Surname	
Other Names	
Candidate's Signature	

GCSE 9 - 1 Questions

Vectors Proof

Calculator Allowed

INSTRUCTIONS TO CANDIDATES

Write your name in the space provided.

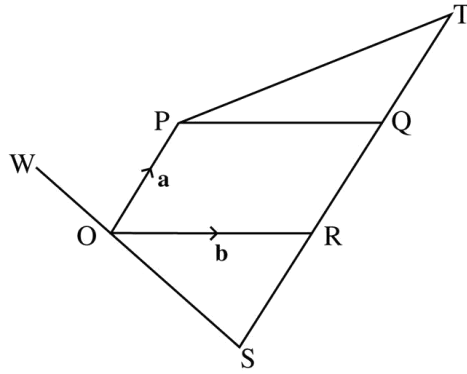Write your answers in the spaces provided in this question paper.

Answer ALL questions.

Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.

You should have a ruler, compass and protractor where required.

Total Marks :

1)

OPQR is a parallelogram. SRQT is a straight line with SR = RQ = QT

$\overrightarrow{OP}$ = **a** and $\overrightarrow{OR}$ = **b**

(a) Express in terms of **a** and **b**

(i) $\overrightarrow{PT}$

Answer _____ [1]

(ii) $\overrightarrow{OS}$

Answer _____ [1]

(b) OW = $\frac{1}{2}$SO. Show that WPT is a straight line.

[3]

2)
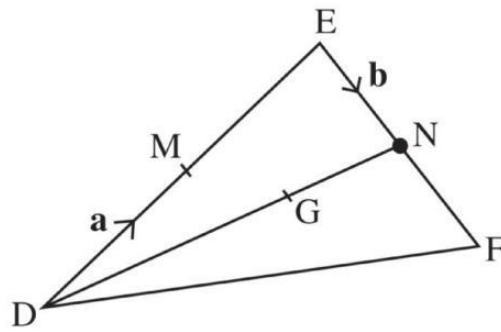
In the triangle DEF, $\overrightarrow{DE} = 2\mathbf{a}$ and $\overrightarrow{EF} = 2\mathbf{b}$.
M is the midpoint of DE, N is the midpoint of EF and DG is twice GN.
Use vectors to show that FG is twice GM.

[3]

3)

B

Diagram not
drawn accurately
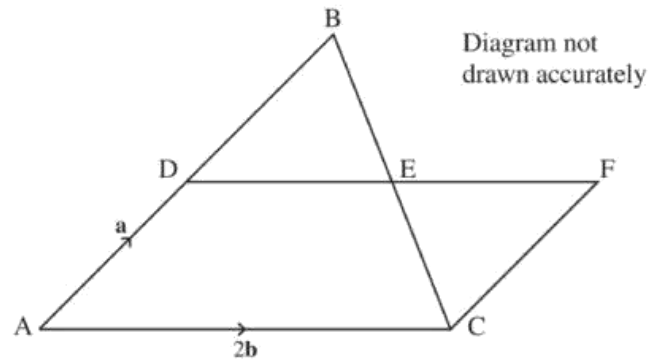
ABC is a triangle and D is the midpoint of AB.
ACFD is a parallelogram.

$$\overrightarrow{AB} = 2\mathbf{a} \qquad \text{and} \qquad \overrightarrow{AC} = 2\mathbf{b}$$

(a) Find, simplifying your answers as far as possible,

   (i) $\overrightarrow{CF}$

Answer _____ [1]

   (ii) $\overrightarrow{BC}$

Answer _____ [2]

(b) Use **vectors** to prove that DC is parallel to BF.

[3]

4) Given that $\mathbf{OA} = 2\mathbf{x} + 8\mathbf{y}$, $\mathbf{OB} = 4\mathbf{x} + 7\mathbf{y}$ and $\mathbf{CD} = 4\mathbf{x} - 2\mathbf{y}$, explain the geometrical relationships between the straight lines AB and CD.

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[3]

5)
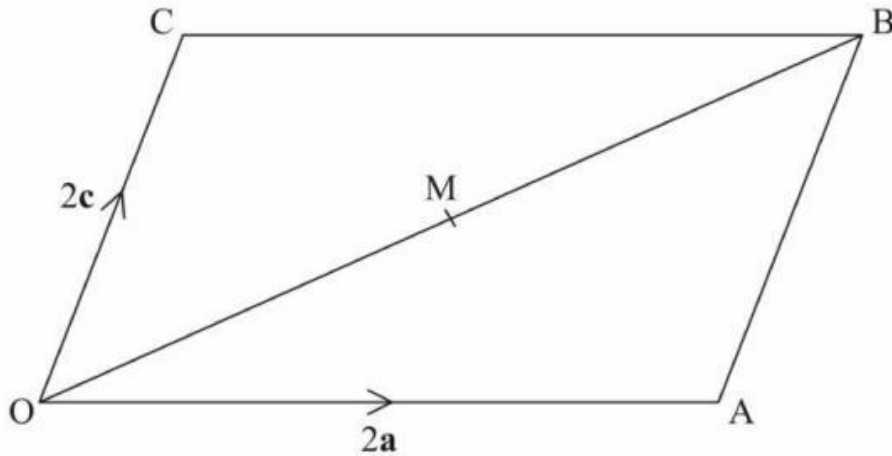
OABC is a parallelogram.

M is the mid-point of the diagonal OB.

$\overrightarrow{OA}$ = 2**a** and $\overrightarrow{OC}$ = 2**c**.

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

Answer $\overrightarrow{OM}$ = _____ [1]

(b) Use vectors to prove that M is also the mid-point of AC.

[3]

6) You are given that **HL** $= 5x + 6y$, **LK** $= 3x - 6y$ and **KN** $= 18x - 36y$.

   (a)   Express **HK** in terms of x and y in its simplest form.   [2]

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   (b)   (i)   Show that **LN** $= k$**LK** where the value of k is to be found.   [2]

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            (ii)   What can you say about the points **L**, **K** and **N**?   [1]

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