

قرار رقم ٤٨٠ / ٢٠٢٦

اعتماد منهاج مادة "الرياضيات"
لمستوى التكميلية المهنية السنة الاولى والسنة الثانية
الذي يؤدي لنيل شهادات رسمية في المديرية العامة للتعليم المهني والتقني

إن المديرية العامة للتعليم المهني والتقني بالتكليف،
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إعفاء من تكليفه بهذه المديرية العامة وتكليف مدير المعهد الوطني للعباية التمرضية بمهام المدير العام لها)،
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الامتحانات الرسمية لهذه الشهادات)،
بناءً على اقتراح رئيسي المصلحة الفنية بالتكليف ومصلحة التأهيل المهني بالتكليف،
تقرر ما يأتي:

المادة الأولى: يُعتمد في المديرية العامة للتعليم المهني والتقني، المنهاج المُرفق بهذا القرار العائد لمادة " الرياضيات "
لمستوى التكميلية المهنية السنة الاولى والسنة الثانية ، الذي يؤدي لنيل شهادة رسمية .

المادة الثانية: يُنشر هذا القرار في الجريدة الرسمية ويُعمل به فور صدوره

٢٠٢٦/٩/١

الدكوانه في:

المديرية العامة للتعليم المهني والتقني

د. هنادي بري



٢٠٢٦/٩/١ - ٦٥٢ - ٢٠٢٦



MODERNIZED CURRICULUM

MATHEMATICS

VOCATIONAL BREVET (BP)

FIRST YEAR (BP1) & SECOND YEAR (BP2)

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1. INTRODUCTION

In the modern labor market, there is a need for functional understanding of numbers and mathematical skills just as there is a need for skills in reading, writing, and use of information technology. The needs are found both among workers themselves and in workplaces where new technology with its changing techniques and work organization places new demands on competencies.

The primary aim of Mathematics education at the BP level is to prepare students for further education and work, and ensure that they develop the necessary knowledge of mathematics and skills to live and work in the 21st century.

This syllabus emphasizes a balanced approach towards the acquisition of knowledge in mathematics, attitudes and skills through carefully organized activities. There are two types of lessons in this syllabus, the concept development lessons that are meant to first reveal students' prior knowledge, then develop students' understanding of important mathematical ideas, connecting concepts to other mathematical knowledge. And problem-solving lessons are meant to assess, then develop, students' ability to apply their mathematical knowledge and reasoning in flexible ways to non-routine, unstructured problems within mathematics and in real-world contents.

Skills, understandings and attitudes towards mathematics are parts of students' personal qualifications. The mathematics is often hidden in the technology, and usually formulas are used unconsciously of the applied mathematics embedded within them. It is noted that some students can solve problems in the school-based material, but they are not able to use the theory and methods in practice. Their skills are not functional. Conversely, other students may be able to apply mathematical methods practically but struggle with the critical concepts found in text book problems. When mathematical instruction is integrated within vocational teaching with practical exercises or project tasks it is possible to break this pattern. It can be obvious to the participants that the mathematical methods are useful. Learning Mathematics in these contexts will be more interesting and effective.

The content of this syllabus has been carefully chosen to ensure continuity and progression of mathematics education across the levels. Students are presented with skills of mathematics that are interesting and best contribute to their general education. It is expected that upon completion of the course students shall acquire the basic foundations for developing competences relevant for job related occupations as well as for more academic pursuit in the discipline of mathematics. To help students keep up with advances in mathematics and technology, teachers should feel free to incorporate current issues that are relevant and interesting into their lessons.

It is important to note that the sequencing of topics in this syllabus follows a recommended teaching order. Schemes of work and assessment should be drawn up by teachers in a manner commensurate with the needs, interest and abilities of their students. Teachers are advised to adopt a variety of approaches in their teaching and incorporate ideas as well as activities and applications from the everyday life of their students.

2. OBJECTIVES OF THE MATHEMATICS CLASSES

The broad aims of this syllabus are that students should:

- Describe and model situations
- Think logically
- Be able to work out solutions to problems they will meet on the job
- Confront difficulties rather than seeks to avoid or pre-empt them
- Expose and discuss common misconceptions and other surprising phenomena
- Create connections between topics both within and beyond mathematics

3. LEARNING OUTCOMES

Based on the broad aims, it is possible to identify the general learning outcomes for the syllabus as follows:

Year 1

Intended Learning Outcomes (ILOs)	Description
Natural Numbers	ILO1 Recognize natural numbers ILO 2 Write natural numbers in expanded form ILO 3 Apply addition on natural numbers ILO 4 Apply subtraction on natural numbers ILO 5 Apply multiplication on natural numbers
Power	ILO 1 Define a power and use the terms "base" and "exponent" correctly ILO 2 Expand powers into repeated multiplication ILO 3 Apply the power rules

Prime Numbers	ILO 1 Define a prime number and a non-prime number and distinguish them from composite number ILO 2 Recognize and apply divisibility rules ILO 3 Perform prime factorization of a composite number ILO 4 Find GCD and LCM of two or more numbers
Fractions	ILO 1 Define a fraction, understand the numerator and denominator ILO 2 Simplify fractions to their lowest terms ILO 3 Add and subtract fractions with like denominators only
Decimals	ILO 1 Define a decimal and identify the place value of its digits ILO 2 Expand decimals ILO 3 Identify the types of decimals ILO 4 Apply simple operations on decimals
Geometry	ILO 1 Define a circle and understand its properties ILO 2 Identify and draw parallel and perpendicular lines ILO 3 Define and draw angles ILO 4 Define a triangle and understand its properties
Statistics	ILO 1 Understand the concept of statistics ILO 2 Collect and organize simple categorical data

Year 2

Intended Learning Outcomes (ILOs)	Description
Numbers and Operations	ILO 1 Define and identify integers and apply simple operations (addition, subtraction, multiplication) and apply the distributive property to integers ILO 2 Identify, represent, compare, and locate numbers on a number line ILO 3 Identify multiples and factors of given numbers
Fractions	ILO 1 Apply simple operations on fractions like addition, subtraction, multiplication and division ILO 2 Compare fractions ILO 3 Simplify fractions
Algebraic Expression	ILO 1 Define algebraic expression, identify its components ILO 2 Apply simple addition and subtraction to like terms
Proportionality	ILO 1 Define proportionality, calculate the constant of proportionality and solve for an unknown in a proportional relationship ILO 2 Define a scale and use it to enlarge and reduce shapes

Equation	ILO 1 Define what an equation is and distinguish it from an expression ILO 2 Solve one-step addition and subtraction equations
Statistics	ILO 1 Organize data using tables and simple frequency distributions ILO 2 Represent data using appropriate graphical methods such as bar graphs, pie charts, line graphs, and histograms ILO 3 Calculate and interpret basic measures of central tendency (mean, median, and mode)

4. CURRICULUM DELIVERY

The teaching methods must be dynamic and encourage active participation on the part of the students. Methods and learning strategies shall be based on interactive communication.

General education subjects should be presented with close reference to working situations and linked to the development of practical activities.

The instructor should choose a participative teaching-learning approach providing as much possibility to the student to discover and practice as possible. The student should be encouraged to actively participate in the development of his/her skills through discussion as well as practical exercises related to the occupation.

In the latter students will carry out presentations or reports. Audio-visual aids are also used to support lectures.

The use of ICT and web browsing should be encouraged to stimulate curiosity and the search for solutions available on the web, as well as through creating discussion forums and blogs.

5. ASSESSMENT

Assessment of the learners' achievement provides information about what has been learned at a particular point in time.

The assessment modes comprise not only the evaluation of demonstrated knowledge and understanding the fundamentals of the subject, but also other abilities, to be applied by students when performing a task or involved in a situation.

Continuous assessment is part of the teaching/learning process. It should be used to inform teachers when they are planning lessons and guiding their students to achieve the objectives of their subject and grade. By using continuous assessment techniques, teachers can ensure that all students are making progress consistent with their level of ability. It will also give them a system for diagnosing at an early-stage problem that their students may be encountering (either the whole class or individual students). As it is continuous, it does not matter if only a few students are assessed at any one time – teachers can regularly check the progress in a single skill or area of knowledge of an individual student or of a small group. Methods used can include:

- Students' self-assessment against specific criteria
- Peer assessment
- Peer correction and marking (students exchange their work for comments or marks)
- Group report on activities and projects
- Teacher's assessment of students' knowledge against specific criteria
- Teacher's assessment of group work (individual contributions and roles played)
- Evaluation of homework assignment
- Student performance in quizzes and tests

To secure progression between the 1st and 2nd year, students are sitting for end of year exams. When students complete the second year of their education, they take official exams in their respective tracks. Students who finish the examinations successfully are eligible to enrol in year 1 of "Brevet Professional" BP1.

6. MATHEMATICS PROGRAM FOR THE TWO YEARS OF BP

6.1 SUMMARY OF THE TWO YEARS

Mathematics		
General competences		Objectives and skills
First year	Understanding the concept of natural numbers	<u>Unit 1: Natural numbers (Sport)</u> Count and name numbers Write numbers in expanded form Add and subtract natural numbers Multiply natural numbers Use addition, subtraction and multiplication for tracking scores, calculating team totals, measuring of stadium ...
	Performing basic operations on natural numbers Understanding, calculating and applying powers Identifying prime numbers Understanding the concept of factors, GCD and LCM	
		<u>Unit 2: Powers (Environment)</u> Define a power and write powers for repeated multiplications Identify the base and exponent of a power Write powers in expanded forms Explain the six rules of power Evaluate powers of natural numbers with positive integer exponents Illustrate power by building blocks, trees, plants ...

	Understanding decimal place value Converting between fractions and decimals Performing operations with decimals Understanding circle terminology and properties Understanding and identifying lines and angles Understanding and applying the angle sum property of triangles Understanding basic concept of statistics and collecting data	<u>Unit 3: Prime numbers (Cryptography)</u> Define prime numbers Differentiate between prime numbers and composite numbers Develop logical reasoning Memorize the first 10 prime numbers Perform prime factorization of composite numbers Use division method to decompose composite number into the product of its prime factors Write a number as a product of its prime factors Calculate LCM and GCD Explore simple applications of prime numbers in cryptography <u>Unit 4: Fractions (Food and hygiene)</u> Identify the numerator and denominator in a fraction Define irreducible fraction Determine the <u>common factors</u> of the numerator and denominator of a given fraction Simplify a fraction by dividing its numerator and its denominator by a common factor Determine the <u>greatest common divisor</u> of the numerator and denominator of a given fraction Simplify a fraction by dividing its numerator and its denominator by their greatest common factor Add and subtract two fractions with like denominators Use fractions to measure medication, to prepare meals and to interpret nutritional labels ... <u>Unit 5: Decimals (Market)</u> Define decimal Identify the whole number and fractional parts of a decimal Write decimals in expanded form Write a decimal number in the form of the sum of several decimal fractions with the denominators 10, 100, 1000, and so on Understand the relationship between fractions and decimals Differentiate between decimal fraction and non-decimal fraction Use decimals in money exchange, to plan how to spend a budget and to calculate the total cost of many items <u>Unit 6: Geometry (Architecture)</u> Define a circle Identify the radius, diameter, and center of a circle Define intersecting, parallel, and perpendicular lines
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		Recognize parallel and perpendicular lines in architectural designs, such as straight lines in building outlines, parallel lines in window grids, and perpendicular lines in door frames Define angles Measure angles in architectural designs, such as the right angles in the corners of a room or the obtuse angles in a triangular roof Define triangle and understand its properties
		<u>Unit 7: Statistics (Food)</u> Define statistics as the process of collecting, organizing, and presenting data. Collect simple data from real-life situations like the classroom.
Second year	Understanding the concept of integers Performing operations on integers Applying the order of operations (PEMDAS) Using the distributive property in calculations Understanding the concept of fractions Performing operations on fractions	<u>Unit 1: Numbers and operations (Finance)</u> Define the set of integers and apply simple operations on integers Understand PEMDAS rule Identify which operations have priority and apply the order correct of operations when evaluating a numerical expression Define and understand the number line Define the distributive property Apply the distributive property to solve problems involving real-life situations Define factors and multiples Understand how to find factors and multiples Calculate gains and losses, income and expenses, earnings and loans
	Understanding the concept of algebraic expressions Understanding the concept of proportional relationships Determining the constant of proportionality	<u>Unit 2: Fractions (Health and hygiene)</u> Recall fraction Use fractions to express proportions Add and subtract fractions with like and unlike denominators Multiply fractions Divide fractions Simplify fractions Use operations on fractions for medicine dosage, nutrition intake and daily water consumption
		<u>Unit 3: Algebraic expressions (Market)</u> Understand the difference between a numerical and an algebraic expression Define a monomial

		Add and subtract monomials Use algebraic expressions to find the price of a product, the revenue from selling products and the cost of a product after discount
		<u>Unit 4: Proportionality (Art)</u> Define proportional relationship Decide whether two quantities are in a proportional relationship Identify the constant of proportionality Define a scale and use a scale to find lengths Enlarge or reduce the sizes of shapes given specific scale factors Use proportionality to mix colors
		<u>Unit 5: Equation (Environment)</u> Understand the concept of an equation Recognize the meaning of the equal sign as balance between two sides Identify unknown values in simple equations Solve one-step equations involving addition and subtraction Solve one-step equations involving multiplication and division Check solutions by substituting values back into the equation
		<u>Unit 6: Statistics (Finance)</u> Recall the concept of statistics Identify different types of data (qualitative and quantitative, discrete and continuous). Organize data using tables and frequency distributions. Represent data using appropriate graphs such as bar charts, pie charts, line graphs, pictographs, and histograms. Calculate basic measures of central tendency (mean, median, and mode). Describe measures of dispersion such as range in simple terms. Interpret data from graphs and tables to draw simple conclusions. Explain the importance of statistics in understanding real-life information.

7. MATHEMATICS – BP

7.1 WEEKLY DISTRIBUTION OF EACH UNIT – YEAR 1

Unit 1	Natural numbers	
Weekly distribution		
Week 1	Count, name and expand natural numbers	- Express numbers in words or letters - Provide a chart of numbers and their corresponding words - Explain the rule to write number names and how the position of the number is used to convert it into words. - Write numbers in expanded form by using the place value chart to identify the place value of the given number.
Week 2	Addition of natural numbers	- Explain the terms of addition (addends and sum) - Explain the vertical addition with examples
Week 3	Subtraction of natural numbers	- Explain the terms of subtraction (the minuend, the subtrahend and the difference) - Explain the vertical subtraction with examples
Week 4	Multiplication of natural numbers	- Explain the terms of multiplication (the multiplicand, the multiplier, and the product). - Explain the vertical multiplication with examples.
Total learning hours		4 hours

Unit 2	Powers	
Weekly distribution		
Week 1	Define power	- Introduce power as repeated multiplication - Define the base and the exponent (The base is the repeated factor (the number multiplied) and the exponent counts the number of factors) - Write a power in expanded form (as multiplication of factors)
Week 2	Rules of power + exercises	- Explain product of powers rule $a^n \times a^m = a^{n+m}$ (When multiplying two bases of the same value, keep the bases the same and then add the exponents together to get the solution) - Explain quotient of powers rule $\frac{a^n}{a^m} = a^{n-m}$ (When dividing two bases of the same value, keep the base the

		same, and then subtract the exponent values) Explain power of a power rule $(a^n)^m = a^{n \times m}$ (When a power is being raised by another power, multiply the exponents together and keep the base the same)		
Week 3	Rules of power + exercises	- Explain power of a product rule $(ab)^n = a^n \times b^n$ (When raising a product to a power, raise each factor to that power and then multiply the results) - Explain Power of a quotient rule $(\frac{a}{b})^n = \frac{a^n}{b^n}$ (When raising a quotient to a power, raise each factor to that power and then divide the results)		
Week 4	Rules of power + exercises	- Explain zero power rule $a^0 = 1$ (Any base ($\neq 0$) raised to the power of zero is equal to one) - Evaluate the power (it means determine the equivalent numerical value)		
Total learning hours		4 hours		

Unit 3	Prime numbers			
Weekly distribution				
Week 1	Introduction to prime numbers	- Define prime numbers and non-prime numbers - Differentiate prime numbers from composite numbers - Memorize the first 10 prime numbers		
Week 2	Divisibility rules and Prime factorization	- Apply divisibility rules for numbers such as 2, 3, 4, 5, 6, 9, and 10 - Perform prime factorization using division method - Write a number as product of its prime factors		
Week 3	LCM	- Define LCM - Use prime factorization to calculate the LCM of a composite number		
Week 4	GCD	- Define GCD - Use prime factorization to calculate the GCD of a composite number		
Total learning hours		4 hours		

Unit 4	Fractions			
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Weekly distribution			
Week 1	Introduction to fractions	- Define a fraction - Represent a fraction a part of a whole (represented by shades on circle) - Define irreducible fraction	
Week 2	Reduce fractions using factors simplification	- Perform the prime factorization of both numerator and denominator - Simplify common factors from both numerator and denominator to get the irreducible fraction	
Week 3	Reduce fractions by GCD method	- Determine the GCD of the numerator and the denominator - Divide both numerator and denominator by the GCD to get the irreducible fraction	
Week 4	Simple addition and subtraction of fractions	Explain how to add and subtract fractions with like denominators only (Note that this rule does not apply on fractions of different denominators)	
Total learning hours		4 hours	

Unit 5	Decimals			
Weekly distribution				
Week 1	Introduction to decimals	- Define a decimal - Identify the parts of a decimal (the whole part to the left of the decimal point and the fractional part to the right of the decimal point) - Name the whole part (ones, tens, hundreds ...) - Name and identify the fractional part (tenths, hundredths, thousandths)		
Week 2	Expand decimals	Write decimal in expanded form (this means writing each number according to its place value, example: $3.482 = 3 + \frac{4}{10} + \frac{8}{100} + \frac{2}{1000} = 3 + 0.4 + 0.08 + 0.002$		
Week 3	Types of decimals	Identify the types of decimal numbers		
Week 4	Operations on decimals	Simple operations on decimals (addition and subtraction)		
Total learning hours		4 hours		

Unit 6	Geometry	
Weekly distribution		
Week 1	Circle	- Define a circle - Define the parts of a circle including the relation between the radius and the diameter - Explain the properties of circles
Week 2	Lines and segments	- Define parallel lines and their properties - Define perpendicular lines and their properties - Draw parallel and perpendicular lines
Week 3	Angles	- Define angles - Use protractor to measure and draw angles
Week 4	Triangle	- Define a triangle - Identify the properties of triangles
Total learning hours		4 hours

Unit 7	Statistics	
Weekly distribution		
Week 1	Introduction to statistics	Define statistics as the process of collecting, organizing, and presenting data. Collect simple data from classmates using a survey or question.
Total learning hours		1 hour

7.2 WEEKLY DISTRIBUTION OF EACH UNIT – YEAR 2

Unit 1	Numbers and operations	
Weekly distribution		
Week 1	Integers	- Define integers - Apply simple addition and subtraction on integers - Apply multiplication rule to multiply integers
Week 2	Number line	- Define the number line - Identify the parts of a number line - Locating numbers on a number line

		- Comparing numbers using a number line - Use the number line for operations		
Week 3	Distributive property	- Define the distributive property - Solve problems involving the distributive property		
Week 4	Factors and multiples	- Define factors of a number - Define multiples of a number - Find factors and multiples of a number		
Total learning hours		4 hours		

Unit 2	Fractions			
Weekly distribution				
Week 1	Introduction to fractions	- Define a fraction - Express proportion by using fractions		
Week 2	Addition and subtraction of fractions	- Find common denominator of two or more fractions - Add fractions with like and unlike denominators - Subtract fractions with like and unlike denominators		
Week 3	Multiplication, division of fractions	- Multiply two or more fractions - Divide two or more fractions		
Week 4	Comparison of fractions	- Compare between addition and multiplication of fractions - Compare two fractions that share the same denominator - Compare two fractions that share the same numerator		
Week 5	Simplification of fractions	- Simplify a fraction using successive divisions - Simplify a fraction using GCD method - Simplify a fraction by simplifying factors		
Week 6	Exercises	Solve several examples related to the unit		
Total learning hours		6 hours		

Unit 3	Algebraic expressions	
Weekly distribution		
Week 1	Introduction to algebraic	Define numerical expression

	expression	• Define algebraic expression • Differentiate between numerical and algebraic expression • Define a monomial		
Week 2	Simple operations on monomials	• Add and subtract monomials • Multiply monomials		
Week 3	Exercises	• Solve several examples related to the unit		
Total learning hours		3 hours		

Unit 4	Proportionality			
Weekly distribution				
Week 1	Introduction to proportionality	- Define proportionality - Determine if ratios are in proportion - Identify the constant of proportionality		
Week 2	Table of proportionality	- Find an unknown in a ratio when two ratios are in proportion - Complete a table that shows equivalent ratios or two proportional quantities		
Week 3	Scale	- Define a scale - Understand the relationship between the drawing scale, the actual length, and the drawing length - Use scale to find length		
Week 4	Enlargement and Reduction	- Define reduction and enlargement and their relation with the drawing scale - Decide whether a drawing scale represents a reduction or an enlargement - Enlarge or reduce the sizes of shapes given a scale factor		
Total learning hours		4 hours		
Unit 5	Equation			
Weekly distribution				
Week 1	Introduction to equation	- Define an equation - Distinguish an equation from an expression - Define an unknown - Define a solution		

Week 2	One-step addition and subtraction equations	• Define a one-step addition and subtraction equation • Solve equations from visual models • Solve equations using inverse operations		
Week 3	One step multiplication and division equations	• Define one-step multiplication and division equation • Solve equations using inverse operations		
Week 4	Exercises	• Solve several examples related to the unit		
Total learning hours		4 hours		

Unit 6	Statistics			
Weekly distribution				
Week 1	Review of Statistics with Examples	• Define statistics and explain its meaning • Give real-life examples of statistics • Explain the basics of statistics (central tendency and dispersion) • Define data • Identify the types of data		
Week 2	Representation of data	• Represent data on bar graph • Represent data on pie chart • Represent data on histogram • Represent data on line graph • Represent data on frequency distribution		
Week 3	Measures of central tendency	• Define measures of central tendency • Identify the three measures of central tendency (mean, median, and mode).		
Week 4	Exercises	• Solve several examples related to the unit		
Total learning hours		4 hours		

8. LEARNING UNITS (YEAR 1)

8.1 LEARNING UNIT 1: NATURAL NUMBERS

Learning Unit 1	Duration
Natural numbers	4 hours

8.1.1. INTRODUCTION

This Unit is more than just a basic concept — Natural numbers $N = \{1, 2, 3, \dots\}$ are a crucial component of logical reasoning and problem-solving in both theoretical and practical contexts. Natural numbers are the foundation of mathematics. In daily life, natural numbers are used in counting, measuring, and organizing. They're essential in fields like engineering, economics, and data analysis, where counting and quantifying are crucial. Working with natural numbers enhances logical thinking and problem-solving skills. It develops an ability to approach problems methodically and to apply mathematical reasoning, also, they help to understand patterns and sequences.

Natural numbers are the first type of numbers introduced in education. Understanding them well sets a strong foundation for learning more advanced mathematics and science topics.

8.1.2. UNIT LEARNING OUTCOMES

At the end of this learning unit students should be able to:

- Define Natural Numbers
- Use natural numbers to count items in everyday situations
- Expand natural numbers
- Perform Basic arithmetic operations like addition, subtraction and multiplication
- Track and record scores in games

8.1.3. CAPABILITIES RELATED TO LEARNING OUTCOMES

The suggested activities in this unit should facilitate the development of the following competencies to the students' fullest capability:

- Counting players in a team
- Scoring in a game
- Counting goals or points
- Ranking players or teams
- Counting time in a match
- Setting team wins and losses

8.1.4. UNIT 1: NATURAL NUMBERS – CONTENT

Lessons	Key points / Reference to ILO	Content	Suggested learning / teaching activities
Lesson 1 - Week 1 Count, name and expand natural numbers	• Read and write natural numbers in numerals and words • Chart of numbers and their corresponding words • Rule to write number names • Expanded form	Start by explaining that numbers can be represented both in numerical form and in word form. Teach basic number words (1-10), then larger numbers. Draw a chart of basic numbers and their corresponding words. Explain the rules for writing numbers in words. Introduce the concept of place value, Write the expanded form Step-by-Step and use examples.	Create a sports-related worksheet where students are given a series of numbers (scores, rankings, player stats) and asked to write them in expanded form. Pre-made cards with numbers related to sports scores, rankings. Organize a tournament-style competition. Each student or team picks a card with a number on it. The student/team has to write the number on the card in words within a time limit.
Resources	• https://www.youtube.com/watch?v=Ju3kQjmcH5g		
Lesson 2 - Week 2 Addition of natural numbers	• The terms of addition (addends and sum) • The vertical addition	Start with a simple definition of addition, addends and sum and use examples. Explain the concept of vertical addition, and explain its steps and provide practical examples.	Write down a series of basketball shots for a player or team and ask the student to add these points vertically (using vertical addition) to find the total points scored. Practice vertical addition using swimming lap times by providing students with the times for each lap of a race and ask them to add the lap times vertically to find the total time for the race. Encourage students to identify the addends (lap times) and the sum (total time).

Resources	• https://www.pinterest.com/pin/vertical-addition-practice-math-worksheet--496381190190080826/ • https://www.youtube.com/watch?v=mAvuom42NyY • https://www.youtube.com/watch?v=1Al2Fc3wOIQ		
Lesson 3 - Week 3 Subtraction of natural numbers	• The terms of subtraction (the minuend, the subtrahend and the difference) • The vertical subtraction	Start with a simple definition of subtraction, minuend, subtrahend and difference and use examples. Explain the concept of vertical subtraction, and explain its steps and provide practical examples.	Use sports scenarios to explain the subtraction. For example, if the basketball team scores 80 points and their opponent scores 65 points, ask the students to identify the terms: Minuend: The number you start with (the total score of one team). Subtrahend: The number you subtract from the minuend (the total score of the opposing team). Difference: The result of the subtraction (the score difference between the teams). And then ask the students to apply vertical subtraction.
Resources	• https://www.youtube.com/watch?v=8_X680JiWDc • https://www.youtube.com/watch?v=489srqkdgMQ		
Lesson 4 - Week 4 Multiplication of natural numbers	• The terms of multiplication (the multiplicand, the multiplier, and the product) • The vertical multiplication	Start with a simple definition of multiplication (repeated addition, rows and columns), multiplicand, multiplier, and product, and use examples. Explain the concept of vertical multiplication, explain its steps, and provide practical examples.	Show pictures of sports teams with equal numbers of players. Example: 4 basketball teams with 6 players each. Students count the equal groups and write: $6+6+6+6=24$ Then connect repeated addition to multiplication: $4 \times 6 = 24$ Discussion Question: "How does multiplication help us find the total number of players faster than adding?" Students write: Multiplicand = 6 players Multiplier = 4 teams Product = 24 players

			And then ask the students to apply vertical multiplication.
Resources	• https://www.youtube.com/watch?v=eW2dRLyoyds		

8.1.5. SUGGESTED ACTIVITIES TO DEVELOP SKILLS AND CAPABILITIES

Suggested activity	Example of practical activity
• Expanded form match-up: Cards with numbers written in standard form and cards with numbers written in expanded form and the students play matching game.	Material: Video • https://www.youtube.com/watch?v=Nf7yR3ocaD8
• Addition and subtraction relay race: Divide students into small teams, set up a relay race where each team member solves a problem in turn. They write the solution on their whiteboard and then pass the next problem to their teammate, the first team to correctly solve all their problems and finish the relay wins. Finally, discuss solutions and verify accuracy with the class.	Material: Video • https://www.youtube.com/watch?v=DTZqgYRoxYU
• Sports Score Challenge Relay: Divide students into small teams and organize a “sports championship relay.” Each team represents a sports club competing for points. At each station, one student picks a multiplication card (e.g., goals scored × matches played, baskets × points per basket, or players × equipment packs) and solves it using a whiteboard. Once they get the correct answer, they earn points for their team and pass the turn to the next teammate at the next station. Each station has a different type of multiplication challenge, such as: Simple multiplication Word problems Vertical multiplication The team that correctly completes all stations and earns the highest total points wins the sports championship. Finally, the class comes together to review the answers, discuss different solving strategies, and check accuracy of all multiplication solutions.	Material: Video • https://www.youtube.com/watch?v=7fY1rSc7-so

8.1.6. FORMATIVE ASSESSMENT

Student Name:	Date:			
Learning Outcomes	Criteria for assessment	Assessment		
		Yes	No	N/A
LO 1: Recognize natural numbers	Is s/he able to count objects?	☐	☐	☐
	Is s/he able to express small numbers in words?	☐	☐	☐
	Is s/he able to express large numbers in words?	☐	☐	☐
LO 2: Write natural numbers in expanded form	Is s/he able to recognise the position of each digit in a number?	☐	☐	☐
	Is s/he able to use the place value chart?	☐	☐	☐
	Is s/he able to write small numbers in expanded form?	☐	☐	☐
	Is s/he able to large numbers in expanded form?	☐	☐	☐
LO 3: Apply addition on natural numbers	Is s/he able to define the terms addends and sum?	☐	☐	☐
	Is s/he able to apply vertical addition on small numbers?	☐	☐	☐
	Is s/he able to apply vertical addition on large numbers?	☐	☐	☐
LO 4: Apply subtraction on natural numbers	Is s/he able to define minuend, subtrahend and difference?	☐	☐	☐
	Is s/he able to apply vertical subtraction on small numbers?	☐	☐	☐
	Is s/he able to apply vertical subtraction on large numbers?	☐	☐	☐
LO 5: Apply multiplication on natural numbers	Is s/he able to define multiplicand, multiplier and product?	☐	☐	☐
	Is s/he able to apply vertical multiplication on small numbers?	☐	☐	☐

8.2 LEARNING UNIT 2: POWERS

Learning Unit 2	Duration
Powers	4 hours

8.2.1. INTRODUCTION

Dive into the fascinating world of power in mathematics with this lesson. You'll understand everything from the definition and key elements of power to detailed explorations of power laws. Discover how power plays a role in algebra, delving into exponential power principles. More than theoretical understanding, the lesson also illuminates the practical applications of power in real-world and advanced mathematical scenarios. Learn how and where to utilize these concepts in everyday life and precise mathematical context.

Exponents are fundamental tools for comprehending connections between numbers, modeling phenomena, and solving equations in everything from elementary arithmetic to advanced calculus.

8.2.2. UNIT LEARNING OUTCOMES

At the end of this learning unit students should be able to:

- Define a power
- Identify the base and exponent of a power
- Write a power in expanded form (repeated multiplication) and vice versa
- Evaluate powers of natural numbers with positive integer exponents
- Solve simple real-life and vocational problems involving powers of natural numbers

8.2.3. CAPABILITIES RELATED TO LEARNING OUTCOMES

The suggested activities in this unit should facilitate the development of the following competencies to the students' fullest capability:

- Relating the concept of powers to environmental growth
- Using repeated multiplication with plants
- Applying power rule in different examples related to the environment theme

8.2.4. UNIT 2: POWERS – CONTENT

Lessons	Key points / Reference to ILO	Content	Suggested learning / teaching activities
Lesson 5 – Week 5 Define power	- Power as repeated multiplication - Base and exponent - Expanded form of powers	Start by defining the power as repeated multiplication and use examples. Define what is base and exponent of a power. Explain how to expand the power expression into repeated multiplication. Teach students how to convert from power form to expanded form and vice versa.	Give the students some nature items or pictures such as 3 leaves, 2 flowers, or 4 twigs. And ask them to create a power expression for how these items could grow over time. Then ask the students to expand these powers and solve the multiplication to understand the total amount of items over time. A population starts with 1 pair of rabbits. The number of pairs doubles every month. How many pairs are there after 3 months? Write it as repeated multiplication. Discuss the exponent as the number of months and how the rabbit population grows exponentially.
Lesson 6 - Week 6 Rules of power – part 1	- Product of a powers rule - Quotient of a powers rule - Power of a power rule	Start by defining the product of a power rule with real-life examples. Define the quotient of a power rule with real-life examples. Define the power of a power rule with real-life examples.	A flower shop sells gift boxes each box has 3^2 flowers. The shop sold 3^3 boxes How many total flowers were delivered? Discuss the result with the students. A farm's main water tank holds 5^6 liters of water. The farmer uses 5^4 liters every day. In how many days will the tank be empty? And discuss the result with the students. Imagine a tree that produces 2^2 branches. Each branch grows 2^3 leaves. How many total leaves are on the tree? Write your setup as a power of a power, then calculate the answer.
Lesson 6 – Week 7 Rules of power – part 2	- Power of product rule - Power of quotient rule	Start by defining the power of product rule with real-life examples. Define the power of quotient rule with real-life examples.	Imagine A farm has 2 orchards, and each orchard plants 3 trees. Over 2 years, the entire farm layout is squared as it expands. How many total trees are there now? Apply the power of a product rule and discuss the results with the students. A community garden compares Tank A (6 liters) to Tank B (2 liters) as a fraction: $\frac{6}{2}$. For a 2-day conservation experiment, the garden squares this

			fraction $(\frac{6}{2})^2$. Apply the power of a quotient rule and discuss the results with the students.
Lesson 6 – Week 8 Rules of powers – part 3	- Zero power rule - Evaluate power (find the equivalent numerical value)	Start by defining the zero-power rule with real-life examples. Apply examples to evaluate power and find the equivalent numerical value.	A tree triples its branches every year: Year 3: $3^3 = 27$ branches Year 2: $3^2 = 9$ branches Year 1: $3^1 = 3$ branches Year 0: Before any growing years pass (3^0), how many original tree trunks did you start with? Apply the zero-power rule and discuss the results with the students. Imagine a garden with 2 rows of trees, and each row has 3 trees. Each tree grows 2 branches. We want to find out how many total branches there are in the garden. And find the numerical value.
Resources	https://www.mathcentre.ac.uk/resources/uploaded/mc-ty-indicespowers-2009-1.pdf http://sites.isdschools.org/grade8_remote_learning_resources/useruploads/04_08/Math%208_Nowlin_April%208.pdf		

8.2.5. SUGGESTED ACTIVITIES TO DEVELOP SKILLS AND CAPABILITIES

Suggested activity	Example of practical activity
Tree Growth Challenge: Explain to the kids that some plants and trees grow in a way that they double in size every year. This kind of growth is called “exponential growth.” Set a scenario and use exponents to show growth and then discuss the results with the students.	Material: video https://www.youtube.com/watch?v=zdu8dII7zRE https://www.youtube.com/watch?v=39I-MZFUEzY https://www.youtube.com/watch?v=vJ7RbHPsDL0

8.2.6. FORMATIVE ASSESSMENT

Student Name:	Date:				
Learning Outcomes	Criteria for assessment	Assessment			
		Yes	No	N/A	
LO 1: Define a power and use the terms “base” and “exponent” correctly	Is s/he able to define power?	☐	☐	☐	
	Is s/he able to identify the base and the exponent correctly?	☐	☐	☐	
LO 2: Expand powers into repeated multiplication	Is s/he able to expand powers?	☐	☐	☐	
	Is s/he able to find the equivalent value of a power?	☐	☐	☐	
LO 3: Apply the power rules	Is s/he able to apply the product of a power rule?	☐	☐	☐	
	Is s/he able to apply the quotient of a power rule?	☐	☐	☐	
	Is s/he able to apply the power of a power rule?	☐	☐	☐	
	Is s/he able to apply the power of a product rule?	☐	☐	☐	
	Is s/he able to apply the power of a quotient rule?	☐	☐	☐	
	Is s/he able to apply the zero-power rule?	☐	☐	☐	

8.3 LEARNING UNIT 3: PRIME NUMBERS

Learning Unit 3	Duration
Prime numbers	4 hours

8.3.1. INTRODUCTION

Every natural number greater than 1 is either prime or can be expressed as a product of prime numbers in a unique way.

Prime numbers are important in some areas of computer science and cryptography. They can be used as part of mathematical methods for securing digital information.

8.3.2. UNIT LEARNING OUTCOMES

At the end of this learning unit students should be able to:

- Define and distinguish prime and composite numbers.
- Identify prime numbers using factors and divisibility.
- Define and identify factors and prime factors.
- Apply divisibility rules for 2, 3, 4, 5, 6, 9 and 10.
- Perform prime factorization of composite numbers.
- Find the GCD and LCM of two or more numbers.

8.3.3. CAPABILITIES RELATED TO LEARNING OUTCOMES

The suggested activities in this unit should facilitate the development of the following competencies to the students' fullest capability:

- Recall the first 10 prime numbers
- Apply prime numbers and factors in simple coding activities

8.3.4. UNIT 3: PRIME NUMBERS – CONTENT

Lessons	Key points / Reference to ILO	Content	Suggested learning / teaching activities
Lesson 7 - Week 9 Introduction to prime numbers	Prime numbers, non-prime numbers and composite numbers	Start with a fun story or analogy, then introduce the definition in simple terms. Introduce students to how prime numbers can help create secret messages (simple cryptography). Define composite numbers and the difference between prime number and composite number. Write the 10 first prime numbers and help the students memorize them.	Write numbers from 1 to 20 on the board and ask the students to work as detectives and find the prime numbers. Use sorting game of prime and composite numbers, and discuss the process with students.
Lesson 8 - Week 10 Divisibility rules and prime factorization	- Prime factors - Division method	Start by explaining the divisibility rules for numbers such as 2, 3, 4, 5, 6, 9, and 10. Define the prime factorization and then use simple steps to explain the division method.	Use prime factorization to encrypt and decrypt secret messages like converting letters to numbers and encrypt a secret message.
Lesson 9 - Week 11 Lowest Common Multiple LCM	Prime factorization to calculate LCM	Introduce LCM and start with multiples, find the common multiples and then find the LCM. Explain how to use prime factorization to calculate LCM of a composite number.	The teacher (or one student) selects two numbers, for example, 6 and 8, and the student finds the LCM of those numbers. Then, each letter in a word will be multiplied by the LCM value (24). You can let the student decrypt a message by himself.
Lesson 10 – Week 12 Greatest Common Divisor GCD	Prime factorization to calculate GCD	Introduce GCD and start with factors, find the common factors and then find the GCD. Explain how to use prime factorization to calculate GCD of a composite	The teacher (or one student) selects two numbers, for example, 6 and 8, and the student finds the GCD of those numbers. Then, each letter in a word will be multiplied by the GCD value (2). You can let the student decrypt a message by himself.

		number.	
Resources	• https://thirdspacelearning.com/blog/what-is-a-prime-number/ • https://www.cuemath.com/numbers/prime-factorization/		

8.3.5. SUGGESTED ACTIVITIES TO DEVELOP SKILLS AND CAPABILITIES

Suggested activity	Example of practical activity
Secret garden code: Introduce the idea that in this activity, the students are going to protect a secret garden using “Prime Number Codes.” The secret garden is a metaphor for the encrypted message, and only someone with the right prime number key can decode it. Create a simple codebook: Assign each letter of the alphabet a number. Use prime numbers to create a special code for letters. Challenge the kids to write a short message using the prime number codebook. The teacher can encode and decode many words with many students.	Material: video • https://www.youtube.com/watch?v=5gBtzdM5M5k
Sports Stadium Code Breaker: Introduce the idea that students are security agents at a sports stadium, and their job is to check if players and teams are “eligible” to enter matches using divisibility rules. Only numbers that follow the correct divisibility “rules of the stadium” are allowed to pass security checkpoints. Create a “Security Rulebook” for the stadium gates: Gate 2: Only numbers divisible by 2 enter (even numbers) Gate 3: Only numbers divisible by 3 enter ... Give students a list of “player ID numbers”. Students act as security officers in teams. Each team must decide which stadium gates each number can enter and they write their decisions on a “security pass sheet”.	Material: video • https://www.youtube.com/watch?v=CqrYYiffPr0

LCM Activity: "Finding the Common Time for Handwashing"

Discuss how LCM is used to find a common event time. For example, if you wash your hands every 2 hours and your friend washes his hands every 3 hours, what is the next time you will both wash hands at the same time?

Calculate the LCM and set a timer for the different intervals (2 hours, 3 hours), and ask students to mark when each event will happen on a chart. This helps them visualize the intervals and the common time.

Material: video activity

- <https://www.youtube.com/watch?v=TVH90D9EvSY>

8.3.6. FORMATIVE ASSESSMENT

Student Name:	Date:				
Learning Outcomes	Criteria for assessment	Assessment			
		Yes	No	N/A	
LO 1: Define a prime number and distinguish it from composite number	Is s/he able to define a prime number?	☐	☐	☐	
	Is s/he able to define a composite number?	☐	☐	☐	
	Is s/he able to distinguish prime number from composite number?	☐	☐	☐	
LO 2: Recognize and apply divisibility rules	Is s/he able to divide by 2?	☐	☐	☐	
	Is s/he able to divide by 3?	☐	☐	☐	
	Is s/he able to divide by 4?	☐	☐	☐	
	Is s/he able to divide by 5?	☐	☐	☐	
	Is s/he able to divide by 6?	☐	☐	☐	
	Is s/he able to divide by 9?	☐	☐	☐	
	Is s/he able to divide by 10?	☐	☐	☐	
LO 3: Perform prime factorization of a composite number	Is s/he able to define a prime factor?	☐	☐	☐	
	Is s/he able to apply prime factorization using division method?	☐	☐	☐	
LO 4: Find GCD and LCM of two or more numbers	Is s/he able to define a factor?	☐	☐	☐	
	Is s/he able to find factors of a composite number?	☐	☐	☐	
	Is s/he able to find LCM of two or more composite numbers?	☐	☐	☐	
	Is s/he able to find GCD of two or more composite numbers?	☐	☐	☐	

8.4 LEARNING UNIT 4: FRACTIONS

Learning Unit 4	Duration
Fractions	4 hours

8.4.1. INTRODUCTION

Fractions are a foundational concept in mathematics with wide-ranging importance and applications. They represent part of a whole and are fundamental to understanding proportions, ratios, and division. They are essential for grasping how quantities relate to each other. While performing our daily activities, we use fractions unknowingly in several ways. They are essential in everyday life; they deeply impact everything around us and are really important. Try to think of other ways in which fractions are used in your life.

8.4.2. UNIT LEARNING OUTCOMES

At the end of this learning unit students should be able to:

- Define a fraction
- Show cooperation through group activity and class discussion
- Represent a fraction
- Define irreducible fraction
- Perform the prime factorization of both numerator and denominator
- Simplify the fraction to its reduced form
- Add two fractions with like denominators
- Subtract two fractions with like denominators

8.4.3. CAPABILITIES RELATED TO LEARNING OUTCOMES

The suggested activities in this unit should facilitate the development of the following competencies to the students' fullest capability:

- Representing proportions and fractions
- Simplifying, adding and subtracting fractions

8.4.4. UNIT 4: FRACTIONS – CONTENT

Lessons	Key points /	Content	Suggested learning / teaching
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	Reference to ILO		activities
Lesson 11 - Week 13 Introduction to fractions	Proportion and fraction	Start by explaining what proportion and fraction are, explain the two parts of a fraction. Relate fractions to food and hygiene like using a portion of a toothpaste, hand wash, fruits and vegetables ...	Cutting a snack into parts, and discuss the fractions with the students.
Lesson 12 - Week 14 Reduce fractions using factors simplification	- Simplify fraction by prime factorization - Irreducible fraction	Start by defining what simplifying fraction is. Explain how to use prime factorization to simplify fraction. Explain how to get the irreducible fraction.	Let's say we have a sandwich that we want to share with friends. If we cut the sandwich into 6 equal pieces, and we eat 2 of them, the fraction of the sandwich we've eaten is $\frac{2}{6}$. Explain step by step how to simply the fraction and get the irreducible form.
Lesson 13 - Week 15 Reduce fractions by GCD method	Simplify fraction by GCD method	Start by recalling the GCD and how to find GCD of two numbers. Explain how to get the irreducible fraction by dividing by the GCD.	Suppose you have a 500ml water bottle, and you drink 300ml of the water. The fraction of the water you drank is $\frac{300}{500}$. Explain how to write the corresponding fraction, then how to find the GCD and how to get the irreducible form of the fraction.
Lesson 14 – Week 16 Simple addition and subtraction of fractions	- Addition of two or more fractions with like denominators - Subtraction of two or more fractions with like denominators	Explain that this section is about like denominators only. Explain how to add or subtract two or more fractions with like denominators.	Imagine you have a sandwich and you cut it into 4 equal pieces. You eat $\frac{1}{4}$ of the sandwich, and your friend eats $\frac{2}{4}$ of the sandwich. How much of the sandwich has been eaten? Explain how to add the two fractions. Use similar examples on subtracting two fractions.

8.4.5. SUGGESTED ACTIVITIES TO DEVELOP SKILLS AND CAPABILITIES

Suggested activity	Example of practical activity
Fraction activity: “Sharing hygiene products” Start with an example of a group of soap bars. Imagine you have 4 soap bars, and 3 friends need to share them equally. Ask students: “How much soap does each person get?” (Answer: Each person gets $\frac{4}{3}$ of a soap bar.) Then show how dividing 1 soap bar into 4 equal pieces gives each person $\frac{1}{4}$.	Material: video • https://www.youtube.com/watch?v=FSTIQjxznUg

8.4.6. FORMATIVE ASSESSMENT

Student Name:	Date:				
Learning Outcomes	Criteria for assessment	Assessment			
		Yes	No	N/A	
LO 1: Define a fraction, understand the numerator and denominator	Is s/he able to define a proportion?	☐	☐	☐	
	Is s/he able to define a fraction?	☐	☐	☐	
	Is s/he able to identify the numerator and the denominator?	☐	☐	☐	
LO 2: Simplify fractions to their lowest terms	Is s/he able to apply prime factorization on composite numbers?	☐	☐	☐	
	Is s/he able to get the irreducible fraction using factors simplification?	☐	☐	☐	
	Is s/he able to simplify a fraction using GCD method?	☐	☐	☐	
LO 3: Add and subtract fractions with like denominators	Is s/he able to add two or more fractions with denominators?	☐	☐	☐	
	Is s/he able to subtract two or more fractions with like denominators?	☐	☐	☐	

8.5 LEARNING UNIT 5: DECIMALS

Learning Unit 5	Duration
Decimals	4 hours

8.5.1. INTRODUCTION

The whole numbers, also called the counting numbers, provide the means to specify “discrete” quantities, but not all uses of numbers are like this, other quantities are continuous. The need to describe continuous quantities often occurs in commerce and everyday activities involving measurement where amounts of a basic measurement unit intermediate between two whole numbers need to be specified and communicated.

Decimals are used every day to represent quantities such as money, weight, length, capacity and temperature. They are used in situations where more precision is required than the whole numbers can provide.

Fractions and decimals both serve the same purpose of describing parts of a whole. The idea of a fraction is more basic. Indeed, the fraction concept of a tenth is required to understand decimals.

8.5.2. UNIT LEARNING OUTCOMES

At the end of this learning unit students should be able to:

- Define decimals
- Understand decimal place value
- Convert between decimals and fractions
- Name the whole part and the fractional part
- Add and subtract decimals

8.5.3. CAPABILITIES RELATED TO LEARNING OUTCOMES

The suggested activities in this unit should facilitate the development of the following competencies to the students' fullest capability:

- Understanding the concept of decimals, including place value
- Recognizing and representing decimals in various forms
- Applying mental math strategies for basic decimal operations
- Solving real-world problems involving decimal operations
- Using decimals in pricing and budgeting

8.5.4. UNIT 5: DECIMALS – CONTENT

Lessons	Key points / Reference to ILO	Content	Suggested learning / teaching activities
Lesson 15 - Week 17 Introduction to decimals	- Decimals - Whole part - Decimal part	Start by defining what decimals are, and explain the parts of a decimal. Explain how to name the whole part and the decimal part.	Make a fun introduction [Set up a mock market in the classroom. Arrange a few desks or tables with play money and “market items” (you can use toy food or pictures of items)] and then introduce the concept of decimals and its parts.
Lesson 16 - Week 18 Expanding decimals	Expanded form of decimals	Explain how to write a decimal in expanded form.	Use place value charts, manipulatives (like base-ten blocks), and colorful markers to make learning more engaging. Emphasize how decimals are used in everyday life, such as in pricing, measuring, and cooking.
Lesson 17 - Week 19 Types of decimals	- Types of decimals - Terminating decimals - Non-terminating decimals - Recurring decimals - Non-recurring decimals	Start by explaining the types of decimals: Terminating decimals: They have a finite number of digits after the decimal point. Also known as exact decimal numbers. Non – terminating decimal numbers: The digits after the decimal point are endless. These decimal numbers are further divided into 2 types: - Recurring: decimal part is repeated endlessly. - Repeating: the decimal part is endless without repetition.	Create a "market stall" with items labeled with various decimal prices. Some prices should be terminating (e.g., \$2.50, \$1.75), some repeating (e.g., \$0.3333... for a candy bar - hint at the repeating pattern), and one or two with non-repeating decimals (e.g., a "rare collectible" priced at \$3.141... - introduce Pi as a non-repeating decimal). Let the students shop and identify the types of decimals.

Lesson 18 – Week 20 Operations on decimals	• Addition of decimals • Subtraction of decimals	Explain the steps to add two terminating decimals with examples. Explain the steps to subtract two terminating decimals with examples.	Use pricing game, and let the students add and subtract prices to get the total bill.
Resources	• https://byjus.com/maths/decimals/ • https://www.superprof.co.uk/resources/academic/maths/arithmetic/decimal-numbers/types-of-decimal-numbers.html#chapter_types-of-decimal-numbers		

8.5.5. SUGGESTED ACTIVITIES TO DEVELOP SKILLS AND CAPABILITIES

Suggested activity	Example of practical activity
Divide children into teams. Each team creates a "market" with prices for different "products" (could be drawings, play items, etc.). Prices must be decimals. Teams exchange "market lists" and write the prices of the other team's products in expanded form. Extension: Have teams calculate the total cost of a "shopping list" from the other team's market.	Material: video • https://www.youtube.com/watch?v=9frz4ODJUc0

8.5.6. FORMATIVE ASSESSMENT

Student Name:	Date:				
Learning Outcomes	Criteria for assessment	Assessment			
		Yes	No	N/A	
LO 1: Define a decimal and identify the place value of its digits	Is s/he able to define a decimal?	☐	☐	☐	
	Is s/he able to identify the parts of a decimal?	☐	☐	☐	
	Is s/he able to name the whole part of a decimal?	☐	☐	☐	
	Is s/he able to name the decimal part of a decimal?	☐	☐	☐	
LO 2: Expand decimals	Is s/he able to identify the place value of each digit in a decimal?	☐	☐	☐	
	Is s/he able to write decimals in expanded form?	☐	☐	☐	
LO 3: Identify the types of decimals	Is s/he able to name the types of decimals?	☐	☐	☐	
	Is s/he able to identify terminating decimals?	☐	☐	☐	
	Is s/he able to identify non-terminating decimals?	☐	☐	☐	
	Is s/he able to identify recurring decimals?	☐	☐	☐	
	Is s/he able to identify non-recurring decimals?	☐	☐	☐	
LO 4: Apply simple operations on decimals	Is s/he able to correctly add two decimals?	☐	☐	☐	
	Is s/he able to correctly subtract two decimals?	☐	☐	☐	

8.6 LEARNING UNIT 6: GEOMETRY

Learning Unit 6	Duration
Geometry	4 hours

8.6.1. INTRODUCTION

Geometry is a branch of mathematics that studies shapes, sizes, and the properties of space. It focuses on understanding the relationships between geometric figures and how they interact in space. Geometry is essential not only within mathematics but also in real-life applications such as engineering, architecture, art, and computer graphics, where it helps in designing structures and representing ideas visually.

Basic geometric concepts such as circles, lines, angles, and symmetry form the foundation for understanding more advanced ideas. Circles are used in everyday objects and designs like wheels and domes, while lines help build concepts such as segments and rays. Angles are important in constructing and analyzing shapes, and symmetry is widely used in design and art. These concepts are applied in fields like architecture, engineering, and navigation, showing how geometry is closely connected to the world around us.

8.6.2. UNIT LEARNING OUTCOMES

At the end of this learning unit students should be able to:

- Understand the basic properties of a circle
- Understand the relationship between radius and diameter Apply circle properties in real-world situations
- Define a line, a segment, and a ray
- Understand the properties of intersecting, parallel, and perpendicular lines
- Solve problems involving lines
- Draw and measure angles
- Define and classify triangles according to their sides and angles

8.6.3. CAPABILITIES RELATED TO LEARNING OUTCOMES

The suggested activities in this unit should facilitate the development of the following competencies to the students' fullest capability:

- Being able to draw circles of various sizes
- Recognizing how the properties of circles are used in architectural features
- Identifying and differentiating between various types of lines
- Developing the ability to draw intersecting, parallel, and perpendicular lines
- Understanding the types of angles
- Measuring angles using tools like a protractor and apply this skill in drawing and designing
- Understanding the properties of a triangle

8.6.4. UNIT 6: GEOMETRY - CONTENT

Lessons	Key points / Reference to ILO	Content	Suggested learning / teaching activities
Lesson 19 - Week 21 Circle	- Center - Radius - Diameter - Compass	Start by introducing the concept of a circle and how to draw it. Define radius, diameter, and center. Introduce the relationships $R = D/2 \text{ and } D = 2 \times R$ Explain how to use compass to draw a circle.	Present images of famous architectural structures that incorporate circles, such as the Pantheon (Rome), Apple Park (Cupertino), or the Guggenheim Museum (New York), and discuss how circles are used in these structures for aesthetic appeal, structural support, or symbolic purposes.
Lesson 20 – Week 22 Lines, segments and rays	- Line, segment, ray - Intersecting lines - Parallel lines - Perpendicular lines	Start by introducing the concept of line, segment, and ray using endpoints and proper notation. Explain intersecting lines (lines that cross at a single common point). Explain parallel lines (lines that never cross). Explain perpendicular lines (lines that intersect to form square corners).	- Show images of architectural grids, window frames, and floor plans to identify lines, segments, rays, and line relationships in real-world structures. - Have students use a straightedge and set square to construct a simple 2D room layout, incorporating parallel walls and perpendicular/intersecting doorways and partitions.
Lesson 21 - Week 23 Angles	- Angle - Protractor	Start by introducing the concept of angle and its types - Acute angles ($< 90^\circ$) - Right angles ($= 90^\circ$) - Obtuse angles ($> 90^\circ$ and $< 180^\circ$) - Straight angles ($= 180^\circ$) And explain how to use a protractor to measure it.	Present images of architectural structures with prominent angles, such as the pointed arches in Gothic cathedrals or the angled roofs of modern skyscrapers. Discuss how these angles contribute to the overall design and functionality of the structures.

Lesson 22 – Week 24 Triangle	• Shape of triangle • Angles of triangle	Start by introducing the concept of triangle and that it has three sides and three angles. Explain that the sum of the angles of a triangle is always 180°. Introduce the types of triangles: • Equilateral • Isosceles • Right angle • Scalene	• Present images of architectural and engineering structures that rely on triangles, such as roof trusses, bridge frames, and construction scaffolding. Discuss how triangles provide structural rigidity and cross-bracing in buildings. • Demonstrate that the interior angles sum is 180° by having students tear the three corners of a paper triangle and line them up along a straight ruler.
Resources	• https://byjus.com/maths/circles/ • https://www.splashlearn.com/math-vocabulary/geometry/parallel-and-perpendicular-lines • https://byjus.com/maths/angles/ • https://byjus.com/maths/triangles/		

8.6.5. SUGGESTED ACTIVITIES TO DEVELOP SKILLS AND CAPABILITIES

Suggested activity	Example of practical activity
Teach students how to draw circles to understand their application in architecture, particularly in circular floor, and discuss the use of circular spaces in architecture, such as circular meeting rooms or amphitheaters. Ask students to draw a floor plan of a circular building. They can start by drawing the central circle (representing the building) and then add elements such as walls, windows, doors, or furniture. Encourage them to use their knowledge of geometry to make the circle as accurate as possible.	Material: video • https://www.youtube.com/watch?v=OCbJUSu8dlQ

Designing a floor plan: Introduce students to basic architectural floor plans and explain the use of parallel and perpendicular lines in these designs. And then ask students to design their own simple floor plan for a room or house. They should use parallel lines for walls, windows, and furniture arrangements, and perpendicular lines to create right angles between walls, doors.	Material: video • https://www.youtube.com/watch?v=kQNHFPFS-ss
Recall the types of angles Acute angles, Right angles, Obtuse angles, Straight angles And show how they're used in architecture, such as the slanted angles of a triangular roof (acute), and the peak of the roof (obtuse). Have students draw both acute and obtuse angles on their own using a protractor. They can then design an abstract building facade or a roof structure where they incorporate these angles.	Material: video • https://www.youtube.com/watch?v=D3jnx2RLKBg
Recall the different types of triangles: • Equilateral • Isosceles • Right angle • Scalene Then Create geodesic domes with triangles: Explain the concept of a geodesic dome and how it uses triangles to create a stable, strong, and lightweight structure. Provide students with materials like straws, toothpicks, or paper to create a small-scale model of a geodesic dome. They should arrange triangular pieces to form the dome structure.	Material: video • https://www.youtube.com/watch?v=GI71iOkeIDo

8.6.6. FORMATIVE ASSESSMENT

Student Name:	Date:			
Learning Outcomes	Criteria for assessment	Assessment		
		Yes	No	N/A
LO 1: Define a circle and understand its properties	Is s/he able to define a circle?	☐	☐	☐
	Is s/he able to identify the center of a circle?	☐	☐	☐
	Is s/he able to identify the radius of a circle?	☐	☐	☐
	Is s/he able to identify the diameter of a circle?	☐	☐	☐
	Is s/he able to draw a circle using a compass?	☐	☐	☐
LO 2: Identify and draw parallel and perpendicular lines	Is s/he able to define a line?	☐	☐	☐
	Is s/he able to define a segment?	☐	☐	☐
	Is s/he able to define a ray?	☐	☐	☐
	Is s/he able to differentiate between lines, segments, and rays?	☐	☐	☐
	Is s/he able to identify intersecting lines?	☐	☐	☐
	Is s/he able to draw intersecting lines?	☐	☐	☐
	Is s/he able to identify parallel lines?	☐	☐	☐
	Is s/he able to draw parallel lines?	☐	☐	☐
	Is s/he able to identify perpendicular lines?	☐	☐	☐
LO 3: Define and draw angles	Is s/he able to define an angle?	☐	☐	☐
	Is s/he able to draw an angle using protractor?	☐	☐	☐
	Is s/he able to measure an angle using protractor?	☐	☐	☐
LO 4: Define a triangle and understand its properties	Is s/he able to define a triangle?	☐	☐	☐
	Is s/he able to identify a triangle by its three sides?	☐	☐	☐
	Is s/he able to identify a triangle by its three angles?	☐	☐	☐
	Is s/he able to sum a triangle's angles to 180°?	☐	☐	☐

8.7 LEARNING UNIT 7: STATISTICS

Learning Unit 7	Duration
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Statistics	1 hour
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8.7.1. INTRODUCTION

Statistics is the process of collecting, organizing, presenting and interpreting data to answer questions and make simple decisions.

8.7.2. UNIT LEARNING OUTCOMES

At the end of this learning unit students should be able to:

- Define statistics as the process of collecting, organizing, presenting, and interpreting data.
- Collect simple data from real-life questions or surveys.
- Organize and group information in a meaningful way through activities.
- Represent data visually using simple methods such as groupings or physical representations.
- Interpret data by identifying which categories have more, less, or equal values.
- Answer questions based on data collected, such as most popular and least popular choices.

8.7.3. CAPABILITIES RELATED TO LEARNING OUTCOMES

The suggested activities in this unit should facilitate the development of the following competencies to the students' fullest capability:

- Defining statistics
- Collecting data
- Organizing data
- Identifying more, less, or equal
- Answering questions like most and least popular

8.7.4. UNIT 7: STATISTICS - CONTENT

Lessons	Key points / Reference to ILO	Content	Suggested learning / teaching activities
Lesson 23 - Week 25 Introduction to statistics	• Population • Parameter • Data • Data collection • Qualitative data • Quantitative data • Most • Least	Start with a simple definition of statistics Explain the concept of data, data collection, data organization, and data interpretation Explain how to collect data using surveys or questions Explain what is population, parameter, data, qualitative data and quantitative data.	The teacher gives a set of information orally or on the board. Students answer questions like: Which choice is the most popular? Which is the least popular? How many students chose a certain option?

		Explain the meaning of most, least, and equal values in data	
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8.7.5. SUGGESTED ACTIVITIES TO DEVELOP SKILLS AND CAPABILITIES

Suggested activity

Write 4 broad qualitative categories on the whiteboard: Crunchy/Salty (chips/popcorn), Sweet/Fruity (fruit/gummies), Baked Goods (cookies/muffins), and Dairy (cheese/yogurt). Hand one sticky note to every student. Have them write their name on it.

Have students walk up row-by-row and stick their note directly under their favorite category on the whiteboard. Instruct them to stack their sticky notes straight up, one on top of the other, like building blocks.

To achieve your final learning outcomes (interpreting data and answering questions), have the students look at the board and complete a quick "Snack Party Report" on a blank sheet of paper:

- Most Popular (Highest number of students): "Which snack category has the tallest tower of sticky notes? Why is this our most popular choice?"
- Least Popular (Lowest number of students): "Which category has the shortest tower? Why is this our least popular choice?"
- Comparison: "Look at the Sweet tower and the Crunchy tower. Count the notes. Which category has more students? Which category has fewer students?"
- The Decision: "Based on our statistical data, which snack should we definitely order for the party? Which one should we avoid?"

8.7.6. FORMATIVE ASSESSMENT

Student Name:	Date:			
Learning Outcomes	Criteria for assessment	Assessment		
		Yes	No	N/A
LO 1: Understand the concept of statistics	Is s/he able to define statistics?	☐	☐	☐
	Is s/he able to define population?	☐	☐	☐
	Is s/he able to define parameter?	☐	☐	☐
	Is s/he able to define qualitative data?	☐	☐	☐
	Is s/he able to define quantitative data?	☐	☐	☐
LO 2: Collect and organize simple categorical data	Is s/he able to collect data?	☐	☐	☐
	Is s/he able to organize data?	☐	☐	☐
	Is s/he able to compare data?	☐	☐	☐

9. LEARNING UNITS (YEAR 2)

9.1 LEARNING UNIT 1: NUMBERS AND OPERATIONS

Learning Unit 1	Duration
Numbers and operations	4 hours

9.1.1. INTRODUCTION

This Unit forms the basis of arithmetic. Understanding numbers helps students grasp more complex concepts in mathematics. Working with integers enhances skills such as problem-solving, critical thinking, and logical reasoning, which are essential for more advanced mathematical studies.

Numbers and operations on numbers are essential in daily activities, they are used for counting items, tracking scores in games, and measuring quantities in recipes and many daily activities.

Overall, this lesson is vital not just for academic success but also for practical applications in everyday life. It equips students with essential skills and knowledge that extend beyond the classroom, influencing various aspects of their personal and professional lives.

9.1.2. UNIT LEARNING OUTCOMES

At the end of this learning unit, students should be able to:

- Differentiate between natural numbers and integers
- Add, subtract, multiply, and divide integers, including working with negative numbers
- Locate and plot numbers on a number line
- Perform addition and subtraction using the number line
- Correctly use the PEMDAS/PEDMAS rule to evaluate mathematical expressions, prioritizing operations in the correct order (Parenthesis, Exponent, Division/Multiplication, Addition/Subtraction)
- Use the distributive property to simplify numerical expressions.
- Determine the factors of given integers
- Determine the multiples of given integers
- Apply the learned mathematical concepts to real-world situations

9.1.3. CAPABILITIES RELATED TO LEARNING OUTCOMES

The suggested activities in this unit should facilitate the development of the following competencies to the students' fullest capability:

- Performing basic financial calculations
- Solving real-world problems with financial applications

9.1.4. UNIT 1: NUMBERS AND OPERATIONS - CONTENT

Lessons	Key points / Reference to ILO	Content	Suggested learning / teaching activities
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Lesson 1 - Week 1 Integers	• Simple addition • Simple subtraction • Multiplication rule • PEMDAS rule	Start by recalling the set of natural numbers then introduce the set of integers. Explain how to add two positive integers and how to add two negative integers. Explain how to add a positive integer and a negative integer. Explain how to subtract two positive integers. Explain how to subtract two negative integers. Explain how to subtract a positive integer from a negative integer. Explain how to subtract a negative integer from a positive integer. Introduce the multiplication rule and explain it step by step with examples $[(+)(+)=(+); (+)(-)=(-); (-)(+)=(-); (-)(-)=(+)]$. Explain the priority of mathematical operations according to PEMDAS rule.	• Bank account • Shopping • Profit and loss • Budget • Multiplication: Imagine you are a small business owner. You either make a profit or a loss each day. The number of days you make a profit or loss depends on whether you are multiplying by a positive or negative number. Give the students a number of days and the profit or loss per day. Ask them to multiply the number of days by the profit/loss per day to find the total profit or loss.
Lesson 2 - Week 2 Number line	• Position • Origin • Positive numbers • Negative numbers • Opposite numbers • Ascending order • Descending order • Plot	Start by introducing the number line. Explain the purpose of a number line and how it represents numbers in order. Identify the origin (0) on the number line. Explain that numbers increase as we move to the right and decrease as	Students start the activity by being given a starting amount of money (for example \$50) and a number line ranging from -50 to 100. They are then presented with a series of real-life financial situations such as receiving pocket money, buying items, or earning money from small tasks. Each situation represents either income (positive value) or expense (negative value). Students use the number line to track their money by moving to the right for gains and

		we move to the left. Demonstrate how numbers are placed at equal intervals on the number line. Show students how to locate and label numbers on the number line. Explain how to compare numbers using their positions on the number line. Explain the concept of distance between two numbers on the number line. Demonstrate addition on a number line by moving right for positive integers and left for negative integers. Demonstrate subtraction on a number line by moving left for positive integers and right for negative integers.	to the left for expenses after each transaction. They record their balance at every step to see how their financial situation changes over time. At the end of the activity, students discuss their final balance, identify which transactions increased or decreased their money the most, and reflect on whether they ended with more or less money than they started with. They can then create their own similar financial sequences and exchange them with classmates to solve using the same method.
Lesson 3 - Week 3 Distributive property	• Distributive property	Explain the distributive property and introduce it in the context of finance.	You go shopping for school supplies and you want to buy: 4 packs of pens costing \$2 each 4 notebooks costing \$3 each Apply the distributive property and discuss the results.
Lesson 4 - Week 4 Factors and multiples	• Factors • Multiples	Start by defining factors and multiples. Explain how to calculate multiples (by multiplying or by applying repeated addition). Explain how to calculate	Imagine that the student works at a part-time job where he earns \$15 per hour. He wants to know how much he will earn after working different numbers of hours. Imagine a company buys 48 items (such as pens or notebooks) in bulk and wants to divide them into packs for sale. The

		factors (by dividing or by applying prime factorization).	company needs to divide these items into different pack sizes.
Resources	• https://byjus.com/maths/operations-of-integers/ • https://www.splashlearn.com/math-vocabulary/algebra/distributive-property • https://www.splashlearn.com/math-vocabulary/factors-and-multiples		

9.1.5. SUGGESTED ACTIVITIES TO DEVELOP SKILLS AND CAPABILITIES

Suggested activity	Example of practical activity
Bank Account Simulation: Give each student a mock "bank account" with an initial balance. Create scenarios where students need to make deposits (positive integers) and withdrawals (negative integers). Have students update their balance after each transaction. At the end, students report their final account balances, applying the rules of integer addition and subtraction.	Material: Video • https://www.youtube.com/watch?v=g-8unH4zYzQ
Imagine you run a small lemonade stand business. You need to calculate the total cost of supplies, the total revenue, and profits, all while using basic arithmetic operations with integers and understanding business financial concepts. Use examples related to all the skills acquired in this lesson.	Material: video • https://www.youtube.com/watch?v=DBSviXhkubg

9.1.6. FORMATIVE ASSESSMENT

Student Name:	Date:			
Learning Outcomes	Criteria for assessment	Assessment		
		Yes	No	N/A
LO 1: Define and identify integers and apply simple operations (addition, subtraction, multiplication and the distributive property)	Is s/he able to identify an integer?	☐	☐	☐
	Is s/he able to add two positive integers?	☐	☐	☐
	Is s/he able to add two negative integers?	☐	☐	☐
	Is s/he able to add a positive integer and a negative integer?	☐	☐	☐
	Is s/he able to subtract two positive integers?	☐	☐	☐

	Is s/he able to subtract two negative integers?	☐	☐	☐
	Is s/he able to subtract a positive integer from a negative integer?	☐	☐	☐
	Is s/he able to subtract a negative integer from a positive integer?	☐	☐	☐
	Is s/he able to multiply two positive integers?	☐	☐	☐
	Is s/he able to multiply two negative integers?	☐	☐	☐
	Is s/he able to multiply a positive integer with a negative integer?	☐	☐	☐
	Is s/he able to apply the distributive property of multiplication over addition?	☐	☐	☐
	Is s/he able to apply the distributive property of multiplication over subtraction?	☐	☐	☐
LO 2: Identify, represent, compare, and locate numbers on a number line	Is s/he able to apply PEMDAS rule?	☐	☐	☐
	Is s/he able to understand and explain the concept of a number line?	☐	☐	☐
	Is s/he able to identify the origin (0) and the direction of increasing and decreasing numbers?	☐	☐	☐
	Is s/he able to correctly locate and plot numbers on a number line?	☐	☐	☐
	Is s/he able to compare numbers using the number line?	☐	☐	☐
	Is s/he able to order numbers in ascending and descending order?	☐	☐	☐
	Is s/he able to perform addition using the number line by moving to the right?	☐	☐	☐
	Is s/he able to perform subtraction using the number line by moving to the left?	☐	☐	☐
LO 3: Identify multiples and factors of given numbers	Is s/he able to identify multiples of a number using simple multiplication?	☐	☐	☐
	Is s/he able to identify multiples of a number using repeated addition?	☐	☐	☐
	Is s/he able to identify factors of a number using simple prime factorization?	☐	☐	☐

9.2 LEARNING UNIT 2: FRACTIONS

Learning Unit 2	Duration
Fractions	6 hours

9.2.1. INTRODUCTION

This Unit is vital for developing both mathematical understanding and practical life skills. Mastery of fractions enables students to perform well academically while also equipping them with essential tools for navigating everyday situations.

Fractions are used in everyday and vocational situations such as measuring ingredients, dividing materials, calculating portions, and expressing quantities that are less than or greater than a whole number.

9.2.2. UNIT LEARNING OUTCOMES

At the end of this learning unit students should be able to:

- Perform addition and subtraction of fractions with like denominators.
- Identify and generate equivalent fractions
- Find a common denominator to add or subtract fractions with unlike denominators.
- Multiply fractions by multiplying the numerators and denominators.
- Divide fractions by multiplying by the reciprocal.
- Compare fractions that have equal numerators, equal denominators, different numerators and denominators.
- Reduce fractions to their simplest form by finding the greatest common divisor (GCD).
- Reduce fractions to their simplest form by simplifying factors.
- Solve practical problems involving fractions.

9.2.3. CAPABILITIES RELATED TO LEARNING OUTCOMES

The suggested activities in this unit should facilitate the development of the following competencies to the students' fullest capability:

- Adding and subtracting fractions with like and unlike denominators
- Multiplying and dividing fractions
- Comparing fractions
- Simplifying fractions

9.2.4. UNIT 2: FRACTIONS - CONTENT

Lessons	Key points / Reference to ILO	Content	Suggested learning / teaching activities
Lesson 5 - Week 5 Recall of fractions	- Recall basics of fraction from first year - Addition of two or more fractions with like denominators - Subtraction of two or more fractions with like denominators - Notion of equivalent fractions	Revise all the skills related to fractions acquired in the previous year. Explain the idea of equivalent fractions and how to extract fractions equivalent to a given fraction.	You are preparing a healthy snack, Fruit Salad, and you need to adjust the ingredients based on the number of servings. Each ingredient is measured in fractions, and you will need to add or subtract fractions to get the right proportions for your recipe. Give numerical examples and discuss the process and the result with the students.
Lesson 6 - Week 6 Addition and subtraction of fractions	- Addition of two or more fractions with unlike denominators - Subtraction of two or more fractions with unlike denominators	Explain step by step how to add or subtract two or more fractions with unlike denominators.	Start by explaining that you are making a healthy smoothie or juice, and you need to add fractions of ingredients. Emphasize that, just like in the smoothie recipe, we might need to combine ingredients with different measurements (fractions) to get the right balance. Ask the students to add fractions to find the total amount of liquid in the recipe.
Lesson 7 - Week 7 Multiplication and division of fractions	- Multiplication of two or more fractions - Division of two or more fractions	Explain how to multiply or divide two or more fractions.	Tell the students that they are making a healthy snack (like a smoothie) for a specific number of people. The recipe is for 4 people, but they need to adjust it based on the number of people they will serve. This introduces the need for multiplying or dividing fractions based on the serving size.
Lesson 8 – Week 8 Comparison of fractions	- Greater than ($>$) - Less than ($<$) - Equal to ($=$) - Not equal to ($\neq$)	Explain how to compare two fractions. Begin with simple examples using the same denominator, then move to fractions with the same numerator, finally compare fractions with different denominators and numerators.	Give the Students daily water goals shown as fractions ($1/2$ liter, $3/4$ liter, $2/3$ liter). They compare which person drank more water and arrange the amounts from least to greatest.

Lesson 9 - Week 9 Simplification of fractions (Recall)	• Successive divisions • Prime factorization • G.C.D • Irreducible fraction	Remind the students how to use prime factorization to simplify fraction. Explain how to get the irreducible fraction.	Create a "healthy eating plate" where students divide the plate into sections based on the recommended portions of different food groups Students are asked to create their own "plate" based on specific instructions, and once they have their fractions, they will simplify them.
Lessons (6,7,8,9) - Week 10	• Recall	Prepare several exercises on fractions.	Prepare a PDF worksheet for further practice.
Resources	• https://thirdspacelearning.com/us/math-resources/topic-guides/number-and-quantity/fractions-operations/ • https://www.mathsisfun.com/simplifying-fractions.html • https://thirdspacelearning.com/gcse-maths/number/simplifying-fractions/ • https://www.youtube.com/watch?v=u_QTuWj107o • https://www.khanacademy.org/math/get-ready-for-4th-grade/xe731db3f95b84f06:get-ready-for-fractions/xe731db3f95b84f06:comparing-fractions/e/comparing_fractions_1		

9.2.5. SUGGESTED ACTIVITIES TO DEVELOP SKILLS AND CAPABILITIES

Suggested activity	Example of practical activity
Draw a hand on the board and place stickers on it to represent germs. Ask the students, "If you wash your hands with soap and remove 5 of the 10 germs, what fraction of germs were removed? Then, ask them to simplify the fraction. Discuss how simplifying the fraction helps to understand exactly how many germs were removed and how keeping hands clean is crucial for health. Emphasize that irreducible fractions are when the numerator and denominator can't be reduced further.	Material: video • https://www.youtube.com/watch?v=Hd6Q9C6RgQc

9.2.6. FORMATIVE ASSESSMENT

Student Name:	Date:			
Learning Outcomes	Criteria for assessment	Assessment		
		Yes	No	N/A
LO 1: Apply simple operations on fractions like addition, subtraction, multiplication and division	Is s/he able to add fractions with like denominators?	☐	☐	☐
	Is s/he able to add fractions with unlike denominators?	☐	☐	☐
	Is s/he able to subtract fractions with like denominators?	☐	☐	☐
	Is s/he able to subtract fractions with unlike denominators?	☐	☐	☐
	Is s/he able to multiply fractions?	☐	☐	☐
	Is s/he able to divide fractions?	☐	☐	☐
LO 2: Compare fractions	Is s/he able to compare fractions with the same denominator correctly?	☐	☐	☐
	Is s/he able to compare fractions with the same numerator correctly?	☐	☐	☐
	Is s/he able to identify which fraction is greater, smaller, or equal?	☐	☐	☐
	Is s/he able to use symbols ($>$, $<$, $=$) correctly when comparing fractions?	☐	☐	☐
	Is s/he able to find fractions equivalent to a given fraction?	☐	☐	☐
LO 3: Simplify fractions	Is s/he able to apply prime factorization on composite numbers?	☐	☐	☐
	Is s/he able to simplify fractions by simplifying factors?	☐	☐	☐
	Is s/he able to get the irreducible fraction using factors simplification?	☐	☐	☐
	Is s/he able to simplify a fraction using GCD method?	☐	☐	☐

9.3 LEARNING UNIT 3: ALGEBRAIC EXPRESSIONS

Learning Unit 3 Algebraic expressions	Duration 3 hours
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9.3.1. INTRODUCTION

This Unit is fundamental in algebra; algebraic expressions provide the building blocks for equations and inequalities. Understanding these expressions is essential for solving more complex mathematical problems. They are used to model real-world situations and solve problems. They allow students to formulate equations based on given scenarios, enhancing their problem-solving abilities.

Working with algebraic expressions fosters logical thinking and reasoning skills, as students learn to work through problems step by step.

9.3.2. UNIT LEARNING OUTCOMES

At the end of this learning unit students should be able to:

- Identify algebraic expressions, including variables, constants, terms, and coefficients
- Define a monomial
- Evaluate algebraic expressions by substituting values for variables
- Simplify algebraic expressions by combining like terms
- Model real-world situations using algebraic expressions
- Think abstractly and represent relationships mathematically using algebraic expressions
- Analyze and evaluate mathematical arguments involving algebraic expressions

9.3.3. CAPABILITIES RELATED TO LEARNING OUTCOMES

The suggested activities in this unit should facilitate the development of the following competencies to the students' fullest capability:

- Recognizing variables and constants in expressions
- Understanding monomials
- Simplifying monomials
- Setting up expressions using variables and constants

9.3.4. UNIT 3: ALGEBRAIC EXPRESSIONS – CONTENT

Lessons	Key points / Reference to ILO	Content	Suggested learning / teaching activities
Lesson 10 - Week 11 Introduction to algebraic expression	- Numerical expression - Algebraic expression - Variable - Constant - Coefficient - Monomial - Substitution	Start by defining the algebraic expression and distinguish it from the numerical expression. Define the variable, constant, and coefficient. Define a monomial. Explain how to substitute the variable with a given value	An online market is selling all units at 5\$ price and taking 2\$ as packaging fees for every order. Write down the algebraic expression representing the total cost.
Lesson 11 - Week 12 Adding and subtracting like terms of monomials	- Like terms - Addition - Subtraction	Start by defining like terms with examples, and then explain how to add and subtract monomials.	Imagine the students are at a store buying apples. Each apple costs \$2, and the number of apples the students want to buy depends on the situation, represented by a variable. Let x be the number of apples, and the price per apple is 2 dollars. So, the cost for buying apples can be written as: $2x$ And suppose there's also a fixed cost for shipping, say \$5. The total cost would be: $2x+5$ The teacher can apply further applications to add and subtract monomials.
Lesson 11 - Week 13 Exercises	Recall	Prepare several exercises on algebraic expressions.	Prepare a PDF worksheet for further practice.
Resources	https://byjus.com/maths/algebraic-expressions/ https://thirdspacelearning.com/gcse-maths/algebra/algebraic-expressions/		

9.3.5. SUGGESTED ACTIVITIES TO DEVELOP SKILLS AND CAPABILITIES

Suggested activity

In this activity, students will go shopping at a market. The market offers various items, each with a price and a fixed cost for certain services (like packaging or delivery). The total cost will depend on how many items you buy, which will be represented by variables (unknowns).

Step-by-Step Procedure:

Step 1: Setting Up the Market

Create a list of items you can buy at the market, each item priced in terms of a monomial and delivery charge as a constant.

Step 2: Forming Monomial Expressions

Explain to students that the total cost for each item depends on the number of items they decide to purchase. This is where monomials come in: each item's cost is represented as a monomial.

Step 3: Total Cost Calculation with Delivery Charge

To make the lesson more practical, add the delivery charge. Explain to students that no matter how many items they buy, the delivery charge is a fixed cost and will always be added at the end.

Step 4: Example with Specific Values

Now that students have seen how to write expressions for individual items, use specific values to demonstrate how to calculate the total cost.

Step 5: Students Practice with Different Quantities

Now, give students different combinations of items to buy and have them calculate the total cost.

9.3.6. FORMATIVE ASSESSMENT

Student Name:	Date:				
Learning Outcomes	Criteria for assessment	Assessment			
		Yes	No	N/A	
LO 1: Define algebraic expression, identify its components	Is s/he able to define an algebraic expression?	☐	☐	☐	
	Is s/he able to define a numerical expression?	☐	☐	☐	
	Is s/he able to identify the coefficient?	☐	☐	☐	
	Is s/he able to identify the variable?	☐	☐	☐	
	Is s/he able to identify the constant?	☐	☐	☐	
LO 2: Simplify algebraic expressions and apply simple addition, subtraction	Is s/he able to identify like terms?	☐	☐	☐	
	Is s/he able to identify unlike terms?	☐	☐	☐	
	Is s/he able to add monomials?	☐	☐	☐	
	Is s/he able to subtract monomials?	☐	☐	☐	

9.4 LEARNING UNIT 4: PROPORTIONALITY

Learning Unit 4 Proportionality	Duration 4 hours
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9.4.1. INTRODUCTION

The importance of this lesson lies in its broad applications across various fields and everyday life. Proportionality is essential for understanding and using scale drawings, maps, and models, it equips students with the tools to solve a wide range of real-world problems involving ratios, rates, and proportions.

Learning proportionality encourages students to think critically and analyze relationships between quantities. It helps them develop effective problem-solving strategies by breaking down complex problems into simpler proportional relationships.

By the end of this unit, you will have a solid understanding of proportionality and be able to apply it to various real-world situations.

9.4.2. UNIT LEARNING OUTCOMES

At the end of this learning unit students should be able to:

- Understand the concept of proportionality and how it relates to two quantities in which the ratio between the corresponding values remains constant
- Recognize proportional relationships in various contexts, such as tables and equations
- Determine the constant of proportionality (k) in a proportional relationship
- Find the unknown value in a proportional relationship
- Understand the concept of scale as a ratio that compares the size of a model or representation to the size of the actual object
- Identify scale factors
- Use scale factors to find measurements
- Solve problems involving scale

9.4.3. CAPABILITIES RELATED TO LEARNING OUTCOMES

The suggested activities in this unit should facilitate the development of the following competencies to the students' fullest capability:

- Calculating proportions
- Applying scale
- Measuring and drawing with accuracy

9.4.4. UNIT 4: PROPORTIONALITY - CONTENT

Lessons	Key points / Reference to ILO	Content	Suggested learning / teaching activities
Lesson 12 - Week 14 Introduction to proportionality	- Proportional quantities - Constant of proportionality k	Start by Introducing the concept of proportionality. Define proportional quantities where the ratio $\frac{x}{y} = k$ remains constant. Explain how to write and identify proportions and give real-world applications. Explain how to calculate k from real data pairs.	Discuss how artists use proportions to ensure their drawings are accurate. Explain that proportions refer to the ratio between different dimensions of objects in a drawing (e.g., the height of a person compared to their width, or the length of a tree compared to its width).
Lesson 13 - Week 15 Table of proportionality	- Proportionality Table - Cross-multiplication - Solving for Unknowns	Explain how to draw the table of proportionality. Explain the cross-multiplication method $\frac{a}{b} = \frac{c}{d} \Leftrightarrow a.d = c.b$ Explain how to find the unknown forth proportion using cross multiplication	On a piece of paper, draw a large "X" shape. Explain that this shape resembles a butterfly. Label the top left and bottom right points of the "X" with the numerators of the two fractions. Label the top right and bottom left points with the denominators. Explain that to cross-multiply, you multiply the numbers on each "wing" of the butterfly. Write the products below each wing. Explain that the products obtained from the cross-multiplication are equal. Write an equation to represent this. Explain how to solve for the unknown
Lesson 14 - Week 16 Scale	- Scale - Actual length - Drawing length	Explain what a scale is, and how to relate the drawing length to the actual length. $\text{Scale} = \frac{\text{Drawing Length}}{\text{Actual Length}}$ Explain how to draw with a scale. Explain how to measure a length with a scale.	Choose a simple image for the students to scale. It could be a small geometric shape (like a triangle, square, or rectangle), a simple object (like a fruit, a flower, or an animal), or a piece of abstract artwork. Write the original dimensions of the object on the board and decide on a scale factor for the students to use. Calculate the new dimensions using the scale. Let the students set up proportions to find the new dimensions for their scaled

			drawing and draw the scaled image.
Lesson 15 - Week 17 Enlargement and Reduction	• Enlarge • Reduce	Explain how to enlarge or reduce the sizes of shapes given specific scale factors.	Start with a simple shape, like a square, then write down the original dimensions of the square. Choose a scale factor less than 1 and let the students draw a new smaller square. This represents the minimized version of the original shape. Choose a scale factor greater than 1 and let the students draw a new larger square. This represents the enlarged version of the original shape. Make a notation for the students when the scale factor is equal to 1 to let them notice that in this case no enlargement or reduction happens.
Resources	• https://www.maneuveringthemiddle.com/how-to-teach-proportional-relationships/ • https://www.aaamath.com/rat-prop-crossx.htm • https://www.skdavpolytech.ac.in/news_files/module_3_1588817755.pdf		

9.4.5. SUGGESTED ACTIVITIES TO DEVELOP SKILLS AND CAPABILITIES

Suggested activity	Example of practical activity
Choose the object/Image to scale. Determine the scale factor and original dimensions. Calculate new dimensions using the scale factor. Draw the scaled version.	Material: video • https://www.youtube.com/watch?v=_ve-a89LRYc

9.4.6. FORMATIVE ASSESSMENT

Student Name:	Date:			
Learning Outcomes	Criteria for assessment	Assessment		
		Yes	No	N/A
LO 1: Define proportionality, calculate the constant of proportionality and apply cross-multiplication method	Is s/he able to define proportionality?	☐	☐	☐
	Is s/he able to write a proportion?	☐	☐	☐
	Is s/he able to calculate the constant of proportionality?	☐	☐	☐
	Is s/he able to draw the table of proportionality?	☐	☐	☐
	Is s/he able to apply the cross-multiplication method?	☐	☐	☐
	Is s/he able to find an unknown using cross-multiplication method?	☐	☐	☐
LO 2: Define a scale and use it to enlarge and reduce shapes	Is s/he able to define a scale?	☐	☐	☐
	Is s/he able to relate the drawing length to the actual length?	☐	☐	☐
	Is s/he able to determine the scale factor?	☐	☐	☐
	Is s/he able to determine the original dimensions of a scaled shape?	☐	☐	☐
	Is s/he able to calculate new dimensions using the scale factor?	☐	☐	☐
	Is s/he able to draw the scaled version (reduced or enlarged)?	☐	☐	☐

9.5 LEARNING UNIT 5: EQUATION

Learning Unit 5	Duration
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9.5.1. INTRODUCTION

An equation is a fundamental mathematical tool that helps express relationships between quantities in a precise and logical way. It develops critical thinking, problem-solving skills, and analytical reasoning by helping individuals understand how different variables interact with one another. Equations are used to create mathematical models that represent real-world situations, allowing us to predict outcomes, make calculations, and solve practical problems. They are essential in numerous fields, including science, engineering, economics, technology, and medicine, where accurate analysis and decision-making are required.

In short, equations provide a universal language for describing patterns, solving problems, and understanding the world around us.

9.5.2. UNIT LEARNING OUTCOMES

At the end of this learning unit students should be able to:

- Explain the meaning of an equation and differentiate it from an expression
- Find the value of the unknown in one-step addition and subtraction equations
- Determine the solution of one-step multiplication and division equations
- Use inverse operations to isolate the variable and solve equations
- Check the accuracy of solutions by substituting them into the original equation

9.5.3. CAPABILITIES RELATED TO LEARNING OUTCOMES

The suggested activities in this unit should facilitate the development of the following competencies to the students' fullest capability:

- Developing logical and mathematical reasoning skills
- Interpreting mathematical symbols and relationships accurately
- Manipulating numerical and algebraic information to solve problems
- Demonstrating accuracy and precision in mathematical calculations
- Utilizing appropriate strategies to approach and solve mathematical tasks
- Evaluating the correctness of mathematical solutions
- Transferring mathematical knowledge to real-life situations and problem-solving contexts

9.5.4. UNIT 5: EQUATION - CONTENT

Lessons	Key points / Reference to ILO	Content	Suggested learning / teaching activities
Lesson 16 - Week 18 Introduction to equation	- Equation - Expression - Variable - Unknown - Constant - Coefficient - Term - Value - Solution - Equality - Equal sign (=)	Start by introducing that equations help us understand and solve environmental problems by representing real situations with unknown values. Explain that in the environment, we often need to find unknown quantities such as: - amount of water used - number of trees planted These situations can be written as equations to help us solve them logically. Then explain that: An expression shows a quantity without an equal sign while an equation shows a relationship where two environmental quantities are equal or balanced.	A school is planting trees to help the environment. They planted some trees in the morning and added more in the afternoon. Present the situation Morning trees + 5 trees = 12 trees total Ask students: “Do we know how many trees were planted in the morning?” Then introduce the equation idea. Replace the unknown with a symbol: $x + 5 = 12$ Explain: x = number of trees planted in the morning This is called an equation because it shows two equal sides.
Lesson 17 - Week 19 One-step addition and subtraction equations	- Add / Addition - Subtract/ Subtraction - Isolate - Balance - Solve - Value - Check / Verify - Left side / Right side	Start by reminding students that an equation is a balanced sentence with an equal sign. Both sides must always stay equal. Then introduce the idea of a missing number (variable), such as x. Explain that our goal is to find the value of this unknown that makes the equation true. Use the idea of balance: what you do to one side must also be done to the	Give students a set of mixed cards (or write on board): $x + 7 = 15$ (trees planted) $20 - x = 8$ (plastic bottles collected) $x - 5 = 9$ (water saved in liters) $12 + x = 18$ (recycling bins used)

		other side to keep it equal. For addition equations, explain that we use the opposite operation to “remove” the added number. So, if a number is added to the variable, we subtract it from both sides. For subtraction equations, explain that we use addition to undo subtraction. So, if a number is taken away from the variable, we add it to both sides. After finding the value, always check the answer by putting it back into the original equation to see if both sides are equal. Finally, emphasize the main idea: one-step equations are solved by using inverse operations to isolate the variable and keep the equation balanced.	Also give separate cards: “Addition equation” “Subtraction equation” Students must: - Sort each equation into addition or subtraction. - Solve each equation - Match the solution with its environmental meaning
Lesson 17 Week 20 One-step multiplication and division equations	• Multiply / Multiplication • Divide / Division • Isolate • Balance • Solve • Value • Check / Verify • Left side / Right side	Start by reminding students that an equation is a balanced sentence with an equal sign, where both sides must always stay equal. Remind students that our goal is to find the value of the missing number (variable x) that makes the equation true by isolating the variable. Use the idea of balance: what you do to one side must also be done to the other side to keep it equal. • For multiplication equations: Explain that we use the opposite operation (division) to “undo” multiplication. So, if a variable is multiplied by a number, we divide both sides by that number. • For division equations: Explain that we use multiplication to undo division. So, if a variable is divided by a number, we	Give students a set of mixed cards (or write on board) $3x = 24$ (liters of water saved per rain barrel) $\frac{x}{4} = 6$ (kg of recycled glass per bin) $5x = 35$ (trees planted across equal rows) $\frac{x}{3} = 9$ (solar panels installed per house) Also give separate cards: Multiplication equation Division equation Students must: • Sort each equation into multiplication or division. • Solve each equation

		multiply both sides by that number. After finding the value, always check the answer by putting it back into the original equation to see if both sides are equal. Finally, emphasize the main idea: one-step multiplication and division equations are solved by using inverse operations to isolate the variable and keep the equation balanced	Match the solution with its environmental meaning
Lesson 17 Week 21 Exercises	Exercises	Provide several examples of equations.	Prepare a worksheet of exercises including one-step addition, subtraction, multiplication, and division equations.
Resources	https://www.thethinkacademy.com/blog/how-to-solve-one-step-linear-equations-grade-5-6/ https://www.youtube.com/watch?v=LDliYKYvvdA https://www.youtube.com/watch?v=dtntT4CtJAc		

9.5.5. SUGGESTED ACTIVITIES TO DEVELOP SKILLS AND CAPABILITIES

Suggested activity

- A community eco-market sells reusable items to reduce plastic waste. Some information is missing, and we need equations to find it.

Present situations (on board or cards)

A shop sold some reusable bags and 5 more later. Total sold = 13

A farm collected some eggs and added 7 more trays. Total = 20 trays

A recycling center packed some bottles and added 4 boxes. Total = 18 boxes

A group planted some trees and then planted 6 more. Total = 15 trees

Students must identify the unknown number in each situation, write an equation using x and understand what x represents in the environment context.

- A school is working on reducing waste and protecting the environment. They are tracking how many bags of waste are collected and recycled.

Write on the board: “We often don’t know some values, so we use equations to find them.”

Introduce the idea of the unknown and show a simple situation:

Morning waste bags + 6 bags = 14 bags total

Ask: What do we not know? How can we represent the missing number?

Draw a simple balance

Left side: $x + 6$ waste bags

Right side: 14 waste bags

Both sides must stay equal; to keep balance, we do the same operation on both sides

Give each group “Eco Cards” (or write on board):

Write addition equations and subtraction equations:

For each equation:

Solve for x

Say what x represents in the environment.

- A community is working on saving natural resources. They are tracking how water, trees, and waste are shared equally or used in groups.

Present a simple situation: Each tree needs 3 liters of water. Total water used = 24 liters.

Ask: What do we not know? How can we represent it?

Write: $3x = 24$

Explain:

- x = number of trees
- $3x$ means 3 liters per tree
- This is a multiplication equation

Write Multiplication equations and division equations

For each equation:

- Solve for x
- Identify whether it is multiplication or division

9.5.6. FORMATIVE ASSESSMENT

Student Name:	Date:			
Learning Outcomes	Criteria for assessment	Assessment		
		Yes	No	N/A
LO 1: Define what an equation is and distinguish it from an	Is s/he able to identify whether a mathematical statement is an equation or an expression?	☐	☐	☐
	Is s/he able to recognize the equal sign (=) as a feature of an equation?	☐	☐	☐

expression	Is s/he able to determine whether a number sentence is balanced (equation) or not (expression)?	☐	☐	☐
	Is s/he able to write an expression and an equation from a simple real-life situation?	☐	☐	☐
	Is s/he able to identify the terms variable, unknown, constant, coefficient, term?	☐	☐	☐
LO 2: Solve one-step addition and subtraction equations	Is s/he able to solve one-step addition equations by using inverse operations?	☐	☐	☐
	Is s/he able to solve one-step subtraction equations correctly?	☐	☐	☐
	Is s/he able to solve one-step multiplication equations correctly?	☐	☐	☐
	Is s/he able to solve one-step division equations correctly?	☐	☐	☐
	Is s/he able to identify the unknown (variable) in an addition or subtraction equation?	☐	☐	☐
	Is s/he able to choose the correct operation to isolate the variable?	☐	☐	☐
	Is s/he able to check the solution by substituting it back into the equation?	☐	☐	☐
	Is s/he able to verify their answer by substituting it into the original equation?	☐	☐	☐

9.6 LEARNING UNIT 6: STATISTICS

Learning Unit 6	Duration
Statistics	4 hours

9.6.1. INTRODUCTION

Studying statistics helps students develop critical thinking and analytical skills by enabling them to collect, organize, interpret, and present data in meaningful ways. It strengthens their ability to identify patterns, compare information, and draw logical conclusions based on evidence rather than assumptions.

9.6.2. UNIT LEARNING OUTCOMES

At the end of this learning unit students should be able to:

- Identify real-life situations where statistics is used
- Define data as information collected for analysis
- Identify and classify data into qualitative and quantitative types
- Distinguish between discrete and continuous data
- Collect and organize data from simple situations
- Present data using appropriate tables and basic frequency distribution
- Interpret simple data sets presented in tables

9.6.3. CAPABILITIES RELATED TO LEARNING OUTCOMES

The suggested activities in this unit should facilitate the development of the following competencies to the students' fullest capability:

- Construct and complete simple tables and frequency distributions accurately
- Interpret information presented in data tables
- Apply basic statistical thinking to describe and summarize information
- Communicate findings from data in clear and simple language

9.6.4. UNIT 6: STATISTICS - CONTENT

Lessons	Key points / Reference to ILO	Content	Suggested learning / teaching activities
Lesson 18 - Week 22 Introduction to statistics	• Data • Collection • Organization • Analysis • Interpretation • Qualitative Data • Quantitative Data • Continuous data	Start with a simple question: "Where do we see numbers and information in our daily lives?" Then explain: Statistics is the study of collecting, organizing, analysing, and interpreting data. It helps us	A store clerk records the number of customers served each day for one week. • What information did the clerk collect? • Why did the clerk collect this information? • Which table contains qualitative

	Discrete data	understand information and make decisions based on facts and numbers. Then give real-life examples of statistics Explain that statistics helps us summarize and understand this information. Next, ask students: "What information did we use in the previous examples?" Explain: Data is a collection of facts, numbers, measurements, or observations gathered for a specific purpose. Explain the types of data: Qualitative data (describes qualities or characteristics.) and quantitative data.	data? - Which table contains quantitative data? - Which table contains continuous data? - Which table contains discrete data? - Give another example of data a clerk might collect.
Lesson 19 - Week 23 Representation of data	- Frequency - Frequency Distribution - Graph - Chart - Bar Graph - Bar - Pie Chart - Sector - Percentage - Histogram - Interval - Line Graph - Category - x-axis - y-axis - Scale - Title - Table	Start with raw data (unclean data). Frequency means how many times a value appears. 1. Frequency distribution (f): A table that organizes data and shows the frequency of each value. It helps us understand data more clearly before drawing graphs. 2. Bar Graph: Explain that a bar graph uses separate bars to represent data. Each bar shows a category or value. The height of the bar shows the frequency or amount. It is used to compare different groups. 3. Pie Chart Explain that a pie chart is a circle divided into parts (sectors). Each part shows a percentage or	A school store manager recorded the number of items sold in one week to understand sales and improve the store. Write the raw data on the board: -Students organize the data into a table. -Students draw a bar graph to compare items sold. -Students represent the same data as a pie chart. -Students organize the data into intervals and display it using a histogram. -Students draw a line graph.

		fraction of the whole. The whole circle = 100% of the data. $\text{Angle} = 360 \times \frac{f}{\text{Total}}$ It is used to show how data is shared or divided. 4. Histogram Explain that a histogram looks like a bar graph, but: The bars are touching each other. It represents continuous data. Data is grouped into equal class intervals (ranges) and identify continuous class boundaries. It shows how data is distributed. 5. Line Graph Explain that a line graph uses points connected by lines. It shows change over time. It helps us see trends (increase or decrease). Used for data collected over days, months, or years. Summary: Organize data → Frequency Distribution Compare data → Bar Graph Show parts of a whole → Pie Chart Show distribution → Histogram Show change over time → Line Graph	
Lesson 20 - Week 24 Central Tendency	• Central Tendency • Mean • Median • Mode • Average • Sum • Middle Value • Frequency • Data Set • Value	Start by linking: We already learned how to collect, organize, and represent data using graphs and tables. Now we will learn how to summarize data using a single value. Define measures of central tendency.	A bank employee records the number of daily transactions to understand how busy the bank is each day. Number of transactions in 7 days: 12, 15, 10, 15, 18, 20, 15 Students act as data analysts. They must: • Arrange the data in order • Calculate the mean

	Order	Identify the three measures: - Mean: it is the average of the given values - Median: the middle value in a sorted list - Mode: the most repeated value Link to previous lessons Organize data in tables and graphs and summarize data using one value. These three measures help understand data quickly.	- Find the median - Identify the mode What is the average number of transactions? (Mean) What is the middle value? (Median) What is the most frequent value? (Mode) What does this data tell us about the bank's activity? Discuss: Which measure best describes daily activity? Why is analyzing data important in workplaces like banks?
Lesson (19,20) – Week 25	Exercises	Prepare several exercises on statistics.	Prepare a PDF worksheet for further practice.
Resources	https://byjus.com/maths/statistics/#Types%20of%20Statistics https://www.youtube.com/watch?v=hcgThf5mv38 https://www.youtube.com/watch?v=2N7na6aBvpk		

9.6.5. SUGGESTED ACTIVITIES TO DEVELOP SKILLS AND CAPABILITIES

Suggested activity

A school wants to improve student services by collecting information about students' daily study time.

This information is used to understand patterns and make better decisions. This process is part of statistics, which involves collecting, organizing, analyzing, and interpreting data.

Students are given the following data representing study time in minutes: 20, 30, 25, 30, 40, 20, 35, 30, 25, 20

They identify that this information is called data and recognize that it is quantitative data because it is numerical.

Students then organize the data by arranging it in a frequency table.

After that, students represent the same data using different methods. They draw a bar graph where the study times are shown on the x-axis and frequencies on the y-axis. They may also create a pie chart by converting the frequencies into parts of a whole to show proportions. If the data is grouped into intervals, they may also draw a histogram to show how the data is distributed.

Using the same data set, students calculate the measures of central tendency. They find the mean by adding all values and dividing by the number of values, the median by arranging the data and identifying the middle

value, and the mode by finding the value that appears most frequently.

Finally, students discuss what the data shows about study habits. They identify the most common study time, interpret the graphs, and explain how different representations help in understanding data. They also reflect on how mean, median, and mode summarize the data using a single representative value.

In Another activity use the given data to draw the corresponding line graph

Time (s)	1	2	3	4	5	6	7
Value	0	3	1	2	1	4	2

9.6.6. FORMATIVE ASSESSMENT

Student Name:	Date:			
Learning Outcomes	Criteria for assessment	Assessment		
		Yes	No	N/A
LO 1 Organize data using tables and simple frequency distributions	Is s/he able to define statistics and explain its meaning in simple terms?	☐	☐	☐
	Is s/he able to identify data in real-life situations?	☐	☐	☐
	Is s/he able to distinguish between qualitative and quantitative data?	☐	☐	☐
	Is s/he able to distinguish between discrete and continuous data?	☐	☐	☐
	Is s/he able to collect and list raw data from a given situation?	☐	☐	☐
	Is s/he able to identify individual values in a data set?	☐	☐	☐
	Is s/he able to arrange data in ascending or descending order?	☐	☐	☐
	Is s/he able to recognize repeated values in a data set?	☐	☐	☐
	Is s/he able to determine the frequency of each value?	☐	☐	☐
	Is s/he able to construct a simple frequency table correctly?	☐	☐	☐
	Is s/he able to complete a partially filled frequency table?	☐	☐	☐
LO 2 Represent data using appropriate graphical methods such as bar graphs, pie charts, line graphs, and histograms	Is s/he able to choose the appropriate type of graph for a given data set?	☐	☐	☐
	Is s/he able to represent data using a bar graph?	☐	☐	☐
	Is s/he able to represent data as parts of a whole using a pie chart?	☐	☐	☐

	Is s/he able to divide a pie chart correctly according to given values or percentages?	☐	☐	☐
	Is s/he able to represent data using a line graph?	☐	☐	☐
	Is s/he able to plot points accurately on a line graph?	☐	☐	☐
	Is s/he able to represent grouped data using a histogram?	☐	☐	☐
	Is s/he able to label axes and titles correctly for all graphs?	☐	☐	☐
	Is s/he able to interpret information from different types of graphs?	☐	☐	☐
LO 3 Calculate and interpret basic measures of central tendency (mean, median, and mode)	Is s/he able to calculate the mean of a given data set correctly?	☐	☐	☐
	Is s/he able to find the median after arranging data in order?	☐	☐	☐
	Is s/he able to identify the mode in a data set?	☐	☐	☐
	Is s/he able to choose the correct measure of central tendency for a given situation?	☐	☐	☐