Cambridge IGCSE™

CANDIDATE NAME

CENTRE NUMBER | CANDIDATE NUMBER

9976719342

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 π, 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.

DC (ST/JG) 182698/2

Formula List

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

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

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

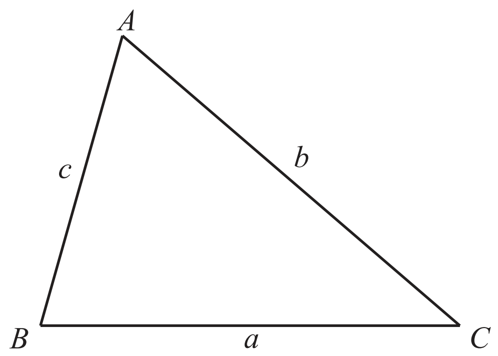
Curved surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

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

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

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

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



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

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

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

Answer **all** the questions.

1 For each sequence, write down the next two terms and find an expression for the nth term.

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

Next two terms .... , ...

nth term .... [3]

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

Next two terms .... , ...

nth term .... [3]

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

Next two terms .... , ...

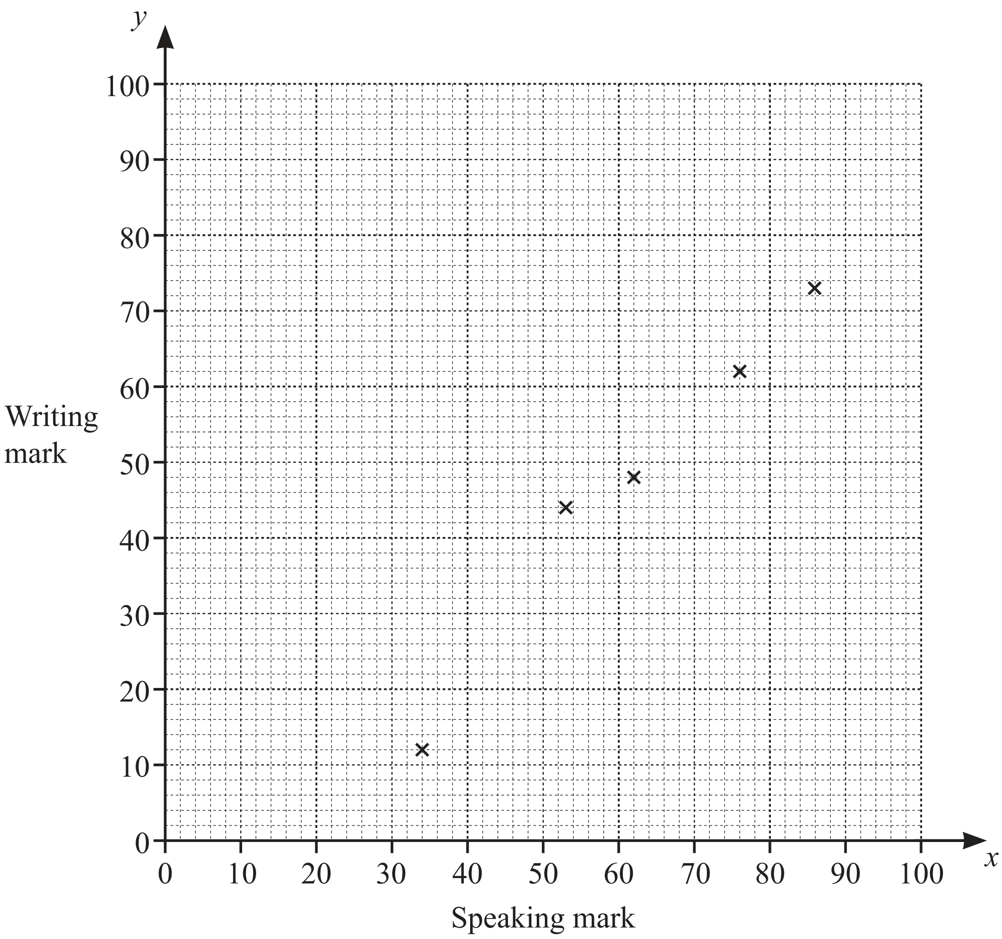
nth term .... [3]

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 $y = mx + c$.

$y =$ .... [2]

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

.... [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.

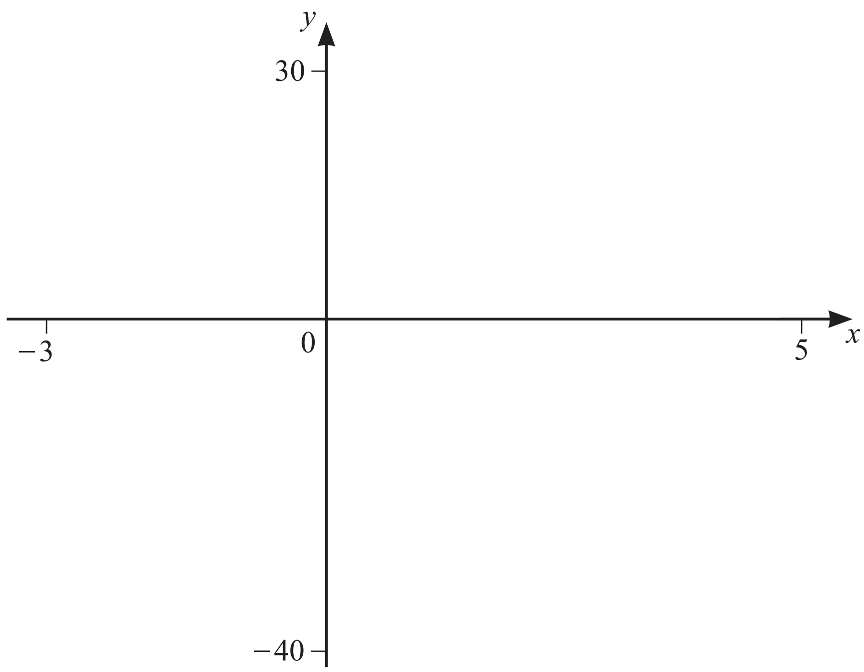
(i) Calculate the value of Yasmin's investment at the end of 4 years.

\$ .... [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 $-3 \leqslant x \leqslant 5$. [2]

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

$x =$ .... , or $x =$ .... , or $x =$ .... [3]

(c) Write down the coordinates of

(i) the local maximum,

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

(ii) the local minimum.

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

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

Find the ranges of values of k .

.... [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]

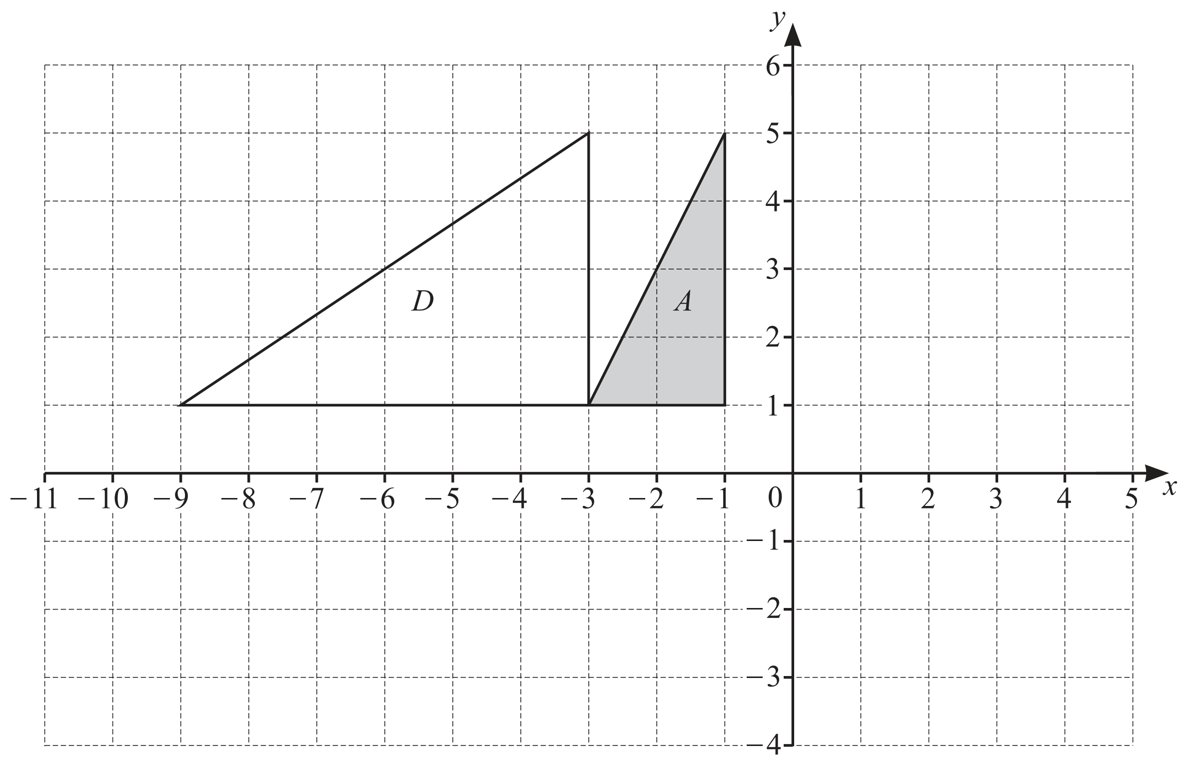
(iii) An enlargement, centre $(2, -1)$, scale factor 3, maps triangle G onto triangle H.

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

....

.... [2]

(b)



(i) Rotate triangle A through 90° anticlockwise, centre $(-1, 0)$.
Label the image B. [2]

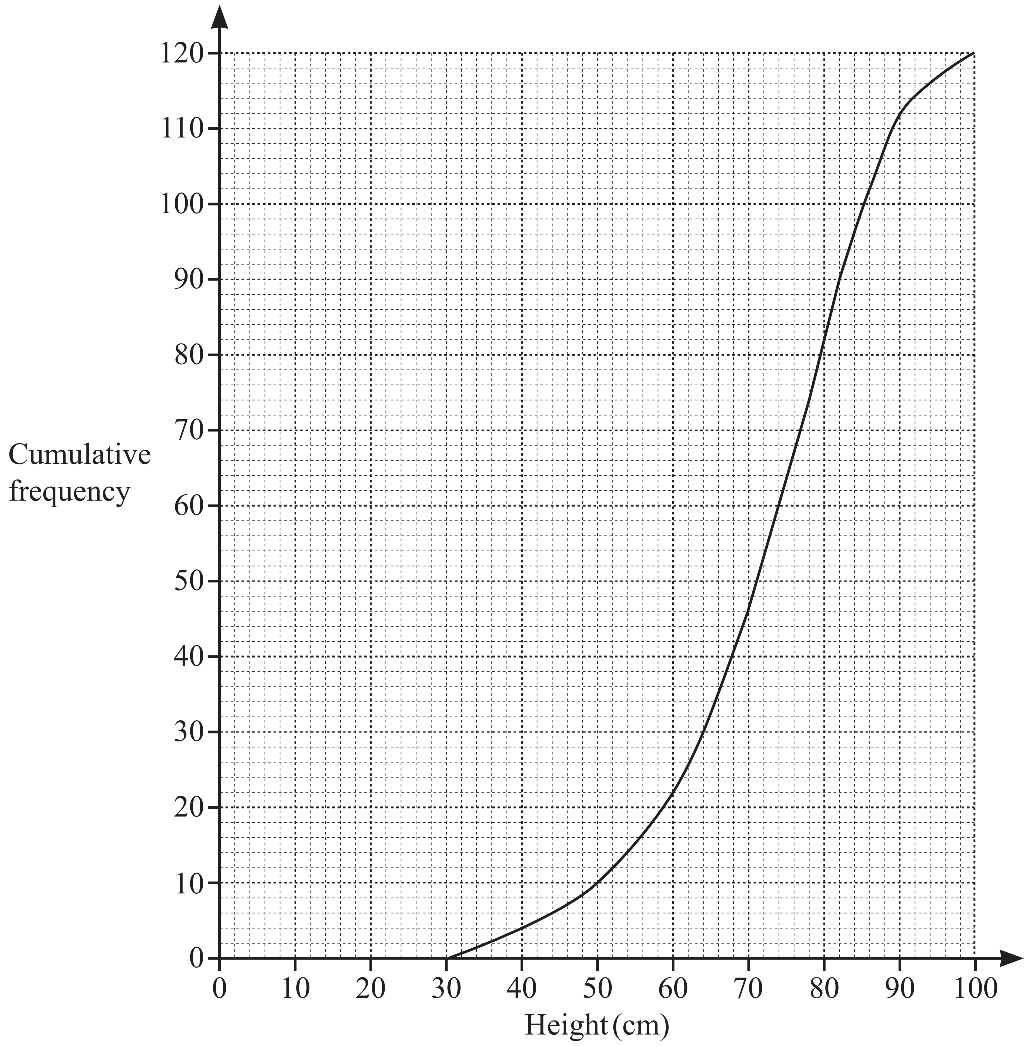
(ii) Enlarge triangle A with scale factor $-\frac{1}{2}$, centre $(1, 3)$.
Label the image C. [2]

(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.

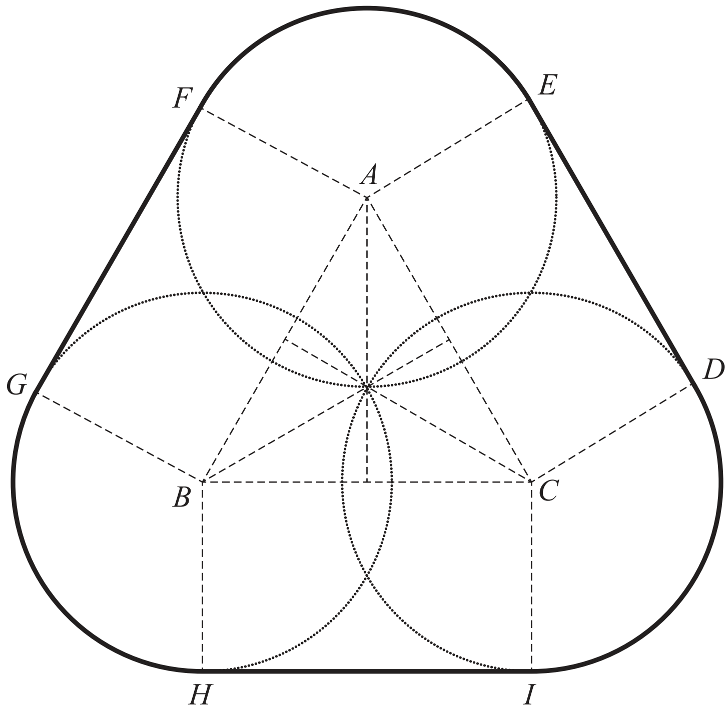
By comparing the **shapes** of the curves, explain how you know this is true.

....

.... [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.

.... cm^2 [4]

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

Calculate the volume of the radio.

.... 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]

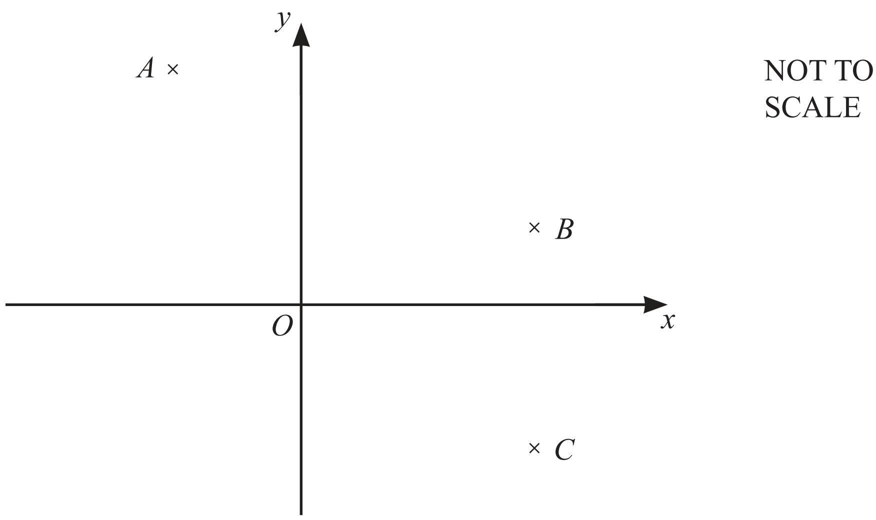
(ii) one had exactly 2 people living in it and the other had exactly 3 people living in it,

.... [3]

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

.... [2]

9



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.

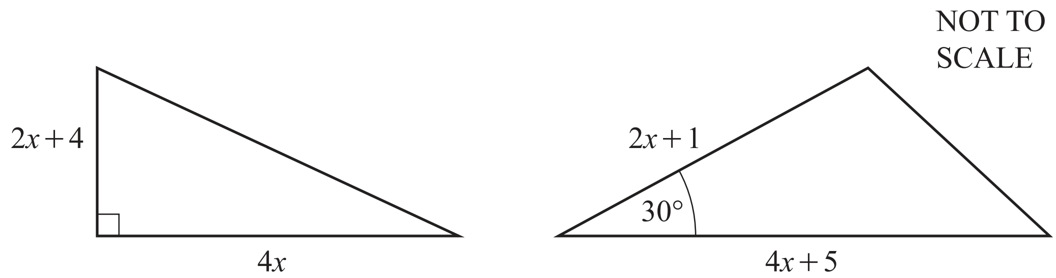
Find the coordinates of the point D.

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

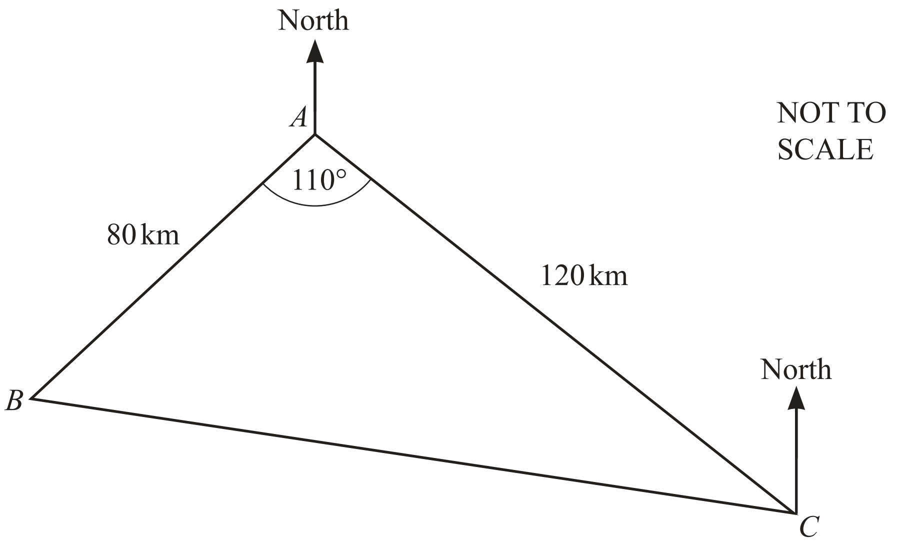
(b) Solve $8x^2 + 18x - 5 = 0$.
You must show all your working.

$x =$ .... or $x =$ .... [3]

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

.... cm^2 [2]

11



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

(a) Calculate *BC*.

BC = ... km [3]

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

Angle *ABC* = ... [3]

(c) The bearing of C from A is 130°.

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 $\quad f(x) = 2x + 3 \qquad g(x) = 5 - 3x$

(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 $\dfrac{2}{f(x)} + \dfrac{3}{g(x)}$.

.... [3]