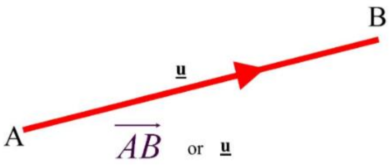
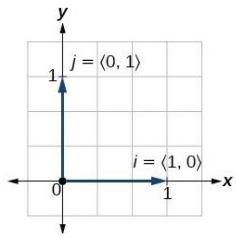
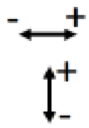
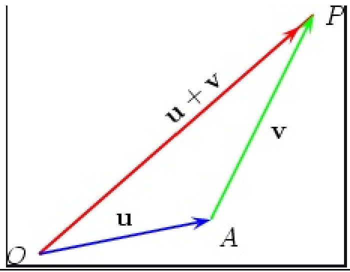
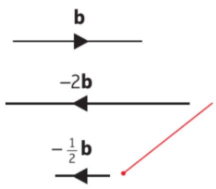
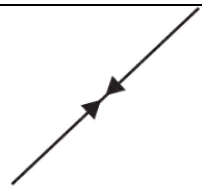
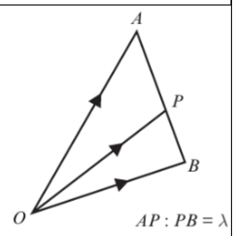
Year 11 Mathematics
Higher
HT 1

Definitions and processes

1.	Magnitude	Size	Denoted using straight lines on either side of the vector $\|a\|$
2.	Vector	A quantity that has both magnitude and direction	e.g. velocity displacement force
3.	Directed line segment	Can be used to represent a vector	
		Can be written in bold **a**, with underlining $\underline{a}$ or $\overrightarrow{AB}$	
4.	Unit vector	A vector with a magnitude of 1	
		Unit vector in the x direction	
		Unit vector in the y direction	
5.	Column vector	x denotes the horizontal movement	$\begin{pmatrix}x\\y\end{pmatrix}$ 
		y denotes the vertical movement	
6.	Resultant	The vector sum of two or more vectors	
7.	Displacement	The action of moving something from its place or position	
8.	Scalar	A quantity that has magnitude	e.g. speed is the magnitude of the velocity vector
9.	Colinear	Two vectors that lie on the same line	

10.	Triangle law	$\overrightarrow{OA} + \overrightarrow{AP} = \overrightarrow{OP}$	
11.	Parallel vectors	Any vector parallel to the vector $\boldsymbol{a}$ may be written as $\lambda\boldsymbol{a}$, where λ is a non-zero scalar	 If the number is negative ($\neq -1$) the new vector has a different length and the **opposite** direction.
12.	$\binom{p}{q}$	Can also be written as $p\mathbf{i} + q\mathbf{j}$	e.g. $5\mathbf{i} + 2\mathbf{j} = \binom{5}{2}$
13.	Zero vector	$\overrightarrow{OA} + \overrightarrow{AO} = 0$	
14.	Vectors and ratios	If P is A point on AB, dividing AB in the ratio $\lambda : \mu$	$\overrightarrow{OP} = \overrightarrow{OA} + \frac{\lambda}{\lambda + \mu}\overrightarrow{AB}$ 

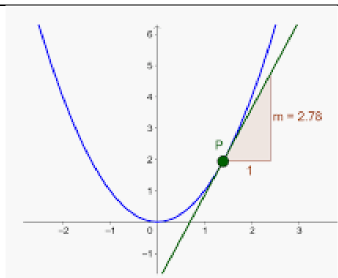
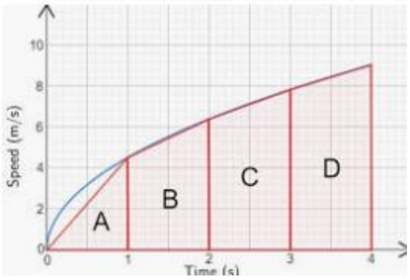
Year 10 Mathematics
Higher
HT 2

Proportion

1.	Constant of proportionality	Represented by k	
		Its value stays the same	
2.	Direct proportion	Two quantities increase at the same rate	e.g. y is directly proportional to x' $y \propto x$ $y = kx$
3.	Inverse proportion	One variable increases at a constant rate while the other variable decreases	e.g. 'y is inversely proportional to x' $y \propto \frac{1}{x}$ $y = \frac{k}{x}$

Graph transformations

4.	$y = -f(x)$	Reflection in the x axis	y coordinates are multiplied by -1
5.	$y = f(-x)$	Reflection in the y axis	x coordinates are divided by -1
6.	$y = -f(-x)$	Reflection in the x axis and then in the y axis Equivalent to rotation of 180◦ about the origin	y coordinates are multiplied by -1 AND x coordinates are divided by -1
7.	$y = f(x) + a$	Translation by the vector $\begin{pmatrix} 0 \\ a \end{pmatrix}$	
8.	$y = f(x + a)$	Translation by the vector $\begin{pmatrix} -a \\ 0 \end{pmatrix}$	
9.	$y = af(x)$	Stretch by scale factor a in the vertical direction, parallel to the y axis	y coordinates are multiplied by a
10.	$y = f(ax)$	Stretch by scale factor $\frac{1}{a}$ in the horizontal direction, parallel to the x axis	x coordinates are multied by $\frac{1}{a}$

<table>
<tr><td colspan="4">Rates of change</td></tr>
<tr><td>11.</td><td>Gradient</td><td>The gradient of the tangent to a curve can be used to calcuakte the gradient of a curve at any point</td><td>
</td></tr>
<tr><td rowspan="2">12.</td><td rowspan="2">Area under graph</td><td>The area under the graph represents the product of the units on the y and x axes</td><td>If the graph is a curve then split up into shapes such as trapezia and triangles to find an estimate for the area</td></tr>
<tr><td>e.g. for a velocity time graph the area represents the distance travelled</td><td>
</td></tr>
</table>