

4.4.1 Vectors

Name: _____ Class: _____ Date: _____

KEY WORDS resultant

<!-- Session 2 native-skill companion -->

Objective

Practise vectors within the labelled native lessons. Public original tasks; locally authored answer guidance.

1 Key knowledge and worked examples

■ Vectors and transformation geometry · Foundation

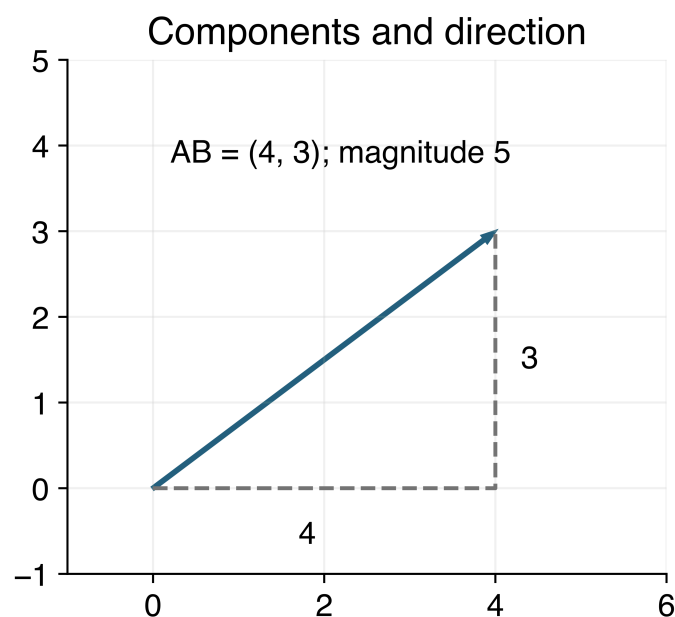
Add corresponding vector components and subtract position vectors to find a displacement. A translation moves every point by the same vector; a scalar multiple changes length and possibly direction.

$$\begin{pmatrix} 4 \\ 1 \end{pmatrix} + \begin{pmatrix} 1 \\ 3 \end{pmatrix} = \begin{pmatrix} 5 \\ 4 \end{pmatrix}$$

With $a=(4,1)$ and $b=(1,3)$, $a+b=(5,4)$ and $2a-b=(7,-1)$. From $A=(1,2)$ to $B=(5,5)$, $AB=(4,3)$ and its length is 5. Write each 2D vector as a column with the horizontal component above the vertical component: the translation AB has top entry 4 and bottom entry 3. A negative horizontal entry moves left; a negative vertical entry moves down. Drawing b from the head of a gives the head-to-tail diagram for $a+b$. Subtracting b adds its opposite $-b$.

The order of subtraction matters: $BA=-AB$. Proving parallelism needs a scalar-multiple relation; a sketch alone is insufficient. Negative enlargement reverses position about its centre.

Draw arrows with direction and identify the starting and ending points. Scalar products, spatial line equations and advanced angle calculations are excluded from this Foundation/Core lesson.



Original native-lesson illustration; labels belong to its worked example.

2 Practice

2.1 (Foundation) Find the x-component of $(4,1)+(1,3)$.

2.2 (Foundation) Find the magnitude of $(4,3)$.

2.3 (Foundation) Find the y-component of $(4,1)+(1,3)$.

3 Exam-style questions

3.1 Decide whether this claim is true. Justify with a concrete calculation or counterexample: $\mathbf{AB}$ and $\mathbf{BA}$ always have the same components.

Solutions

2.1 Add the x-components: $4+1=5$.

2.2 Magnitude= $\sqrt{4^2+3^2}=5$.

2.3 Add the y-components: $1+3=4$.

3.1 False. $A=(1,2)$, $B=(5,5)$ give $AB=(4,3)$ and $BA=(-4,-3)$. Reversing direction negates the vector.

Local review guidance: show the chosen method; give the checked result; explain the condition or failed shortcut. This is authored classroom guidance.