EXAM PAPERS PRACTICE

# GCSE AQA Maths 8300

## Vectors

## Answers

*"We will help you to achieve A Star "*

**Answer 1**

VECTORS

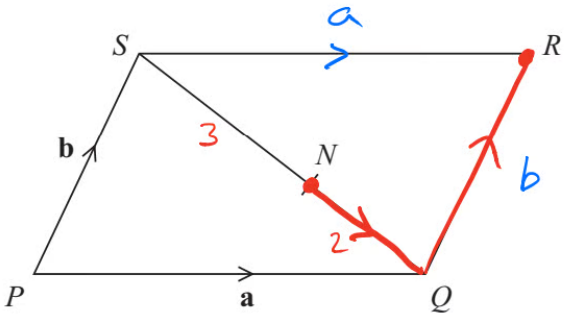



Diagram **NOT** accurately drawn

$PQRS$ is a parallelogram.
$N$ is the point on $SQ$ such that $SN : NQ = 3 : 2$

TOTAL = 5

$\overrightarrow{NQ} = \frac{2}{5}\overrightarrow{SQ}$

$\overrightarrow{PQ} = \mathbf{a}$
$\overrightarrow{PS} = \mathbf{b}$

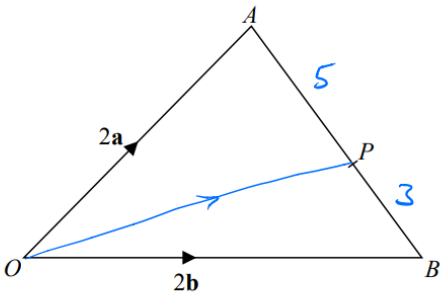
(a) Write down, in terms of **a** and **b**, an expression for $\overrightarrow{SQ}$.

$\overrightarrow{SQ} = \overrightarrow{SP} + \overrightarrow{PQ} = -b + a$

$\overrightarrow{SQ} =$ a − b

**Answer 2**

VECTORS




*OAB* is a triangle.
*P* is the point on *AB* such that $AP : PB = 5 : 3$ → $\overrightarrow{AP} = \frac{5}{8} \times \overrightarrow{AB}$

$\overrightarrow{OA} = \mathbf{2a}$

$\overrightarrow{OB} = \mathbf{2b}$

$\overrightarrow{OP} = k(\mathbf{3a} + \mathbf{5b})$ where $k$ is a scalar quantity.

Find the value of $k$.

↓ NUMBER

$$\overrightarrow{OP} = \overrightarrow{OA} + \overrightarrow{AP}$$

$$= 2a + \frac{5}{8} \times \overrightarrow{AB}$$

$$= 2a + \frac{5}{8} \times (\overrightarrow{AO} + \overrightarrow{OB})$$

$$= 2a + \frac{5}{8} \times (-2a + 2b)$$

$$= 2a - \frac{10}{8_4}a + \frac{10}{8_4}b$$

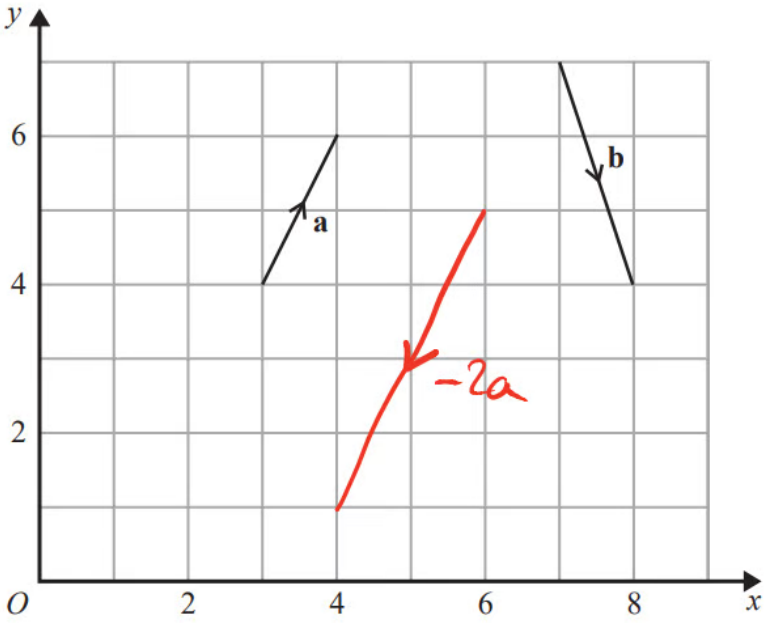
$$2 - \frac{5}{4}$$
$$= \frac{8}{4} - \frac{5}{4}$$
$$= \frac{3}{4}$$

$$\overrightarrow{OP} = \frac{3}{4}a + \frac{5}{4}b$$

$$= \frac{1}{4}(3a + 5b) \Rightarrow k = \frac{1}{4}$$

**Answer 3**

The vector **a** and the vector **b** are shown on the grid.




(a) On the grid, draw and label vector $-2\mathbf{a}$

TWICE AS LONG BUT IN OPPOSITE DIRECTION

**Answer 4**

$\overrightarrow{NQ} = \frac{2}{5}\overrightarrow{SQ}$

(b) Express $\overrightarrow{NR}$ in terms of **a** and **b**.

$\overrightarrow{NR} = \overrightarrow{NQ} + \overrightarrow{QR}$

$= \frac{2}{5}(a - b) + b$

$= \frac{2}{5}a - \frac{2}{5}b + b$

$= \frac{2}{5}a + \frac{3}{5}b$

**Answer 5**

$P$ is the point on $AB$ such that $AP : PB = 3 : 1$

(b) Find $\overrightarrow{OP}$ in terms of **a** and **b**.
Give your answer in its simplest form.

$$\overrightarrow{OP} = \overrightarrow{OA} + \overrightarrow{AP}$$

$$= \overrightarrow{OA} + \frac{3}{4} \times \overrightarrow{AB}$$

$$= a + \frac{3}{4}(b - a)$$

$$= a + \frac{3}{4}b - \frac{3}{4}a$$

$$= \frac{1}{4}a + \frac{3}{4}b$$

$$= \frac{1}{4}(a + 3b)$$

**Answer 6**

VECTORS

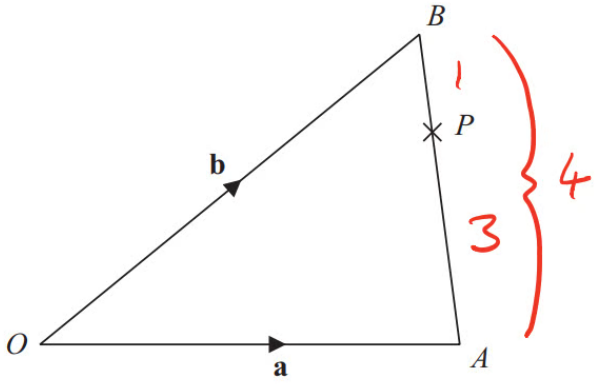



Diagram **NOT** accurately drawn

$\overrightarrow{AP} = \frac{3}{4} \times \overrightarrow{AB}$

$OAB$ is a triangle.

$\overrightarrow{OA} = \mathbf{a}$

$\overrightarrow{OB} = \mathbf{b}$

(a) Find $\overrightarrow{AB}$ in terms of **a** and **b**.

$\overrightarrow{AB} = \overrightarrow{AO} + \overrightarrow{OB}$

$= -a + b$

$b - a$

**Answer 7**

(b) Work out $\mathbf{a} + 2\mathbf{b}$ as a column vector.

$$\mathbf{a} + 2\mathbf{b} = \begin{pmatrix} 1 \\ 2 \end{pmatrix} + 2\begin{pmatrix} 1 \\ -3 \end{pmatrix}$$

$$= \begin{pmatrix} 1 + 2\times 1 \\ 2 + 2\times(-3) \end{pmatrix}$$

$$= \begin{pmatrix} 3 \\ -4 \end{pmatrix}$$