

Vectors

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Name: _____

Date: _____

At a glance

Column vectors, magnitude, position vectors, routes in diagrams, ratios, parallel vectors and collinear points.

1. Column vectors
2. Magnitude
3. Position vectors
4. Vectors in diagrams

1. Column vectors

☐ I revised this

- A column vector has a top number (x, across) and a bottom number (y, up).
- Add or subtract top with top and bottom with bottom.
- Multiply by a number: multiply both parts. $3 \times (-2, 4) = (-6, 12)$.
- Written $\begin{pmatrix} a \\ b \end{pmatrix}$ (by hand) or $\overrightarrow{AB}$ with an arrow.

Worked example

$a = (3, -2)$ and $b = (-1, 5)$. Find $2a - b$.

1. $2a = (6, -4)$.
 2. $(6 - (-1), -4 - 5)$.
- $(7, -9)$**

2. Magnitude

☐ I revised this

- The magnitude $|a|$ is the length of the vector: Pythagoras on its two parts.

Formulas

$$|(x, y)| = \sqrt{x^2 + y^2}$$

Worked example

Find the magnitude of $(5, -12)$.

1. $\sqrt{(25 + 144)} = \sqrt{169}$.
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3. Position vectors

☐ I revised this

- The position vector of A is $\overrightarrow{OA}$ (from the origin).
- $\overrightarrow{AB} = \overrightarrow{OB} - \overrightarrow{OA} = b - a$.
- Midpoint M of AB has position vector $\frac{1}{2}(a + b)$.

Formulas

$$\overrightarrow{AB} = b - a$$

end minus start

$$\overrightarrow{OM} = \frac{1}{2}(a + b)$$

midpoint

