Q1.

In triangle *ABC*

M is the midpoint of *AC*

N is the point on *BC* where *BN* : *NC* = 2 : 3

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

$\overrightarrow{AB} = 3\mathbf{b}$

Not drawn accurately

C

M

N

A

B
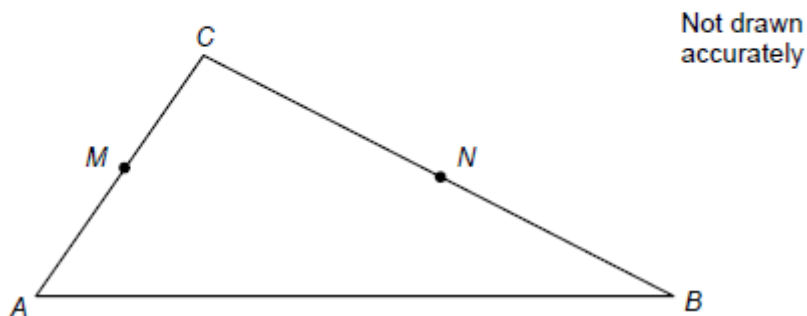
(a)   Work out $\overrightarrow{MN}$ in terms of **a** and **b**.

Give your answer in its simplest form.

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Answer ....

(3)

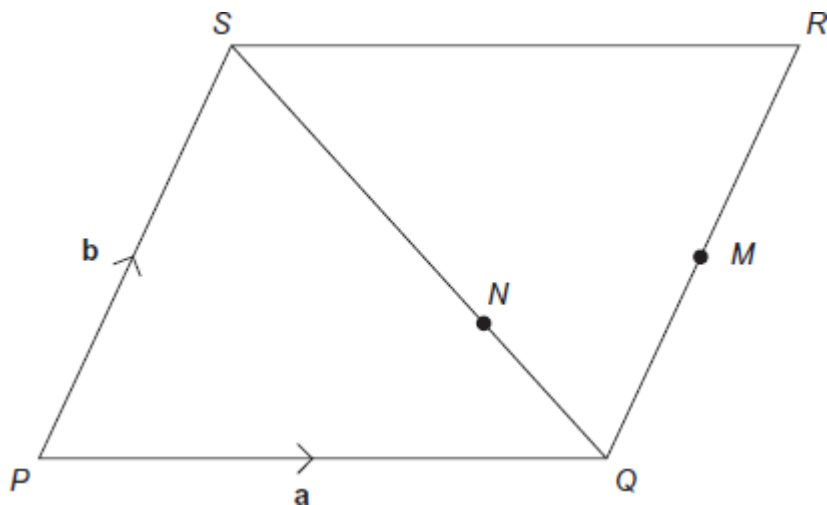(b)   Use your answer to part (a) to explain why *MN* is **not** parallel to *AB*.

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(1)
(Total 4 marks)

Q2.

PQRS is a parallelogram.
M is the midpoint of *QR*.
QN : NS = 1 : 2

$\overrightarrow{PQ}$ = **a**

$\overrightarrow{PS}$ = **b**

(a)   Write the vector $\overrightarrow{PM}$ in terms of **a** and **b**.

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Answer ....

(1)

(b)   Prove that *PNM* is a straight line.

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(4)
(Total 5 marks)

Q3.

Not drawn accurately
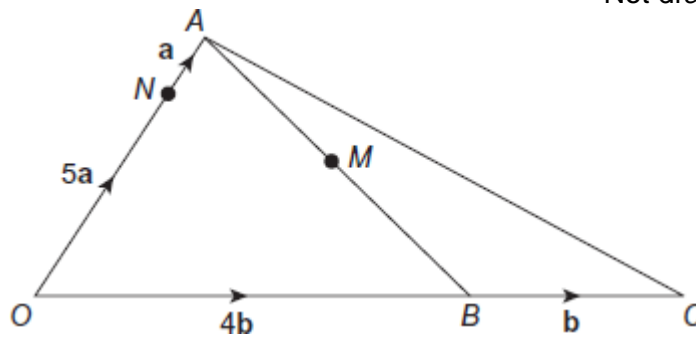
$\overrightarrow{ON}$ = 5**a** $\overrightarrow{NA}$ = **a**

$\overrightarrow{OB}$ = 4**b** $\overrightarrow{BC}$ = **b**

M is the midpoint of *AB*.

(a)   Show that $\overrightarrow{NM}$ = 2(**b** − **a**)

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(2)

(b)   Work out the ratio   *NM* : *NC*

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Answer .... : ....

(2)
(Total 4 marks)

Q4. *ABCDE* is a pentagon.
M is the midpoint of *BC*.
N is the midpoint of *CD*.
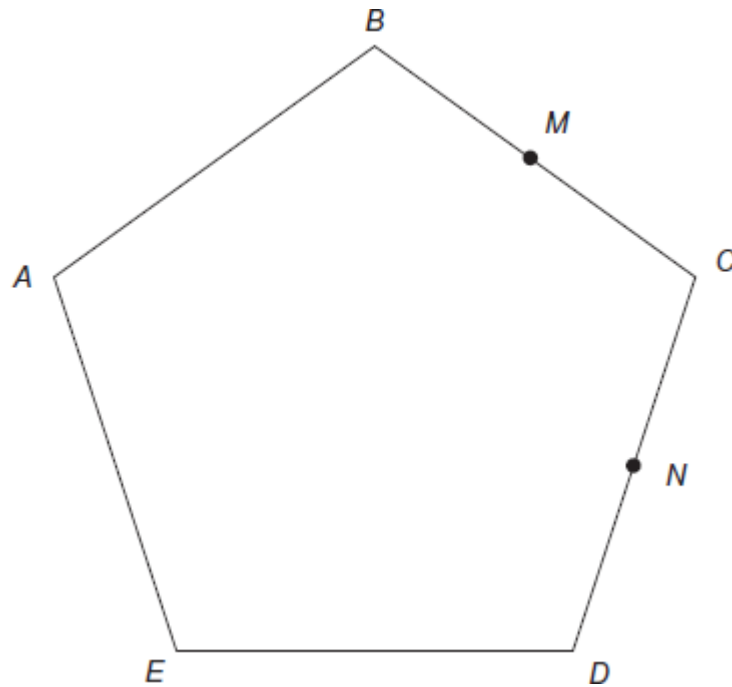
$\overrightarrow{BC} = x$

$\overrightarrow{CD} = y$

(a)   Show that *MN* is parallel to *BD*.

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(3)

(b)   Write down the ratio *BD* : *MN* in its simplest form.

Answer   .... : ....

(1)
(Total 4 marks)

Q5.
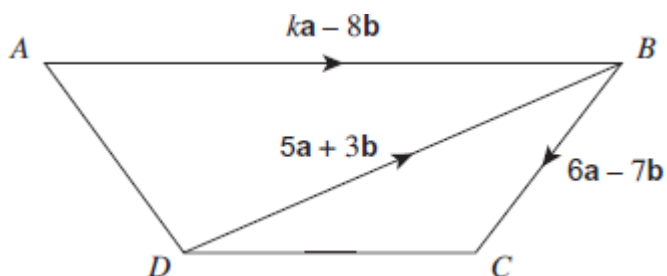
(a)   Work out $\overrightarrow{DC}$ in terms of **a** and **b**.
Simplify your answer.

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Answer ....

(2)

(b)   *ABCD* is a trapezium.

Work out the value of k.

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Answer ....

(1)
(Total 3 marks)

Q6.

(a)   *WXYZ* is a quadrilateral.

$\overrightarrow{WZ} = $ r and $\overrightarrow{XY} = $ r

Not drawn accurately
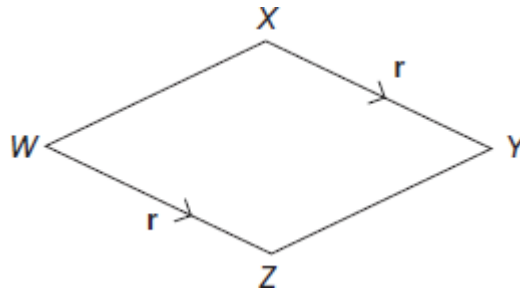
Explain why *WXYZ* must be a parallelogram.

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(1)

(b)   *O, A, B* and *C* are four points.

$\overrightarrow{OA} = $ a, $\overrightarrow{OB} = $ b and $\overrightarrow{OC} = $ c

Not drawn accurately
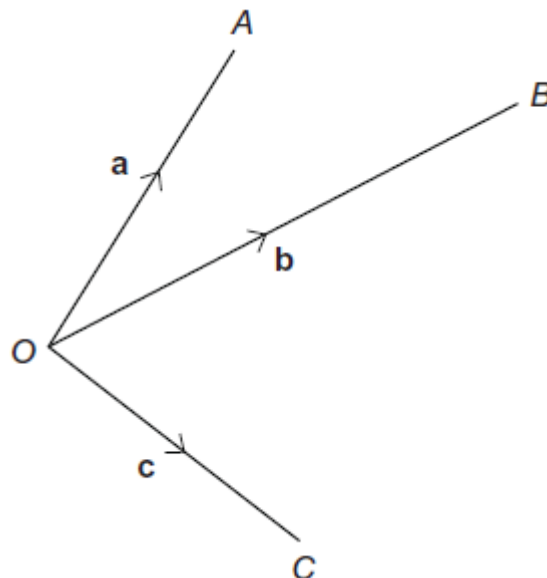
The vector $\overrightarrow{AC} = \mathbf{c} - \mathbf{a}$

Write down the vector $\overrightarrow{CB}$ in terms of $\mathbf{b}$ and $\mathbf{c}$.

Answer ....

(1)

(c) The four points O, A, B and C are joined as shown.
L, M, N and P are the midpoints of OA, OB, CB and AC respectively.

Not drawn accurately
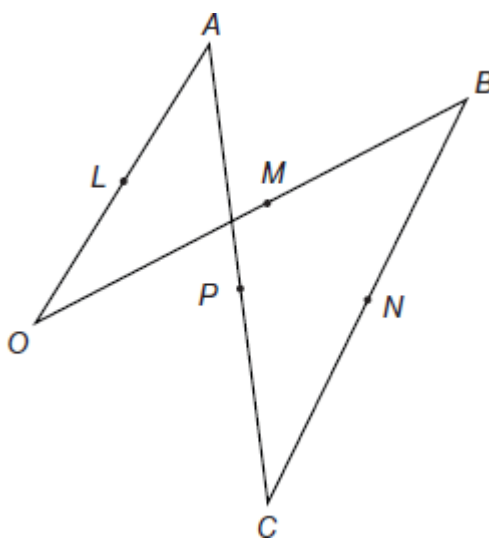
Show that $\overrightarrow{LP} = \frac{1}{2}\mathbf{c}$

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(2)

(d) Prove that $LMNP$ is a parallelogram.

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(2)
(Total 6 marks)