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SUB-STRAND 1: PERSONAL HYGIENE AND FOOD HYGIENE

LESSON 1:

B8.1.1.1.1: DEMONSTRATE SKILLS OF PERSONAL HYGIENE

PERSONAL HYGIENE

In Basic 7, we learnt about ways by which one can maintain personal hygiene and food hygiene.

In groups, share with your friends some of the ways you remember about maintaining:

a. personal hygiene and
b. food hygiene

In this lesson, we are going to learn about skills of personal hygiene.

As learnt earlier, **personal hygiene** is how to care for the body. It involves practices performed by an individual to care for oneself. These practices include: bathing, washing of hands, brushing of the teeth and more. Good personal hygiene is important for both health and social reasons.

Skills of Personal Hygiene

In Basic 7, we learnt about ways that we can maintain personal hygiene. Do you remember them? Mention some.
Below are some more skills that can help maintain personal hygiene when followed.

1. Wash hands regularly.
2. Shave hairs on parts of your body regularly.
3. Avoid biting your fingernails and picking your nose.

4. Brush your hair at least once a day and get a regular haircut.
5. Trim your nails (both hands and feet) to prevent germs from hiding in them.
6. Clean your teeth twice a day (early morning and before going to bed at night).
7. Bath regularly, wash your body and hair often.

You need to keep the body clean to protect it from diseases. This means that when the body is kept clean, pathogens cannot enter the body. We also keep the body clean to prevent bad **body odour** on the body. The body odour is the unpleasant smell on one's body when it is not clean. Again, body odour is any strong or unusual odour (smell) related to the body.

Causes of bad body odour

Body odour may be caused by a number of disorders that either cause excessive sweating or directly contribute to an abnormal odour.

The causes include:

1. Not bathing well.
2. Unshaved armpits. When armpit hair grows, it slows down the evaporation of sweat and causes the body to smell.
3. Not washing our clothes and wearing one dress for more than a day.
4. Dietary consumption of cruciferous vegetables, garlic, cumin, curry, se foods and excessive alcohol.
5. Side effects of medication.
6. Lung disease.
7. Substance abuse, as certain drugs disrupt the body's ability to regula temperature.
8. Tuberculosis or other infections.

Materials used to prevent bad body odour

The best way to get rid of body odour is to clean your armpit with soap warm water, at least once a day. If you sweat profusely, try to clean regular intervals.

However, some materials that can be used to treat bad body odour are:

1. Anti-perspirant deodorant
2. Alum
3. Lime or lemon
4. Wheatgrass
5. Baking soda
6. Apple cider vinegar
7. Neem tree extract
8. Honey bath

Some materials that can remove bad body odour

Honey Bath

Honey is known for keeping body odour at bay. So, after your bath, add a tablespoon of honey in warm water and pour it on your body in the end.

Alum

Antiperspirants contain chemicals which can clog your sweat glands. Alum on the other hand, has both antiseptic and astringent properties. It effectively stops the growth of odour-causing bacteria. So, you should apply powdered alum in your armpit at least twice a day.

Fresh lime or lemon

Using lime or lemon is another way to tackle body odour naturally. It not only controls sweat, but also helps in whitening of underarms. Cut a lemon or lime into two halves and rub it in your armpits. You might feel a bit of irritation at first but eventually it will leave you with happy results. *But avoid it strictly if you have a cut or are suffering from skin problems.*

Baking Soda

Baking soda acts as a neutralising agent which helps in getting rid of body odour naturally. Just sprinkle a little in your underarm, and let it absorb all the sweat. It will automatically take care of the odour. For better absorption of sweat, you can even mix the baking soda with cornstarch before applying it.

Apple cider vinegar

The apple cider vinegar is really effective in reducing the pH levels of the skin and getting rid of the armpit odour, (*pH is a measure of how acidic/basic water is. The full meaning is Potential of Hydrogen*). Just add a small proportion to a mug of water and rinse your armpit with it.

Neem extract

Neem extracts have anti-bacterial properties which can get rid of body odour naturally. Add a few drops of this extract to some warm water. Then dip a hand towel into this solution and dab it in your armpits.

So, in view of this, do not just buy a new deodorant impulsively. Simply use these things available at home to get rid of your body odour naturally.

Activity:

1. Prepare cards/posters showing causes of bad body odour.
2. Demonstrate the use of the following materials to treat body odour e.g. lime/lemon, alum, baking soda.
3. Plan and organise campaigns to educate the school community on the elimination of bad body odour.

Note: Include the following in the planning: message, target group (your teacher will assist you).

Project Work:

Research on the internet about causes, prevention and treatment of body odour.

Write out your findings and bring them to class for a presentation.

End of lesson assessment

1. What is personal hygiene?
2. Define the term 'body odour'.
3. State three causes of bad body odour.
4. List four materials in your community that can be used to prevent body odour.

LESSON 2:

B8.1.1.1.2: DEMONSTRATE SKILLS IN KEEPING FOOD SAFE (FOOD HYGIENE)

FOOD HYGIENE

Food hygiene, otherwise known as food safety, can be defined as handling preparing and storing food or drinks in a way that best reduces the risk o contamination. It is also defined as the measures and conditions necessar to control hazards and to ensure fitness for human consumption.

Food hygiene and food safety are important as they ensure that the food you handle and produce are safe for consumption. If food hygiene is no maintained, consumers could become seriously ill with food poisoning an foodborne illness. Therefore it is important to protect the health of consumers by ensuring good food hygiene practices.

Ways of maintaining food hygiene

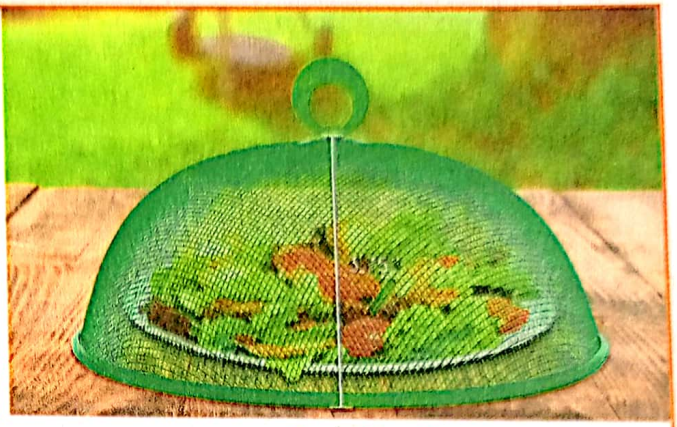
A study has revealed that half of the surfaces in a workplace/kitchen ar contaminated with high levels of bacteria, which can make people get sick.

Below are ways that can help improve food hygiene.

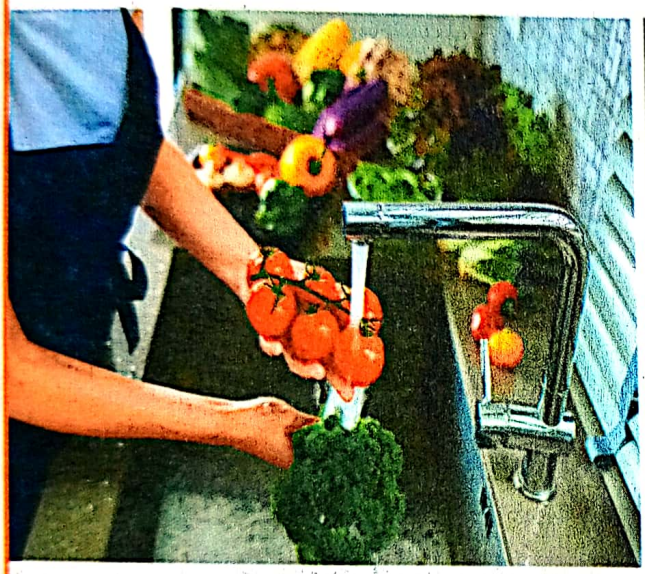
1. Cover food when not ready for eating.
2. Wash hands regularly, before and after handling food.
3. Sneeze or cough into handkerchief when near food.
4. Avoid the use of jewellery on the finger while cooking.
5. Cut or trim finger nails short.
6. Keep hair clean and cover with a cap to prevent it from falling into food.
7. Spitting around food should be avoided because germs can easily spread.
8. Store foods in a proper manner; both before and after cooking.
9. Keep chemicals away from food.
10. Reheat left-over foods very well before eating.
11. Avoid using expired foods.

12. Left-over canned foods should not be stored in the can. Empty it into a bowl before storing.
13. Dented canned foods must not be used.
14. Wear neat protective clothing (caps, aprons, gloves) in the kitchen.

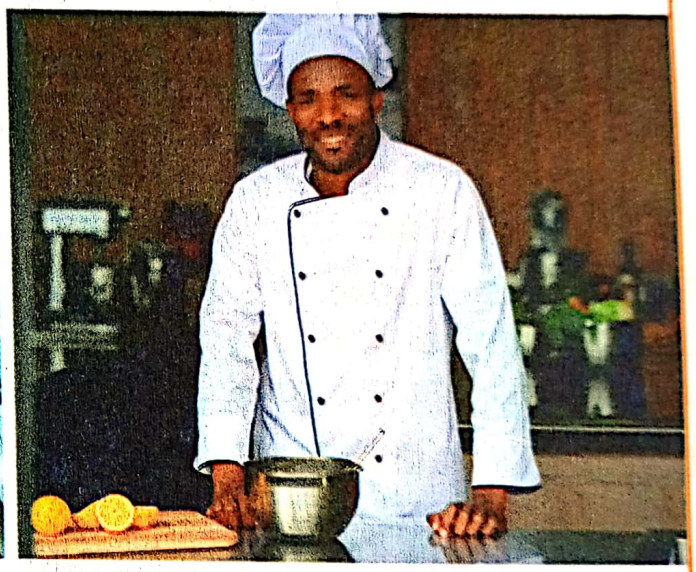
washing hands



covering the food



washing vegetables



wearing protective clothes

Some ways of maintaining food hygiene

Activity:

1. Watch videos and pictures of the processes and skills of maintaining food hygiene and write down your observations.

   Note: Use this website **www.foodandbeveragetrainer.com** as a guide.

2. Role-play the skills of food hygiene in class.

LESSON 1:

B8.1.2.1.1: DEMONSTRATE BASIC SKILLS IN APPLYING FIRST AI TO SELF AND OTHERS

FIRST AID

First aid is the first and immediate assistance given to any person sufferin from either a minor or serious injury or illness until full medical treatment i available. It is also the first response administered to someone experiencin sudden injury or illness before seeking full medical attention.

All accidents require first aid to relieve pain, stop bleeding or prevent furthe harm. However, minor accidents can be treated in the home. Items that ar needed in giving first aid are kept in a ***first aid box or kit***.

The first aid box

First aid kits or boxes are essential for any home, car, work or travel. The come in all types and the list of contents vary depending on their use. Som of the items that should be in the first aid box and their uses are as follows

1. **A box of adhesive dressing (plaster)** of different sizes for covering small wounds. A roll of plaster (cloth-backed micro-pore tape).
2. **Antiseptic lotion** to use with the cotton wool and antiseptic wipes.
3. **Cotton wool** for cleaning cuts.
4. **Some triangular bandages** to hold several safety pins for making a sling or emergency bandage.
5. **Sterile dressings** (of various sizes) e.g. guaze: for covering wounds.
6. **Tweezers** for removing splinters.
7. **Antihistamine cream** for insect bites and stings.
8. **Tubular gauze bandages** for finger injuries and applicator tongs.
9. **Safety pins** are used to keep the bandage in place.
10. **Scissors** are also used for cutting gauze.

11. **Pain reliever spray, gel or balm** to relieve pain and ease the discomfort immediately.
12. **Report book** to record injuries and treatments given.

Note: First aid is given to save life. The first important step in first aid is to remove the source of danger. The second is to keep the person calm and make the patient comfortable. Lastly, stay safe and avoid putting yourself in danger when administering first aid.

FIRST AID TREATMENT

Cuts and open wounds: Cuts are openings on the skin caused by sharp objects. e.g. knife.

Treatments: Stop the bleeding, wash the wound with cold water and apply with antiseptic. Cover the wound with gauze and plaster or bandage. For a deep cut, raise the affected part, apply a clean pad, press on the bleeding spot or press pressure point to stop bleeding. Send patient to a clinic or a medical officer.

Burns or scalds: Burns are injuries on the skin caused by dry heat, (e.g. lighted charcoal, pressing iron) whilst scalds are caused by wet heat, (e.g. steam, hot liquid).

Treatments: Cover the affected part quickly to exclude air and to prevent blisters forming, then cover the spot with flour, baking powder, egg white or strong salt solution. Do not break blisters if they are formed. You may apply gentian violet on it. Cover the patient with blanket if the burns spread over large parts of the body and send him or her to a hospital.

Electric shock: This is caused by direct contact with live electric wires.

Treatments: Protect yourself by wearing rubber sandals. Wipe your hands dry and then switch off the main current before touching the person. Put the person down gently and send him or her to a hospital or clinic.

Poisoning: This is taking in a harmful substance that is injurious to health.

Treatments: Get the poison out of the body by making the person vomit. Induce vomiting by giving the patient any of the following: palm oil, a strong solution of salt, sugar or vinegar.

Sprain: This refers to swelling of a joint which has been twisted, fallen upon or over-worked.

Treatments: Apply cold water and ice, if available, on the wound to relieve pain of swelling. Bandage the part firmly to prevent movement of joint. Send the patient to a hospital if the pain is severe.

Broken bone (Fracture): This refers to a crack or breaking of a bone.

Treatment: Do not move the patient, but make him comfortable. Do not rub the affected area. Seek help from a nurse or any qualified medical personnel.

Diarrhoea: A person with diarrhoea is losing body fluid and should be given liquid to replace it. Below is a simple method for making salt and sugar solution (oral rehydration).

RECIPE (Diarrhoea remedy solution)

Ingredients: 1 litre clean water
2 tablespoons sugar
$^1/_2$ teaspoon salt
$^1/_2$ cup orange juice or coconut milk

Method:

Mix all the ingredients in a clear bottle and shake to dissolve sugar and salt. Add orange juice or coconut milk where available.

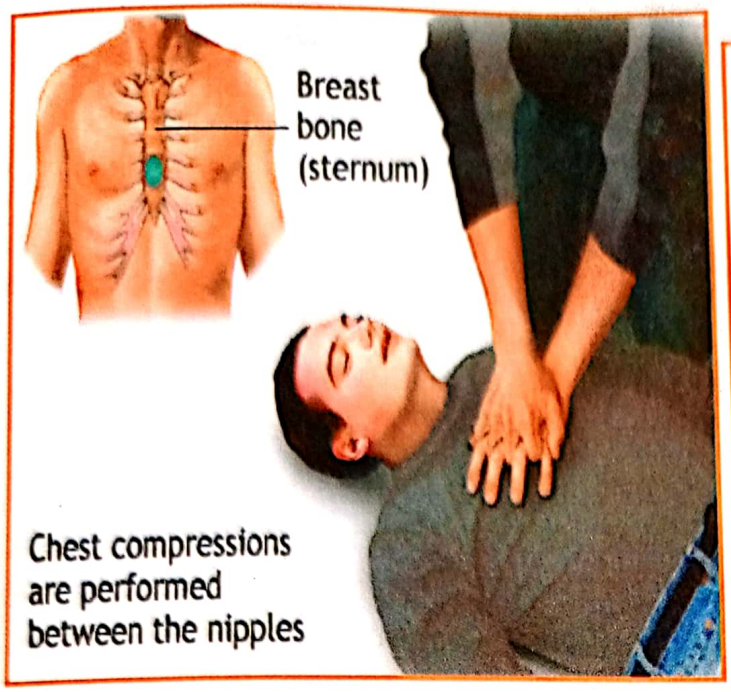
Try as much as possible to give all the liquid to the patient within a day. In extreme cases, see a doctor at once.

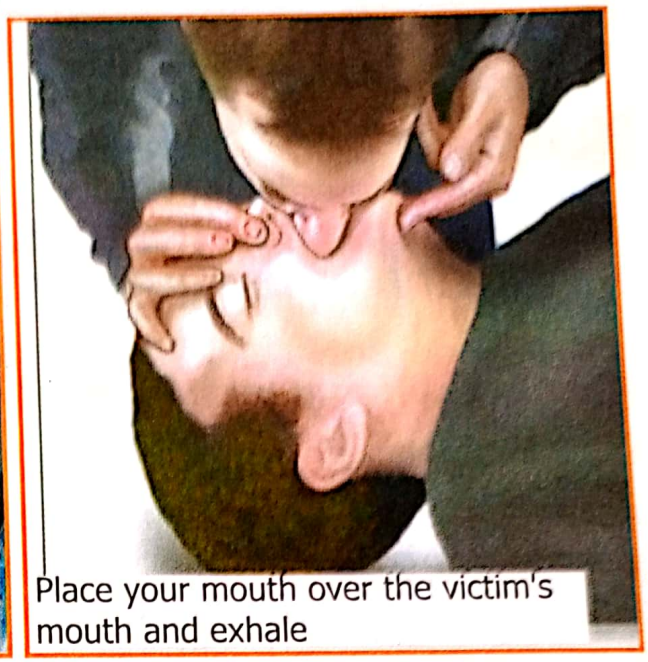
Fall: This results from slippery and wet floors or peels scattered about.

Treatment: Place a cold compress or ice pack on any bumps or bruises.

Suffocation: Suffocation occurs when one is unable to breath due to a blockage in the windpipe.

Treatment: Administer cardiopulmonary resuscitation (CPR) on the person. (CPR is an emergency procedure that can help save a person's life if their breathing or heart stops. When a person's heart stops beating, they are in cardiac arrest)





Applying CPR on a victim

Activity:

1. **NB:** Your teacher will invite a health worker/resource person to demonstrate how to apply first aid, especially CPR.

2. You can watch how to apply CPR and other first aid procedures on the internet:
https://medlineplus.gov/ency/presentations/100219_2.htm

End of lesson assessment

1. What is 'first aid'?
2. List six items that can be found in the first aid box.
3. Explain the following injury terms.
   (i) sprain (ii) fracture
   (iii) scald (iv) cut (v) suffocation

SUB-STRAND 3: ENVIRONMENTAL HEALTH

LESSON 1:

B8.1.3.1.1: DISCUSS THE CAUSAL FACTORS, EFFECTS AND PREVENTION OF DESERTIFICATION AND DEFORESTATION

What is Environmental Health?

Environmental health is a way of protecting quality of life through the prevention and treatment of disease that relates to the natural and built environment that may affect human health and fosters healthy and safe communities. This includes studying the impact of human-made chemicals on wildlife or human health, as well as how the environment influences the spread of diseases. Environmental health constitutes clean water, disease control, sanitation and hygiene.

We learnt about the constituents of environmental health in Basic 7. In this lesson, we are going to talk about the causal factors, the effects and preventive measures of **desertification** and **deforestation**.

DESERTIFICATION

Desertification is a type of land degradation in which a relatively dry land region becomes increasingly arid, typically losing its water bodies as well as vegetation and wildlife. It is caused by a variety of factors such as climate change and human activities. Desertification is a significant global ecological and environmental problem.

Causes of Desertification

1. **Overgrazing:** This refers to allowing animals to graze (feed) an area to the point of destroying vegetational cover. If too many animals are grazing in certain spots, it makes it difficult for the plants to grow back, which makes it lose its former green glory.
2. **Deforestation:** When people are looking to move into an area, where they need trees in order to make houses and do other tasks, then they are contributing to the problems related to desertification.

3. **Farming practices:** Some farmers do not know how to use the land effectively. They may essentially strip the land of everything that it has before moving to another plot of land. By stripping the land of its nutrients, desertification becomes more of a reality for the area that is being used for farming.

4. **Excessive use of fertilizers and pesticide:** The use of excessive amounts of fertilisers and pesticides to maximise crop yield in the short term often leads to significant damages for the soil. In the long run, this may turn from arable into arid land over time, and it will no longer be suitable for farming purpose after a few years of excessive farming since the soil has been damaged too much over time.

5. **Over drafting of groundwater:** Groundwater is the freshwater found underground and also one of the longest water sources. Over drafting is the process in which groundwater is extracted in excess. This can also cause desertification.

6. **Urbanisation** and other types of **Land development:** Development can cause people to destroy and kill plant life. As areas become more urbanized, there is excess demand for land space to settle people and other development on land. When that happens, there are fewer places for plants to grow, thus causing desertification.

7. **Climate change:** Climate change plays a huge role in desertification. As the days get warmer and periods of drought become more frequent, desertification becomes more and more imminent. Unless climate change is slowed down, huge areas of land will become desert and uninhabitable as time goes on.

8. **Natural disaster:** There are some cases where the land gets damaged because of natural disasters such as drought and earthquake. In those cases, there isn't much that people can do except work to try and help rehabilitate the land after it has been damaged by nature.

9. **Overpopulation and excessive consumption:** Since the world's population is continuously growing, the demand for food and material goods is also increasing at an alarming rate. Thus to fulfill our demands, we have to optimize our farming processes to harvest even higher crop yields. However, this excessive demands will hurt the soil and will turn into desertification of land in the long run.

10. **Mining:** Mining is another big reason for desertification. Large amounts of resources have to be extracted by industries to meet our demand for material goods. For mining to be effective and profitable, large areas of land have to be used, which causes deforestation as well as pollution of the nearby areas. By the time most of the natural resources have been extracted and mining practices are no more profitable, the soil gets damaged and the land may not be recoverable and desertification occurs.

Effects of Desertification

1. **Poor farming:** Farming becomes next to impossible if an area becomes a desert, then it's almost impossible to grow substantial crops there without special technologies.
2. **Decrease in crop yields:** Once land turns from arable to arid, it is often no longer suitable for farming purposes. Farmers may lose their livelihood since they can no longer farm to produce sufficient crop yield to improve their standards of living.
3. **Hunger:** Without farms in these areas the food that those farms produce will become much scarcer for the people who live there. Animals go hungry, which will cause even more food shortage.
4. **Flooding:** Without plant life in an area, flooding is a lot more imminent because there is nothing to stop the water from gathering. Flooding can negatively affect the water supply.
5. **Overpopulation:** When areas start to become desert, animals and people will go to other areas where they can actually thrive. This causes crowding and overpopulation and in the long run ends up in continuing the cycle of desertification.
6. **Destruction of habitats:** Desertification often leads to loss of habitats for many animals and plants. It alters the living conditions of the local flora and fauna that makes it impossible for animals and plants to sustain their population.
7. **Migration:** Desertification destroys the livelihood of farmers. This problem becomes worse when large areas of lands that are used for farming will no longer be suitable for farming due to lack of water triggered by global warming. This results in serious migration movement, as people move about in search of greener pastures.

8. **Poverty:** All the above effects of desertification we have talked about can lead to poverty if not checked. Without food and water it becomes harder for people to live, and they take a lot of time to try and get the things they need.

Prevention of Desertification

1. Effecting policy changes related to how people can farm.
2. Educating people on sustainable farming practices.
3. Researching and application of latest technology that can help prevent the issue from becoming an epidemic.
4. Restricting mining practices, e.g. galamsey.
5. Putting together rehabilitation efforts.
6. Reforestation or greening the environment.

DEFORESTATION

Deforestation is the reduction in forest areas across the world. It is caused by both natural and human activities.

Causes of Deforestation

1. Forest or bush fires.
2. Diseases that affect trees.
3. Parasites that attack trees.
4. Infrastructure construction.
5. Agricultural practices.
6. Mining activities.
7. Urbanisation.
8. Uncontrolled felling of trees.

Effects of Deforestation

1. **Loss of habitat:** One of the most dangerous effects of deforestation is the loss of animal and plant species due to their loss of habitat. 70% of land animals and plant species live in forests, therefore a reduction in forest areas has a negative impact on their existence.

2. **Increase in greenhouse gases:** In addition to the loss of habitat, the lack of trees also allows a greater amount of greenhouse gases to be released into the atmosphere.
Healthy forests absorb carbon dioxide from the atmosphere, process it and release oxygen back into the atmosphere which tends to benefit human beings and animals. Deforested areas lose that ability and release more carbon which can become detrimental (harmful and injurious) to humans and animals.

3. **Water in the atmosphere:** Trees also help to control the level of water in the atmosphere by helping to regulate the water cycle. In deforested ares, there is less water in the air to be returned to the soil. This then causes drier soil and the inability to grow crops.

4. **Soil erosion and flooding:** Further effects of deforestation include soil erosion and coastal flooding. Trees help the land to retain water and topsoil, which provides the rich nutrients to sustain additional forest life. Without forests, the soil erodes and washes away, causing farmers to move on and perpertuate the cycle. The barren land which is left behind is then more open (non-resistant) to flooding.

5. **Climate change:** Deforestation also affects the climate in many ways. Forests are the lungs of our planet. Trees take in carbon dioxide and release oxygen and water vapour into the air, and that is why tropical rainforests are extremely humid. Trees also provide shade that keeps the soil moist. All these are compromised with the lack of trees. It leads to the imbalance in the atmospheric temperature, drier climate, higher temperatures and difficult ecology that leads to climate change.

6. **Food insecurity:** With the loss of trees and forest areas, food shortages and famine are more likely to occur because there are not enough fertile lands for farming activities. Crop production becomes low.

Prevention of Defrorestation

1. Government should make regulations to control the idiscriminate felling of trees.
2. Banning the cutting of forests.
3. Reforestation. That is, planting of trees to replace destroyed ones.
4. Reduce consumption of paper and paper products.
5. Educate others about the need to preserve the forest.
6. Avoidance of bush burning.

Group project:

- Using ICT tools and other sources, research the causal factors, effects and preventive measures of desertification and deforestation and develop a folder.
- Present project findings in a report for appraisal.

End of lesson assessment

1. Explain the following terms:
   (i) Desertification
   (ii) Environmental health
2. State and explain three causes of desertification.
3. State and explain three effects of deforestation.

LESSON 2:

B8.1.3.2.1: WASTE MANAGEMENT

Waste management or waste disposal is all the activities and actions required to manage waste from its creation to its final disposal. These include, among other things, collection, transport, treatment and disposal of the waste together with monitoring and regulation.

HOUSEHOLD WASTE

Household or domestic waste refers to waste materials usually generated in the residential or home environment. It is also any solid or liquid material normally generated by the family in a residence in the course of ordinary day to day living. They include paper products, rags, polythene, plastics, leaves and garden trash.

Proper ways of disposing household waste

Proper waste disposal and management can be done by applying the 3Rs **Reduce**, **Reuse** and **Recycle**.

Reducing means lessening the amount of trash or garbage produced.
Reusing refers to using materials more than once.
Recycling means creating new material or product out of trash or garbage.

This refers to both the direct reuse of used products and materials. That is, the recovery of raw materials from waste.

However, apart from the above methods, other ways are:

1. **Incineration:** Incinerating (burning to ashes) waste from households and waste wood that is not suitable for recycling undergoes thermal treatment in waste incineration plants or waste wood furnaces. The heat released in this process is used to generate electricity and heat buildings.

2. **Chemical:** Physical and biological treatments. The objective of both chemical-physical and biological treatment is to enable the removal of pollutants from waste or its safe landfilling. Waste water and polluted excavated materials are typical of the types of waste that are managed in this way.

3. **Landfills:** Residues from waste incineration or waste that are not suitable for material recycling or thermal treatment are deposited in landfills that are compliant with the legal requirements.

4. **Collection and logistics:** This is when the waste management sector collects the waste at source; i.e. industry, commerce and household in suitable transport containers and hand over to waste disposal operations. In the case of hazardous waste, in accordance with *'Ordinance on Movement of Waste'*, the hand over must be documented.

INDUSTRIAL OR WORKSHOP WASTE

Industrial waste is defined as waste generated by manufacturing or industrial processes. The types of industrial wastes generated include cafeteria waste, garbage, dirt and gravel, masonry and concrete scrap metals, trash, oil, weed, grass, trees and lumber.

Ways of Disposing Industrial/Workshop Waste

The most effective methods of industrial waste management are ones that aim to reduce, reuse and recycle when possible and that are guaranteed to cause no harm to the environment.

Below are the best methods of industrial or workshop waste management.

1. **Segregation and recycling:** Much of the waste generated through companies productions, shipping and packaging needs is not reusable or compostable, but it is recyclable.

2. **Use of landfills:** Landfills are one of the most common ways to dispose of waste. When the waste is sent to a landfill, it is confined to a small area, compacted when necessary and then buried in the earth. As the waste decomposes, it releases gases that can be converted to natural gases used for power and fuel.

3. **Composting:** The composting process turns organic waste into fertiliser that can be used to nourish plants. We can compost food waste, leaves, newspaper, very small pieces of cardboard, straw and sawdust. Composting is one of the most effective ways to reuse and recycle waste.

A waste recycling plant

Class project:

Undertake a project on how to recycle waste at home and in school.

End of lesson assessment

Mention and explain three ways/processes of disposing:

a) Household waste

b) Industrial waste

STRAND 2

MATERIALS FOR PRODUCTION

SUB-STRAND 1: COMPLIANT MATERIALS

LESSON 1:

B8.2.1.1.2: DISCUSS THE BASIC CHARACTERISTICS OF COMPLIANT MATERIALS

PROPERTIES OF COMPLIANT MATERIALS THAT MAKE THEM SUITABLE FOR USE

In Basic 7, we learnt what compliant materials are; their types and how they are obtained. In this lesson, we shall learn about the properties of paper and cardboard that make them useable.

PROPERTIES OF MATERIALS

Properties of materials can be classified into two; namely, physical properties and working/mechanical properties.

Physical properties are qualities of the material that can be measured, while working/mechanical properties are the way the material behaves when force is applied to it.

PROPERTIES OF PAPER

Paper is made from wood fibre. Its physical properties include weight, size and thickness, brightness, optical properties (colour, opacity and gloss).

Opacity requires that there be little or no 'show-through' of images from one side of the sheet to the other.

Gloss refers to surface lustre of the paper.

Thicker and heavier sheets turn to be stiff, whereas soft flexible sheets are light and thin.

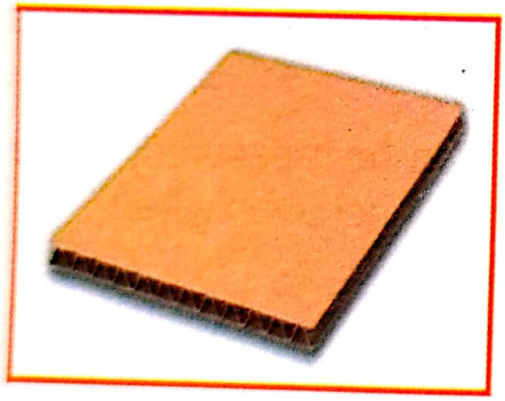
Paper is made up of felted layer of fibre with varying degree of porosity, hence its ability to resist or allow the penetration of fluids.

In certain types of packaging, paper must resist oil and grease penetration. The mechanical/working properties include strength, stiffness, foldable and tearing endurance, moisture absorption and retention, drying and smoothness. Some grades of paper dry very quickly and do not absorb moisture.

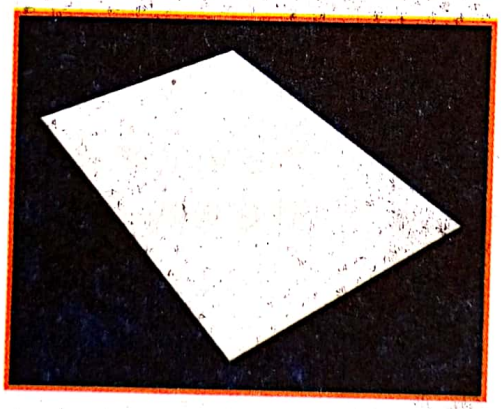
CARDBOARD

Cardboard is similar to paper except for its thickness. The key characteristic of cardboard are its stiffness, smoothness (working proprieties) and thickness (physical property). Cardboard is a durable and sustainable material.

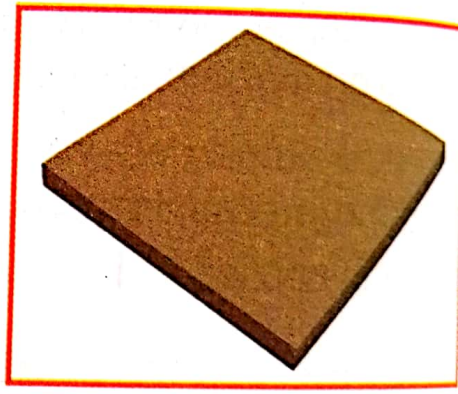
Board	Physical properties	Working properties
Corrugated card	Paper bonded to the outside.	Corrugations make it strong, protective and insulating; used in packaging.
Solid white board	Smooth on both sides.	Stiff, can be cut or scored.



corrugated cardboard



white paper board



paperboard or chipboard

FABRICS OR TEXTILES

Fabric is the cloth or material that is produced after fibres have been woven, knotted or put together in other forms. Textiles and fabrics are inter-related. A textile is a flexible material made by creating interlocking bundles of yarns or threads which are produced by spinning raw fibres into long and twisted lengths.

Textiles are formed by weaving, knitting, crocheting, knotting, tatting, felting and braiding these yarns together. Basically, textile fibres can be classified into two. They are Natural fibre and Man-made fibre.

Natural fibres are the fibres that occur in nature, either from plants or animals.

Examples of these are cotton and linen from plants, wool and silk from animals. They are classified or grouped into plants and animals.

Animal originated textile fibres:

1. Silk — from the secretion of the silkworm
2. Wool — from the fleece of sheep
3. Mohair — from goat
4. Angora — from angora goats or rabbits

Plant or vegetable originated fibres:

1. Sisal — from leaves of the sisal plant
2. Linen — from flax plant
3. Cotton — from cotton plant/boll
4. Jute — from the stem of the jute plant

Man-made or synthetic fibres are produced from vegetables, animals, and mineral sources by using chemicals which change their natural form. The chemical compound from which man-made fibres are produced are known as polymer; a class compound characterised by long chainlike molecules of great size and molecular weight.

There are two main classes:

1. Those produced from cellulose (regenerated); that is, wood pulp or cotton linters as their starting point, e.g. rayon, acetate, tri acetate.
2. Non-cellulose base (synthetic) fibres which have mineral crude oil extracts as their base. They are made from mineral substances such as petroleum and coal, e.g. nylon, polyester, acrylic.

PROPERTIES OF FABRICS OR TEXTILES

Characteristics of Cotton

1. Cotton fabrics are stronger when wet.
2. They can be safely rubbed, squeezed or boiled during washing.
3. Cotton fabrics absorb water easily and are, therefore, cool to wear.
4. They can easily be dyed.
5. Damp cotton can develop mildew when kept for a long time.
6. Cotton fabrics shrink easily.
7. Cotton fabrics are easily destroyed by termites and chemicals, particularly acid.
8. Cotton is easy to wash.
9. It burns easily in flame.
10. It is easy to sew.

Burning Test: Cotton fabrics will burn readily, giving a smell of burning paper, leaving grey or white ash.

Uses of Cotton: Cotton fabrics can be used for personal clothes, underwear, bedsheet, table cloth, etc.

Characteristics of Linen

1. It is stronger than cotton, and durable.
2. Linen can stand high temperature.
3. Linen fabrics wash well.
4. It is absorbent and cool to wear.
5. It burns easily.
6. Linen fabrics dry slowly.

Burning Test: Linen burns readily and gives off a smell of burning paper.

Uses of Linen: Linen is used for making clothing such as suits, dresses, etc.

Characteristics of Silk

1. Silk is expensive but makes luxury fabrics that are very strong, warm, absorbent and springy.
2. Silk is weaker when wet than when dry.
3. It is smooth, shiny and elastic.
4. It can be dyed very easily, using similar dye and processes employed for cotton or wool.
5. It hangs or drapes well.
6. It absorbs moisture easily.

Burning Test: Silk does not burn as easily as cotton. It gives a smell of burning hair or feather when burnt.

Uses of Silk: Silk fabrics are used for dresses, hats, men's ties, umbrellas, scarves and sewing thread.

Characteristics of Wool

1. Materials made from wool are soft, firm and feel warm to the touch.
2. They are elastic and therefore do not crease easily.
3. It is stronger when dry than wet.
4. Woollen fabrics are warm to wear because there is a large number of air spaces between the fibres.
5. It can absorb moisture very well without appearing damp.
6. It can be attacked by moths and bacteria.
7. Woollen fabrics are very heavy when wet.

Burning Test: Wool is not inflammable and will not flare up when put in a flame, but will merely smoulder, and give off a smell of burning feathers or hair.

Uses of Woollen Fabrics: Woollen fabrics can be used for suits, blankets, socks, coats, carpets, sweaters, knitting yarns, etc.

Characteristics of Rayon

1. Rayon is weak when wet.
2. It has silky appearance, feels soft, cool to the touch and is a good conductor of heat.
3. It has a smooth surface which helps it to resist soiling.
4. Weak bleaches like hydrogen peroxide do not weaken the fibre.
5. Shrinkage may occur on washing.
6. Rayon can be damaged by mildew if left in damp conditions, but is not attacked by moths.
7. It is absorbent and comfortable to wear or use.
8. It dyes and finishes easily.

Burning Test: Rayon burns well and leaves a small residue of grey or white ash. It has a smell of burning paper.

Uses of Rayon: Rayon is also used for industrial purposes to make tyres, driving belts and conveyor belts.

Characteristics of Acetate

1. Acetate is very soft, silk-like with a rich soft appearance.
2. It is fairly absorbent and fairly cool to wear.
3. It neither shrinks nor stretches when washed.
4. Strong heat destroys acetate fabrics just as in the case of rayon.
5. It burns readily so it must not be worn near fire.
6. It is easily destroyed by chemicals and also cannot stand hard rubbing when washing.
7. It loses strength when wet.
8. It does not soil easily.
9. It dries quickly.

Burning Test: Acetate burns quickly and gives off acid fumes which smell like vinegar. The fabric tends to melt, leaving a residue that is hard, black and bead-like.

Uses of Acetate: It can be used for curtains, shirts, umbrellas, sports wear, lining fabrics, etc.

Characteristics of Nylon

1. Nylon is an extremely strong, tough fibre.
2. It has a smooth surface and does not absorb dirt or moisture easily.
3. White nylon may become grey and yellow with age.
4. It does not burn easily and so is suitable for use as nightwear.
5. It can be drip-dried and requires little or no ironing.
6. Nylon does not absorb moisture, therefore it is not entirely suitable for underwear, unless as a cellular fabric.
7. It is durable.
8. It is resistant to mildew and moth.
9. It is easy to wash, and dries quickly.
10. Nylon is sensitive to heat.

Burning Test: Nylon is not inflammable. It melts and shrinks away from the flame when heated strongly. Its fumes smell like boiling celery.

Uses of Nylon: Nylon is used for clothing, night wear, carpets, curtains, ribbons, umbrellas, ropes, etc.

Characteristics of Polyester

1. Polyesters are very strong fabrics
2. They are normally warm to wear.
3. They are easy to wash and dry quickly.
4. Polyesters do not take up dyes easily.
5. They are low in absorption.
6. They do not stretch very much.
7. Polyesters have strong wrinkle resistance.
8. They hold oil stains.

Burning Test: Polyesters shrink from flame. They melt similarly to nylon when burnt, but give off a different aromatic smell.

Uses of Polyester: Polyesters are used for dresses, curtains, bed sheets, pillow cases, etc.

Note: Polyesters are often used to add strength to cotton or wool in fabric construction.

CLASS TASK

Activity Instruction:

1. Copy and complete the table below by ticking strong or not strong each of the paper objects in the left column.

Paper	Strong	Not strong
Chalk box		
Writing paper		
Tissue		
Carrier bag		
Toilet paper		
Cardboard		
Paper cup		
Wrapping paper		

2. Define the following properties of paper:
   i) opacity
   ii) gloss

HOME WORK

Copy and complete the table below.

Fabric	Five characteristics	Burning test	Uses
Linen			
Rayon			
Cotton			
Wool			
Nylon			
Polyester			
Silk			

SUB-STRAND 2: RESISTANT MATERIALS

LESSON 1:

B8.2.2.1.1: EXPLAIN THE BASIC PROPERTIES OF RESISTANT MATERIALS

PHYSICAL PROPERTIES OF RESISTANT MATERIALS

A designer's choice of material in manufacturing an artefact is largely informed by the physical and working/mechanical properties of the material. Let's take a look at some of these properties.

PHYSICAL PROPERTIES OF METALS

The physical properties of a material are the properties that can be measured or observed without changing the composition of the material. Below are examples of these properties.

- **Density:** How solid a material is. This is measured by dividing mass (grams) by volume (cm^3), e.g. lead is a dense material.
- **Fusibility:** The ability of a material to be converted through heat into a liquid state and combined with another material before cooling as one material. e.g. lead and tin are fused to obtain solder.
- **Electrical conductivity:** The ability to conduct electricity, e.g. copper is a good conductor of electricity.
- **Thermal conductivity:** The ability to conduct heat, e.g. steel is a good heat conductor, whereas timber is not.
- **Melting point:** The temperature at which a material melts. E.g. copper melts at 1080^0C to 1085^0C.
- **Corrosion resistance:** The ability of the material not to deteriorate. e.g. copper has a high corrosion resistance.

WORKING/MECHANICAL PROPERTIES OF METALS

Mechanical properties of a material are the reactions of the material when force is applied to it. Below are examples.

- **Strength:** The ability of a material to withstand force such as pressure, tension or shear without breaking. e.g. odum.
- **Hardness:** The ability to resist abrasive wear and penetration through impact. e.g. bricks.
- **Toughness:** Materials that are hard to break, are tough and can absorb shock, e.g. cast iron is a very tough material.
- **Malleability:** Being able to bend or shape easily by hammering, rolling or pressing to shape, e.g. sheet metal such as steel or silver is malleable.
- **Ductility:** Materials that can be stretched or pulled are ductile. e.g. pulling copper into wire shows it is ductile.
- **Elasticity:** The ability to be stretched and then return to its original shape, e.g. steel.

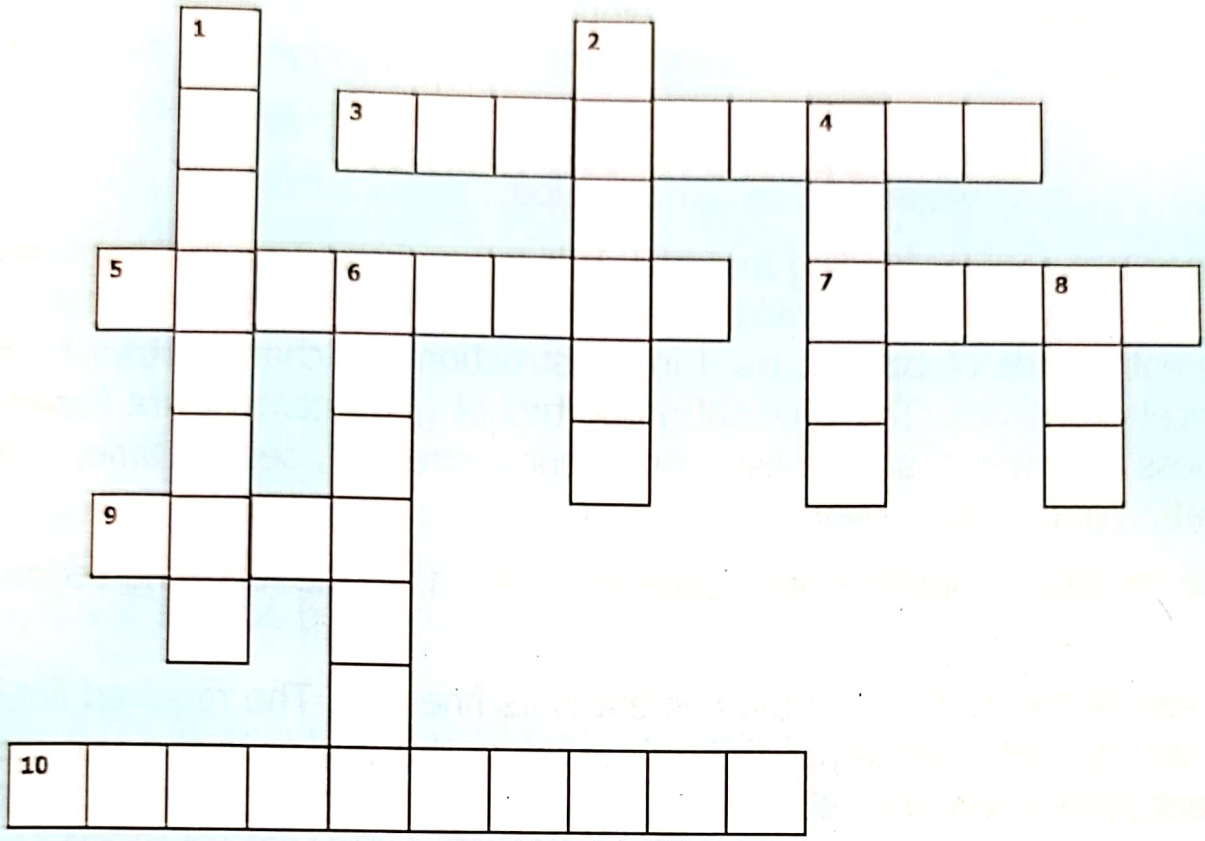
CLASS TASK

1. Describe the properties of the following materials in a table form: metal, plastic, rubber, wood, glass and stone.
2. Answer the questions in the columns.

Properties / Material	Is it flexible? (will it bend)	Is it magnetic?	Is it impermeable? (waterproof?)	Is it transparent? (see through)
Wood				
Paper				
Plastic				
Metal				
Glass				
Stone				

HOME WORK

Complete the crossword



Across

3. Able to be beaten or hammered into shape.
5. Carries heat or electricity.
7. Two or more metals mixed together.
9. Reddish-brown layer formed when iron combines with air and water.
10. Characteristics of matter and material.

Down

1. Stainless steel is an alloy of iron, carbon and .....
2. A metal coated by another metal.
4. Alloy of copper and zinc.
6. Able to be drawn into wires.
8. A type of rock that contains minerals and metals.

LESSON 2:

B8.2.2.1.2: DESCRIBE THE PROPERTIES OF BUILDING MATERIALS

A material is considered for building only when it has the required engineering properties suitable for construction works. It is therefore beneficial to study these properties as the quality of a building will be judged on the materials used.

PROPERTIES OF CEMENT

Cement is a popular binding material. It is a very important civil engineering material. It is therefore necessary to study the properties of cement. Different blends of cement used in construction are characterized by their physical properties. The physical properties of good cement are based on fineness of cement, soundness, consistency, strength, setting time, heat of hydration and bulk density.

These physical properties are discussed in details in the following segment:

Fineness of Cement

The size of the particles of the cement is its fineness. The required fineness of good cement is achieved through grinding the clinker in the last step of cement production process.

Soundness of Cement

Soundness refers to the ability of cement to not shrink upon hardening. Good quality cement retains its volume after setting without delayed expansion, which is caused by excessive free lime and magnesia.

Consistency of Cement

The ability of cement paste to flow is consistency.

Strength of Cement

Three types of strength of cement are measured – compressive, tensile and flexural. Various factors affect the strength, such as water-cement ratio, cement-fine aggregate ratio, curing conditions, size and shape of a specimen, the manner of molding and mixing, loading conditions and age.

Cement gains strength over time.

Setting Time of Cement

Cement sets and hardens when water is added. This setting time can vary depending on multiple factors, such as fineness of cement, cement-water ratio, chemical content, and mixtures. Cement used in construction should have an initial setting time that is not too low and a final setting time not too high.

Hence, two setting times are measured:

Initial set: When the paste begins to stiffen noticeably (typically occurs within 30 - 45 minutes).

Final set: When the cement hardens, being able to sustain some load (occurs below 10 hours).

Heat of Hydration

When water is added to cement, the reaction that takes place is called hydration. Hydration generates heat, which can affect the quality of the cement and also be beneficial in maintaining curing temperature during cold weather.

HOW TO DETERMINE THE QUALITY OF YOUR CEMENT

i. The colour of cement should be uniformly grey with greenish shade.

ii. It should feel smooth when touched or rubbed in-between fingers.

iii. If hand is inserted in a bag of cement or in a heap of cement, it should feel cool and not warm.

iv. It should be free from any hard lumps.

v. It must be easily workable.

vi. It must possess a good plasticity.

vii. It stiffens or hardens early.

viii. A thin paste of cement with water should feel sticky between the fingers.

ix. A cement thrown in water should sink and should not float on the surface.

PROPERTIES OF SAND

Sand is a naturally occurring inorganic substance made up of granulated rocks. Considered as one of the prerequisites for the development of infrastructures, it is of high importance in construction.

Requirements of quality sand

Sand should be clean and free from any particles.
The sand used should be a well-graded mixture from coarser to fine grains.
For plastering purposes, the fine sand used must be smooth.
For brickwork, fine sand used must be medium.
Concreting works require coarse sand.

TYPES OF SAND AND CLASSIFICATION OF SAND

1. Based on the grain size of the particle, sand is classified as *Fine Sand* (0.075 to 0.425mm), *Medium Sand* (0.425 to 2mm), and *Coarse Sand* (2.0mm to 4.75mm).
2. Based on origin, sand is classified as Pit sand, River sand, Sea sand, and Manufactured sand.

Below are the widely used types of sand:

Pit Sand:

This is a type of coarse sand that is commonly found in red-orange colour. It is secured from deep pits dug 1 to 2 meters from below the topsoil.

The grain of pit sand is rough, angular, sharp and harsh. It is free from salts and other impurities. It is suitable for concreting.

River Sand:

River sand is a type of fine sand formed by the corrosion from water current and is obtained from the banks of rivers and streams. It is generally white-grey. Unlike pit sand, the grain of river sand is smooth, rounded and of fine quality. Hence, it is suitable for plastering.

Sea Sand:

Sea sand (also known as offshore sand) refers to the sand eroded by seawater. It is secured from seashores and has a distinct brown colour.

The grain of sea sand is very fine in quality with a circular shape. Sea sand contains salt and other marine impurities which tend to absorb atmospheric moistness and bring forth dampness.

Therefore it is not suitable for concrete structure and engineering works.

Manufactured Sand:

Created by crushing hard granite stones, manufactured sand refers to an artificially created type of sand made as an alternative to river sand for construction.

It is prepared with the required gradation of fineness, shape, surface smoothness, texture, and consistency; making it the best sand suitable for construction while providing with greater strength to the concrete by reducing segregation during placing.

PROPERTIES OF STONE

The following properties of stones should be looked into before selecting them for engineering works: structure, density, appearance, strength, hardness, porosity and absorption, weathering, toughness and seasoning.

Structure

The structure of the stone may be stratified (layered) or unstratified. Structured stones should be easily dressed and suitable for super-structure.

Unstratified stones are hard and difficult to dress. They are preferred for the foundation works.

Density

Denser stones are stronger. Light-weight stones are weak.

Appearance

A stone with uniform and attractive colour is durable if grains are compact. Marble and granite get a very good appearance, when polished. Hence they are used for face works in buildings.

Strength

Strength is an important property to be looked into before selecting stone as a building block.

The stone should be able to resist the load coming on it. Ordinarily this is not of primary concern since all stones are having good strength.

Hardness

It is an important property to be considered when a stone is used for flooring and pavement.

The stone used should be able to resist abrasive forces caused by the movement of people and materials over them.

Porosity and Absorption

All stones have pores and hence absorb water. The reaction of water with a material of stone causes it to crumble.

Weathering

Rain and wind cause loss of the good appearance of stones.
Therefore stones with good weather resistance should be used for face works.

Toughness

The resistance to impact or force is known as toughness. Building stones should be tough enough to sustain stresses developed due to vibrations.

The vibrations may be due to the machinery mounted over them or due to the loads moving over them.

Seasoning

The stones obtained from the quarry contain moisture in the pores.
The strength of the stone improves if this moisture is removed before using the stone.

The process of removing moisture from pores is called seasoning. The best way of seasoning is to allow it to dry in the sun for 6 to 12 months.

Durability

Stones selected should be capable of resisting adverse effects of natural forces like wind, rain, and heat.

Home Task

Activity Instruction: Circle the words listed beneath the word hunt.

BUILDING MATERIALS AND DESIGN

O	T	I	E	Q	G	C	R	C	H	A	L	K	I	H	F	Y
T	M	N	W	T	R	E	G	S	T	A	B	I	L	I	T	Y
Q	O	S	O	R	A	M	S	T	R	U	C	T	U	R	E	H
K	S	T	O	I	V	E	R	S	H	C	C	Q	F	X	N	B
W	T	R	D	A	I	N	Y	J	W	M	W	H	L	S	C	O
T	R	O	L	N	T	T	Y	K	A	U	S	M	E	W	X	V
O	U	N	J	G	Y	R	X	Q	T	P	Q	B	X	A	P	S
H	T	G	S	L	N	O	F	O	E	L	B	U	I	D	A	T
P	B	I	K	E	P	K	H	P	R	N	U	K	B	U	P	E
N	M	H	U	F	U	W	R	T	N	I	I	N	L	R	E	E
K	F	M	L	K	G	S	Y	K	O	V	L	C	E	A	R	L
J	K	L	B	R	I	D	G	E	W	N	D	P	V	B	K	N
U	N	O	S	T	O	N	E	L	U	C	I	M	G	L	T	J
I	H	A	F	T	R	U	S	S	Y	L	N	P	J	E	C	E
G	E	D	Y	X	B	Z	T	G	K	A	G	C	P	G	H	I
Y	X	P	Q	A	Q	W	K	S	C	Y	S	C	C	A	A	G
W	W	R	U	F	W	X	D	M	B	P	Z	D	L	K	D	B

bridge
building
cement
chalk
clay
durable
flexible
load
stability
steel
stone
strong
structure
wood

SUB-STRAND 3: SMART AND MODERN MATERIALS

LESSON 1:

B8.2.3.1.1: DISCUSS SMART AND MODERN MATERIALS

USES OF SMART AND MODERN MATERIALS IN INDUSTRIES

In Basic 7, we learnt about what smart and modern materials are. We als learned that factors such as temperature and light affects the properties smart and modern materials.

In this lesson, we shall be learning about the uses of smart and moder materials in various industries. The industries to be looked at are foo industry, textile industry, electricals/electronics industry, healthcare industr and the building industry.

FOOD INDUSTRY

Many natural food ingredients are smart. They are smart because the respond to heat and light and some changes are reversible. Such workin features are frequently used in food technology.

Modified starches: Modified food starch, also called starch derivatives is made from corn, waxy maize and potatoes. They do not contain gluten. Modified starches respond to differences in temperatures. For example, they swell (thicken) in hot water or when heated, but return to flow when cool This working characteristic is used in pizza toppings. The topping thickens when heated in the oven and so does not run off the base, but on slight cooling the topping is runny (flows) again for eating.

Examples of modern food materials include genetically modified foods, anti-oxidants, modified enzymes and probiotic drinks/yoghurts.

- Oxidised starches produce tough, clear films that make products like fish coatings and French fries crispier.
- They are also added to some breakfast cereals so they stay crisp after you add the milk.

- Re-dried starches have less moisture than ordinary ones and are used to dust sweet moulds to stop the sweets sticking.
- Modified starches are also used in many low fat products. They improve the melting and stretching of imitation mozzarella cheese and also its flavour.

The most common types of modified food starch are made from ingredients like corn, wheat, potato, and tapioca.

Other modified starches are used as thickeners in sauces, soups, gravies, puddings, fillings for pies or tarts, and salad dressings, as well as to make noodles and pastas. Food starches are modified to make them easier to use in certain recipes, e.g. pizza toppings (*Modified starch helps them to thicken when heated and stick to the top of the pizza as toppings*).

modified starch

pizza with toppings

TEXTILE INDUSTRY

Sanitised fabrics: Fibre and fabric technological developments have created a whole range of smart and modern textiles which can be used in many applications. These textiles have been used in functional sportwear, medical and safety wear and fashion clothing.

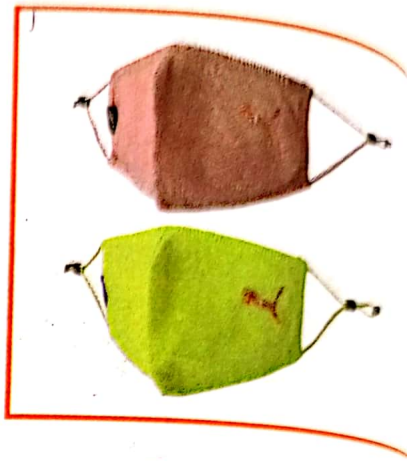
Fabrics can be enclosed with substances required by the body or antiseptics. Allergy control fabrics can be used in bedding for people with breathing problems caused by dust mites.

Other smart textiles include sanitised fabrics for sportwear and socks which have anti-microbial protection. Anti-bacterial and anti-fungal fabrics have been used in clothing, linen, towels and carpets.

Many synthetic fibres now have moisture management properties. Moreover because micro-organisms and bacteria are present in every home, the textile industry has anti-bacterial or sanitised fabrics that can protect the environment and our well-being.
Below are examples of artefacts made from sanitised fabrics.

socks

crepe bandage



nose masks

HEALTHCARE INDUSTRY

An organic light-emitting diode (OLED or organic LED), also known as organic electroluminescent (organic EL) diode, is a light-emitting diode (LED) in which the emissive electroluminescent layer is a film of organic compound that emits light in response to an electric current. OLEDs are used to create digital displays in devices such gun thermometers, television screens (LCDs), computer monitors, and portable systems such as smartphones.

gun thermometer

Activity:

Use ICT tools to search for, and make a list of products from various workplaces (Food industry, Textile industry, Healthcare industry) made of Smart and Modern Materials. Look for properties in the materials that make them useful or suitable for the identified products.

ELECTRICALS/ELECTRONICS/AUTOMOBILE INDUSTRY

Piezoelectric materials can convert mechanical energy into electrical energy and vice versa. For example, they change their shape in response to an electrical impulse or produce an electrical charge in response to an applied mechanical stress.

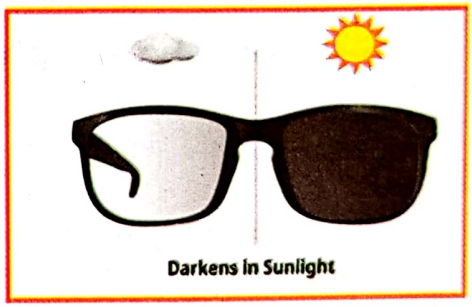
A piezoelectric material can generate electricity when pressure is mounted. Common applications are microphones, quartz crystals, alarm systems and keypad sensors.

Electroluminescent materials

Electroluminescents emit light when they are fed with electrical impulses, fluorescents reflect light with greater intensity and phosphorescents are able to emit light after the initial source has ceased.

Photochromic pigments change their properties when exposed to ultraviolet (UV) light.

An example is photochromic glasses where the lenses are clear when worn inside a building, but become more like dark sunglasses when exposed to bright sunlight outside.



Photochromic lens

Reactive glass is a material that changes from transparent to opaque by passing current through an electrochromic material built into the glass. Some applications are privacy glass and auto-dimming rear view mirrors in vehicles that help prevent the driver from being dazzled by bright lights of vehicles behind.

Intelligent building materials, also known as active substances, smart materials and future materials, are those that have the ability to respond to conditions in their environment. They are used in civil engineering projects and contribute to increasing performance, comfort and energy efficiency in the facility and make the modern world think about how to turn the urban world into an environmentally friendly place to live.

Photochromic pigments change when ultraviolet (UV) light falls on them. This technology is used in windows to prevent rooms from getting too hot in warm weather.

No direct sunlight ***Direct sunlight***

Class Task

1. Tick true or false for each statement.

	True	False
Photochromatic dyes change colour in response to UV light/sunlight.		
Thermochromic dyes change colour in response to W light/sunlight.		
Biometrics identify an individual from a physical characteristic.		

SMART AND MODERN MATERIALS

Word hunt: Circle the smart materials.

P H O T O C H R O M I C T I D V F
C I X I K M A I E H B Y C H U D Y
I S K E G O L R M T 3 3 P P M M O
M F F O 0 R K U B Y U R F E X U L
O Y A L C E G G H O O D L V O I L
R U C I V S R K R M N B Y A L N A
H U H L H A N X Y F I F D V S A Y
C T A K P U R L P X T F I F C T R
O R R H T E O Y E X U V F B K I O
M N E F R P P L H 0 S C G C R T M
R N M X V K F 3 A H T 3 3 I G E E
E O U X T C L R A Y 0 O H M R I M
H E R I 0 I G T 0 3 D Y M F K Y E
T H O K P C N O F U 3 N X X R E P
U P T F I B R E O P T I C S Y T A
S H Y D R O C H R O M I C V P M H
A 3 X M U 0 M E F C L P X D L S S

Carbon fibre
Kevler
Flexible MDF
Titanium
Fibre optics
Graphene
Shape
Memory
Alloy
D30
Polymorph
Hydrochromic
Photochromic
Thermochromic

SUB-STRAND 4: FOOD COMMODITIES (ANIMAL AND PLANT SOURCES)

B8.2.4.1.1: EXPLORE THE FUNCTIONS OF FOOD TO THE BODY

In Basic 7 we learnt about the sources of food commodities, classes ar reasons for eating food. In this unit, we will learn about the food commoditi and their functions in the body.

FOOD

We learnt that "Food is anything solid or liquid which when taken into t body provides heat and energy, promotes growth, protects and regulat body processes". Food can also be described as anything we eat or dri which contains substances essential for the proper functioning of the bo Food has always been recognised as the basis of life and as human being we eat to live.

Foods exist in two forms: liquid and solid.
Liquid foods include: milk, beverages, soups, fruit drinks, etc.
Solid foods include: rice, yam, bread, meat, etc.

Food is obtained from two main sources: plants and animals.
Foods that begin to spoil quickly, immediately after they are produced, are termed as perishable foods, e.g. meat, milk, fish, tomatoes.
Foods that keep long before beginning to spoil are termed as non-perishable foods, e.g. sugar, flour, dried legumes.

CHARACTERISTICS OF FOOD

All foods have certain characteristics. These characteristics are used to judg foods in terms of appearance and palatability. They include:

1. Taste (Food can taste sweet, bitter, sour and salty)
2. Colour
3. Flavour
4. Texture
5. Consistency

THE SIX FOOD GROUPS

The foods we eat are put into six groups according to their sources and functions.

1. **Animal foods and products:** This group of foods is obtained from animals. They are the richest source of protein which promotes growth in the body and also repairs worn-out tissues. Some vitamins and mineral elements are also found in animal products, e.g. meat, milk, cheese, egg, fish.
2. **Vegetable Protein Foods (legumes and oily seeds):** This group is also known as pulses. They contain proteins (low quality), minerals and vitamins. Vegetarians eat a lot of vegetable protein foods in place of animal foods, e.g. beans, peas, melon seeds, groundnuts, werewere.
3. **Fruits and Vegetables:** This group is obtained from parts of plants grown for food. They protect the body against diseases, e.g. orange, okro, tomatoes, pawpaw, mango.
4. **Cereals and Grains:** They are the edible seeds obtained from plants of the grass family, e.g. rice, wheat, corn, millet.
5. **Starchy Roots and Plantain:** These food groups are mainly carbohydrates. They provide the body with energy, e.g. yam, cassava, plantain, potatoes.
6. **Fats and oils:** This group is obtained from both vegetables (e.g. oil palm, groundnut, coconut) and animals (e.g. pig, sheep, cow). They are commonly known as lipids. The difference between fats and oils is that fats exist in solid form at room temperature, whilst oils are liquid at room temperature.

N.B: When you select foods from all the food groups to prepare a meal, you obtain a **balanced meal.**

FUNCTIONS OF FOOD

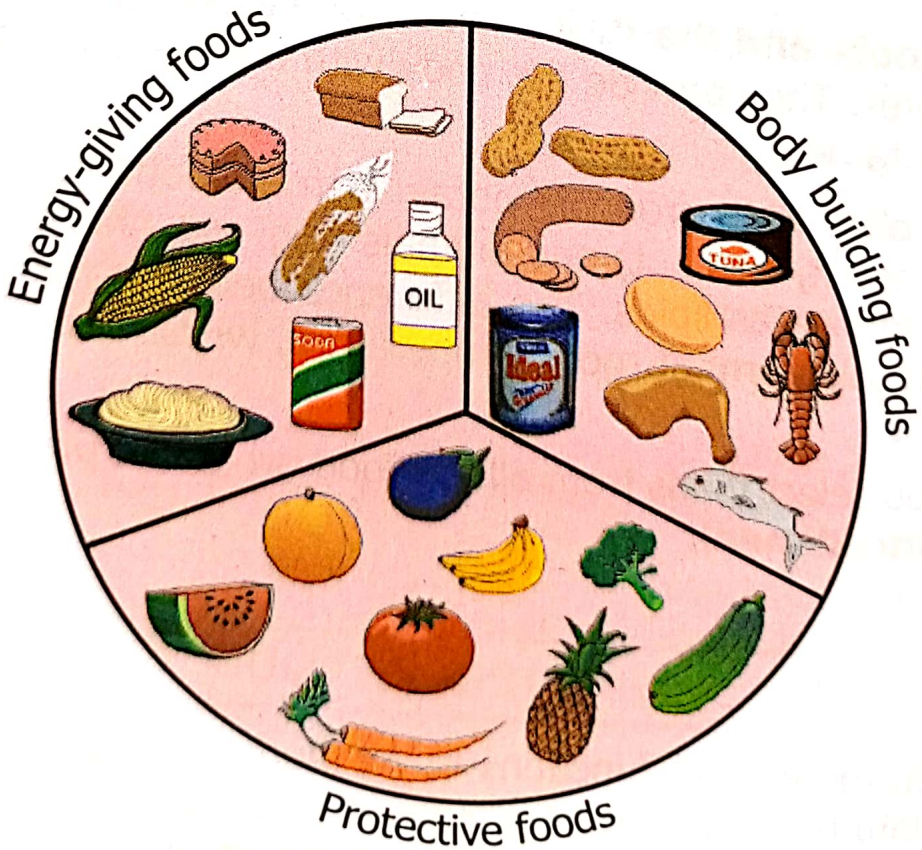
Foods perform three basic functions in the human body. Foods can further be classified into three functional groups, according to their functions in the body. These are: body-building and repair foods, energy-giving foods and protective foods.

An item can only be classified as food if it performs at least one of these functions.

1. **Body-building and repair foods**. These are foods that we normally g from animals and their products as well as plant protein such as bean mushroom and oily seeds. The body uses them for building body tissu and developing firmer muscles. Examples are beef, chicken, game, eg crab, cheese, all types of beans, mushroom, werewere, groundnuts a melon seeds (agushie).

2. **Energy-giving foods**. This group of foods gives the body heat a energy materials that enable it to move about and work. They also ke vital organs in the body such as the lungs, heart, liver and kidney worki when we are at rest or sleeping. Examples are foods we get from cere and grains, yam, plantain and fats and oils. After eating any of the foods, the body gets heat and energy to do all types of work.

3. **Protective foods**. These foods protect the body against diseases a are supplied by foods that are rich in vitamins and minerals mostly fou in fruits and vegetables of all kinds. Examples are: pawpaw, pineapp garden egg, tomato, carrot, spinach, orange, kontomire, lettuce.



The three functional food groups

The six food groups can further be classified as follows:

A. **Body building:** Animal foods and products, vegetable protein foods.
B. **Protective:** Fruits and vegetables.
C. **Energy-giving cereals and grains:** Fats and oils, starchy roots and plantain.

Activity:

1. In groups, discuss perishable and non-perishable foods.
2. Draw a chart to show the three functional food groups with examples of many food commodities in each group, and display in class for appraisal.
3. Research on the internet about the functions of food to the body. Type and print or write down your notes and print for a presentation in class.

End of lesson assessment

1. State the main functions of food in the body.
2. What are perishable foods? Give three examples.
3. List the six food groups, with five examples of food in each group.
4. Classify the six food groups listed in question 3 under the functional groups.

STRAND 3

TOOLS, EQUIPMENT AND PROCESSES

SUB-STRAND 1: MEASURING AND MARKING OUT

LESSON 1:

B8.3.1.1.1: IDENTIFY TOOLS AND EQUIPMENT FOR MEASURING AND MARKING OUT

MEASURING AND MARKING PROCESS

In Basic 7, we learnt about the tools used in measuring and marking. In this lesson, we shall learn about the processes a craftsperson goes through in measuring and marking out artefacts during the manufacturing process. Some of the workplaces where such processes go on are food laboratory (kitchen), sewing workshop/laboratory, building site, metal/plastic workshop, wood workshop.

Measurement is defined as the act of measuring, or the size of something, or the act of assigning numbers with physical quantities.

Without the ability to measure, it would be difficult for a craftsman to manufacture an artefact. Measurement is essential in engineering, construction, manufacturing, and numerous other occupations and activities.

Measurement ensures precision and standardization in engineering.

Marking out or layout means the process of transferring a drawing, design or pattern to a workpiece as the first step in the manufacturing process.

We shall discuss the measuring and marking out processes employed in the manufacturing of basic artefacts in the following fields: food laboratory (kitchen), sewing workshop, building site, wood workshop and metal/plastic workshop.

FOOD LABORATORY (KITCHEN) MEASURING AND MARKING OUT TOOLS

Cooking is the best when it is enjoyable, and for it to be enjoyable we need to be creative and spontaneous. Again cooking consumes much of our time. This is why using the appropriate kitchen gadgets can help finish the cooking activity correctly and swiftly.

Processes/Procedures a craftsperson uses in measuring and marking out

There are many types of measuring and marking out tools available to ease the cooking process so that you can receive a standing ovation.

In Basic 7, you learnt about identification and classification of measuring and marking out tools. In this unit, we are going to learn about the procedure for using measuring and marking out tools for products or food items.

Measuring ingredients for recipes is the most fundamental cooking basic to master as a cook. The golden rule of measuring is simply this: Use dry measuring cups for dry ingredients and liquid measuring cups for liquid ingredients.

Processes of Measuring Dry Ingredients

- To measure dry ingredients, be sure you are using graduated dry measuring cups, or measuring spoons for smaller amounts.
- Before measuring dry ingredients such as flour, corn meal, oats, rice or sugar, stir it in its container.
- Use a large spoon to fill the measuring cup without shaking or packing.
- Use a straight edge to level off the excess into a bowl or back into its container.

Ingredients that are not dry but also not liquids should be spooned in and levelled off.

Processes of Measuring Liquid Ingredients

To measure food products like milk, water, oil, broth, and others:

- Pour the liquid into a liquid measuring cup (those clear cups with markings on the side) on a level surface.
- Bend down so your eye is level with the markings on the cup and add or remove liquid.
  The bottom of the meniscus (curved surface) is the amount you need.

- To measure small amounts of liquids, use your measuring spoon.
- Fill the appropriate size spoon to the rim without letting liquid spill over.

measuring cup

measuring spoons

Processes of Measuring Sticky Ingredients

We usually struggle when measuring peanut butter, honey, molasses, syrup and other sticky ingredients because they won't come out of the measuring cup or spoon. Before measuring such ingredients all you need to do is spray your measuring cup or spoon with non-stick cooking spray. When you pour the ingredient will slip right out, or come out very easily with the assistance of a rubber scraper.

Note: Measuring cups are not ideal for measuring pasta or rice, it is best to use a kitchen scale.

Processes of Measuring and Marking out at the Sewing Workshop

Marking out refers to the process of measuring and marking lines on the surface of material that will be used for constructing a garment. The marking out tools are used to indicate:

1. Cutting line
2. Folding line
3. Hole position

Usually, tools that are used for measuring and marking out at the sewing workshop are yard stick, tape measure, clear ruler and tailor's chalk.

The tape measure, as was discussed in Basic 7, is used primarily for taking body measurement, as well as drafting patterns, measuring fabric, checking size of hems and many others.

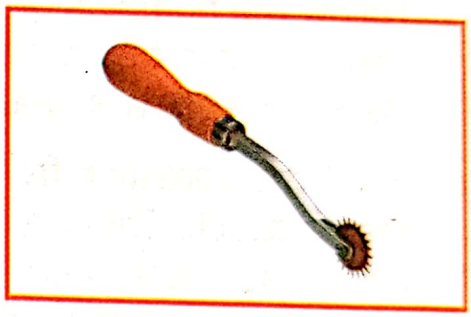
The two main measuring systems are the:

1. Imperial system of measurements where things are measured in yards, feet and inches. The markings on it are applied with the main divisions with an interval of 1inch and intermediate – $^1/_8$ or $^1/_{16}$ inches.
2. Metric system of measurements which uses metres, centimetres and millimetres. The markings on it are applied with the main division with an interval of 1cm and intermediate - 1mm. A centimetre is divided into 10 equal parts (10 millimetres) and one can express fraction with decimal point (e.g. 2.3cm = 2cm 3mm or 23mm).

Choose a tape measure that has the scale beginning directly from edge of the tape. This is from the zero line. Be sure to check the accuracy of the scale on the tape measure when measuring.

Tracing Wheel

A tracing wheel, also known as a pattern wheel, pounce wheel and dart wheel is an instrument with multiple teeth on a wheel attached to a handle. The teeth can be either serrated or smooth. It is used to transfer markings such as pleats, darts, buttonholes, notches or pockets onto fabric without the use of tracing paper.



tracing wheel

Process of using a tracing wheel

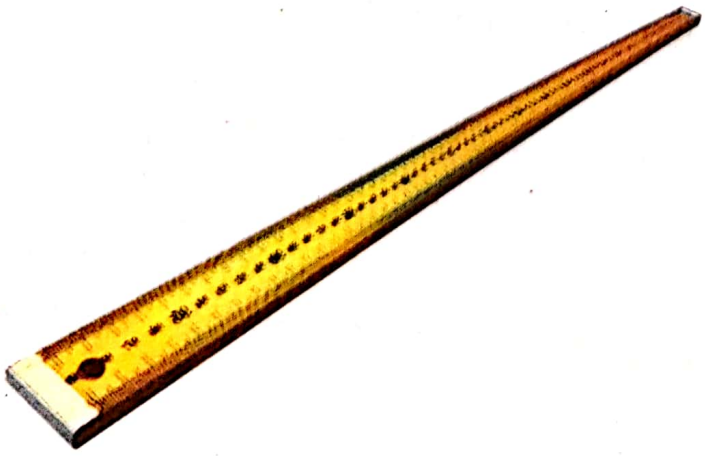
1. Place your fabric on a mat. It will prevent you from scratching the work surface when rolling.
2. Place the pattern piece on your fabric, making sure the grain line is properly aligned. Hold the pattern pieces in place with pins placed inside the pattern piece.
3. Roll the tracing wheel along the pattern pieces, following the line for your size.
4. Trace the pattern markings, like notches and darts. You may have to move the pins around to get to any markings that go into the centre of the pattern pieces.
5. Remove the pattern pieces, pins and carbon paper. You should have a nice outline of your pattern pieces right on the fabric.

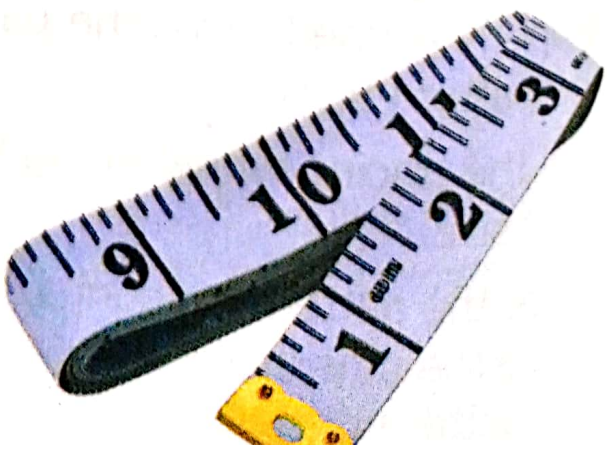
In conclusion, using tracing wheel makes the process of transferring pattern markings much easier and helps to ensure that all the marks exactly where they should.

The Yardstick

Many times, a yardstick makes a better tape measure or marking out devi than a 12-inch ruler. The advantage of yardstick is that they are made out two substances, wood or metal. When using the yardstick for measuring marking out, the process is as follows:

1. Examine your yardstick. Depending on how it has been manufacture make sure you are using the yardstick that has the measurements th relate to the degree of accuracy you require.
2. Place the end of the yardstick at the location that will be your startin point. This is the beginning of the measurement and will start at zero.
3. Follow the numbers on the yardstick to the point where you are going t end. This can be on a solid inch or it can be on an inch with a fraction. Mark this spot with your marking device.
4. Read the yardstick from the bottom starting at zero. This is the end the yardstick. The first whole number you will see is 1. Locate where yo have made your mark on the surface you are measuring and determin where it falls. Start with the whole number closest to but less than th distance you measure. For example, start with 5 if your measuremen falls between 5 and 6 inches. Then, determine the fractions of the inc remaining. The largest line in this series is in the middle and is the $^1/_2$ inc mark. Between $^1/_2$ inch mark and the $^1/_4$ inch marks, are the slightly shorte lines for $^1/_8$ inch and the shortest lines denoting $^1/_{16}$ inch.

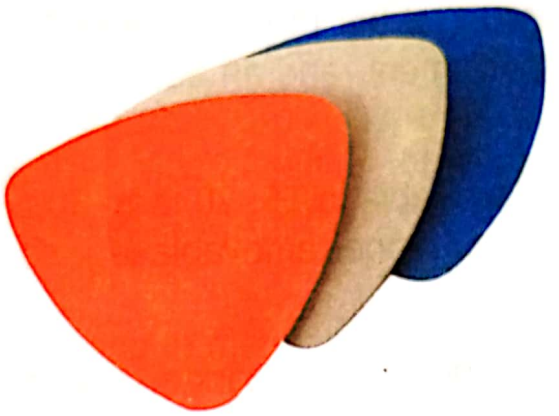




Tailor's Chalk

Tailor's chalk is wax-based chalk designed to make temporary marks on cloth. Using this chalk, a tailor can make markings where fabric needs to be cut or garments need be altered. Once the markings are no longer useful they can be easily brushed off or washed out leaving no residue behind. It can be found in different shapes and colours. Always choose the shade that is most contrasting with your fabric and makes highly visible markings.

The chalk's triangular shape and thin design makes it easy to hold and use for marking. The sharp edge is what is used to mark location such as dart lines, notches on the fabric when cutting and sewing. Brush the marks out of your fabric when you are done.



Activity:

1. Sketch and label the parts of some measuring and marking out tools and equipment used in the food and sewing laboratory.
2. Present the sketched tools and equipment for appraisal in class.

End of lesson assessment

1. Describe the procedure for measuring with each of the following:
   a) measuring cup
   b) yardstick
2. Describe the procedure for marking out with each of the following:
   a) tracing wheel
   b) tailor's chalk

DIVIDERS

Dividers are instruments used for measuring distances between two point transferring or comparing measurements directly from a rule, or for scribi an arc, radius, or circle.

Spring divider

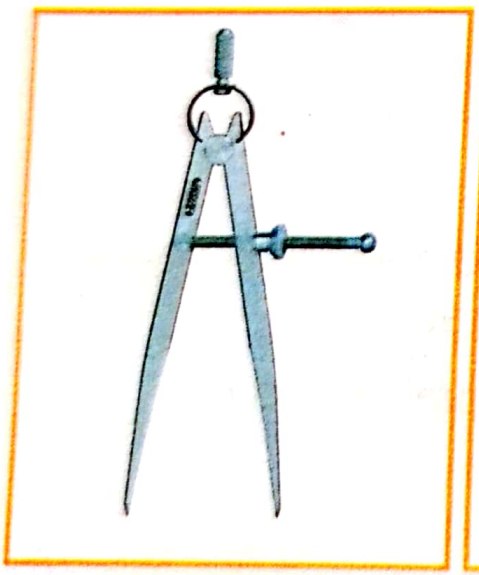
A spring divider consists of two sharp points at the end of straight legs, he apart by a spring and adjusted by means of a screw and nut. The sprin divider is available in sizes from 7.5cm to 12.5cm in length.

Wing divider

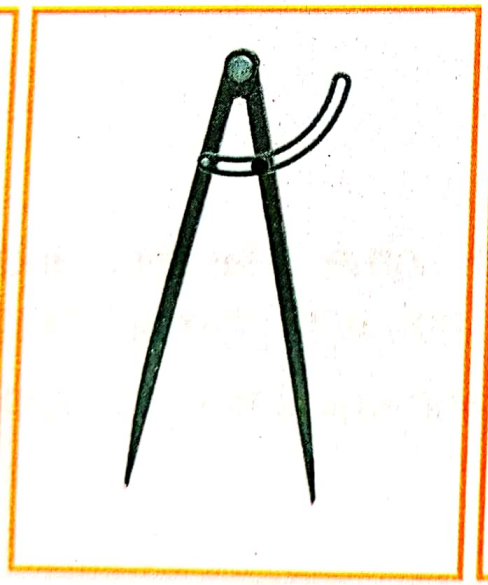
A wing-type divider has a steel bar that separates the legs, a lock nut for setting a rough measurement, and an adjustment screw for fine adjustments.

The wing-type divider is available in 15, 20, and 30.5 cm lengths. Also available is a divider with one removable leg, so that a pencil may be inserted.

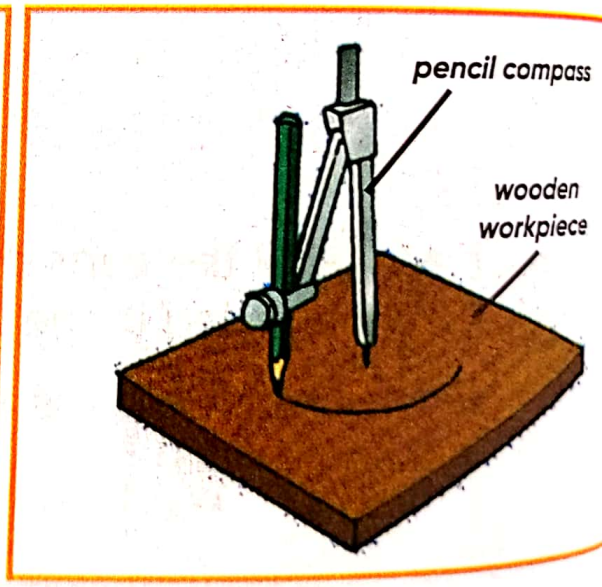
A pencil compass can also be used to mark arcs and circles on wood.



spring divider



wing divider

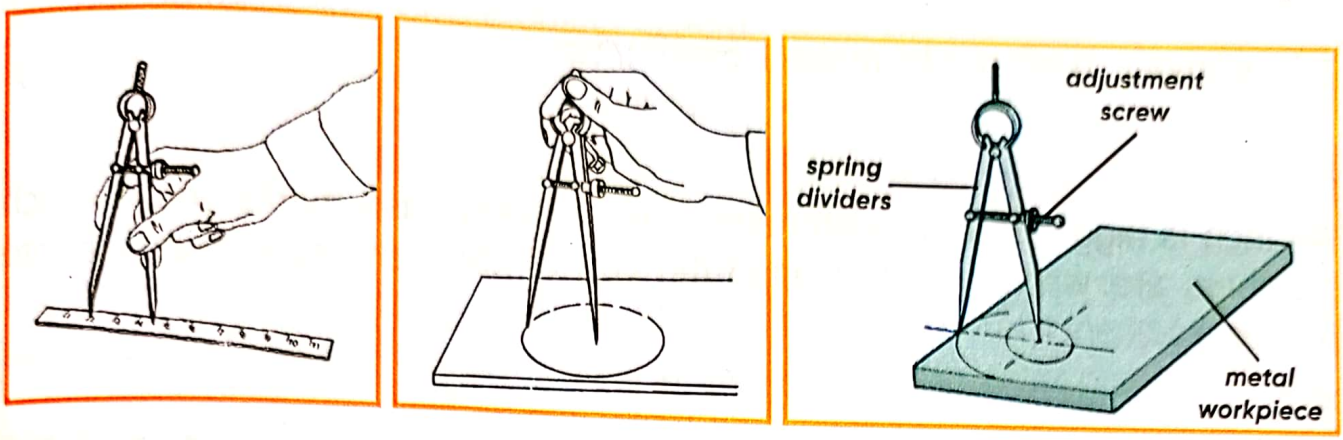


pencil compass

Using a divider to scribe a circle

1. Set the desired radius on the dividers using the appropriate graduations on a rule.
2. Place the point of one of the divider legs on the point to be used as the centre.

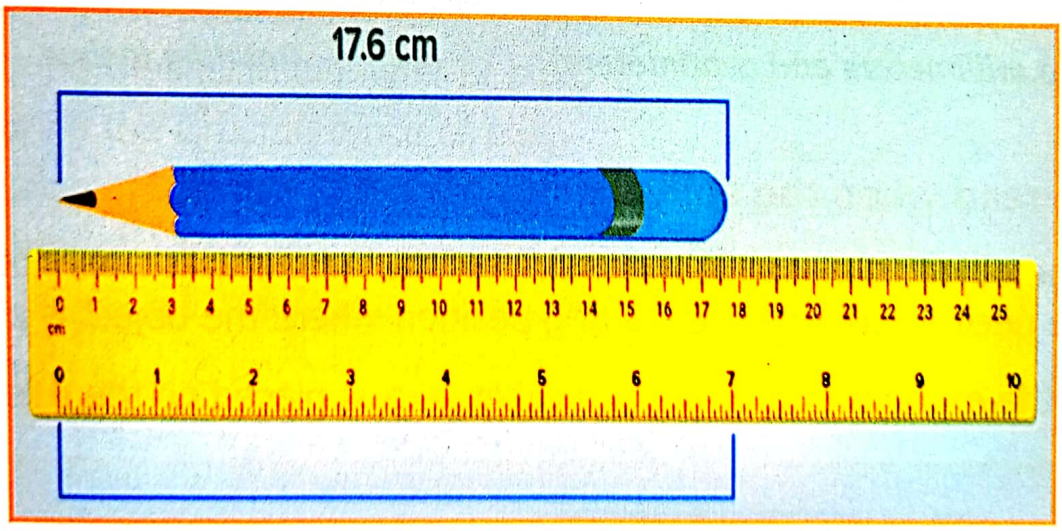
3. Lean the dividers in the direction of movement and scribe the circle by revolving the dividers.



MEASURING OBJECTS USING A RULER

To measure the length of an object, place the zero hash mark of the ruler exactly along one end of the object. Align the object you are measuring along the edge of the ruler. Note the hash mark on the ruler along which the other side of the object ends.

Here, the pencil is 17.6cm long in metric units of length, and 7 inches long in imperial units of length.



Measuring pencil using ruler

Reading a Ruler in Centimeters and Millimeters:

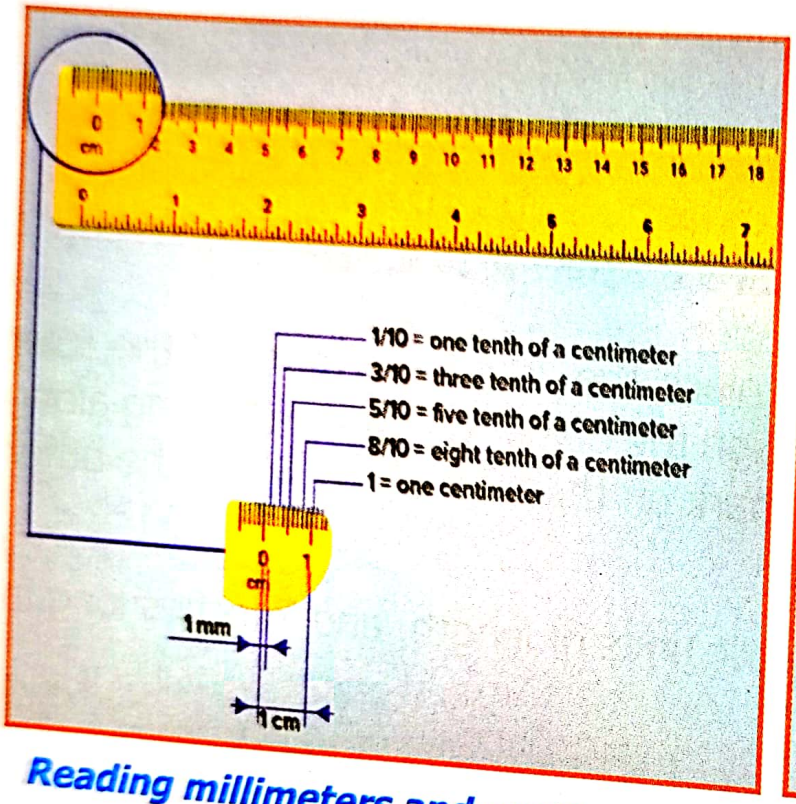
A centimeter is smaller than an inch. The long hash marks under which numbers are written on the ruler denote centimeters.

A millimeter is even smaller than a centimeter. The smaller hash marks between each centimeter represent millimeters.

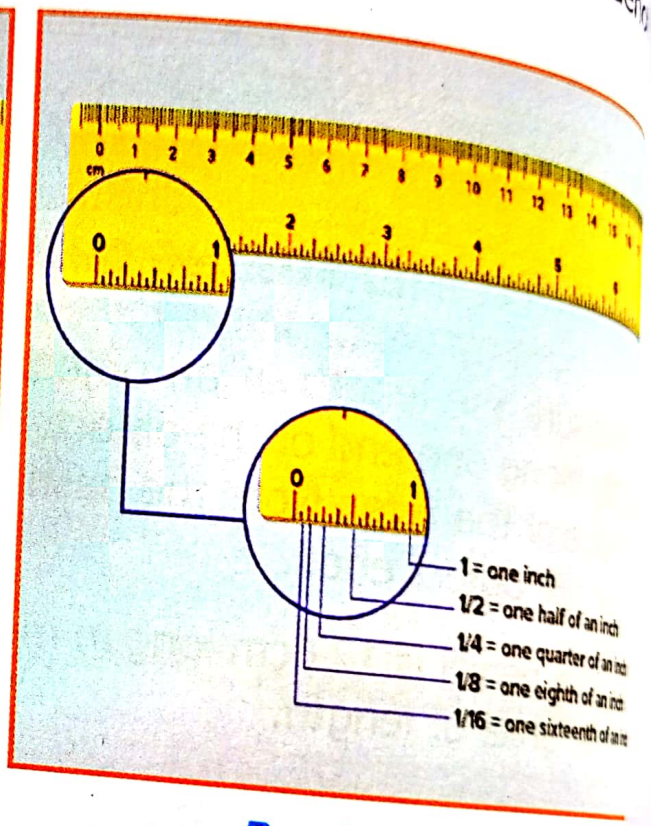
10-millimeter hash marks make 1 centimeter.

Reading Inches:

An inch is bigger than a centimeter. The big long hash marks above which numbers are written on the opposite side of the centimeter ruler denote inches.



Reading millimeters and centimeters

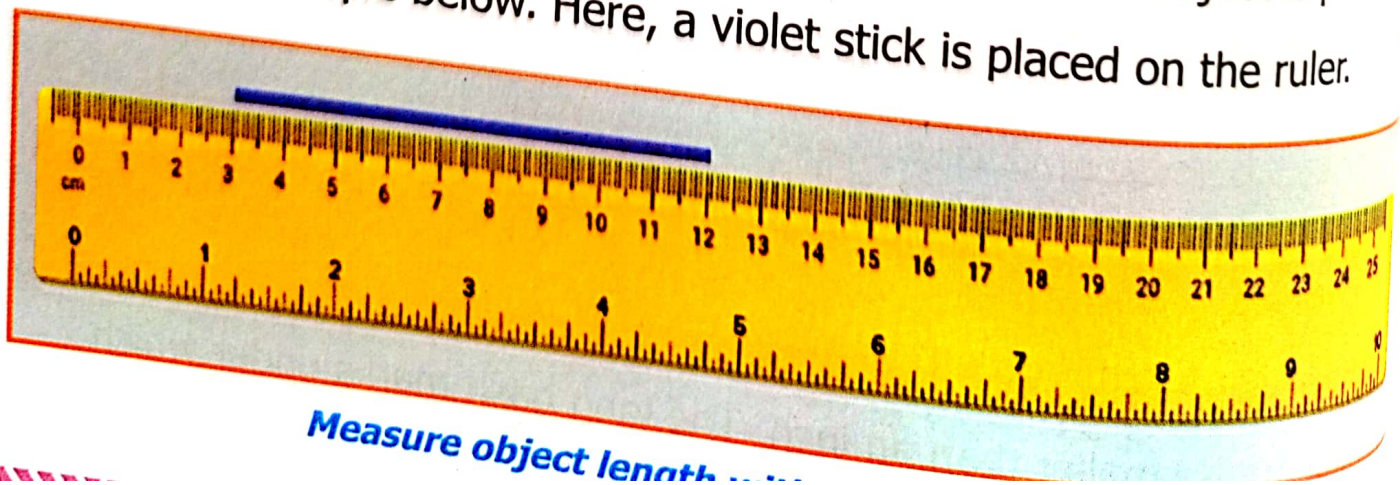


Reading inches

How to read when the object is not placed at zero (0):

When the object is placed in the middle of the ruler and it does not start from zero, we need to observe the starting position where the object is placed.

Look at the example below. Here, a violet stick is placed on the ruler.



Measure object length

The given object is not 12cm long as it did not start at the edge of the ruler (zero). It started at 3. So start counting from 3 till 12 *(i.e. 4, 5, 6, 7, 8, 9, 10, 11, 12)*. So the length of the object is 9cm.

Mathematically we can calculate it as 12cm – 3cm = 9cm.

FOLDING RULES

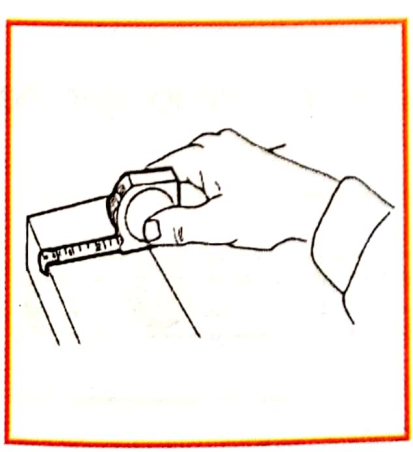
These folding rules are usually from two to six feet long (5-15 cm).
The folding rules cannot be relied on for extremely accurate measurements because a certain amount of play develops at the joints after continued use.

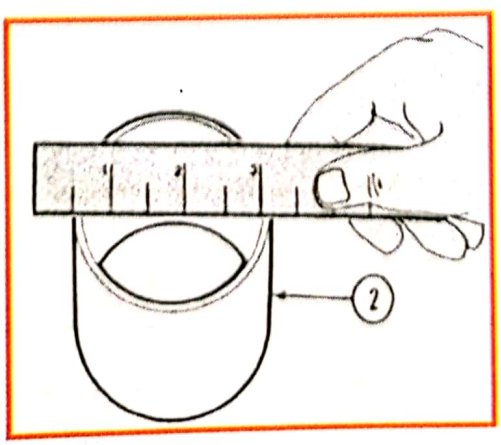
STEEL TAPES

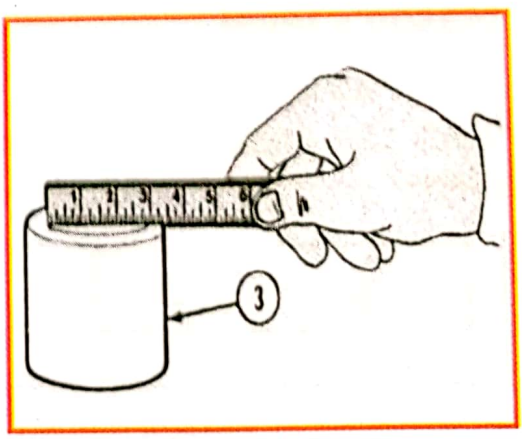
Steel tapes are made from 6 to about 300 feet (2-92 meters) in length. The shorter tapes are made with a curved, but rigid, cross section flexible enough to be rolled up. Long, flat tapes need support over their full length to avoid sagging. Lack of support can cause reading errors. The most common types of steel tapes have a hook at one end to let one person take all the readings.

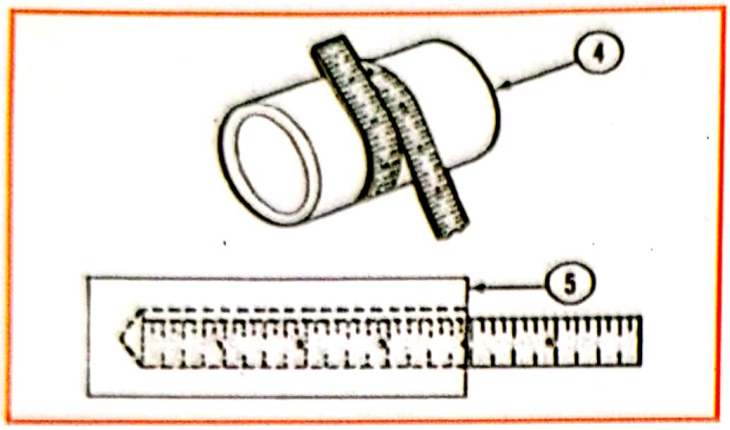
Using rules and tapes

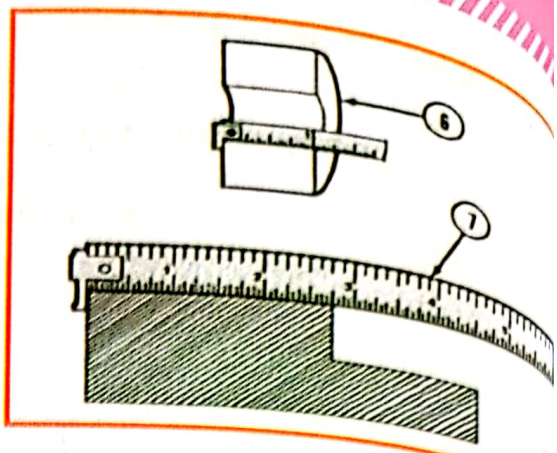
1. Rules and tapes are used for measuring lengths.
2. Measuring the outside diameter of pipe.
3. Measuring the inside diameter of pipe.
4. Measuring the circumference of pipe.
5. Measuring inside dimensions.
6. Measuring the thickness of stock through a hole.
7. Measuring outside dimension with a tape.
8. Steel rule is used to check the straightness of an edge.

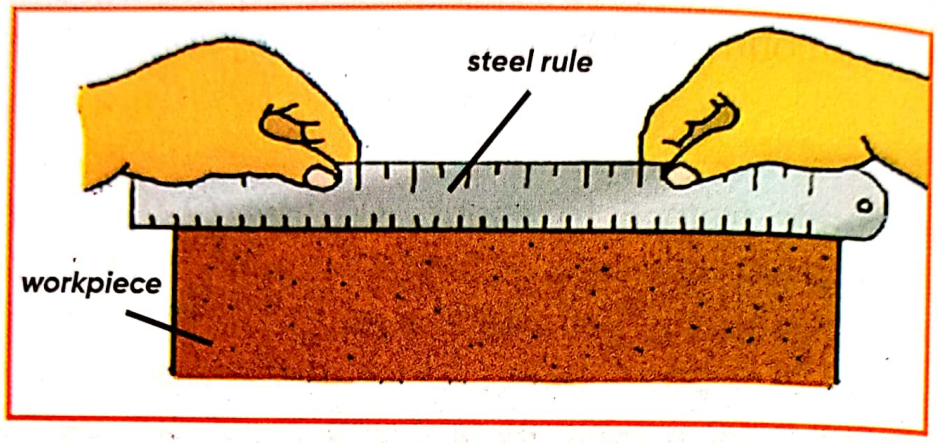












LEVELS

Levels are tools designed to prove whether a plane or surface is in the t vertical or true horizontal. All levels consist of a liquid-filled glass tube tubes supported in a frame.

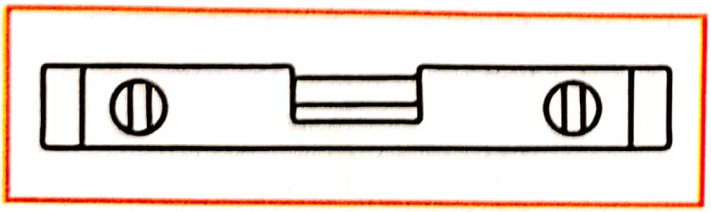
There are different types of levels. Some are:

Carpenter's level

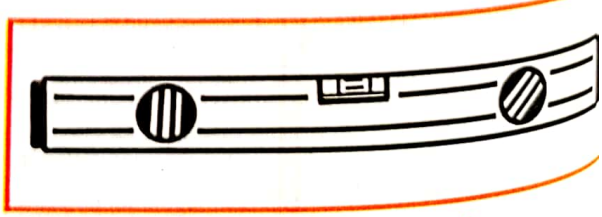
The carpenter's level has three vials which are mounted horizontally vertically (2) and at a 45 degree angle (3). The carpenter's level is used construction for checking for true vertical, true horizontal, and 45 degr angles.

Mason's level

This level is about 4 feet or longer. Two things to keep in mind: the longer t level, the greater the accuracy.



Mason's level



Carpenter's level

Using a level

A level may be checked for accuracy by placing it on a known level surface and noting the position of the bubble. Reverse the level end for end. Observe the position of the bubble. If the relative position of the bubble was the same for both readings, the level is accurate.

- **Horizontal surface**

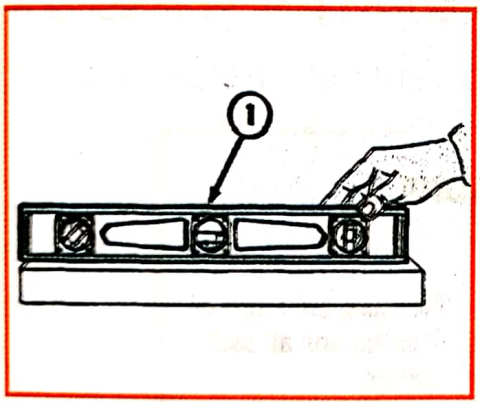
  Place the level on a flat horizontal surface. Check the horizontal vial (1). The bubble should be between the two etched lines on the vial. If it is not, the surface is not horizontal.

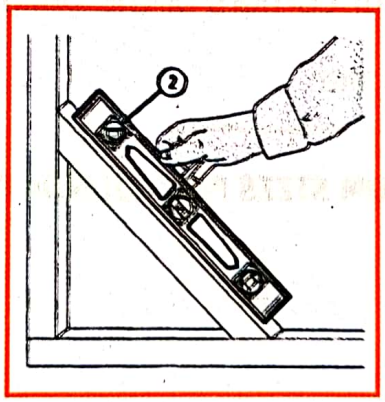
- **Angled surface**

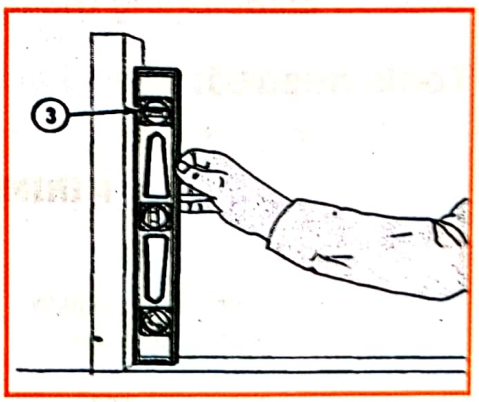
  Place the level on an angled surface. If the angle is 45 degrees (45^0), the bubble will appear between the notched lines on the 45 degree vial (2).

- **Vertical surface**

  Place the level against a flat vertical surface. Check the vertical vial (3). The bubble should be between the two etched lines on the vial. If it is not, the surface is not vertical.

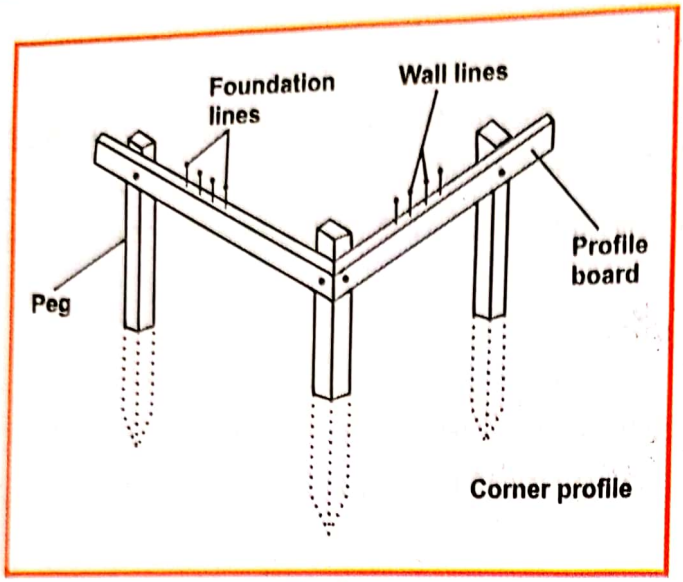




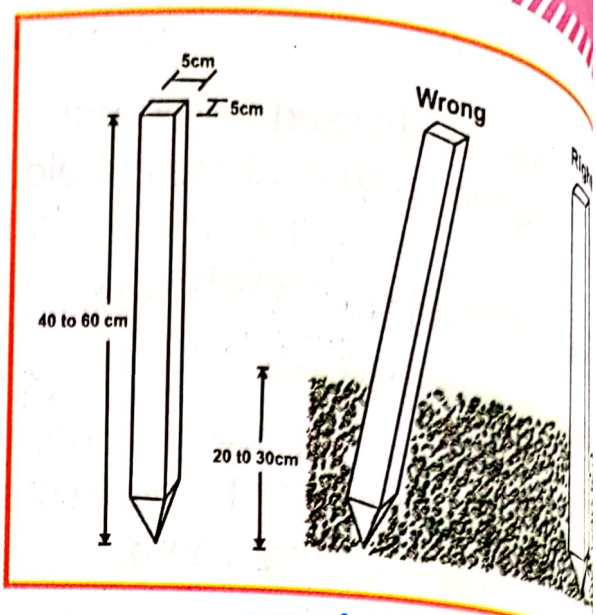


BUILDING SITE

Taking accurate measurements is very necessary in construction.
Inaccurate measurements could lead to several defects in a building.
We shall look at the process of measuring and marking out the outline of a wall on a site using the profile board, surveyor's tape and pegs.



profile board



wooden peg

The operation sequence below shows how to set out the foundation of a building.

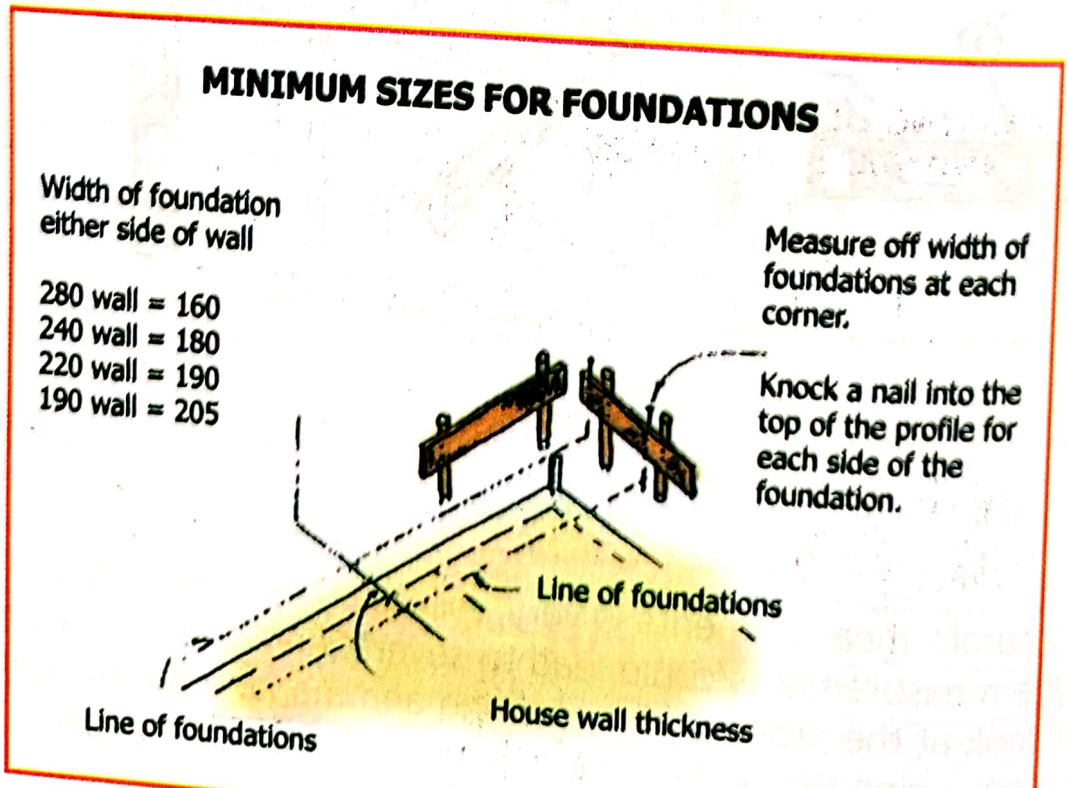
SETTING OUT THE FOUNDATION OF A BUILDING

Step 1: Clear the site.

Tools needed: pick axe, cutlass, mattock.

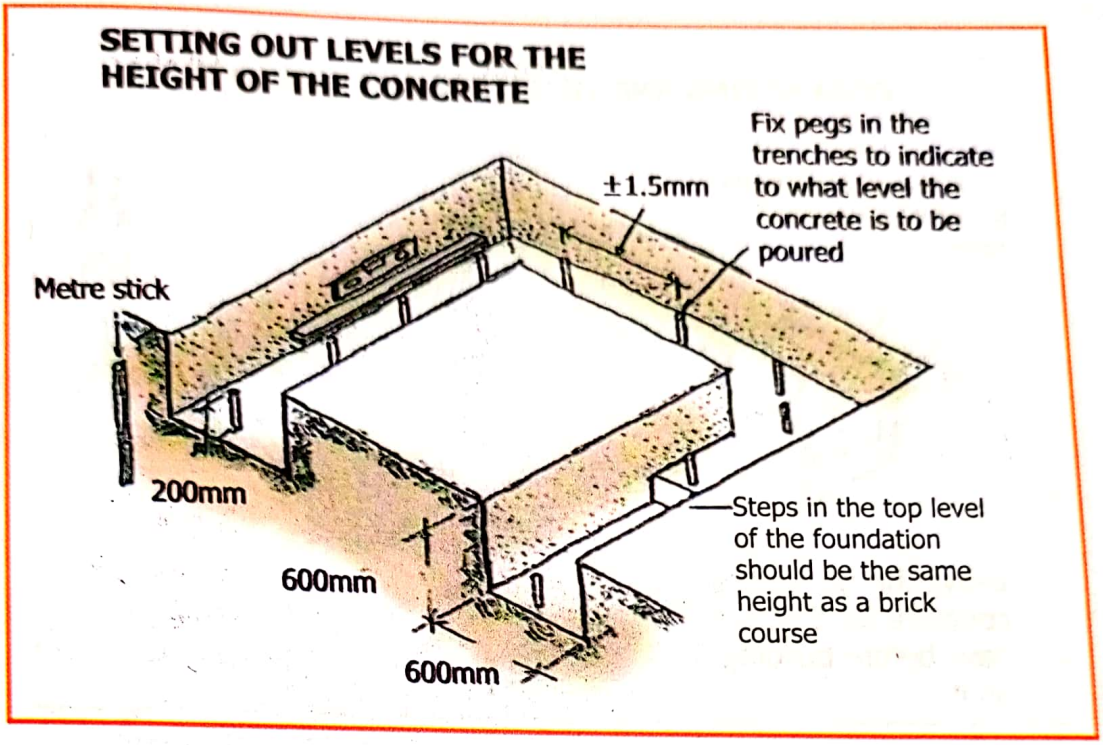
Step 2: Establishing the four corners of the building floor plan by pegging

Tools needed: pegs, hammer.



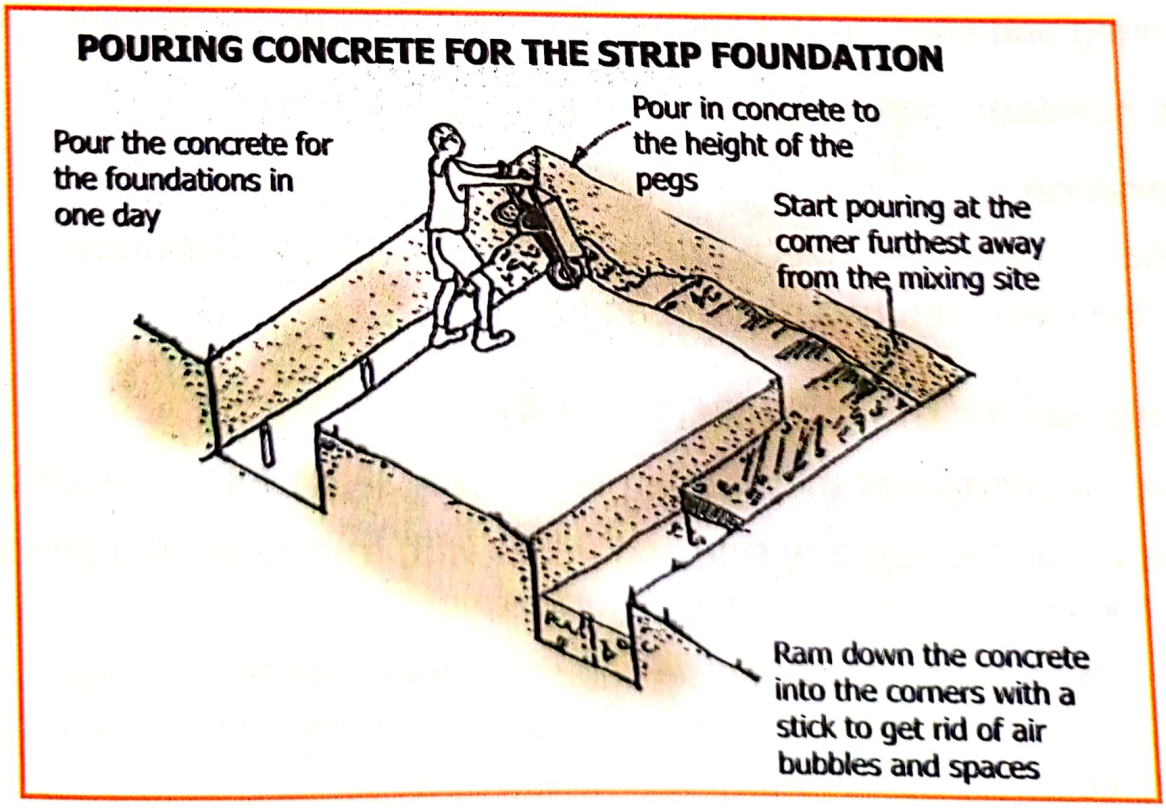
Step 7: Dig out the foundation.

Tools needed: pick axe, mattock, spade.



Step 8: Set out pegs to indicate the height of the concrete.

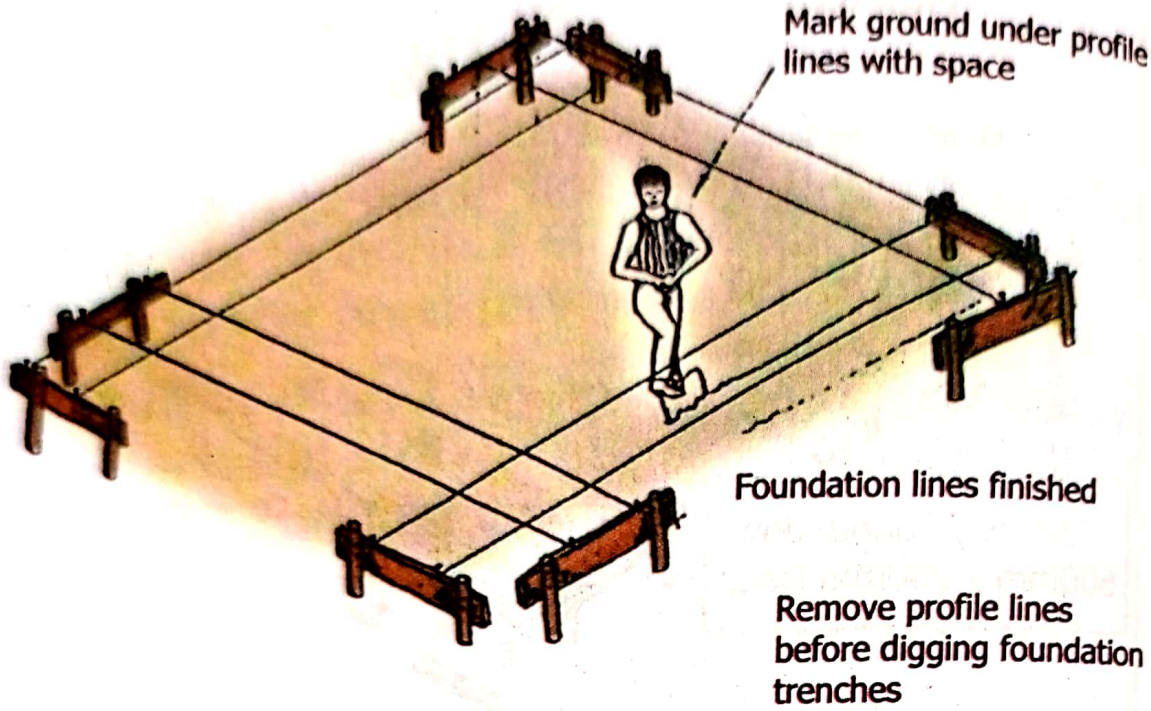
Tools needed: hammer, pegs, tape measure.



Step 5: Mark out the foundation and wall thicknesses.

Tools needed: tape measure, hammer.

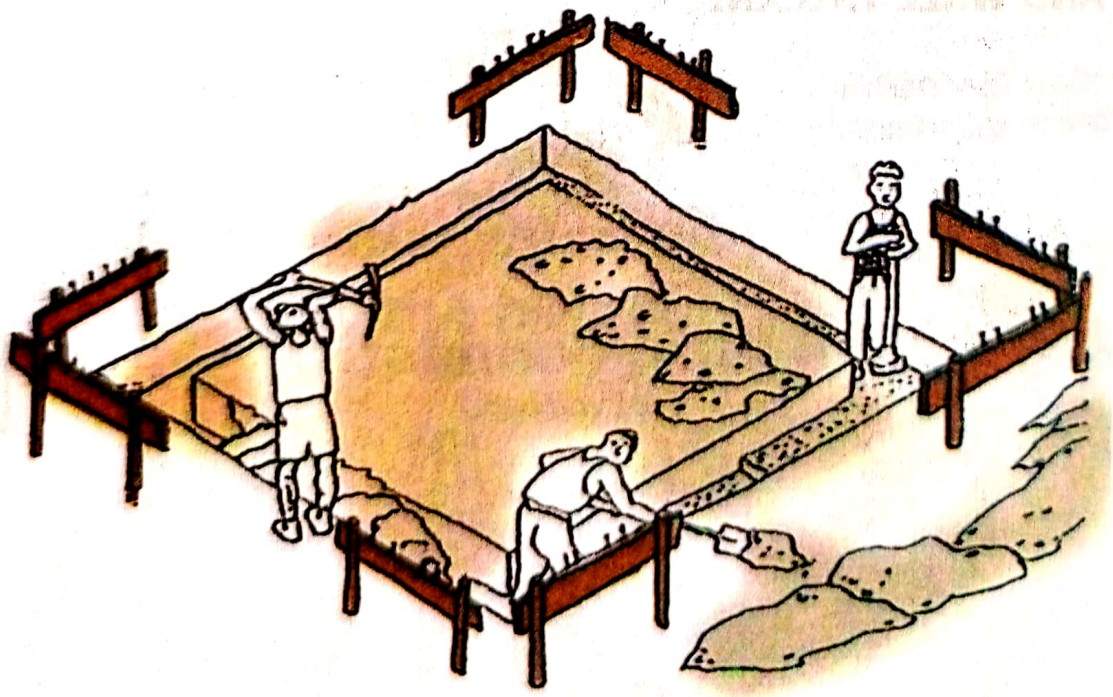
MARKING OUT ON THE GROUND FROM THE PROFILES



tep 6: Transfer the measurements from the profile board to the ground

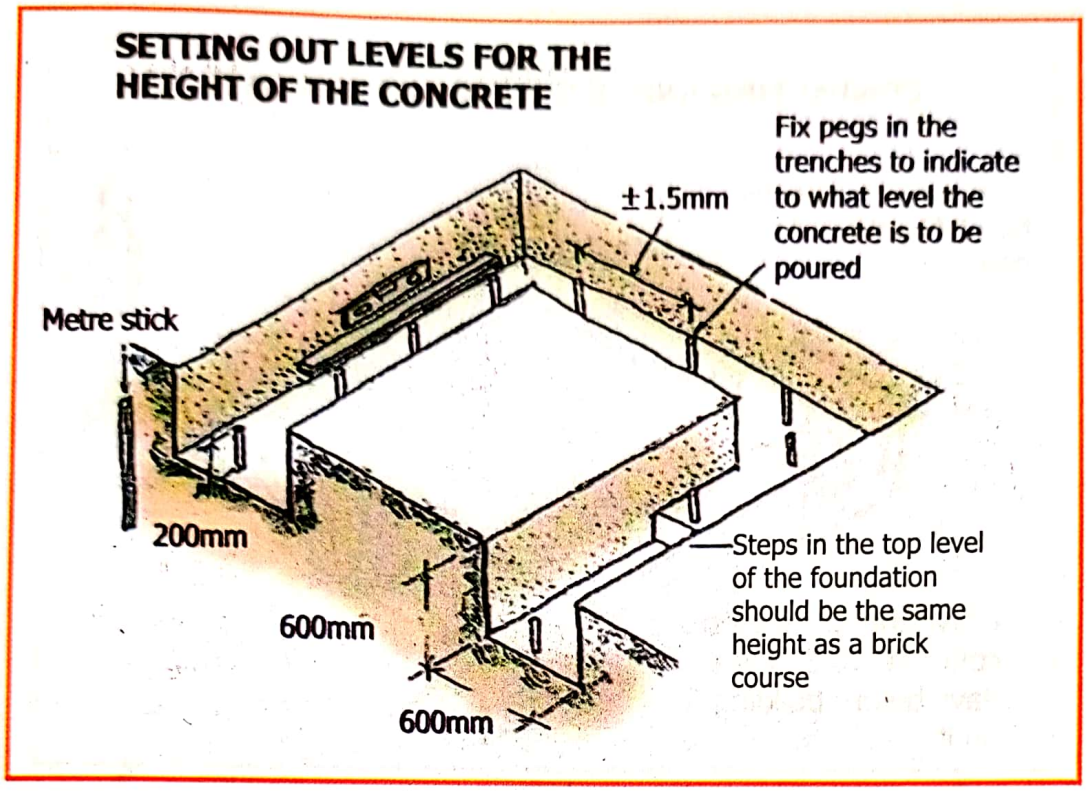
ools needed: pegs, spade.

EXCAVATION OF FOUNDATION



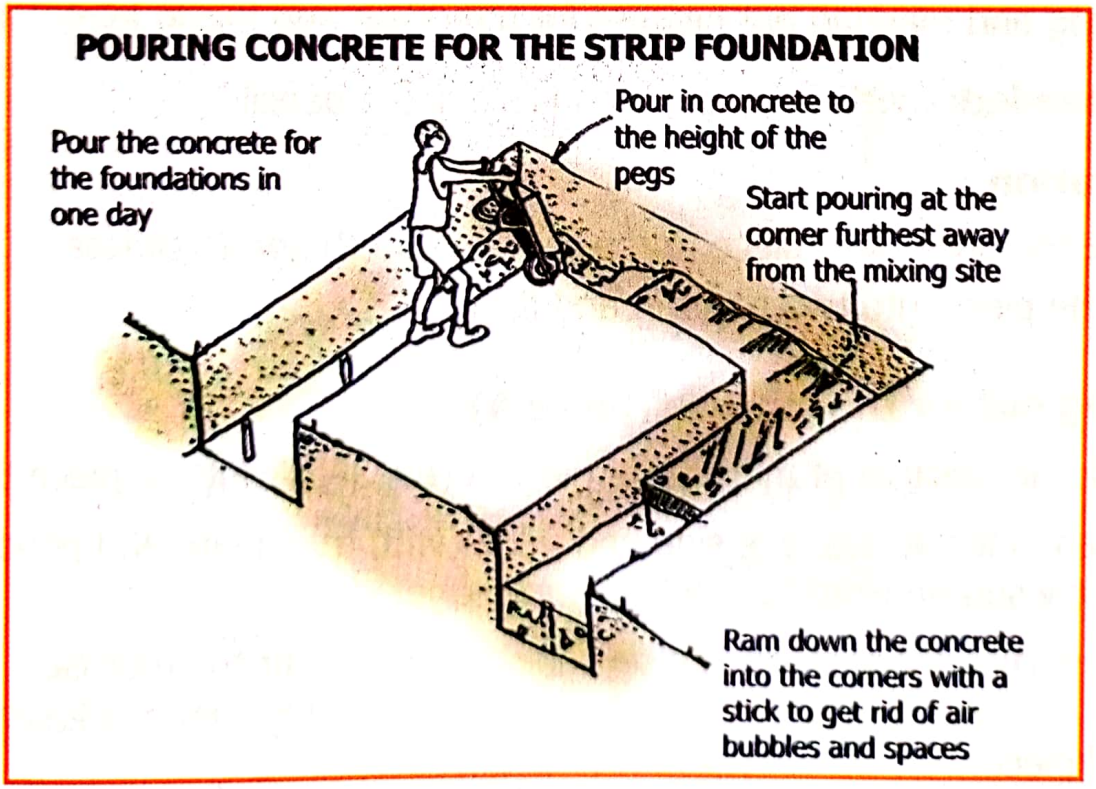
Step 7: Dig out the foundation.

Tools needed: pick axe, mattock, spade.



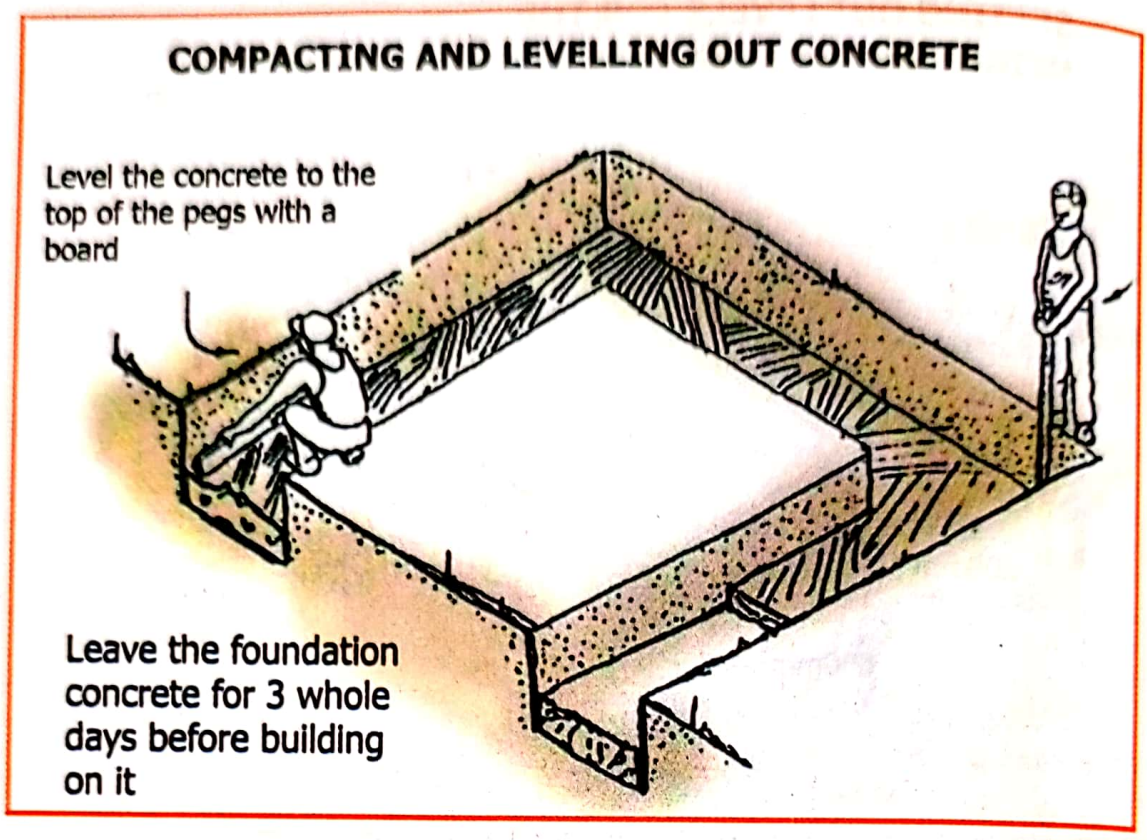
Step 8: Set out pegs to indicate the height of the concrete.

Tools needed: hammer, pegs, tape measure.



Step 9: Pour in the concrete. Compact and level the concrete.

Tools needed: wheel barrow, head pan, straight edge, spirit level, spade shovel.



WOOD WORKSHOP

Measuring and marking out process for a mortise and tenon joint.

Tools needed: mortise gauge, try square and a pencil

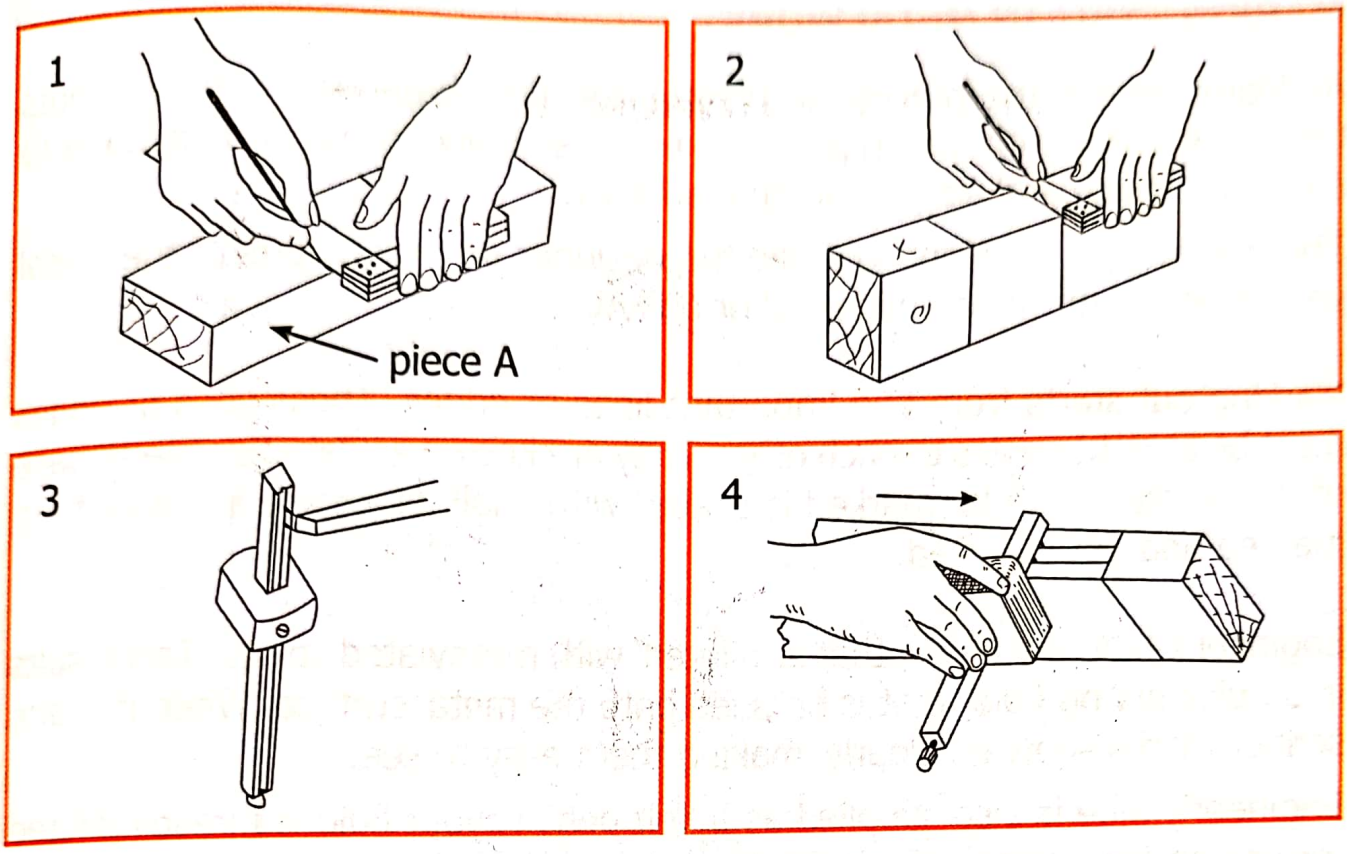
Preparation

- Plane the given workpiece to the required width and thickness.
- Cut the piece into two parts, A and B.

Marking out for the mortise (piece A)

1. Mark the position of mortise on piece A (equal to width of piece B).
2. Square lines across face side and edges with try square and pencil. Use try square from face side or face edge.
3. Set mortise gauge to the chisel selected tool to cut the mortise. Size of chisel should be as close as possible to one-third thickness of the workpiece.

4. Gauge for the mortise on both edges of the workpieces. Gauging should be done from face side.



Marking out for the tenon (piece B)

1. Mark the length of the tenon at one end of piece B. Allow 3mm waste on end.
2. Square the line round workpiece. Use marking knife for the lines on the faces (shoulder lines).
3. Mark tenon with mortise gauge from face side.
4. Make marks on the portions of the workpieces to be removed.