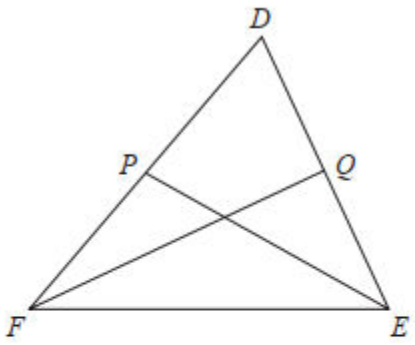
VECTORS

Pearson Edexcel – Tuesday 19 May 2020 - Paper 1 (Non-Calculator) Higher Tier

1.

21 DEF is a triangle.



P is the midpoint of FD.
Q is the midpoint of DE.

$\overrightarrow{FD} = \mathbf{a}$ and $\overrightarrow{FE} = \mathbf{b}$

Use a vector method to prove that PQ is parallel to FE.

(Total for Question 21 is 4 marks)

Pearson Edexcel – Thursday 4 June 2020 - Paper 2 (Calculator) Higher Tier

2.

6 $\mathbf{a} = \begin{pmatrix} 3 \\ 4 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} 5 \\ -2 \end{pmatrix}$

Find $2\mathbf{a} - 3\mathbf{b}$ as a column vector.

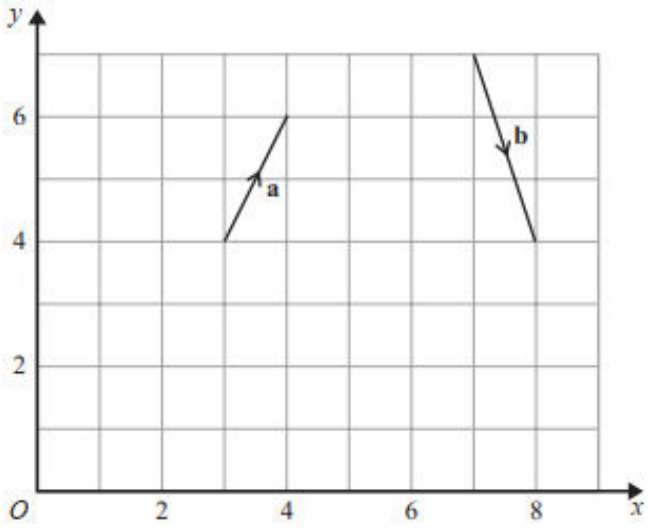
$\begin{pmatrix} \ldots\ldots \\ \ldots\ldots \end{pmatrix}$

(Total for Question 6 is 2 marks)

Pearson Edexcel - Thursday 7 June 2018 - Paper 2 (Calculator) Higher Tier

3.

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



(a) On the grid, draw and label vector **–2a**

(1)

(b) Work out **a** + 2**b** as a column vector.

$$\begin{pmatrix} \cdots\cdots \\ \cdots\cdots \end{pmatrix}$$

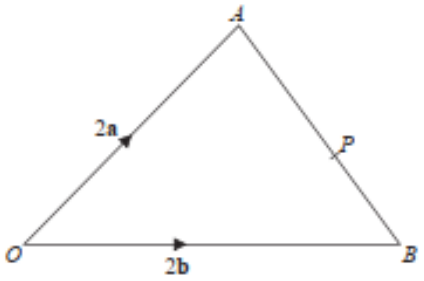
(2)

(Total for Question 10 is 3 marks)

Pearson Edexcel - Specimen Papers Set 2 - Paper 3 (Calculator) Higher Tier

4.

20



OAB is a triangle.
P is the point on AB such that $AP : PB = 5 : 3$

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

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

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

Find the value of k.

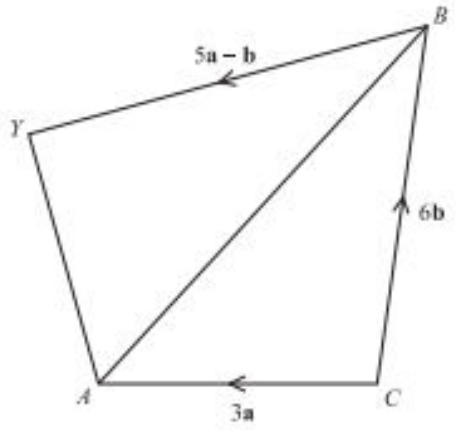
.....

(Total for Question 20 is 4 marks)

Pearson Edexcel - Specimen Papers Set 1 - Paper 1 (Non-Calculator) Higher Tier

5.

22



$CAYB$ is a quadrilateral.

$\overrightarrow{CA} = 3\mathbf{a}$
$\overrightarrow{CB} = 6\mathbf{b}$
$\overrightarrow{BY} = 5\mathbf{a} - \mathbf{b}$

X is the point on AB such that $AX : XB = 1 : 2$

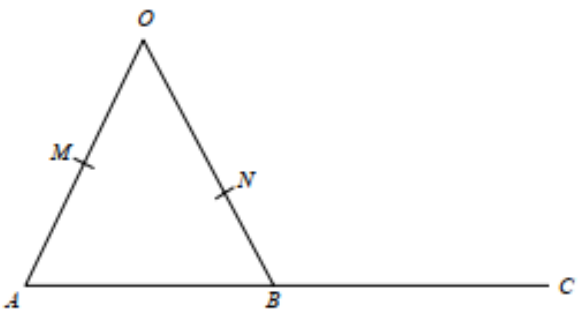
Prove that $\overrightarrow{CX} = \frac{2}{5}\overrightarrow{CY}$

(Total for Question 22 is 5 marks)

Pearson Edexcel - Sample Paper 3 - (Calculator) Higher Tier

6.

18



OMA, *ONB* and *ABC* are straight lines.
M is the midpoint of *OA*.
B is the midpoint of *AC*.
$\overrightarrow{OA} = 6\mathbf{a}$ $\overrightarrow{OB} = 6\mathbf{b}$ $\overrightarrow{ON} = k\mathbf{b}$ where *k* is a scalar quantity.

Given that *MNC* is a straight line, find the value of *k*.

(Total for Question 18 is 5 marks)

Pearson Edexcel - Thursday 26 May 2016 - Paper 1 (Non-Calculator) Higher Tier

7.

23

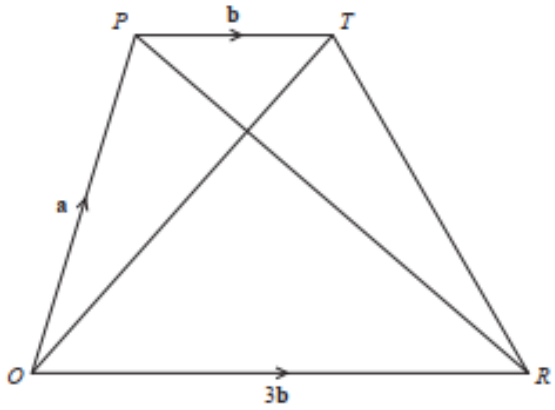


Diagram **NOT** accurately drawn

OPTR is a trapezium.

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

(a) (i) Find $\overrightarrow{OT}$ in terms of **a** and **b**

.....

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

.....

(2)

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

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

.....

(2)

*(c) What does your answer to part (b) tell you about the position of point S?

.....

.....

.....

.....

(2)

(Total for Question 23 is 6 marks)

Pearson Edexcel - Monday 8 June 2015 - Paper 2 (Calculator) Higher Tier

8.

27

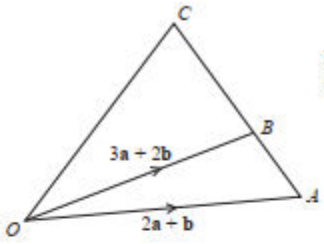


Diagram **NOT** accurately drawn

ABC is a straight line.

$AB : BC = 2 : 5$

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

$\overrightarrow{OB} = 3\mathbf{a} + 2\mathbf{b}$

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

.....

(Total for Question 27 is 4 marks)

Pearson Edexcel - Monday 9 June 2014 - Paper 1 (Non-Calculator) Higher Tier

9.

*24

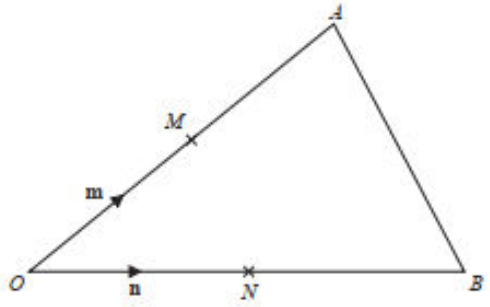


Diagram **NOT** accurately drawn

OAB is a triangle.
M is the midpoint of *OA*.
N is the midpoint of *OB*.

$\overrightarrow{OM} = \mathbf{m}$

$\overrightarrow{ON} = \mathbf{n}$

Show that *AB* is parallel to *MN*.

(Total for Question 24 is 3 marks)

Pearson Edexcel - Wednesday 6 November 2013 - Paper 1 (Non-Calculator) Higher Tier

10.

24 $OACB$ is a parallelogram.

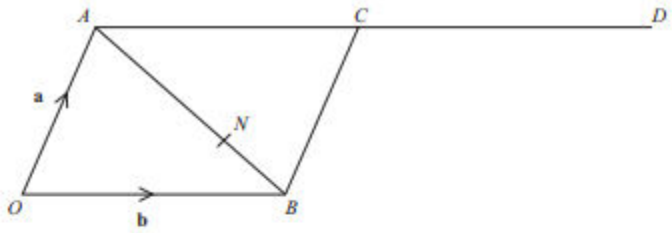


Diagram **NOT** accurately drawn

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

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

.....

(3)

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

(3)

(Total for Question 24 is 6 marks)

Pearson Edexcel - Tuesday 11 June 2013 - Paper 1 (Non-Calculator) Higher Tier

11.

27

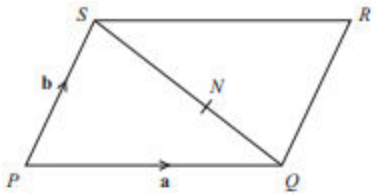


Diagram **NOT** accurately drawn

$PQRS$ is a parallelogram.
N is the point on SQ such that $SN : NQ = 3 : 2$
$\overrightarrow{PQ} = \mathbf{a}$
$\overrightarrow{PS} = \mathbf{b}$

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

$\overrightarrow{SQ} =$ .....

(1)

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

$\overrightarrow{NR} =$ .....

(3)

(Total for Question 27 is 4 marks)

Pearson Edexcel - Thursday 28 February 2013 - Paper 1 (Non-Calculator) Higher Tier

12.

26

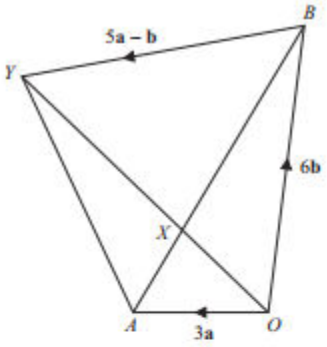


Diagram **NOT** accurately drawn

OAYB is a quadrilateral.

$\overrightarrow{OA} = 3\mathbf{a}$

$\overrightarrow{OB} = 6\mathbf{b}$

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

.....

(1)

X is the point on *AB* such that $AX : XB = 1 : 2$

and $\overrightarrow{BY} = 5\mathbf{a} - \mathbf{b}$

*(b) Prove that $\overrightarrow{OX} = \frac{2}{5}\overrightarrow{OY}$

(4)

(Total for Question 26 is 5 marks)

Pearson Edexcel - Tuesday 6 November 2012 - Paper 1 (Non-Calculator) Higher Tier

13.

28

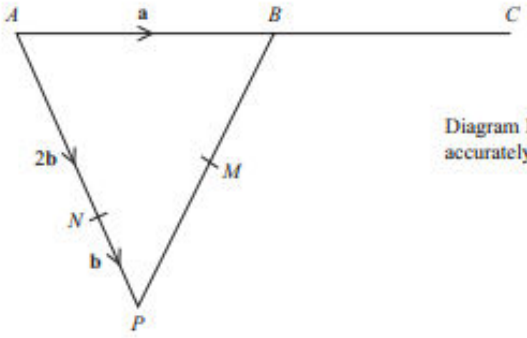


Diagram **NOT** accurately drawn

APB is a triangle.
N is a point on *AP*.

$\overrightarrow{AB} = \mathbf{a}$ $\overrightarrow{AN} = 2\mathbf{b}$ $\overrightarrow{NP} = \mathbf{b}$

(a) Find the vector $\overrightarrow{PB}$, in terms of **a** and **b**.

.....

(1)

B is the midpoint of *AC*.
M is the midpoint of *PB*.

*(b) Show that *NMC* is a straight line.

(4)

(Total for Question 28 is 5 marks)

Pearson Edexcel - Wednesday 13 June 2012 - Paper 2 (Calculator) Higher Tier

14.

26

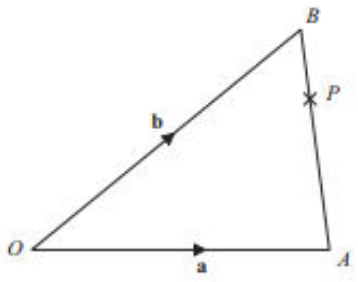


Diagram **NOT** accurately drawn

OAB is a triangle.

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

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

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

.....

(1)

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.

.....

(3)

(Total for Question 26 is 4 marks)

Pearson Edexcel - Friday 2 March 2012 - Paper 3 (Non-Calculator) Higher Tier

15.

23.

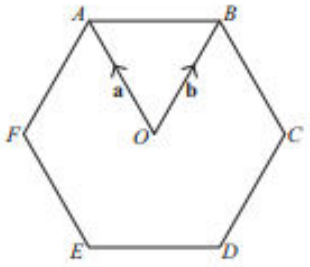


Diagram **NOT** accurately drawn

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

$\overrightarrow{OA} = \mathbf{a}$, $\overrightarrow{OB} = \mathbf{b}$.

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

.....

(1)

The line AB is extended to the point K so that $AB : BK = 1 : 2$

(b) Write the vector $\overrightarrow{CK}$ in terms of **a** and **b**.
Give your answer in its simplest form.

.....

(3)

(Total 4 marks)

Pearson Edexcel - Monday 6 June 2011 - Paper 3 (Non-Calculator) Higher Tier

16.

26.

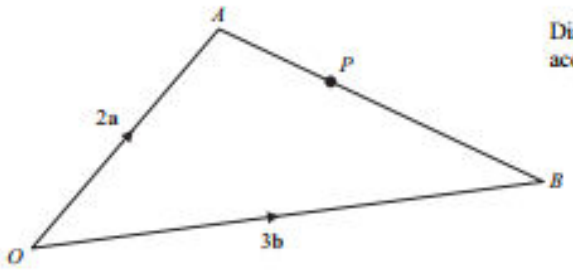


Diagram **NOT** accurately drawn

OAB is a triangle.

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

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

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

$\overrightarrow{AB} =$ .....

(1)

P is the point on AB such that $AP : PB = 2 : 3$

(b) Show that $\overrightarrow{OP}$ is parallel to the vector $\mathbf{a} + \mathbf{b}$.

(3)

(Total 4 marks)

Pearson Edexcel - Tuesday 9 November 2010 - Paper 3 (Non-Calculator) Higher Tier

17.

27.

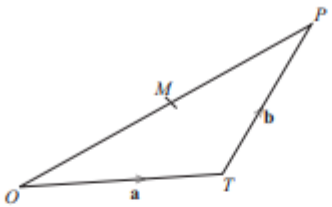


Diagram **NOT** accurately drawn

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

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

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

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

$\overrightarrow{OM}$ = ...

(2)

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

$\overrightarrow{TM}$ = ...

(2)

(Total 4 marks)

Pearson Edexcel - Thursday 5 November 2009 - Paper 3 (Non-Calculator) Higher Tier

18.

22.

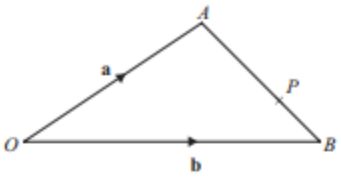


Diagram **NOT** accurately drawn

OAB is a triangle.

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

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

$\overrightarrow{AB}$ = ...

(1)

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

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

$\overrightarrow{OP}$ = ...

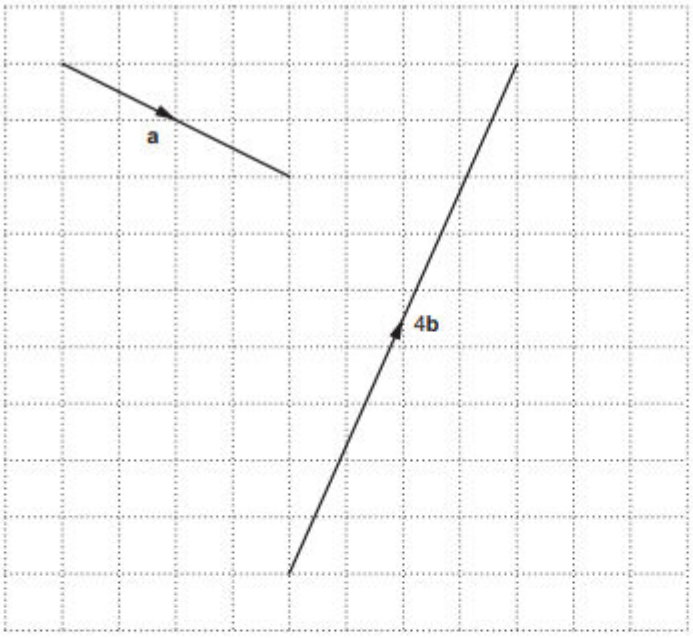
(3)

(Total 4 marks)

OCR GSCE – Monday 9 November 2020 – Paper 6 (Calculator) Higher Tier

19.

7 Vectors **a** and 4**b** are drawn on the grid.



(a) Write vector **a** as a column vector.

(a) $\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ **[2]**

(b) Find vector **b** as a column vector.

(b) $\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ **[2]**

OCR GSCE – Monday 9 November 2020 – Paper 6 (Calculator) Higher Tier

20.

20 Vector $\mathbf{m} = \begin{pmatrix} 2 \\ k \end{pmatrix}$ and vector $\mathbf{n} = \begin{pmatrix} 3 \\ 11 \end{pmatrix}$.

Vector $2\mathbf{m} + \mathbf{n}$ is parallel to $\begin{pmatrix} 1 \\ -1 \end{pmatrix}$.

Find the value of k.

$k =$ ..... **[4]**

OCR GSCE – Monday 11 November 2019 – Paper 6 (Calculator) Higher Tier

21.

9 Vector $\mathbf{a} = \begin{pmatrix} 3 \\ -1 \end{pmatrix}$ and vector $\mathbf{b} = \begin{pmatrix} 1 \\ 3 \end{pmatrix}$.

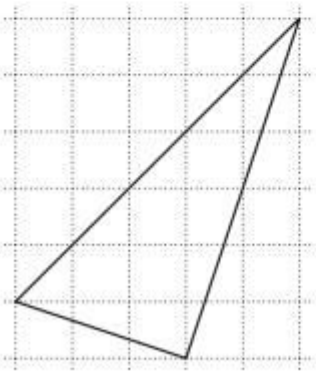
(a) Find the values of k and n so that

$$k(\mathbf{a} + \mathbf{b}) = \begin{pmatrix} 10 \\ n \end{pmatrix}.$$

(a) $k =$ .....

$n =$ ..... **[3]**

(b) Gavin starts to draw a diagram to show that $\mathbf{a} + 2\mathbf{b} = \begin{pmatrix} 5 \\ 5 \end{pmatrix}$.

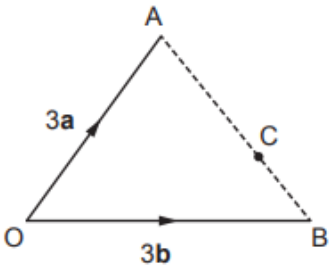


Complete Gavin's diagram. **[3]**

OCR GSCE – Tuesday 21 May 2019 – Paper 4 (Calculator) Higher Tier

22.

15 The diagram shows triangle OAB and points C and D.



Not to scale

D

$\overrightarrow{OA} = 3\mathbf{a}$ and $\overrightarrow{OB} = 3\mathbf{b}$.
C lies on AB such that $AC = 2CB$.
D is such that $\overrightarrow{BD} = 2\mathbf{a} + \mathbf{b}$.

Show, using vectors, that OCD is a straight line. **[5]**

OCR GSCE – Monday 12 November 2018 – Paper 6 (Calculator) Higher Tier

23.

20 (a) **b** is a vector.

Given that $\mathbf{b} + \begin{pmatrix} 5 \\ 2 \end{pmatrix}$ is parallel to $\begin{pmatrix} 2 \\ 1 \end{pmatrix}$, find two possible answers for **b**.

(a) $\mathbf{b} = \begin{pmatrix} \quad \\ \quad \end{pmatrix}$ or $\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ **[3]**

(b) Given that

$$m\begin{pmatrix} 4 \\ 1 \end{pmatrix} + n\begin{pmatrix} 5 \\ 2 \end{pmatrix} = \begin{pmatrix} 12 \\ 6 \end{pmatrix}$$

find the value of m and the value of n.

(b) $m =$ .....

$n =$ ..... **[5]**

OCR GSCE – Thursday 7 June 2018 – Paper 5 (Non - Calculator) Higher Tier

24.

3 Work out.

(a) $\begin{pmatrix} -3 \\ 2 \end{pmatrix} + \begin{pmatrix} 5 \\ 7 \end{pmatrix}$

(a) $\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ **[1]**

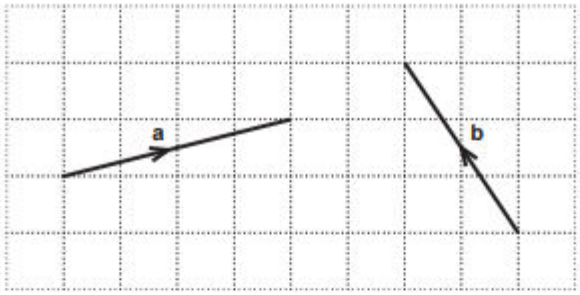
(b) $\begin{pmatrix} 3 \\ 4 \end{pmatrix} - 2\begin{pmatrix} 1 \\ -3 \end{pmatrix}$

(b) $\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ **[2]**

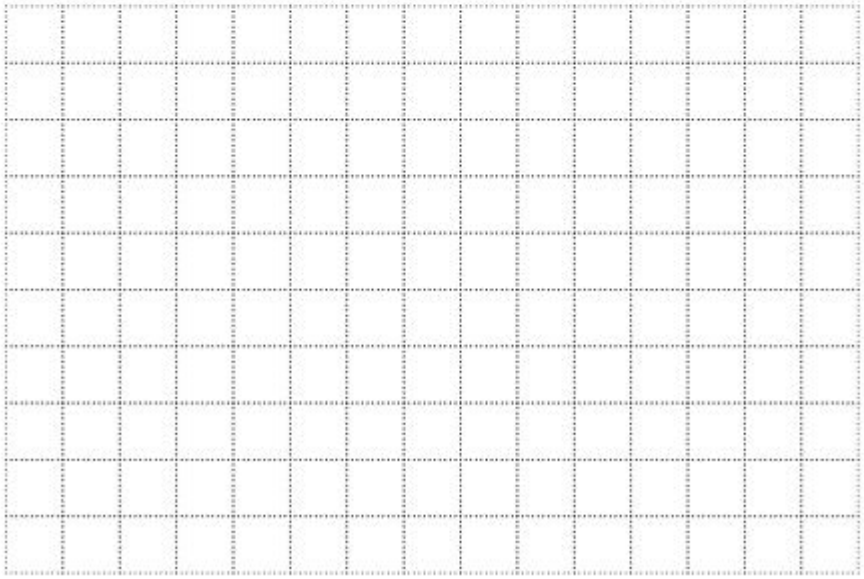
OCR GSCE – Tuesday 12 June 2018 – Paper 6 (Calculator) Higher Tier

25.

10 Two vectors, **a** and **b**, are shown on the 1 centimetre grid below.



Show that the vector **a** + 2**b** has length 7 cm.
You may use the grid below.

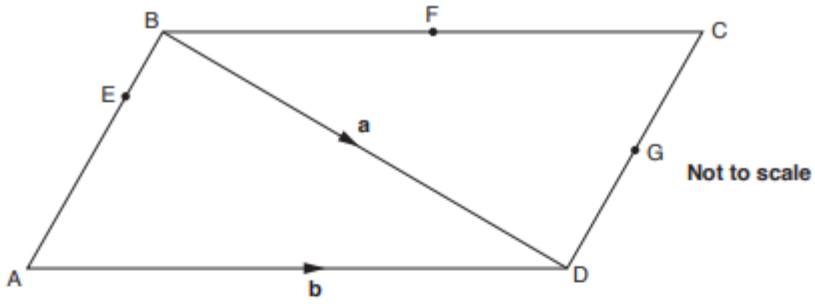


[3]

OCR GSCE – Wednesday 8 November 2017 – Paper 6 (Calculator) Higher Tier

26.

16 ABCD is a parallelogram.



$\overrightarrow{BD} = \mathbf{a}$ and $\overrightarrow{AD} = \mathbf{b}$.
F is the midpoint of BC.
G is the midpoint of DC.
AE = 3EB.

(a) Write down simplified expressions in terms of **a** and **b** for

(i) $\overrightarrow{AB}$,

(a)(i) ..... **[1]**

(ii) $\overrightarrow{EB}$.

(ii) ..... **[1]**

(b) Show that $\overrightarrow{EF} = \frac{1}{4}(3\mathbf{b} - \mathbf{a})$. **[2]**

(c) Prove that $\overrightarrow{EF}$ and $\overrightarrow{AG}$ are parallel.

.....

.....

..... **[3]**

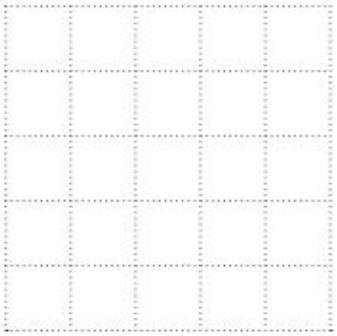
OCR GSCE – Thursday 8 June 2017 – Paper 5 (Non - Calculator) Higher Tier

27.

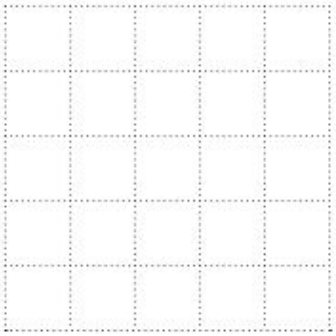
11 Vector $\mathbf{a} = \begin{pmatrix} 2 \\ 1 \end{pmatrix}$, vector $\mathbf{b} = \begin{pmatrix} -2 \\ 1 \end{pmatrix}$.

(a) On each grid below, draw a vector to represent

(i) $2\mathbf{a}$,



(ii) $\mathbf{a} + \mathbf{b}$.



[2]

(b) Emma says that if she draws vector **a** and vector **b** they will be the same.

Explain why this is incorrect.

..... **[1]**

(c) $\mathbf{c} = \begin{pmatrix} -12 \\ 0 \end{pmatrix}$.

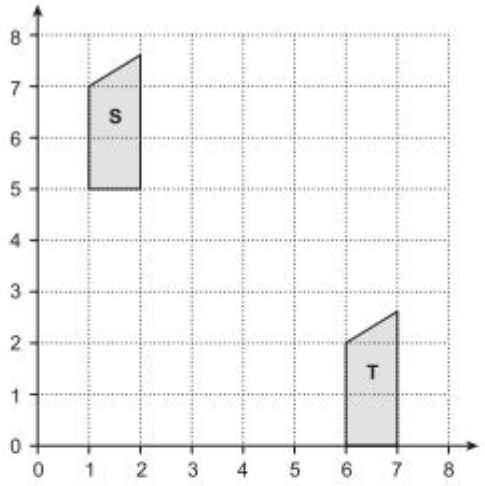
Find the value k so that $k(\mathbf{a} - \mathbf{b}) = \mathbf{c}$.

(c) $k =$ ..... **[2]**

OCR GSCE – Sample Papers – Paper 5 (Non - Calculator) Higher Tier

28.

1 **(a)** Here is a coordinate grid.



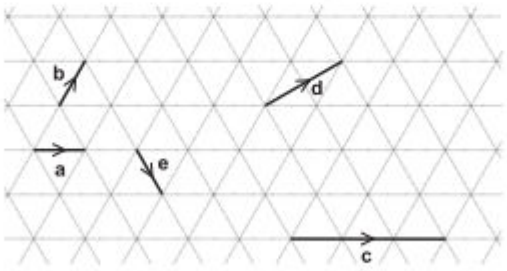
Shape S is translated to Shape T using vector $\begin{pmatrix} p \\ q \end{pmatrix}$.

Write down the values of p and q.

(a) p = ...

q = ... **[2]**

(b) Vectors **a**, **b**, **c**, **d** and **e** are drawn on an isometric grid.



Write each of the vectors **c**, **d** and **e** in terms of **a** and/or **b**.

c = ...

d = ...

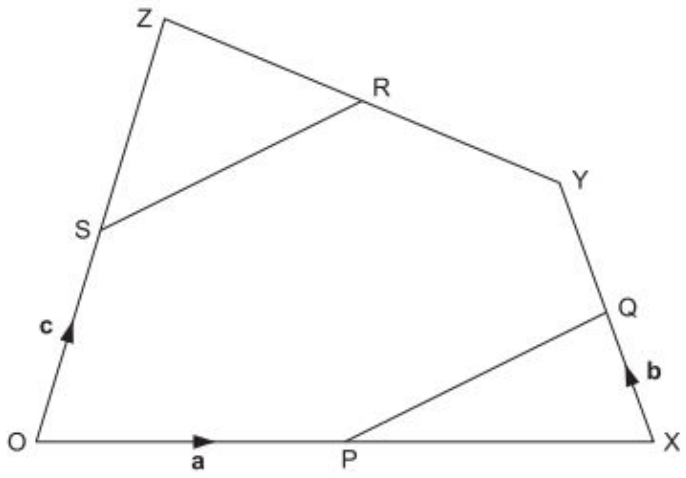
e = ...

[3]

OCR GSCE – Sample Papers – Paper 5 (Non - Calculator) Higher Tier

29.

18 P, Q, R and S are the midpoints of OX, XY, YZ and OZ respectively.



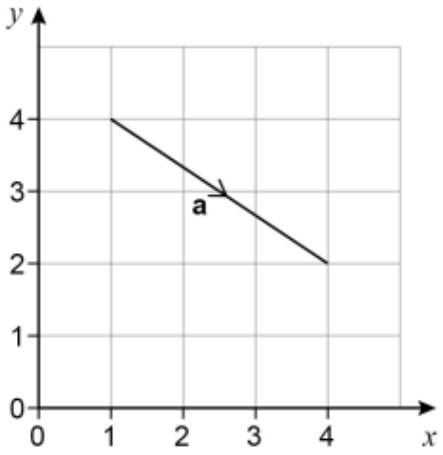
$\overrightarrow{OP} = \mathbf{a}$, $\overrightarrow{XQ} = \mathbf{b}$ and $\overrightarrow{OS} = \mathbf{c}$.

Show that PQ is parallel to SR. **[5]**

AQA GSCE – Tuesday 19 May 2020 – Paper 1 (Non - Calculator) Higher Tier

30.

2 Here is vector **a**.



Circle the column vector that represents **a**.

[1 mark]

$\begin{pmatrix} 3 \\ 2 \end{pmatrix}$ $\begin{pmatrix} -3 \\ 2 \end{pmatrix}$ $\begin{pmatrix} 3 \\ -2 \end{pmatrix}$ $\begin{pmatrix} -3 \\ -2 \end{pmatrix}$

AQA GSCE – Thursday 8 June 2020 – Paper 3 (Calculator) Higher Tier

31.

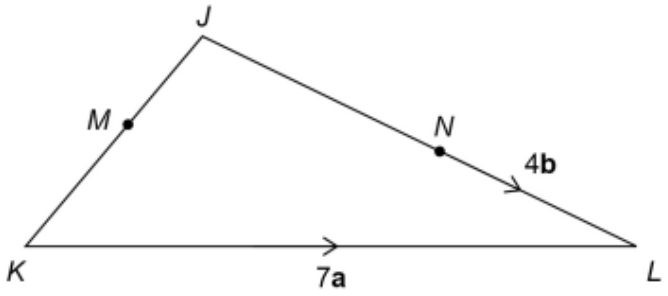
23 In triangle JKL

M is the midpoint of JK

$JN : NL = 3 : 2$

$\overrightarrow{KL} = 7\mathbf{a}$ $\overrightarrow{NL} = 4\mathbf{b}$

Not drawn accurately



Work out $\overrightarrow{JM}$ in terms of **a** and **b**.

Give your answer in its simplest form.

[3 marks]

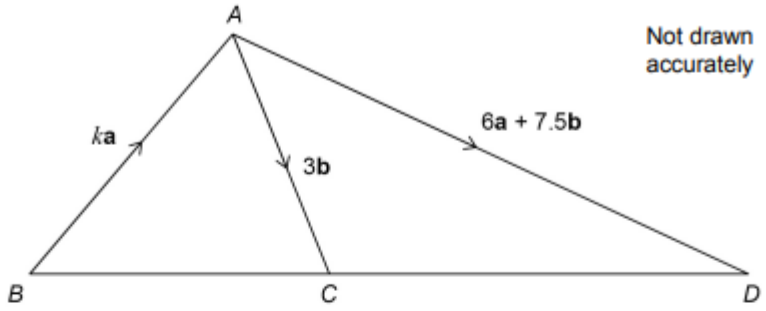
Answer _____

AQA GSCE – Tuesday 21 May 2019 – Paper 1 (Non - Calculator) Higher Tier

32.

22 *ABC* and *ACD* are triangles.

k is a constant.



22 (a) Show that $\overrightarrow{CD} = 6\mathbf{a} + 4.5\mathbf{b}$

[1 mark]

22 (b) *BCD* is a straight line.

Work out the value of k.

You **must** show your working.

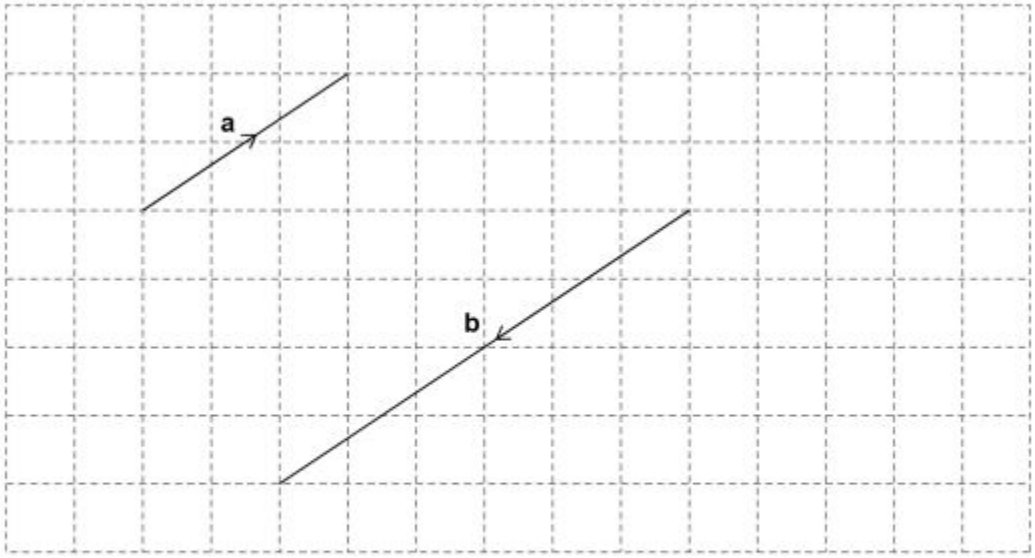
[3 marks]

Answer _____

AQA GSCE – Tuesday 11 June 2019 – Paper 3 (Calculator) Higher Tier

33.

13 (a) Vectors **a** and **b** are drawn on a grid.

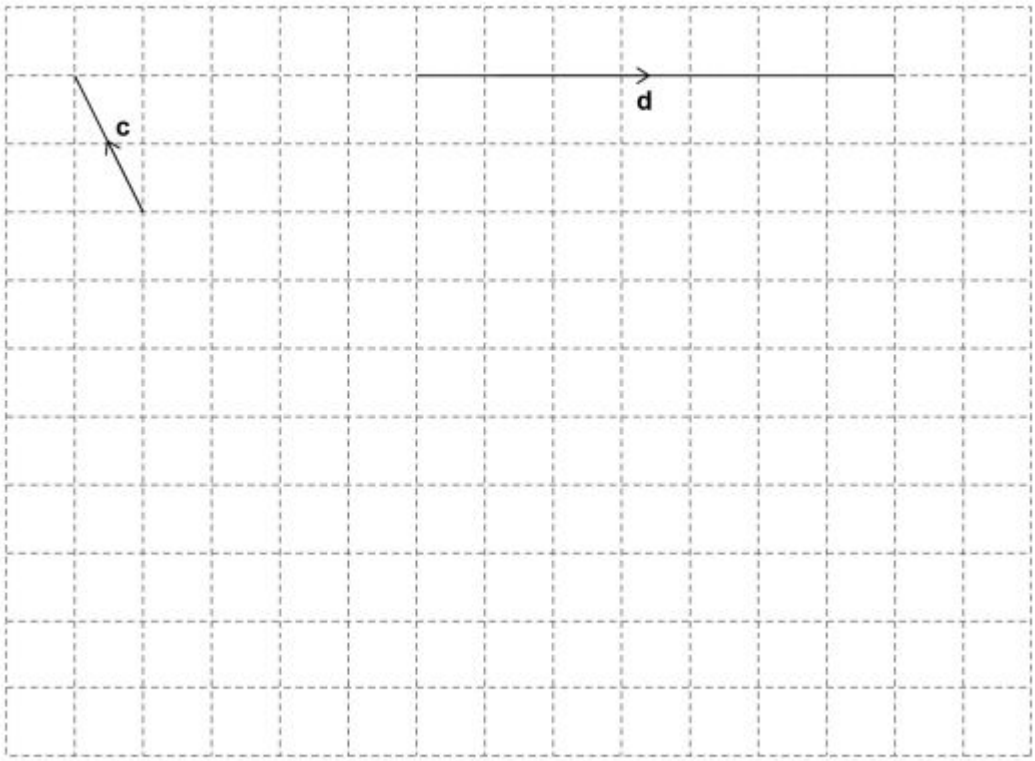


Write **b** in terms of **a**.

[1 mark]

b = _____

13 (b) Vectors **c** and **d** are drawn on a grid.



On the grid above, draw a vector representing **c – d**

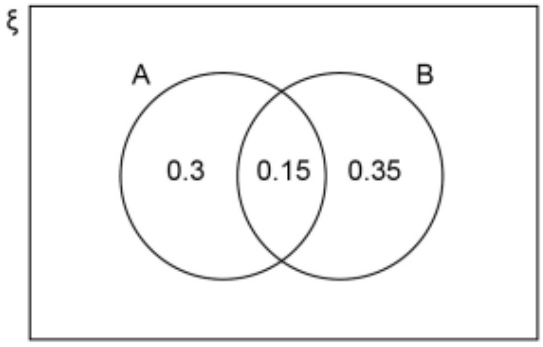
[2 marks]

AQA GSCE – Tuesday 6 November 2018 – Paper 1 (Non - Calculator) Higher Tier

34.

14 A and B are two events.

Some probabilities are shown on the Venn diagram.



Work out $P(A' \cup B)$

[2 marks]

Answer _____

AQA GSCE – Thursday 8 November 2018 – Paper 2 (Calculator) Higher Tier

35.

23 *PQR* is a straight line.

$PQ : QR = 3 : 1$

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

Not drawn accurately

Circle the vector $\overrightarrow{RQ}$

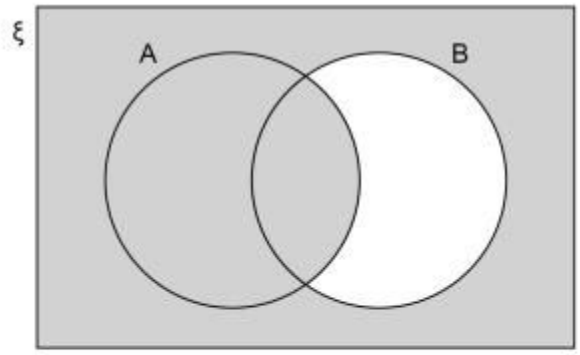
[1 mark]

$\frac{1}{3}\mathbf{a}$ $\frac{1}{4}\mathbf{a}$ $-\frac{1}{3}\mathbf{a}$ $-\frac{1}{4}\mathbf{a}$

AQA GSCE – Monday 24 May 2018 – Paper 1 (Non - Calculator) Higher Tier

36.

22



Which of these represents the shaded region?

Circle your answer.

[1 mark]

$A \cap B'$ B' $A \cup B'$ $A' \cup B'$

AQA GSCE – Tuesday 12 June 2018 – Paper 3 (Calculator) Higher Tier

37.

11 $\mathbf{a} = \begin{pmatrix} 6 \\ -10 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} -1 \\ 2 \end{pmatrix}$ $\mathbf{c} = \begin{pmatrix} -4 \\ 7 \end{pmatrix}$

11 (a) Work out $\mathbf{a} + \mathbf{b} + \mathbf{c}$

[2 marks]

Answer $\begin{pmatrix} \quad \\ \quad \end{pmatrix}$

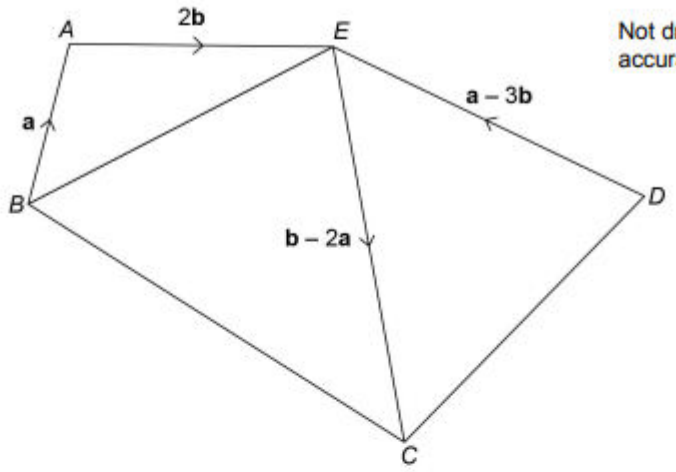
11 (b) Show that $\mathbf{a} + 2\mathbf{c}$ is parallel to $\mathbf{b}$

[2 marks]

AQA GSCE – Thursday 6 November 2017 – Paper 2 (Calculator) Higher Tier

38.

26 *ABCDE* is a pentagon.



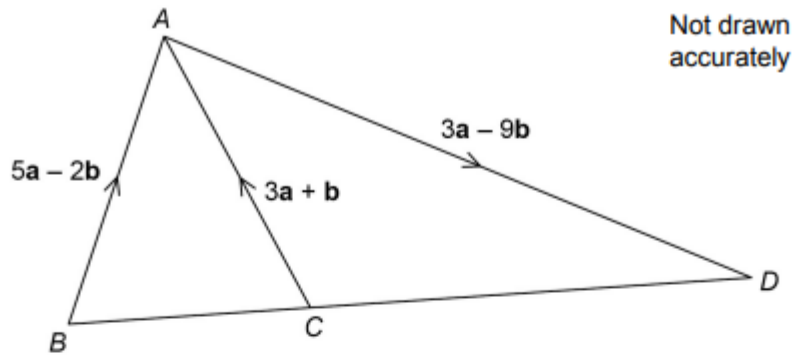
Show that *BCDE* is a parallelogram.

[3 marks]

AQA GSCE – Thursday 8 June 2017 – Paper 2 (Calculator) Higher Tier

39.

23



Is *BCD* a straight line?

Show working to support your answer.

[3 marks]

Answer _____

AQA GSCE – Tuesday 13 June 2017 – Paper 3 (Calculator) Higher Tier

40.

1 $\mathbf{a} = \begin{pmatrix} -4 \\ -1 \end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix} 3 \\ -1 \end{pmatrix}$

Circle the vector $2\mathbf{a} + \mathbf{b}$

[1 mark]

$\begin{pmatrix} -5 \\ -3 \end{pmatrix}$ $\begin{pmatrix} -11 \\ -3 \end{pmatrix}$ $\begin{pmatrix} -5 \\ -1 \end{pmatrix}$ $\begin{pmatrix} -11 \\ -1 \end{pmatrix}$

AQA GSCE – Sample Paper 3 (Calculator) Higher Tier

41.

2 $\mathbf{a} = \begin{pmatrix} 5 \\ -2 \end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix} -2 \\ 3 \end{pmatrix}$

Circle the vector $\mathbf{a} - \mathbf{b}$

[1 mark]

$\begin{pmatrix} -3 \\ -5 \end{pmatrix}$ $\begin{pmatrix} 7 \\ 1 \end{pmatrix}$ $\begin{pmatrix} 3 \\ 1 \end{pmatrix}$ $\begin{pmatrix} 7 \\ -5 \end{pmatrix}$

AQA GSCE – Sample Paper 3 (Calculator) Higher Tier

42.

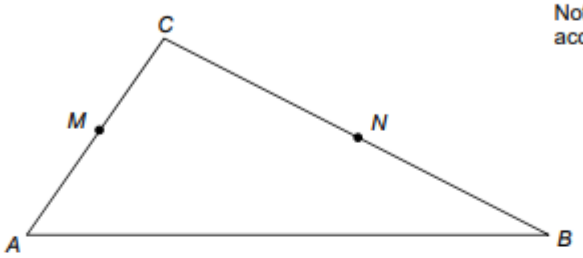
25 In triangle ABC

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

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

Give your answer in its simplest form.

[3 marks]

Answer _____

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

[1 mark]