

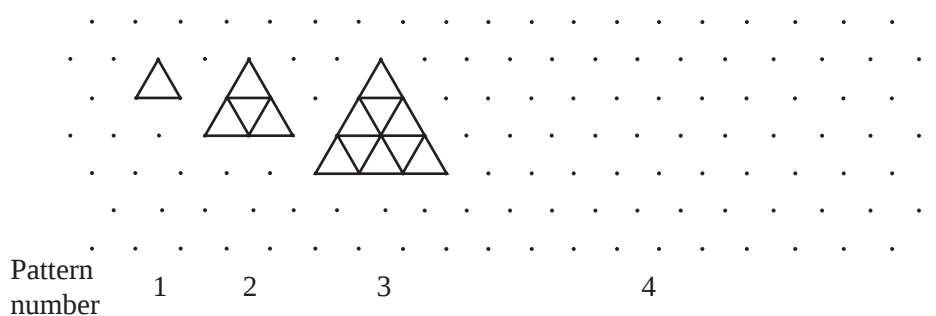
1 (a)

 $\frac{2}{3}$ 2 3 3.14 $\sqrt{35}$ 10 24 37 45 88
For
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From the list of numbers above choose one that is

- (i) an irrational number, *Answer(a) (i)* [1]
- (ii) the cube root of 27, *Answer(a) (ii)* [1]
- (iii) a multiple of 9, *Answer(a) (iii)* [1]
- (iv) a prime number, *Answer(a) (iv)* [1]
- (v) a factor of 44, *Answer(a) (v)* [1]
- (vi) the product of 6 and 4. *Answer(a) (vi)* [1]

(b) The diagram below shows a sequence of patterns made with small triangular tiles.



- (i) Draw the next pattern in the sequence. [1]
- (ii) Complete the table below.

Pattern number	1	2	3	4	5	6
Number of tiles	1	4	9			

- (iii) How many tiles will be in the 100th pattern? [2]

Answer(b) (iii) [1]

- (iv) How many tiles will be in the n th pattern?

Answer(b) (iv) [1]

- (v) What is the special name given to the numbers in the second row of the table?

Answer(b) (v) [1]

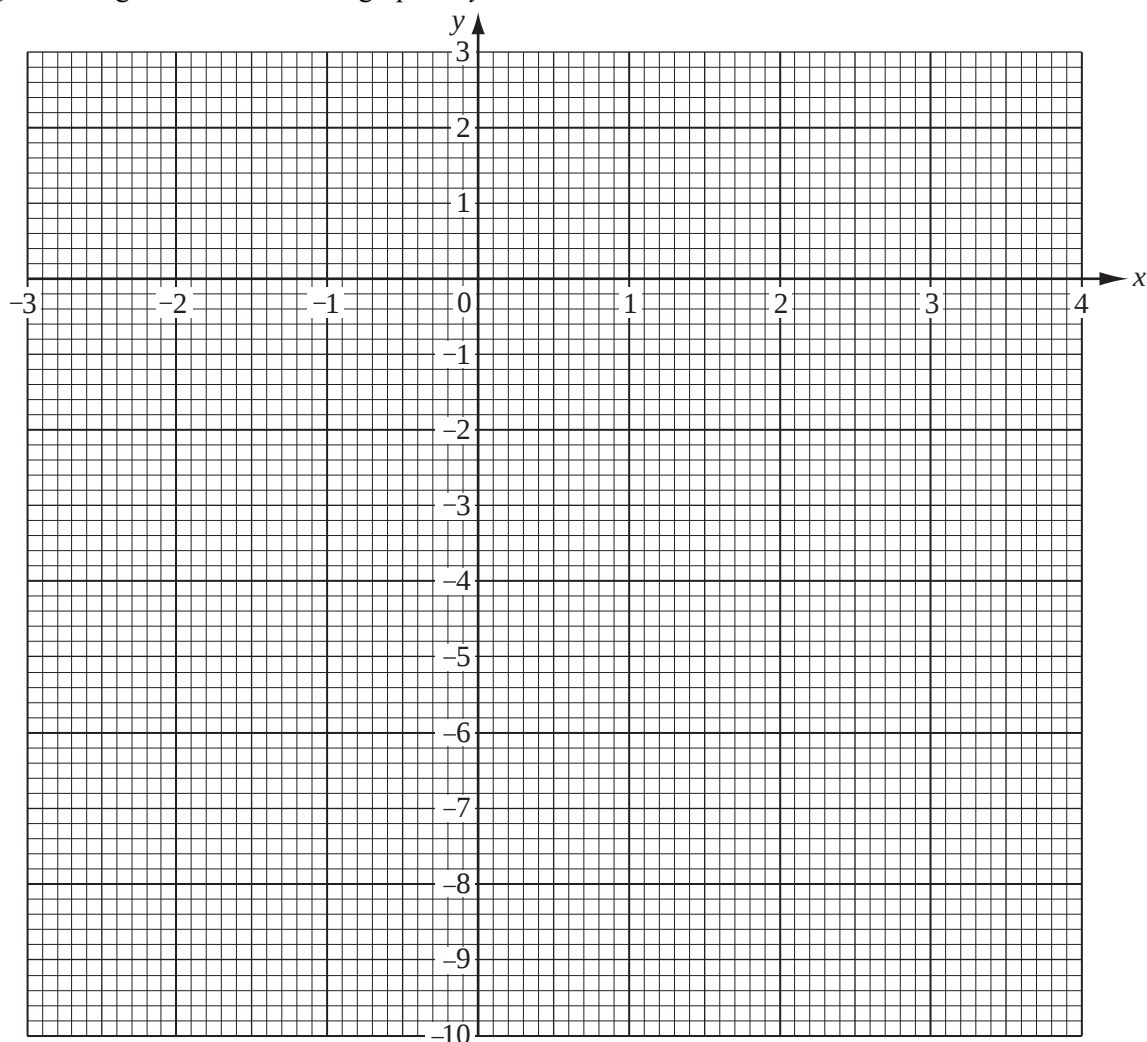
- 2 (a) Complete the table for the equation $y = -x^2 + x + 2$.

x	-3	-2	-1	0	1	2	3	4
y	-10		0	2	2	0		

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[3]

- (b) On the grid below draw the graph of $y = -x^2 + x + 2$.



[4]

- (c) On the grid, draw the line of symmetry of your graph.

[1]

- (d) Use your graph to find the maximum value of y .

Answer(d) $y = \dots\dots\dots$ [1]

- (e) Draw the line $y = 1$ on the grid.

[1]

- (f) Write down the two values of x for which $-x^2 + x + 2 = 1$.

Answer(f) $x = \dots\dots\dots$ or $x = \dots\dots\dots$ [2]

- 3 (a) (i) Calculate the **interior** angle of a regular heptagon (seven-sided polygon).
Write down all the figures on your calculator display.

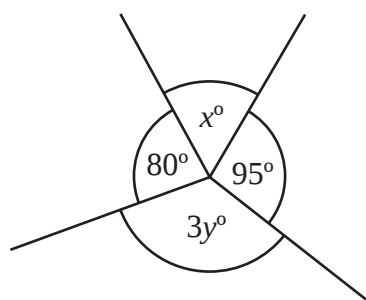
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Answer(a) (i) [2]

- (ii) Round your answer to **part (a)(i)** to 1 decimal place.

Answer(a) (ii) [1]

(b)



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The diagram shows four angles around a point.

- (i) Write down an equation in x and y .

Answer(b) (i) [1]

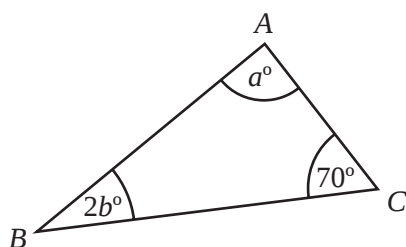
- (ii) Simplify your equation.

Answer(b) (ii) [1]

- (iii) Find y when $x = 65$.

Answer(b) (iii) $y =$ [2]

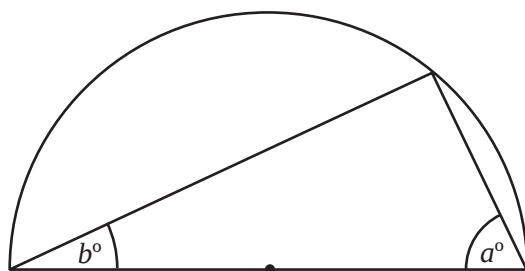
(c) (i)

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Explain why $a + 2b = 110$ in the triangle above.

Answer(c) (i) [1]

(ii)

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Explain why $a + b = 90$ in the semi-circle above.

Answer(c) (ii) [1]

(iii) Solve the equations

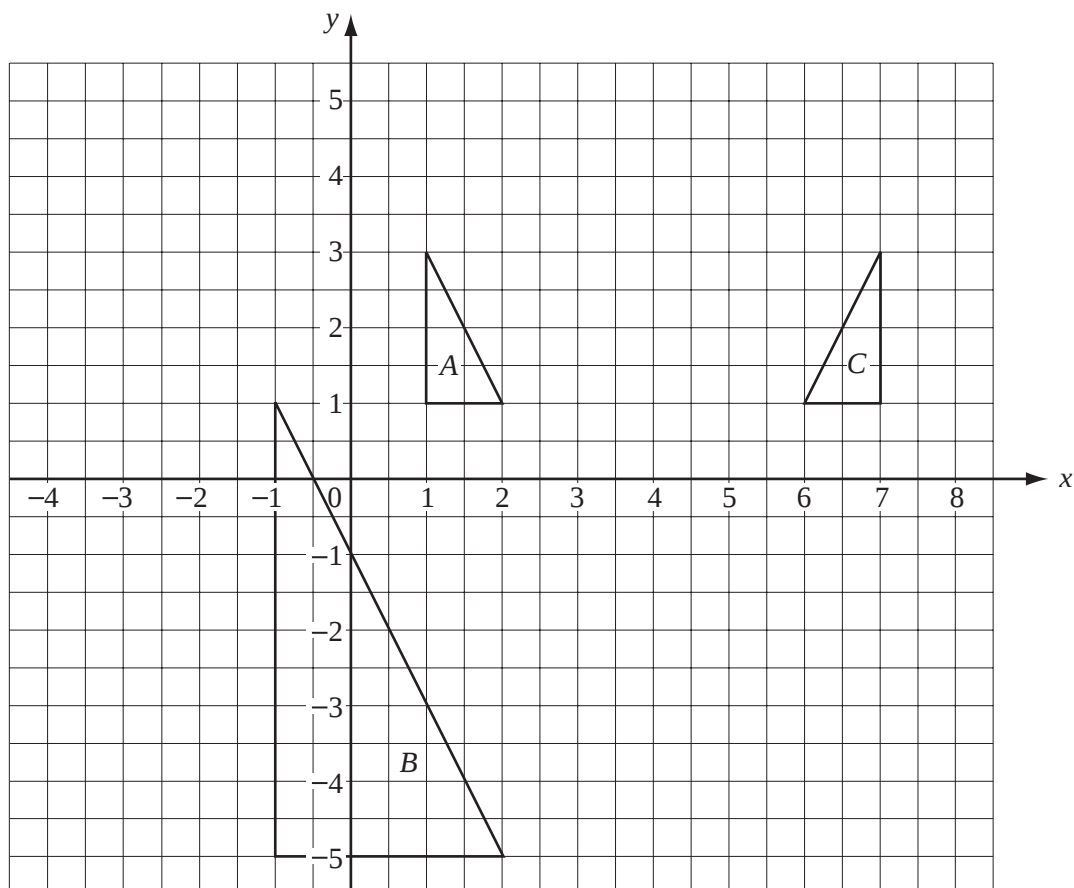
$$\begin{aligned} a + 2b &= 110, \\ a + b &= 90. \end{aligned}$$

Answer(c) (iii) $a =$

$b =$ [2]

(iv) Work out the size of angle ABC in the triangle in **part (c)(i)**.

Answer(c) (iv) Angle $ABC =$ [1]



(a) Describe fully the **single** transformation that maps

(i) triangle *A* onto triangle *B*,

Answer(a) (i) [3]

(ii) triangle *A* onto triangle *C*.

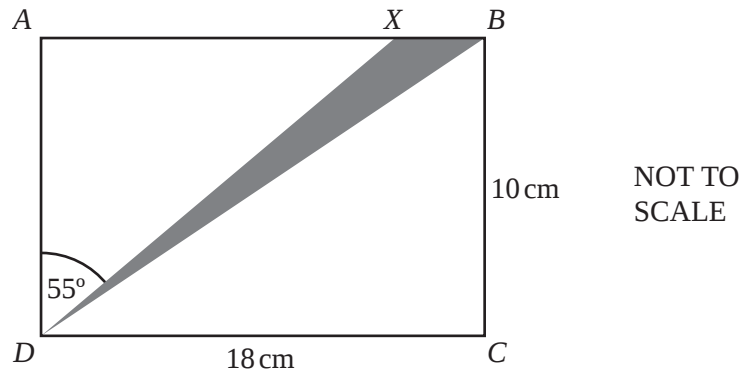
Answer(a) (ii) [2]

(b) On the grid above draw

(i) the translation of *A* by the vector $\begin{pmatrix} 2 \\ -3 \end{pmatrix}$, [2]

(ii) the rotation of *B* through 180° about the point $(-1, -2)$. [2]

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The diagram shows a rectangular tile $ABCD$ which has a shaded triangle DXB .
 $DC = 18$ centimetres, $BC = 10$ centimetres and angle $ADX = 55^\circ$.

- (a) Calculate the area of triangle BDC .

Answer(a) cm^2 [2]

- (b) Calculate the length of AX .

Answer(b) cm [2]

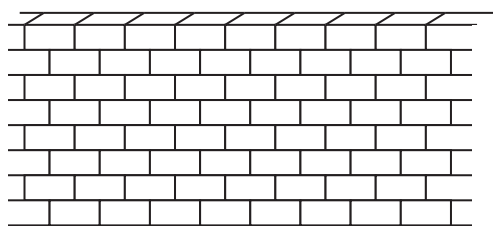
- (c) Calculate the shaded area.

Answer(c) cm^2 [3]

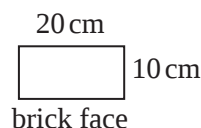
- (d) Calculate the length of BD .

Answer(d) cm [2]

6



Part of the wall

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- (a) A builder estimates the number of bricks in a wall by dividing the area of the wall by the area of the face of a brick.
A brick wall is 10 **metres** long and 1.5 **metres** high.
Each brick is 20 **centimetres** long and 10 **centimetres** high.
Calculate how many bricks the builder estimates are in the wall.
Show all your working.

Answer(a) bricks [3]

- (b) Another wall will need 720 bricks.
The builder adds an extra 5% to this number to allow for mistakes.

- (i) Calculate how many bricks the builder needs to buy.

Answer(b) (i) bricks [2]

- (ii) Bricks are sold in packs of 100 which can not be split.
How many packs should the builder buy?

Answer(b) (ii) packs [1]

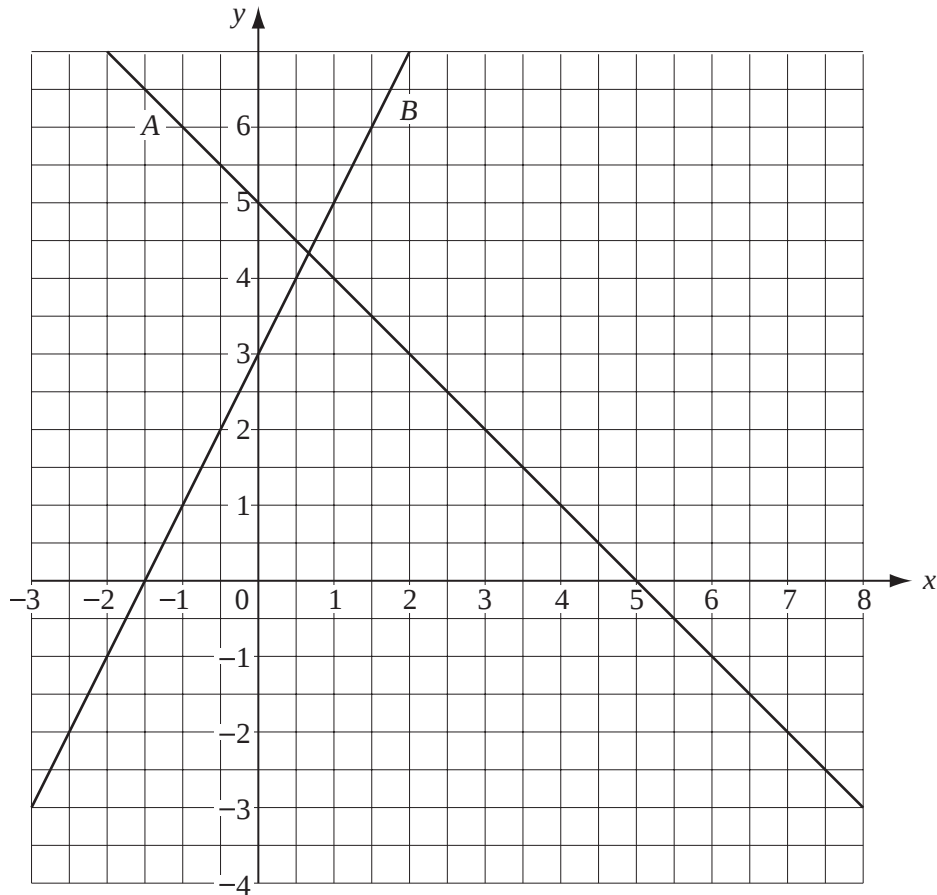
- (c) The builder mixes sand and cement in the ratio 5:2 to make mortar.
He wants 14 buckets of mortar.

- (i) How many buckets of sand and how many buckets of cement does he need?

Answer(c) (i) He needs buckets of sand and buckets of cement. [2]

- (ii) One bag of cement fills 3.5 buckets.
How many bags of cement must the builder buy?

Answer(c) (ii) bags [1]



Two straight lines labelled A and B are shown on the grid above.

- (a) Find the gradient of line A .

Answer(a) [2]

- (b) The equation of line B can be written as $y = mx + c$.
Find the values of m and c .

Answer(b) $m =$

$c =$ [2]

- (c) (i) On the diagram draw the line which is parallel to B and passes through the point $(1, -1)$.

[1]

- (ii) Write down the equation of this line.

Answer(c) (ii) [2]

- 8 (a) Naomi records the sizes of the 34 pairs of shoes that her shop sells in one day.

4 10 5 6 4 8 6 4 7 3 9 7 4
 7 3 5 4 6 5 10 7 5 5 6 4 7
 7 6 6 5 5 3 5 6

- (i) Using the list above complete the frequency table.

Shoe size	3	4	5	6	7	8	9	10
Frequency								

[3]

- (ii) Calculate the mean of these shoe sizes.

Answer(a) (ii) [3]

- (iii) Find the range of these sizes.

Answer(a) (iii) [1]

- (iv) Find the mode of these sizes.

Answer(a) (iv) [1]

- (v) Work out the median shoe size.

Answer(a) (v) [2]

- (vi) Calculate the percentage of all the pairs of shoes that are size 7.

Answer(a) (vi) %. [2]

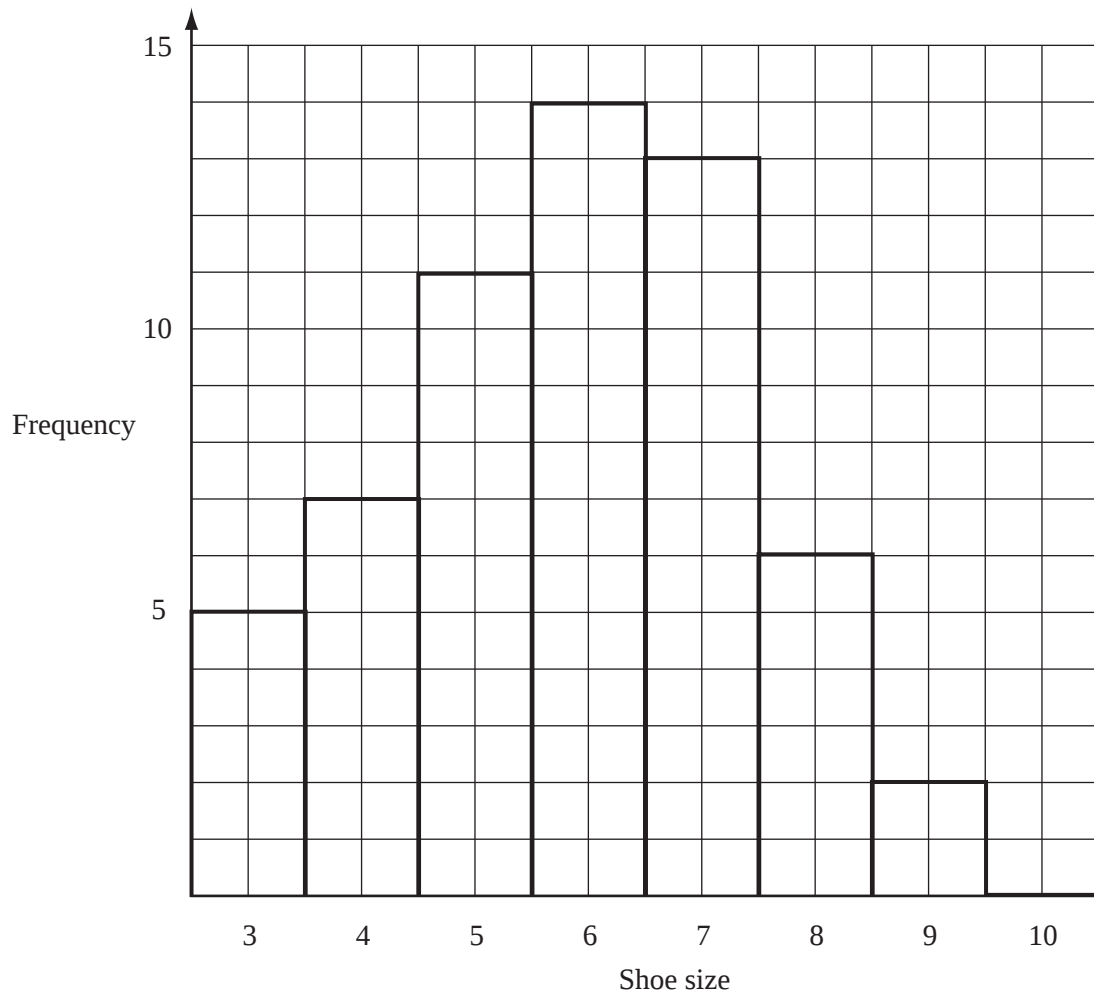
- (vii) Naomi orders 306 pairs of shoes to sell in her shop.
 Estimate how many of these pairs of shoes should be size 7.

Answer(a) (vii) [2]

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- (b) Findlay draws a bar chart to show how many pairs of shoes he has sold in his shop in one week.

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- (i) Use the information in the bar chart to complete the frequency table below.

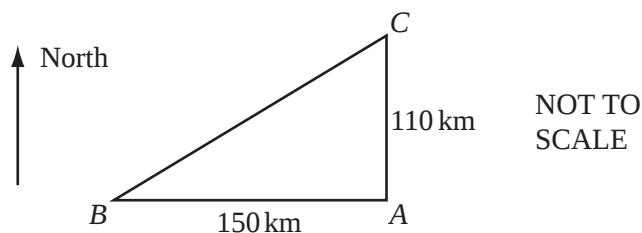
Shoe size	3 and 4	5 and 6	7 and 8	9 and 10
Frequency				

[2]

- (ii) Which is the modal class in the frequency table?

Answer(b) (ii) [1]

- 9 The sketch shows the positions of three islands A , B and C .
 B is 150 kilometres due West of A .
 C is 110 kilometres due North of A .



- (a) Using a scale of 1 centimetre to represent 20 kilometres draw accurately the triangle ABC .
 A is marked for you.

× A

[3]

- (b) A boat sets out from B to sail directly to C .

- (i) Use your protractor to find the three-figure bearing of B from C .

Answer(b) (i) [2]

- (ii) Measure BC on your diagram and hence find the distance in kilometres of B from C .

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Answer(b) (ii) km [2]

- (iii) The boat sails at 20 knots.
[1 knot is 1.85 kilometres per hour.]

How long will the boat take for the first 100 kilometres of the journey?
Give your answer in hours and minutes, to the nearest minute.

Answer(b) (iii) hours min [4]

- (iv) The boat takes 45 minutes for the next 18 kilometres.
Calculate this speed in kilometres per hour.

Answer(b) (iv) km/h [2]

- (v) A radio beacon at A has a range of 100 kilometres.
On your diagram in **part (a)** draw accurately the locus of points that are 100 kilometres from A .

[2]

- (vi) For how many kilometres is the boat within range of the beacon?

Answer(b) (vi) km [2]

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