INDUSTRIAL TECHNOLOGY

TECHNICAL DRAWING
LEVEL 7

Topic	Skills	Knowledge	Understanding	Attitude	Content	Materials	Methods/ Strategies	Projects	Evaluation	Area of Integration
Technical Drawing	Listening to explanations. Formulating answers to questions. Speaking and writing Standard English.	State the definitions of Technical Drawing.	Explain the differences between Technical Drawing and Art.	Appreciate that Technical Drawing is an important part of general education.	Technical Drawing is a universal graphic language. Technicians, engineers and draftsmen use lines, letters, numerals and diagrams as the principal means of communication.	Chart showing examples of Technical Drawings.	Discuss key words-graphic, language, universal, communication. Explain what architects and draftsmen do and how their drawings are used to produce articles. Explain the difference between Technical Drawing and Art.	Ask students to compile a folder on the changes in architectural design and motor vehicle design.	Ask students to state what technical Drawing is. Let students explain the difference between Technical Drawing and Art.	Building Technology Mechanical Engineering Technology Electrical Technology Language Arts.
History of Technical Drawing.	Compiling and presenting a report on the History of Technical Drawing.	State the brief history of Technical Drawing.	Explain the use of Technical Drawing in ancient times.	Using Technical Drawing to communicate ideas of a technical nature.	The earliest known Technical Drawing is the plan view of a fortress drawn by Chaldean engineer Gudea and engraved on stone tablet. The first written evidence of the use of Technical Drawing was in 30 B.C. when the Roman Architect Vitruvius wrote a treatise on architecture.	Chart showing ancient and modern Technical Drawings.	Explain how ancient man communicated. Explain who Vitruvius was and what his treatise was all about. Explain the changes in Technical Drawing and what influenced these changes.	Let students present a report on the history of Technical Drawing.	Ask students who Vitruvius was. Let students explain his link to Technical Drawing.	Language Arts Social Studies.

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The types of Technical Drawing.	Identifying the types of Technical Drawing.	List the types of Technical Drawing -Engineering Drawing -Architectural Drawing -Technical Sketching -Descriptive Geometry.	Explain the difference between the types of Technical Drawing.	Appreciate the purpose served by each type of Technical Drawing.	The Types of Technical Drawing are:- 1.Engineering Drawings 2.Architectural Drawings 3.Technical Sketching 4.Descriptive Geometry Geometry forms the basis of foundation of Technical Drawing.	Samples of the types of Technical Drawing.	Display examples of Technical Drawing. Discuss each type of drawing.		Let students give oral and written presentation s on the types of Technical Drawing.	Building Technology Mechanical Engineering Technology Electrical Engineering Technology Mathematics (Geometry)
Drawing equipme nt and instru-ments.	Identifying and listing drawing equipment and instruments. Manipulate drawing equipment and instruments to produce accurate drawings.	List the names of drawing equipment and instruments -T-square -Set square -Compass -Dividers -Protector -Scales -Pencils -Drawing clips -Eraser -Drawing paper -Drawing board.	Explain the use of each type of drawing equipment and instruments.	Recognizes and appreciate the need for correct use of drawing equipment and instruments. Care and maintain drawing equipment and instruments.	Common drawing equipment and instruments are T-square, set square, scales, pencils, compasses, dividers, protractors, irregular curves, drawing clips, drawing paper, erasers.	Examples of all drawing equipment and instruments.	Display drawing equipment and instruments. Let students list the names of each type of drawing equipment. Explain the correct use of drawing equipment and instruments. Demonstrate the correct use of each type of drawing equipment.	Let students draw chart to show 1.Drawing equipment and instruments 2.Names 3.Correct Uses.	Let students label each type of drawing equipment and instrument. Ask students to explain the correct use of each type of drawing equipment and instrument.	Mathematics Language Arts.

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Letters and Numbers.	Form upright and/or sloping upper and lower case letters and numbers. Draw guide lines for lettering.	List the styles of letters and numbers used in Technical drawing -upright / vertical -sloping / slanting single strong 1)upper case 2)lower case Gothic style lettering.	Explain the difference between upper case and lower case letters.	Appreciate that simplicity and legibility are the keys to good lettering.	The styles for lettering:- 1.Upright / vertical 2.sloping / slanting In any style of lettering uniformity is essential. Guidelines for good lettering. Single stroke letters: i)Upper case ii)Lower case Gothic style in lettering.	Chart showing styles of letters and numbers.	Display examples of styles of lettering. Demonstrate with emphasis on uniformity, shape, size, spacing and balance, styles of lettering. Practice by students.		Let students write sentences using the styles of lettering.	Art Social Studies Integrated Science
Preparation of drawing sheet.	Drawing border lines Preparing a title block.	State the types and intensity of lines used for the border and title block -light -bold.	Distinguish the difference between the bold border lines and the light lines in the title block.	Appreciate the need for neatness, uniformity and clarity.	Layout of borders. Format for Title Block.	Chart showing examples of Title Block.	Explain the importance of a Title Block. Demonstrate the drawing of border lines and the preparation of a Title Block.		Let students draw border lines and prepare title blocks on all paper used for drawing.	Geography.

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Lines used in Technical Drawing.	Identifying the types of lines used in Technical Drawing Drawing each type of line using different 1)Slope)Pencil 3)Direction 4)Intensity	List the names of the types of lines used in Technical Drawing Define 'line', 'straight line', 'curved line', 'horizontal', 'vertical', 'oblique', 'parallel', lines'. State the table of metric measurements from millimeters to kilometers.	Explain 1) The correct use of each type of line in Technical Drawing. 2)The importance of the correct application of the different types of line in Technical Drawing. Convert units of metric measurement to larger and smaller units.	Using the appropriate Technique for Drawing Lines.	A line can be defined as the path between two points. A straight line is the shortest distance between two points. Lines can either be straight or curved. Lines can be drawn in any position – horizontal, vertical, oblique. Parallel lines are the same distance apart. The alphabet of lines.	Chart showing the alphabet of lines.	Discuss the meaning of the word line. Let students formulate a definition of line. Discuss what a straight line is. Explain the different line positions and the alphabet of lines.	Students identify and label the types of lines from Engineering and Architectural Drawings.	Let students produce/ draw lines from given information.	Mathematics Building Technology Mechanical Engineering Technology Electrical Technology.
Linear Measure ment the Internatio nal System of units.	Measuring in millimeters and centimeters using a ruler.			Demonstra-ting accuracy in measure-ment.	Table of the SI Metric System from millimeters to kilometers. Unit Symbols.	Chart showing the conversion method from millimeters to kilometers the metric rule.	Explain and demonstrate how to measure in the various units of the SI system. Let students do practice exercises using the SI system of measurement.		Oral questions and answers on the conversion of millimeters to centimeters. Let students draw lines to given lengths using the SI system of measure ment.	Mathematics

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Geometrical Constructions Bisecting a Straight Line.	Bisecting a straight line using a ruler, compass and pencil.	Define 'bisect' and bisector' List the steps in bisecting a straight line.	Explain the words bisect and bisector.	Working with speed accuracy and neatness.	To bisect is to divide into two equal parts. A line that divides another into two equal parts is called the bisector.	Drawing Instruments. Diagram showing bisected lines.	Discuss the meaning of bisect and bisector. Let students form definitions of bisect and bisector List the steps in bisecting a line. Demonstrate the steps. Let students practice the steps in bisecting a line.		Let students explain the procedure in bisecting a straight line. Exercises on the bisection of straight lines…	Mathematics Building Technology Mechanical Engineering Technology
Geometrical Constructions Drawing Perpendicular Straight Lines To Satisfy Given Conditions.	Drawing a line perpendicular to a given line 1) from a point on the line 2) from a point above the line.	Define perpendicular List the steps in drawing a line perpendicular to a given line.	Explain the uses of perpendicular lines.	Working with speed accuracy and neatness.	Perpendicular lines are lines which are at a right angle (90^o) to each other.	Drawing instruments. Diagram showing perpendicular Lines.	Discuss the meaning of perpendicular lines. List the steps in drawing a line perpendicular to a given line. Demonstrate the steps. Let students practice the steps. Supervise and correct if necessary.		Let students explain the procedure in drawing a line perpendicular to a given line. Exercise on drawing perpendicular straight lines.	Mathematics Building Technology Mechanical Engineering Technology

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Geometrical Constructions Drawing A Straight line.	Measuring line segments using a ruler and a pair of compasses. Drawing line segments.	State the definition of a straight line.	Drawing a straight line in a given direction.	Working with speed accuracy and neatness.	A straight line is the shortest distance between two points. Procedure for drawing a straight line to a required length with ruler and compasses.	Ruler Compass Pencil Chart showing straight lines of different lengths.	Demonstrate how to draw a given straight line using ruler and compasses Let students practice given examples.		Let students draw, measure and record the lengths of various straight lines.	Mathematics
Drawing parallel straight lines.	Drawing parallel horizontal lines using T-square. Using set square and T-square to draw a)parallel vertical lines b)parallel inclined lines. Using two set squares to draw lines parallel to a given line.	Define parallel lines. Define horizontal lines. Define vertical lines. Define inclined line. List the steps to perform each skill.	Use of the appropriate instrument to draw parallel lines.	Working with speed accuracy and neatness.	Parallel lines are the same distance apart and they do not meet in either direction when produced. Distinction of horizontal, vertical and inclined lines. Methods for drawing parallel lines.	Chart showing horizontal, vertical, inclined and parallel lines.	Demonstrate how to draw horizontal parallel lines using the T-square. Explain why these lines are parallel. Demonstrate how to draw vertical parallel lines and inclined parallel lines. Give students practice.		Let students show examples of parallel straight lines in various positions.	Art Mathematics

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Geometrical constructions dividing a straight line into a given number of equal parts.	Dividing a straight line into equal parts using, ruler a pair of compasses, set square and pencil.	List the steps in dividing a straight line into a number of equal parts.	Using appropriate instruments to divide a straight line into equal parts.	Working with speed accuracy and neatness.	A straight line can be divided into any number of equal parts geometrically.	Drawing instruments	Demonstrate the division of straight lines into equal parts. Let students practice dividing lines into equal parts.		Exercise on the division of straight lines of given lengths into equal parts.	Mathematics Building Technology Mechanical Technology
Angles: Definition Parts and units of angular measurement	Drawing angles using the protractor. Label the parts of an angle -vertex -arms	State the definition of 'an angle'. List the parts of an angle. State the unit of angular measurement.	Using appropriate instruments in measuring and drawing a variety of angles.	Working accurately in measuring and drawing angles.	An angle is formed when two straight lines meet. The parts of an angle are the arms and the vertex. The unit of angular measurement is the degree.	Diagram showing parts of an angle.	Demonstrate drawing of angles in different positions. Discuss definition of angle, parts, unit of angular measurement. Let students practice drawing angles using the protractor.		Let students draw and label the parts of an angle. Exercises on drawing angles of given sizes.	Mathematics Building Technology Mechanical Technology.

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Kinds of angles.	Drawing the various kinds of angles.	State the definition of 'acute', 'right', 'obtuse', 'straight' and 'reflex' angles. Identify each kind of angle.	Use of appropriate instruments in the construction of various angles -acute -right -obtuse -reflex.	Working accurately to draw angles.	Kinds of angles 1.Acute - less than 90^{o} 2.Right – 90^{o} 3.Straight – 180^{o} 4.Obtuse – greater than 90^{o} less than 180^{o} 5.Reflex greater than 180^{o} less than 360^{o}.	Diagram showing the kinds of angles.	Demonstrate the drawing of each kind of angle. Let students draw and label the kinds of angles.		Give several angles to be identified. Let students draw types of angles from a given list	Mathematics Building Technology Mechanical Technology
Constructing angles that are multiples of 60^{o}.	Manipulating geometrical instruments to construct angles of 120^{o} and 180^{o}.	State the steps in constructing angles of 120^{o} and 180^{o}.	Using appropriate techniques for constructing various angles.	Working with accuracy speed and neatness.	Multiples of 60^{o} and 120^{o} and 180^{o}.	Drawing instruments.	Let students construct angles of 60^{o}, 120^{o} and 180^{o} after demonstration on the chalk board.		Let students explain the term multiple and give examples. Exercise on constructing 60^{o}, 120^{o} and 180^{o} angles.	Mathematics Building Technology Mechanical Technology.

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Bisecting an angle.	Bisecting an angle using ruler, a pair of compasses, and pencil.	State the definition of bisect.	Selecting and using the correct instruments for bisecting various angles.	Working with neatness, accuracy and speed.	An angle is bisected when it is divided into two equal angles.	Drawing instruments.	Explain the term bisect. Demonstrate steps in bisecting an angel. Let students practice each step.		Exercises in drawing given angles and bisecting them.	Mathematics Building Technology Mechanical Technology
Constructing angles.	Constructing angles of 30^o, 45^o, 75^o, 90^o, 105^o, 135^o using ruler, compasses and pencil.	List the sizes of angles that can be constructed.	Recognize 1.How to produce a required angle 2.That an angle can be constructed if the correct combination of angles is found e.g. $90^o + 15^o = 105^{o.}$	Working accurately in constructing angles.	Construction of angles in multiples of 15^o: $45^o=30^o+15^o$ $75^o=60^o+15^o$ $105^o=90^o+15^o$ $135^o=90^o+45^o$	Drawing instruments.	Let students state the combination of angles that can be constructed Demonstrate the construction of angles stated. Set problems for practice.		Exercises in the construction of angles which are multiples of $15^{o.}$	Mathematics Building Technology Mechanical Technology.

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Copying an angle	Manipulating compasses to draw arcs in copying an angle	List steps in copying an angle	Recognize that an angle is copied when it is accurately reconstructed with the aid of instruments.	Working accurately to copy various angles.	To copy a given angle ABC using compasses five steps are performed in sequence. A'B'C' is the required angle.	Drawing instruments.	Demonstrate each step Let students practice each step.		Exercise which require students to copy given angles.	Building Technology Mechanical Engineering Technology Mathematics
Triangles: Definitions and Parts.	Sketching or drawing a triangle Labelling the parts of a triangle.	State the definition of 'triangles' List the parts of a triangle.	Constructing triangles of different dimensions (sides and angles).	Working accurately in the construction of triangles.	A triangle is a plane figure bounded by three straight lines. The three angles add 180°. Each corner is called vertex. Parts of a triangle – base, vertex, side, altitude, median.	Chart showing a triangle and its parts.	Assist students to formulate the definition of triangles. Use chart to identify the parts of a triangle. Let students draw and label the parts of a triangle.		Oral and written definitions of a triangle and its parts. Exercises on drawing and labelling the parts of a triangle.	Building Technology Mechanical Engineering Technology Mathematics Integrated Science.

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Types of Triangles .	Sketching and drawing the types of triangles - Equilateral - Isosceles - Scalene - Acute angled - Right angled - Obtuse angles.	List the types of triangles. State the definitions of acute angled, right angled, obtuse angled, scalene, isosceles and equilateral triangles. Identify each kind of angle.	Differentiate between the types of triangles. Recognize the wide range of triangles and their uses.	Using triangles for the construction of projects.	The types of Triangles: 1.Equilaterial – three equal sides and angles 2.Isosceles – two equal sides and angles 3.Scalene – three unequal sides and angles 4.Acute angled – three acute angles 5.Right angled – one right angle 6.Obtuse angled – one obtuse angle.	Diagram showing the types of triangles.	Display diagram Discuss the characteristi cs of each type of triangle. Let students draw each type of triangle write its name and character Istics.		Let students give oral or written characteristics of each triangle with an accompany-ing sketch or drawing.	Building Technology Mechanical Engineering Technology Mathematics Integrated Science
Construct ion of Triangles	Constructing triangles from given data.	List data for the construction of triangles – three sides, sizes of angles, altitude.	Formulate the procedures for the accurate construction of triangles. Recognize the importance of adequate data to make the construction of a given triangle possible.	Using triangles for the construction of projects.	Construction of a triangle: 1.Equilateral – given the length of the side. 2.Isosceles – given side lengths. 3.Given two angles and the included side. 4.Isossceles – given base and altitude 5.Given two sides and the included angle. 6.Scalene – given the lengths of three sides.	Drawing Instruments.	State the problem clearly. Assist students to find what is given and what is required. Discuss possible solutions Demonstrate solutions. Give students practice in drawing solutions.		Exercises on the construction of triangles from given data.	Mathematics Building Technology Mechanical Engineering Technology Language Arts.

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Quadri-laterals: Definition and Parts.	Drawing or sketching a quadrilateral labeling the parts of a quadrilateral.	Define the word quadrilateral List the parts of a quadrilateral sides, angles, vertices, diagonals, altitude.	Use of specific data to accurately construct quadrilaterals.	Working accurately to construct quadrilaterals.	A quadrilateral is a plane figure which has four sides. It has four angles and four vertices. The sum of the angles is 360°. The lines joining the opposite vertices are diagonals. The perpendicular distance between parallel sides is the altitude Quadrilaterals may be regular or irregular.	Chart showing a quadrilateral	Display chart and discuss basic features of quadrilaterals Identify parts of a quadrilateral. Let students give definition and name parts of a quadrilaterial.		Let students state the definition of quadrilateral and draw examples of quadrilaterals.	Mathematics Building Technology Mechanical Engineering Technology

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Types of quadrilaterals	Drawing or sketching the types of quadrilaterals.	List the types of quadrilateral Identify properties of various quadrilaterals.	Outline the similarities and difference in properties of quadrilaterals.	Analyze definitions for clarity of meanings.	Types of quadrilaterals are: 1.Square – four equal sides and four right angles 2.Rectangle – opposite sides equal and parallel. Angles are right angles. 3. Parallelogram (trapezoid) – opposite sides equal and parallel, opposite angles equal 4.Rhombus – all sides equal. Opposite sides parallel, opposite angles equal 5. Trapezium – one pair sides parallel 6. Trapezium (kite) – pairs of adjacent sides equal.	Diagram showing types of quadrilaterals.	Display diagram and list quadrilaterals discuss the properties of each quadrilateral Let students draw each quadrilateral.		Let students state the properties of each quadrilateral. Point out similarities or differences in quadrilaterals.	Mathematics Building Technology Mechanical Engineering Technology.

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Construction of Quadri laterals.	Construt-ing quadri laterals from given data.	List data which must be supplied in order to construct a required quadrilateral – length of sides, included angle, diagonals, altitude.	Formulate the procedures for the accurate construction of quadrilaterals.	Analytical and critical thinking in the solution of problems.	Construction of: 1.Square given the length of the sides 2.Square given the length of the diagonal 3.Rectangle given the length of adjacent sides 4.Rectangle given the diagonal and one side 5.Parallelogram given the length of adjacent sides and included angle 6.Rhombus given adjacent sides and included angle.	Drawing instruments	State the problem on construction of a quadrilateral Assist students to analyze data and state the requirements. Demonstrate each step of the construction of the quadrilateral give a similar problem for practice.		Exercises in construction of quadrilaterals with data provided.	Mathematics Building Technology Mechanical Engineering Technology.

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Circles: Definition and parts.	Sketching and drawing circles Labelling parts of a circle -Arc -Radius -Diameter -Chord -Quadrant -Sector -Semicircle -Segment -Tangent -Normal	State the definition of a circle. List the parts of a circle Identify what are concentric and eccentric circles.	Recognize the similarities and differences between parts of a circle.	Working with neatness and accuracy in drawing and sketching circles.	A circle is a plane figure bounded by a curved line called the circumference on which every point is equidistant from a fixed point called the center. Parts of a circle – arc, radius, diameter, chord, quadrant, sector, semicircle, segment, tangent, normal Concentric circles e Eccentric circles	Chart showing parts of a circle.	Students explain their understandin g of what a circle is Assist students to formulate the definition of a circle Draw a circle and label its parts.		Exercises requiring students it define a circle, draw / sketch and label its parts.	Mathematics Building Technology Mechanical Engineering Technology
Drawing Circles.	Manipulate compasses to draw circles with given radius and diameters.	List the steps in drawing a circle when given the radius or diameter.	Recognize the differences between concentric and eccentric circles and their uses.	Working with speed accuracy and neatness in drawing circles.	Drawing circles using compasses a) given radius b) given diameter Concentric circles have common center and different radii Eccentric circles have different centers.	Drawing Instruments	Demonstrate the drawing of a circle to required radius and diameter.		Exercises on drawing circles of given radii and diameter.	Mathematics Building Technology Mechanical Engineering Technology