



MINISTRY OF EDUCATION MALAYSIA

## **Integrated Curriculum for Secondary Schools**

**Curriculum Specifications**

**MATHEMATICS**

**Form 1**

Curriculum Development Centre  
Ministry of Education Malaysia  
2002

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## 1. Learning Area: Whole Numbers

Learning Objectives	Suggested Teaching and Learning Activities	Learning Outcomes	Points to Note	Vocabulary
<p><i>Students will be taught to:</i></p> <ol style="list-style-type: none"> <li>Understand the concept of whole numbers.</li> </ol>	<ul style="list-style-type: none"> <li>Count; read and write whole numbers in words or numerals.</li> <li>Students read and write whole numbers while counting from a given initial value to a final value in a certain specified interval. e.g. i. Count on in tens from 20 to 100. ii. Count back in hundreds from 1200 to 200.</li> <li>Estimate values, including that of real-life situations by rounding.</li> </ul>	<p><i>Students will be able to:</i></p> <ol style="list-style-type: none"> <li>Count, read and write whole numbers.</li> <li>Identify place value and value of each digit in whole numbers.</li> <li>Round whole numbers.</li> </ol>	<p>Emphasise the relationship between rounding and estimation.</p>	<p>Whole number Place value Digit Interval Round Estimate Nearest Larger Largest Smaller Smallest Nearest ten, hundred, thousand... hundred thousand.</p>

Learning Objectives	Suggested Teaching and Learning Activities	Learning Outcomes	Points to Note	Vocabulary
2. Perform computations involving <b>addition and subtraction</b> of whole numbers to solve problems.	<ul style="list-style-type: none"> <li>Explore addition and subtraction using standard algorithm (rules of calculations), estimation, mental and speed computation or pencil-and-paper.</li> <li>Use calculators to compare and verify answers.</li> <li>Students pose and solve problems related to addition and subtraction of whole numbers.</li> </ul>	<ul style="list-style-type: none"> <li>i. Add whole numbers.</li> <li>ii. Solve problems involving addition of whole numbers.</li> <li>iii. Subtract whole numbers.</li> <li>iv. Solve problems involving subtraction of whole numbers.</li> </ul>	<p>Addition and subtraction should begin with two numbers.</p> <p>Emphasise that subtraction is the inverse of addition.</p> <p>Emphasise that:</p> <ul style="list-style-type: none"> <li>The quotient of a number divided by zero is undefined.</li> <li>The quotient of zero divided by any number (except zero) is zero.</li> </ul>	<p>Add</p> <p>Addition</p> <p>Subtract</p> <p>Subtraction</p> <p>Multiply</p> <p>Multiplication</p> <p>Divide</p> <p>Division</p> <p>Regroup</p> <p>Algorithm</p> <p>Estimate</p> <p>Estimation</p> <p>Mental and speed computation</p> <p>Compute</p> <p>Quotient</p> <p>Undefined</p> <p>Inverse</p> <p>Sum</p> <p>Difference</p>
3. Perform computations involving <b>multiplication and division</b> of whole numbers to solve problems.	<ul style="list-style-type: none"> <li>Explore multiplication and division using standard algorithm (rules of calculations), estimation, mental and speed computation or pencil-and-paper.</li> <li>Use calculators to compare and verify answers.</li> <li>Students explore the relationship between multiplication and division.</li> <li>Students pose and solve problems related to multiplication and division of whole numbers.</li> </ul>	<ul style="list-style-type: none"> <li>i. Multiply two or more whole numbers.</li> <li>ii. Solve problems involving multiplication of whole numbers.</li> <li>iii. Divide a whole number by a smaller whole number.</li> <li>iv. Solve problems involving division of whole numbers.</li> </ul>		

Learning Objectives	Suggested Teaching and Learning Activities	Learning Outcomes	Points to Note	Vocabulary
4. Perform computations involving <b>combined operations of addition, subtraction, multiplication and division</b> of whole numbers to solve problems	<ul style="list-style-type: none"> <li>Students explore combined operations of whole numbers by using standard algorithm (rules of calculations), estimation, pencil-and-paper or calculator.</li> <li>Solve problems related to real-life situations.</li> <li>Students use calculators to compare and verify answers.</li> </ul>	<ol style="list-style-type: none"> <li>Perform computations involving any combination of addition, subtraction, multiplication and division of whole numbers, including the use of brackets.</li> <li>Solve problems involving combined operations of addition, subtraction, multiplication and division of whole numbers, including the use of brackets.</li> </ol>	Emphasise on the order of operations and the use of brackets.	Multiply Multiplication Divide Division Estimate Compute Solve Bracket Order of operations Combined operation Combination

## 2. Learning Area: Number Patterns and Sequences

Learning Objectives	Suggested Teaching and Learning Activities	Learning Outcomes	Points to Note	Vocabulary
<p><i>Students will be taught to:</i></p> <p>1. Recognise and extend <b>number patterns and sequences</b> formed by counting on and counting back in intervals of any size.</p> <p>2. Recognise <b>odd and even numbers</b> and make general statements about them.</p>	<ul style="list-style-type: none"> <li>Relate number sequence to patterns in real-life situations. e.g. Odd numbers are used as addresses of houses on one side of the road and even numbers on the other.</li> <li>Use calculators to skip count (generate number sequences), explore number patterns, and solve problems.</li> <li>Explore general statements about odd and even numbers such as: <ul style="list-style-type: none"> <li>The sum of odd and even numbers.</li> <li>The product of odd and even numbers.</li> <li>The difference between odd and even numbers.</li> </ul> </li> </ul>	<p><i>Students will be able to:</i></p> <ol style="list-style-type: none"> <li>Describe the pattern of a given number sequence.</li> <li>Extend number sequences.</li> <li>Complete missing terms in given number sequences.</li> <li>Construct number sequences based on given patterns.</li> <li>Identify and describe odd and even numbers.</li> <li>Make general statements about odd and even numbers.</li> </ol>	<p>Do not include negative numbers.</p>	<p>Number sequence Pattern Term Sum Product Difference Count on Count back Odd Even Subtract Multiply Construct</p>

Learning Objectives	Suggested Teaching and Learning Activities	Learning Outcomes	Points to Note	Vocabulary
3. Understand the characteristics of <b>prime numbers</b> .	<ul style="list-style-type: none"> <li>• Use calculators or computer programmes to explore prime numbers.</li> <li>• Use sieve of Eratosthenes to generate prime numbers less than 100.</li> </ul>	i. Identify the characteristics of prime numbers. ii. Determine whether a given number is a prime number. iii. Determine all the prime numbers less than 100.	Emphasise that Number 1 is not a prime number.	Prime number Factor Prime Factor
4. Understand the characteristics and use the knowledge of <b>factors</b> of whole numbers.	<ul style="list-style-type: none"> <li>• Determine factors of whole numbers by exploring and investigating.</li> </ul>	i. List factors of whole numbers. ii. Determine whether a number is a factor of another whole number.	Emphasise that 1 and the number itself are factors of any number.	
5. Understand the characteristics and use the knowledge of <b>prime factors</b> of whole numbers.	<ul style="list-style-type: none"> <li>• Students explore and investigate to determine prime factors of whole numbers.</li> <li>• State any given whole number as a product of its prime factors.</li> </ul>	i. Identify prime factors from a list of factors. ii. Find prime factor(s) of whole numbers. iii. Determine whether a number is a prime factor of another whole number.		

Learning Objectives	Suggested Teaching and Learning Activities	Learning Outcomes	Points to Note	Vocabulary
6. Understand and use the knowledge of <b>multiples</b> of whole numbers.	<ul style="list-style-type: none"> <li>Students use the divisibility test of 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and their combinations. e.g. 30 can be divided by 6. Therefore it can be divided by 2 and 3 and vice-versa.</li> </ul>	<ul style="list-style-type: none"> <li>i. List the multiples of whole numbers.</li> <li>ii. Determine whether a number is the multiple of another number.</li> </ul>	<p>Emphasise that the list of multiples of a number is also a number sequence.</p> <p>Use small numbers to develop the concept.</p>	<p>Multiple</p> <p>Divisible</p> <p>Divisibility test</p> <p>Common multiple</p> <p>Lowest Common Multiple (LCM)</p> <p>Sequence</p>



Learning Objectives	Suggested Teaching and Learning Activities	Learning Outcomes	Points to Note	Vocabulary
7. Understand the characteristics and use the knowledge of <b>common multiples and Lowest Common Multiple (LCM)</b> of whole numbers.	<ul style="list-style-type: none"> <li>Students find common multiples and LCM by listing down the multiples of each given number. e.g. Multiples of 4 : 4, 8, 12, ..... Multiples of 6 : 6, 12, ..... Common Multiples of 4 and 6: 12, 24, 36, 48, ..... which are the multiples of 12.</li> <li>Use the method of “prime factorisation” to find common multiples and LCM. e.g. <math>4 = 2 \times 2</math> <math>6 = 2 \times 3</math> Therefore the LCM of 4 and 6 is <math>2 \times 2 \times 3 = 12</math>.</li> </ul>	<ul style="list-style-type: none"> <li>i. Find the common multiples of two or three whole numbers.</li> <li>ii. Determine whether a number is the common multiple of two or three given numbers.</li> <li>iii. Determine the LCM of two or three given numbers.</li> </ul>	<p>Emphasise that a list of common multiples is also a number sequence.</p> <p>Use small numbers to develop the concept</p>	

Learning Objectives	Suggested Teaching and Learning Activities	Learning Outcomes	Points to Note	Vocabulary
8. Understand and use the knowledge of <b>common factors</b> and <b>Highest Common Factors (HCF)</b> of whole numbers.	<ul style="list-style-type: none"> <li>Use algorithm to find the LCM.</li> </ul> <div style="display: flex; align-items: center; justify-content: center;"> <div style="margin-right: 20px;"> <math display="block">\begin{aligned} \text{LCM} &amp;= 2 \times 2 \times 3 \\ &amp;= 12 \end{aligned}</math> </div> <div style="border-left: 1px solid black; padding-left: 10px; margin-left: 10px;"> <math display="block">\begin{array}{r l} 2 &amp; 4, 6 \\ \hline 2 &amp; 2, 3 \\ 3 &amp; 1, 3 \\ \hline &amp; 1, 1 \end{array}</math> </div> </div> <ul style="list-style-type: none"> <li>Students list down all the factors of each given number and identify the same factors for each number.</li> <li>Students explore, identify and determine common factors of whole number.</li> </ul>	<ul style="list-style-type: none"> <li>i. Find common factors of two or three whole numbers.</li> <li>ii. Determine whether a number is a common factor of two or three given whole numbers.</li> <li>iii. Determine the HCF of two or three given numbers.</li> </ul>		<p>Common Factor</p> <p>Highest Common Factor (HCF)</p>

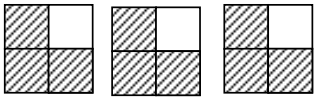
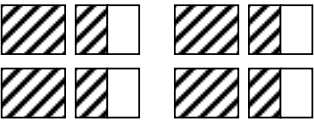
Learning Objectives	Suggested Teaching and Learning Activities	Learning Outcomes	Points to Note	Vocabulary
	<ul style="list-style-type: none"> <li>Students find the HCF by listing down all the factors of each given number.</li> <li>Explore, identify and determine the HCF of whole numbers.</li> <li>Use the method of prime factorisations to find the common prime factors and hence HCF.</li> </ul> <p>e.g.</p> $12 = \boxed{2} \times 2 \times \boxed{3}$ $18 = \boxed{2} \times 3 \times \boxed{3}$ <p>Common Prime Factors: 2 and 3 The HCF: <math>2 \times 3 = 6</math></p> <ul style="list-style-type: none"> <li>Use algorithm to find HCF.</li> </ul>			

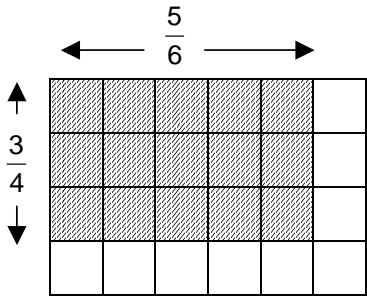
### 3. Learning Area: Fractions

Learning Objectives	Suggested Teaching and Learning Activities	Learning Outcomes	Points to Note	Vocabulary
<p><i>Students will be taught to:</i></p> <p>1. Understand and use the knowledge of <b>fractions</b> as part of a whole.</p> <p>2. Understand and use the knowledge of <b>equivalent</b> fractions.</p>	<ul style="list-style-type: none"> <li>Use concrete materials and drawings to demonstrate the concept of fractions such as:               <ol style="list-style-type: none"> <li>Folding a ribbon to find one-third of its length.</li> <li>The number of girls as compared to the whole class.</li> <li>Folding papers.</li> </ol> </li> <li>Use concrete materials and drawings to demonstrate the concept of equivalent fractions.</li> <li>Use paper folding to explain and explore:               <math display="block">\text{Why } \frac{3}{6} \text{ is the same as } \frac{1}{2}.</math> </li> <li>Compare the values of two fractions by converting them to fractions with the same denominator or the same numerator.</li> </ul>	<p><i>Students will be able to:</i></p> <ol style="list-style-type: none"> <li>Read fractions.</li> <li>Describe fractions as parts of a whole.</li> <li>Represent fractions with diagrams.</li> <li>Write fractions for given diagrams.</li> <li>Find equivalent fractions for a given fraction.</li> <li>Determine whether two given fractions are equivalent.</li> <li>Compare the values of two given fractions.</li> <li>Arrange fractions in order.</li> <li>Simplify fractions to the lowest terms.</li> </ol>	<p><math>\frac{4}{5}</math> read as: Four over five</p> <p><math>\frac{15}{22}</math> read as: Fifteen over twenty two</p> <p>Use the terms numerator and denominator.</p> <p>Use number lines, concrete materials or the concept of equivalent fractions to compare fractions.</p>	<p>Fraction</p> <p>Denominator</p> <p>Numerator</p> <p>Equivalent fractions</p> <p>Lowest terms</p> <p>Arrange</p> <p>Order</p>

Learning Objectives	Suggested Teaching and Learning Activities	Learning Outcomes	Points to Note	Vocabulary
3. Understand the concept of <b>mixed numbers</b> and their representations.	<ul style="list-style-type: none"> <li>Use concrete materials, drawings and number lines to represent mixed numbers.</li> <li>Identify the use of mixed numbers in everyday situations.</li> </ul>	<ol style="list-style-type: none"> <li>Recognise mixed numbers.</li> <li>Represent mixed numbers with diagrams.</li> <li>Write mixed numbers based on given diagrams.</li> <li>Compare and order mixed numbers on number lines.</li> </ol>		Mixed number  Proper fraction  Improper fraction  Number line  Denominator
4. Understand the concept of <b>proper fractions and improper fractions</b> .	<ul style="list-style-type: none"> <li>Use concrete materials and drawings to demonstrate the relationship between mixed numbers and improper fractions.</li> <li>Use calculators to explore the relationship between mixed numbers and improper fractions.</li> </ul>	<ol style="list-style-type: none"> <li>Recognise proper and improper fractions from given fractions.</li> <li>Change mixed numbers into improper fractions.</li> <li>Change improper fractions into mixed numbers.</li> </ol>		

Learning Objectives	Suggested Teaching and Learning Activities	Learning Outcomes	Points to Note	Vocabulary
5. Understand the concept of <b>addition and subtraction of fractions</b> to solve problems.	<ul style="list-style-type: none"> <li>Use concrete materials, drawings and symbols to demonstrate the process of addition and subtraction of fractions.</li> <li>Add and subtract fractions by writing the fractions in their equivalent forms with common denominators including the use of LCM.</li> <li>Perform addition and subtraction of mixed numbers by:               <ol style="list-style-type: none"> <li>Adding and subtracting whole numbers and fractions separately.</li> <li>Writing mixed numbers in the form of improper fractions.</li> </ol> </li> <li>Pose and solve problems related to everyday situations.</li> </ul>	<ol style="list-style-type: none"> <li>Perform addition involving:               <ol style="list-style-type: none"> <li>Fractions with common denominators.</li> <li>Fractions with different denominators.</li> <li>Whole numbers and fractions.</li> <li>Fractions and mixed numbers.</li> <li>Mixed numbers.</li> </ol> </li> <li>Perform subtraction involving:               <ol style="list-style-type: none"> <li>Fractions with common denominators.</li> <li>Fractions with different denominators.</li> <li>Whole numbers and fractions.</li> <li>Fractions and mixed numbers.</li> <li>Mixed numbers.</li> </ol> </li> <li>Solve problems involving combined operations of addition and subtraction of fractions.</li> </ol>	Addition and subtraction involving not more than three numbers.	Mixed Number Add Subtract Fraction Simple fraction Lowest term Equivalent fractions

Learning Objectives	Suggested Teaching and Learning Activities	Learning Outcomes	Points to Note	Vocabulary
6. Understand the concept of <b>multiplication and division of fractions</b> to solve problems.	<ul style="list-style-type: none"> <li>Use concrete materials, drawings and symbols to explore and investigate the process of multiplication and division of fractions.</li> <li>Examples of <b>multiplication</b>:               <ul style="list-style-type: none"> <li>A whole number times a fraction.                   <math display="block">3 \times \frac{3}{4}</math>  <math display="block">3 \times \frac{3}{4} = \frac{9}{4} = 2 \frac{1}{4}</math> </li> <li>A whole number times a mixed number.                   <math display="block">4 \times 1\frac{1}{2}</math>  <math display="block">4 \times 1\frac{1}{2} = 4 \times \frac{3}{2} = \frac{12}{2} = 6</math> </li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Multiply:               <ul style="list-style-type: none"> <li>A whole number by a fraction or mixed number.</li> <li>A fraction by a whole number.</li> <li>A fraction by a fraction (include mixed numbers).</li> </ul> </li> <li>Solve problems involving multiplication of fractions.</li> <li>Divide:               <ul style="list-style-type: none"> <li>A fraction by a whole number.</li> <li>A fraction by a fraction.</li> <li>A whole number by a fraction.</li> <li>A mixed number by a mixed number.</li> </ul> </li> <li>Solve problems involving division of fractions.</li> </ul>	<p>Emphasise multiplication of fractions as repeated addition of the fractions</p> <p>Division involving not more than three numbers including whole numbers, fractions and mixed numbers.</p>	<p>Multiply</p> <p>Divide</p> <p>Mixed Number</p> <p>Repeated addition</p> <p>Numerator</p>

Learning Objectives	Suggested Teaching and Learning Activities	Learning Outcomes	Points to Note	Vocabulary
7. Perform computations involving <b>combined operations of addition, subtraction, multiplication and division of fractions</b> to solve problems.	<p>c. A fraction times a fraction.</p>  $\frac{5}{6} \times \frac{3}{4} = \frac{15}{24} = \frac{5}{8}$ <ul style="list-style-type: none"> <li>• Pose problems related to real-life situations.</li> <li>• Use concrete materials and diagrams to demonstrate computations.</li> </ul>	<ul style="list-style-type: none"> <li>i. Perform computations involving combined operations of addition, subtraction, multiplication and division of fractions, including the use of brackets.</li> <li>ii. Solve problems involving combined operations of addition, subtraction, multiplication and division of fractions, including the use of brackets.</li> </ul>	<p>Limit the operations to three numbers including whole numbers and mixed numbers.</p> <p>Emphasise the order of operations, including the use of brackets.</p>	<p>Multiplication</p> <p>Addition</p> <p>Subtraction</p> <p>Division</p> <p>Combined operation</p> <p>Mixed number</p> <p>Whole number</p> <p>Bracket</p>



#### 4. Learning Area: Decimals

Learning Objectives	Suggested Teaching and Learning Activities	Learning Outcomes	Points to Note	Vocabulary
<p><i>Students will be taught to:</i></p> <p>1. Understand the <b>relationship between decimals and fractions</b>.</p> <p>2. Understand the concept of <b>place value and value of each digit in decimals</b>.</p>	<ul style="list-style-type: none"> <li>Use concrete materials, drawings, calculators and symbols to explain the relationship between decimals and fractions.</li> <li>Use number lines to compare and order decimals.</li> </ul>	<p><i>Students will be able to:</i></p> <p>i. Represent fractions <math>\frac{1}{10}</math> and <math>\frac{1}{100}</math> as decimals and vice-versa.</p> <p>ii. Represent fractions with denominators 10,100 and 1000 as decimals.</p> <p>iii. Read and write decimals to thousandths.</p> <p>iv. Change fractions to decimals and vice-versa.</p> <p>i. State the place value and value of each digit in decimals.</p> <p>ii. Compare the values of two given decimals.</p> <p>iii. Arrange decimals in order.</p> <p>iv. Round decimals to the nearest whole number or up to three decimal places.</p>	<p>0.3 read as: zero point three</p> <p>0.05 read as: zero point zero five</p> <p>3.29 read as: three point two nine.</p> <p>Emphasise the relationship between rounding and estimation.</p>	<p>Fraction</p> <p>Decimal</p> <p>Denominator</p> <p>Tenths</p> <p>Hundredths</p> <p>Thousandths</p> <p>Number line</p> <p>Place value</p> <p>Value of a digit</p> <p>Rounding</p> <p>Decimal point</p>

Learning Objectives	Suggested Teaching and Learning Activities	Learning Outcomes	Points to Note	Vocabulary
3. Understand the concept of <b>addition and subtraction</b> of decimals to solve problems.	<ul style="list-style-type: none"> <li>• Use concrete materials, drawings and symbols.</li> <li>• Solve problems related to everyday situations.</li> <li>• Use calculators or computers to verify answers.</li> <li>• Use estimation strategies to determine whether the solution is reasonable.</li> </ul>	<ul style="list-style-type: none"> <li>i. Add decimals.</li> <li>ii. Solve problems involving addition of decimals.</li> <li>iii. Subtract decimals.</li> <li>iv. Solve problems involving subtraction of decimals.</li> </ul>	<p>Include whole numbers.</p> <p>Addition and subtraction should begin with two decimals.</p> <p>Limit to three decimal places.</p>	<p>Add</p> <p>Subtract</p> <p>Decimal</p> <p>Multiply</p> <p>Divide</p> <p>Mentally divide</p> <p>Mentally multiply</p> <p>Reasonable</p> <p>Estimation</p>
4. Understand the concept of <b>multiplication and division</b> of decimals to solve problems.	<ul style="list-style-type: none"> <li>• Relate to everyday situations.</li> <li>• Use appropriate calculation methods such as pencil-and - paper, calculators and computers.</li> <li>• Mentally multiply decimals by 10, 100 and 1000.</li> <li>• Mentally multiply decimals by 0.1, 0.01 and 0.001.</li> <li>• Mentally divide decimals by 10, 100 and 1000.</li> <li>• Mentally divide decimals by 0.1, 0.01 and 0.001.</li> </ul>	<ul style="list-style-type: none"> <li>i. Multiply two or more decimals.</li> <li>ii. Solve problems involving multiplications of decimals</li> <li>iii. Divide: <ul style="list-style-type: none"> <li>a. A decimal by a whole number.</li> <li>b. A decimal by a decimal.</li> <li>c. A decimal by a fraction.</li> </ul> </li> <li>iv. Solve problems involving division of decimals.</li> </ul>	<p>For multiplication and division, include whole numbers.</p> <p>Begin with one digit whole number</p>	

Learning Objectives	Suggested Teaching and Learning Activities	Learning Outcomes	Points to Note	Vocabulary
5. Perform computations involving <b>combined operation of addition, subtraction, multiplication and division</b> of decimals to solve problems.	<ul style="list-style-type: none"> <li>Pose problems related to everyday situations.</li> </ul>	<ul style="list-style-type: none"> <li>i. Perform computations involving combined operations of addition, subtraction, multiplication and division of decimals, including the use of brackets.</li> <li>ii. Solve problems involving combined operations of addition, subtraction, multiplication and division of decimals, including the use of brackets.</li> </ul>	<p>Emphasise the order of operations including the use of brackets.</p> <p>Include whole numbers and fractions</p>	<p>Addition</p> <p>Subtraction</p> <p>Multiplication</p> <p>Division</p> <p>Decimal</p> <p>Bracket</p> <p>Combined operation</p>

## 5. Learning area: Percentages

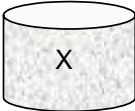
Learning Objectives	Suggested Teaching and Learning Activities	Learning Outcomes	Points to Note	Vocabulary
<p><i>Students will be taught to:</i></p> <ol style="list-style-type: none"> <li>Understand the concept of <b>percentages</b> and the <b>relationship</b> between percentages and fractions or decimals.</li> <li><b>Perform computations and solve problems</b> involving percentages.</li> </ol>	<ul style="list-style-type: none"> <li>Use concrete materials and drawings to demonstrate percentages. e.g. Use ten by ten grids to discuss the equivalent percentages of fractions and decimals. For example the fraction <math>\frac{1}{2}</math> has a decimal equivalent of 0.5, and 0.5 has a percentage equivalent of 50%. (<math>\frac{1}{2} = 0.5</math> or 50%)</li> <li>Pose and solve problems involving profit and loss, simple interest, dividend, commission and discount.</li> </ul>	<p><i>Students will be able to:</i></p> <ol style="list-style-type: none"> <li>Express percentages as the number of parts in every 100.</li> <li>Change fractions and decimals to percentages and vice-versa.</li> <li>Find the percentage of a quantity.</li> <li>Find the percentage one number is of another.</li> <li>Find a number given the percentage.</li> <li>Find the percentage of increase or decrease.</li> <li>Solve problems involving percentages.</li> </ol>	<p>Use the symbol % to represent percent. Include percentages larger than 100.</p> <p>30% of 240 = 72 3 of 12 = 25%</p> <p>8 is 20% of what number? (40)</p> <p>Original amount: 15 Increased to: 18 Find percentage of increase.</p> <p>Original amount: 40 Decreased to: 10 Find percentage of decrease.</p>	<p>Percent Fraction Decimal Increase Decrease Discount Profit Loss Simple interest Dividend Commission</p>

## 6. Learning Area: Integers

Learning Objectives	Suggested Teaching and Learning Activities	Learning Outcomes	Points to Note	Vocabulary
<p><i>Students will be taught to:</i></p> <ol style="list-style-type: none"> <li>Understand and use the knowledge of <b>integers</b>.</li> </ol>	<ul style="list-style-type: none"> <li>Introduce integers in context (e.g. temperatures, sea levels and floors of building).</li> <li>Students complete sequences of integers, find the missing terms, and identify the largest and the smallest value of integers from given sets of integers.</li> <li>Given sets of integers, students order them on number lines.</li> </ul>	<p><i>Students will be able to:</i></p> <ol style="list-style-type: none"> <li>Read and write integers.</li> <li>Represent integers on number lines.</li> <li>Compare the values of two integers.</li> <li>Arrange integers in order.</li> <li>Write positive or negative numbers to represent word descriptions.</li> </ol>	<p>– 32 read as: negative thirty-two.  – 5 is less than – 2  –15 is greater than –25</p> <p>Words description: e.g.</p> <ol style="list-style-type: none"> <li>30 metres below sea level: – 30</li> <li>Weight gain of 2 kg: 2</li> </ol> <p>The number 0 is neither positive nor negative.</p>	<p>Integer  Negative number  Positive number  Number line  Temperature  Sea level  Floors of a building  Less than  Greater than  Words description  Missing terms  Largest  Smallest</p>

Learning Objectives	Suggested Teaching and Learning Activities	Learning Outcomes	Points to Note	Vocabulary
2. Perform computations involving <b>addition and subtraction</b> of integers to solve problems.	<ul style="list-style-type: none"> <li>Use number lines to add and subtract integers.</li> <li>Use concrete materials, drawings, and symbols (e.g. coloured chips) to demonstrate addition and subtraction of integers.</li> <li>Use brackets to differentiate between operations and the signs of numbers.</li> <li>Solve problems related to real-life situations.</li> </ul>	<ul style="list-style-type: none"> <li>i. Add integers.</li> <li>ii. Solve problems involving addition of integers.</li> <li>iii. Subtract integers.</li> <li>iv. Solve problems involving subtraction of integers.</li> </ul>	<p>Begin addition and subtraction using two integers.</p> <p><math>-8 - (-7)</math> read as negative eight minus negative seven.</p> <p><math>-4 - 2</math> read as negative four minus two.</p> <p>Addition should include like and unlike signs.</p> <p>e.g Like signs: <math>9+5</math>, <math>-7+(-8)</math></p> <p>Unlike signs: <math>3 + (-4)</math>, <math>(-9) + 5</math></p> <p>Differentiate between operations and signs. Relate subtraction of integers to addition.</p>	<p>Add</p> <p>Addition</p> <p>Subtract</p> <p>Subtraction</p> <p>Minus</p> <p>Plus</p> <p>Integer</p> <p>Negative</p> <p>Positive</p> <p>Like signs</p> <p>Unlike signs</p>

## 7. Learning Area: Algebraic Expressions

Learning Objectives	Suggested Teaching and Learning Activities	Learning Outcomes	Points to Note	Vocabulary
<p><i>Students will be taught to:</i></p> <ol style="list-style-type: none"> <li>Understand the concept of <b>unknowns</b>.</li> <li>Understand the concept of <b>algebraic terms</b>.</li> </ol>	<ul style="list-style-type: none"> <li>Use examples of everyday situations to explain unknowns. e.g: Glass X contains y numbers of marbles.</li> </ul>  <p>Which letter represents the unknown number?</p> <ul style="list-style-type: none"> <li>Give a list of terms and students select algebraic terms with one unknown.</li> </ul>	<p><i>Students will be able to:</i></p> <ol style="list-style-type: none"> <li>Use letters to represent unknown numbers.</li> <li>Identify unknowns in given situations.</li> </ol> <ol style="list-style-type: none"> <li>Identify algebraic terms with one unknown.</li> <li>Identify coefficients in given algebraic terms with one unknown.</li> <li>Identify like and unlike algebraic terms with one unknown.</li> <li>State like terms for a given term.</li> </ol>	<p>An algebraic term is written as <math>3x</math> not <math>x^3</math></p> <p>A number, e.g 8 is also a term.</p> <p><math>\frac{x}{2}</math> is a term.</p> <p><b>7p :</b></p> <p>The coefficient of p is 7.</p>	<p>Unknown Term</p> <p>Alphabet</p> <p>Algebraic term</p> <p>Multiplication</p> <p>Coefficient</p> <p>Like terms</p> <p>Unlike terms</p>

Learning Objectives	Suggested Teaching and Learning Activities	Learning Outcomes	Points to Note	Vocabulary
3. Understand the concept of <b>algebraic expressions</b> .	<ul style="list-style-type: none"> <li>Use concrete materials to demonstrate the concept of combining like and unlike terms. e.g.               <ol style="list-style-type: none"> <li><math>4s + 8s = 12s</math></li> <li><math>5r - 2r = 3r</math></li> <li><math>7g + 6h</math> cannot be simplified because they are not like terms.</li> <li><math>3k + 4 + 6k - 3</math>  <math>= 3k + 6k + 4 - 3</math>  <math>= 9k + 1</math></li> </ol> </li> </ul>	<ol style="list-style-type: none"> <li>Recognise algebraic expressions.</li> <li>Determine the number of terms in given algebraic expressions.</li> <li>Simplify algebraic expressions by combining the like terms.</li> </ol>	$4p = p + p + p + p$	Algebraic expression Number of terms Like terms Unlike terms Simplify



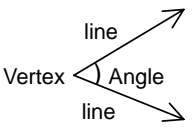
## 8. Learning Area: Basic Measurements

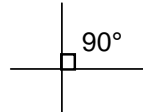
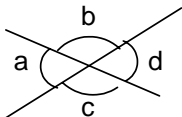
Learning Objectives	Suggested Teaching and Learning Activities	Learning Outcomes	Points to Note	Vocabulary
<p><i>Students will be taught to:</i></p> <ol style="list-style-type: none"> <li>Understand the concept of <b>length</b> to solve problems.</li> <li>Understand the concept of <b>mass</b> to solve problems.</li> </ol>	<ul style="list-style-type: none"> <li>Measure the length of objects around the school compound.</li> <li>Students draw a line given its length.</li> <li>Measure given lines using different standard units.</li> <li>Relate to everyday situations.</li> </ul>	<p><i>Students will be able to:</i></p> <ol style="list-style-type: none"> <li>Measure the length of objects.</li> <li>Convert one metric unit to another. (mm, cm, m and km)</li> <li>Estimate lengths of objects in appropriate units.</li> <li>Use the four operations to solve problems involving length.</li> <li>Measure the mass of objects.</li> <li>Convert one metric unit to another. (mg, g, kg, tonne).</li> <li>Estimate masses of objects in appropriate units.</li> <li>Use the four operations to solve problems involving mass.</li> </ol>	<p>Emphasise the importance of using standard measurement.</p> <p>Introduce inches, feet, yards, miles and nautical miles.</p>	<p>Length</p> <p>Millimetre</p> <p>Centimetre</p> <p>Metre</p> <p>Kilometre</p> <p>Estimate</p> <p>Measure</p> <p>Convert</p> <p>Metric units</p> <p>Mass</p> <p>Milligrams</p> <p>Grams</p> <p>Kilograms</p> <p>Nautical mile</p> <p>Inch</p> <p>Feet</p> <p>Yard</p>

Learning Objectives	Suggested Teaching and Learning Activities	Learning Outcomes	Points to Note	Vocabulary
3. Understand the concept of <b>time</b> in seconds, minutes, hours, days, weeks, months and years.	<ul style="list-style-type: none"> <li>Use calendars, clocks or stop-watches to discuss the measurement of time for events.</li> <li>Suggest a unit to estimate or measure:               <ol style="list-style-type: none"> <li>The time it will take to eat lunch.</li> <li>Your age.</li> <li>How long it takes for water to boil?</li> <li>How long it takes to run 100 metres?</li> </ol> </li> <li>Involve great events in history.</li> </ul>	<ol style="list-style-type: none"> <li>Determine the appropriate measurement of time for certain events.</li> <li>Convert measurement of time in different units (seconds, minutes, hours, days, weeks, months and years).</li> <li>Estimate the time intervals of events.</li> <li>Use the four operations to solve problems involving time.</li> </ol>	1 millennium = 1000 years  1 century = 100 years  1 year = 12 months = 52 weeks = 365 days  1 week = 7 days  1 day = 24 hours  1 hour = 60 minutes  1 minute = 60 seconds	Time Second Minute Hour Day Week Month Year Century Millennium Measurement Leap year

Learning Objectives	Suggested Teaching and Learning Activities	Learning Outcomes	Points to Note	Vocabulary
4. Understand and use times in <b>the twelve-hour and twenty-four hour system</b> to solve problems.	<ul style="list-style-type: none"> <li>• Use digital and analogue clocks.</li> <li>• Read times from train or bus schedules.</li> <li>• Relate events to everyday situations.</li> </ul>	<ul style="list-style-type: none"> <li>i. Read and write times in twelve-hour system.</li> <li>ii. Read and write times in twenty-four-hour system.</li> <li>iii. Convert time in twelve-hour system to twenty-four hour system and vice-versa.</li> <li>iv. Determine the interval between two given times.</li> <li>v. Solve problems involving time.</li> </ul>	<p>7.30 read as seven thirty; half past seven; thirty minutes past seven and thirty minutes to eight.</p> <p>Introduce a.m. and p.m.</p> <p>0350 read as three fifty hour</p> <p>3.50 a.m. read as three fifty a.m. or three fifty in the morning.</p> <p>1900 read as nineteen hundred hours.</p>	<p>Twelve hour system</p> <p>Twenty-four hour system</p> <p>Time Interval</p> <p>Time</p> <p>Digital clock</p> <p>Analogue clock</p>

## 9. Learning Area: Lines and Angles

Learning Objectives	Suggested Teaching and Learning Activities	Learning Outcomes	Points to Note	Vocabulary
<p><i>Students will be taught to:</i></p> <p>1. Understand the concept of <b>angles</b>.</p>	<ul style="list-style-type: none"> <li>Students identify angles in the classroom. (e.g. corners of tables, blackboards, windows, clock hands, and opened doors).</li> <li>Students demonstrate the different types of angles with their arms.</li> <li>Guide students on how to use protractors to measure angles.</li> </ul>	<p><i>Students should be able to:</i></p> <ol style="list-style-type: none"> <li>Recognise angles.</li> <li>Denote and label angles.</li> <li>Measure angles using protractors.</li> <li>Draw angles using protractors.</li> <li>Recognise, compare and classify angles as acute, right, obtuse and reflex.</li> <li>Draw acute, right, obtuse and reflex angles using protractors.</li> <li>Determine angles on straight lines equal <math>180^\circ</math>.</li> <li>Determine one whole turn is <math>360^\circ</math>.</li> </ol>	<p>An angle is formed by two straight lines that meet at a point called the vertex.</p>  <p>Angles can be named as <math>\angle BAC</math> or <math>\angle A</math> or <math>BAC</math>.</p> <p>Use degree (<math>^\circ</math>) as the unit of measurement of angles.</p> <p>One whole turn is <math>360^\circ</math>.</p>	<p>Angle</p> <p>Line</p> <p>Protractor</p> <p>Label</p> <p>Denote</p> <p>Right angle</p> <p>Acute angle</p> <p>Reflex angle</p> <p>Obtuse Angle</p> <p>One whole turn</p> <p>Vertex</p> <p>Classify</p> <p>Compare</p> <p>Degree</p>

Learning Objectives	Suggested Teaching and Learning Activities	Learning Outcomes	Points to Note	Vocabulary
2. Understand the concept of <b>parallel and perpendicular lines</b> .	<ul style="list-style-type: none"> <li>Students identify perpendicular and parallel lines in the classroom (e.g edges of books, windows and doors).</li> </ul>	i. Determine parallel lines. ii. Determine perpendicular lines. iii. State that the angles formed by perpendicular lines is $90^\circ$ .	<p>Two lines are parallel if they never intersect.</p> <p>A perpendicular line is a line that makes a <math>90^\circ</math> with another line.</p> <p>Denote a <math>90^\circ</math> angle as:</p> 	Parallel lines Perpendicular lines Intersecting lines Complementary angle Supplementary angle Adjacent angle Vertically opposite angle
3. Understand and use <b>properties of angles associated with intersecting lines</b> to solve problems.	<ul style="list-style-type: none"> <li>Students investigate the properties of angles formed by intersecting lines.</li> </ul>	i. Identify intersecting lines. ii. Determine the properties of vertical, complementary and supplementary angles. iii. Determine the value of an angle on a line, given the adjacent angle. iv. Solve problems involving angles formed by intersecting lines.	 <p>Vertical-angle pairs:  <math>\angle a = \angle d</math>  <math>\angle b = \angle c</math></p> <p>Sum of adjacent angles on a straight line is <math>180^\circ</math>  <math>(a + b = 180^\circ)</math></p>	

## 10. Learning Area: Polygons

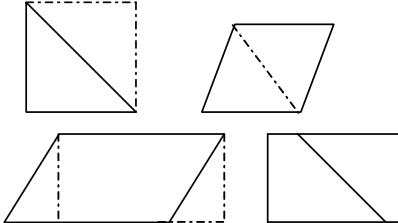
Learning Objectives	Suggested Teaching and Learning Activities	Learning Outcomes	Points to Note	Vocabulary
<p><i>Students will be taught to:</i></p> <p>1. Understand the concept of <b>polygons</b>.</p>	<ul style="list-style-type: none"> <li>Use concrete materials such as protractors, rulers, grid papers, geo-boards and computer software to explore the concept of polygons.</li> <li>Students explore the relationship between the sides, diagonals and vertices of polygons.</li> </ul>	<p><i>Students will be able to:</i></p> <ol style="list-style-type: none"> <li>Recognise polygons.</li> <li>Name polygons (triangle, quadrilateral, pentagon, hexagon, heptagon and octagon).</li> <li>Determine the number of sides, vertices and diagonals of given polygons.</li> <li>Sketch polygons.</li> </ol>	<p>Use capital letters to name vertices.</p>	Polygon Triangle Quadrilateral Pentagon Hexagon Heptagon Octagon Vertices Sides Diagonal Shape Symmetry Line of symmetry Sketch
<p>2. Understand the concept of <b>symmetry</b>.</p>	<ul style="list-style-type: none"> <li>Students explore symmetry by using mirrors, pattern blocks, folding papers or making inkblot designs.</li> <li>Students explore the importance of symmetry in everyday situations (e.g. pattern on buildings and tiles).</li> </ul>	<ol style="list-style-type: none"> <li>Determine and draw the line(s) of symmetry of shapes.</li> <li>Complete shapes given part of the shapes and the line of symmetry.</li> <li>Draw designs using the concept of symmetry.</li> </ol>	<p>Shapes include polygons</p>	

Learning Objectives	Suggested Teaching and Learning Activities	Learning Outcomes	Points to Note	Vocabulary
<p><i>Students will be taught to:</i></p> <p>3. Identify and use the geometric properties of <b>triangles</b> to solve problems.</p> <p>4. Identify and use the geometric properties of <b>quadrilaterals</b> to solve problems.</p>	<ul style="list-style-type: none"> <li>Investigate the relationship between angles and sides of all types of triangles.</li> <li>Use a variety of methods to find the sum of angles of triangles: e.g aligning corners on a straight line, using protractors and geometry computer software.</li> <li>Investigate the relationship between angles, sides and diagonals of all types of quadrilateral.</li> <li>Use a variety of methods to find the sum of angles of quadrilaterals: e.g aligning corners on a point, using protractors and geometry computer software.</li> </ul>	<p><i>Students will be able to:</i></p> <ol style="list-style-type: none"> <li>Determine and draw symmetry line(s) of given triangles.</li> <li>Draw triangles using protractors and rulers.</li> <li>State the geometric properties of the different types of triangles and name the triangles.</li> <li>Determine that the sum of the angles of a triangle is <math>180^\circ</math>.</li> <li>Solve problems involving triangles.</li> <li>Determine and draw symmetry line(s) of given quadrilaterals.</li> <li>Draw a quadrilateral using protractor and ruler.</li> <li>State the geometric properties of the different types of quadrilaterals and name quadrilaterals.</li> <li>Determine that the sum of the angles of a quadrilateral is <math>360^\circ</math>.</li> <li>Solve problems involving quadrilaterals.</li> </ol>	<p><b>Types of triangles:</b></p> <ul style="list-style-type: none"> <li>Isosceles triangle</li> <li>Equilateral triangle</li> <li>Scalene triangle</li> <li>Acute triangle</li> <li>Right-angled triangle</li> <li>Obtuse triangle</li> </ul> <p><b>Types of quadrilaterals:</b></p> <ul style="list-style-type: none"> <li>Square</li> <li>Rectangle</li> <li>Rhombus</li> <li>Parallelogram</li> <li>Trapezium</li> </ul>	<p>Isosceles</p> <p>Equilateral</p> <p>Scalene</p> <p>Acute triangle</p> <p>Obtuse triangle</p> <p>Right-angled triangle</p> <p>Quadrilateral</p> <p>Square</p> <p>Rectangle</p> <p>Parallelogram</p> <p>Trapezium</p> <p>Rhombus</p> <p>Diagonal</p> <p>Geometric properties</p> <p>Align</p> <p>Corner</p>

## 11. Learning Area : Perimeter and Area

Learning Objectives	Suggested Teaching and Learning Activities	Learning Outcomes	Points to Note	Vocabulary
<p><i>Students will be taught to:</i></p> <p>1. Understand the concept of <b>perimeter</b> to solve problems.</p> <p>2. Understand the concept of <b>area of rectangles</b> to solve problems.</p>	<ul style="list-style-type: none"> <li>Use square chips, tessellation grids, geo-boards, grid-papers or computer software to explore the concept of perimeter.</li> <li>Investigate and develop formula to find the perimeter of a rectangle.</li> <li>Use unit squares, tessellation grids, geo-boards, grid-papers or computer software to explore the concept of area.</li> <li>Investigate and develop formula to find the area of a rectangle.</li> <li>Use unit square chips or tiles to investigate, explore and make generalisations about the: <ul style="list-style-type: none"> <li>Perimeters of rectangles having the same area.</li> <li>Areas of rectangles having the same perimeter.</li> </ul> </li> </ul>	<p><i>Students will be able to:</i></p> <p>i. Identify the perimeter of a region.</p> <p>ii. Find the perimeter of a region enclosed by straight lines.</p> <p>iii. Solve problems involving perimeters.</p> <p>i. Estimate the area of a shape.</p> <p>ii. Find the area of a rectangle.</p> <p>iii. Solve problems involving areas.</p>	<p>Shapes enclosed by straight lines and curves.</p> <p>Limit to straight lines.</p> <p><math>\text{cm}^2</math> read as square cm.</p> <p>The area of a unit square is 1 square unit</p> <p>Area of a right triangle</p> <p><math>\frac{1}{2}</math> of the area of a rectangle.</p>	<p>Perimeter</p> <p>Formulae</p> <p>Measure</p> <p>Figure</p> <p>Area</p> <p>Square unit</p> <p>Region</p> <p>Enclosed</p>



Learning Objectives	Suggested Teaching and Learning Activities	Learning Outcomes	Points to Note	Vocabulary
3. Understand the <b>concept of area of triangles, parallelograms and trapezium</b> to solve problems.	<ul style="list-style-type: none"> <li>Investigate and develop formulae to find the areas of triangles, parallelograms and trapeziums based on the area of rectangle.</li> </ul>  <ul style="list-style-type: none"> <li>Solve problems such as finding the height or base of a parallelogram.</li> </ul>	<ul style="list-style-type: none"> <li>i. Identify the heights and bases of triangles, parallelograms and trapeziums.</li> <li>ii. Find the areas of triangles, parallelograms and trapeziums.</li> <li>iii. Find the areas of figures made up of triangles, rectangles, parallelograms or trapeziums.</li> <li>iv. Solve problems involving the areas of triangles, rectangles, parallelograms and trapeziums.</li> </ul>		Area Triangle Trapezium Parallelogram Height Base Rectangle Figure

## 12. Learning Area: Solid Geometry

Learning Objectives	Suggested Teaching and Learning Activities	Learning Outcomes	Points to Note	Vocabulary
<p><i>Students will be taught to:</i></p> <p>1. Understand <b>geometric properties of cubes and cuboids.</b></p>	<ul style="list-style-type: none"> <li>Use concrete materials to demonstrate the concepts of geometric solids.</li> <li>Game: Searching out Solids. Make up sets of activity cards containing descriptions of solids such as:               <ol style="list-style-type: none"> <li>Exactly two faces that are the same shape and size.</li> <li>All edges have the same length.</li> </ol> <p>Students compete to search out solids in the classroom based on the descriptions.</p> </li> <li>Investigate and explore the relationship between faces, edges and vertices of cubes and cuboids.</li> <li>Compare and contrast between cubes and cuboids. Ask students how they are alike or different.</li> <li>Use concrete materials (opened boxes) to draw the layout of cubes and cuboids.</li> </ul>	<p><i>Students will be able to</i></p> <ol style="list-style-type: none"> <li>Identify geometric solids.</li> <li>State the geometric properties of cubes and cuboids.</li> <li>Draw cubes and cuboids on:               <ol style="list-style-type: none"> <li>Square grids.</li> <li>Blank papers.</li> </ol> </li> <li>Make models of cubes and cuboids by:               <ol style="list-style-type: none"> <li>Combining given faces.</li> <li>Folding given layouts of solids.</li> </ol> </li> </ol>	<p>Geometric solids include</p> <ul style="list-style-type: none"> <li>Cubes</li> <li>Cuboids</li> <li>Cylinders</li> <li>Pyramids</li> <li>Cones</li> <li>Spheres</li> </ul>	<p>Face Edge Vertex Vertices Cube Cuboid Cylinder Pyramid Cone Sphere Surface</p>

Learning Objectives	Suggested Teaching and Learning Activities	Learning Outcomes	Points to Note	Vocabulary
2. Understand the concept of <b>volume of cuboids</b> to solve problems	<ul style="list-style-type: none"> <li>• Use unit cubes or other concrete materials to let students explore the concept of volumes.</li> <li>• Investigate and develop formula to find the volume of cuboids.</li> </ul>	<ol style="list-style-type: none"> <li>Estimate the volume of cuboids.</li> <li>Find the volume of cuboids.</li> <li>Solve problems involving volume of cuboids.</li> </ol>	$\text{cm}^3$ read as cubic cm.  The volume of a unit cube is 1 cubic unit	Volume Cubic cm Unit cube Cuboid