

# Vectors

## Difficulty: Hard

### Question Paper 2

Level	IGCSE
Subject	Maths (0580/0980)
Exam Board	CIE
Topic	Vectors and transformations
Sub-Topic	Vectors
Paper	Paper 2
Difficulty	Hard
Booklet	Question Paper 2

**Time allowed:** 34 minutes

**Score:** /26

**Percentage:** /100

#### Grade Boundaries:

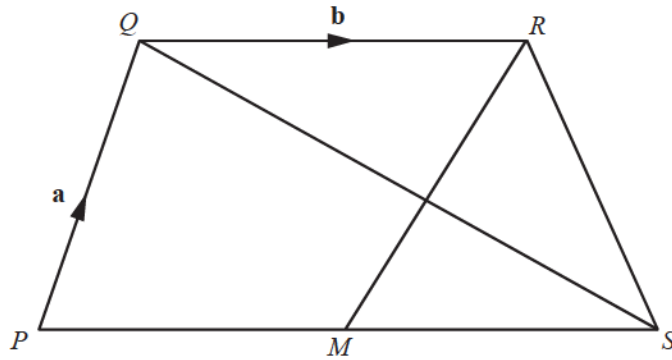
##### CIE IGCSE Maths (0580)

A*	A	B	C	D	E
>88%	76%	63%	51%	40%	30%

##### CIE IGCSE Maths (0980)

9	8	7	6	5	4	3
>94%	85%	77%	67%	57%	47%	35%

## Question 1



NOT TO  
SCALE

$PQRS$  is a quadrilateral and  $M$  is the midpoint of  $PS$ .

$\vec{PQ} = \mathbf{a}$ ,  $\vec{QR} = \mathbf{b}$  and  $\vec{SQ} = \mathbf{a} - 2\mathbf{b}$ .

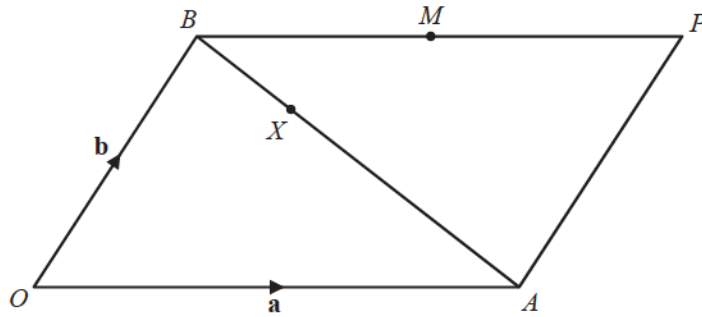
(a) Show that  $\vec{PS} = 2\mathbf{b}$ .

[1]

(b) Write down the mathematical name for the quadrilateral  $PQRM$ , giving reasons for your answer.

[2]

## Question 2



NOT TO  
SCALE

$OAPB$  is a parallelogram.

$O$  is the origin,  $\vec{OA} = \mathbf{a}$  and  $\vec{OB} = \mathbf{b}$ .

$M$  is the midpoint of  $BP$ .

(a) Find, in terms of  $\mathbf{a}$  and  $\mathbf{b}$ , giving your answer in its simplest form,

(i)  $\vec{BA}$ ,

[1]

(ii) the position vector of  $M$ .

[1]

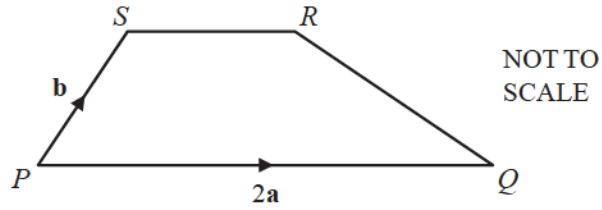
(b)  $X$  is on  $BA$  so that  $BX:XA = 1:2$ .

Show that  $X$  lies on  $OM$ .

[4]

### Question 3

(a)



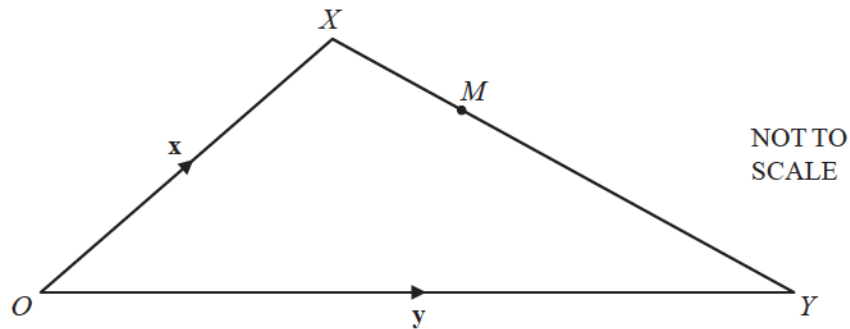
$PQRS$  is a trapezium with  $PQ = 2SR$ .

$\vec{PQ} = 2\mathbf{a}$  and  $\vec{PS} = \mathbf{b}$ .

Find  $\vec{QR}$  in terms of  $\mathbf{a}$  and  $\mathbf{b}$  in its simplest form.

[2]

(b)



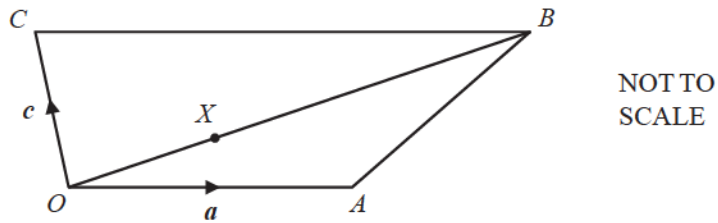
$\vec{OX} = \mathbf{x}$  and  $\vec{OY} = \mathbf{y}$ .

$M$  is a point on  $XY$  such that  $XM:MY = 3:5$ .

Find  $\vec{OM}$  in terms of  $\mathbf{x}$  and  $\mathbf{y}$  in its simplest form.

[2]

## Question 4



The diagram shows a quadrilateral  $OABC$ .

$\vec{OA} = \mathbf{a}$ ,  $\vec{OC} = \mathbf{c}$  and  $\vec{CB} = 2\mathbf{a}$ .

$X$  is a point on  $OB$  such that  $OX:XB = 1:2$ .

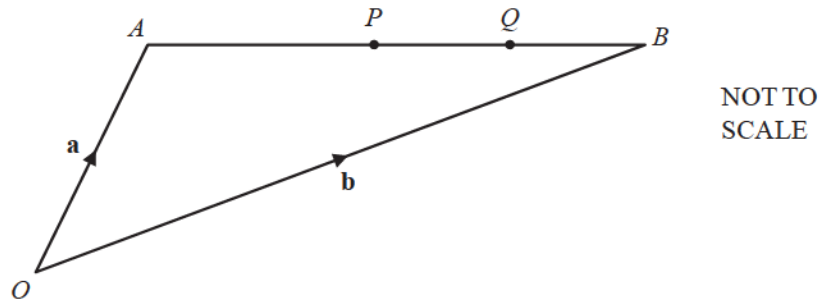
(a) Find, in terms of  $\mathbf{a}$  and  $\mathbf{c}$ , in its simplest form

(i)  $\vec{AC}$ , [1]

(ii)  $\vec{AX}$ . [3]

(b) Explain why the vectors  $\vec{AC}$  and  $\vec{AX}$  show that  $C$ ,  $X$  and  $A$  lie on a straight line. [2]

## Question 5



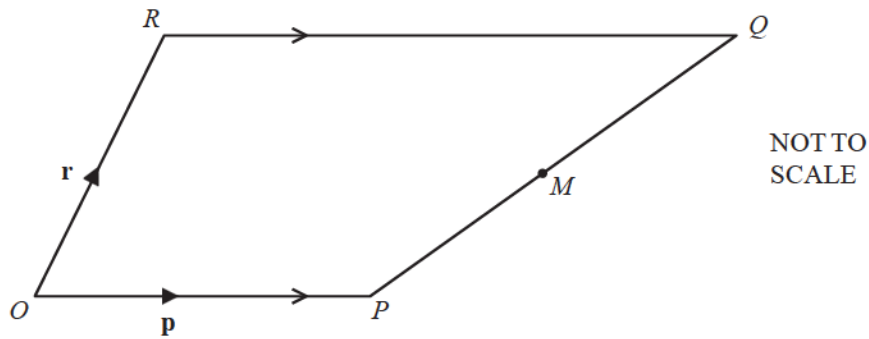
The diagram shows two points,  $P$  and  $Q$ , on a straight line  $AB$ .  
 $P$  is the midpoint of  $AB$  and  $Q$  is the midpoint of  $PB$ .  
 $O$  is the origin,  $\vec{OA} = \mathbf{a}$  and  $\vec{OB} = \mathbf{b}$ .

Write down, in terms of  $\mathbf{a}$  and  $\mathbf{b}$ , in its simplest form

(a)  $\vec{AP}$ , [2]

(b) the position vector of  $Q$ . [2]

## Question 6



$OPQR$  is a trapezium with  $RQ$  parallel to  $OP$  and  $RQ = 2OP$ .

$O$  is the origin,  $\vec{OP} = \mathbf{p}$  and  $\vec{OR} = \mathbf{r}$ .

$M$  is the midpoint of  $PQ$ .

Find, in terms of  $\mathbf{p}$  and  $\mathbf{r}$ , in its simplest form

(a)  $\vec{PQ}$ , [1]

(b)  $\vec{OM}$ , the position vector of  $M$ . [2]