IGCSE Mathematics Revision

Session 6

1.5 Set Language and Notation	understand sets defined in algebraic terms	
	understand and use subsets	If A is a subset of B, then $A \subset B$
	understand and use the complement of a set	Use the notation A'
	use Venn diagrams to represent sets and the number of elements in sets	
	use the notation n(A) for the number of elements in the set A	
	use sets in practical situations	
5.1 Vectors	understand that a vector has both magnitude and direction	
	understand and use vector notation	The notations $\overrightarrow{OA}$ and $\mathbf{a}$ will be used
	multiply vectors by scalar quantities	
	add and subtract vectors	
	calculate the modulus (magnitude) of a vector	
	find the resultant of two or more vectors	$\overrightarrow{OA} = 3\mathbf{a}$, $\overrightarrow{AB} = 2\mathbf{b}$, $\overrightarrow{BC} = \mathbf{c}$ so: $\overrightarrow{OC} = 3\mathbf{a} + 2\mathbf{b} + \mathbf{c}$ $\overrightarrow{CA} = -\mathbf{c} - 2\mathbf{b}$
	apply vector methods for simple geometrical proofs	

$\mathcal{E}$ = {1, 2, 3, 4, 5, 6, 7, 8}
P = {2, 3, 5, 7}

(a) List the members of P'

.....

(1)

The set Q satisfies both the conditions $Q \subset P$ **and** $n(Q) = 3$

(b) List the members of **one** set Q which satisfies both these conditions.

.....

(2)

(Total 3 marks)

There are 35 students in a group.
18 students play hockey.
12 students play both hockey and tennis.
15 students play neither hockey nor tennis.

Find the number of students who play tennis.

.....

(Total 4 marks)

(a) A = {Quadrilaterals with two pairs of parallel sides}
B = {Quadrilaterals with at least one right angle}

Write down the mathematical name for the quadrilaterals in

(i) A, ...

(ii) $A \cap B$. .....

(2)

(b) The universal set $\mathscr{E}$ = {Positive whole numbers}
P = {Multiples of 3 less than 11}
Q = {Multiples of 5 less than 11}

(i) What is $P \cap Q$?

.....

(ii) Is it true that $10 \in P \cup Q$?

.....

Explain your answer.

.....

.....

(2)

PQR is a triangle.
M and N are the midpoints of PQ and PR respectively.

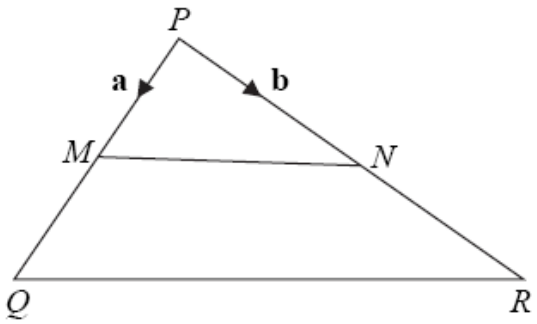

Diagram **NOT** accurately drawn

$\overrightarrow{PM} = \mathbf{a}$ $\overrightarrow{PN} = \mathbf{b}$.

(a) Find, in terms of **a** and/or **b**,

(i) $\overrightarrow{MN}$

.....

(ii) $\overrightarrow{PQ}$

.....

(iii) $\overrightarrow{QR}$

.....

(3)

(b) Use your answers to (a)(i) and (iii) to write down two geometrical facts about the lines MN and QR.

.....

.....

(2)

(Total 5 marks)

PQR is a triangle.
E is the point on PR such that $PR = 3PE$.
F is the point on QR such that $QR = 3QF$.

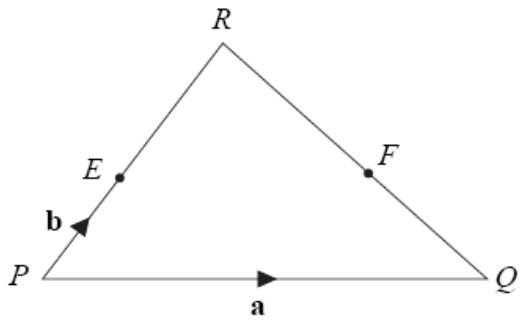

Diagram **NOT** accurately drawn

$\overrightarrow{PQ} = \mathbf{a}$, $\overrightarrow{PE} = \mathbf{b}$.

(a) Find, in terms of **a** and **b**,

(i) $\overrightarrow{PR}$

.....

(ii) $\overrightarrow{QR}$

.....

(iii) $\overrightarrow{PF}$

.....

(3)

(b) Show that $\overrightarrow{EF} = k\overrightarrow{PQ}$

(2)

(Total 5 marks)

$OABC$ is a parallelogram.

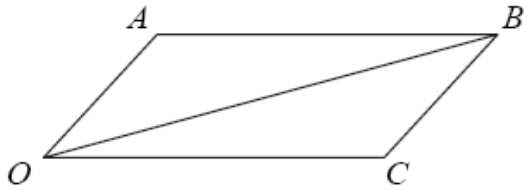

Diagram **NOT** accurately drawn

$\overrightarrow{OA} = \begin{pmatrix} 1 \\ 2 \end{pmatrix}$, $\overrightarrow{OC} = \begin{pmatrix} 4 \\ 0 \end{pmatrix}$.

(a) Find the vector $\overrightarrow{OB}$ as a column vector.

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

.....

(1)

X is the point on OB such that $OX = kOB$, where $0 < k < 1$

(b) Find, in terms of k, the vectors

(i) $\overrightarrow{OX}$,

.....

(ii) $\overrightarrow{AX}$,

.....

(iii) $\overrightarrow{XC}$.

.....

(3)

(c) Find the value of k for which $\overrightarrow{AX} = \overrightarrow{XC}$.

.....

(2)

(d) Use your answer to part (c) to show that the diagonals of the parallelogram $OABC$ bisect one another.

.....

.....

.....

(2)

(Total 8 marks)

Answers

a) P'={1, 4, 6, 8} b) e.g.{2, 3, 5}

a) (i) Parallelogram (ii) Rectangle (b) (i)$\varnothing$ (ii) Yes. $p \cup Q = \{3,5,6,9,10\}, \therefore 10 \in \{P \cup Q\}$

(i) MN=**b-a** (ii) PQ=2**a** (iii) QR=2**b**-2**a** b) QR is parallel to MN, and twice the length

a) (i) PR=3**b** (ii) QR=3**b-a** b)EF=$\frac{2}{3}$**a**

a) $\begin{pmatrix}5\\2\end{pmatrix}, b)\begin{pmatrix}5k\\2k\end{pmatrix}, c)(i)\begin{pmatrix}5k-1\\2k-2\end{pmatrix}, ii)\begin{pmatrix}4-5k\\-2k\end{pmatrix}, c)k = 0.5, (d) \because AX = XC, OX = \frac{1}{2}OB$