Surname

Other Names

Candidate Signature

AQA

General Certificate of Secondary Education
Foundation Tier
January 2012

# Methods in Mathematics (Linked Pair Pilot)   93652F

F

Unit 2   **Geometry and Algebra**

Thursday 19 January 2012   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 space 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 12, 14 and 16.
  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 = $\frac{1}{2}(a+b)h$
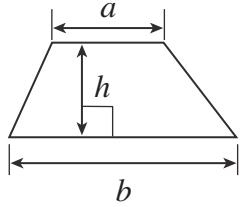
Volume of prism = area of cross-section × length

WMP/Jan12/93652F
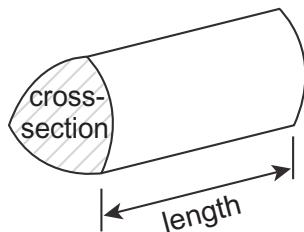
Answer **all** questions in the spaces provided.

1   Points *A*, *B* and *C* are shown on the centimetre grid.
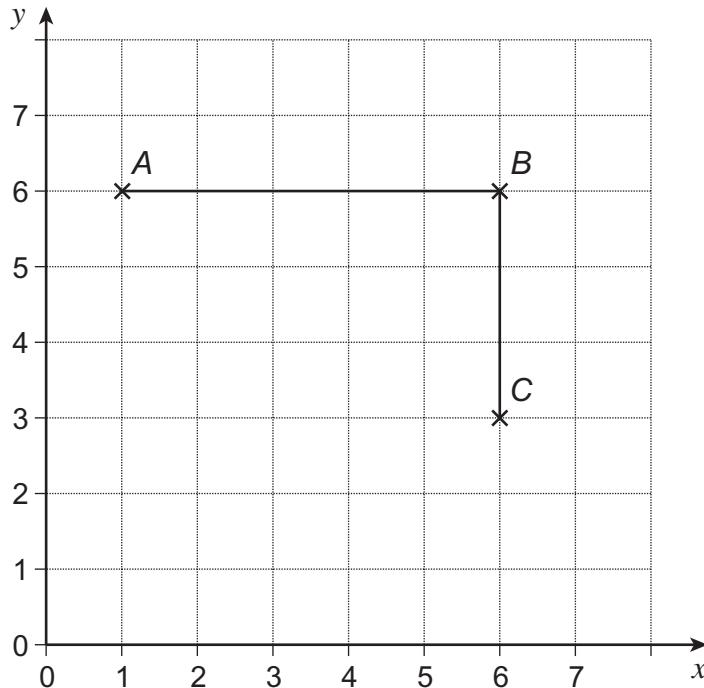
1 (a)   Write down the coordinates of point *A*.

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

1 (b)   Write down the coordinates of the midpoint of *BC*.

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

1 (c) (i)   *A*, *B* and *C* are three corners of a rectangle *ABCD*.

Draw the rectangle on the grid.   *(1 mark)*

1 (c) (ii)   By counting squares, work out the area of rectangle *ABCD*.

....

....

....

Answer .... cm² *(2 marks)*

5

Turn over ▶

2 (a) Write down the next term in this sequence.

25   31   37   43   49   ......

....

Answer ....   *(1 mark)*

2 (b) Describe in words the rule for continuing the sequence.

....

....

(1 mark)

3 Here is a list of numbers.

6   9   13   18   20   27   35

3 (a) Write down the square number.

Answer ....   *(1 mark)*

3 (b) Write down the multiple of 7.

Answer ....   *(1 mark)*

3 (c) Write down the factor of 40.

Answer ....   *(1 mark)*

3 (d) Write down the prime number.

Answer ....   *(1 mark)*

4 Here is a list of words about circles.

radius   diameter   chord   tangent

The diagram shows a circle, centre O.
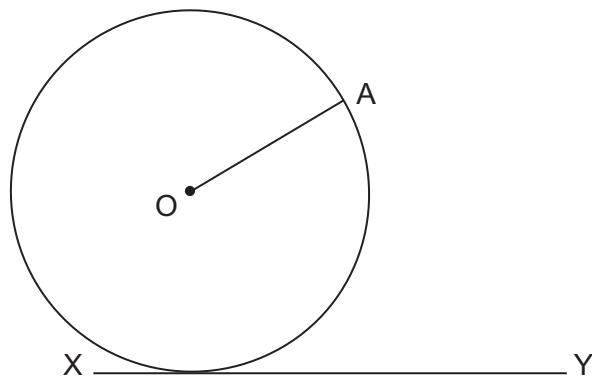
Choose a word from the list above to complete each sentence.

4 (a) OA is a .... of the circle.   *(1 mark)*

4 (b) XY is a .... of the circle.   *(1 mark)*

Turn over for the next question

8

Turn over ▶

5 A, B, C, D and E are shapes made up of five squares.

5 (a) What is the order of rotational symmetry of shape A?
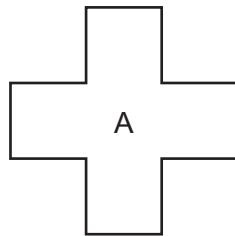
Answer .... *(1 mark)*

5 (b) Draw the line of symmetry on shape B.
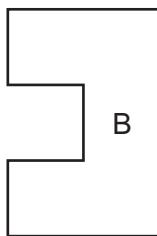
(1 mark)

5 (c) Enlarge shape C by a scale factor of 2.
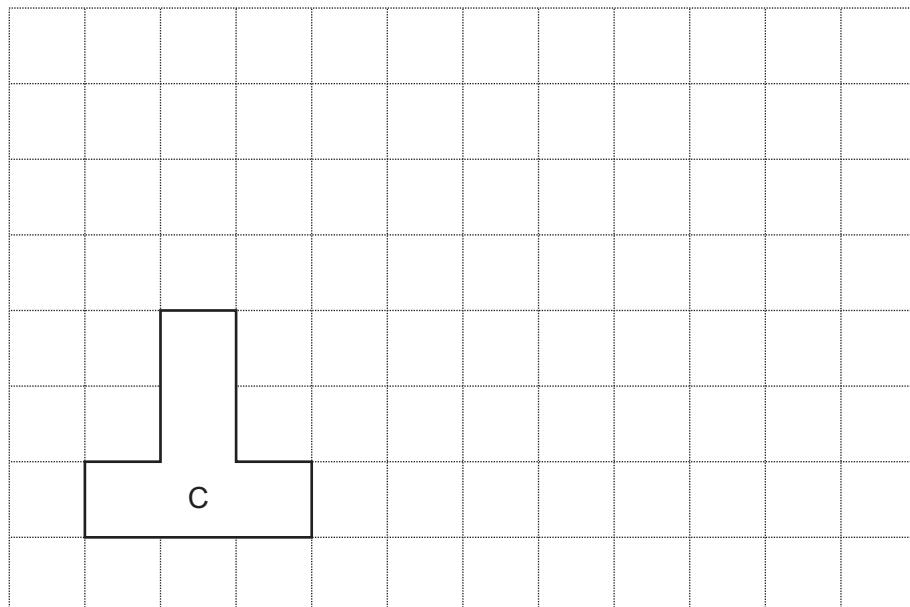
(2 marks)

5 (d) Draw enough shapes to show that shape A will tessellate.
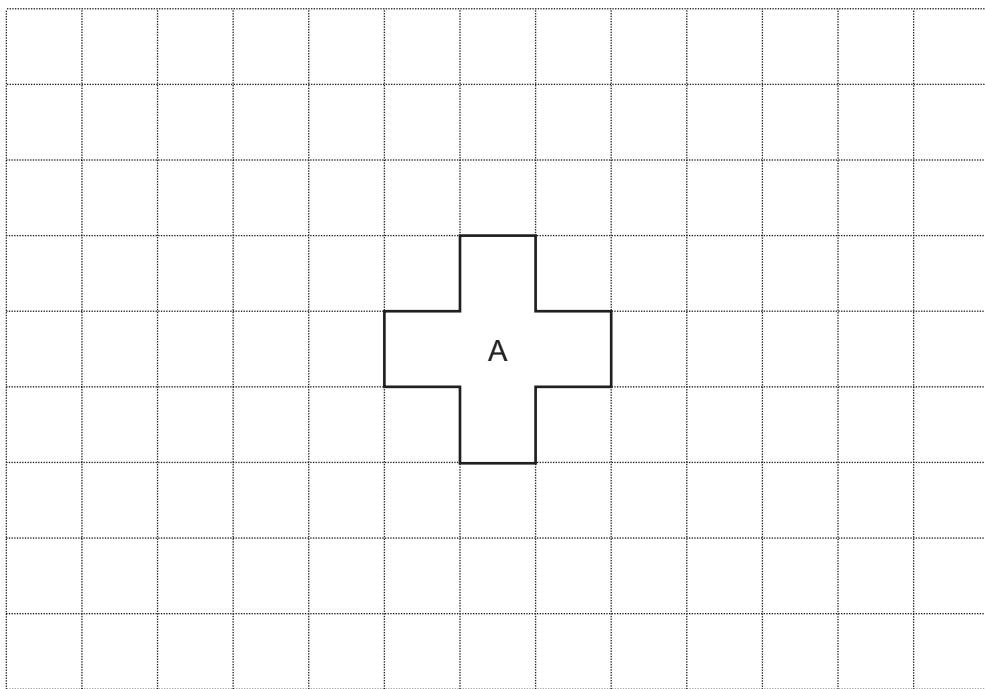
(1 mark)

5 (e) All five shapes will fit into the grid below.
Shapes B and E are in their correct positions.

Draw shapes A, C and D on the grid so they fill the grid completely.

(1 mark)

6
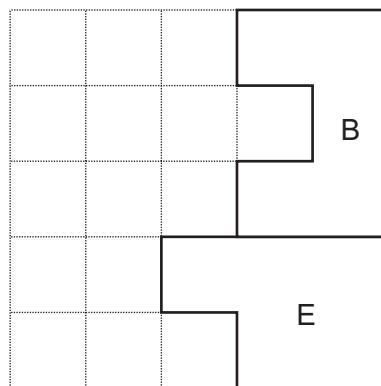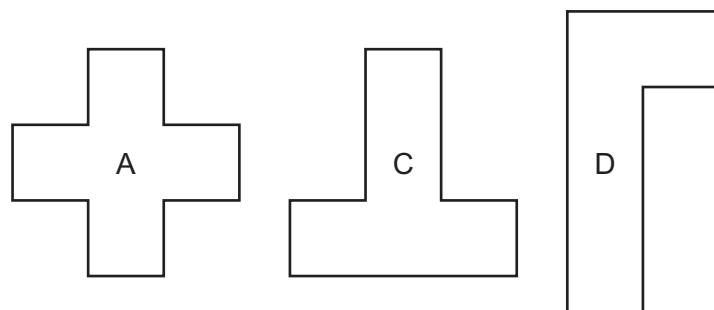
Turn over ▶

6 Five girls take part in a race.

Carla was ahead of me but I wasn't last

I was ahead of Anna

I was ahead of Donna

I was ahead of Beth

Anna was ahead of me

Anna

Beth

Carla

Donna

Edie
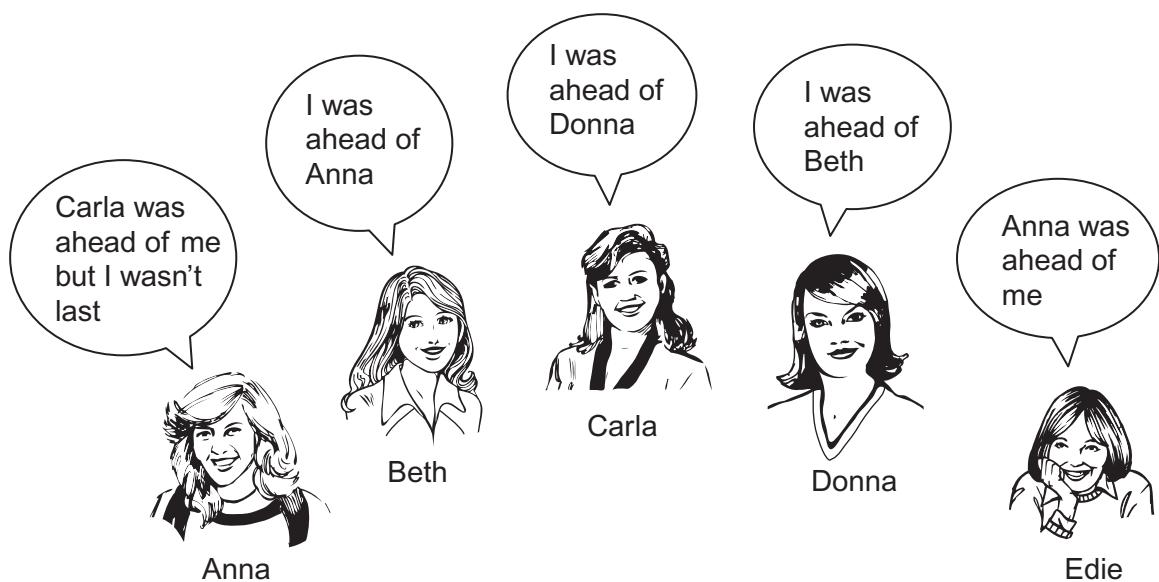
Work out the order in which the girls finished.

....

....

....

....

....

Answer   First   ....

Second   ....

Third   ....

Fourth   ....

Fifth   ....   *(3 marks)*

7 This table shows the lengths of some British rivers in miles and kilometres.

River	Length	
	Miles	Kilometres
Severn	220	354
Trent	185	298
Ouse	143	230
Wye	135	217
Ure	129	208

7 (a) Approximately how many kilometres are there in one mile?

....

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

7 (b) What is the length of the river Ure to the nearest 10 miles?

....

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

7 (c) Which river is being described in this sentence?

This river is 300 km long to the nearest 10 km.

Answer ....   *(1 mark)*

7 (d) Two rivers have the same length when rounded to the nearest 10 miles.

Which **two** rivers are they?

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

7 (e) The river Thames is 350 km long when rounded to the nearest 10 km.
It is 300 km long when rounded to the nearest 100 km.

Work out a possible value for the actual length of the river.

....

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

8

Turn over ▶

8 Mary's calculator is broken.

The only keys that work are ⊠ ➗ ➕ ➖ ═ 5

Show how Mary can get 31 on the display using only these keys.
You do not have to use all of the keys.

....

....

....

....

(2 marks)

9 One of the oldest number problems was written nearly 4000 years ago.

'A number added to a quarter of that number equals 15.'

What is the number?

....

....

....

....

....

Answer .... *(3 marks)*

10 (a)   This shape is made from centimetre cubes.
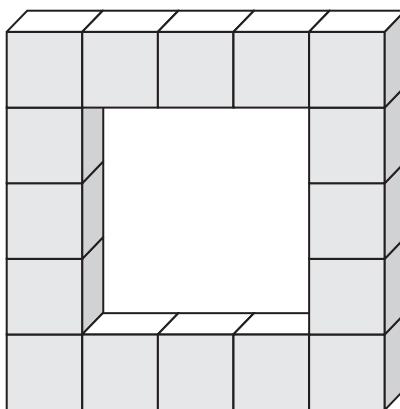
How many cubes were used to make the shape?

Answer .... *(1 mark)*

10 (b)   Two of the shapes and some other cubes are used to make a hollow cube.
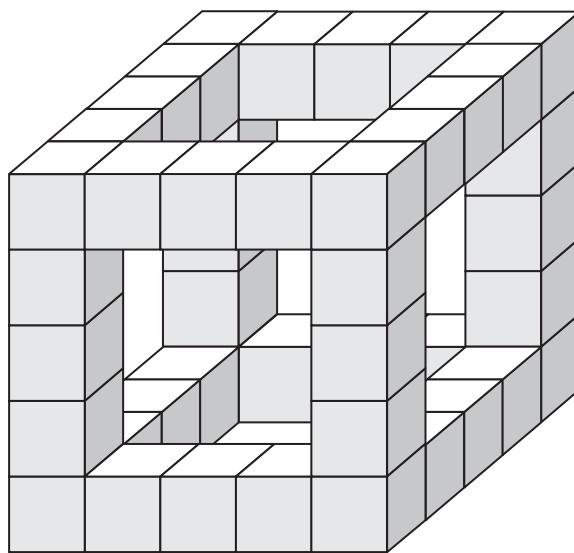
How many cubes are used to make the hollow cube?

....

Answer .... *(2 marks)*

10 (c)   Some more centimetre cubes are added to make the hollow cube into a **solid** cube.

How many more centimetre cubes are needed to do this?

....

....

Answer .... *(2 marks)*

10

Turn over ▶

11   Solve the equations

11 (a) $8 - w = 5$

....

....

           Answer w = ... *(1 mark)*

11 (b) $10x = 24$

....

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

11 (c) $\dfrac{y}{3} = 5$

....

           Answer y = ... *(1 mark)*

11 (d) $9z - 3 = 5z + 2$

....

....

....

....

           Answer z = ... *(3 marks)*

*12   Work out   12% of £680

....

....

....

....

           Answer £ .... *(3 marks)*

Do not write outside the box

13 (a) The triangle is moved 3 squares to the right and 2 squares down.
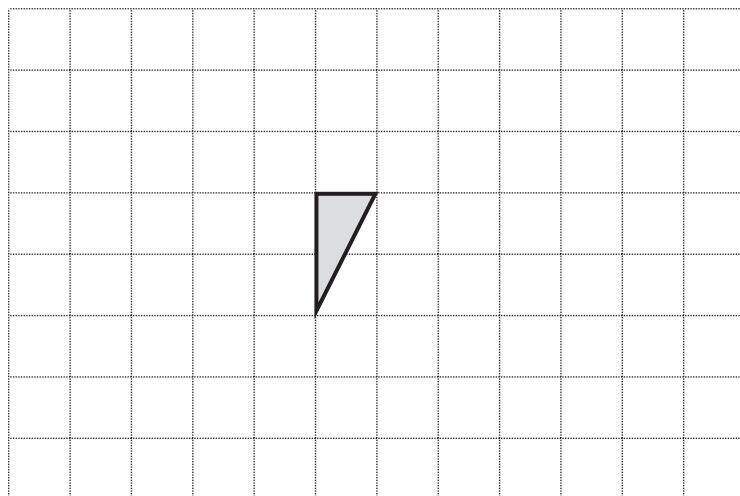
Draw the new position of the triangle. *(2 marks)*

13 (b) Triangles A, B, C and D are drawn on the centimetre grid.
The triangles are fitted together to make a rectangle.
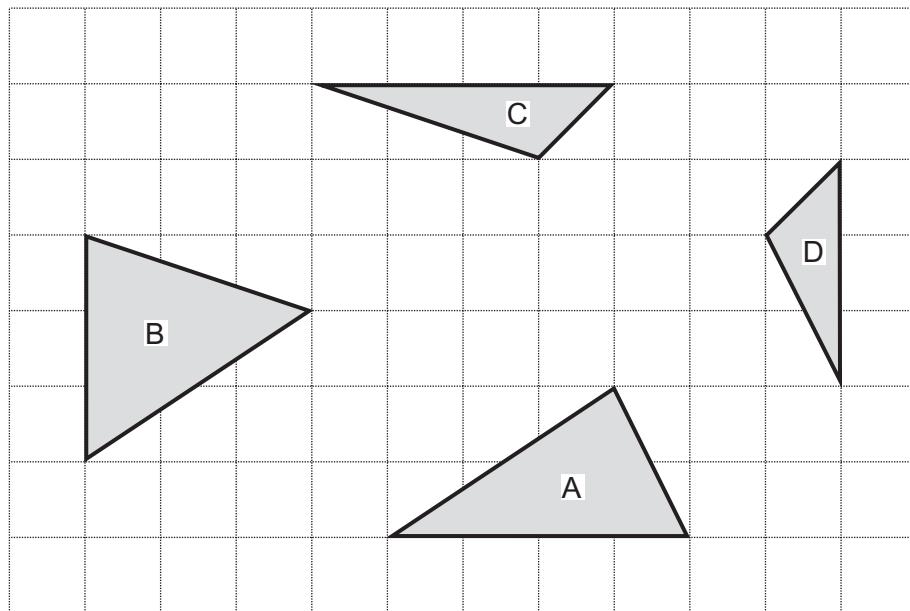
Work out the perimeter of the rectangle.

....

....

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

13

Turn over ▶

*14 A large square is made from a small square, four equilateral triangles and four isosceles triangles.
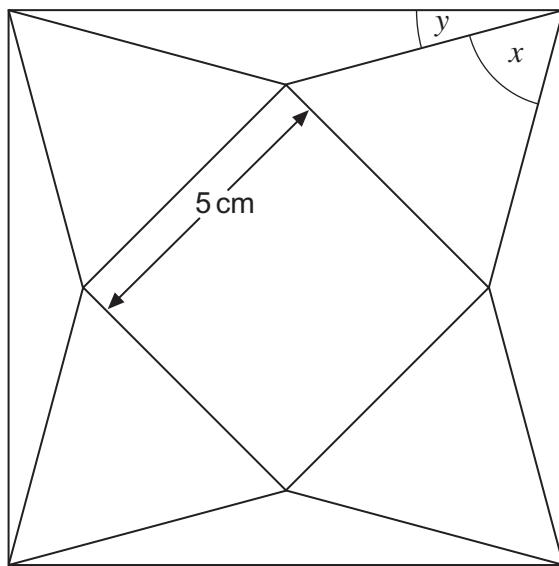
Not drawn accurately

14 (a) Complete the sentence.

In the equilateral triangle, the angle x is .... degrees. *(1 mark)*

14 (b) Work out the value of angle y.

....

....

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

14 (c) The small square has sides of 5 cm.

What is the area of the small square?

....

Answer .... cm² *(2 marks)*

14 (d) Which of the following is true for the large square?
Tick a box.

The length of each side is less than 10 cm ☐

The length of each side is equal to 10 cm ☐

The length of each side is greater than 10 cm ☐

Show clearly how you decide.
You may use a diagram.

....

....

....

(3 marks)

15 *XYZ* is a straight line.
a and *c* are **different** acute angles.
b is an obtuse angle.

Not drawn
accurately
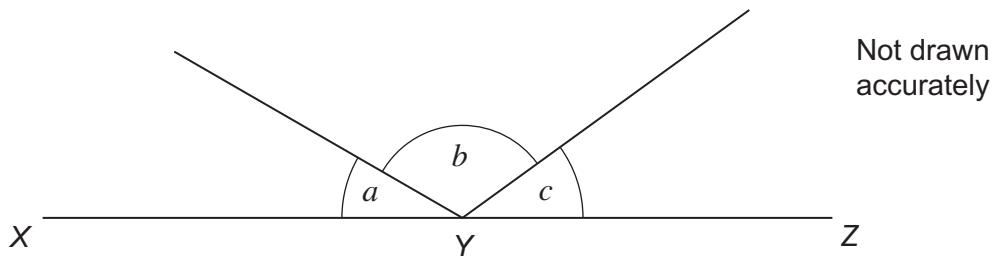
Write down possible values for *a*, *b* and *c*.

Answer *a* = ... degrees

b = ... degrees

c = ... degrees   *(3 marks)*

11

Turn over ▶

*16   A shape is shaded on a centimetre grid.
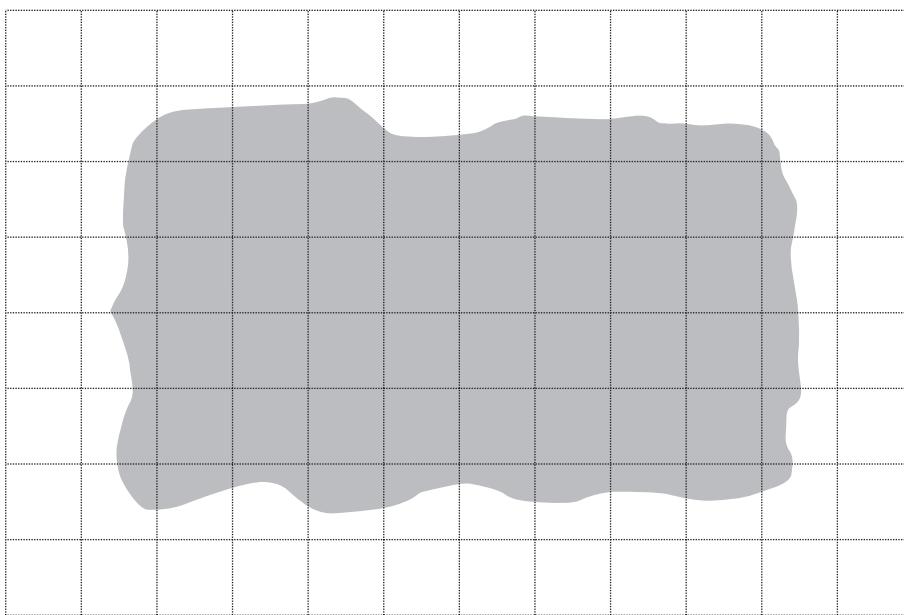
Simon says that the area of the shaded shape is between $32\,cm^2$ and $60\,cm^2$.

Explain why Simon is correct.
You may mark the diagram to help you with your answer.

....

....

....

....

....

....

....

(3 marks)

**17 (a)**   How many lines of symmetry does a square have?
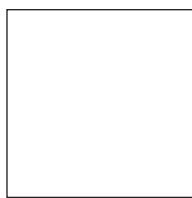
Answer .... *(1 mark)*

17 (b)   Here are three quadrilaterals.
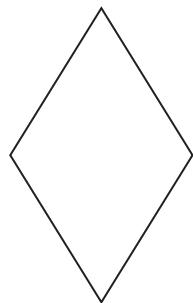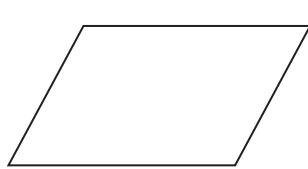
rhombus   parallelogram   kite
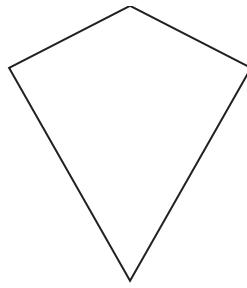
Give a reason why each of the quadrilaterals could be the odd one out.

17 (b) (i)   The rhombus could be the odd one out because ....

....

(1 mark)

17 (b) (ii)   The parallelogram could be the odd one out because ....

....

(1 mark)

17 (b) (iii)   The kite could be the odd one out because ....

....

(1 mark)

Turn over for the next question

7
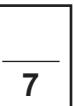
Turn over ▶

18 (a)   Expand $5(x + 7)$

....

Answer ....   *(1 mark)*

18 (b)   Factorise $3x - 12$

....

Answer ....   *(1 mark)*

18 (c)   Expand and simplify $3(5x + 2) - 4(2x - 1)$

....

....

....

Answer ....   *(3 marks)*

19   Airmail stamps are 73p.
First class stamps are 42p.
Jack buys some of each.
He spends £40.97.

19 (a)   How can you tell from the amount he spends that he buys an odd number of airmail stamps?

....

....

(1 mark)

19 (b) Jack buys four times as many first class stamps as airmail stamps.

How many of each stamp does he buy?

....

....

....

....

Answer   Airmail stamps ....

                  First class stamps .... *(3 marks)*

20 Calculate the length x in the triangle.

23 cm   38 cm   Not drawn accurately

x

....

....

....

....

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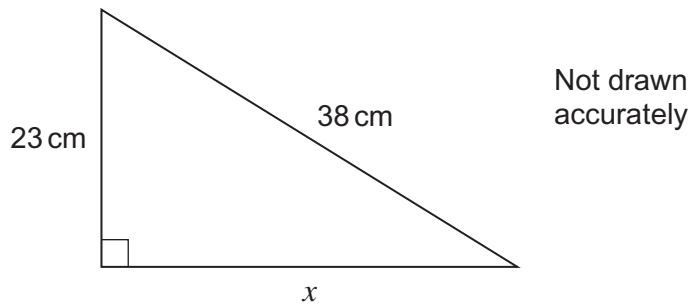
Answer .... cm   *(3 marks)*

END OF QUESTIONS

12

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED