

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**

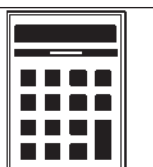
**F**

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  $\pi$  button, take the value of  $\pi$  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.



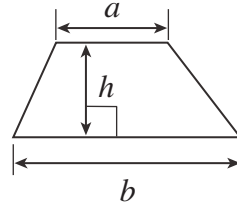
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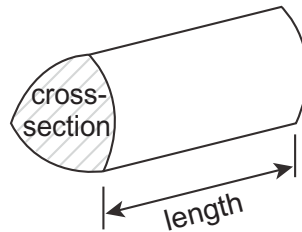
**93652F**

**Formulae Sheet: Foundation Tier**

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



**Volume of prism** = area of cross-section  $\times$  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.

<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>M</b>	<b>A</b>	<b>T</b>	<b>H</b>	<b>S</b>

(2 marks)

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

The first letter is done.

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<b>E</b>	<b>X</b>	<b>A</b>	<b>M</b>	<b>S</b>

(2 marks)

Turn over for the next question



**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.

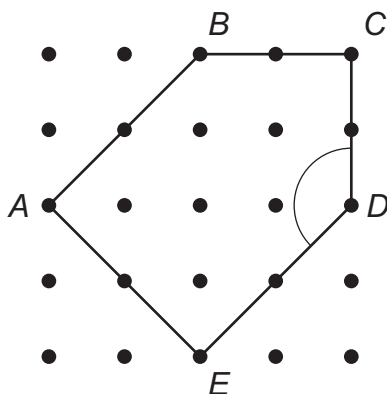
2, 11 and 17 are all ..... numbers.

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)

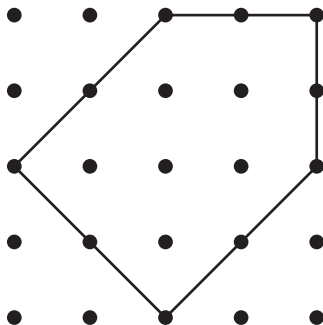
4 (b) Write down a line at right angles to  $AE$ .

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  $10 \text{ cm}^2$ .



(2 marks)

10
----

Turn over ►



5 (a) Draw a parallelogram.

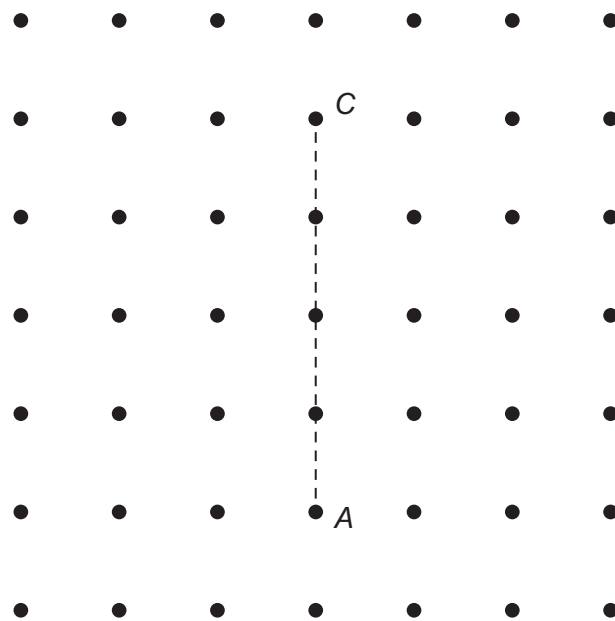
(1 mark)

5 (b) Draw a kite.

(1 mark)

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

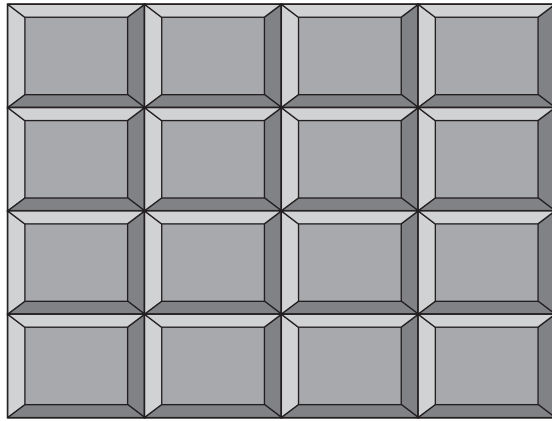
Draw the square  $ABCD$  on the grid.



(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**



**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  $3y + 2 = 11$

.....

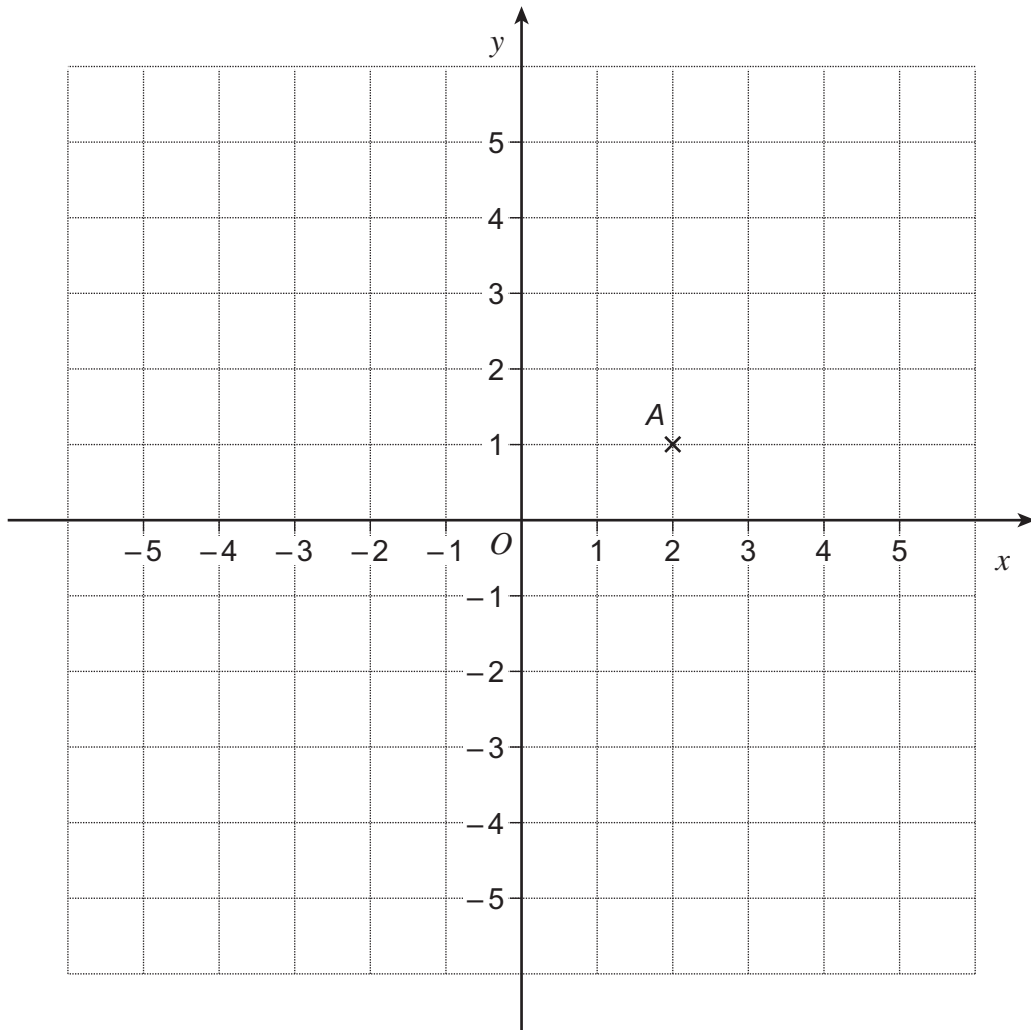
.....

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





9 Point A is shown on the centimetre grid.



9 (a) Write down the coordinates of A.

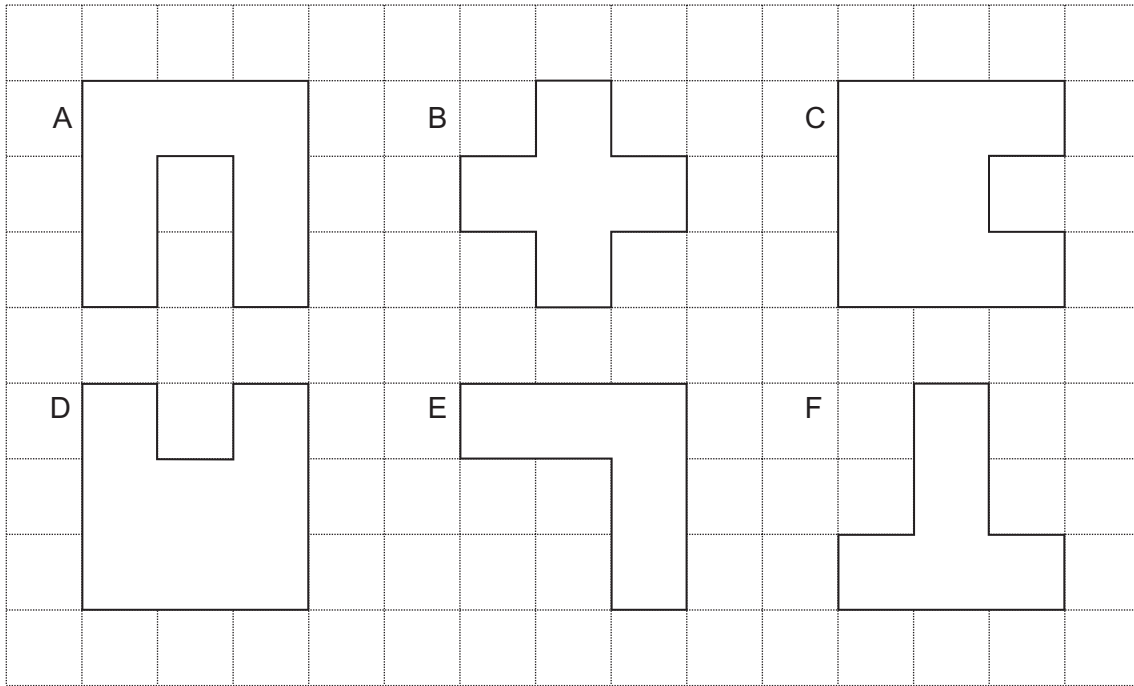
Answer ( ..... , ..... ) (1 mark)

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<sup>2</sup>.  
Mark a possible point C on the grid. (2 marks)



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)

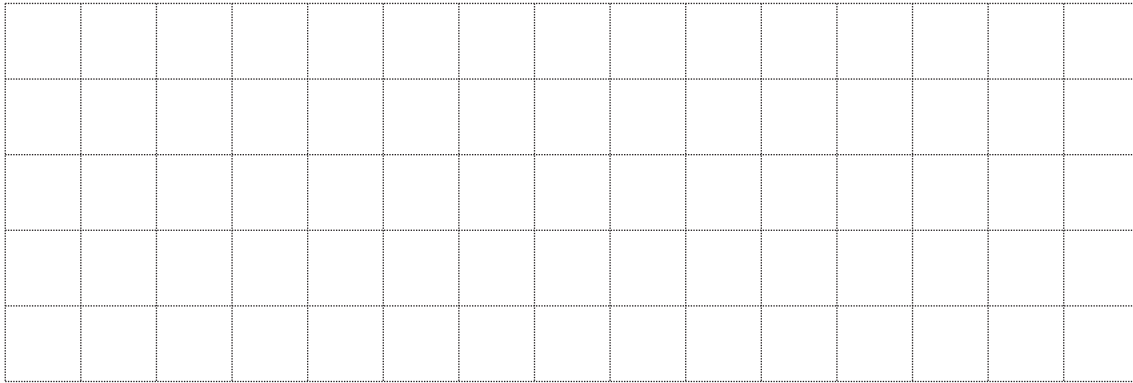
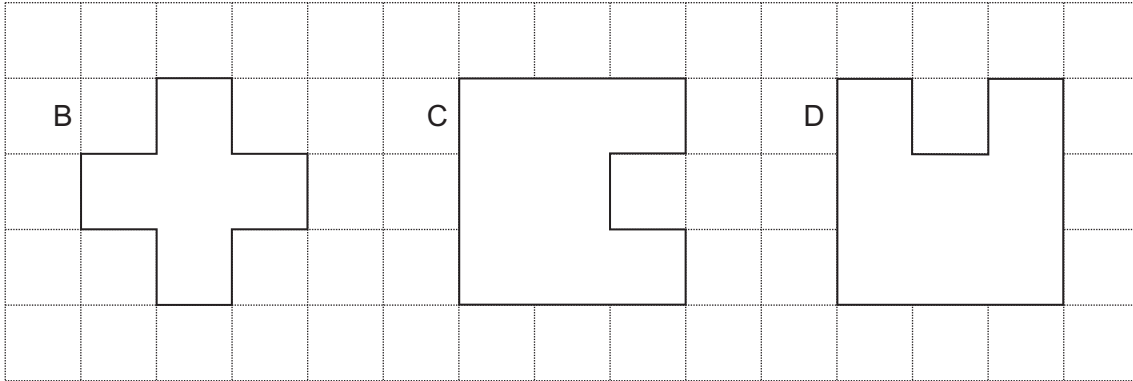
10 (c) Which two shapes have the same area as shape B?

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.

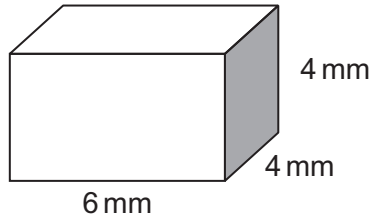


(1 mark)

**Turn over for the next question**



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



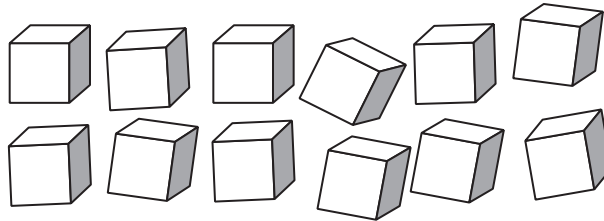
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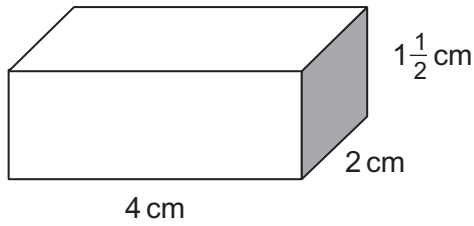
.....

Answer ..... mm<sup>3</sup> (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.

.....

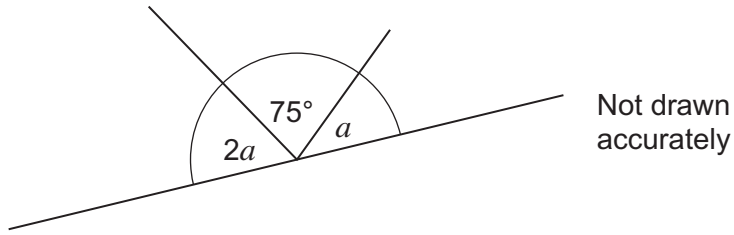
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(2 marks)



12 (a) Three angles form a straight line.



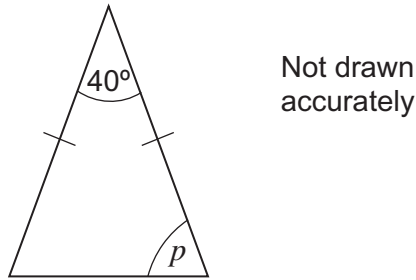
Calculate the value of  $a$ .

.....

.....

Answer ..... degrees (3 marks)

12 (b) This triangle is isosceles.



Calculate the size of angle  $p$ .

.....

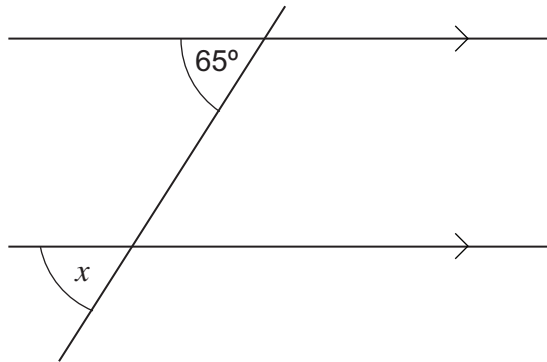
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Answer ..... degrees (2 marks)



\*13

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



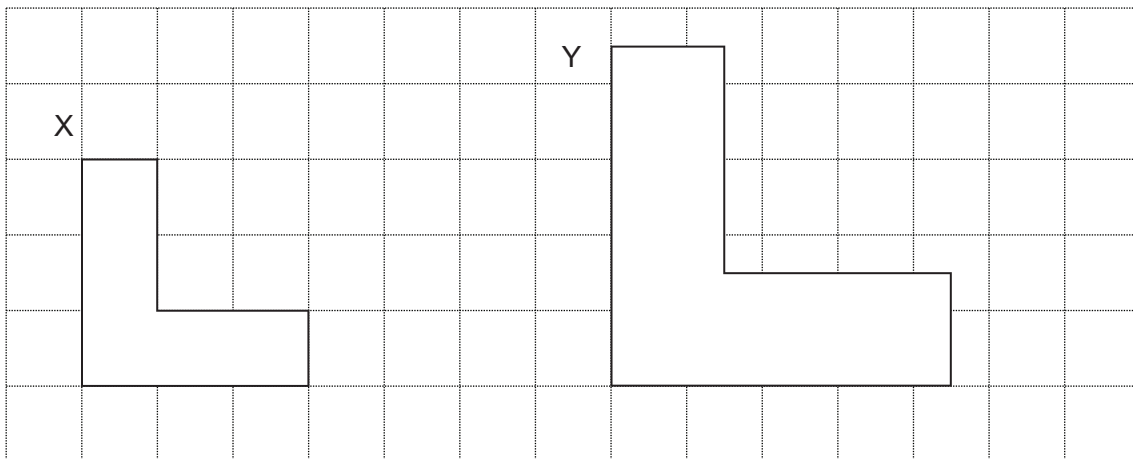
Not drawn accurately

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.

.....  
.....  
.....

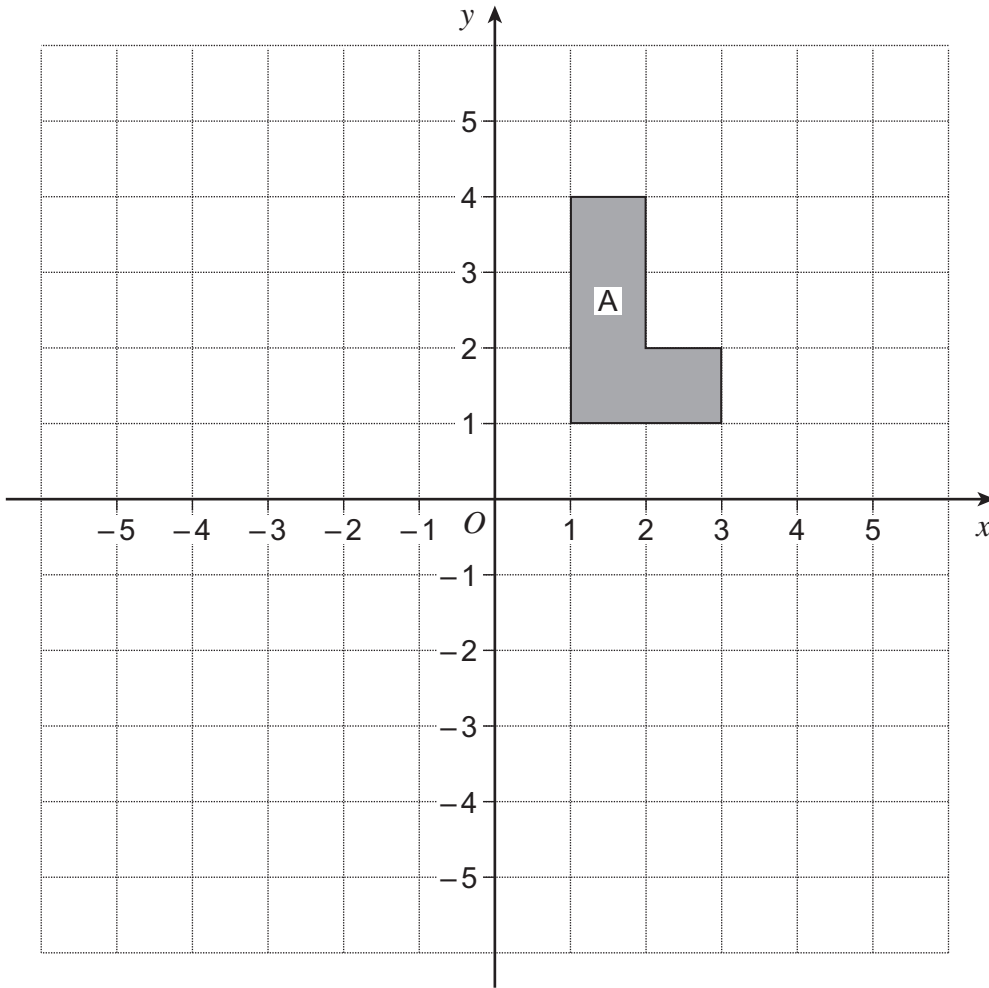
Answer ..... and ..... and ..... (3 marks)

10

Turn over ►



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.

.....

.....

.....

.....

.....

.....

.....

.....

.....

Answer ..... (5 marks)

**Turn over for the next question**



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.

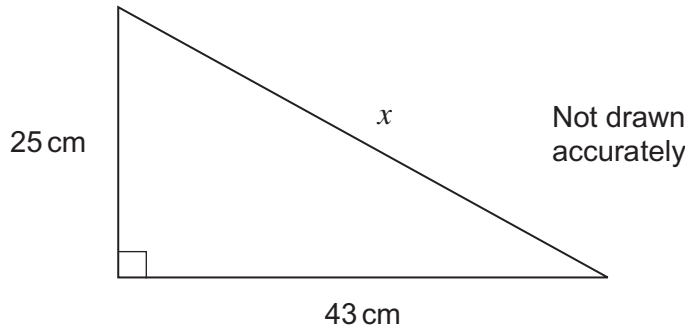
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Write down the first and fourth terms of the sequence using your rule.

.....

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

20 Calculate the length  $x$  in the triangle.



.....  
.....  
.....  
.....  
.....

Answer ..... cm (3 marks)

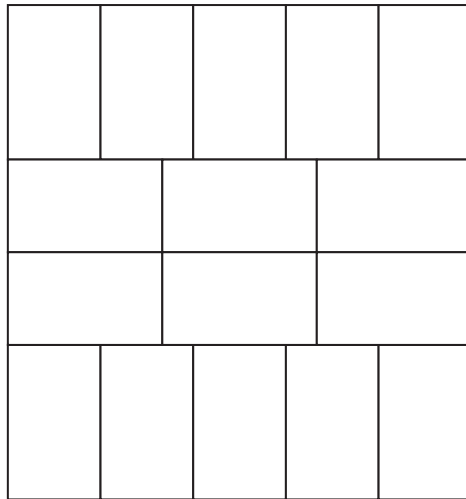


21 A rectangle has a width 1.5 cm.



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<sup>2</sup> (5 marks)

Turn over for the next question

Turn over ►

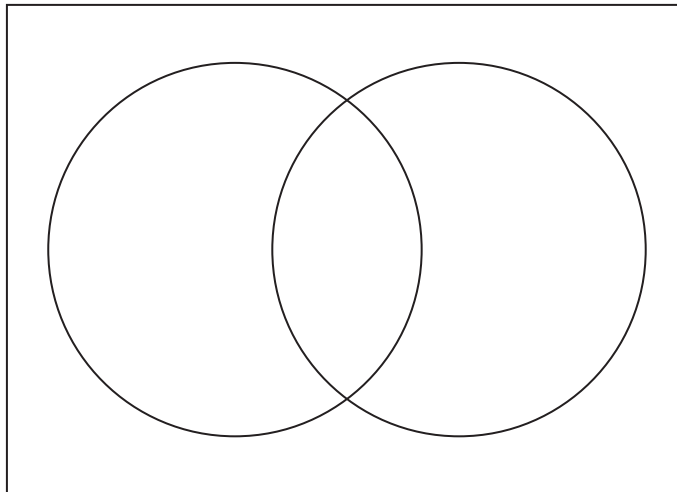


22

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**