Surname	Centre Number	Candidate Number
Other Names		0

WJEC CBAC

GCSE

185/10

SOLUTIONS.

MATHEMATICS

HIGHER TIER

PAPER 2

A.M. FRIDAY, 10 June 2011

2 hours

ADDITIONAL MATERIALS

A calculator will be required for this paper.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen. Do not use correction fluid.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided.

Take π as 3·14 or use the π button on your calculator.

INFORMATION FOR CANDIDATES

You should give details of your method of solution especially when a calculator is used.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

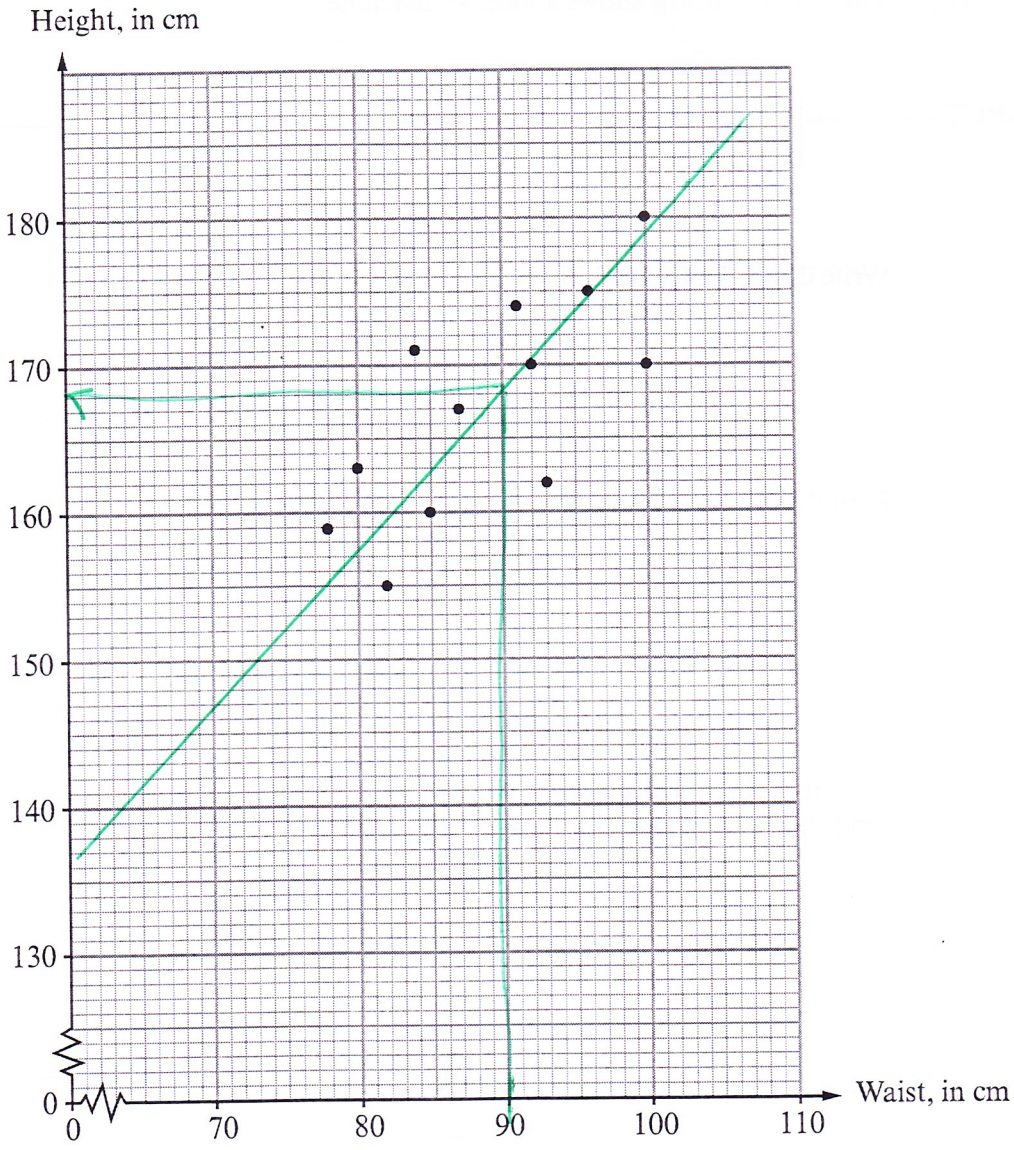
For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1	5	
2	5	
3	4	
4	11	
5	3	
6	7	
7	11	
8	13	
9	9	
10	5	
11	8	
12	7	
13	3	
14	9	
TOTAL MARK		

0185 160001

JUN110185100 1

Examiner only

1. The scatter diagram shows the heights and waist measurements, in cm, of 12 people in a darts club.



(a) Write down the height and waist measurement of the **tallest** of the 12 people.

Height ..... 180 ..... cm

Waist ..... 100 ..... cm

[2]

(b) Write down the type of correlation shown by the scatter diagram.

..... POSITIVE .....

[1]

(c) Draw, by eye, a line of best fit on the scatter diagram. [1]

(d) Estimate the height of another member of the darts club with a waist measurement of 90 cm.

..... 168 cm .....

[1]

Examiner only

2. *(a)* The diagram below shows a number machine.

Write down the **OUTPUT** when the **INPUT** is n.

$5(n+7)$

[1]

(b) Find the nth term of the sequence 1, 7, 13, 19, 25, ...

+6

$6n-5$

[2]

(c) The nth term of a sequence is $n^2 + 6$.
Find the value of the 15th term of the sequence.

$n = 15$

$15^2 + 6$

$= 225 + 6$

$= 231$

[2]

Examiner only

3.

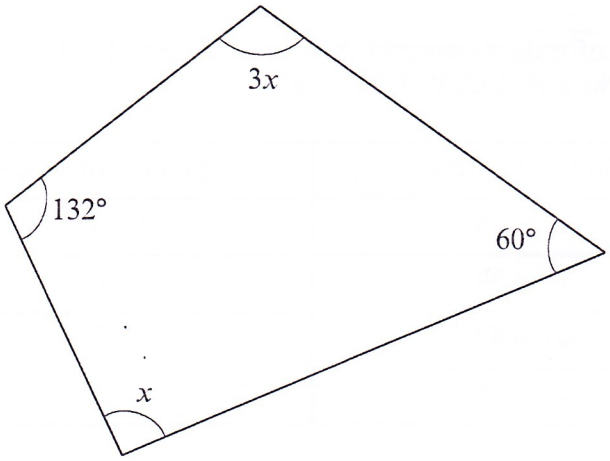


Diagram not drawn to scale

Calculate the value of x.

$3x + 132 + 60 + x = 360$

$4x + 192 = 360$

$4x = 360 - 192$

$4x = 168$

$x = \frac{168}{4}$

$x = 42°$

[4]

Examiner only

4. Trainer sizes are given as whole numbers.

A survey of the size of trainers worn by 20 women is carried out.
The table below shows a summary of the results.

Size of trainers	Number of women
34 to 36	4
37 to 39	12
40 to 42 .	3
43 to 45	1

(a) Calculate an estimate for the mean size of these trainers.

Estimated mean size $= \frac{(4\times35)+(12\times38)+(3\times41)+(1\times44)}{20}$

$= \frac{140+456+123+44}{20}$

$= \frac{763}{20}$

$= 38.15$

[4]

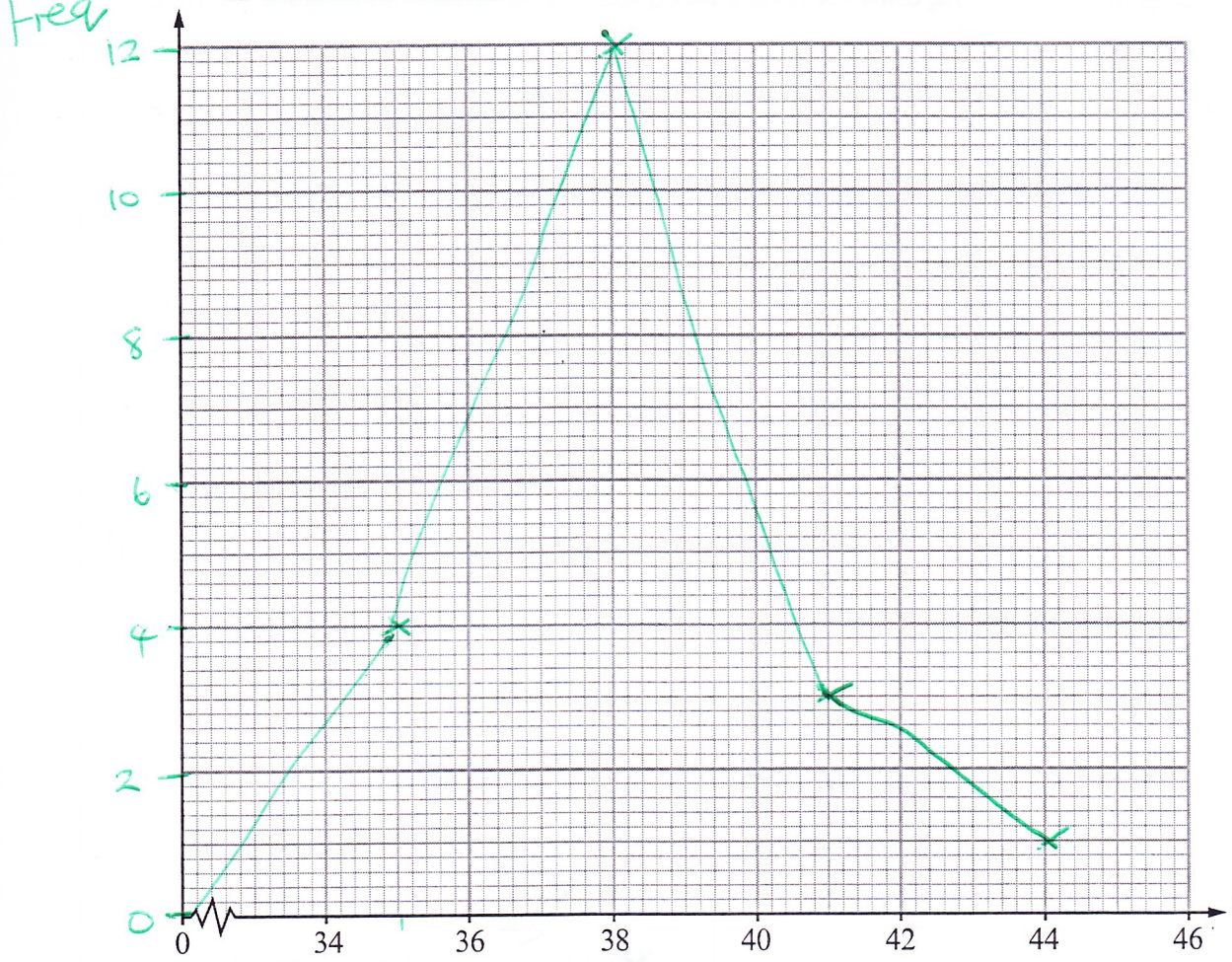
(b) Which is the modal group?

37 to 39

[1]

Examiner only

(c) On the graph paper below, draw a grouped frequency polygon to show the distribution of the sizes of trainers.



[3]

(d) A shop decides to stock 600 pairs of women's trainers in the same proportions as the results of the survey.
Complete the stock order form below.

Women's trainers stock order form	
Size of trainers	Number of pairs of trainers
34 to 36	4 x 30 = 120
37 to 39	12 x 30 = 360
40 to 42	3 x 30 = 90
43 to 45	1 x 30 = 30

.....

.....

.....

.....

[3]

Examiner only

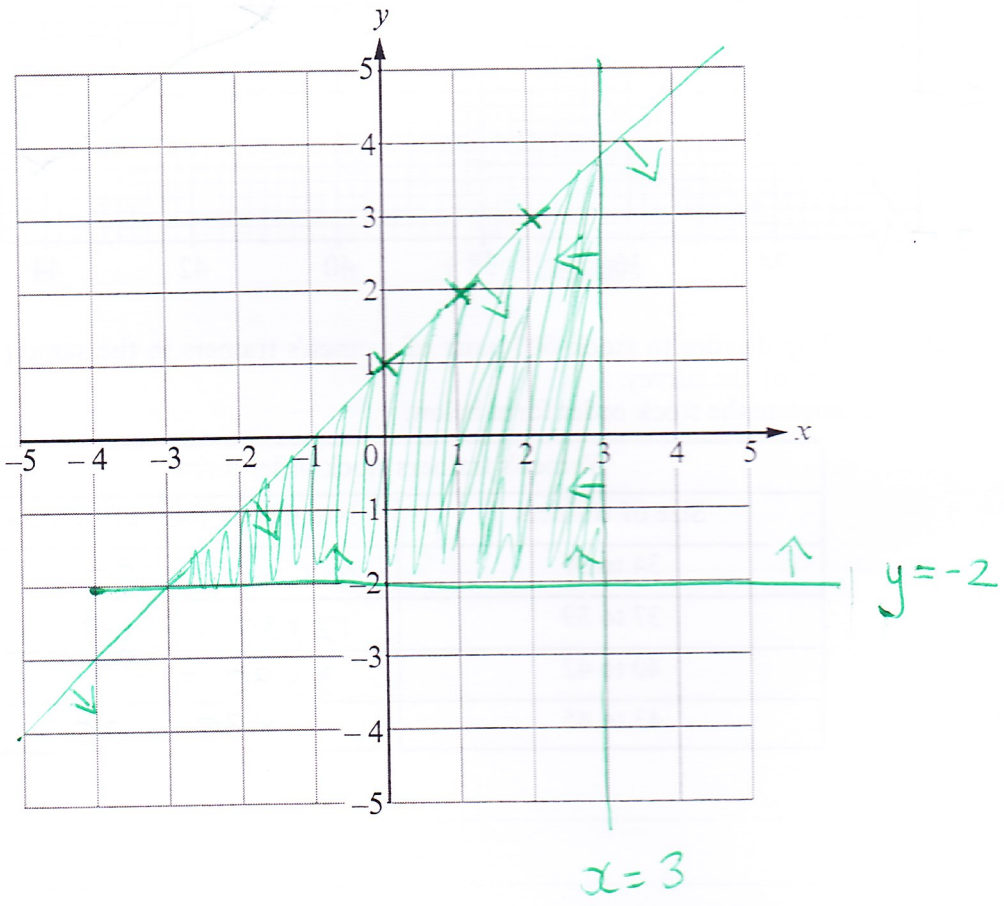
5. On the graph paper below, draw the region which satisfies **all** of the following inequalities.

$$y \leqslant x + 1$$
$$y \geqslant -2$$
$$x \leqslant 3$$

Make sure that you clearly indicate the region that represents your answer.

x	0	1	2
y	1	2	3

[3]



Examiner only

6. *(a)* Make r the subject of the following formula.

$$3r + d = f^2 + 4$$

$3r = f^2 - d + 4$

$r = \dfrac{(f^2 - d + 4)}{3}$

[2]

(b) Solve the inequality $5(t-2) > 3t + 14$.

$5t - 10 > 3t + 14$

$5t - 3t > 14 + 10$

$2t > 24$

$t > 12$

[3]

(c) Solve $x(x+4) = 0$.

$x = 0$ or $x + 4 = 0$

$x = -4$

[2]

Examiner only

7. *(a)* Ruth and Tony share £1491 in the ratio 2 : 5.
Calculate how much they each receive.

7 parts = 1491

1 part = $\frac{1491}{7}$ = £213

2 × 213 = 426 5 × 213 = 1065

Ruth £ 426

Tony £ 1065

[2]

(b) Find the compound interest, to the nearest penny, when £6000 is invested for 3 years at 4% per annum.

Total = 6000×1.04^3

= £6749.18

∴ Interest = 6749.18 − 6000

= £749.18

[4]

Examiner only

(c) The cost of a meal for a group of people, including an 8% service charge, is £203.04. Calculate the cost of the meal before the service charge was added.

$\square \times 1.08 = 203.04$

$\frac{203.04}{1.08} = £188$

[3]

(d) Two boxes are stacked one on top of the other.
The height of one box is 57 cm correct to the nearest centimetre.
The height of the other box is 38 cm correct to the nearest centimetre.
Find the least height and the greatest height of the boxes when stacked one on top of the other.

Box 1 Max 57.5 cm Min 56.5 cm

Box 2 Max 38.5 cm Min 37.5 cm

37.5 + 56.5 38.5 + 57.5

Least height 94.0 cm

Greatest height 96 cm

[2]

Examiner only

8. Two friends, Kim and Terry, are planning a camping holiday.

(a) The floor of their tent can be thought of as a rectangle.
The tent has a ground area of $5{\cdot}12\,m^2$.

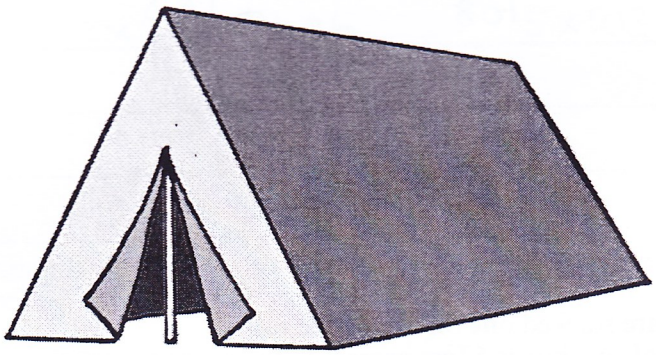


Diagram not drawn to scale

The length of the tent is twice as long as the width.
Calculate the length and width of the floor of the tent.

$2x^2 = 5{\cdot}12$

$x^2 = 2{\cdot}56$

$x = 1{\cdot}6$

Length 3·2 metres Width 1·6 metres

[4]

Examiner only

(b) Their tent packs away in a bag.

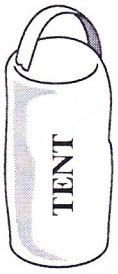


Diagram not drawn to scale

The bag can be thought of as a cylinder.
When packed with the tent the diameter of the bag is 28 cm and the length is 44 cm.
Calculate the volume, in litres, of the bag when it is packed.

$V = \pi r^2 h$

$V = 3.14 \times 14 \times 14 \times 44$

$V = 27079.4 \text{ cm}^3$

$V = 27.1$ litres

[4]

(c)

Europark Campsite
Charges per night
1 person .... 9.20 euros
Pets .... 0.30 euros
Each tent plot .... 0.69 euros

Kim and Terry share one tent and stay for 2 nights at the Europark Campsite.
They changed pounds into euros for an exchange rate of 1.15 euros to the pound.
Calculate the cost, in pounds, of their 2 night stay in their tent.

Cost $= [0.69 + 9.20 + 9.20] \times 2$

$= 38.18$ €

$= \frac{38.18}{1.15} = £33.20$

[5]

Examiner only

9. *(a)*

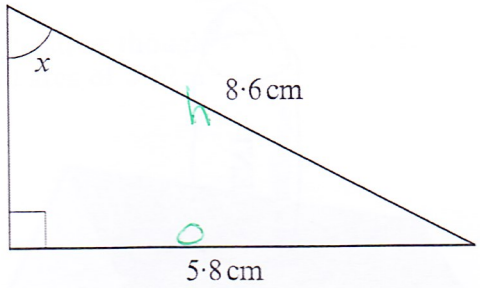


Diagram not drawn to scale

Calculate the size of the angle marked x.

$\sin x = \frac{5.8}{8.6}$

$x = 42.4°$

[3]

(b)

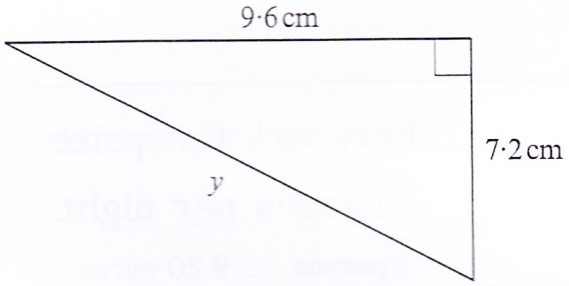


Diagram not drawn to scale

Calculate the length of the side marked y.

$y^2 = 9.6^2 + 7.2^2$

$y^2 = 92.16 + 51.84$

$y^2 = 144$

$y = 12$ cm

[3]

Examiner only

(c)

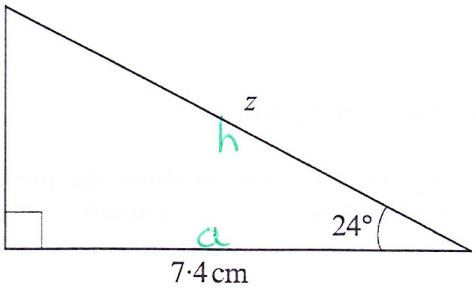


Diagram not drawn to scale

Calculate the length of the side marked z.

$\cos 24^\circ = \frac{7.4}{z}$

$z = \frac{7.4}{\cos 24}$

$z = 8.1 \text{ cm}$

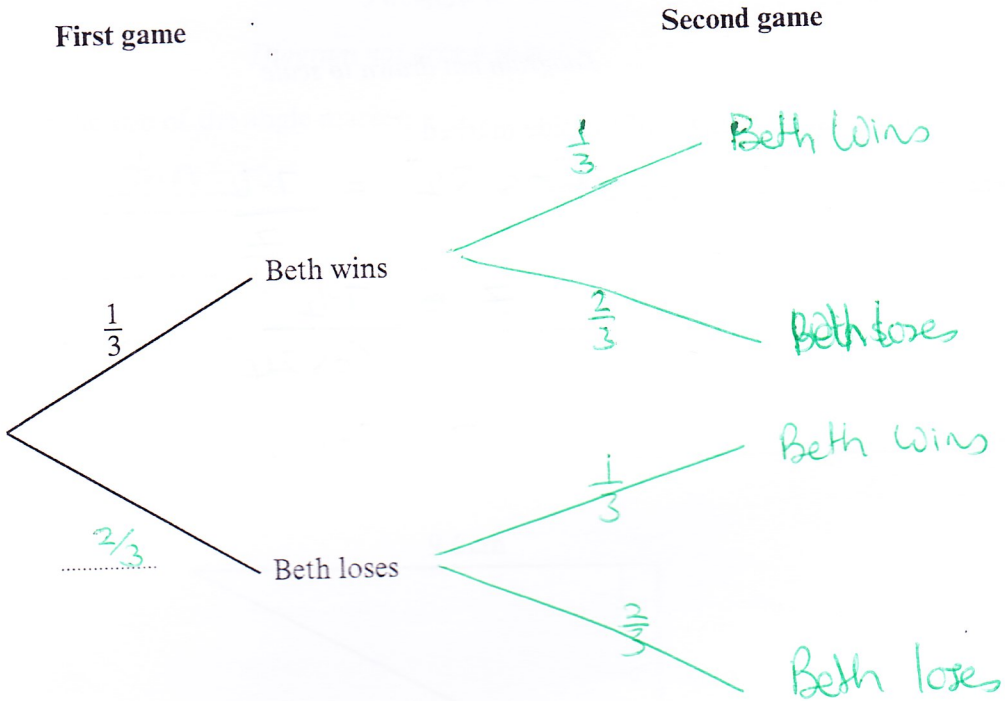
[3]

Examiner only

10. Whenever Beth plays a game of pool against Zainab, the probability that she wins the game is $\frac{1}{3}$.

Beth plays **two** games of pool against Zainab.

(a) Complete the following tree diagram to show the probabilities of what can happen when Beth plays **two** games of pool against Zainab.



[3]

(b) Calculate the probability that Beth wins both games against Zainab.

$= \frac{1}{3} \times \frac{1}{3}$

$= \frac{1}{9}$

[2]

Examiner only

11. *(a)* You are given that y is inversely proportional to x^2, and that $y = 100$ when $x = 2$.

(i) Find an expression for y in terms of x.

$y = \frac{k}{x^2}$

$100 = \frac{k}{4}$ $\therefore$ $y = \frac{400}{x^2}$

$400 = k$

(ii) Use the expression you found in (i) to complete the following table.

x	2	10	40
y	100	4	$\frac{1}{4}$

$x = 10$ $y = \frac{400}{10^2} = 4$

$\frac{1}{4} = \frac{400}{x^2}$ $4 = \frac{x^2}{400}$

$1600 = x^2$

$40 = x$

[5]

(b) Use the quadratic formula to solve the equation $5x^2 + 20x - 4 = 0$.
Give your answers correct to two decimal places.

$x = \frac{-20 \pm \sqrt{400 - 4(5)(-4)}}{10}$

$x = \frac{-20 \pm \sqrt{400 + 80}}{10}$

$x = \frac{-20 \pm \sqrt{480}}{10}$

$x = \frac{-20 \pm 21.9}{10}$

$x = \frac{1.9}{10}$ or $\frac{-41.9}{10}$

$= 0.19$ -4.19

[3]

Examiner only

12. Vectors **OM**, **ON** and **OP** are shown in the diagram below.

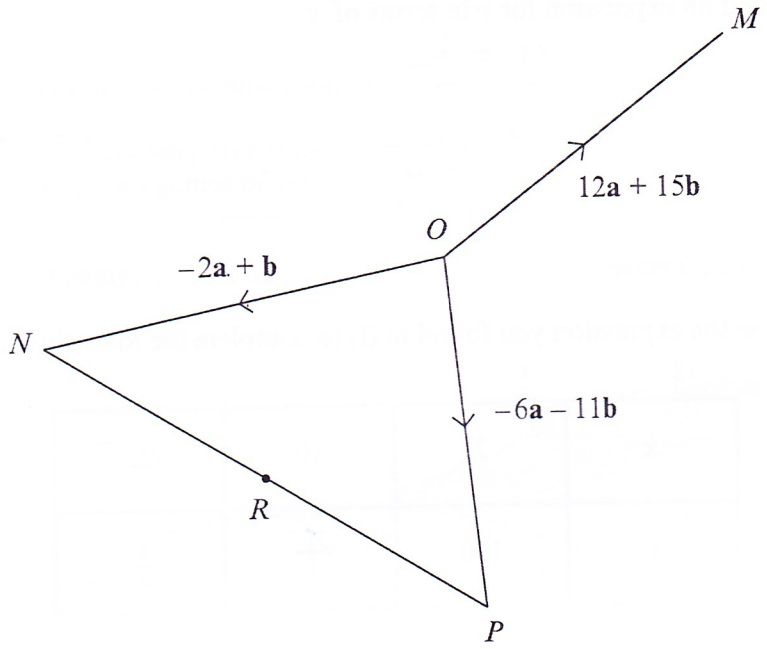


Diagram not drawn to scale

(a) Find **PN** in terms of **a** and **b**.

.....

.....

.....

[2]

(b) The point R is the mid-point of NP.

(i) Find **RO** in terms of **a** and **b** in its simplest form.

.....

.....

.....

.....

(ii) Show that **OM** = k**RO** where k is a constant.

.....

.....

.....

Examiner only

(iii) State **two** geometrical relationships between RO and OM.

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.....

.....

.....

.....

[5]

13.

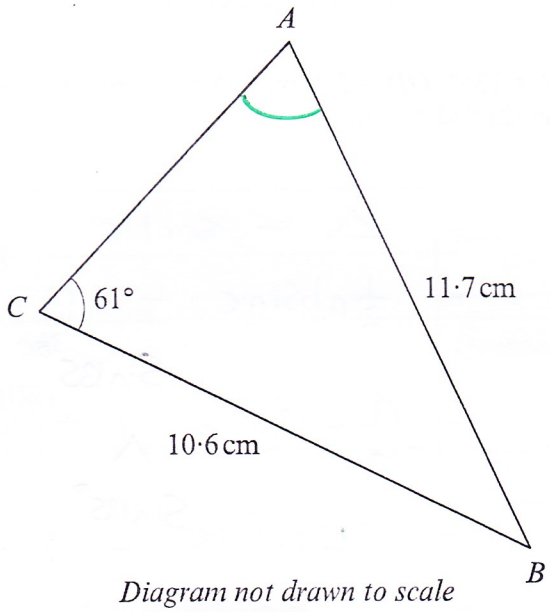

Diagram not drawn to scale

Calculate the size of $C\hat{A}B$.

$$\frac{10.6}{\sin C\hat{A}B} = \frac{11.7}{\sin 61}$$

$$\frac{\sin C\hat{A}B}{10.6} = \frac{\sin 61}{11.7}$$

$$\sin C\hat{A}B = \frac{\sin 61}{11.7} \times 10.6$$

$$\sin C\hat{A}B = 0.7923$$

$$C\hat{A}B = 52.4°$$

[3]

Examiner only

14. In the diagram below, AD is an arc of a circle with centre O and OCB is a triangle.

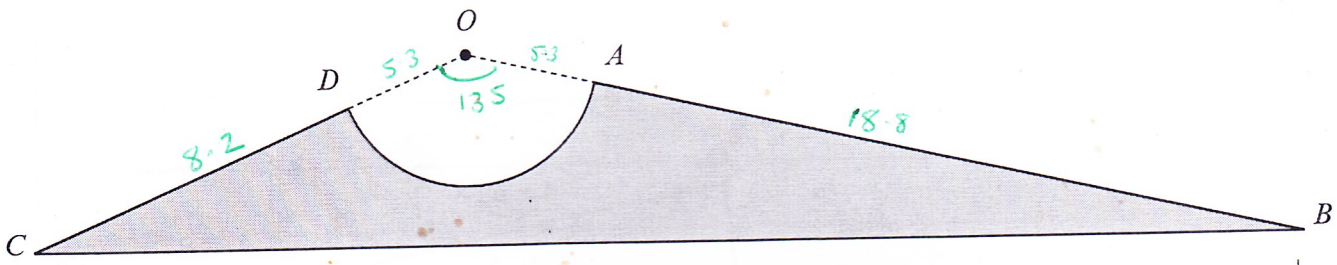

Diagram not drawn to scale

You are given that $D\hat{O}A = 135°$, $OD = 5{\cdot}3\,\text{cm}$, $CD = 8{\cdot}2\,\text{cm}$ and $AB = 18{\cdot}8\,\text{cm}$.
Calculate the area of the shaded region $ABCD$.

Area /// = △ − sector

$= \frac{1}{2}ab\sin C - \frac{135}{360}\cdot\pi r^2$

$= \left(\frac{1}{2}\times 13{\cdot}5\times 24{\cdot}1\times \sin 135^\circ\right) - \left(\frac{135}{360}\times 3{\cdot}14\times 5{\cdot}3\times 5{\cdot}3\right)$

$= 162{\cdot}675 - 33{\cdot}076$

$= 129{\cdot}6\ \text{cm}^2$

$= 115{\cdot}03 - 33{\cdot}08$

$= 81{\cdot}94\ \text{cm}^2$.

[9]