Mock Grade 8/9

Maths Booklet 6

Paper 3H
Calculator

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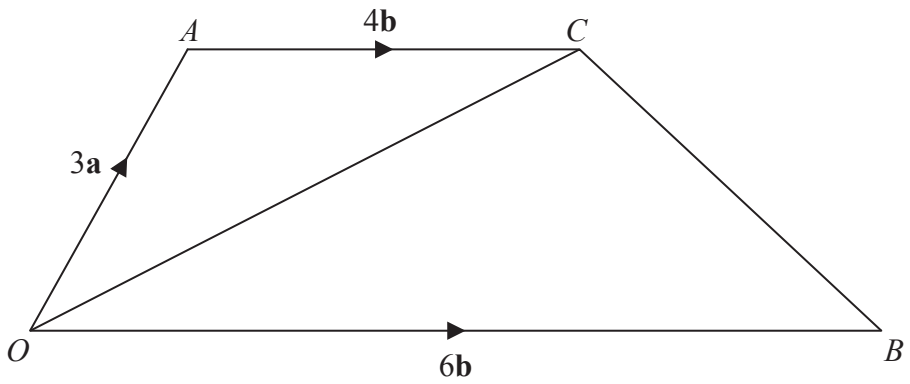
1 The diagram shows trapezium $OACB$.



$\overrightarrow{OA} = 3\mathbf{a}$ $\overrightarrow{OB} = 6\mathbf{b}$ $\overrightarrow{AC} = 4\mathbf{b}$

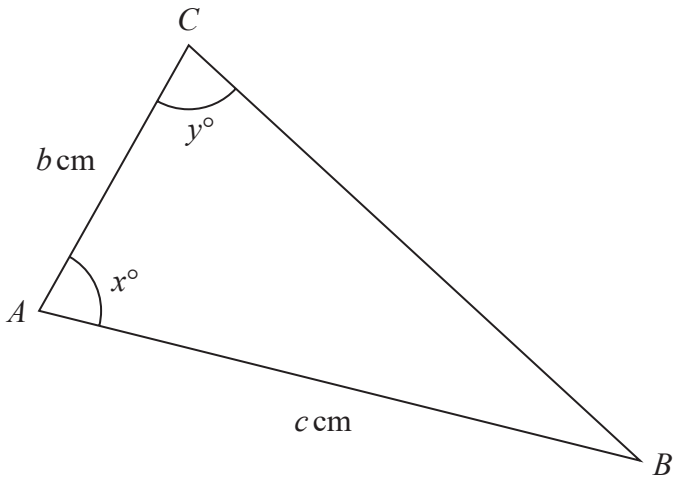
N is the point on OC such that ANB is a straight line.

Find $\overrightarrow{ON}$ as a simplified expression in terms of **a** and **b**.

.....

(Total for Question 1 is 5 marks)

2 The diagram shows triangle ABC



$c = 11.5$ correct to one decimal place
$x = 80$ correct to the nearest whole number
$y = 75$ correct to the nearest whole number

Calculate the upper bound for the value of b
Show your working clearly.
Give your answer correct to 3 significant figures.

.....

(Total for Question 2 is 4 marks)

3 *ABCED* is a five-sided shape.

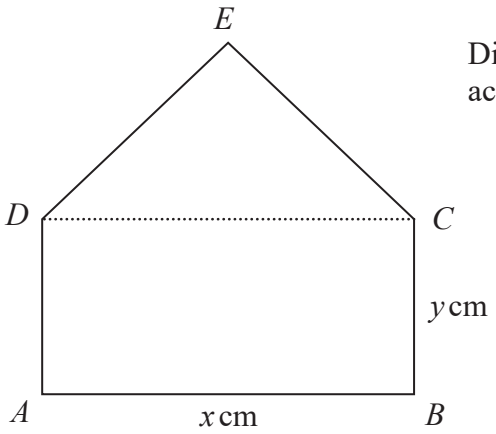


Diagram **NOT** accurately drawn

ABCD is a rectangle.
CED is an equilateral triangle.

$AB = x$ cm $BC = y$ cm

The perimeter of *ABCED* is 100 cm.
The area of *ABCED* is R cm^2

(a) Show that $R = \frac{x}{4}\left(200 - \left[6 - \sqrt{3}\right]x\right)$

(Total for Question 3 is 3 marks)

4 Solve the simultaneous equations

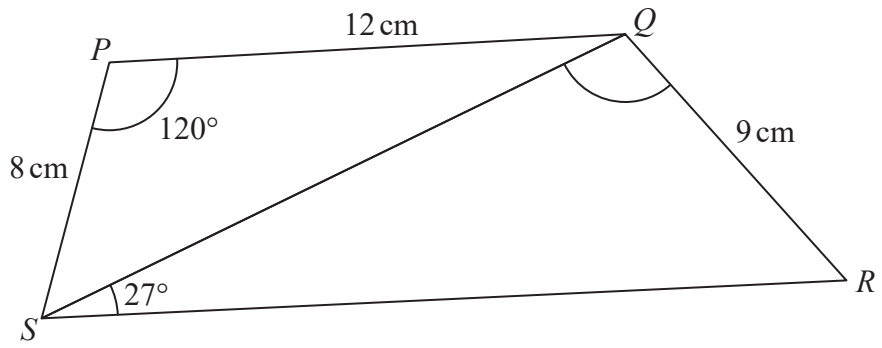
$$x^2 - 9y - x = 2y^2 - 12$$
$$x + 2y - 1 = 0$$

Show clear algebraic working.

.....

(Total for Question 4 is 5 marks)

5 Here is a quadrilateral *PQRS*.



Angle *SRQ* is acute.

Work out the size of angle *SQR*.
Give your answer correct to 1 decimal place.

.....°

(Total for Question 5 is 6 marks)

6 The straight line **L** has equation $x - y = 3$
The curve **C** has equation $3x^2 - y^2 + xy = 9$

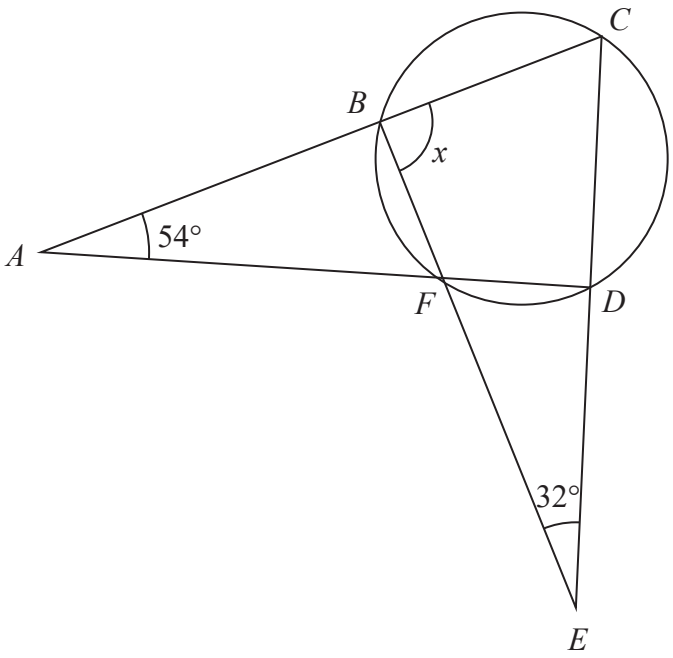
L and **C** intersect at the points P and Q.

Find the coordinates of the midpoint of PQ.
Show clear algebraic working.

(..... , ...)

(Total for Question 6 is 6 marks)

7



B, *C*, *D* and *F* are points on a circle.
ABC, *AFD*, *BFE* and *CDE* are straight lines.

Work out the size of angle *x*.
Show your working clearly.

x = ... °

(Total for Question 7 is 4 marks)

8 OAB is a triangle.

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

C is the midpoint of OA.
D is the point on AB such that $AD : DB = 3 : 1$
E is the point such that $\overrightarrow{OB} = 2\overrightarrow{BE}$

Using a vector method, prove that the points C, D and E lie on the same straight line.

(Total for Question 8 is 5 marks)