



CHAPTER	LESSON	DESCRIPTION
I. Numbers (1)	Integers	At the end of this activity, students should be able to: understand and use negative integers, order integers, use basic operations on integers, round large integers to the nearest given power of 10.
	Divisibility	At the end of this activity, students should be able to: understand the division of integers, know the notions of the quotient and the remainder, and how to use them, know how to recognize prime, composite numbers and relatively prime numbers, know how to find the highest common factor of two integers, know how to find the least common multiple of two integers.
	Prime Factorization	At the end of this activity, students should be able to decompose a positive integer into prime factors and use prime factor decomposition to determine the greatest common factor and the least common multiple of two positive integers
	Fractions	At the end of this activity, students should be able to recognize and name fractions, reduce a fraction to lowest terms, compare fractions and find a fraction of a number.
	Operations on Fractions	At the end of this activity, students should be able to: multiply fractions, add and subtract fractions, divide fractions, use the notion of the reciprocal of a rational number, use the properties of operations on rational numbers.
	Decimals	At the end of this activity, students should be able to: apply arithmetic operations to decimals, round decimals to a given number of significant figures or decimal places.
	Decimals and Fractions	At the end of this activity, students should be able to: recognize terminating, recurring and non-recurring decimals, convert terminating and recurring decimals to fractions, convert a fraction to a decimal.
	General Division	At the end of this activity, students should be able to: divide any two rational numbers, use long division with decimals.
	Powers and Roots	At the end of this activity, students should be able to: represent multiplication as a power, understand and use square and cube roots and apply properties of exponents in calculations (for integer indices).
	Scientific Notation	At the end of this activity, students should be able to: represent a number in scientific notation, use scientific notation in computations.
	Use of a Calculator	At the end of this activity, students should be able to perform arithmetic operations, apply the division algorithm, find the prime factorization of a natural number, approximate certain irrational numbers and better understand the standard form.
II. Geometry and Transformations	Triangles	At the end of this activity, students should be able to: recognize adjacent, supplementary, vertical, alternate, corresponding, straight and full angles, calculate the measures of the above angles, given one or two of them, use the theorem on the angle sum of a triangle, define an exterior angle in a triangle and compute it, calculate angles in a triangle, given two of its angles, one of its angles etc.
	Congruence of Triangles	At the end of this activity, students should be able to recognize congruent figures and understand and use congruence conditions for triangles: SAS, ASA, SSS.



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	Quadrilaterals and Their Properties	At the end of this activity, students should be able to understand and be able to precisely describe types of quadrilaterals, know and be able to apply the theorem on the angle sum in a quadrilateral and understand what the exterior angle of a quadrilateral is.
	Polygons and Regular Polygons	At the end of this activity, students should be able to: understand what irregular and regular polygons are, calculate the number of diagonals in a polygon, calculate the sum of the angles in a polygon, calculate the sum of the exterior angles of a convex polygon, calculate the central angle in a regular polygon, calculate the interior and the exterior angles of a regular polygon, draw regular n-gons.
	Coordinates	At the end of this activity, students should be able to place numbers in their correct places on the number line, understand the coordinates of points on the plane, place points with given coordinates in the correct places on the plane, find equations of horizontal and vertical lines on the plane, understand what the coordinates of a point in 3-dimensional space mean and find equations of planes parallel to the planes $x = 0$, $y = 0$ and $z = 0$.
	Symmetry	At the end of this activity, students should be able to find images of figures under reflection, find coordinates of figures under reflection in the axes, find coordinates of figures under reflection in the line $x = a$ and the line $y = b$, find coordinates of figures under reflection in the line $x = y$ and the line $y = -x$, find images of figures under symmetry and find coordinates of figures under symmetry with respect to the origin.
	Translations, Reflections, Rotations	At the end of this activity, students should be able to draw images of figures under translations, rotations and reflections, find a vector of a translation given in the coordinate system, know and use properties of translations, know and use properties of rotations and know and use properties of reflections.
	Dilations	At the end of this activity, students should be able to draw images of figures under enlargement with respect to a given point and using a given scale, find the centre point of an enlargement, find the scale of an enlargement, know and use properties of enlargements, know how the area of a given figure is changed after enlargement and know how the volume of a given solid is changed after enlargement.
	Similarity	At the end of this activity, students should be able to recognize similar figures, know when two polygons are similar, know when two triangles are similar (SSS, AA, SAS) and know the ratio of the areas of two similar figures.
	Similarity - Solving Problems	At the end of this activity, students should be able to: use similarity of triangles in solving problems, recognize proportions when an angle is cut by two parallel lines, find line segments on the arms of an angle cut by two parallel lines.
III. Algebraic Expressions	Algebraic Expressions	At the end of this activity, students should be able to: form algebraic expressions, calculate their values, simplify like terms, simplify algebraic expressions, name algebraic expressions.
	Using the Distributive Property	At the end of this activity, students should be able to: multiply out brackets of the form $a(b + c)$, multiply out brackets of the form $a(b + c + d)$, multiply out brackets of the form $(a + b)(c + d)$, multiply out brackets of the form $(a + b)(c + d)(e + f)$, deal with the negative sign in expressions.
	Special Products	At the end of this activity, students should be able to: use special formulas for squaring binomials, use the formula for the difference of squares, recognise and use the formulas in different calculations.



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	Factoring by Grouping	At the end of this activity, students should be able to: reverse the process of multiplying out the brackets, factorise an expression by taking out the common factor, factorise an expression by grouping.
	Factoring by Other Methods	At the end of this activity, students should be able to: factorize binomials by using the difference of squares, factorize trinomials by algebraic manipulation.
	More Factoring	At the end of this activity, students should be able to: factorise trinomials by algebraic manipulation.
IV. Algebraic Fractions	Solving Equations Involving Algebraic Fractions	At the end of this activity, students should be able to simplify algebraic fractions, operate on algebraic fractions and solve simple rational equations.
	Solving a Formula for a Specified Variable	At the end of this activity, students should be able to: rearrange different formulas, make a variable the subject of the formula.
V. Reasoning	Mathematical Statements	At the end of this activity, students should be able to: recognise mathematical statements in the form of a theorem, recognise the assumption and the claim of a theorem, understand the role of a proof and of a counterexample in mathematical reasoning, construct counterexamples to simple false statements.
	Deductive Reasoning	At the end of this activity, students should be able to: use short deductions to build a proof, verify deductions.
	Understanding the Theorem	At the end of this activity, students should be able to: recognize the difference between a proof and a demonstration, construct a proof based on a demonstration.
	Problem Solving	At the end of this activity, students should be able to: discover a property upon observation and trials, find a (short) proof of a given simple property, recognize incorrect steps in reasoning.
	Problem Assumptions	At the end of this activity, students should be able to: understand the significance of theorem assumptions, check the necessity of assumptions.
VI. Sets	Sets	At the end of this activity, students should be able to: understand the notion of a set, identify particular sets (either by a list of elements or by a formula), perform operations on sets: sum, intersection and difference, apply the operations to solve simple problems.
VII. Handling Data	Problem Specification	At the end of this activity, students should be able to: identify variables and cases, distinguish different types of data, design experiments.
	Sampling	At the end of this activity, students should be able to: construct a good questionnaire, identify a source of bias in the data, choose an appropriate sampling method, draw the sampling units using different sampling methods.
	Representing Data	At the end of this activity, students should be able to: draw dot plots, identify categorical, ordinal, discrete and continuous variables, construct stemplots and back-to-back stemplots, join the stems in a stemplot, construct frequency tables, describe class intervals in a frequency table, draw histograms, read the frequencies from a histogram, draw frequency polygons and frequency density polygons, calculate frequency density and frequency density histograms.



CHAPTER	LESSON	DESCRIPTION	
	Measures of Central Tendency - the Arithmetic Mean	At the end of this activity, students should be able to: understand the mean as an indicator of fair allocation, understand the mean as the 'balancing point' of a data set, calculate the arithmetic mean for raw data, calculate the weighted mean, calculate the arithmetic mean for data in frequency tables, calculate the arithmetic mean for scaled data, calculate the arithmetic mean for combinations of sets of data.	
	Measures of Central Tendency - the Mode, the Median	At the end of this activity, students should be able to find the mode of raw data, find the mode of grouped data, check multimodality of data, find the median of raw data, find the median in a stemplot, understand the difference between arithmetic mean and median and find the median in transformed data.	
	Measures of Variability (1)	At the end of this activity, students should be able to: use different measures of data variability, calculate the standard deviation and variance.	
	Measures of Variability (2)	At the end of this activity, students should be able to construct the five-number summary and draw a box plot- detect an outlier in data.	
	Cumulative Frequency Curve	At the end of this activity, students should be able to: draw the cumulative frequency curve (polygon), draw the cumulative percentage frequency curve (polygon). -estimate the median and the quartiles for grouped data.	
	Skewness	At the end of this activity, students should be able to investigate skewness of data and calculate different measures of skewness.	
	Case Study (1)	At the end of this activity, students should be able to apply the measures of central tendency in real-life situations.	
	Case Study (2)	At the end of this activity, students should be able to apply statistical tools to real-life data.	
	VIII. Geometry - Pythagorean Theorem	Pythagorean Theorem	At the end of this activity, students should be able to: understand and use the Pythagorean formula for right triangles, calculate the unknown side in a right triangle, apply the Pythagorean theorem to real-world problems, recognise Pythagorean triples - use the converse of the Pythagorean theorem to recognise right triangles.
		Application of the Pythagorean Theorem in 2-D	At the end of this activity, students should be able to: find the diagonal of a square, find the height of an equilateral triangle, find the area of an equilateral triangle, find the area of a square, given the diagonal, use the Pythagorean theorem to solve real-world problems, find the radii of inscribed and circumscribed circles about an equilateral triangle, find the distance between two points in a coordinate system.
Application of the Pythagorean Theorem in 3-D		At the end of this activity, students should be able to find the diagonals of cubes and cuboids, use the Pythagorean theorem to calculate segments in solids and find the distance between points in the 3-dimensional coordinate system.	
Compass-and-Straightedge Constructions (1)		At the end of this activity, students should be able to construct a perpendicular bisector of a segment, construct a perpendicular to a given line through a point on the line, construct a perpendicular to a given line through a point off the line, construct a line parallel to a given line, construct the bisector of an angle and use the basic constructions to construct more complex configurations.	
Compass-and-Straightedge Constructions (2)		At the end of this activity, students should be able to solve simple problems related to loci and constructions, construct an equilateral triangle, a square, a regular pentagon, a regular hexagon, a regular octagon and decagon and construct some simple loci.	



CHAPTER	LESSON	DESCRIPTION
IX. The Circle	The Circle	At the end of this activity, students should be able to: recognise parts of a circle: centre, radius, circumference, arc, chord, diameter, sector, segment, calculate the length of an arc, calculate the area of a sector, relate the area of a segment to the area of a sector and of a triangle, understand the notion of tangent and construct a tangent at a given point, understand the notion of a common tangent.
	Circle Theorems	At the end of this activity, students should be able to: solve problems using properties of tangents, solve problems using chord bisection by a perpendicular radius.
	Inscribed and Central Angles	At the end of this activity, students should be able to: recognize inscribed and central angles, explain the relation between inscribed and central angles on the same arc, calculate the area of a sector, recognize cyclic quadrilaterals.
	Equation of a Circle	At the end of this activity, students should be able to: write the equation of a circle with centre at the origin and at an arbitrary point, determine the centre and the radius of a circle, solve problems involving the equation of the circle.
	Mutual Position of Two Circles	At the end of this activity, students should be able to: recognise the mutual position of two circles, find the mutual position of two circles in the coordinate system, solve problems involving circles.
	Mutual Position of a Line and a Circle	At the end of this activity, students should be able to: recognise the mutual position of a circle and a line, write an equation of a tangent in simple cases.
	Circles Inscribed and Circumscribed	At the end of this activity, students should be able to: understand the notions of inscribed and circumscribed circles, construct a circle inscribed into a triangle or quadrilateral, construct a circle circumscribed about a triangle or quadrilateral, recognise quadrilaterals that have an incircle, recognise cyclic quadrilaterals.
	Solving Problems Involving Circles	At the end of this activity, students should be able to: solve various problems involving the circle and inscribed and central angles.
X. Percentages	Solving Problems Involving Percentages	At the end of this activity, students should be able to: find the scale factor of increase and decrease, find percentage change, find the value after consecutive percentage changes, find the percentage profit.
	Repeated Percentage Change	At the end of this activity, students should be able to: find the amount when percentage change is repeated, find the population, given the rate, find the price, given the inflation rate, find the accumulated amount, given the rate, find the equivalent rate and effective rate.
	Percentages	At the end of this activity, students should be able to: change a fraction into a percentage and vice versa, find the percentage of a value, express one number as a percentage of another, find the value, given a percentage of a number.
XI. Sequences	Looking for the Pattern	At the end of this activity, students should be able to: recognize patterns in number sequences, name the next term in a given simple sequence.
	Finding the nth Term of a Sequence	At the end of this activity, students should be able to: find term-to-term or position-to-term definition for a given sequence, find the nth term of a sequence given by term-to-term or position-to-term definition.



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	Classical Concepts of Probability (1)	At the end of this activity, students should be able to: understand the notion of relative frequency, understand the notion of probability, use probability measures in simple situations.
	Classical Concepts of Probability (2)	At the end of this activity, students should be able to: distinguish experimental and subjective probability, understand classical probability, find classical probabilities in different probabilistic situations.
	The Set of Possible Outcomes	At the end of this activity, students should be able to: represent the possibility space in many several ways, choose equally likely elementary events, write up the outcomes of a compound experiment using a tree diagram and a possibility space diagram.
	Mutually Exclusive Events	At the end of this activity, students should be able to: recognize mutually exclusive events, use the sum formula for mutually exclusive events.
	Independent Events (1)	At the end of this activity, students should be able to: recognise independent events.
	Independent Events (2)	At the end of this activity, students should be able to: find the probability of two independent events occurring simultaneously, use the multiplication rule for independent events.
	Solving Probability Problems	At the end of this activity, students should be able to: use various methods to solve probabilistic problems.
XV. Graphs of Different Functions	A Function and Its Graph	At the end of this activity, students should be able to: plot the graph of a simple function, understand how the graph of a function is constructed.
	Equation of a Line	At the end of this activity, students should be able to: plot the graph of a line, find the gradient of a given straight line, find the gradient of a line perpendicular or parallel to a given straight line, read properties of a line from its general equation.
	Linear Functions	At the end of this activity, students should be able to: recognise linear functions, understand the role of coefficients of a linear function, construct the graph of a given linear function.
	Quadratic Functions (1)	At the end of this activity, students should be able to: recognise the graph of a quadratic function as a parabola, read properties of a quadratic function from its graph.
	Quadratic Functions (2)	At the end of this activity, students should be able to: sketch the graph of a given quadratic function, read properties of a quadratic function from its graph.
	Other Functions	At the end of this activity, students should be able to: recognise the graph of a reciprocal function, recognise the graph of the function $y=x^3$, construct and understand the graph of the function $y=a^x$ for integer x and fixed positive integer a .
	Graphs and Real-World Situations	At the end of this activity, students should be able to: understand the behaviour of a function knowing its graph, read basic properties of a function from its graph, predict 'future values' of a function knowing part of its graph.
XVI. Measurement on the Plane and in Space	Measuring (1)	At the end of this activity, students should be able to use measures in daily use, use measurements to estimate length, angle and weight and understand and interpret approximate values of measures.



CHAPTER	LESSON	DESCRIPTION
	Measuring (2)	At the end of this activity, students should be able to use measures in daily use, use measurements to estimate length, angle, mass and speed and understand and interpret approximate values of measures.
	Areas of Plane Shapes (1)	At the end of this activity, students should be able to find the areas of polygons and other shapes made of triangles on the plane.
	Areas of Plane Shapes (2)	At the end of this activity, students should be able to find the area of shapes bounded by straight lines and arcs on the plane.
	Volume and Surface Area of Prisms	At the end of this activity, students should be able to understand the notion of volume, calculate the volume and the surface area of a given prism and apply the formula for the volume of a prism in real-world situations.
	Volume and Surface Area of Pyramids	At the end of this activity, students should be able to understand the notion of volume, calculate the volume and the surface area of a given pyramid and apply the formula for the volume of a pyramid in real life.
	Volume and Surface Area of Cylinders and Spheres	At the end of this activity, students should be able to calculate the volume and the surface area of cylinders and spheres, understand how the formulas for volume and surface area of a sphere were established and apply the formulas for volume and surface area of cylinders and spheres in real-life situations.
	Volume and Surface Area of Cones	At the end of this activity, students should be able to calculate the volume and the surface area of cones and frustums, construct a model of a cone and a frustum.
	Volumes of Similar Solids	At the end of this activity, students should be able to recognize similar solids and prove similarity and find the volume of a solid similar to a given solid.
XVII. Solving Equations	Solving Linear Equations	At the end of this activity, students should be able to understand the notion of a linear equation and solve linear equations in one variable.
	Solving Systems of Linear Equations Graphically	At the end of this activity, students should be able to mark the solution set of an equation on the plane, solve linear equations in two variables and solve simultaneous linear equations in two variables graphically.
	Solving Systems of Linear Equations Graphically and Algebraically	At the end of this activity, students should be able to solve simultaneous linear equations in two variables using graphical and algebraic methods.
	Solving Problems Involving Systems of Linear Equations	At the end of this activity, students should be able to use simultaneous linear equations to solve problems.
	Solving Quadratic Equations	At the end of this activity, students should be able to understand the notion of a quadratic equation, be able to solve quadratic equations.
	The Quadratic Formula	At the end of this activity, students should be able to understand the notion of the discriminant of a quadratic equation, find the number of real solutions of a quadratic equation without solving it and solve a quadratic equation by using the quadratic formula.



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	Solving Problems Involving Quadratic Equations (1)	At the end of this activity, students should be able to apply the quadratic formula in various situations and solve mathematical problems involving quadratic equations.
	Solving Problems Involving Quadratic Equations (2)	At the end of this activity, students should be able to apply the quadratic formula in different situations and solve real-life problems involving quadratic equations.
	Solving Polynomial Equations	At the end of this activity, students should be able to recognise polynomial equations, understand the notion of a solution of an arbitrary equation and understand the notion of an approximate solution of an equation.
	Approximating Solutions of Polynomial Equations	At the end of this activity, students should be able to find approximate solutions of equations, understand the bisection method and approximate roots of an equation up to a given accuracy.
XVIII. Inequalities	Linear Inequalities	At the end of this activity, students should be able to: understand the notion of inequality, solve linear inequalities in one variable, mark the solution set of an inequality on the number line.
	Systems of Linear Inequalities	At the end of this activity, students should be able to solve simultaneous linear inequalities in one variable, solve linear inequalities in two variables, solve simultaneous linear inequalities in two variables and mark the solution set on the plane.
XIX. Numbers (2)	Powers, Roots and Rational Exponents	At the end of this activity, students should be able to understand and calculate the n th root of a positive number, understand fractional indices and use index laws.
	Irrational Numbers	At the end of this activity, students should be able to understand and recognize irrational numbers, simplify expressions containing irrational numbers, rationalize denominators and approximate irrational numbers.
XX. Vectors	Vectors	At the end of this activity, students should be able to understand the notion of a vector.
	Operations on Vectors	At the end of this activity, students should be able to: add and subtract vectors graphically.
	Scalar Multiple	At the end of this activity, students should be able to know how to change the magnitude of a vector using a scalar multiple.
	Applications of Vectors	At the end of this activity, students should be able to understand applications of vectors in science problems and use vectors in simple science problems.
XXI. Correlation and Regression	Sampling Techniques	At the end of this activity, students should be able to: use simple, systematic and stratified sampling methods in choosing a random sample from a population.
	Regression Line	At the end of this activity, students should be able to find the line of best fit for a given set of data and estimate a future value.
	Correlation	At the end of this activity, students should be able to understand correlation as a measure of the relationship between two variables, recognize positive, negative and zero correlation, use Pearson's correlation coefficient to measure the strength of linear correlation and use Spearman's rank coefficient to measure correlation between two sets of data.
	Analyzing and Comparing Sets of Data	At the end of this activity, students should be able to: compare two sets of data using measures of central tendency, dispersion of data and compare two sets of data using diagrams.



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	Using Probability to Analyze Random Events	At the end of this activity, students should be able to: simulate a random sample for the given frequency, calculate the expectation of a population (population mean), and the population variance, calculate the expectation and variance of the sample mean.
XXII. Trigonometry (2)	Trigonometric Equations (1)	At the end of this activity, students should be able to solve simple trigonometric equations.
	Trigonometric Equations (2)	At the end of this activity, students should be able to solve simple trigonometric equations.
	The Sine Formula for the Area of a Triangle	At the end of this activity, students should be able to: use the sine formula for the area of a triangle in various problems.
	Solving Problems Involving Trigonometric Equations	At the end of this activity, students should be able to: solve real-life problems involving trigonometric equations.
	Pythagorean Theorem and Trigonometry in 3-D	At the end of this activity, students should be able to recognise the angles of elevation and depression, find the angle between the line and the plane, and the angle between two planes, apply the Pythagorean theorem and trigonometric ratios to find the volume and surface area of solids, apply the Pythagorean theorem and trigonometric ratios to find the measures of some angles in solids.
XXIII. Transformations of Graphs	Transforming Graphs of Various Functions	At the end of this activity, students should be able to: sketch a graph of a function given by a simple equation (linear or quadratic) involving absolute value, sketch the graph of a function $y = f(x) $ or $y = f(x)$, knowing the graph of the function $y = f(x)$.
	Transforming Graphs of Trigonometric Functions (1)	At the end of this activity, students should be able to: calculate the periods of modified trigonometric functions, sketch graphs of trigonometric functions with modified periods.
	Transforming Graphs of Trigonometric Functions (2)	At the end of this activity, students should be able to: draw graphs of trigonometric functions with modified period, amplitude and position, model periodic phenomena using trigonometric functions.
	Using Graphs (1)	At the end of this activity, students should be able to: solve equations graphically, solve systems of equations graphically.
	Using Graphs (2)	At the end of this activity, students should be able to: solve an inequality graphically, solve systems of inequalities graphically.
	Graphs of Simple Loci	At the end of this activity, students should be able to: construct graphs of simple loci, derive Cartesian equations of simple loci, find the intersection points of a circle and a straight line graphically and algebraically.
	Area Under a Curve	At the end of this activity, students should be able to: understand the relationship between distance and the velocity–time graph, approximate the area under a curve by rectangles, apply the trapezium rule to approximate the area under a curve.
	Tangents to Graphs	At the end of this activity, students should be able to: understand the notion of a tangent to a curve at a point, write the equation of a tangent from a graph, understand the notion of the gradient of a line, find a gradient of a line from a graph, find the equation of a tangent to a circle, estimate the gradient of a curve at a point.