

## **FIRST TERM JSS 2 BASIC TECHNOLOGY NOTES:**

### **Week One: TOPIC: RESCUE OPERATION.**

#### **Definition:**

Rescue operation is any activity that is done mainly to save or remove an object or a living thing from the danger it is exposed to. Rescue operation has had a lot of role to play in saving lives and properties.

Anything can be exposed to dangerous situations such as accident, being stranded, fire outbreak, sickness, suffocation, etc. Any effort made to save such a thing or being from the harmful situation is an act of rescue operation.

#### **Areas that Rescue Operations Affect**

At this level of our learning, we shall limit the scope of our teaching on rescue operations to the saving of living things and properties. And so, the areas we will be looking at in this context will include:

1. **Highway Rescue Operations:** Operations carried out to save victims of road accidents. Vehicles that damaged on the road and stranded people are included in this.
2. **Surface Water Rescue Operations:** Is the kind of operation that involves saving people from water accident such as drowning. This involves shallow water levels like the river, streams, swimming pool, etc.
3. **Air-to-Sea Rescue Operations:** This involves the use of aircrafts to save victims of accidents that occur at sea and big rivers.
4. **Household Rescue Operations:** Involves steps taken to save someone who is a victim of household accidents or violence.
5. **Fire Rescue Operations:** Are steps taken to save someone from fire accidents cause by chemicals or electrical systems in the workshop, vehicle, home, farm, etc.
6. **Urban Rescue Operations:** Involves steps taken to save victims of structural failures in towns and cities.
7. **Ground Rescue Operations:** Involves steps taken to save people who are either lost in a bush, forest or are faced with the dangers of wild life threats.
8. **Combat Search Rescue Operations:** These are steps taken to save wounded and victims of war, riot, attack, etc.

#### **General Steps Taken During Rescue Operations**

1. Rescue person or team must secure him/themselves before starting anything.
2. Rescue person or team must carry sophisticated equipment and tools needed to carry out the operation successfully.
3. Securing the victim; making sure the people, animals or things in question are secured from further harm or damage.
4. Securing the properties that are under threat. Such things can be vehicle, motorcycle, goods, etc.

5. Securing the environment by putting up notice that keeps people away from the area under threat.

### **Techniques Used In Rescue Operations**

There are so many techniques that are used to ensure the safety of any victim of something harmful. People use each of these techniques based on their own intuition or judgment. Some of the techniques are mentioned below:

- Sending emergency message to the people or body that can render help.
- Using the right tool or equipment where necessary to save the victim or the danger from the harm.
- Removing the cause of the danger immediately to save the person or object if you can.
- Putting up a notice to alert people of the danger that exists around an object, a place or a being.
- Moving the victim of the attacked away from the threatening danger.
- Providing adequate ventilation where suffocation is observed.

### **Week Two: TOPIC: FAULT DETECTION**

#### **Definition:**

Fault detection is an activity, which is carried out on an appliance to see if there's any hidden problem in it or, to find out the cause of a problem that an appliance is suffering from so as to fix it.

In technical term, the word **Fault Detection** actually means to “troubleshoot” an appliance. This has the ability to expose any unnoticed problem or to clarify the kind of problem that is observed in an appliance. The level at which an appliance is exposed to troubleshooting depends on the kind of problem that is being sought for, or that needs to be corrected. You can also call fault detection as **corrective maintenance**, since it plays a key role when trying to repair faulty equipment.

#### **Importance of Fault Detection**

Outlined below are some of the importance of fault detection.

1. It prevents complicating already existing problem. This is normally caused by the trial and guess methods of untrained persons.
2. It extends the lifespan of household appliances by ensuring that all its parts are working well.
3. It saves a lot of money caused by a poor knowledge of the cause of the problem.

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4. It makes the repair work much easier and accurate. That means it leads the technician direct to the cause of the problem, which he removes immediately.
5. It saves lives and property. Faulty equipment can remove bad situations from the owners. It can happen when the owner does not expect it. E.g., fire outbreak, getting stranded, etc.
6. It removes stress and unnecessary discomfort from the owner of an appliance. Once the cause of a problem in an appliance is known, it brings relief and happiness to the heart. When this is removed, the happiness turns to joy.

### **Techniques Used in Fault Detection**

One or some of following techniques can be used when trying to find out or understand the cause of a problem in an appliance. They include:

1. **Scanning:** This is done by using devices that can go into the appliance and search for problems. The scanner checks the entire working conditions of the equipment and gives a result. From the result, the problem can be found.
2. **Testing:** This is done by connecting the various parts of the appliance to such equipment as the Multimeter. This device checks the voltage pass from one part of the appliance to the other. The appliance is test-run. This gives the Mutlimeter the opportunity to find which part has electrical fault. This is used where the scanning machine is not available.
3. **Checking:** This has to do with the use of our senses to monitor the running condition of the appliance. Once a strange sound, abnormal running or behavior is notices, then a fault is hiding somewhere.

### **Fault Detection Tools**

The tools that are used to perform fault detection tasks are many. Some of them are scanner, Multimeter, Tester, Blower, Thermometer, Gauge, Computers, Sonometer, etc.

### **Week Three: TOPIC: MANUFACTURED BOARD**

**Meaning:** Manufactured board is an artificial board, because it is man that makes it. He makes it from trees, but it is not the same thing as wood. Wood is cut out of trees which had been cut down. Manufactured are then cut out of the felled tree. These boards are very important to mankind and that's why we have to know more about them.

Most of the items we use at home, in the office and in the industry are made from manufactured board. Examples include beds, tables, chairs, wardrobes, shelves, vehicle bodies, aircraft bodies, ship parts, train parts, etc.

### **Properties of Manufactured Board**

Properties of manufactured board include the following:

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1. They are made of waste wood materials or wood sheets.
2. Saw dust is used to make different types of manufactured boards.
3. Special glue, high heat and pressure are used to hold the wooden particles together.
4. They are often covered with thin layers of wooden material called veneer or leather to give them beautiful appearances.

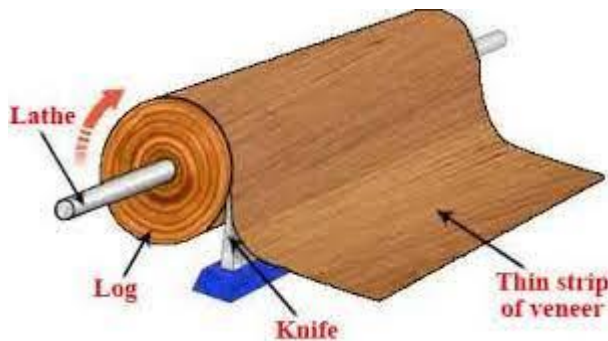
### **The Meaning of veneer**

Veneer is a thin layer of wood, which is sliced or cut out from a wood. It is one of the materials that are used to produce manufactured boards.

### **Cutting of Veneer**

There are two methods that are used when veneer is to be cut out of wood. They are:

1. **Slicing Method:** This is when a log of wood is fastened to a lathe machine. The machine has a very sharp cutting blade is fixed in one place. As the wood log rotates, the blade is gradually fed into the wood to the required thickness. This would slice off the required veneer layer. The diagram below illustrates this.



2. **Cutting (sawing) Method:** This has to do with the use of a very sharp saw to cut wood log into the required thin sheets of veneer. The log is fastened to a wood lathe machine. It does not rotate; it is fixed. The cutting saw is the one that moves to and fro to cut the veneer out. There are two methods that are used in this way. They are:

(i) **Plain or Rift Cut:** this is when the wood log is cut into two halves or by any chosen pattern along its length. The half or the entire log of wood is then sawn into parallel sheets as shown below.

Plain-Sawn

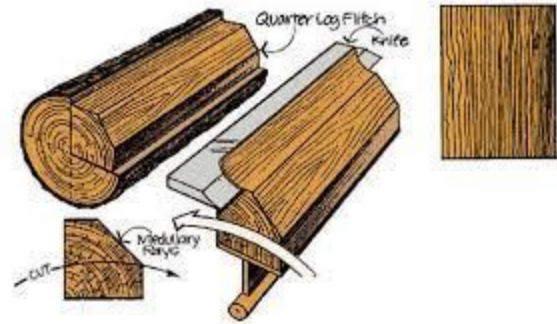


Plain Sawn



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(ii) **Quarter Sawn:** This is when the wood log is cut into four quarters along its length. Each quarter is then sawn as shown below.



### **Week Four: TOPIC: Types of manufactured Board**

There are many types of manufactured board. But we shall look at seven of them in this lesson. They are produced by applying special bonding materials like glue, heat and high pressure. Most of them have their surfaces covered or laminated with leather or veneer to make them attractive. They are briefly explained below.

1. **MDF – Medium Density Fiberboard:** This is a type of board that is made from wood fiber. It is very compact so that air spaces do not exist in it. Wood fiber is a substance that is extracted from wood. An example of MDF is shown to your right hand.



2. **Hard Board:** This is a type of manufactured board that is made from wood dust, whose sizes are very small, just like sand dust. It looks like MDF. The only difference between the two is that MDF is much finer and compact than hard board, because hard board contains air spaces in it and the particles of the wood dust used is much bigger in size than that of MDF. You can see it by the left.

3. **Chip Board:** This is a type of wood that is made from pieces of wood material gathered from such particles as saw dust or mashed rotten wood. An example of chip board is shown to your right.



4. **Ply Wood:** Is a manufactured board that is made from veneer sheets. The veneer or wood sheets are laid in a pile on each other, so that the grains in one veneer sheet cross the ones in the next sheet at 90°. Usually, ply wood is not laminated with leather. It is shown above, to your left hand side.

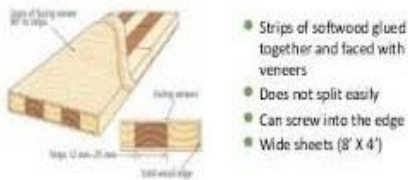




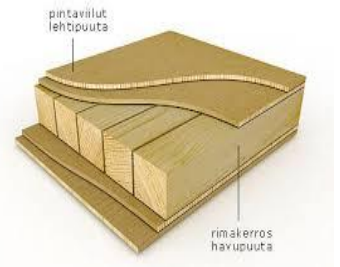
5. **Laminated Board:** This is a board that is made from thin strips of wooden bars or grounded particles. The bars can be laid side by side or in a pile and or the particles bonded together and then covered (laminated) with leather or veneer sheet. It is shown to your right.



Blockboard



6. **Block Board:** This is a board that is made from wooden bars that are much bigger in sizes than the type used in laminated board. In block board, the bars are placed side by side only. They are not usually laminated. An example is shown to your left.



7. **Batten Board:** This is a different type of block board. It only differs from block board in two ways: The thickness and wideness of the wooden bars used in batten board are bigger than those of block board. And, it is laminated with leather. An example is what you see to your right hand side.

## **Week Five: TOPIC: Manufactured Board**

There are certain differences between manufactured board and plain wood. These are presented in the form of advantages and disadvantages that manufactured board have over wood.

### **Advantages of Manufactured Board over Wood**

Listed below are some of the advantages of manufactured board over wood. They are:

1. Manufactured board is more attractive than plain wood.
2. Manufactured board is not easily attacked by termites like in wood because of the variety of wood in it and the chemicals used to make them.
3. Manufactured board can easily be worked on than wood by using workshop tools.
4. Manufactured board is more durable; hence it lasts longer than plain wood.
5. Manufactured board can be folded easily. Hence, it can be used to make mold for building purpose. Wood cannot be folded.

### **Disadvantages of Manufactured Board over Wood**

The following are some of the disadvantages that manufactured board have over wood

1. Manufactured board can be toxic and so are harmful to children and infants.
2. Because of the roughness of some of them, manufactured board can cause injury to people.
3. The chemicals in manufactured board contribute to the sources of air pollution.

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4. Some manufactured board can break easily; hence, it is not all of them that can be used to carry heavy load.
5. Manufactured board has more repulsive appearance than wood when both of them decay or damage.

## **Week Six: TOPIC: Drive Mechanism**

**Meaning:** A drive mechanism is a part of machine that is used to transfer rotational motion from one part of a machine to another. Without drive mechanisms, it will be very impossible for any kind of machine to run, not to talk of running smoothly. It is one of the fundamental parts of machine.

### **Types of Drive Mechanisms**

The different types of drive mechanisms we have are grouped into two, namely:

**1. Flexible Drive Mechanisms:** These types of drive mechanisms are flexible in nature. They look like ropes. That is why they can be folded in the hand. They can wrap around an object, and can even be used to tie up something. But one thing is clear about them: They are very strong so that it is very difficult for them to cut.

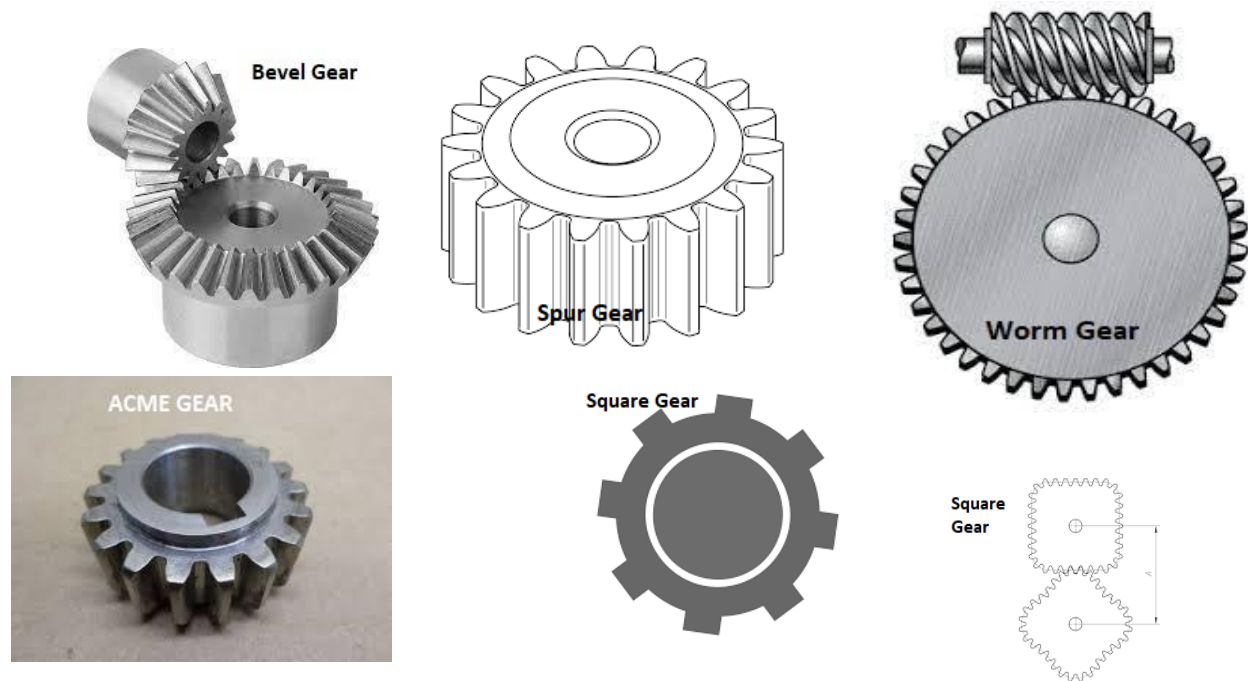
Of course, flexible drive mechanisms are used mainly to transfer rotational motion between two shafts or pipes that are not in touch with each other. Examples of flexible drive mechanisms are belt and chain. Belts require a lot of friction to do its work well. Chains do not require friction to work. In fact, for chain to work well, it requires enough lubrication. Both chain and belt roll over pulleys and sprockets. The pulleys belt roll over are smooth, while that on which chain roll over have teeth.

The different types of belt we have include V-belt, flat belt, and round belt. On the other hand, the different types of chain that we have are single-row, double-row, triple-row and multiple row chains. The examples of these drive mechanisms are shown below



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**2. Rigid Drive Mechanisms:** This is another type of drive mechanisms that is also used to transfer rotational motion between two shafts or pipes that are very close to each other. The shafts do not touch each other; it is the drive mechanisms that touch each other. Without the drivers making this touch with each other, it won't be impossible for them to work. They are very tough, strong, and extremely solid. They are made from metals of the hardest strength. That's why they can perform the kind of job they are designed to do in machines. An example of rigid drive mechanism is gear. And, there are different types of gear, which include: Spur gear, Worm gear, Bevel gear, ACME gear, Square gear, etc.



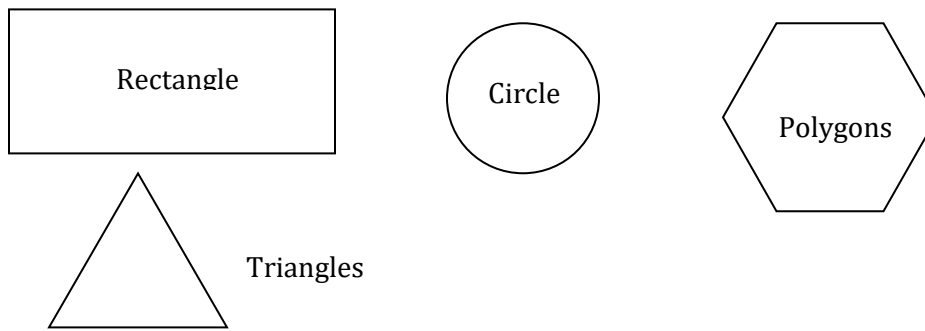
### **Week Seven: TOPIC: Geometrical Construction**

**Meaning:** This is the use of drawing materials such compasses, meter rule, divider, pencils, eraser, set squares, etc to construct simple objects such as plain figures and shapes. Simple plain figures and simple plain shapes are not the same. These two are explained as follows:

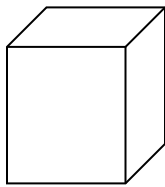
**Plain Figures:** These are objects that do not have thickness. They are drawn between two lines only. One of the lines is vertical and the other is horizontal. Because the lines needed to draw them are only two that is why they are called 2-dimensional drawings or objects. These 2-D objects are the objects that technicians use to draw all kinds of complex shapes and other objects we know. Hence, they are regarded as the fundamental drawing figures or objects. Examples of 2-D figures are circle, triangles (three-sided figures), quadrilaterals (four-sided figures), and polygons (five or more-sided figures). One thing to note about 2-D objects is that their faces all look in one direction. The 2-dimensional axis and some examples of plain figure are shown below.

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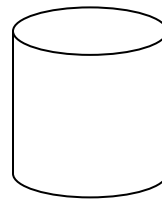




**Plain Shapes:** These are objects that have thickness. They are drawn between three lines. These three lines face different directions, such that one is horizontal, the other is vertical and the third is inclined. To draw these objects, these three lines are required, because they provide the space where the object will occupy. All 3-D objects are formed by combining different types of 2-D objects in special selected ways. Examples of some 3-D objects are cone, pyramid, prism, tetrahedron, hexahedron, etc. It is very important to note that no two faces in any plain shape look in one direction. Each of them faces different directions. The 3-D axis and some of the shapes are shown below.



Cubes, cuboid, etc



Cylinder, Pyramids, etc

**A. Circle:** This is a plain figure, which is formed by drawing a curved line round a fixed point called center of the circle. Circle is one of the fundamental drawing objects and it has the following parts:

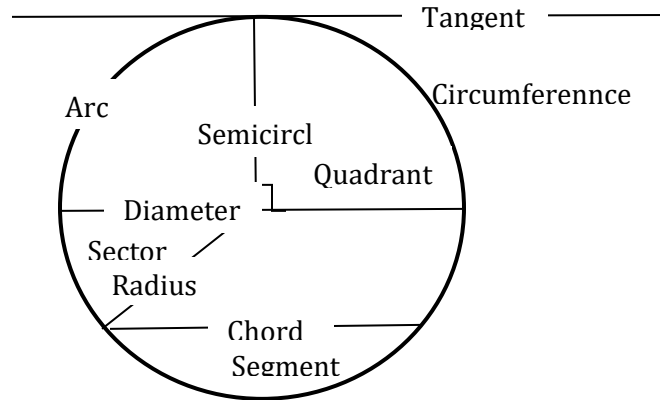
1. **Radius:** This is the straight line from the center of the circle to the circumference of the circle.
2. **Diameter:** This is the straight line that runs from one point on the circumference, passes through the center of the circle and stops at another point on the circumference.
3. **Circumference:** This is the curved line that produces the circle. It starts at a point, goes round the fixed point or center and returns to the starting point.
4. **Chord:** This is the straight line that runs from one side of the circumference to another without passing through the center of the circle.
5. **Quadrant:** This is one area of a circle that is divided into four equal parts. It is formed by two radii, one arc and a  $90^\circ$ .
6. **Arc:** This is a curved line of any length, measured along the circumference of the circle.
7. **Segment:** This is an area in a circle that is formed by a chord and an arc. There are two types of segment. They are minor segment and major segment.
8. **Sector:** This is an area in a circle that is formed by dividing a circle into any number of parts; four equal parts not included. It is formed by two radii, an arc and an angle that is greater or less than  $90^\circ$ . There are two types of sector, namely minor and major sectors.
9. **Angle Subtended at the center of a circle:** This is the angle that two radii or an arc forms at the center of a circle.

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10. **Semi-circle:** This is an area in a circle that is formed by the diameter and an arc. It divides a circle into two equal parts.

11. **Tangent to a circle:** This is a straight line that is drawn from outside the circle, which touches the circle slightly without piercing into it. It is always at  $90^\circ$  to the radius or diameter of a circle.

These parts of a circle are shown below.

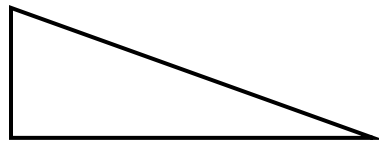


**B. Triangle:** This is a plain figure which is formed by three straight lines that are joined at their ends into one whole object. It is also one of the fundamental drawing objects used in technical drawing and design.

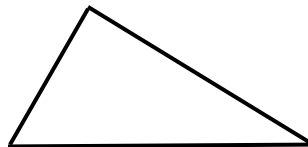
### Types of Triangle

There are four main types of triangle that we have. They are:

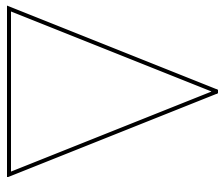
✿ **Right-angled Triangle:** This is a triangle that has  $90^\circ$  as one of its internal angles. It is shown below.



✿ **Scalene Triangle:** It has three unequal sides and three unequal internal angles.

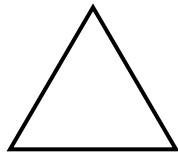


✿ **Isosceles Triangle:** It has two sides and two internal angles that are equal



✿ **Equilateral Triangle:** It has three sides and three internal angles that are equal.

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### Construction of Triangles

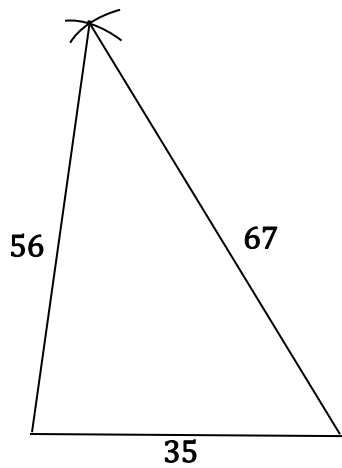
To successfully construct a triangle, three conditions must be met:

- i. Three sides of the triangle must be given
- ii. Two sides and one internal angle of the triangle must be given
- iii. Two angles and one side of the triangle must be given.

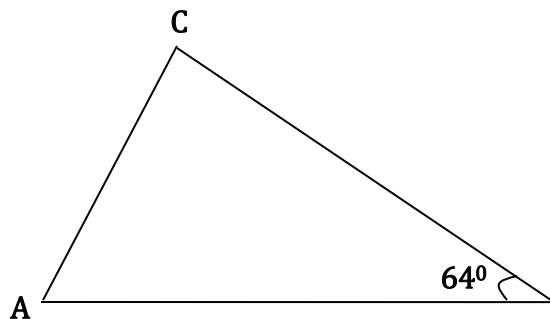
We shall now demonstrate how to construct a triangle by applying these three conditions.

### Examples Problem

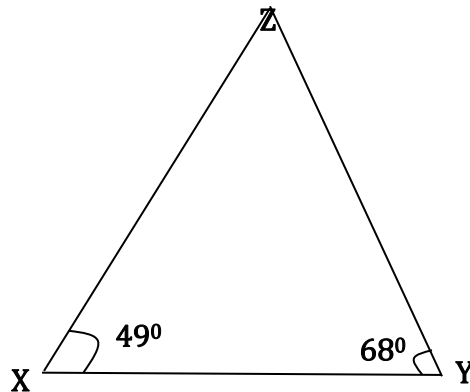
1. Construct a triangle whose sides are 35, 56 and 67.



2. Construct the triangle ABC such that  $\overline{AB} = 52$ ,  $\overline{BC} = 65$ ; if  $\angle ABC = 64^\circ$ .



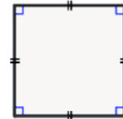
3. Construct the triangle XYZ, given that  $\overline{XY} = 49$ , if  $\angle XYZ = 68^\circ$  and  $\angle ZXY = 51^\circ$



### Week Eight: TOPIC: Quadrilaterals

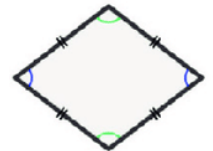
**Definition:** A quadrilateral is a plane figure, which is formed by joining four straight lines of different lengths at their ends. It is one of the fundamental drawing objects used in technical drawing or design work. There are eight different types of quadrilaterals. They are briefly shown and explained as follows:

1. **Square:** This is a plane figure with all four sides equal in length and all its four internal angles are  $90^\circ$ .



2. **Rectangle:** This is a plane figure, which is made up of a pair of two equal opposite sides. Its four internal angles are all  $90^\circ$ .

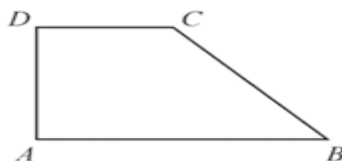
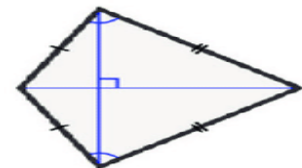
3. **Rhombus:** This is a plane figure, which has four equal sides; but two pair of equal and opposite internal angles. It is formed by stretching a square a bit along one of its diagonals.



4. **Parallelogram:** This is a plain figure that is made up of a pair of two equal opposite sides, and a pair of two equal

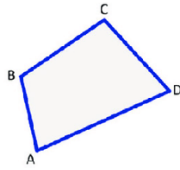
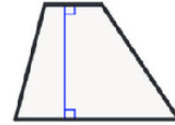
opposite internal angles. It is formed by stretching a rectangle a bit along one of its diagonals.

5. **Kite:** This is a plain figure that has a pair of two equal sides that are adjacent to each other. It has two equal internal angles and two unequal internal angles.



6. **Trapezium:** This is a plain figure with two unequal but parallel sides. One of the remaining two sides is vertical and the other is inclined. It has two right angles, one obtuse angle and one acute internal angle.

7. **Trapezoid:** This is a plain figure with two unequal parallel sides and two unequal inclined sides. It has two obtuse and two acute internal angles.



8. **Deltoid:** This is a plain figure with four sides and four internal angles none of which are equal to each other.

### **Week Nine: TOPIC: Geometrical Construction**

Continued construction of plane figures started in the previous week will dominate the week's entire activities. The teacher will lead the students on a step-by-step process to construct the following plane figures:

1. Selected quadrilaterals such as square, parallelogram, rhombus, and kite.

Detailed steps students will follows to accomplish each task will be explained. Students will work with the teacher for maximum results.

### **Week Ten and Eleven: TOPIC: Energy-Based Appliances**

Energy-based appliances are those appliances we use at home and in the office to do our work. They carry out useful activities for man. Hence, they help to make living easier and more comfortable for man.

Appliances are different from equipment because equipment have huge engines in them. Man makes use of equipment and vehicles outside the home. But appliances are used mainly inside a house like our homes and offices and around the house.

The appliances we will be looking at now are called energy-based because they cannot do any work without energy being supplied to them. There are three main categories of energy that appliances use. They are electrical, chemical and mechanical energies. These energy types will be used to identify the different types of appliances that use of them. They are as follows:

- **Chemical Energy-Based Appliances:** These are appliances that use the energy that comes from chemical, when it is being burnt. Such chemicals include: firewood, charcoal, kerosene, gasoline, petroleum, diesel, leather, and anything that fire can burn. Examples of chemical energy-based appliances are: lantern, gas cooker, stove, generating plant, lighter, charcoal pressing iron, etc.
- **Electrical Energy-Base Appliances:** These are appliances that use electricity only to do work for man. They include: hot plate, boiling ring, oven, toaster, microwave, electric pressing iron, handset, television, etc.

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- **Mechanical Energy-Based Appliances:** These are appliances that require nothing to work except the human hands or legs. They include: scissors, matchet, wheel barrow, bicycle, saw, hammer, mallet, sewing machine, etc.
- **Electromechanical Energy-Based Appliances:** Are appliances that combine electrical and mechanical energies at the same time to do work. They include fan, washing machine, barbing machine, grinding, machine, air conditioners, mixer, etc.