Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Pages	Mark
3	
4 – 5	
6 – 7	
8 – 9	
10 – 11	
12 – 13	
14 – 15	
16 – 17	
18 – 19	
20	
TOTAL	

General Certificate of Secondary Education
Foundation Tier
January 2013

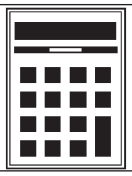
Methods in Mathematics (Linked Pair Pilot) 93652F

F

Unit 2 Geometry and Algebra

Tuesday 15 January 2013 1.30 pm to 3.00 pm

For this paper you must have:
- a calculator
- mathematical instruments.



Time allowed
- 1 hour 30 minutes

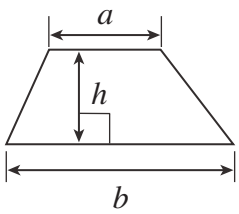
Instructions
- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work that you do not want to be marked.
- If your calculator does not have a π button, take the value of π to be 3.14 unless another value is given in the question.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.
- The quality of your written communication is specifically assessed in Questions 13 and 18.
  These questions are indicated with an asterisk (*).
- You may ask for more answer paper, graph paper and tracing paper.
  These must be tagged securely to this answer booklet.
- You are expected to use a calculator where appropriate.

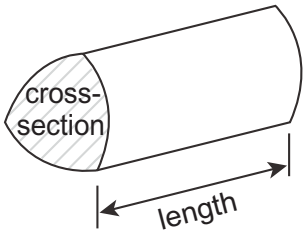
Advice
- In all calculations, show clearly how you work out your answer.

Formulae Sheet: Foundation Tier

Area of trapezium = $\frac{1}{2}(a+b)h$



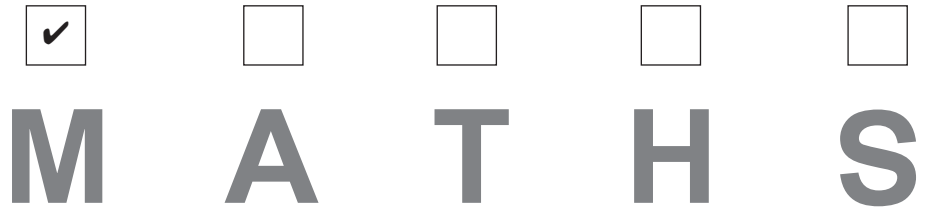
Volume of prism = area of cross-section × length



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

1 (a) For each letter tick ☑ if it has **line symmetry** and cross ☒ if it does not.

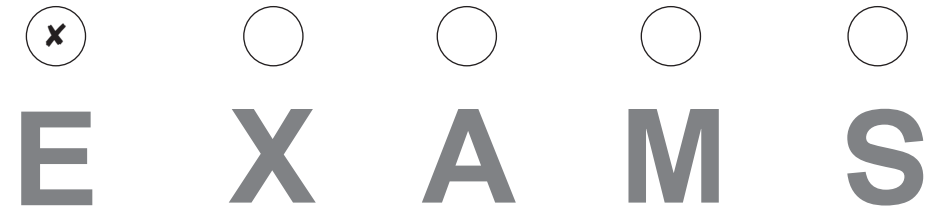
The first letter is done.



(2 marks)

1 (b) For each letter tick ✔ if it has **rotational symmetry** and cross ✘ if it does not.

The first letter is done.



(2 marks)

Turn over for the next question

4

2 Here is a list of numbers.

2 3 4 25 40 60

2 (a) Write down two numbers in the list that multiply to equal 100.

.....

Answer ..... and ..... *(1 mark)*

2 (b) Write down the multiple of 8.

.....

Answer ..... *(1 mark)*

3 (a) Circle the word that is missing from this sentence.

3, 9 and 11 are all ..... numbers.

cube even odd prime square

(1 mark)

3 (b) Circle the word that is missing from this sentence.

4, 9 and 25 are all ..... numbers.

cube even odd prime square

(1 mark)

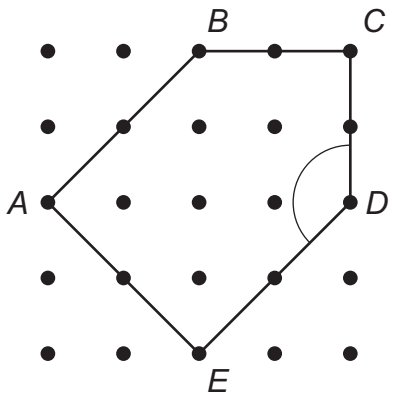
3 (c) Circle the word that is missing from this sentence.

2, 11 and 17 are all ..... numbers.

cube even odd prime square

(1 mark)

4 Shape *ABCDE* is drawn on a centimetre grid.



4 (a) What type of angle is the angle at *D*?

Answer ..... *(1 mark)*

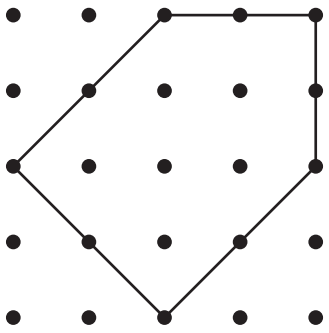
4 (b) Write down a line at right angles to *AE*.

Answer ..... *(1 mark)*

4 (c) Write down a line parallel to *AB*.

Answer ..... *(1 mark)*

4 (d) Mark and count squares on the diagram below to show that the area of the shape is 10 cm^2.



(2 marks)

10

5 (a) Draw a parallelogram.

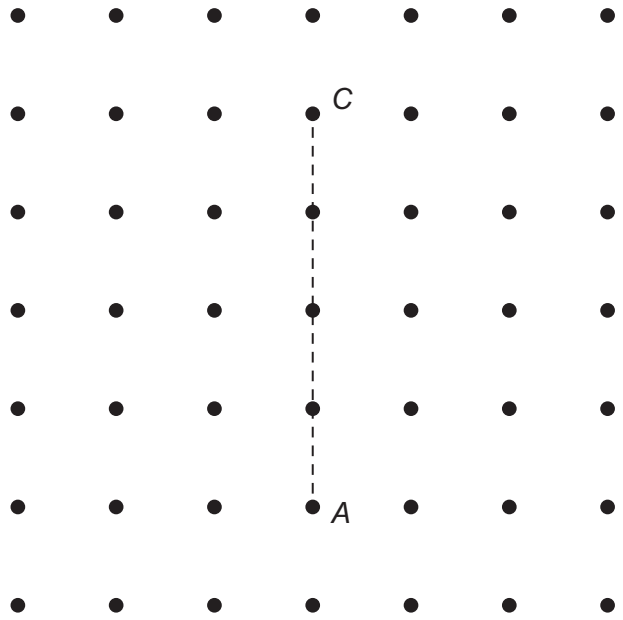
(1 mark)

5 (b) Draw a kite.

(1 mark)

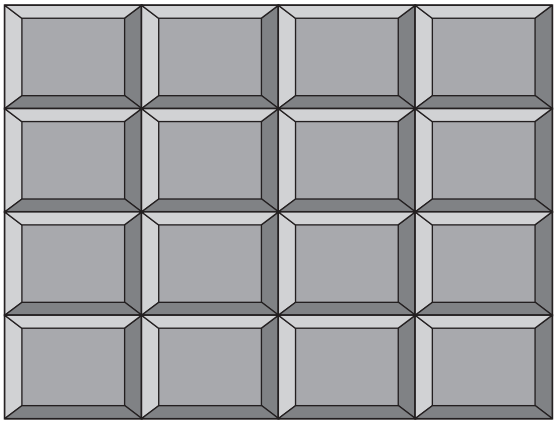
5 (c) *AC* is the **diagonal** of a square *ABCD*.

Draw the square *ABCD* on the grid.



(1 mark)

6 A chocolate bar has 16 pieces.



Jacob eats half the bar.
Ethan eats **more** than a quarter of the bar.
Michael eats the rest.

Work out how many pieces each boy could have eaten.

.....

.....

.....

.....

Jacob .....

Ethan .....

Michael ..... *(3 marks)*

Turn over for the next question

6

7 John travels by train or by bus.

The daily train fare is £ 22.00
The daily bus fare is £ 14.50

Over 5 days he spends a total of £ 87.50

How many of each fare did he pay?

.....

.....

.....

.....

.....

Train .....

Bus ..... *(3 marks)*

8 (a) Simplify $4w + 2w - w$

.....

Answer ..... *(1 mark)*

8 (b) Solve $x - 5 = 4$

.....

x = ... *(1 mark)*

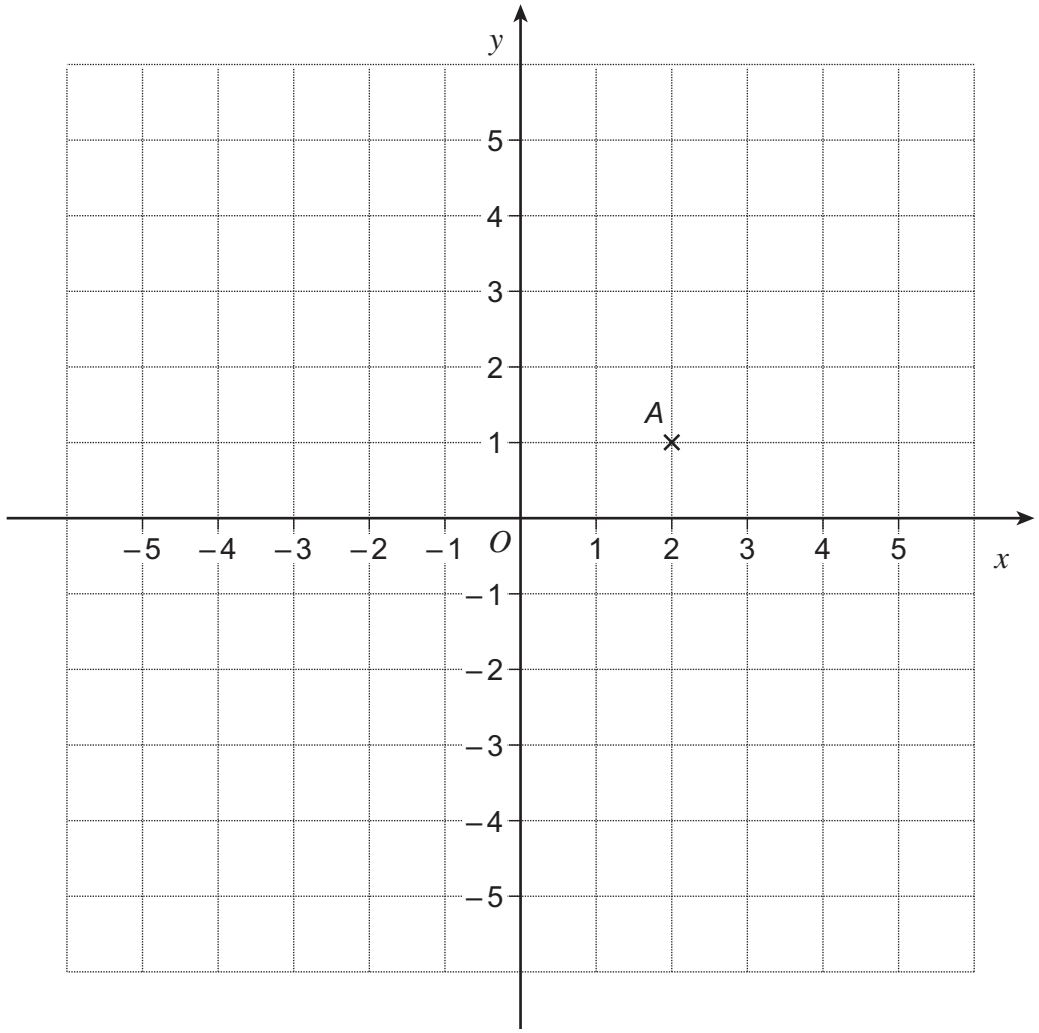
8 (c) Solve $3y + 2 = 11$

.....

.....

y = ... *(2 marks)*

9 Point A is shown on the centimetre grid.



9 (a) Write down the coordinates of A.

Answer (..... , ...) *(1 mark)*

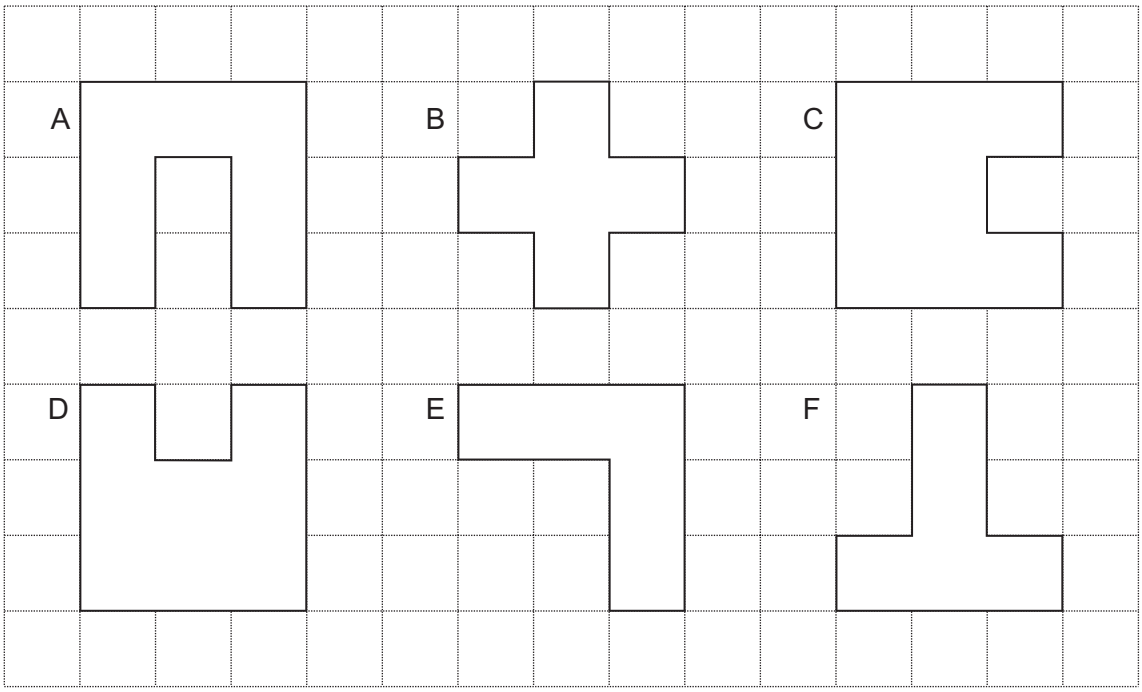
9 (b) Plot B $(-4,1)$ on the grid. *(1 mark)*

9 (c) ABC is a right-angled triangle.
It has an area of $12\,cm^2$.

Mark a possible point C on the grid. *(2 marks)*

11

10



10 (a) Which two shapes fit together to make a rectangle?

Answer ..... and ..... *(1 mark)*

10 (b) Which two shapes are congruent?

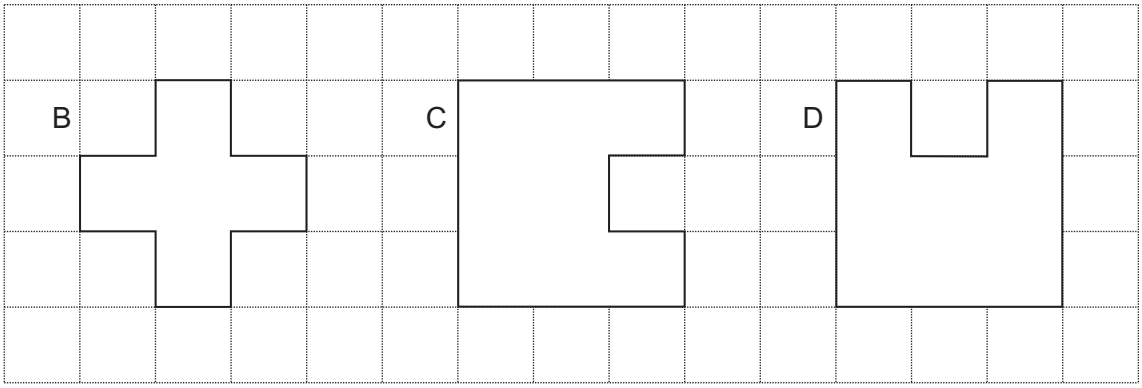
Answer ..... and ..... *(1 mark)*

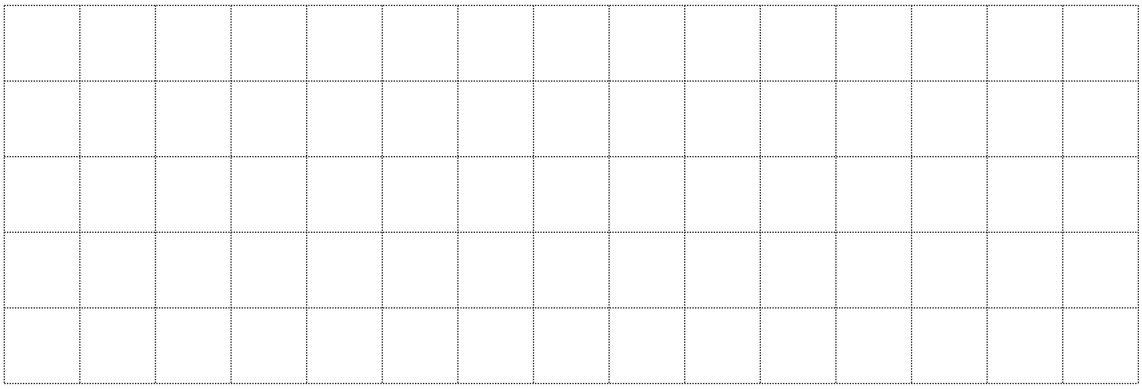
10 (c) Which two shapes have the same area as shape B?

Answer ..... and ..... *(2 marks)*

10 (d) Shapes B, C and D will fit together to make a shape that will tessellate.

On the grid below show how the shapes could fit together.



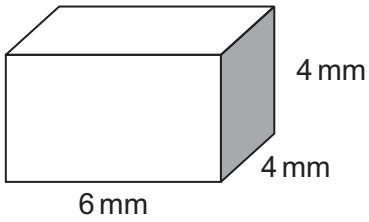


(1 mark)

Turn over for the next question

5

11 (a) Work out the volume of this cuboid.



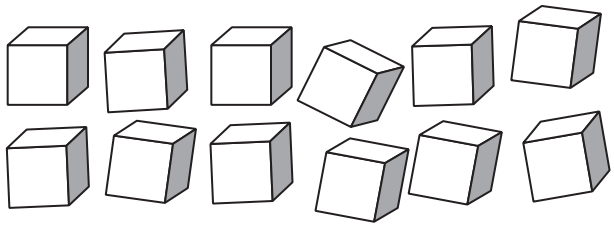
.....

.....

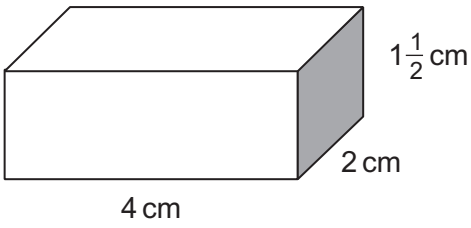
.....

Answer ..... mm^3 *(2 marks)*

11 (b) Centimetre cubes are to be packed into a cuboid.



Will these 12 cubes fit into this cuboid?



Tick a box.

☐ Yes ☐ No

Give a reason for your answer.

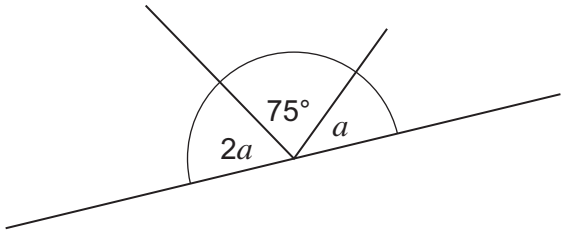
.....

.....

.....

(2 marks)

12 (a) Three angles form a straight line.



Not drawn accurately

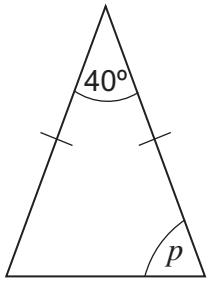
Calculate the value of a.

.....

.....

Answer ..... degrees *(3 marks)*

12 (b) This triangle is isosceles.



Not drawn accurately

Calculate the size of angle p.

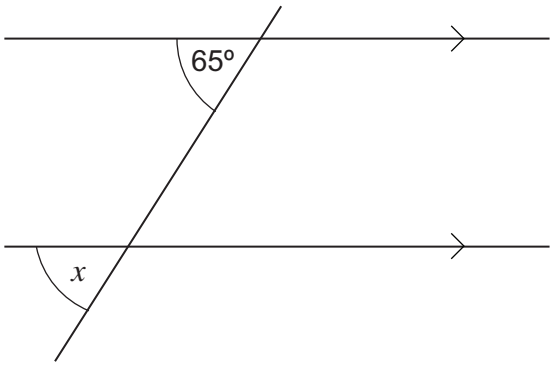
.....

.....

Answer ..... degrees *(2 marks)*

9

***13** Write down the size of angle x.
Give a reason for your answer.



Not drawn accurately

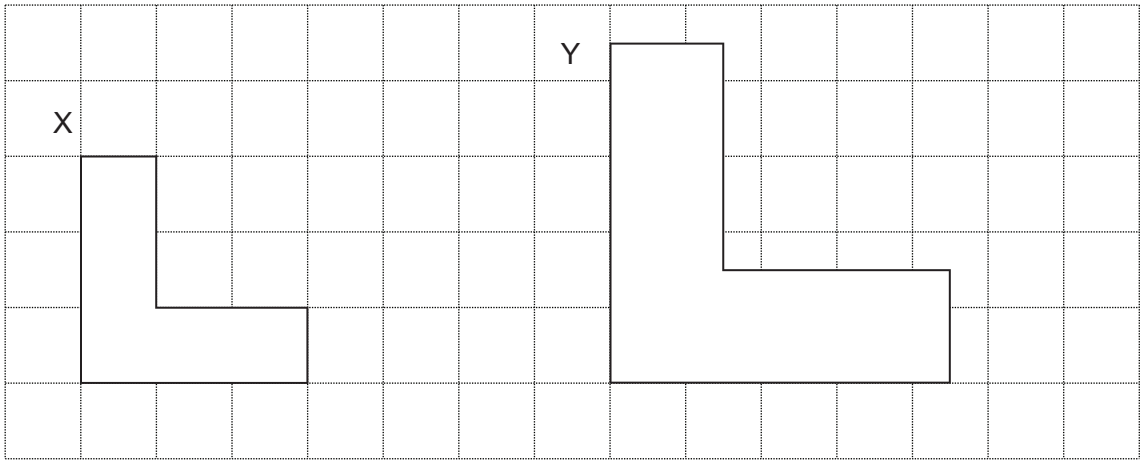
Answer ..... degrees

Reason .....

.....

(2 marks)

14



14 (a) Shape Y is an enlargement of shape X.

What is the scale factor of the enlargement?

Answer ..... *(1 mark)*

14 (b) Shape X has a perimeter of 12 cm.

Work out the perimeter of shape Y.

Answer ..... cm *(1 mark)*

15 (a) Solve $6x = 12$

.....

.....

$x =$ ..... *(1 mark)*

15 (b) Solve $12y = 6y + 9$

.....

.....

.....

$y =$ ..... *(2 marks)*

16 There are four numbers that are

prime

less than 50

1 more than a square number.

For example

One of the numbers is 2

2 is prime
2 is less than 50
2 is one more than the square number 1.

Work out the other **three** numbers.

.....

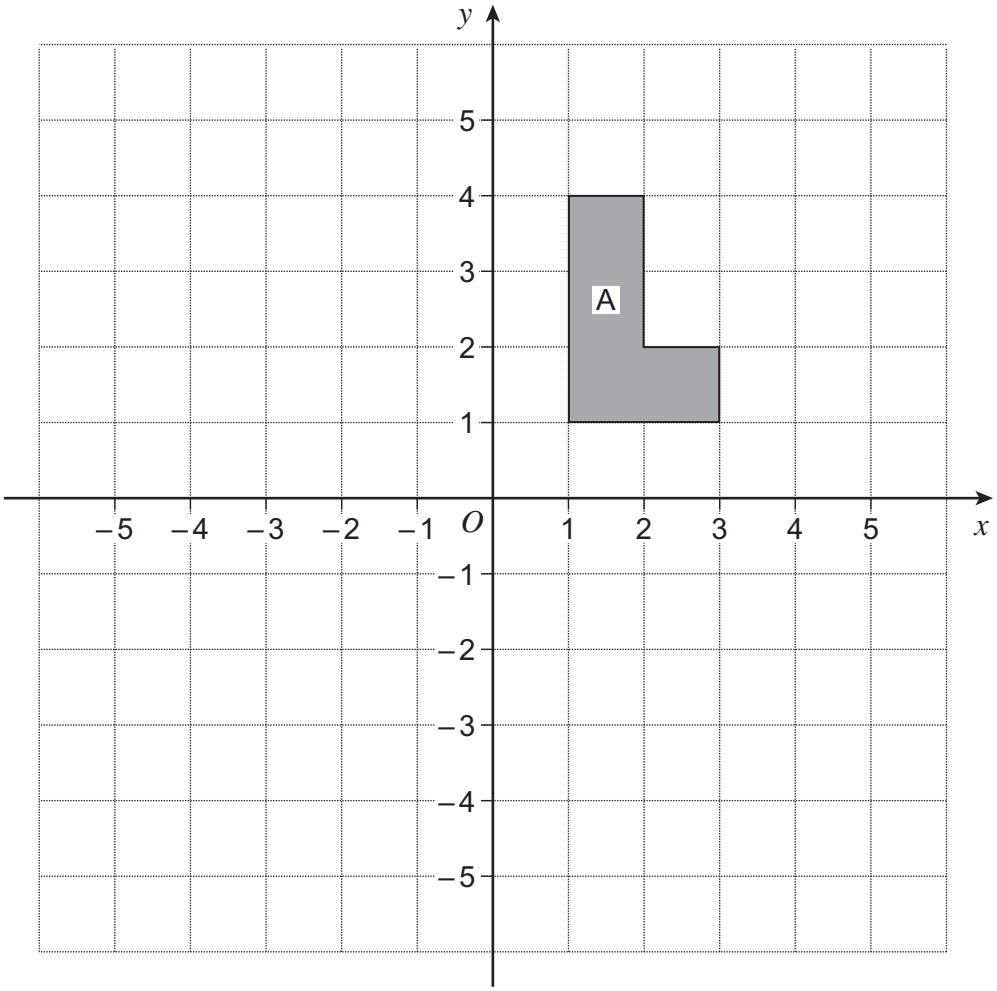
.....

.....

Answer ..... and ..... and ..... *(3 marks)*

10

17



17 (a) Reflect shape A in the x-axis.
Label the new shape B. *(1 mark)*

17 (b) Reflect shape B in the y-axis.
Label the new shape C. *(1 mark)*

17 (c) Describe **fully** the rotation that maps shape C to shape A.

.....

.....

.....

(2 marks)

***18** Which is greater?

68% of 480

or $\frac{3}{8}$ of 900

You **must** show your working.

.....

.....

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.....

.....

Answer ..... *(5 marks)*

Turn over for the next question

9

19 (a) Fill in the **two** missing numbers in this sequence.

2 5 11 20 ..... 47 .....

(2 marks)

19 (b) A different sequence has second term 2 and third term 4.

..... 2 4 .....

Write down a possible rule for continuing the sequence.

.....

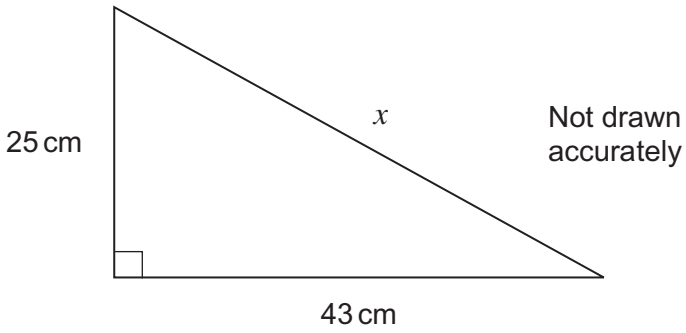
.....

Write down the first and fourth terms of the sequence using your rule.

.....

Answer ..... and ..... *(2 marks)*

20 Calculate the length x in the triangle.



.....

.....

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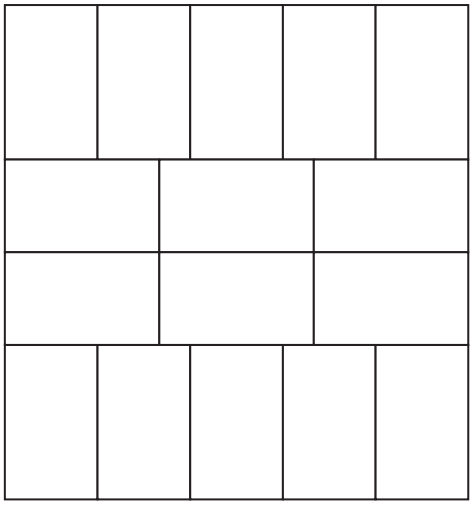
.....

Answer ..... cm *(3 marks)*

21 A rectangle has a width 1.5 cm.

Not drawn accurately

16 of the rectangles are put together to form a shape as shown.



Not drawn accurately

Work out the area of the shape.

.....

.....

.....

.....

.....

.....

.....

.....

Answer ..... cm^2 *(5 marks)*

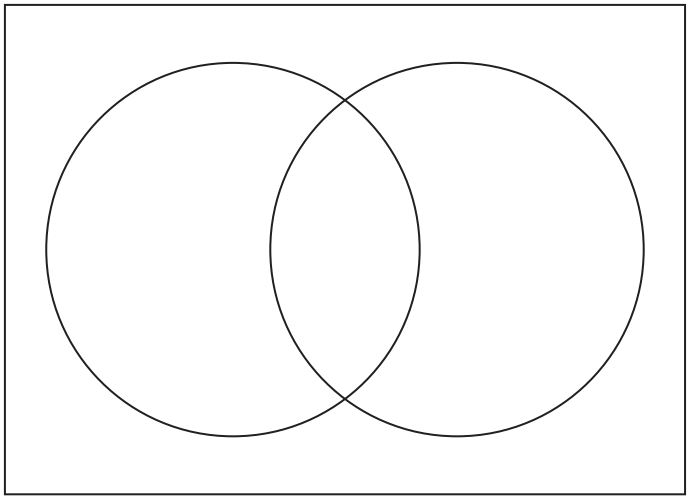
Turn over for the next question

12

22 In a class of 30 students

19 have a brother
15 have a sister
4 do **not** have a brother or a sister.

How many students have a brother and a sister?
You may use the Venn Diagram to help you.



Answer ..... *(4 marks)*

END OF QUESTIONS