



# Cambridge IGCSE™

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**CAMBRIDGE INTERNATIONAL MATHEMATICS**

**0607/43**

Paper 4 (Extended)

**May/June 2020**

**2 hours 15 minutes**

You must answer on the question paper.

You will need: Geometrical instruments

## INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You should use a graphic display calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly and you will be given marks for correct methods, including sketches, even if your answer is incorrect.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.
- For  $\pi$ , use your calculator value.

## INFORMATION

- The total mark for this paper is 120.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **20** pages. Blank pages are indicated.

## Formula List

For the equation  $ax^2 + bx + c = 0$   $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Curved surface area,  $A$ , of cylinder of radius  $r$ , height  $h$ .  $A = 2\pi rh$

Curved surface area,  $A$ , of cone of radius  $r$ , sloping edge  $l$ .  $A = \pi rl$

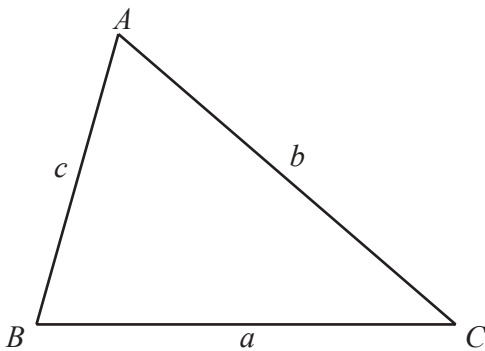
Curved surface area,  $A$ , of sphere of radius  $r$ .  $A = 4\pi r^2$

Volume,  $V$ , of pyramid, base area  $A$ , height  $h$ .  $V = \frac{1}{3}Ah$

Volume,  $V$ , of cylinder of radius  $r$ , height  $h$ .  $V = \pi r^2 h$

Volume,  $V$ , of cone of radius  $r$ , height  $h$ .  $V = \frac{1}{3}\pi r^2 h$

Volume,  $V$ , of sphere of radius  $r$ .  $V = \frac{4}{3}\pi r^3$



$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$\text{Area} = \frac{1}{2}bc \sin A$$

Answer **all** the questions.

**1** For each sequence, write down the next two terms and find an expression for the  $n$ th term.

**(a)** 15, 11, 7, 3, -1, ...

Next two terms ....., .....

$n$ th term ..... [3]

**(b)** 1, 2, 4, 8, 16, ...

Next two terms ....., .....

$n$ th term ..... [3]

**(c)** 4, 10, 18, 28, 40, ...

Next two terms ....., .....

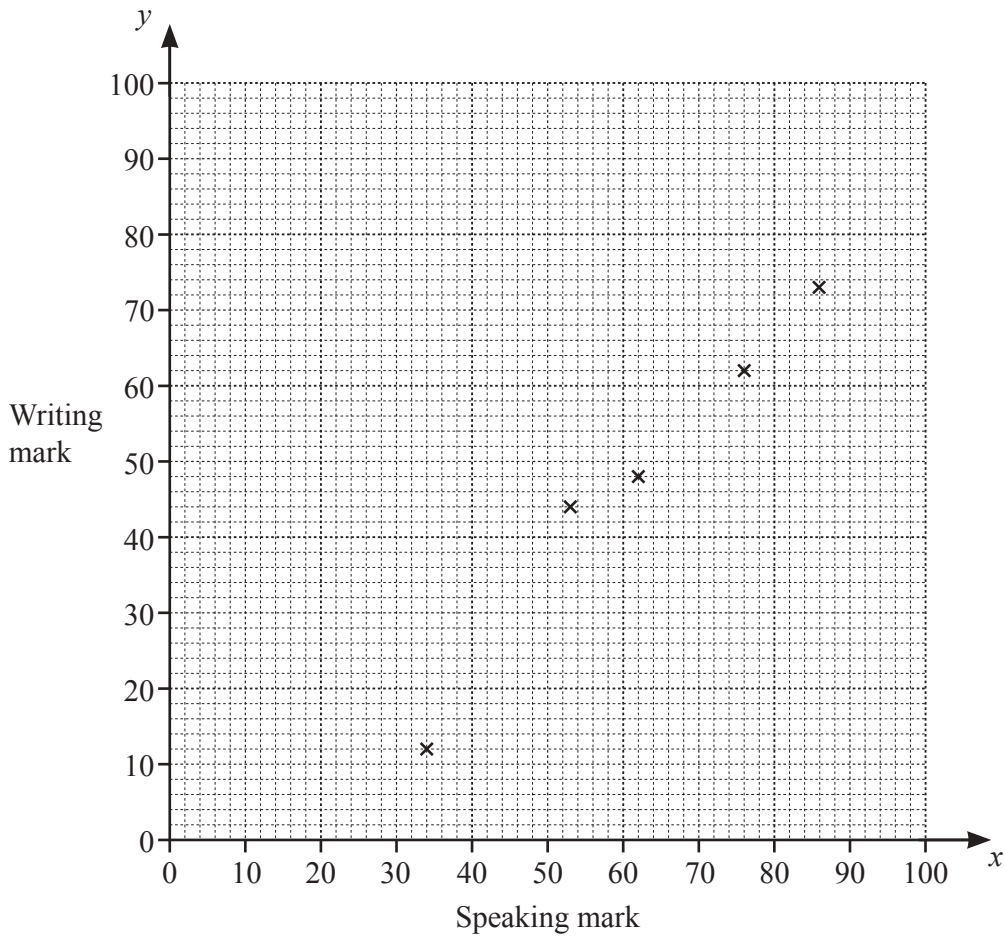
$n$ th term ..... [3]

- 2 10 students take a language examination.  
The examination consists of two parts, a speaking test and a writing test.  
Both tests are marked out of 100.

The marks for the students in each of the tests is shown in the table.

Speaking mark ( $x$ )	86	62	53	34	76	95	30	70	88	72
Writing mark ( $y$ )	73	48	44	12	62	66	26	44	90	75

- (a) Complete the scatter diagram to show these results.  
The first five points have been plotted for you.



[2]

- (b) What type of correlation is shown in your scatter diagram?

..... [1]

- (c) (i) Calculate the equation of the regression line in the form  $y = mx + c$ .

$$y = \dots\dots\dots [2]$$

- (ii) Use this equation to estimate a mark in the writing test for a student who scored 48 in the speaking test.

$$\dots\dots\dots [1]$$

3 (a) Riaz invests \$5000 at a rate of 2.5% per year simple interest.

(i) Calculate the value of the investment at the end of 4 years.

\$ ..... [3]

(ii) Calculate the number of complete years it will take for the value of the investment to be \$6500.

..... [2]

(b) Yasmin invests \$5000 at a rate of 2% per year compound interest.

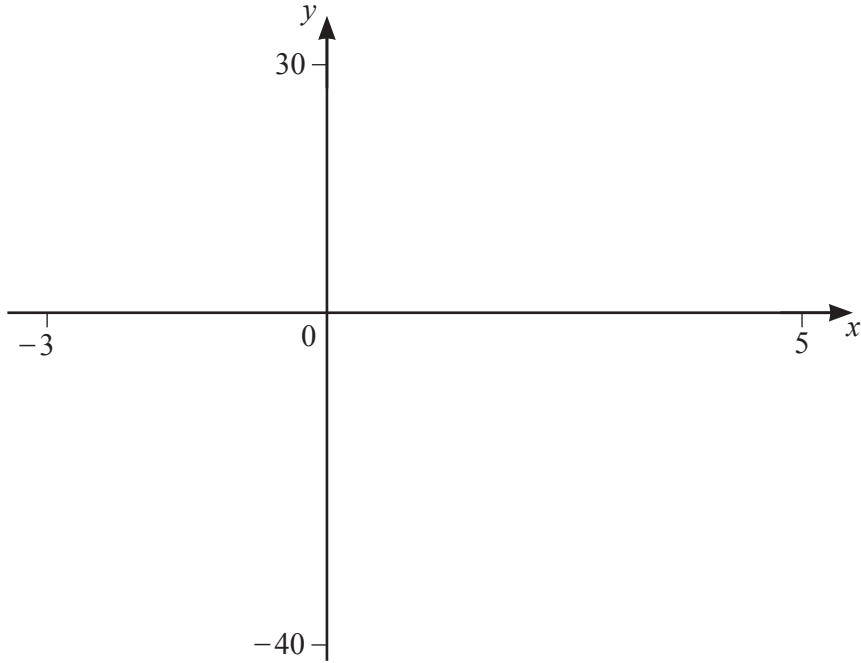
(i) Calculate the value of Yasmin's investment at the end of 4 years.

\$ ..... [3]

(ii) Calculate the number of complete years it will take for the value of Yasmin's investment to first be worth more than \$6500.

..... [4]

4



$$f(x) = x^3 - 4x^2 - 3x + 18$$

(a) On the diagram, sketch the graph of  $y = f(x)$  for  $-3 \leq x \leq 5$ . [2]

(b) Solve the equation  $f(x) = 10$ .

$x = \dots\dots\dots$ , or  $x = \dots\dots\dots$ , or  $x = \dots\dots\dots$  [3]

(c) Write down the coordinates of

(i) the local maximum,

( $\dots\dots\dots$ ,  $\dots\dots\dots$ ) [2]

(ii) the local minimum.

( $\dots\dots\dots$ ,  $\dots\dots\dots$ ) [1]

(d)  $f(x) = k$  has only 1 solution.

Find the ranges of values of  $k$ .

$\dots\dots\dots$  [2]

- 5 (a) (i) A reflection in the line  $y = 3$  maps triangle  $A$  onto triangle  $B$ .

Describe fully the **single** transformation that maps triangle  $B$  onto triangle  $A$ .

.....  
 ..... [1]

- (ii) A translation using the vector  $\begin{pmatrix} 5 \\ -4 \end{pmatrix}$  maps triangle  $C$  onto triangle  $D$ .

Describe fully the **single** transformation that maps triangle  $D$  onto triangle  $C$ .

.....  
 ..... [2]

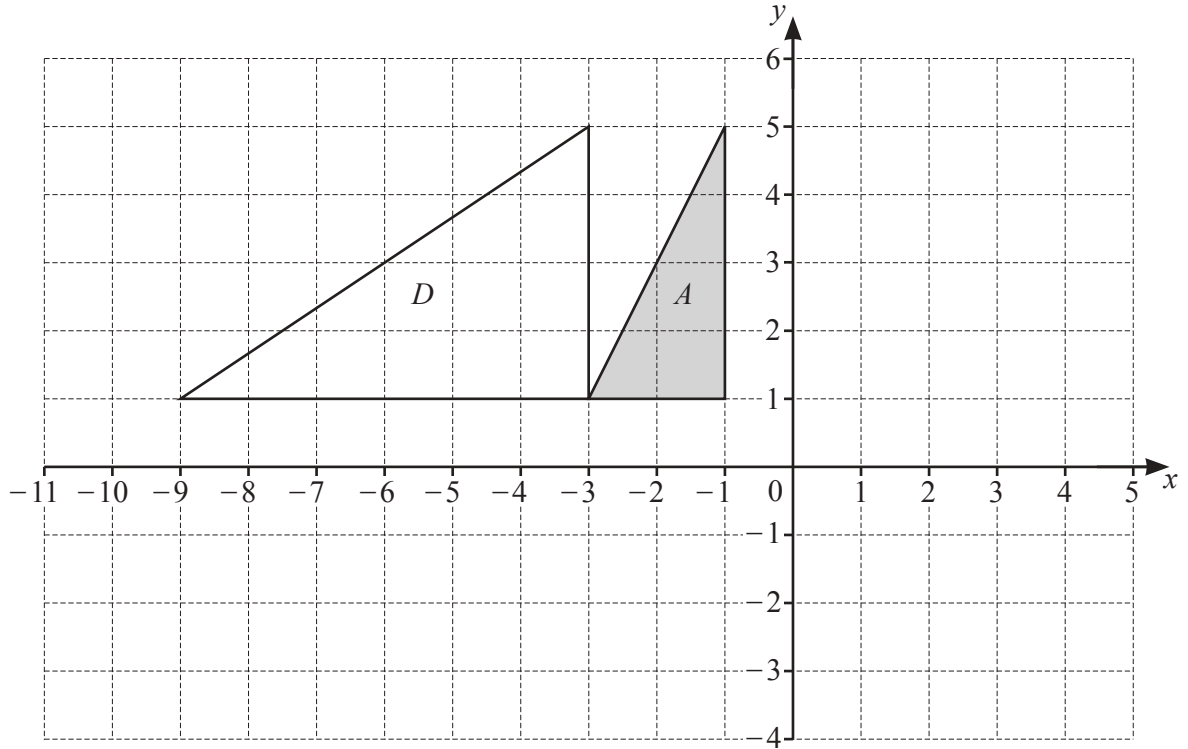
- (iii) An enlargement, centre  $(2, -1)$ , scale factor 3, maps triangle  $G$  onto triangle  $H$ .

Describe fully the **single** transformation that maps triangle  $H$  onto triangle  $G$ .

.....  
 ..... [2]



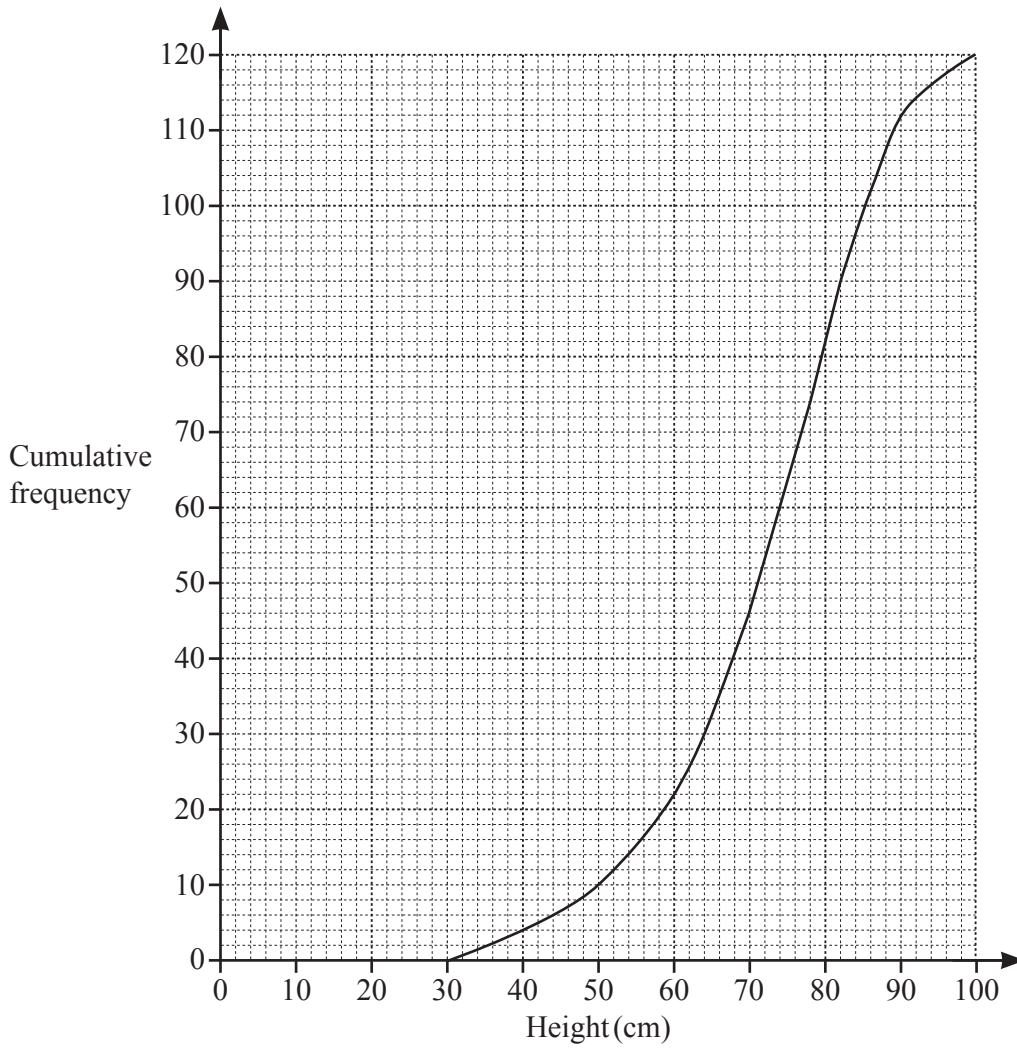
(b)



- (i) Rotate triangle  $A$  through  $90^\circ$  anticlockwise, centre  $(-1, 0)$ .  
Label the image  $B$ . [2]
- (ii) Enlarge triangle  $A$  with scale factor  $-\frac{1}{2}$ , centre  $(1, 3)$ .  
Label the image  $C$ . [2]
- (iii) Describe fully the **single** transformation that maps triangle  $A$  onto triangle  $D$ .

..... [3]  
 .....

6 The cumulative frequency graph shows the heights, in centimetres, of 120 plants in location A.



(a) Use the graph to estimate

(i) the median,

..... cm [1]

(ii) the interquartile range,

..... cm [2]

(iii) the number of plants over 80 cm in height.

..... [2]

(b) The table gives some information about 120 similar plants in location B.

Minimum height (cm)	Lower quartile (cm)	Median (cm)	Interquartile range (cm)	Range (cm)
10	34	50	28	90

- (i) On the grid opposite, draw the cumulative frequency curve for the heights of the plants in location B. [3]
- (ii) Use the curves to estimate how many **more** plants had heights of over 70 cm in location A than in location B.

..... [2]

- (iii) The heights of the plants in location A are more consistent than the heights of the plants in location B.

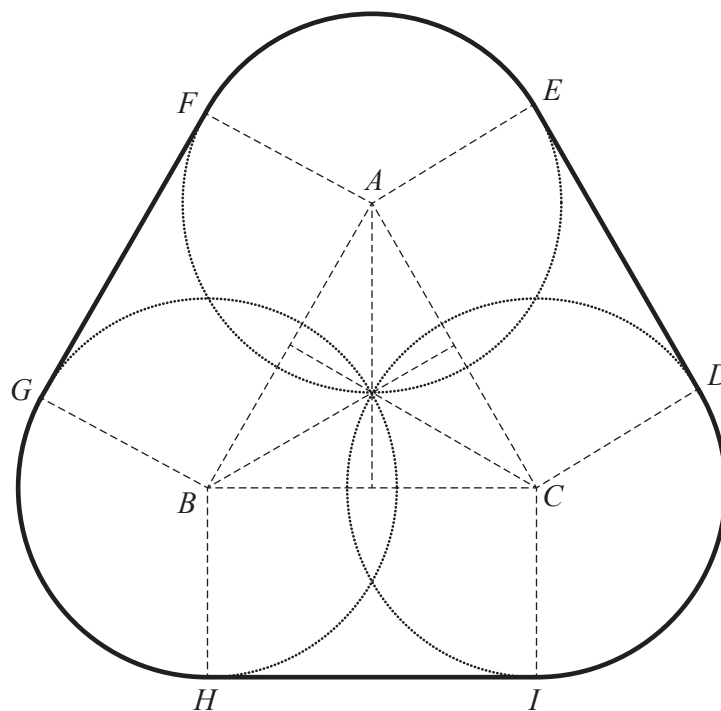
By comparing the **shapes** of the curves, explain how you know this is true.

.....  
 ..... [1]

- 7 The diagram shows a radio in the shape of a prism.



This diagram shows the base of the radio.



$ABC$  is an equilateral triangle.

The circles have their centres at  $A$ ,  $B$  and  $C$  and each has a radius of 5 cm.

$DE$ ,  $FG$  and  $HI$  are tangents to the circles.

- (a) Show that  $AB = 8.66$  cm, correct to 3 significant figures.

[3]

(b) Calculate the area of the base of the radio.

.....  $\text{cm}^2$  [4]

(c) The height of the radio is 12 cm.

Calculate the volume of the radio.

.....  $\text{cm}^3$  [1]

- 8 The number of people living in each house in a street of 100 houses is recorded. The results are shown in the table.

Number of people	Frequency
1	5
2	16
3	28
4	32
5	17
6	2

(a) Find

(i) the range,

..... [1]

(ii) the median,

..... [1]

(iii) the mean.

..... [2]

(b) Two of the houses are selected at random.

Find the probability that

(i) both had exactly one person living in them,

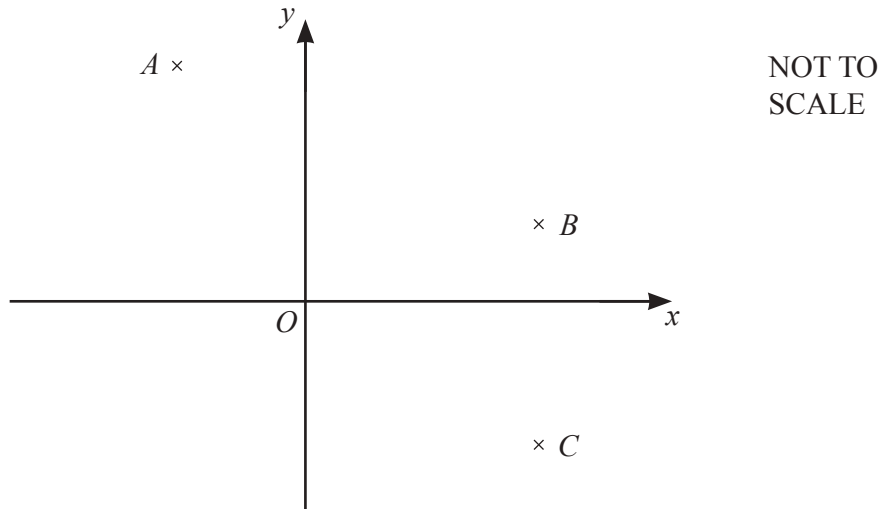
..... [2]

(ii) one had exactly 2 people living in it and the other had exactly 3 people living in it,

..... [3]

(iii) at least one house had fewer than 5 people living in it.

..... [2]



$A$  is the point  $(-2, 6)$ ,  $B$  is the point  $(3, 2)$  and  $C$  is the point  $(3, -4)$ .

(a) Write down the equation of  $BC$ .

..... [1]

(b) Find the coordinates of the point  $M$ , the mid-point of  $AC$ .

(....., .....) [1]

(c) The quadrilateral  $ABCD$  has rotational symmetry of order 2 about the point  $M$ .

Find the coordinates of the point  $D$ .

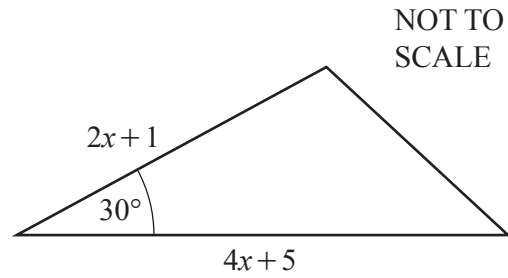
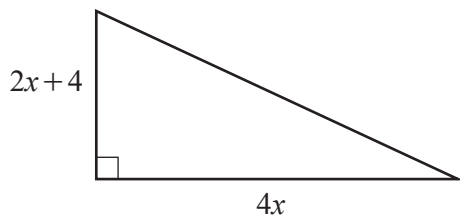
(....., .....) [2]

(d) Find the equation of the perpendicular bisector of  $AC$ .

..... [4]



10 In this question, all lengths are in centimetres.



The areas of the two triangles are equal.

(a) Show that  $8x^2 + 18x - 5 = 0$ .

[5]

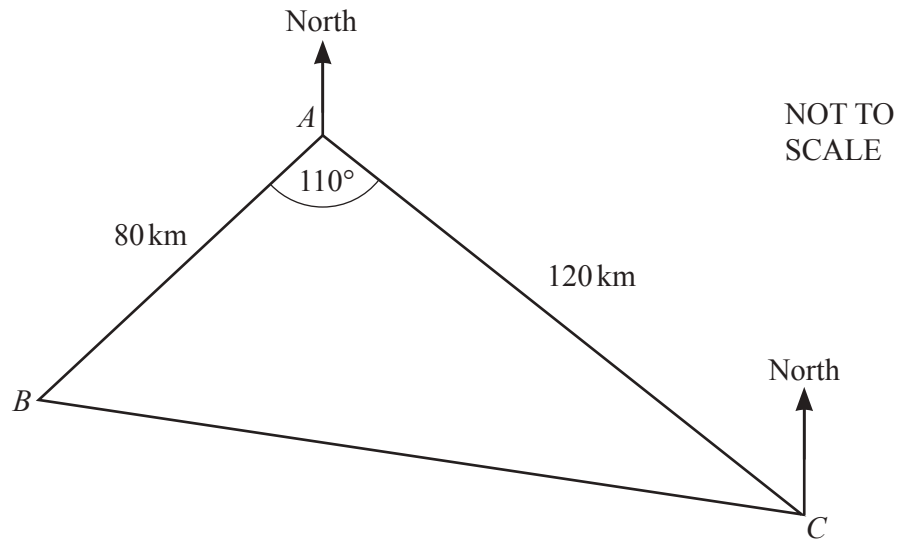
(b) Solve  $8x^2 + 18x - 5 = 0$ .  
You must show all your working.

$x = \dots\dots\dots$  or  $x = \dots\dots\dots$  [3]

(c) Find the area of each of the triangles.

$\dots\dots\dots \text{ cm}^2$  [2]

11



The diagram shows the positions of three ports,  $A$ ,  $B$  and  $C$ .

(a) Calculate  $BC$ .

$$BC = \dots\dots\dots \text{ km [3]}$$

(b) Use the sine rule to calculate angle  $ABC$ .

$$\text{Angle } ABC = \dots\dots\dots [3]$$

- (c) The bearing of  $C$  from  $A$  is  $130^\circ$ .

Find the bearing of  $B$  from  $C$ .

..... [2]

- (d) A ship leaves  $B$  at 13 50 and sails in a straight line towards  $C$ .  
Its constant speed is 37 km/h.

Find the time when it is at its closest point to  $A$ .  
Give your answer correct to the nearest minute.

..... [5]

**Question 12 is printed on the next page.**

12  $f(x) = 2x + 3$        $g(x) = 5 - 3x$

(a) Find  $f(4)$ .

..... [1]

(b) Solve  $f(x) - g(x) = 5$ .

$x =$  ..... [2]

(c) Find  $g^{-1}(x)$ .

$g^{-1}(x) =$  ..... [2]

(d) Find and simplify  $f(g(x))$ .

..... [2]

(e) Simplify  $\frac{2}{f(x)} + \frac{3}{g(x)}$ .

..... [3]

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