

VECTORS: BETWEEN TWO POINTS

GRADE 8

Examination Practice Questions

You should have:

A ruler, protractor, compasses, a pen, pencil, eraser, calculator.
For some questions, you may need tracing paper.

Instructions

- Use **black** ink or ball-point pen.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- **Calculators may be used.**

Information

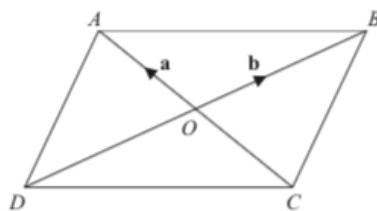
- The marks for each question are shown in brackets.
- Use the number of marks for each question as a guide as to how much time to spend on each question. As a rough guide, you can multiply the number of marks by 1.2 to see how many minutes you should spend on a question.
- Questions been carefully compiled from or modelled on a variety of past papers and will generally get more challenging as the document progresses. Some of the later questions will go beyond the core grade level for this topic.

Advice

- Read each question carefully before you start to answer it.
- Don't forget to have fun.
- Check your answers at the end.

Q1.

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$ABCD$ is a parallelogram.

The diagonals of the parallelogram intersect at O .

$$\vec{OA} = a \text{ and } \vec{OB} = b$$

Find, in terms of b , the vector $\vec{DB}$

.....
(1 mark)

Q2.

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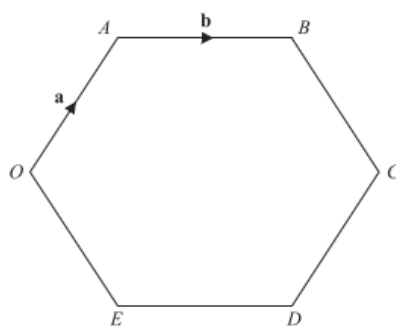


Diagram NOT
accurately drawn

Figure 3

Figure 3 shows the regular hexagon $OABCDE$ with

$$\vec{OA} = a \text{ and } \vec{AB} = b$$

Find $\vec{OB}$ in terms of a and b

.....
(1 mark)

Q3.

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The diagram shows quadrilateral $OABC$.
 $OA = 5x$, $OB = 12x + 6y$ and $OC = 8y$.

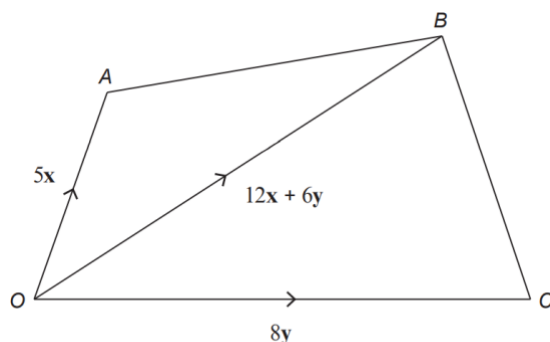


Diagram not drawn to scale

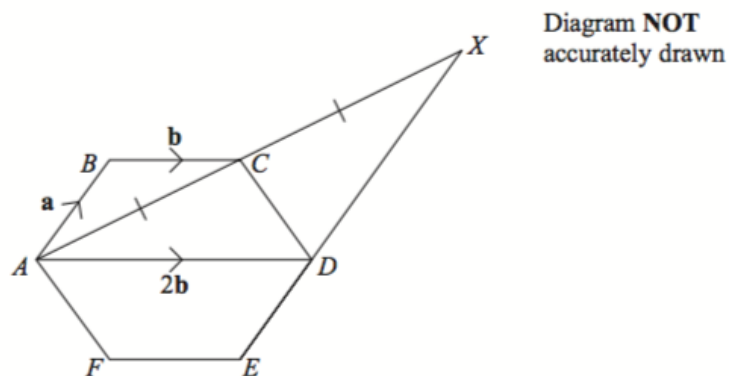
Express CA in terms of x and y .

.....

(1 mark)

Q4.

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ABCDEF is a regular hexagon.

$$\overrightarrow{AB} = a \quad \overrightarrow{BC} = b \quad \overrightarrow{AD} = 2b$$

Find the vector $\overrightarrow{AC}$ in terms of a and b .

.....

(1 mark)

Q5.

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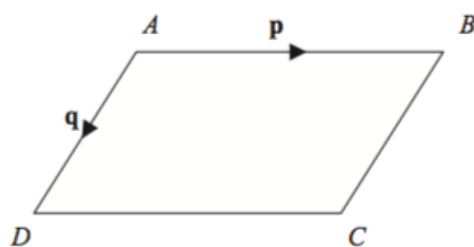


Diagram **NOT**
accurately drawn

$ABCD$ is a parallelogram.

AB is parallel to DC .

AD is parallel to BC .

$$\overrightarrow{AB} = p \quad \overrightarrow{AD} = q$$

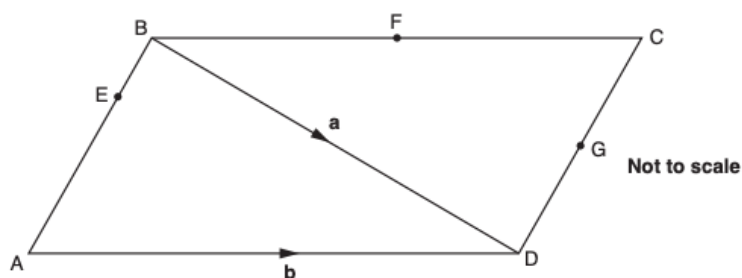
Express $\overrightarrow{AC}$ in terms of p and q .

.....
(1 mark)

Q6.

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$ABCD$ is a parallelogram.



$$\overrightarrow{BD} = a \text{ and } \overrightarrow{AD} = b.$$

F is the midpoint of BC .

G is the midpoint of DC .

$$AE = 3EB.$$

Write down a simplified expression in terms of a and b for $\overrightarrow{AB}$.

.....
(1 mark)

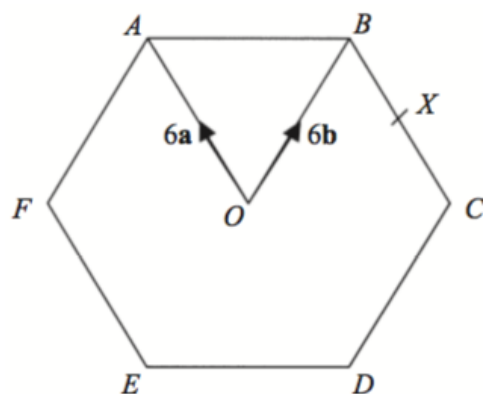


Diagram **NOT**
accurately drawn

The diagram shows a regular hexagon $ABCDEF$ with centre O .

$$\overrightarrow{OA} = 6a \quad \overrightarrow{OB} = 6b$$

Express in terms of a and/or b the vector $\overrightarrow{EF}$.

.....
(1 mark)

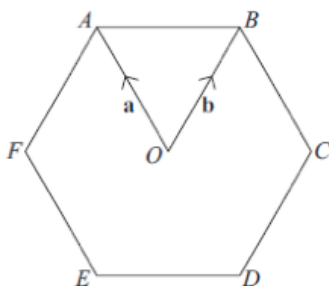


Diagram **NOT**
accurately drawn

$ABCDEF$ is a regular hexagon, with centre O .

$$\overrightarrow{OA} = a \quad \overrightarrow{OB} = b$$

Write the vector $\overrightarrow{AB}$ in terms of a and b .

.....
(1 mark)

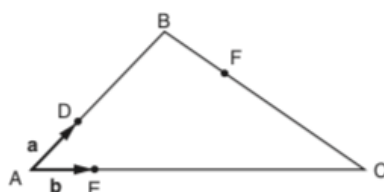
Q9.

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In the diagram below, ABC is a triangle.

$\overrightarrow{AD} = a$ and $\overrightarrow{AE} = b$

- D is a point on AB such that $AB = 4AD$
- E is a point on AC such that $AC = 4AE$
- F is a point on BC such that $BC = 4BF$



Not to scale

Write the vector $\overrightarrow{AB}$ in terms of a and b in their simplest form.

.....
(1 mark)

Q10.

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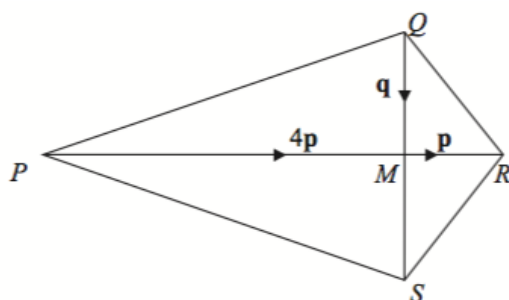


Diagram NOT
accurately drawn

PQRS is a kite.

The diagonals PR and QS intersect at M.

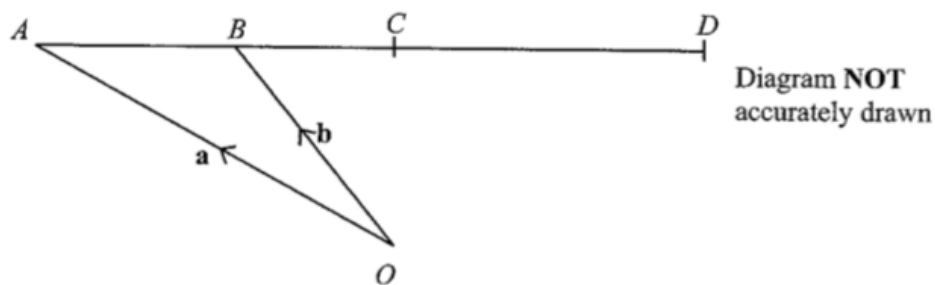
$$\overrightarrow{PM} = 4p \quad \overrightarrow{QM} = q \quad \overrightarrow{MR} = p \quad \overrightarrow{QM} = \overrightarrow{MS}$$

Find an expression, in terms of p and/or q for $\overrightarrow{QS}$

.....
(1 mark)

Q11.

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O is a point so that $\overrightarrow{OA} = a$ and $\overrightarrow{OB} = b$.

B is the midpoint of AC .

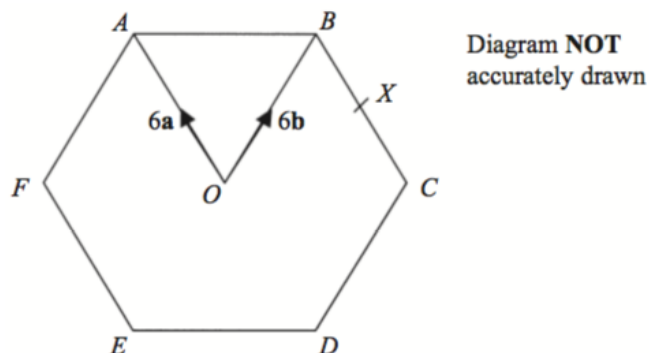
C is the midpoint of AD .

Express, in terms of a and b , the vector $\overrightarrow{AC}$

.....
(1 mark)

Q12.

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The diagram shows a regular hexagon $ABCDEF$ with centre O .

$$\overrightarrow{OA} = 6a \quad \overrightarrow{OB} = 6b$$

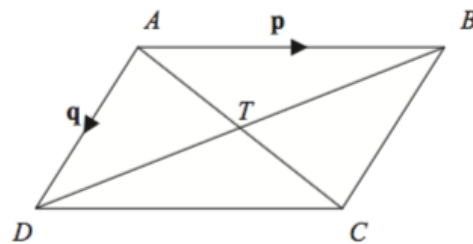
X is the midpoint of BC .

Express $\overrightarrow{EX}$ in terms of a and/or b .

.....
(1 mark)

Q13.

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Diagram NOT
accurately drawn $ABCD$ is a parallelogram. AB is parallel to DC . AD is parallel to BC .

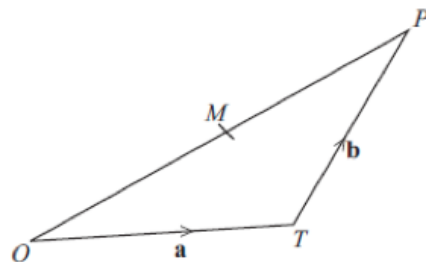
$$\overrightarrow{AB} = p \quad \overrightarrow{AD} = q$$

AC and BD are diagonals of parallelogram $ABCD$.
 AC and BD intersect at T .

Express $\overrightarrow{AT}$ in terms of p and q
(1 mark)

Q14.

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Diagram NOT
accurately drawn

OPT is a triangle.
 M is the midpoint of OP .

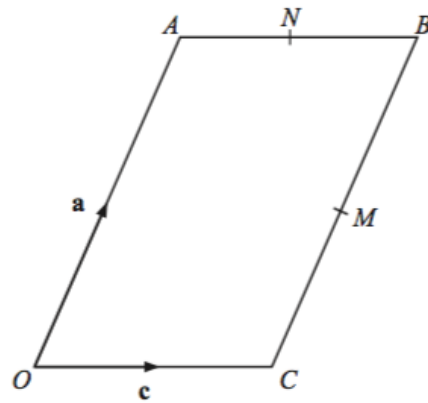
$$\overrightarrow{OT} = a \quad \overrightarrow{TP} = b$$

Express $\overrightarrow{TM}$ in terms of a and b .
 Give your answer in its simplest form.

.....
(2 marks)

Q15.

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Diagram **NOT**
accurately drawn

OABC is a parallelogram.

M is the midpoint of CB. N is the midpoint of AB.

$$\overrightarrow{OA} = a \quad \overrightarrow{OC} = c$$

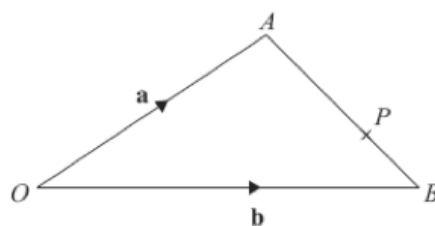
Find, in terms of a and/or c , the vector $\overrightarrow{MN}$

.....

(1 mark)

Q16.

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Diagram **NOT**
accurately drawn

OAB is a triangle.

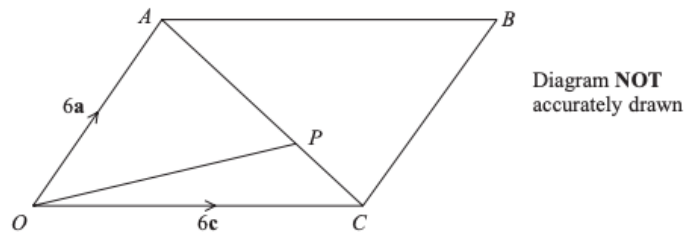
$$\overrightarrow{OA} = a, \quad \overrightarrow{OB} = b$$

P is the point on AB so that $AP:PB = 2:1$

Find the vector OP in terms of a and b . Give your answer in its simplest form.

.....

(3 marks)



$OABC$ is a parallelogram.

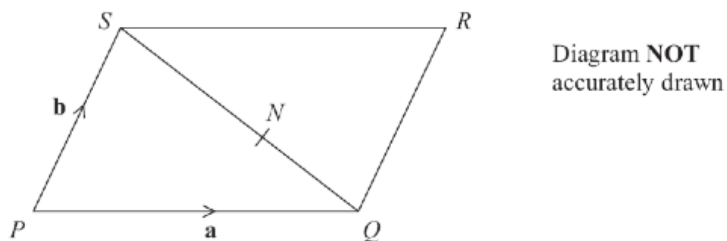
P is the point on AC such that $AP = \frac{2}{3}AC$.

$$\overrightarrow{OA} = 6a \quad \overrightarrow{OC} = 6c$$

Find the vector $\overrightarrow{OP}$.

Give your answer in terms of a and c .

.....
(3 marks)



$PQRS$ is a parallelogram.

N is the point on SQ such that $SN : NQ = 3 : 2$

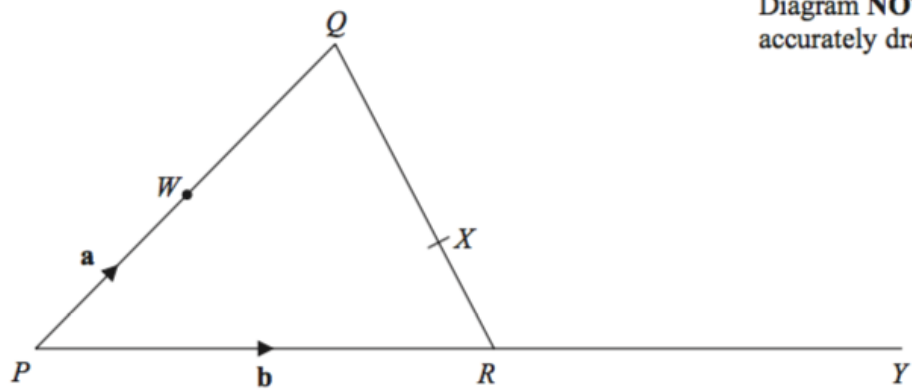
$$\overrightarrow{PQ} = a \quad \overrightarrow{PS} = b$$

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

.....
(3 marks)

Q19.

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Diagram NOT
accurately drawn

PQR is a triangle. The midpoint of PQ is W . PRY is a straight line.
 X is the point on QR such that $QX : XR = 2 : 1$

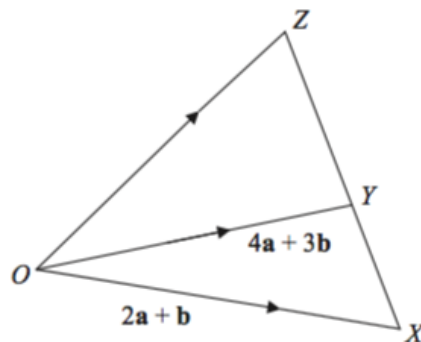
$$\overrightarrow{PW} = \mathbf{a} \text{ and } \overrightarrow{PR} = \mathbf{b}$$

Find $\overrightarrow{WX}$ in terms of $\mathbf{a}$ and $\mathbf{b}$.

.....
(1 mark)

Q20.

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$$\overrightarrow{OX} = 2\mathbf{a} + \mathbf{b} \quad \overrightarrow{OY} = 4\mathbf{a} + 3\mathbf{b}$$

XYZ is a straight line. $XY : YZ = 2 : 3$

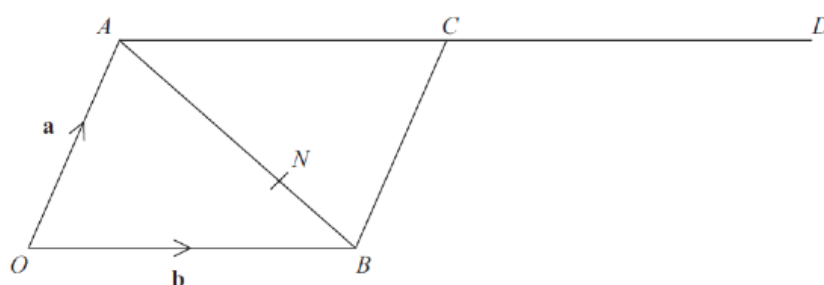
Express the vector $\overrightarrow{OZ}$ in terms of $\mathbf{a}$ and $\mathbf{b}$. Give your answer in its simplest form.

.....
(3 marks)

Q21.

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$OACB$ is a parallelogram.



$$\overrightarrow{OA} = \mathbf{a} \text{ and } \overrightarrow{OB} = \mathbf{b}$$

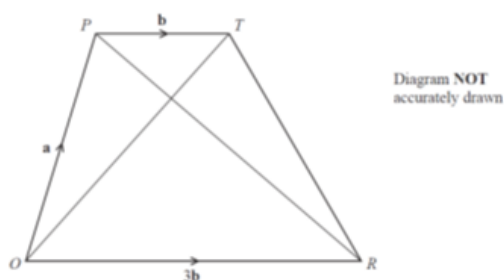
D is the point such that $\overrightarrow{AC} = \overrightarrow{CD}$. The point N divides AB in the ratio $2 : 1$.

Write an expression for $\overrightarrow{ON}$ in terms of $\mathbf{a}$ and $\mathbf{b}$.

.....
(3 marks)

Q22.

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$OPTR$ is a trapezium.

$$\overrightarrow{OP} = \mathbf{a} \quad \overrightarrow{PT} = \mathbf{b} \quad \overrightarrow{OR} = 3\mathbf{b}$$

S is the point on PR such that $PS : SR = 1 : 3$

Find $\overrightarrow{OS}$ in terms of $\mathbf{a}$ and $\mathbf{b}$.

Give your answer in its simplest form.

.....
(2 marks)

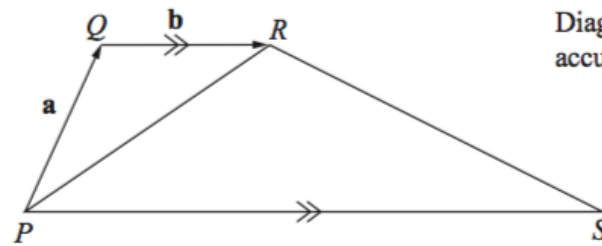


Diagram **NOT**
accurately drawn

The diagram shows a trapezium PQRS.

PS is parallel to QR.

PS = 4QR.

$$\overrightarrow{PQ} = a \quad \overrightarrow{QR} = b$$

The point T lies on the line PR such that $PT:TR = 4:1$

Given that $\overrightarrow{TS} = k\overrightarrow{QT}$, find the value of k .

.....
(3 marks)