Class 7

Section I
Pedagogical processes suggested by NCERT
The learner may be provided opportunities in pairs /groups / individually and encouraged to—
Provide contexts for exploring the rules of multiplication and division of integers. This can be done through number line or number patterns.
Explore the multiplication / division of fractions /decimals through pictures /paper folding activities /daily life examples.
Discuss the situations that require the use of fractional numbers in opposite direction, such as moving 10 1 m to the right of a tree 10 1 m to the right of a tree and 15 3 m to its left etc.
Involve children in exploring how repeated
Multiplication of numbers can be expressed in short form. For example, 2×2×2×2×2×2= can be expressed as 26.
Explore the possible combinations of variables and constants using different operations to form algebraic expressions in various contexts.
Provide situations from daily life that lead to setting up of equations and choosing the appropriate value of the variable that equate both sides.
Conduct activity of adding /subtracting number of objects of same category from daily life. For example, number of notebooks obtained when 3 notebooks are added to a group of 5 notebooks.
Evolve the understanding of the concepts of ratios and percentage (equality of ratio.)
Provide daily life situations based on profit / loss and simple interest that show the use of percentage
Explore different examples from daily life in which pair of angles are involved with a common vertex, e.g., scissors, road junction, letter x, t, etc
Verify the properties of various pairs of angles by drawing diagram (one group can give measure of one angle; the other group needs to give the measure of another angle.)
Visualise the relationship between various pairs of angles when `a transversal cuts two lines (parallel and non-parallel), angles of triangle and relationship among its sides through diagrams and upper primary mathematics kit (developed by NCERT)
Draw different types of triangles, ask them to measure angles of all triangles, and verify
Explore exterior angle property of triangles; and Pythagoras theorem
Identify symmetrical figures from their environment and which shows rotational symmetry
Visualise the symmetry through paper folding activities
Establish congruence criterion and later on verify the property by superimposing one above the other
Demonstrate the construction of a line parallel to the given line from a point outside it through student's active participation
Construct the simple triangle by using ruler and compasses
Cut out different closed figures drawn on hard boards / thick papers. Trace the figures in the given graph sheets

Count the exact number of square units occupied by the traced figure (complete, half, etc). And find out the approximate area of these figures
Through discussion motivate them to arrive at the formula for area of a rectangle /square
Find a representative value of data i.e. Mean, mode or median of ungrouped data. Encourage them to arrange it in a tabular form and represent it by bar graphs
Draw inferences for future events from the existing data
Discuss the situations where the term 'chance' can be used, for example, what are the chances of winning today as chances of getting 6 while rolling a dice
Sum of two sides of a triangle is greater than the third side.

Section II	
Learning Outcomes of NCERT	**Measuring the Los**
The learner—	
Multiplies /divides two integers	Applies rules for multiplication and division in order to solve problems involving two integers with same or different signs
Interprets the division and multiplication of fractions. For example, interprets - as of. Also, is interpreted as how many make?	Applies repeated addition and subtraction in order to interpret the division and multiplication of fractions.
Uses algorithms to multiply and divide fractions /decimals.	Applies algorithms for multiplication and division in order to multiply and divide fractions /decimals. Applies appropriate mathematical operations on rational numbers in order to solve problems related to daily life situations
Solves problems related to daily life situations involving rational numbers	Applies appropriate mathematical operations on rational numbers in order to solve problems related to daily life situations
Uses exponential form of numbers to simplify problems involving multiplication and division of large numbers.	Applies properties of exponential numbers in order to simplify problems involving multiplication and division of large numbers
Represents daily life situations in the form of a simple equation and solves it	Translates a real-life situation in the form of a simple algebraic equation in order to arrive at a generalized problem and solution for the situation
Adds /subtracts algebraic expressions	Applies algebraic properties in order to add /subtract two algebraic expressions

Distinguishes quantities that are in proportion. For example, tells that 15, 45, 40, 120 are in proportion as is the same as	Calculates the simple form of a fraction in order to distinguish quantities that are in proportion.
Solves problems related to conversion of percentage to fraction and decimal and vice versa	Expresses a fraction as percentages and decimals in order to solve daily life problems.
Calculates profit /loss percent and rate percent in simple interest	Applies algorithm to calculate percentages in order to calculate profits, loss and rate of interest in simple interest calculation
Classifies pairs of angles based on their properties as linear, supplementary, complementary, adjacent and vertically opposite and finds value of the one when the other is given.	Classifies pairs of angles based on their properties in order describe linear, supplementary, complementary, adjacent and vertically opposite angles
Verifies the properties of various pairs of angles formed when a transversal cuts two lines	Applies the properties of linear, supplementary, complementary etc. Angle in order to find the value of one angle when the other one is given.
	Verifies the properties of various pairs of angles formed when a transversal cuts two lines in order demonstrate the properties of angles when two lines are parallel
Finds unknown angle of a triangle when its two angles are known	Applies angle sum property of a triangle to calculate unknown angles of a triangle when its two angles are known
Explains congruency of triangles on the basis of the information given about them like (SSS, SAS, ASA, RHS)	Applies the similarity rules in order to explains the congruency of triangles on the basis of the information given about them like (SSS, SAS, ASA, RHS)
Using ruler and a pair of compasses constructs, a line parallel to a given line from a point outside it and triangles	Uses ruler and a pair of compasses in order to construct a line parallel to a given line from a point outside the line and the triangles
Finds out approximate area of closed shapes by using unit square grid / graph sheet	Uses unit square grid /graph sheet in order to approximate the area of a closed shape
Calculates areas of the regions enclosed in a rectangle and a square	Applies properties of simple shape in order to calculate the areas of the

	regions enclosed in a rectangle and a square
Finds various representative values for simple data from her /his daily life contexts like mean, median and mode	Calculates mean, median and mode in order to find various representative values for simple data from her /his daily life
Recognises variability in real life situation such as, variations in the height of students in her class and uncertainty in happening of events like throwing a coin	Calculates the variability in real life situation in order to appreciate the variation observed in real life situations
Interprets data using bar graph such as consumption of electricity is more in winters than summer, runs scored by a team in first 10 overs etc.	Represents data pictorially in order to interpret data using bar graph

MAPPING OF GRADE 7 MATHEMATICS TOPICS WITH NCERT LEARNING OUTCOMES			
Important Note: It must be ensured by the teachers that learners are able to use mathematical learning in day to day life and unfamiliar contexts/ situations about which they are not exposed earlier. Learning Objectives should also focus on enhancing the ability of the learner to convert a real life problem into a mathematical problem and the ability to interpret and evaluate mathematical results in the real life contexts.			
Chapter	**Content Area/Concept**	**Learning Objectives**	**Learning Outcome**
1. Integers	Whole Numbers and Integers	Differentiate between whole numbers and integers and give concrete examples.	Applies rules for multiplication and division in order to solve problems involving two integers with same or different signs
		Represent numbers with positive and negative signs and apply to various situations	
	Representation of Integers on Number Line	Represent integers on a number line and perform operations and verify properties of integers	
	Properties of Addition and subtraction of integers	Apply properties of addition and subtraction of integers and simplify arithmetic expressions.	
	Multiplication of integers	Apply rules of multiplication of integers and solve various arithmetic expressions and contextual problems	
	Properties of multiplication of integers	Apply properties of multiplication of integers and simplify arithmetic expressions	

		Apply properties of addition, subtraction and multiplication of integers and devise methods for easier calculation and solve problems based on real life related to integers	
	Division of integers	Infer division of integers as inverse operation of multiplication and write multiplication statement into corresponding division statement	
	Properties of division of Integers	Apply properties of division of integers and simplify arithmetic expressions	
2. Fractions and Decimals	Fractions	Define proper, improper and mixed fractions and distinguish between them	Applies repeated addition and subtraction in order to interpret the division and multiplication of fractions.
		Multiply (or divide) numerator and denominator with the same number and write equivalent fractions	Expresses a fraction as percentages and decimals in order to solve daily life problems.
		Convert unlike fractions into like fractions and compare them.	
	Multiplication of fractions	Extend concept of multiplication as repetitive addition for fraction and multiply a fraction and a whole number.	Applies algorithms for multiplication and division in order to multiply and divide fractions /decimals.
		Multiply fractions involving the term 'of'	
		Multiply fractions and calculate the total number of parts	
		Multiply fractions and compare the value of the product with the original fractions	
	Division of fractions	Invert a given fraction and find its reciprocal	Applies appropriate mathematical operations on rational numbers in

		Divide two fractions and find the smaller parts of the fraction	order to solve problems related to daily life situations
	Decimal Numbers	recall and apply concept of decimal representation and expansion and perform mathematical operations on decimal	Calculates the simple form of a fraction in order to distinguish quantities that are in proportion.
	Multiplication of Decimal numbers	Multiply decimal numbers by 10, 100 and 1000 and infer right shift in decimal point	
		Find the intersection of 2 decimal numbers on the grid and represent their product	
	Division of decimal numbers	Divide decimal numbers by 10, 100 and 1000 and infer left shift in decimal point	
		Divide decimal number by a whole number and solve real life problems related to decimals	
		Convert decimals into fractions and divide decimal number by another decimal number	
3. Data handling	Collection and Representation of data	Collect, record and present data and organize experiences or information and draw inferences from them	Represents data pictorially in order to interpret data using bar graph
	Organizing data	Organize raw data into tabular form and make data easier to interpret	
	Representative Values	Calculate average and represent the central tendency of the data	
	Arithmetic Mean	Calculate arithmetic mean and find its position in the data	
		Calculate range of the data and know the spread of the data	
	Mode	Calculate mode of the data and find the observation that occurs most often in the data set	Calculates mean, median and mode in order to find various representative
	Median	Calculate median of the data and find the observation that lies in the middle of the data set	

	Use of bar graphs with a different purpose	Represent data in a bar graph using appropriate scale and represent given information in form of a bar graph	values for simple data from her /his daily life
		Represent data using double bar graph and compare and discuss two collection of data at a glance	
	Chance and Probability	Calculate probability and find the chance of occurring /not-occurring of the event/s	Calculates the variability in real life situation and appreciate the variation observed in real life situations
4. Simple equations	Setting up of an equation	Use number and variable with different operations and express a real-life situation in the form of a simple linear equation.	Translates a real-life situation in the form of a simple algebraic equation in order to arrive at a generalized problem and solution for the situation
	Review of what we know	Convert the given equation in words and express it in statement form.	
	What is an equation?	Use trial and error method and determine the solution of a simple equation.	
	More equations	Explain the first step to be taken and separate the variable while solving the given equation.	
		Create a strategy and solve the given simple equation.	
	Solution to equation	Use the given solution and construct equations from it.	
	Applications of simple equations to practical solutions	Construct simple equations and solve them for the given problems /puzzles in the familiar or unfamiliar contexts .	
5. Lines and angles	Concepts of line, line segment and	Recall the concept of line, line segment and angles and identify them in the given figure(s).	Classifies pairs of angles based on their properties in order describe linear, supplementary, complementary,
	Related Angles	Examine different angles and identify complementary angles.	
		Examine different angles and identify supplementary angles.	
		Examine different angles and determine the measure of their complement and supplement.	

		Describe adjacent angles and identify a pair of adjacent angles in the given angles	adjacent and vertically opposite angles
		Examine different angles and identify linear pair.	
		Describe vertically opposite angles and their property and identify them in the given figure.	
		Identify different types of angles and determine the measure of unknown angles in the given figure.	
	Pairs of Lines	Compare the given lines and distinguish between intersecting and parallel lines.	Applies the properties of linear, supplementary, complementary etc. Angle in order to find the value of one angle when the other one is given.
		Discuss the different angles made by a transversal and intersecting lines and identify them in the given figure.	Verifies the properties of various pairs of angles formed when a transversal cuts two lines in order demonstrate the properties of angles when two lines are parallel
		Use the properties of angles made by a transversal of parallel lines and determine the measure of unknown angles.	
	Checking for Parallel lines	Create a strategy and determine whether the given lines are parallel or not.	
6. The triangle and its properties	Types of triangles	Compare different triangles and classify them on the basis of their sides and angles	Applies angle sum property of a triangle to calculate unknown angles of a triangle when its two angles are known
		Recall the parts of a triangle and describe it for the given triangle.	
	Medians of a triangle	Describe median of a triangle and identify it for the given triangle	
	Altitude of a triangle	Describe altitude of a triangle and identify it for the given triangle	
	Exterior angle of a triangle and its property	Apply the exterior angle property of a triangle and find the measure of the unknown angle in the given triangle	

	Angle sum property of a triangle	Apply the angle sum property of a triangle and find the measure of unknown angle.	
	Measure of angle	Use appropriate property and determine the measure of the unknown angle(s) in the given figure.	
	Sum of lengths of 2 sides of a triangle	Apply the property of lengths of sides of a triangle and determine whether a triangle is possible for the given side lengths or not.	
		Apply the Pythagoras property and verify whether the triangle for the given side lengths will be right angled triangle or not.	
	Right angles triangle and Pythagoras property	Apply the Pythagoras property and fine the length of the unknown side in a right-angled triangle.	
		Use appropriate properties and defend whether the given triangle is possible or not.	
7. Congruence of triangles	Congruence of plane figures	Experiment superposition of different figures and verify congruence of two figures	Applies the similarity rules in order to explains the congruency of triangles on the basis of the information given about them (like SSS, SAS, ASA, RHS)
	Congruence among line segments	Experiment superposition of different lengths and understand congruence of two-line segments and vice versa	
	Congruence of angles	Experiment superposition of different angles and understand congruence of two angles and vice versa	
	Congruence of triangles	Give example(s) and discuss the congruence of triangles and its corresponding parts under a given correspondence.	
	Criteria for congruence of triangles	Use SSS Congruence criterion and examine whether the given triangles are congruent or not.	
		Use SAS Congruence criterion and examine whether the given triangles are congruent or not.	
		Use ASA Congruence criterion and examine whether the given triangles are congruent or not.	

		Apply RHS congruence criterion and check the congruence of given right triangles.	
	Congruence among right angles triangle	Use any appropriate criterion of congruency and check whether the given triangles are congruent or not.	
8. Comparing quantities	Concept of ratio	Compare quantities and represent them as ratio	Applies algorithm to calculate percentages in order to calculate profits, loss and rate of interest in simple interest calculation
		Compare the units of the quantities and represent them in ratio	
	Equivalent ratios	Convert ratios into like fractions and compare them and identify equivalent ratios	
		Equate ratios and represent them in proportion	
		Represent equal ratios in proportion and find missing term(s)	
	Comparing Quantities using percentage	Convert denominators of fractions into 100 and represent them in percentages	
		Convert fractional numbers to percentage and make comparing of quantities easier	
		Convert decimal numbers to percentage and make comparing of quantities easier	
		Convert percentages to fractions or decimals and solve real life problems	
		Represent shaded part of a figure in the form of percentage and estimate the part of an area	
	Use of Percentages	Interpret percentage given in a statement and infer meaning of the statement	
		Convert percentage into number and know how many of a given situation	
		Convert ratios to percentages and solve problems based on real life	
		Calculate increase or decrease in quantity as percentage and examine change in quantity based on real life problems	
	Prices related to an item or buying /selling	Calculate cost and selling price and determine profit /loss percentage	

	Charge given on borrowed money or simple interest	Understand the concept of simple interest and interpret real life problems	
		Make use of percentage and calculate simple interest for multiple years	
9. Rational Numbers	What are rational numbers	Define rational numbers and classify a number as a rational number	Applies appropriate mathematical operations on rational numbers in order to solve problems related to daily life situations
		Represent integers in the form of numerator /denominator where denominator is non-zero and define rational numbers	
		Multiply numerator and denominator by same non-zero integer and find equivalent rational numbers	
	Positive and negative rational numbers	Define positive and negative rational numbers and classify a number as either of them	
	Rational numbers on a number line	Construct a number line and represent rational numbers on it	
	Rational numbers in standard form	Simplify rational number such that there is no common factor between numerator and denominator and represent the number in standard form	
	Comparison of rational numbers	Determine the distance of a rational number from 0 and compare them	
	Rational number between two rational numbers	Calculate and find rational numbers between any two rational numbers and infer that there are infinite rational numbers between any two given rational numbers	
	Operations on rational numbers	Apply the rules of rational numbers operations and simplify arithmetic operations	
10. Practical geometry	Construction of line parallel to given line, though a point not on the line	Use a ruler and compass and construct a line parallel to another line through a point not on the line	Uses ruler and a pair of compasses in order to construct a line parallel to a given line from a

	Constructing a triangle when length of 3 sides are known (SSS criterion)	List and execute steps and construct a triangle given the measures of its three sides.	point outside the line and the triangles
	Constructing a triangle when the lengths of two sides and measure of angle between them are known (SAS)	List and execute steps and construct a triangle when any of its two lengths and an angle between them is given.	
	Construct triangle when measure of 2 angles and one side are known (ASA)	List and execute steps and construct a triangle when any of its two angles and the side included between them is given.	
	Construct a right-angled triangle when length of one leg and hypotenuse are known (RHS)	List and execute steps and construct a right-angled triangle when the length of one leg and its hypotenuse are given.	
		Examine the given information and determine if construction of a triangle from it is possible or not.	
11. Perimeter and area	Concepts of Area and Perimeter	Describe the area and perimeter of plane figures and find the same for square and rectangle	Uses unit square grid /graph sheet in order to approximate the area of a closed shape
		Give example(s) and explain that increase in perimeter of a plane figure does not always mean that area will also increase	
		Use unit square grid sheets and determine the perimeter and area square and rectangles	
	Squares and rectangles	Develop and apply a formula and determine the area of triangle as half of the area of a rectangle.	

		Recall the concept of congruent figures and generalize the area of congruent parts of rectangles.	
	Area of a parallelogram	Use unit square grid sheets and find the perimeter and estimate the area of parallelogram.	
		Develop and apply a formula and determine the area of a parallelogram.	
	Area of triangle	Compare the area of a triangle and its corresponding parallelogram and discuss their relation.	
	Circles	Use direct or indirect measurements and describe the relationships among radius, diameter, and circumference of circles	
		Investigate different circumference of circles and compare them with their respective diameter and relate circumference to Pi.	
		Use direct or indirect methods to find the circumference of circle, semicircle.	
		Develop and apply the formula and find the area of a circle and semicircle.	
	Conversion of units	Convert units and measure area or perimeter in other units.	
	Applications	Examine area and perimeter of different figures and find solution for real life problems.	Applies properties of simple shape in order to calculate the areas of the regions enclosed in a rectangle and a square
12. Algebraic expressions	Difference between algebraic expressions and arithmetic expressions	Describe algebraic expressions and distinguish them from arithmetic expressions.	Translates a real-life situation in the form of a simple algebraic equation in order to arrive at a generalized problem and solution for the situation
	Formation of expressions	Combine variables and constants in order to form an algebraic expression for the given statement.	
	Terms of an expression	Examine the given algebraic expression and determine its terms and their factors	

		Examine the given algebraic expressions and distinguish between the terms which are constants and those which are not.	
		Examine the given algebraic expression and determine the numerical coefficient of the given variable.	
	Like and unlike terms	Examine the algebraic factors of the given terms and distinguish between like and unlike terms.	
	Monomials, binomials, trinomials and polynomials	Examine the given algebraic expressions and classify them as monomial, binomial, trinomial, polynomial.	
	Add and subtract algebraic expressions	Combine like terms and simplify the given algebraic expression.	Applies algebraic properties in order to add /subtract two algebraic expressions
		Add algebraic expressions and determine their sum.	
		Subtract the given algebraic expressions and determine their difference.	
	Finding value of an expression	Use the given value of variable(s) and evaluate the algebraic expression.	
	Using algebraic formulas and rules	Use the given algebraic expression and complete the table of number patterns or find its n^{th} term.	
		Examine the pattern and verify whether the given algebraic expression satisfies the shown pattern or not.	
13. Exponents and powers	Exponents	Describe exponential form of numbers and express numbers in exponential notation.	Applies properties of exponential numbers in order to simplify problems involving multiplication and division of large numbers
		Examine the exponential form of the given number and identify its base and exponent.	
		Examine the numbers given in exponential form and compare and represent them in an order.	
		Find prime factors of numbers and express them as the product of powers of prime factors	
	Laws of Exponents	Apply laws of exponents and simplify a given expression	

	Miscellaneous examples of laws of exponents		
		Write numbers using powers of 10 and express them in standard form	
	Decimal Number system	Expand the given number using powers of 10 and express it in the exponent form.	
	Expressing large numbers in standard form	Represent large numbers in exponential form and read, understand and compare them easily.	
14. Symmetry	Symmetrical figures	Give examples and non-examples and describe symmetrical figures.	-
	Lines of symmetry for regular polygons	Determine lines of symmetry for the given figures and classify them on the basis of number of lines of symmetry.	
		Examine regular polygons and determine their lines of symmetry.	
		Complete the mirror reflection of the given figure(s) along the mirror line (i.e., the line of symmetry) and identify the figure	
	Rotational symmetry	Give example(s) for rotational symmetry and describe their center of rotation and the direction of rotation.	
		Examine the given figure and determine its angle of rotation.	
		Examine the given figure and determine its order of rotation.	
	Line symmetry and rotational symmetry	Examine the given figures and identify figures which have both line symmetry as well as rotational symmetry.	
15. Visualizing solid shapes	Introduction to Plane figures and solid shapes	Discuss and give examples and differentiate between plane figures and solid shapes	-

	Faces, edges and vertices	Examine different solid shapes and identify and count their number of faces, edges and vertices	
	Nets for building 3D shapes	Build nets of 3D shapes and understand their properties	
	Drawing solids on a flat surface	Examine oblique sketches and visualize all the faces of a solid shape	
		Use isometric dot sheet and draw isometric sketches of a 3D shape.	
		Draw 3D objects in 2D and visualize solid objects from different perspectives.	
	Viewing different sections of a solid	Examine cross sections of different solid shapes and interpret and visualize different planes.	
		Examine the different figures formed by changing the angle of shadows formed and visualize solid figures	
		Examine solid figures from different angles and view different sections of solids.	