$= \frac{6}{9}$

Method 2

0.4

X0.4 => 0.16

1 6

x 0 0

0.16 (two decimal places)

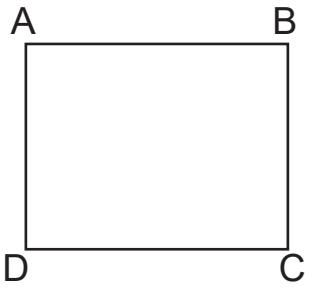
Exercise

Find the square of

i) 0.1
ii) 0.16
iii) 0.42
iv) 0.96
v) 0.0.6
vi) 0.7
vii) O.10
viii) 0.12
ix) 0.5
x) 0.7

11. Find the square of 0.17
12. One side of a square is 0.9 m . Find the area of the square.
13. Find the area of a square sheet of paper whose side is 0.48 dm.

14.



ABCD is a square manila card.
The length of DC is 0.75 cm.
Find the area of the square.

15. The side of a square top of a table is 0.5m. Find its Area.

Square roots of decimals

Example 1 Find the square root of 0.36

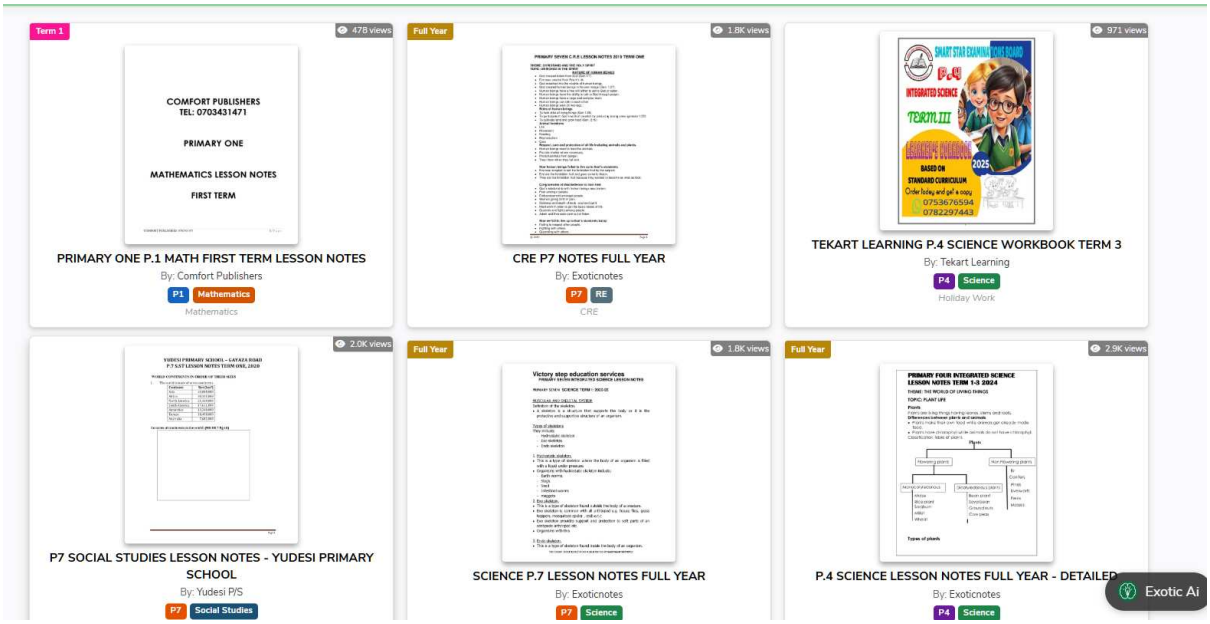
$\sqrt{}$ 0.36 = $\frac{36}{100}$

$= \sqrt{\frac{36}{100}} = \sqrt{(\frac{6x6}{10x10})}$

Exercise : Find the square root of

1. 0.09
2. 0.49
3. 0.64
4. 0.0016
5. 0.0169
6. 0.81
7. ABCD is a square manilla card its area is 6.25 cm^2. Find the length of AB.
8. Find the perimeter of a square field whose area is 1.21 sqkm.
9. If $k^2 = 2.56$ find the value of 2k.

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