

Y3IP Advanced Mathematics

<b>1</b>	<b>Topic 1: Revision – Algebraic Fractions</b>
<b>2</b>	<p><b>Topic 2: Polynomials</b></p> <p>2.1 <b>Polynomials</b> To find the unknown constants in a given polynomial.</p> <p>2.2 <b>Identities</b> To find the unknown constants in a given identity.</p> <p>2.3 <b>Long Division involving Polynomials</b> To divide a polynomial of a higher order by another polynomial of a lower order. To introduce Synthetic Division as an alternative method.</p> <p>2.4 <b>Remainder Theorem</b> To find the remainder when a polynomial is divided by a linear divisor. To form and solve equations involving unknown constants.</p> <p>2.5 <b>Factor Theorem</b> To find the factors of a polynomial. To solve equations using factor theorem.</p> <p>2.6 <b>Solve Cubic Equations</b> To solve cubic equations using the concepts using factorization, the remainder theorem and the factor theorem.</p>
<b>3</b>	<p><b>Topic 3: Partial Fractions</b></p> <p>3.1 <b>Linear Factors</b> To decompose a rational expression to partial fractions involving linear factors</p> <p>3.2 <b>Repeated Linear Factors</b> To decompose a rational expression to partial fractions involving repeated linear factors</p> <p>3.3 <b>Quadratic Factors (cannot be factorised)</b> To decompose a rational expression to partial fractions involving quadratic factors that cannot be factorised.</p>
<b>4</b>	<p><b>Topic 4: Functions</b></p> <p>4.1 <b>Relations &amp; Functions</b> To determine if a relation is a function. To find, for a function defined by <math>y = f(x)</math>,</p> <ul style="list-style-type: none"> <li>- the image of <math>y</math> corresponding to a value of <math>x</math>;</li> <li>- the possible values of <math>x</math> corresponding to a value of <math>y</math>;</li> </ul>

	<ul style="list-style-type: none"> <li>- the unknown constants in <math>f(x)</math>.</li> </ul> <p>Using the graph of a function, find</p> <ul style="list-style-type: none"> <li>- the range corresponding to a given domain;</li> <li>- the domain corresponding to a given range.</li> </ul>
	<p><b>4.2 Composite Functions</b> To find the composite functions <math>fg, gf, f^2, f^3</math>, etc. of two functions <math>f</math> and <math>g</math>. To state the values of <math>x</math> such that the composite functions are not defined.</p>
	<p><b>4.3 Inverse Functions</b> To find the inverse function of <math>y = f(x)</math>. To show <math>y = f^{-1}(x)</math> is the reflection of <math>y = f(x)</math> in the line <math>y = x</math>. To find the composite functions <math>fg, gf, f^{-1}, g^{-1}</math> etc. To show that <math>g^{-1}f^{-1} = (fg)^{-1}</math>. To use the result <math>gff^{-1} = g</math> to find <math>g(x)</math>.</p>
	<p><b>4.4 Absolute Valued Functions</b> To introduce the concept of absolute valued functions. To solve absolute valued functions using</p> <ul style="list-style-type: none"> <li>- algebraic manipulation,</li> <li>- diagram.</li> </ul>
	<p><b>4.5 Transformation of Graphs</b> To sketch the graphs of functions after undergoing a reflection, a translation and a stretch.</p>
<b>5</b>	<b>Topic 5: Growth Functions</b>
	<p><b>5.1 Exponential Functions</b> To introduce the concept of exponential functions.</p>
	<p><b>5.2 Graphs of Exponential Functions</b> To sketch the graph of an exponential function.</p>
	<p><b>5.3 Logarithmic Functions</b> To introduce the concept of logarithmic functions.</p>
	<p><b>5.4 Graphs of Logarithmic Functions</b> To sketch the graph of a logarithmic function.</p>
	<p><b>5.5 Applications of Exponential and Logarithmic Functions</b> To solve word problems involving exponential functions and logarithmic functions.</p>
<b>6</b>	<b>Topic 6: Basic Trigonometry</b>
	<b>6.1 Trigonometric Ratios and General Angles [including special angles]</b>

	To find the trigonometric ratios for acute angles (measured in degrees & radians).
6.2	<b>Trigonometric Ratios of Any Angles</b> To extend the definitions of sine, cosine & tangent to any angle.
6.3	<b>Graphs of Sine, Cosine and Tangent Functions</b> To sketch the graphs of the following functions: <ul style="list-style-type: none"> <li>- <math>y = a \sin (bx) + c</math>;</li> <li>- <math>y = a \cos (bx) + c</math>;</li> <li>- <math>y = a \tan (bx) + c</math>;</li> </ul> To state the amplitude, period & symmetry related to the sine & cosine functions.
6.4	<b>Basic Angles and Simple Trigonometric Equations</b> To determine the sign of a trigonometric ratio of an angle in a quadrant. To relate the trigonometric functions of any angle to that of its basic (reference) angle. To solve simple trigonometric equations.
<b>7</b>	<b>Topic 7: Intermediate Trigonometry</b>
7.1	<b>Reciprocals of Trigonometric Functions</b> To define the secant, cosecant & cotangent functions.
7.2	<b>Fundamental Trigonometric Identities</b> To derive the following trigonometric identities: <ul style="list-style-type: none"> <li>- <math>\sin^2 \theta + \cos^2 \theta = 1</math>;</li> <li>- <math>1 + \tan^2 \theta = \sec^2 \theta</math>;</li> <li>- <math>1 + \cot^2 \theta = \operatorname{cosec}^2 \theta</math>.</li> </ul>
7.3	<b>Proving Trigonometric Identities</b> To prove trigonometric identities using the basic trigonometric identities.
7.4	<b>Trigonometric Equations</b> To solve basic trigonometric equations that can be reduced to the form: <ul style="list-style-type: none"> <li>- <math>\sin x = k</math>; <math>\sin (ax + b) = k</math>;</li> <li>- <math>\cos x = k</math>; <math>\cos (ax + b) = k</math>;</li> <li>- <math>\tan x = k</math>. <math>\tan (ax + b) = k</math>.</li> </ul> To solve trigo equations by factorization and quadratic equations.