

JSS 1 BASIC TECHNOLOGY NOTES

Week One Topic: Understanding Technology

Definition: Technology is the application of special knowledge and skills toward facing human needs and solve them satisfactorily.

Introduction:

What this means is that technology is that aspect of man's activity, which targets his challenges and tries to solve them by using the material things around him. Man's continued desire to live a more comfortable and happy life pushes him to make different kind of things he needs by using technology.

There's nothing in the world today, which makes man feel happier that technology does not have a hand in. Beginning from such primitive products of technology like the hoe to the most advanced ones like the robot, they are all the products of technology.

Technology cannot grow where research and development is not taking place. It is research and development that helps man to come up with newer ideas of where he can apply technology to create something new for his use and ease of living. This is what leads man into what is called **innovation** and **invention**.

The level at which a country is looked at and called developed is measured by what that country can do with technology. Technology is as old as the human history. And it is one aspect of the human endeavor that will never disappear.

Advantages of technology

Technology:

1. Improves the living standard of a people.
2. Enhances and increases productivity.
3. Makes communication easier and faster.
4. Makes life and living safer.
5. Helps to secure our environment.
6. Saves a lot of time, energy and resources.
7. Makes movement very easy and enjoyable.
8. Boosts entertainment, commerce and industry.
9. It preserves vital data.
10. Enhances learning through easy access to knowledge worldwide.

Who should participate in technological activities and learning?

Everyone is expected to learn one aspect of technology or the other. The world is getting to the point where almost everything we do require the help of technology. So, we must learn it and learn it very well.

Technology-related Careers

Listed below are some of the careers that are built around technological knowhow. They include bricklaying, blueprint interpretation, glazier, painting and decoration, plumber, plumbing, roofing, tile setting, iron worker, metal forming, sheet metal work, tool and die work, welding, panel beating, production technologists, carpentry, cabinet making, furniture finishing, luthier, and all fields of engineering and technical skills.

Assignment: List ten careers you can find that is related to technology.

Week Two Topic: Workshop Safety

Definition: A workshop is a room or a building space where machines and useful items or devices are produced, repaired and or maintained.

Human beings used hand tools and machine tools to carry out the three functions we mentioned above. None of these things have brain. For this reason, all of them pose dangerous threat to the people who use them to work in the workshop.

Whenever any of these machines injures, damages or kills a human being, we say that an accident has happened. Hence, accident is seen as any unfavorable and unexpected event that happens, which leads to injury, death or damage to property. In everything that man does, effort is made to reduce accidents to the smallest level possible. This is the reason why we have to learn about workshop safety.

Causes of accident

There are so many things that can cause an accident. We will briefly look at thirteen of them.

1. **Taking shortcuts:** This is when people decide to take shorter means to finish what they are doing, especially when they feel they are familiar with the machine.
2. **Fatigue:** When someone is tired and he still insists on continuing to work.
3. **Over confidence:** This is the bane of people who feel they have mastered their work. They may not be in haste; but they can mistakenly do something that can lead to the accident.
4. **Pre-occupation:** When so many life challenge cloud the mind of someone working in a workshop, he can lose concentration and get himself fatally injured.
5. **Poor Knowledge of the machine:** There is a saying that half knowledge is more deadly than no knowledge. When someone who is not properly educated about how to use a machine goes ahead to use it, you can guess what may result later.

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6. **Liquid surface:** When the floor, handles, machine parts, etc are wet by anything, friction can be lost. And that can lead to a severe issue.
7. **Untidy workshop or house:** When the environment is not clean, it affects the mind of the workers. This naturally moves people to do things carelessly. And that is a dangerous behavior in a workshop.
8. **Hazardous material:** Dangerous chemicals like fuel, acid, diesel, gas, and smoke are some of the hazards that can be had in a workshop. They have made accident more deadly than normal.
9. **Ignoring safety rules:** When people intentionally refuse to follow safety rules or, when they fail to educate others about it, they set up a situation that can lead to severe accidents.
10. **Attempting risky challenges:** When people choose to lift or carry loads that are more than they can bear, they are inviting trouble. The same goes with the man who feels he can do things alone by refusing to ask others to help him.
11. **Emotional imbalance:** Some can be working with a bad, good or lonely feeling. It is very deadly to work on a machine, etc, when you are very much excited, loved, angry or feeling depressed or lonely.
12. **Costly mistakes:** When some starts a machine without checking if no one is near it. Walking into an object that moves unexpectedly. Throwing sharp objects in the name of play, etc. All these contribute to making accident happen.
13. **Poor planning:** Once you do not plan how to work, the tendency to make serious mistake is sure.

Week Three Topic: Workshop Safety

Types of workshop accident

1. Stepping on sharp objects.
2. Injuries caused by faulty machines.
3. Attacks from corrosive substances.
4. Electrocution.
5. Suffocation.
6. Falling from a height.
7. Toxic gas emission and inhalation.
8. Ear and eye problems from unhealthy sounds and light.
9. Fire outbreak and it injuries.

Types of fire accident

1. Electrical fire caused by sparks and burning accessories.
2. Liquid chemical fire caused by inflammable liquids.
3. Solid materials fire cause by objects that can catch fire easily such as paper, etc.

Safety rules and regulation

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The rules and regulations listed below are some of the instructions you are to carefully obey when you are in the workshop area.

1. Listen carefully to instructions before using the workshop or its equipment.
2. Do not play anyhow in the workshop. None of the machines is your mate.
3. Try to know where safety devices and gadgets are kept for prompt action.
4. Wear safety materials as long as you are in the workshop.
5. Makes sure there is enough space around you.
6. Do not attempt to start a machine without first knowing how to stop it.
7. Keep all you limbs and clothing away from moving machine parts.
8. Never you be in haste in whatever you are doing in the workshop.
9. Be careful when using sharp hand tools that can cut easily.
10. Read any post or bill you see on the walls of the workshop and keep to them.
11. Report any damage you notice in the workshop.

Week Four Topic: Workshop Safety

In this lesson we shall be looking at the devices that are used to fight, manage and stop accident cases from occurring. Let's take a look at some of the safety gadgets and devices that are required in the workshop and their uses.

1. **Overall:** It protects the body from injuries coming from scratches and bruises. It also gives the person smart look.
2. **Boots:** Workshop books are designed to protect the feet from sharp objects and corrosive substances.
3. **Goggles:** The piece of device protects the eyes from intense light, flying particles, and dust.
4. **Hand gloves:** Protects the hands from cutting tools, corrosive substances and electric shock.
5. **Helmet:** It protects the head from severe injuries caused by falling objects, accidents fall and crashing, and unexpected collision.
6. **Safety belt:** Used to fasten people on firm supports when working on high altitudes.
7. **Ear pad:** It is a head device that is used to protect the ears from intense sounds.
8. **Bucket of sand:** It is kept at selected areas in the workshop. It is used to fight fire outbreak when fire extinguisher is not enough or has finished.
9. **Fire extinguisher:** It is used to fight fire outbreak in the workshop.
10. **Tick blanket:** Used to fight off fire that catches human beings and small inflammable materials.
11. **Fire alarm:** Used to alert people of danger around working vicinity.
12. **Bills, signs, and poster:** Used to educate people on what to do, where to go, and how to behave in the face of danger. Some this bills, sign and posters are shown below.

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13.CCTV cameras: Used to monitor movements and work situations in and around the working space to track possible danger signs.

Pictures of some of the safety devices and gadgets



Safety boot



Helmet



Overall



Overall



Goggles



Ear pad



Hand gloves



Safety belt

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Week Five Topic: Identification of materials

There is the need to identify and know the types of material around us, which are used to make things that are useful to us. That means, these materials are the ones that man uses to produce anything he wants to make.

In this week's lesson, we will only identify wood and ceramics. This will give us the opportunity to know their properties, nature and what they are used to make in technological activities.

Identification of wood

Wood is an engineering material that is extracted from trees. It has a lot of technical value. In many things that man has built, wood is often found in one area or the other in them. There are two main types of wood in existence. They are **hardwood** and **softwood**. In identifying wood, we shall look at it based on these two types. The table below presents them according to their specific properties and examples.

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Specific properties of wood

S/No	Hardwood	Softwood
1.	They are called deciduous wood	They are call coniferous wood
2.	They have broad leaves	They have scale-like or needle-like leaves
3.	They are heavy in weight	They are light in weight
4.	They have dark coloration	They are light in color
5.	They have complex cellular structure	They have simple cellular structure
6.	Oak, Iroko, Teak, Mahogany, Mansonia, etc are examples.	Cedar, Spruce, Pine, Cyprus, Fir, etc are examples.

General properties of wood

All wood have the following general properties

1. They appear dark or light in color.
2. They are all poor conductors of heat.
3. Magnet does not attract them.
4. They are poor conductors of electricity when they are dry.
5. When polished, wood looks shiny.
6. They are useful in making furniture, weapon, hand tools, then vehicles, train and aircraft body part, roofing materials and building house.
7. They make low sounds when wet.
8. Wood can absorb shock or impact.

Identification of ceramics

Ceramics are made from clay. The same goes with glass. The only difference between them is the ways they are made.

To identify ceramics, we have to look out for the following properties in a material that we see.

1. **Brittleness:** Ceramics can break easily once they fall on a hard surface.
2. **Heat resistant:** They do not conduct heat and so, they also don't burn in the fire.
3. **Inorganic materials:** They are made from mainly inorganic materials like silicon (sand), sillimanite, sulphur and the rest.
4. **Non-sonorous:** They don't make loud sounds when hit.
5. **Poor Electric conductor:** They do not allow current to past through them.
6. **Water resistant:** They can retain water. That means they cannot absorb water or allow it to pass through them.

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7. **Refractory:** Some ceramics can change the direction of light and heat.
8. **Shiny in nature:** Ceramics can sparkle in the eye and look like the mirror.

Week Six Topic: Identification of materials

In this lesson, we will identify plastics and rubber. They are another set of materials that man uses when he wants to make things. We will now take a look at the properties they have that can help us identify them.

Identification of plastics

Plastics are materials that man extracted from two sources. One of them is **petroleum**. This source gives us the type of plastics that are called **thermoplastics**. The second source is **chemical reactions**. This source gives man the type of plastics that are called **thermosetting plastics**.

Properties of plastics

Listed below are the properties of plastics:

1. They are very light and so can float on water.
2. They are poor conductors of heat and electricity.
3. They can never decay or rust.
4. They can be melted and be re-molded.
5. They can be folded into different shapes.
6. They don't cut easily when stretched.
7. When stretched, their length increase only a little.

Identification of rubber

Rubber is a material that is extracted from two sources like plastics. The first source is called **latex**. And it is collected from a special tree called **Hevea**. This latex gives man the type of rubber that is called **natural rubber**. The second source of rubber is **chemical reactions**. It gives man the type of rubber that is called **synthetic rubber**.

Properties of rubber

The list below presents to us the properties of rubber. They include:

1. They are elastic, meaning they stretch to twice their normal lengths.
2. They can return to their normal length as stretching.
3. They are poor heat and electricity conductor.
4. They are very good shock absorbers.
5. They are highly water resistant.
6. They can look dark reddish, yellow or white.

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Week Seven Topic: Identification of materials

The materials we will be identifying in this lesson are glass and metals. It's possible you already know them. But it's important that we get to know them even better. And because they are part of the materials that play major role in engineering, that's why we have to study them.

Identification of Glass

Listed below are the properties of glass, which we can use to identify them.

1. They can break very easily.
2. They are poor conductor of heat and electricity.
3. They do not rust or decay.
4. They are water resistant, meaning water cannot pass through them.
5. They are made from inorganic materials such as silicon, etc.
6. They are non-metallic, hence do not possess metal properties.
7. They are hard when felt with the hand.
8. They are transparent.
9. They are not elastic like rubber and plastic.

Identification of metal

For us to identify metal, we should look out for the following properties on the material before us.

1. **Toughness:** They don't bend, stretch or break easily.
2. **Malleability:** Metals can be hammered into different shapes.
3. **Fusibility:** Metals can melt when they are subjected to high heat or temperature.
4. **Density:** Metals feel heavy when you try to lift them up.
5. **Ductility:** Metals can be stretched into thin wire under certain conditions. They can also be deformed permanently without them breaking.
6. **Brittleness:** This is the tendency of certain metals, like iron, to break instead of bending or stretching.
7. **Magnetism:** Some metals, like iron, can be attracted to a magnet.
8. **Conductivity:** All metals allow current and heat to travel through them.
9. **Hardness:** It is difficult to scratch or pierce metals by using other hard objects.
10. **Elasticity:** Some metals can be stretched to a new length and they will gradually return to their normal length again. Their stretching is always small.

Week Eight Topic: Drawing Instruments

Drawing instrument are the m materials that are used to draw in Basic Tech. We use it is in the section of Basic Tech called Technical Drawing. This lesson will help us to identify the drawing instrument that we would need in this subject and beyond.

Drawing Materials



*Masking or
Adhesive Tape*



*Pencils
2H or HB for thick line
4H for thin line*



Eraser



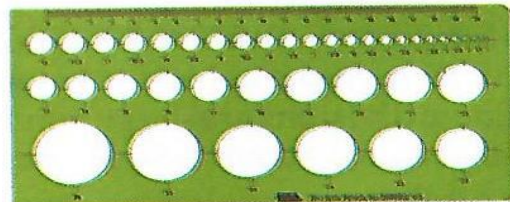
*Flexible curves
(for drawing irregular curves)*



Sandpaper



Lettering Template



Circle Template



Table sharpener



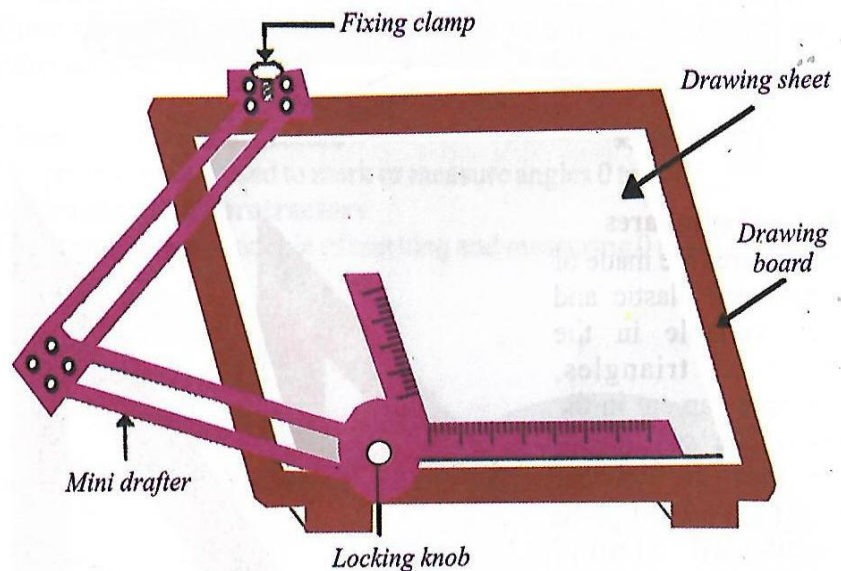
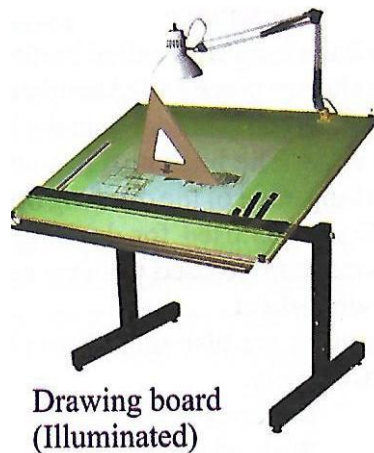
Tissue paper



Sharpener

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Standard Drawing Board



2. Tee square

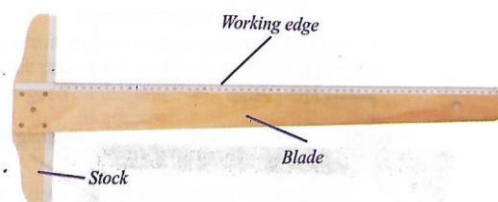
It has a long strip called blade, which is screwed rigidly at right angle to a shorter piece called head or stock. It is made of mahogany or pear wood, which is harder than the board wood to withstand any damage to the edge. The head also has an perfect edge which slides against the working edge of the drawing board.

T-Square is used for drawing horizontal. Also, with the aid of Set-squares can be used to draw vertical, inclined or parallel lines on the drawing sheet.

T-squares are also made from hard wood. A T-square consists of two parts namely

- i. the stock and
- ii. the blade

joined together at right angles to each other by means of screws and pins as shown below. The stock is made to slide along the working edge and the Blade moves on the drawing board.



3. Set squares

Set-squares are made of transparent plastic and are available in the shape of triangles, having a gap cut in the body. The set squares are used for drawing short straight and inclined lines, measuring and drawing certain angles.



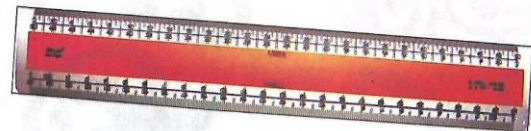
Types of set-squares

A good combination of set-squares are:

- i. 30° x 60° set square with a long edge of 250 mm.
- ii. 45° set squares with each edge of 200 mm.

4. Scale rules

Scales are made of wood, steel, celluloid or plastic. Stainless steel scales are more durable. Scale may be of triangular cross-section or flat. 15 cm long and 2 cm wide or 30 cm long or 3 cm wide flat scales are commonly used. These are usually about 1 mm thick. The longer edges of the scale are calibrated in mm, cm or inch.



5. Protractors

Protractors are used for drawing or measuring any desired angles. These are made of hard transparent plastic or celluloid. The edges are either squared or beveled.

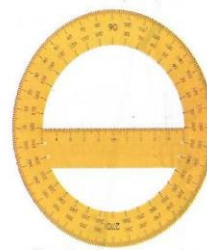
Types of protractor

i. Semi-circular protractors

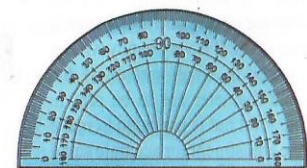
The protractors are used to mark or measure angles 0 to 180°.

ii. Circular shape protractors

The protractors are capable of marking and measuring 0 to 360°.



Circular shape protractor



Semi-circular protractor

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6. French Curves

French curves are made of transparent celluloid or plastic. These are available in various shapes. French curves are used to draw irregular curved lines, which can not be drawn with a compass.

A light pencil is first used to make points free hand through the path where the curve is to be drawn. Neat continuous curve is finally drawn with the longest possible curve-edge of the french curve coinciding exactly with the free hand made points. Proper care must be taken to ensure that no corners are formed anywhere on the curve. Proper use of French curves requires skill.



7. Compass

The compass is used for drawing circles and arcs. It consists of two legs hinged together at its upper end. A pointed needle is fitted at the lower end of one leg, while a pencil is inserted at the end of the second leg. The pencil is removable and it can be interchanged with a similar piece containing an ink-pen.

Types of compass

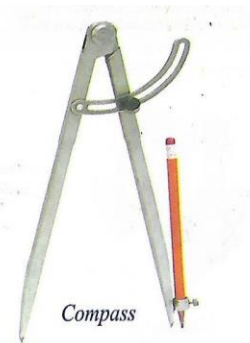
i. Small bow compass

This is conveniently used for drawing circles and arcs of small diameters. It is very handy when a number of small circles of the same diameter are to be drawn. The joint nut is provided to make fine adjustment for accurate small circles.



ii. Large Size Compass

Both the legs are provided with knee joints. Circles up to about 120 mm diameter can be drawn using large size compass with the legs of the compass kept straight. For drawing smaller circles, the two legs should be bent at the knee joints so that these are perpendicular to the surface of the paper. It can be used to draw large arcs and circles.



8. Divider: The dividers has two legs hinged at the upper end and is provided with steel pins at both the lower ends.

Types of divider

i. Large size divider: The large size divider is used to make large divisions and number of long equal distances.

ii. Small bow divider: The small bow divider is very convenient for marking minute divisions and large number of short equal distances. Some are adjusted by a nut.



The dividers are generally used to:

- transfer measurements from one part of the drawing to another.
- divide straight or curved lines into required number of equal parts.
- set off distances from the scale to the drawings.

Week Nine Topic: Scale Drawing

Measurement: This is the act of using a special instrument to give specific values for the distance between two points. It is through measurement that we can be able to describe the size of any object accurately.

Types of measurement

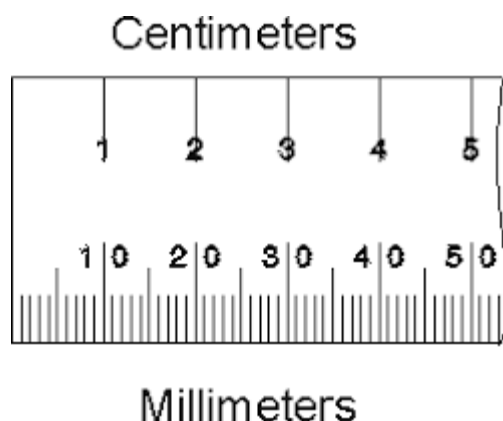
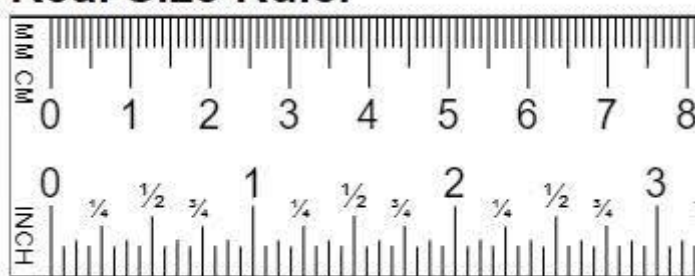
There are basically two types of measurement. They are:

- Angular measurement:** When we measure the angle between two lines or points. We do this by using the protractor to measure them.
- Linear measurement:** This is when we measure the distance between lines that are connected by a straight line. We use meter rules to take this kind of measurement.

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How to read graduation:

Real Size Ruler



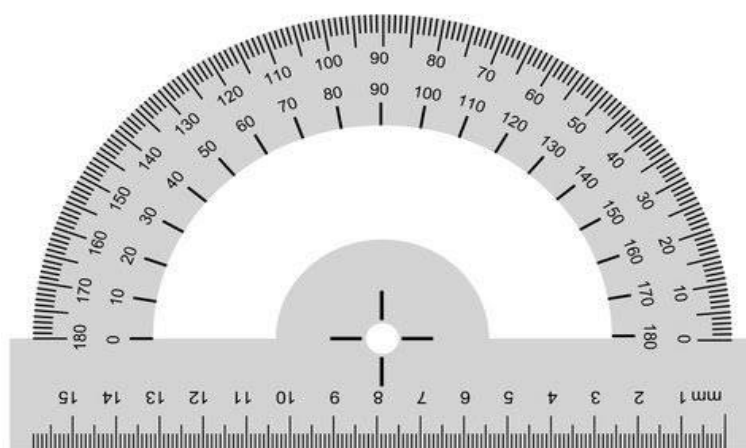
Meter rules are graduated in millimeters (mm), centimeters (cm), and so on. For anyone to read measurement from any of this instrument, the starting point is not the place where you see 1cm or 10mm. No. That's not where the starting point on the ruler is. The correct starting point, i.e, where you mark and

consider it to be the place where you measurement will begin, is the mark on the ruler where you see 0cm or 0mm. so, you place the 0 (zero) mark on the ruler on the point, where your measurement begins. Then, you start counting from 1cm or 10mm and continue.

The same thing applies to angles. When you want to measure an angle, the 0° mark on the protractor is where you place on the starting point. Then you count along the curved edge of the tool. Remember

that the small lines that are 4 in number, marked between the loner one ones gives you the opportunity to count small lengths and angles. For instance, if you are to measure 5.7cm, when you count to the number 5, you then count the shorter lines including the longer ones that do not have number written on them. Once you count the lines to the seventh on, you stop. That's where you measurement, which started at 0cm, will stop.

In the case of angle, the small lines, too, allows you to include smaller angles. As an example, if you want to measure 84° , you arrange the protractor so that its 0° sits at the starting point. Then, count along the curved edge, either from your right or from your left, till you have reached the 80 written on the protractor. You get the remaining 4° by counting 4 small lines ahead of the 80. That's where you 84° angle stops.



Week Ten Topic: Scale Drawing

In this lesson, we will look at what scale rule is all about. It is very important that we learn how to use it.



Scale rule is a special type of measuring device that allows us to measure large distances while using a very small ruler to do so. It exists in two types namely: **plain scale** and **diagonal scale**. As for this lesson, we shall concentrate on plain scale.

Interpretation of scale rule

If you look at the three arms of the scale rule, you will see that each of their faces marked with something like this 1: 100; 1: 200; 1: 250; 1: 300, and so on. If I take 1: 250 for example, before you can tell what you are measuring, find out first what unit it is you are measuring. So, on that arm where you see 1: 250, you will also see something like this 5m along the face where the 1: 250 is written. The “*m*” in front of the 5 tells you that you are trying to take a measurement in *meters*. So, what 1: 250 means is this: *that for every 1 unit measurement you take on the ruler, you have assigned 250m distance to the object in real life.*

In practical sense, this statement means reducing the size of the object by 250 times. In other words, 1: 250 actually means 1 divide by 250 or, $1/250$, which gives us 0.004 of the normal size of the object.

So, if you are asked to draw an object by using the scale 1: 500, what you are asked to do is to divide every measurement given on the object by 500. This number will reduce the object to a small size. Thus, the bigger the number under the division sign, the smaller the size of the object will be. That means, 1: 20 scale will produce a bigger object than the object drawn with 1: 100 scale will produce.

How scale rule is used



To use the scale rule, all you need to do is to find the face that contains the ratio you were asked to use to draw the object. If the ratio is 1: 200, then, along the length of that face where you see 1: 200, there are numbers written. If the intervals of the numbers are 1, i.e, if you see the numbers in this form: 1, 2, 3... etc, then, each of them represent 200. But if the intervals are 2, 4, 6..., then each number there represents 100. You get this by dividing 200 with the first number, 2. That's how it applies all other ratios.

Finally...

Scale rule is normally used to help engineers and architects to reduce the sizes of their drawing to a smaller size.

Week Eleven Topic: Scale Drawing

In this lesson, we shall learn how to use scale to increase or decrease the sizes of given objects.

Examples

1. Construct a rectangle of sides 100 by 50 and re-construct it in the ratios (a) 1: 5 (b) 1: 10.
2. Construct a cuboid of sides 80 x 50 x 30 and reconstruct it in the ratio 1:15.
3. Construct a cylinder, whose base radius is 20 and height is 120. Then reconstruct it to the ratio 1: 10

NB: The teacher will guide the students through this process.