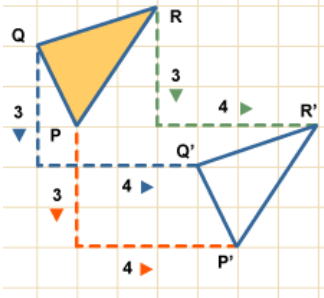
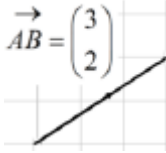
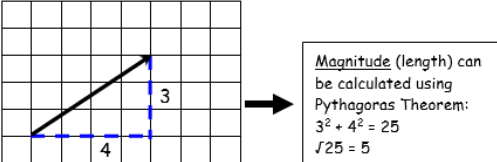

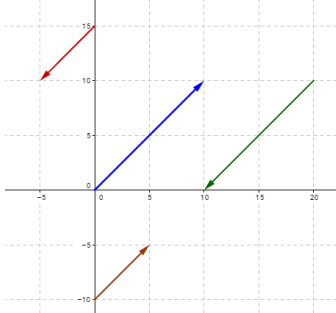
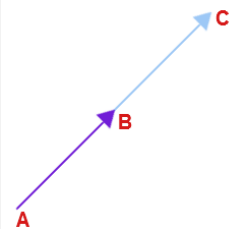
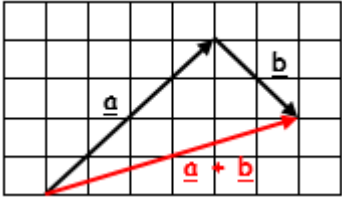
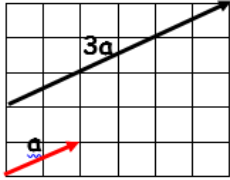
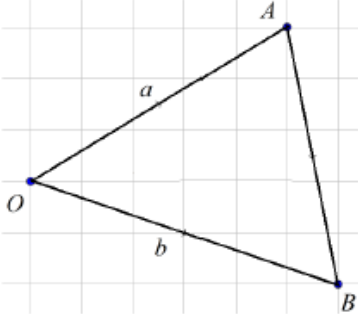
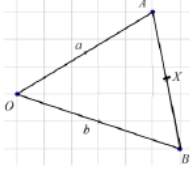


Topic: Vectors

Topic/Skill	Definition/Tips	Example
1. Translation	<p>Translate means to move a shape. The shape does not change size or orientation.</p>	
2. Vector Notation	<p>A vector can be written in 3 ways:</p> $\mathbf{a} \quad \text{or} \quad \overrightarrow{AB} \quad \text{or} \quad \begin{pmatrix} 1 \\ 3 \end{pmatrix}$	
3. Column Vector	<p>In a column vector, the top number moves left (-) or right (+) and the bottom number moves up (+) or down (-)</p>	<p>$\begin{pmatrix} 2 \\ 3 \end{pmatrix}$ means '2 right, 3 up'</p> <p>$\begin{pmatrix} -1 \\ -5 \end{pmatrix}$ means '1 left, 5 down'</p>
4. Vector	<p>A vector is a quantity represented by an arrow with both direction and magnitude.</p> $\overrightarrow{AB} = -\overrightarrow{BA}$	
5. Magnitude	<p>Magnitude is defined as the length of a vector.</p>	
6. Equal Vectors	<p>If two vectors have the same magnitude and direction, they are equal.</p>	
7. Parallel Vectors	<p>Parallel vectors are multiples of each other.</p>	<p>$2\mathbf{a} + \mathbf{b}$ and $4\mathbf{a} + 2\mathbf{b}$ are parallel as they are multiple of each other.</p> 

<p>8. Collinear Vectors</p>	<p>Collinear vectors are vectors that are on the same line. To show that two vectors are collinear, show that one vector is a multiple of the other (parallel) AND that both vectors share a point.</p>	
<p>9. Resultant Vector</p>	<p>The resultant vector is the vector that results from adding two or more vectors together.</p> <p>The resultant can also be shown by lining up the head of one vector with the tail of the other.</p>	<p>if $\underline{a} = \begin{pmatrix} 4 \\ 4 \end{pmatrix}$ and $\underline{b} = \begin{pmatrix} 2 \\ -2 \end{pmatrix}$</p> <p>then $\underline{a} + \underline{b} = \begin{pmatrix} 4 \\ 4 \end{pmatrix} + \begin{pmatrix} 2 \\ -2 \end{pmatrix} = \begin{pmatrix} 6 \\ 2 \end{pmatrix}$</p> 
<p>10. Scalar of a Vector</p>	<p>A scalar is the number we multiply a vector by.</p>	 <p>Example: $3\mathbf{a} + 2\mathbf{b} =$ $= 3\begin{pmatrix} 2 \\ 1 \end{pmatrix} + 2\begin{pmatrix} 4 \\ -1 \end{pmatrix}$ $= \begin{pmatrix} 6 \\ 3 \end{pmatrix} + \begin{pmatrix} 8 \\ -2 \end{pmatrix}$ $= \begin{pmatrix} 14 \\ 1 \end{pmatrix}$</p>
<p>11. Vector Geometry</p>	 <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> $\begin{matrix} \vec{OA} = a & \vec{AO} = -a \\ \vec{OB} = b & \vec{BO} = -b \end{matrix}$ </div> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> $\begin{matrix} \vec{AB} = \vec{AO} + \vec{OB} = -a + b = b - a \\ \vec{BA} = \vec{BO} + \vec{OA} = -b + a = a - b \end{matrix}$ </div>	<p>Example 1: X is the midpoint of AB. Find \vec{OX} Answer: Draw X on the original diagram</p>  <p>Now build up a journey. You could use $\vec{OX} = \vec{OA} + \frac{1}{2}\vec{AB}$.</p> <p>This will give: $\vec{OX} = a + \frac{1}{2}(b - a)$.</p> <p>This will simplify to $\frac{1}{2}a + \frac{1}{2}b$ or $\frac{1}{2}(a + b)$</p>