ALPHA CHOICE INNOVATIVE ACADEMY

(International Secondary School)

4/6 Richard Okoroike Close, Praise Hill Estate, Arepo, Ogun State.

BASIC TECHNOLOGY

FIRST TERM 2022/2023 SESSION

GRADE 8

SYNOPSIS

WEEEK	TOPIC
1.	Revision
2.	Quadrilaterals (Definition and Construction)
3.	Polygons (Types and Construction)
4.	Enlargement and Reduction of Plane Figures I
5.	Enlargement and Reduction of Plane Figures II
6.	Wood Work Machines
7.	Mid - Term Break
8.	Metal Work Machines
9.	Friction
10.	Revision
11.	Examination
12.	Examination

WEEK ONE: REVISION

WEEK: TWO: QUADRILATERALS (DEFINITIONANDCONSTRUCTION)

OBJECTIVES:

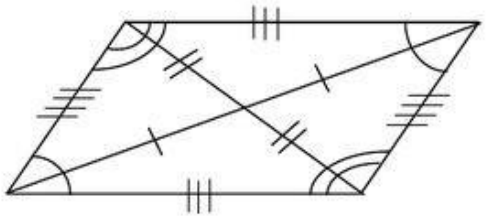
1. Identify Quadrilaterals
2. Highlight Properties of Quadrilaterals
3. Outline the description of Quadrilaterals with the aid of drawing

QUADRILATERALS

A quadrilateral is a **2-dimensional,** closed figure with four straight sides. Quadrilateral just means "**four sides"** (*quad* means four, *lateral* means side).

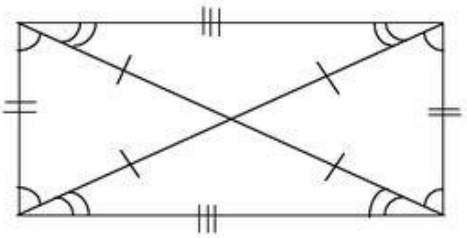
PROPERTIES

PARALLELOGRAMS (rectangles, squares, and rhombi):



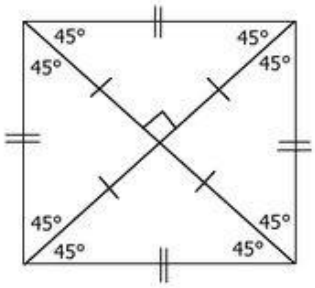
1) Opposite sides of a parallelogram are congruent.
2) Opposite angles of a parallelogram are congruent.
3) Consecutive angles in a parallelogram are supplementary.
4) The diagonals of a parallelogram bisect each other.

RECTANGLES:



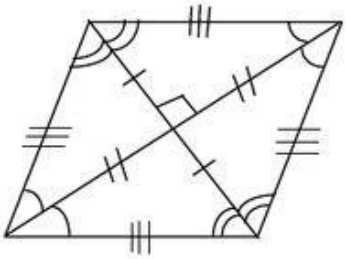
1) Opposite sides are congruent (they equal each other).
2) Opposite angles are congruent (they equal each other).
3) Consecutive angles are supplementary (they add up to 180).
4) Diagonals bisect each other (the parts are equal).
5) Diagonals are congruent (they equal each other).
6) All four corner angles are 90°.

SQUARES:



1) Opposite sides are congruent (they equal each other).
2) Opposite angles are congruent (they equal each other).
3) Consecutive angles are supplementary (they add up to 180).
4) Diagonals bisect each other (the parts are equal).
5) Diagonals are congruent (they equal each other).
6) All four corner angles are 90°.
7) Diagonals perpendicular (the form right angles in the middle).
8) Diagonals bisect angles (the angles equal to each other).

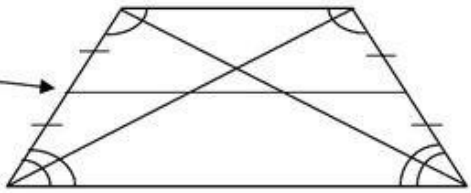
RHOMBI:



1) Opposite sides are congruent (they equal each other).
2) Opposite angles are congruent (they equal each other).
3) Consecutive angles are supplementary (they add up to 180).
4) Diagonals bisect each other (the parts are equal).
5) Diagonals perpendicular (the form right angles in the middle).
6) Diagonals bisect angles (the angles are equal to each other).
7) All four sides are congruent.
8) The diagonals are NOT congruent.

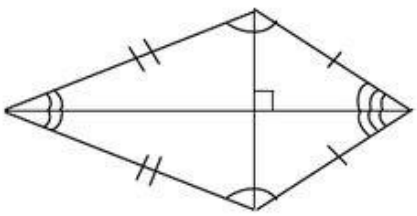
ISOSCELES TRAPEZOIDS:

Median = ½ (base + base)



1) Lower two base angles are congruent (they equal each other).
2) Upper two base angles are congruent (they equal each other).
3) The diagonals are congruent (they equal each other).
4) opposite angles are supplementary (they add up to 180).

Kite



1) Two pairs of consecutive sides congruent, but opposite sides not congruent
2) Diagonals perpendicular.
3) Exactly one pair of angles congruent.
4) One pair of angles bisected.

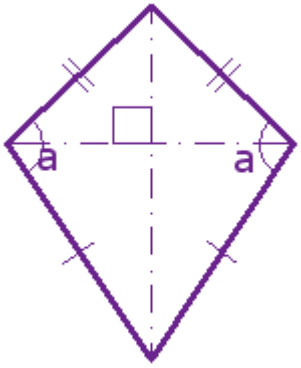
Shape	Shape	Shape	Shape	Shape	Shape
					
Sides 2 pairs of parallel sides and all sides are equal	**Sides** 2 pairs of parallel sides and opposite sides are equal	**Sides** 2 pairs of parallel sides and opposite sides are equal	**Sides** 2 pairs of parallel sides and all sides are equal	**Sides** 1 pairs of parallel sides	**Sides** 2 pairs of equal sides
Angles All angles are right angles	**Angles** All angles are right angles	**Angles** Opposite angles are equal	**Angles** Opposite angles are equal	**Angles** No consistent facts	**Angles** One opposite pair of equal angles
Diagonals Diagonals bisect at right angles	**Diagonals** Diagonals are equal	**Diagonals** Diagonals bisect	**Diagonals** Diagonals bisect at right angles	**Diagonals** No consistent facts	**Diagonals** Diagonals bisect at right angles
Symmetry Reflective: 4 Lines Rotational: Order of 4	**Symmetry** Reflective: 2 Lines Rotational: Order of 2	**Symmetry** Reflective: No Lines Rotational: No order	**Symmetry** Reflective: 2 Lines Rotational: Order of 2	**Symmetry** Reflective: Not consistent Rotational: No order	**Symmetry** Reflective: 1 Line Rotational: No order

EXERCISE

1. What is the name of this quadrilateral?

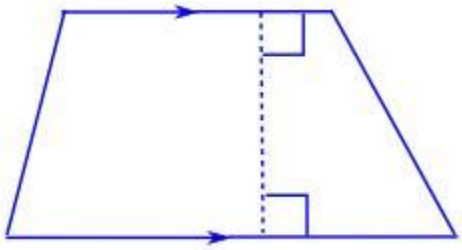
(a) kite
(b) square
(c) rhombus
(d) trapezium

2. What is the name of this quadrilateral?



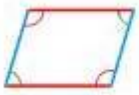
(a) trapezoid or trapezium
(b) kite
(c) parallelogram
(d) rhombus

3. What is the name of this quadrilateral?



(a) kite
(b) parallelogram
(c) rhombus
(d) trapezoid or trapezium

4. What is the name of this quadrilateral?



(a) parallelogram
(b) rectangle
(c) trapezoid or trapezium
(d) kite

5. One of these statements is **not true** of kites

(a) it has two pairs of sides
(b) it has three pairs of sides
(c) the angles where the two pairs meet are equal
(d) one of the diagonals *bisects* (cuts equally in half) the other

WEEK THREE: POLYGONS (TYPES AND CONSTRUCTION)

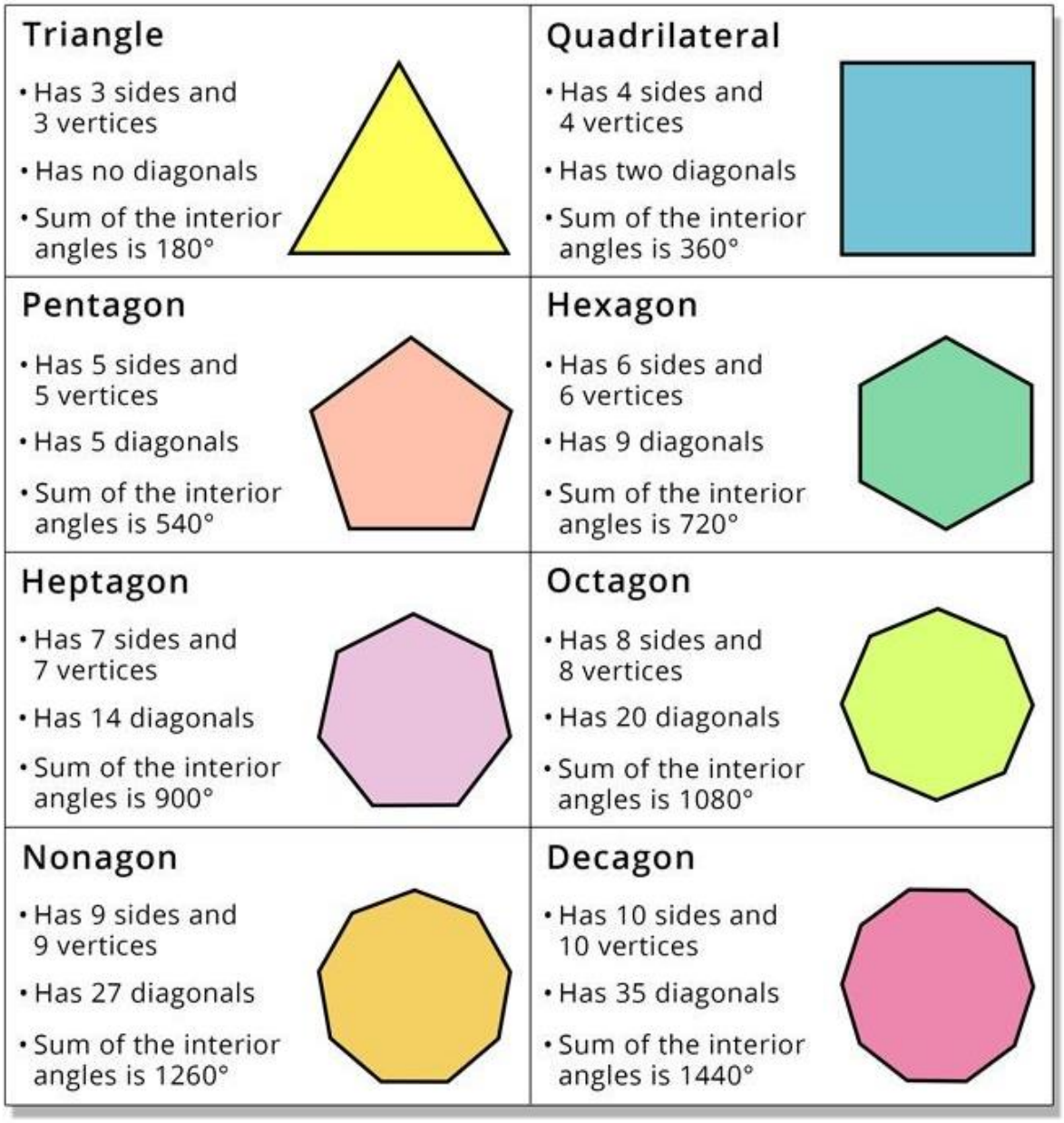
OBJECTIVES:

1. Identify the types of polygons
2. Highlight the full characteristics of polygons.
3. Outline steps involved in the construction of polygons.
4. Describe the term ‘polygon’.

Definition of a Polygon

Polygons are everywhere! A polygon is any 2-dimensional shape formed

by joining three or more straight sides. A polygon is said to be regular if all its sides are equal and its angles are equal.



Types of Polygon

A **pentagon** is a polygon with five sides.

A **hexagon** is a polygon with six sides.

A **heptagon** has seven sides.

An **octagon** has eight sides.

A **decagon** has ten sides.

Construction of a Polygon

1. CONSTRUCTION OF Construct a Pentagon with sides = 60mm, using the rule 360/N.

(i). Draw a horizontal line AB=40mm.

(ii). With A and B as centres in turn, use a protractor to locate 72^0 (i.e. $360^0/5 = 72^0$.

(iii). Draw a line from A and B to the point located at 72^0.

(iv). With A and B as centres in turn and radius AB, cut the produced lines at C and D respectively.

(v). With C and D as centres and the same radius, cut arcs to intersect at E.

(vi). Join C and D to E to complete the required pentagon. E.g.

CONSTRUCTED REGULAR PENTAGON

2. Construct a Regular Octagon Using the 45^0 Set Square (i). Draw a horizontal and mark off AB = 40mm

(ii). At A and B, draw lines, using the 45^0 set square

(iii). With the pair of compasses, cut off CD = 40mm

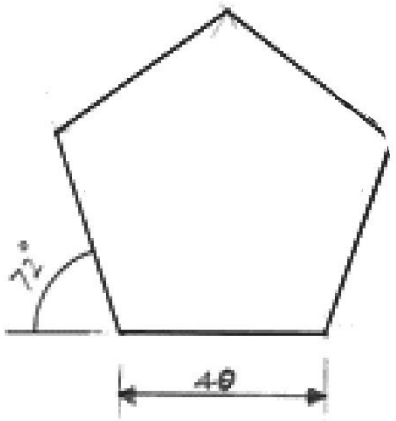
(iv). Draw vertical lines at C and D respectively and mark off EF

(v). At E and F, draw lines with 45^0 set square again

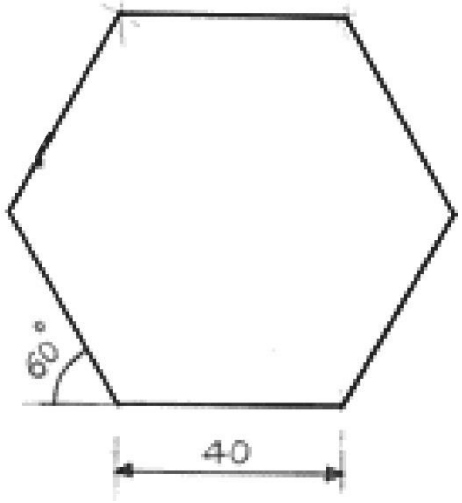
(vi). Mark off GH = 40mm.

(vii). Join G to H to complete the required Octagon. E.g.

CONSTRUCTION OF A REGULAR PENTAGON



CONSTRUCTION OF A REGULAR HEXAGON



EXERCISE

1. Describe the term ''Polygon''
2. Construct pentagon given that its diameter is 60mm
3. Highlight FIVE types of Polygon
4. Construct hexagon given that its diameter is 60mm
5. Identify types of polygons.

WEEK FOUR: ENLARGEMENT AND REDUCTION OF PLANE FIGURES I

OBJECTIVES:

1. Identify plane figures.
2. Highlight the process of enlargement of plane figures.
3. Enlarge a plane figures to a given ratio.

Enlargement and Reduction

This topic shows you how to enlarge or reduce a given object that is usually given as a plane figure. The following slides show the basic steps to making an object bigger or smaller.

ENLARGEMENT
AND
REDUCTION

Let's start with Enlargement

'Enlargement' is the term used in drawing when you are making an object bigger by increasing the lengths of each side by using a given ratio.

In an "enlargement" ratio the second numeral is always bigger than the first numeral

Examples of enlargement ratios:

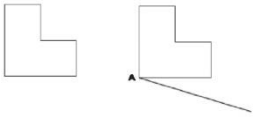
1:2 2:3 1:5 3:7 5:12 16:59

Do you notice the bigger numbers?

Let's have a look at one example:

An object is given for you to enlarge to the ratio of 1:2

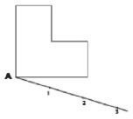
Step 1: Draw an oblique line from a suitable corner. For this example I will choose corner "A"



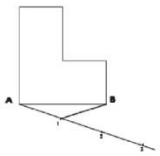
Step 2: Sum up the total of the numbers in the given ratio 1:2

1+2 = 3

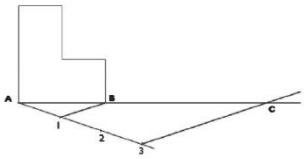
Now, open your divider or compass to a suitable radius and mark off, from point "A" 3 equal divisions on the oblique line.



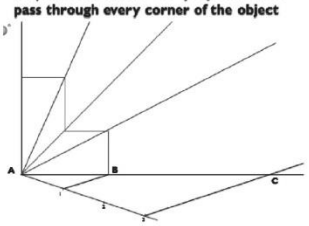
Step 3: Draw a straight line from point "1" to point "B" at the end of the line AB



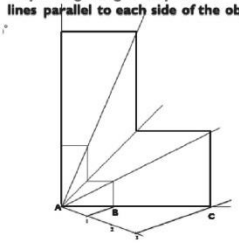
Step 4: Project line AB more to the right. Then draw a line parallel to line "1B" from point '3' to intersect with the projected line at "C".



Step 5: From corner "A" project lines to pass through every corner of the object



Step 6: Beginning from point "C" draw main lines parallel to each side of the object.



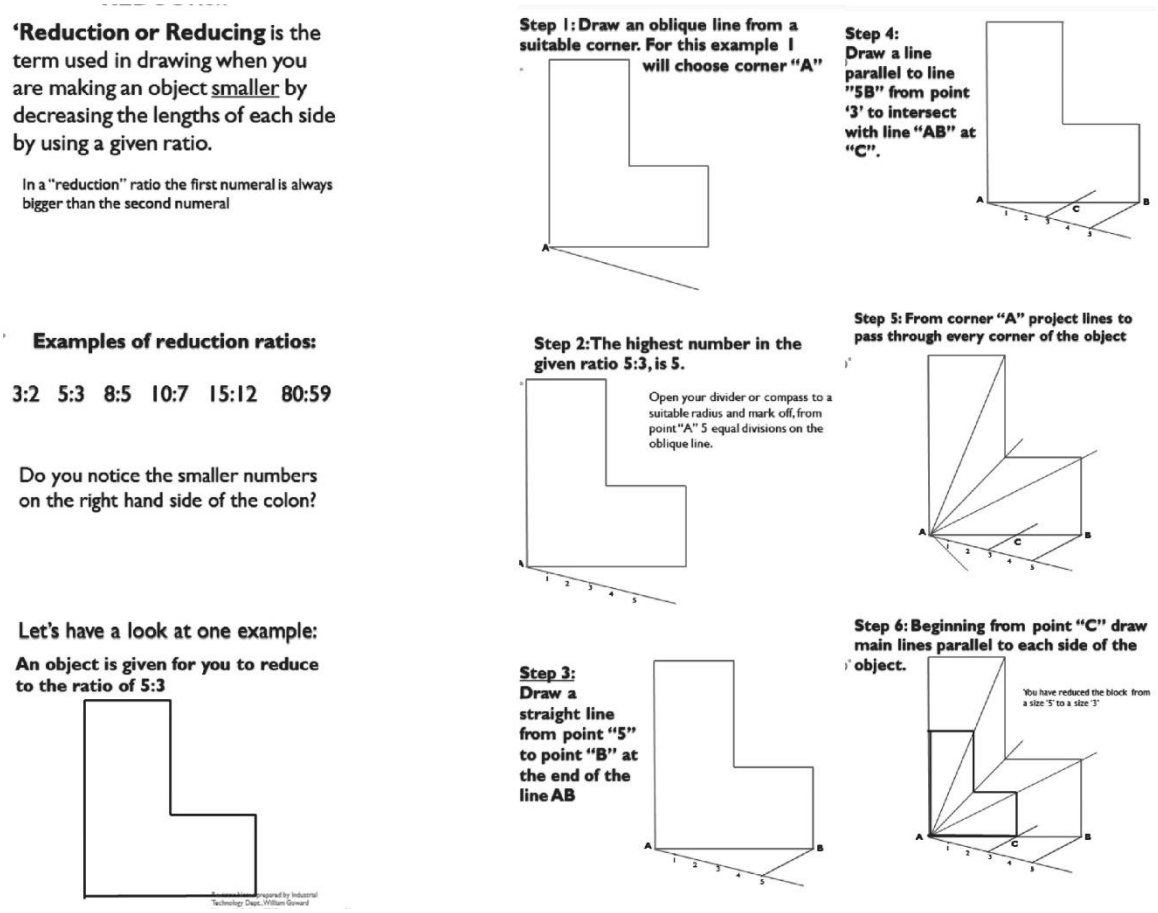
EXCERCISE

1. Describe a plane figure
2. Highlight 5 examples of plane figures
3. Enlarge the figure given above in ratio 3:7

WEEK FIVE: ENLARGEMENT AND REDUCTION OF PLANE FIGURES II

OBJECTIVES:

1. Identify plane figures.
2. Outline the process of reduction of plane figures.
3. Reduce a plane figures to a given ratio.



To construct a figure similar to a given figure ABCDEF with its sides in the ratio of 4:6 to those of the given figure

EXERCISE

1. Differentiate between enlargement and reduction
2. Describe a plane figure
3. Highlight 5 examples of plane figures
4. Reduce the figure given above in ratio 5:3

WEEK SIX: WOOD WORK MACHINES

OBJECTIVES:

1. Identify types of wood work machines.
2. Highlight all the safety hints in using the woodwork machines
3. Outline all the safety hints in using the woodwork hand tools
4. Describe wood work machine.

WOOD WORK MACHINES

Woodwork machines refer to the common equipment used in the wood workshop. Most of these machines are heavy and cannot be handled ordinarily. Some of them are fixed on the ground and are used with electric power.

FORMS OF WOOD WORK MACHINES

1. Portable power tools

CORDLESS DRILL
DEWALT - $100

IMPACT DRIVER
DEWALT - $100

HAMMER DRILL
DEWALT - $130

MITER SAW
DEWALT - $350

CIRCULAR SAW
DEWALT - $130

JIGSAW
DEWALT - $130

ORBITAL SANDER
DEWALT - $60

FINISH NAILER
DEWALT - $180

SHOP VAC
RIGID - $100

2. Machines

Portable Power Tools

These are tools that are held in the hand and operated with electric current. The examples to be discussed here are:

1. Sanders

2. Hand drills

3. Fret-saw

Sanders

Sanding means smoothing of work with coated abrasives. Available portable sanders for wood-work smoothing including belt sanders and drum sanders.

Disc sander

Orbiter sander

Belt Sander

Drum sander

Hand Drills

Drills and drilling machines are the commonest tools used for making holes. The operation is called drilling and the tool used is called a drill.

There are different types of drills used in a metal workshop:

a. Twist drill;

b. Flat drill;

c. Straight-fluted drill;

d. Counter-sink drill.

Machines

The other types of the equipment's used in woodworks are those equipment which are not portable as the discussed earlier. These machines are heavy. They are fixed on a spot most of the times. Examples are circular saw, band saw, wood lathe, surface planner, thicknesser, sanders, drills, etc.

Safety Hints in Using the Woodwork Machines

1. Remove loose fitting clothings, rolling sleeves aprons and eye shield.

2. Remove scraps from saws, tables and floor.

3. Regular oiling and greasing of bearing must be encouraged.

4. Use the correct saw for each job.

5. Saws should be properly set and should be sharp.

6. Before switching one, make sure the blade runs free.

7. Stand to one side when switching on.

8. Switching on to make adjustments on machine or checking measurements or changing belt speed.

9. Do not overload the machine or force it to work beyond its capacity.

10. Make sure you know how to use the machine that you want to use.

EXERCISE

1. Highlight 5 safety hints in using the hand drills
2. Outline 5 safety hints in using the woodwork hand tools
3. Differentiate between portable power tool and machine
4. Identify 5 woodwork hand tools
5. Enumerate 4 woodwork portable power tools

WEEK SEVEN: MID TERM BREAK

WEEK EIGHT: METAL WORK

MACHINES

OBJECTIVES:

1. Identify types of metal work machines.
2. Highlight all the safety hints in using the metal work machines
3. Describe metal work machine.

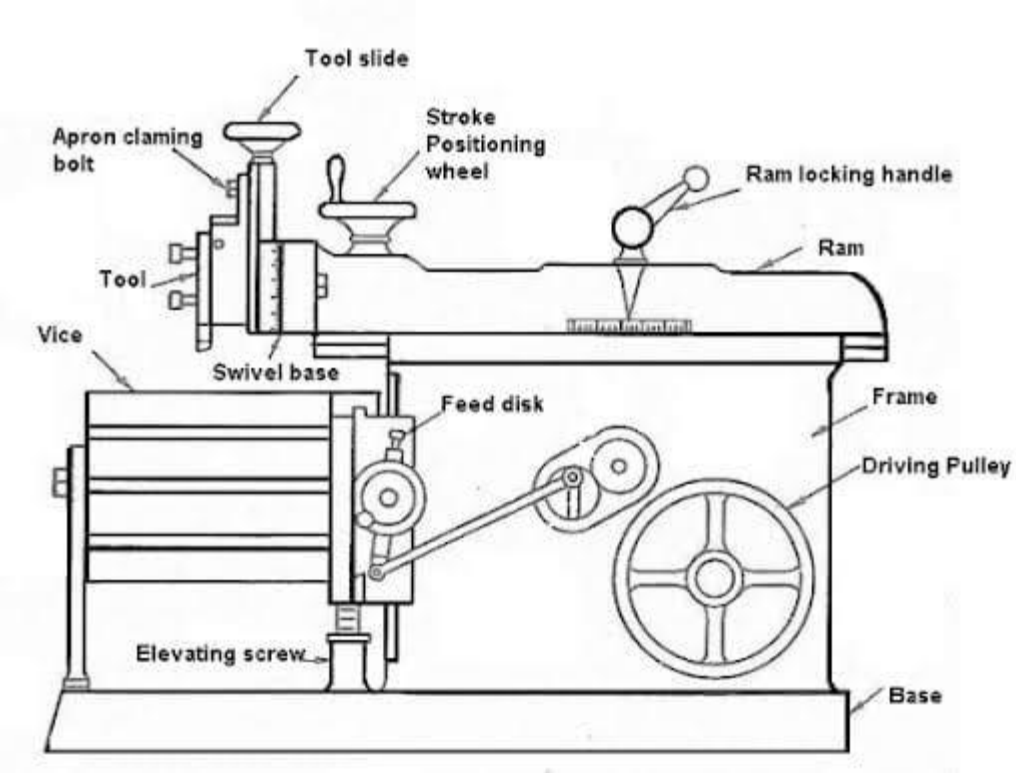
METAL WORK MACHINES AND TOOLS

A machine tool is a machine that cuts metals and performs some other operations by manipulation of its parts

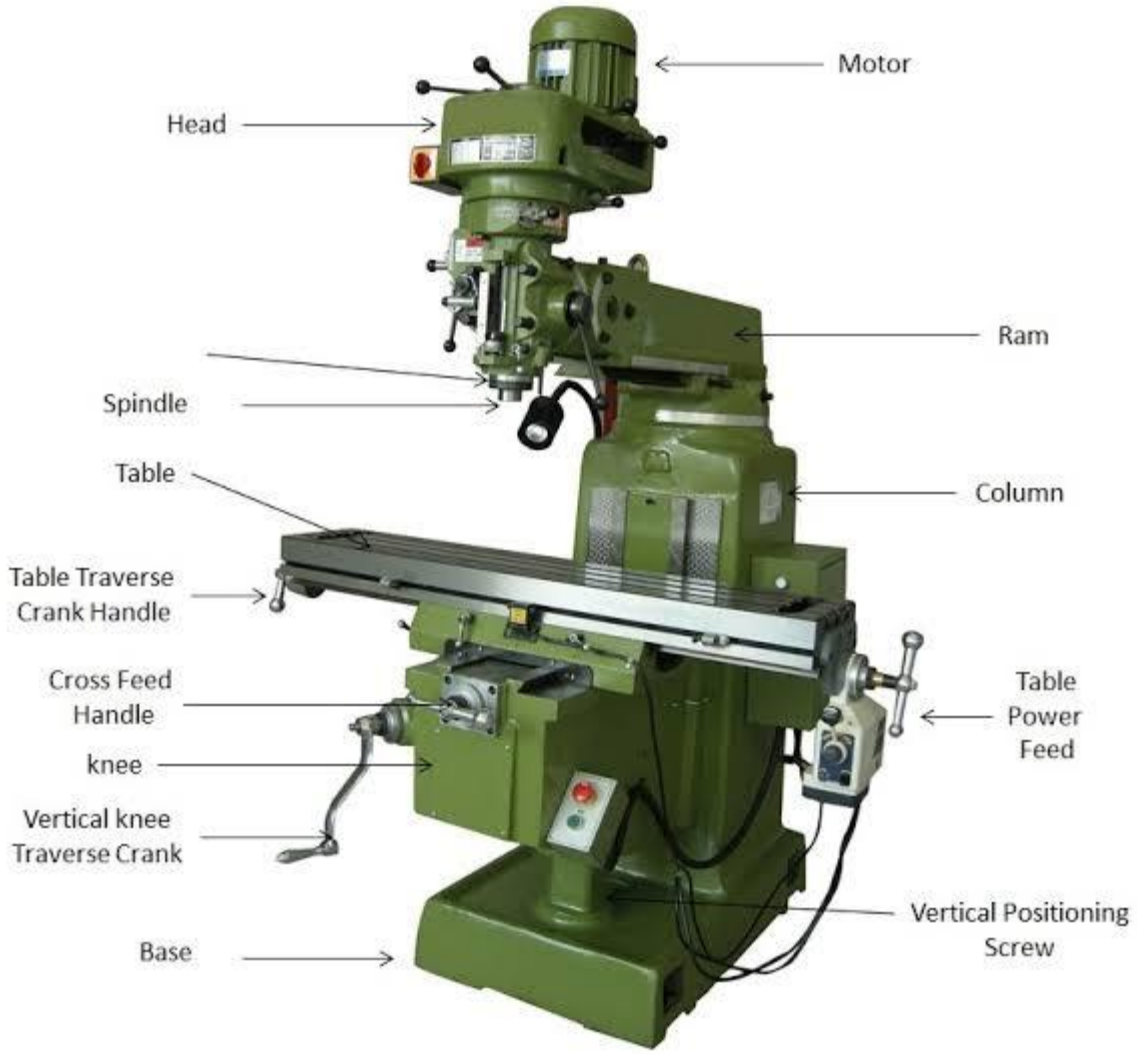
Types of Metal work Machines and their Functions

i. Lathe

ii. Shaping machine



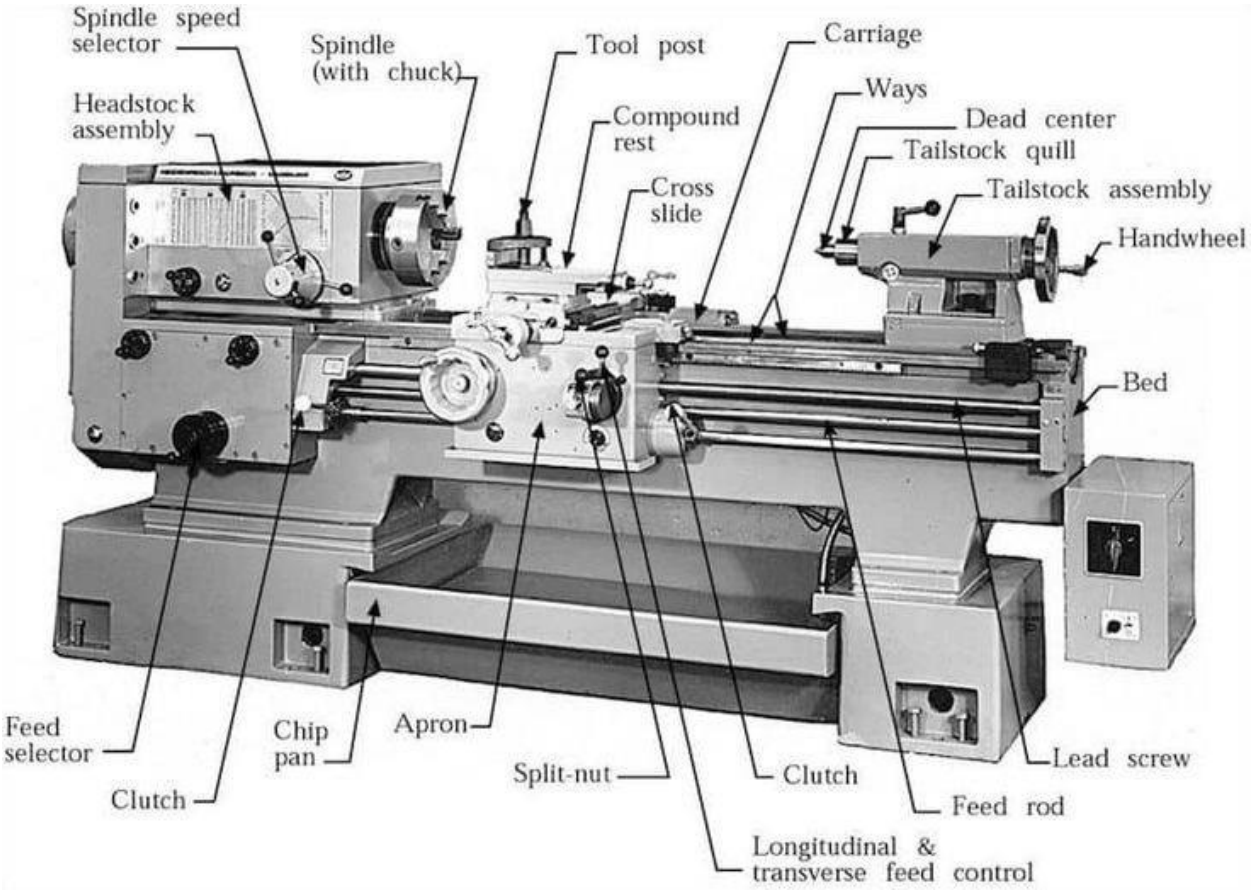
iii. Milling machine



iv. Drill press

LATHES

There are two types of metal lathes – the plain lathe and the screw cutting lathe. The purpose of a lathe is to remove metal by use of a rigidly controlled hard steel-cutting tool. Lathes are equipped with various devices as presented below:



Taper Turning

Taper turning is the production of a piece of round work in which one end is bigger than the other. It is always a conical shape. There are few methods by which the shape could be produced on the lathe.

Surfacing

Surfacing is achieved when the cutting tool moves perpendicular to the axis of rotation of the job being machined and therefore produces a flat surface. A good face is got when a suitable surfacing tool is used.

Sawing

The power sawing machine is used to cut the soft material with coarse tooth back-saw blades. The coarse tooth ensures that the metal chips do not clog the teeth.

Abrasives

In metal working, two types of abrasive are used. These are aluminium oxide and silicon carbide. Silicon carbide is suitable for the grinding of materials of low tensile strength such as iron, brass, bronze, copper, aluminium and cemented carbide.

Drill Press

Small diameter holes can be drilled with the use off-hand drills, as the holes to be drilled becomes larger, the handle of the drill can be replaced with breast plates at right angles.

Cutting Fluids

These are sometimes called coolants or cutting lubricants. They are important on machine tools. They are used to:

a. cool works and tools, and to lessen distortion.

b. lubricate, thereby reducing power consumption.

c. preventing welding of chips to tool.

d. wash away tools chips and swarf.

e. improve surface finish

f. protect tools against corrosion.

Coolant may be divided into three main classes:

a. Soluble oils

b. Straights oils

c. Water-based fluids

Soluble oils: These are mineral oils treated to form an emulsion when added to water. They usually leave on the machine a protective cooling or film that is rust resistant.

Straight oils: These are mainly mineral and extreme pressure (EP) cutting oils. They are used undiluted for slow heavy-cutting operations, as they process good lubricating properties.

Water-base fluids: These are solutions of salts and other minerals in water. They have good cooling properties.

EXERCISES

1. Describe the term ''lathe machine''
2. Highlight 3 types of Machines
3. Outline three classes of coolants
4. Identify areas of application of coolants
5. Enumerate the importance of coolants
6. Highlight the difference between machines and tools
7. Outline THREE types of metal work

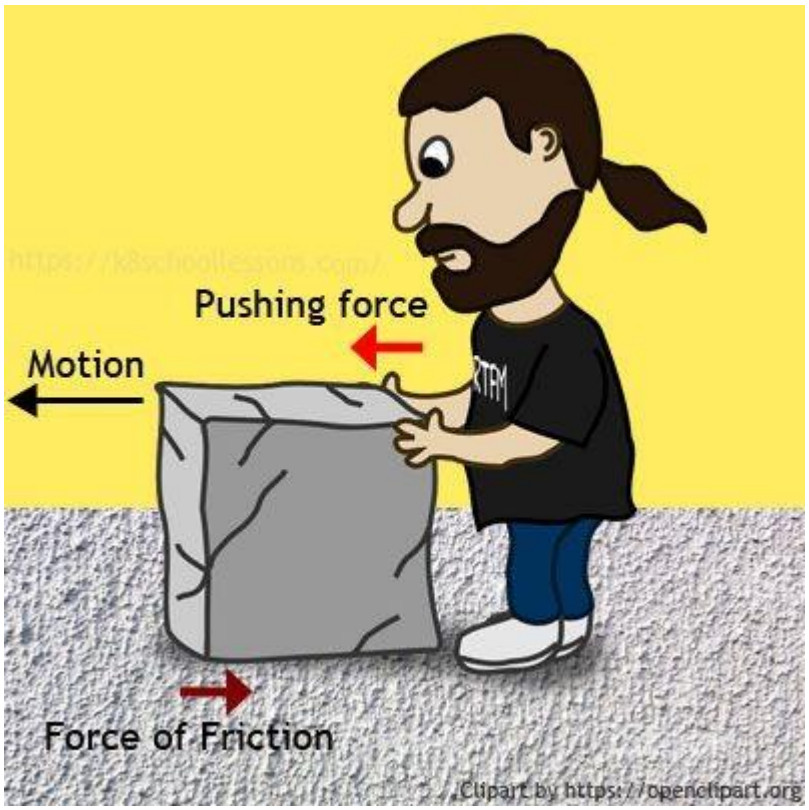
WEEK NINE: FRICTION

OBJECTIVES:

1. Identify all the causes of friction.
2. Highlight the methods of reducing friction.
3. Outline all the advantages and disadvantages of friction
4. Describe a friction.

DEFINITION OF FRICTION

Friction is the resistance to motion of one object moving relative to another. It is not a fundamental force



Causes of Friction

Friction is a force that resists the relative motion between two objects or materials. The causes of this resistive force are molecular adhesion, surface roughness, and deformations.

Surface roughness

All solid materials have some degree of surface roughness. If you looked at what seems to be a smooth surface under a high-powered microscope, you would see bumps, hills and valleys that could interfere with sliding motion.

ADVANTAGES OF FRICTION

Friction plays a vital role in our daily life. Without friction we are handicap.

1. It is becomes difficult to walk on a slippery road due to low friction. When we move on ice, it becomes difficult to walk due to low friction of ice.

2. We cannot fix nail in the wood or wall if there is no friction. It is friction which holds the nail.

3. A horse cannot pull a cart unless friction furnishes him a secure Foothold.

DISADVANTAGES OF FRICTION

Despite the fact that the friction is very important in our daily life, it also has some disadvantages like:

1. The main disadvantage of friction is that it produces heat in various parts of machines. In this way some useful energy is wasted as heat energy.

2. Due to friction we have to exert more power in machines.

3. It opposes the motion.

4. Due to friction, noise is also produced in machines.

5. Due to friction, engines of automobiles consume more fuel which is a money loss.

METHODS OF REDUCING FRICTION

There are a number of methods to reduce friction in which some are discussed here.

USE OF LUBRICANTS: The parts of machines which are moving over one another must be properly lubricated by using oils and lubricants of suitable viscosity.

USE OF GREASE: Proper greasing between the sliding parts of machine reduces the friction.

USE OF BALL BEARING: In machines where possible, sliding friction can be replaced by rolling friction by using ball bearings.

DESIGN MODIFICATION: Friction can be reduced by changing the design of fast moving objects. The front of vehicles and airplanes made oblong to minimize friction.

EXERCISE

1. Which of the following actions will reduce friction?
(a) Make the surfaces rougher
(b) Make the surfaces smoother

(c) Increasing the contact between the surfaces
(d) Exerting more force on the surfaces

2. Lubrication is a way to make a surface
(a) clean
(b) smooth
(c) rough
(d) dirty

3. The stronger the forces acting on the surfaces…
(a) the higher the friction
(b) the lower the friction
(c) the higher the smoothness
(d) the lower the smoothness

4. One of these is not a class of lubricants
(a) solid
(b) liquid
(c) gaseous
(d) flat

5. Greases contain a thickening agent that makes them
(a) solid
(b) semi-solid
(c) liquid
(d) gas