

Non-Calculator

Q1.

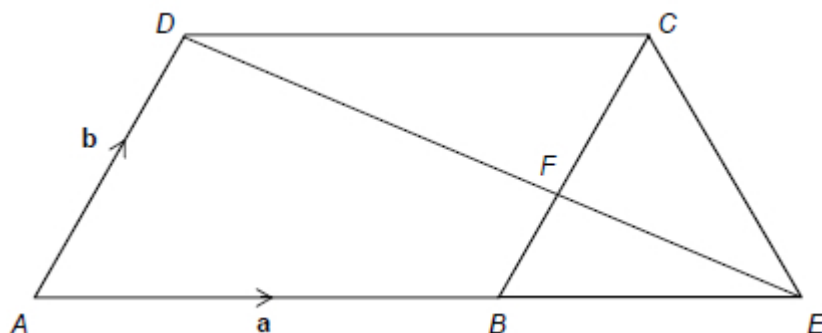
$ABCD$ is a parallelogram.

ABE is a straight line and $AB : BE = 3 : 2$

BC and ED intersect at F .

$$\vec{AB} = \mathbf{a} \quad \text{and} \quad \vec{AD} = \mathbf{b}$$

Not drawn accurately



- (a) Work out \vec{ED} in terms of \mathbf{a} and \mathbf{b} .

Give your answer in its simplest form.

Answer _____

(3)

- (b) Deduce \vec{EF} in terms of \mathbf{a} and \mathbf{b} .

Answer _____

(2)

(Total 5 marks)

Q2.

In triangle OAB

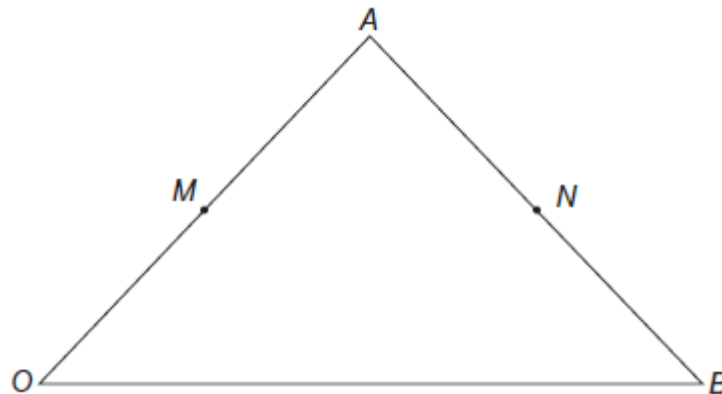
M is the midpoint of OA .

N is the midpoint of AB .

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

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

Not drawn accurately



- (a) Write down \vec{AB} in terms of \mathbf{a} and \mathbf{b} .

Answer _____

(1)

- (b) Show that $\vec{MN} = \mathbf{b}$

(2)

- (c) Explain why triangles AMN and AOB are similar.

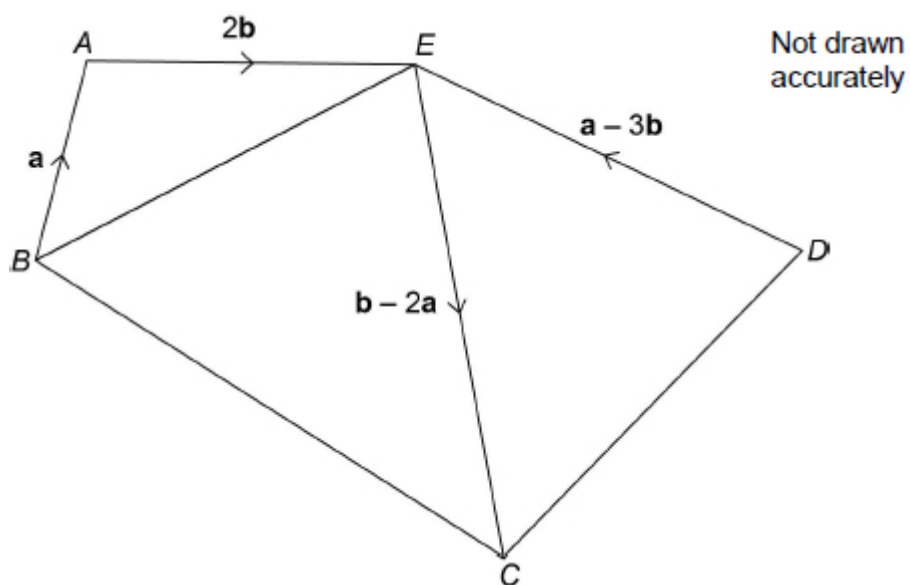
(2)

(Total 5 marks)

Calculator

Q3.

$ABCDE$ is a pentagon.



Show that $BCDE$ is a parallelogram.

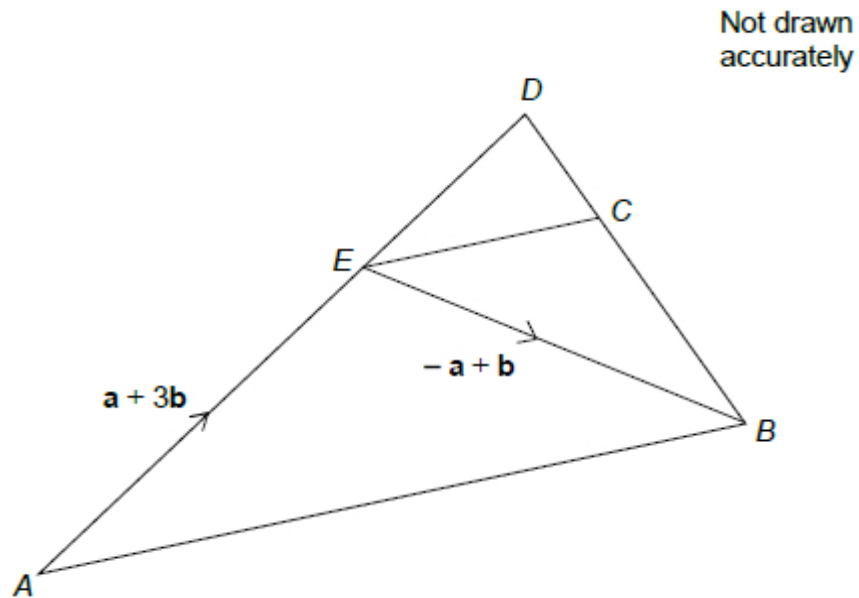
(Total 3 marks)

Q4.

AED is a straight line.

$$\vec{AE} = \mathbf{a} + 3\mathbf{b}$$

$$\vec{EB} = -\mathbf{a} + \mathbf{b}$$



- (a) Work out the vector \vec{AB}

Answer _____

(1)

- (b) Also $\vec{ED} = \frac{1}{3} \vec{AE}$ and $\vec{DC} = -\frac{1}{3} \mathbf{a}$

Prove that EC is parallel to AB .

(3)

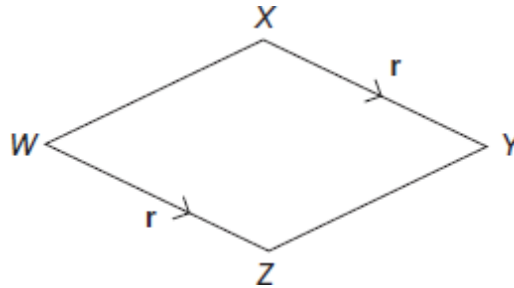
(Total 4 marks)

Q5.

(a) $WXYZ$ is a quadrilateral.

$$\vec{WZ} = \mathbf{r} \text{ and } \vec{XY} = \mathbf{r}$$

Not drawn accurately



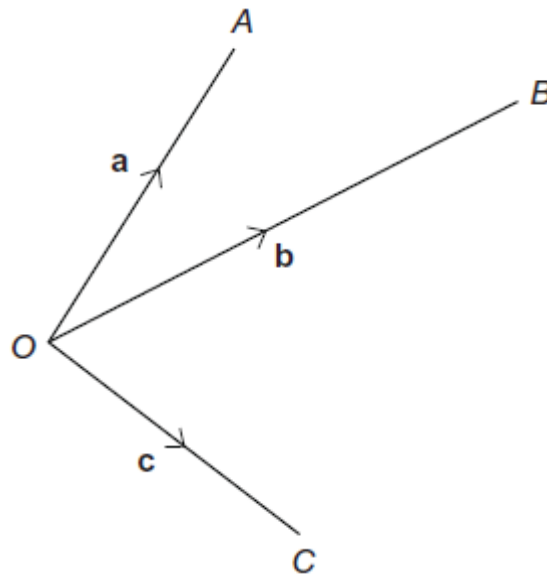
Explain why $WXYZ$ must be a parallelogram.

(1)

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

$$\vec{OA} = \mathbf{a}, \vec{OB} = \mathbf{b} \text{ and } \vec{OC} = \mathbf{c}$$

Not drawn accurately



The vector $\vec{AC} = \mathbf{c} - \mathbf{a}$

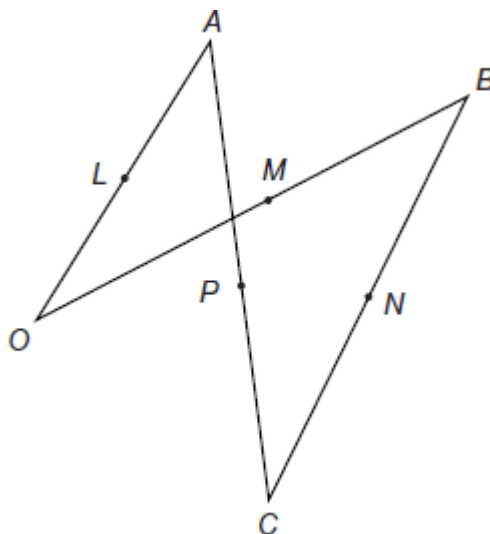
Write down the vector \vec{CB} in terms of \mathbf{b} and \mathbf{c} .

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 $\vec{LP} = \frac{1}{2} \mathbf{c}$

(2)

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

(2)

(Total 6 marks)

Q6.

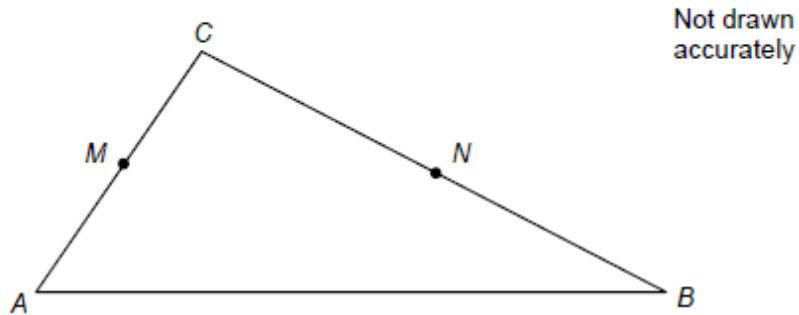
In triangle ABC

M is the midpoint of AC

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

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

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



- (a) Work out \vec{MN} in terms of \mathbf{a} and \mathbf{b} .

Give your answer in its simplest form.

Answer _____

(3)

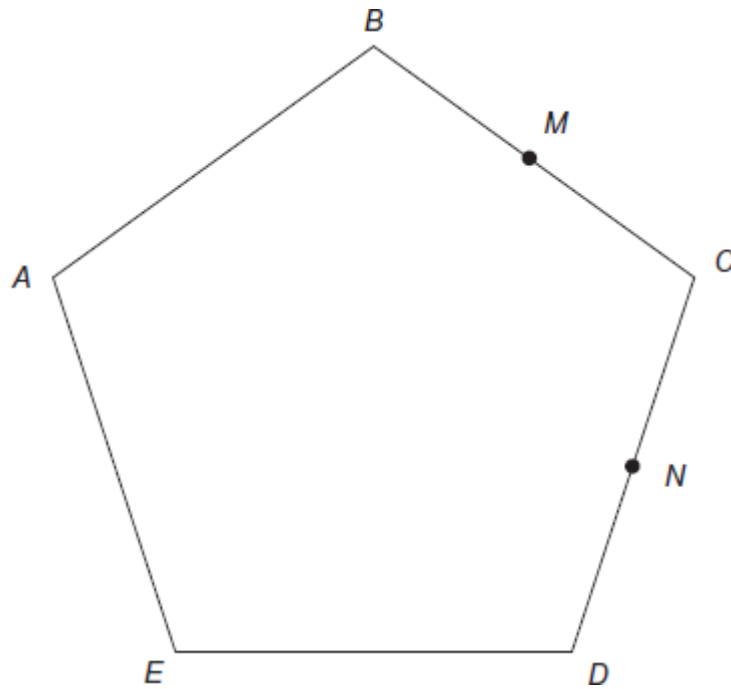
- (b) Use your answer to part (a) to explain why MN is **not** parallel to AB .

(1)

(Total 4 marks)

Q7.

$ABCDE$ is a pentagon.
 M is the midpoint of BC .
 N is the midpoint of CD .



$$\vec{BC} = x$$

$$\vec{CD} = y$$

(a) Show that MN is parallel to BD .

(3)

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

Answer _____ : _____

(1)

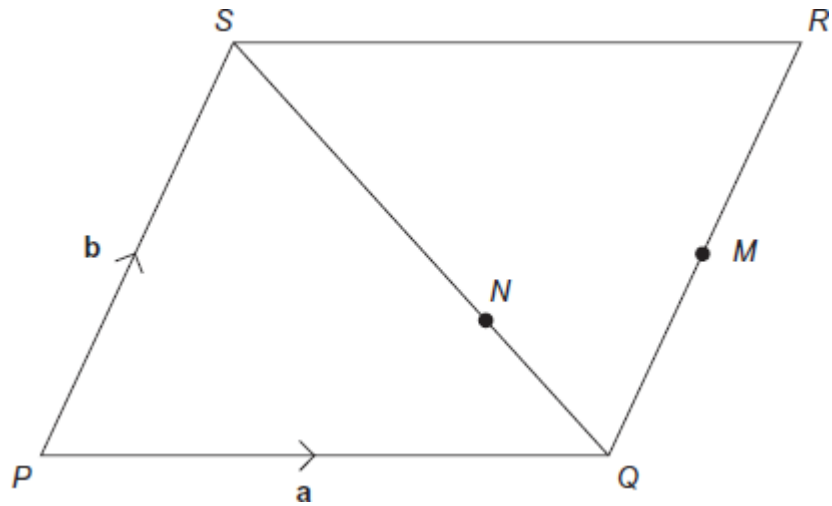
(Total 4 marks)

Q8.

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

$$\vec{PQ} = \mathbf{a}$$

$$\vec{PS} = \mathbf{b}$$



- (a) Write the vector \vec{PM} in terms of \mathbf{a} and \mathbf{b} .

Answer _____

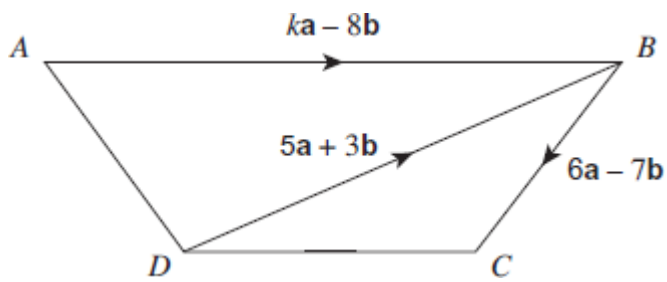
(1)

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

(4)

(Total 5 marks)

Q9.



- (a) Work out \vec{DC} in terms of **a** and **b**.
Simplify your answer.

Answer _____

(2)

- (b) $ABCD$ is a trapezium.

Work out the value of k .

Answer _____

(1)

(Total 3 marks)