General Certificate of Secondary Education
November 2009

MATHEMATICS (SPECIFICATION A)   **4306/2F**
Foundation Tier
Paper 2 Calculator

F

Tuesday 10 November 2009   9.00 am to 10.30 am

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. Answers written in margins or on blank pages will not be marked.
- Do all rough work in this book.

Information
- The maximum mark for this paper is 100.
- The marks for questions are shown in brackets.
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer booklet.
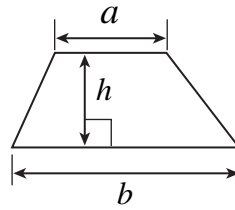
Advice
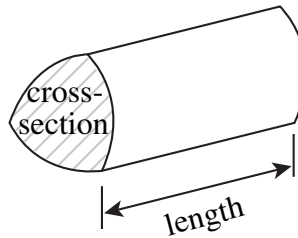- In all calculations, show clearly how you work out your answer.

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 The table shows the approximate populations of five cities.

City	Approximate population
Glasgow	600 000
Coventry	300 000
Dundee	150 000
Bangor	15 000
St David's	1500

1 (a) Which city has a population approximately twice as big as that of Dundee?

....

Answer .... *(1 mark)*

1 (b) Which city has an approximate population 100 times that of St David's?

....

Answer .... *(1 mark)*

1 (c) The approximate population of London is seven million.

Write seven million in figures.

....

Answer .... *(1 mark)*

1 (d) After the 2001 census the population of Stirling was 32 768

Write 32 768 to the nearest 100.

....

Answer .... *(1 mark)*

Turn over ▶

4

2 The diagram shows a circle centre *O*.
The line *ABC* touches the circle at *B*.
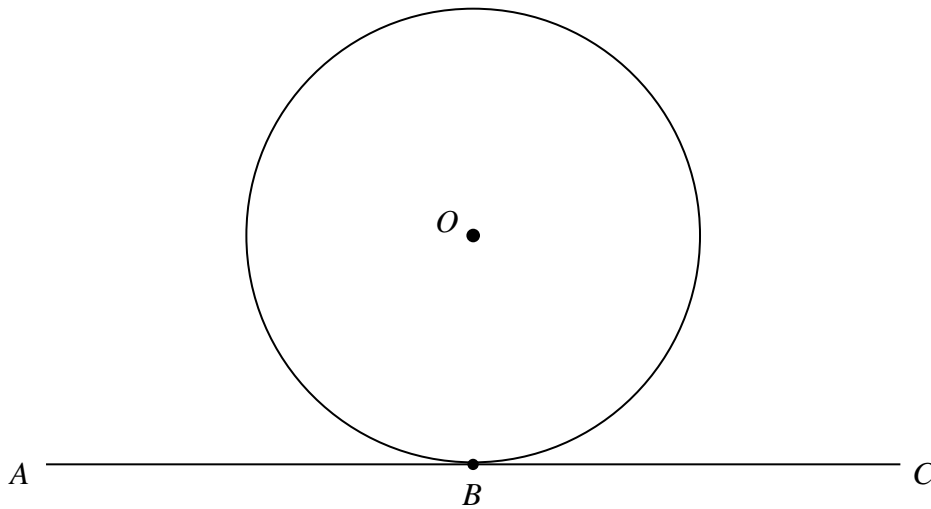
2 (a) What is the mathematical name of the line *ABC*?

Answer .... *(1 mark)*

2 (b) (i) Measure the length of a radius of the circle.

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

2 (b) (ii) Write down the length of a diameter of the circle.

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

2 (c) Measure the angle between the line *OB* and the line *ABC*.

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

3 Sue has a bag of sweets.
The bag contains 5 red sweets, 2 blue sweets and 8 green sweets.
Sue picks a sweet from the bag at random.

3 (a) Which colour is she most likely to pick?

....

Answer .... *(1 mark)*

3 (b) What is the probability that she will pick a red sweet?

....

Answer .... *(1 mark)*

3 (c) What is the probability that she will pick a white sweet?

....

Answer .... *(1 mark)*

3 (d) The arrow on the probability scale below shows the probability of choosing a blue sweet.

P(Blue)

0   1
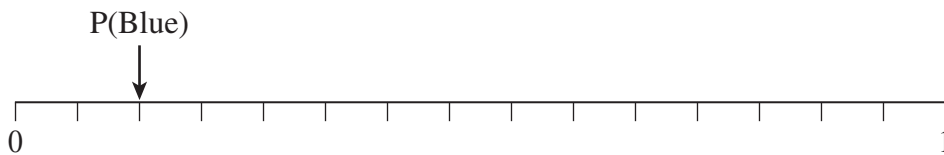
Draw an arrow on the scale to show the probability of picking a green sweet.

(1 mark)

Turn over for the next question

8

Turn over ▶

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4 Here are some patterns that are made from shaded and plain squares.
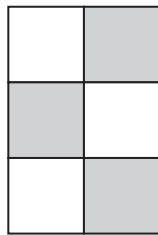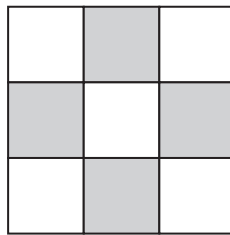
Pattern 1   Pattern 2   Pattern 3   Pattern 4
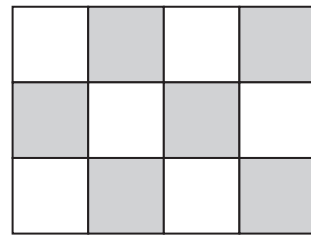
4 (a) Draw Pattern 5
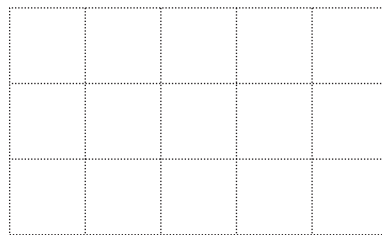
(1 mark)

4 (b) Fill in the missing entries in this table.

Pattern number	1	2	3	4	5	6
Shaded squares	1	3	4	6		
Plain squares	2	3	5	6		9
Total number of squares	3	6	9		15	18

(2 marks)

4 (c) Which pattern number has a total of 27 squares?

....

....

Answer ....   *(1 mark)*

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5 (a) Write down all the factors of 12

....

Answer .... *(2 marks)*

5 (b) Write down which of the following numbers are multiples of 6

2   3   12   18

....

Answer .... *(2 marks)*

5 (c) Write down a prime number between 10 and 20

....

Answer .... *(1 mark)*

5 (d) 2 and 3 are the only consecutive numbers that are both prime.

Explain why there can never be another pair of consecutive numbers that are both prime.

....

....

....

(1 mark)

6 Use your calculator to work out

6 (a) 5.3^3

Answer .... *(1 mark)*

6 (b) $\sqrt{36.69}$

Answer .... *(1 mark)*

12

Turn over ▶

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7 (a) The diagram below shows the calculation $+6 - 8 = -2$
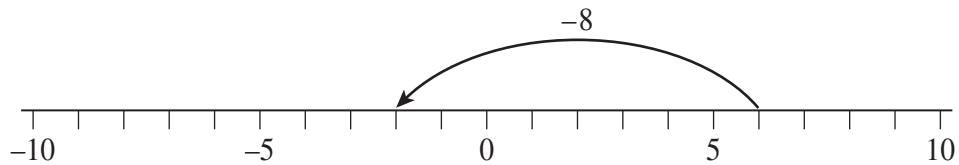
What calculations are shown on the following diagrams?

7 (a) (i)
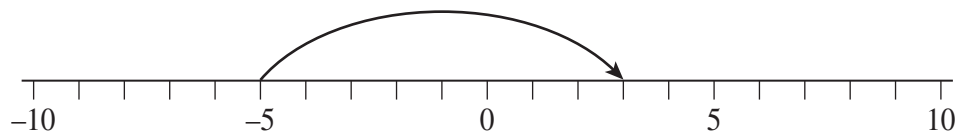
Answer .... $= +3$ *(1 mark)*

7 (a) (ii)
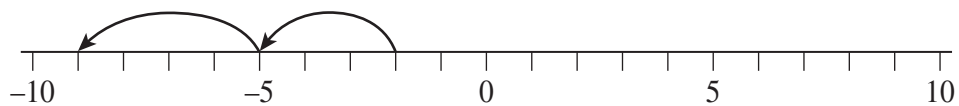
Answer .... $= -9$ *(1 mark)*

7 (b) Write a number in each empty box to make the calculations true.

7 (b) (i)

☐ **+** **–4** **=** ☐

(1 mark)

7 (b) (ii)

☐ **—** ☐ **=** **–2**

(1 mark)

8 Three views of the same dice are shown.
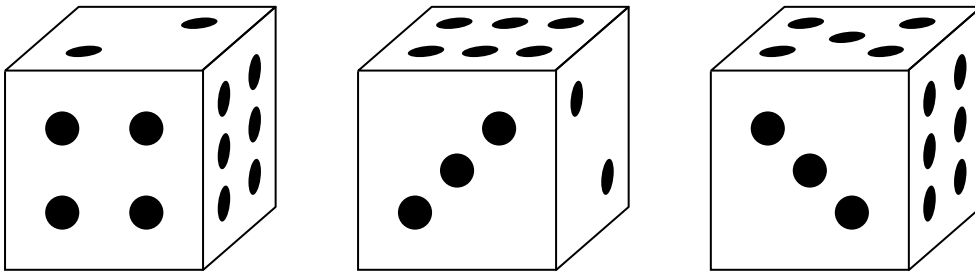
The net of the dice is shown.

Fill in the missing faces.
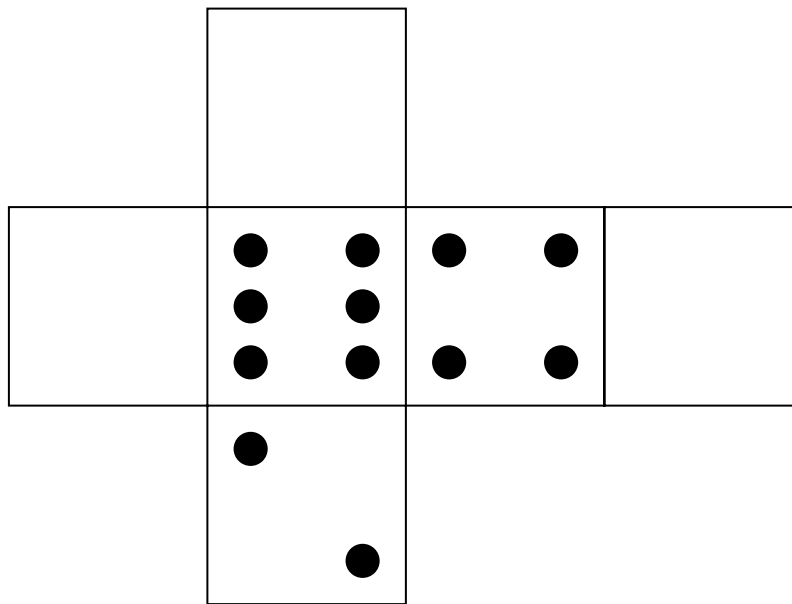
(2 marks)

9 Find a number between $\frac{2}{7}$ and $\frac{3}{7}$

....

....

Answer .... *(2 marks)*

8

Turn over ▶

10 (a) Write down the next term of the sequence

                44   50   56   62   68   ....

(1 mark)

10 (b) A number machine is shown.

INPUT → Multiply by 6 → Add 38 → OUTPUT
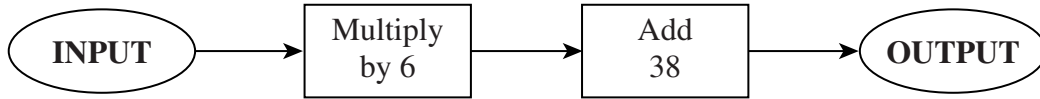
For example, when the input is 1, the output is 44

10 (b) (i) Show clearly that when the input is 2, the output is 50

....

....

(1 mark)

10 (b) (ii) Work out the output when the input is 7

....

....

                Answer .... *(1 mark)*

10 (b) (iii) Work out the input when the output is 98

....

....

....

                Answer .... *(2 marks)*

10 (c) The line segment on the graph shows part of the straight line connecting input and output of the number machine.

The line passes through the point (2, 50).
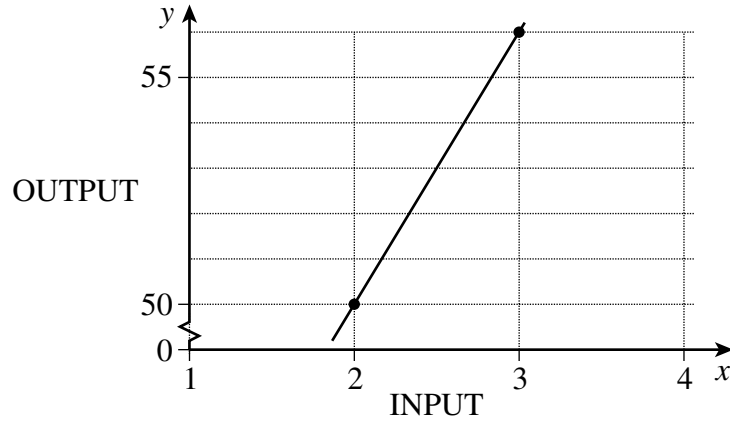
Fill in the missing values for these two points that are on the line.

....

....

Answer   (3, ...)

(4, ...)   *(2 marks)*

Turn over for the next question

7

Turn over ▶

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11 These grids are made from centimetre squares.

11 (a)
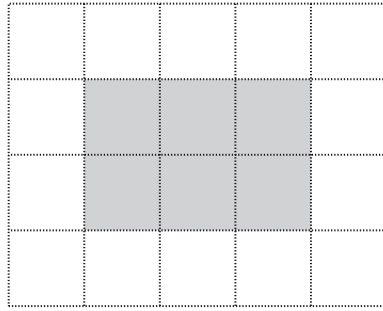
What is the area of the shaded rectangle?

....

Answer .... cm^2 *(1 mark)*

11 (b) On the grid below draw a rectangle with an area of $12\,\text{cm}^2$.
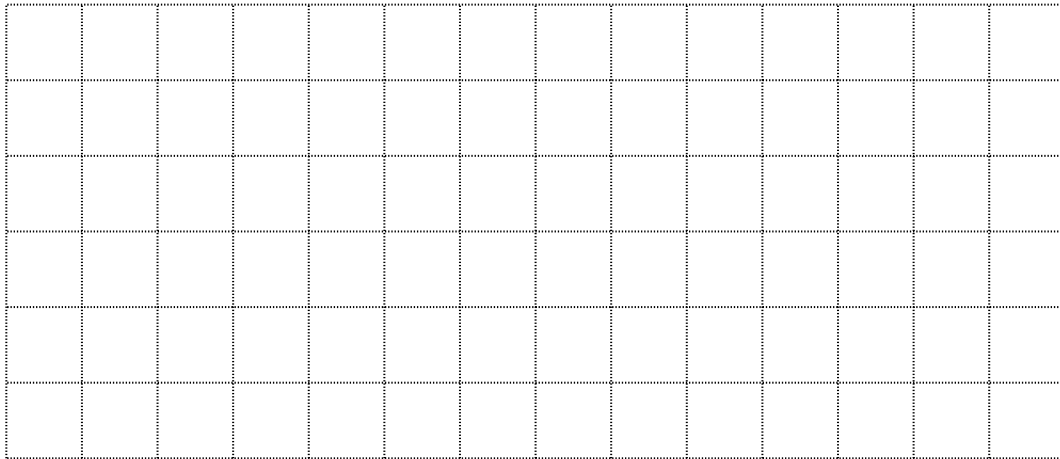
(1 mark)

11 (c) On the grid below draw a rectangle with a perimeter of $12\,\text{cm}$.
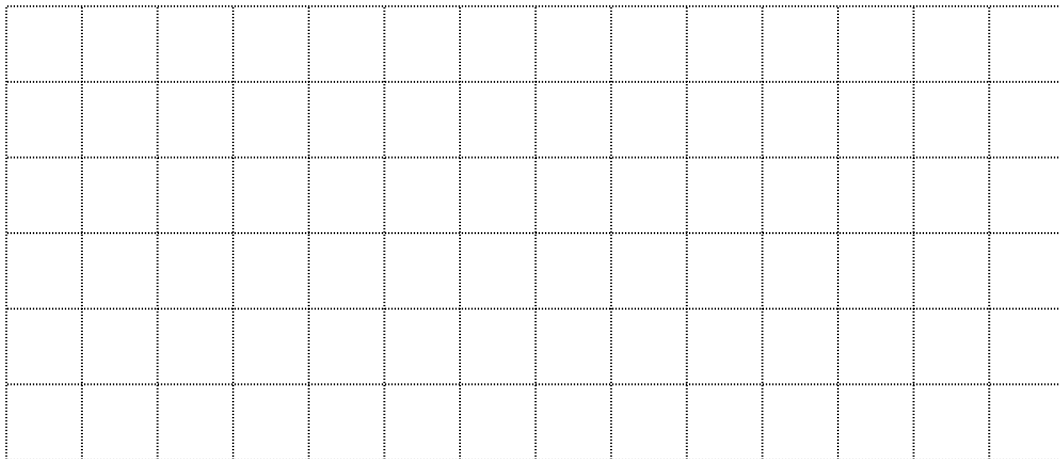
(1 mark)

11 (d) On the grid below draw a triangle with an area of $6\,\text{cm}^2$.
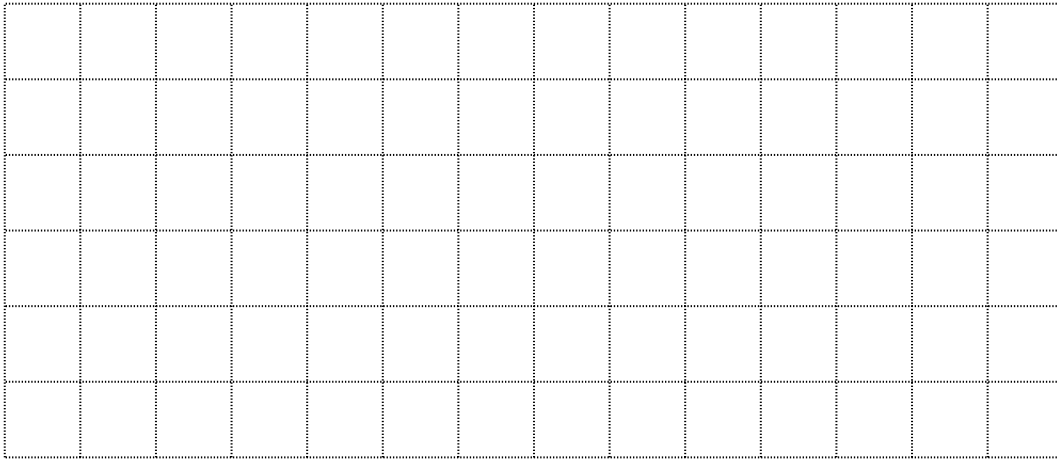
(1 mark)

12 (a) Angle *x* is an acute angle.
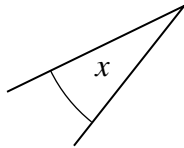
Write down a possible value for *x*.
You do not need to measure the angle.

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

12 (b) Angle *y* is an obtuse angle.
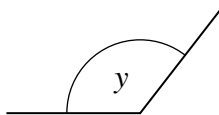
Explain what is meant by an obtuse angle.

....

....

(1 mark)

12 (c) Katie says that it is impossible to have an isosceles triangle with a right angle.

Draw a fully labelled diagram to show that Katie is wrong.

(2 marks)

8

Turn over ▶

13   Five towns, A, B, C, D and E on an island are joined by straight roads.
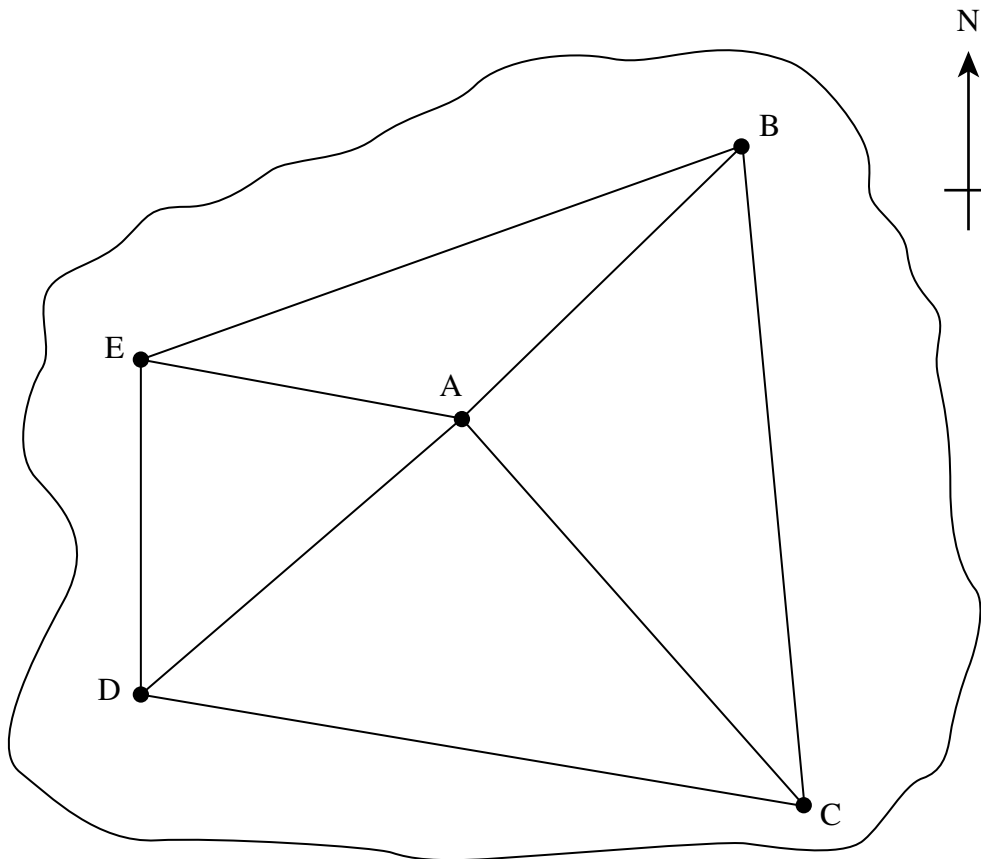
13   (a)   Town D is due south of town E.

What is the three-figure bearing of South?

Answer .... ° *(1 mark)*

13   (b)   Which town is North-East of town A?

Answer .... *(1 mark)*

13   (c)   Measure the bearing of town B from town E.

Answer .... ° *(1 mark)*

13   (d)   Measure the bearing of town C from town D.

Answer .... ° *(1 mark)*

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14 Below are six shapes drawn on a centimetre grid.
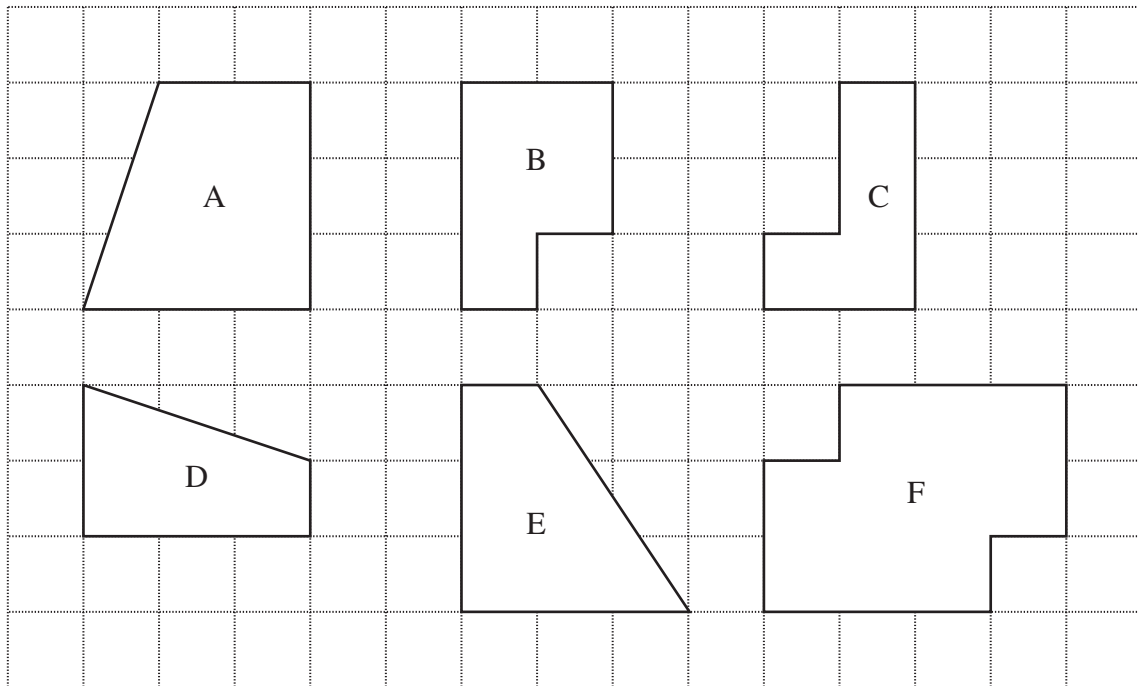
14 (a) Which two shapes will fit together to make a square?

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

14 (b) Which two shapes will fit together to make a rectangle?

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

14 (c) Shape B can be used twice to make the shape F as shown below.
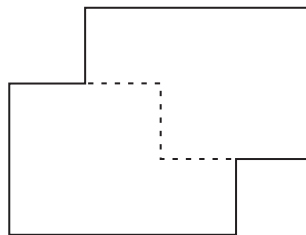
On the grid below show a different way that shape B can be used twice to make shape F.

(1 mark)

7
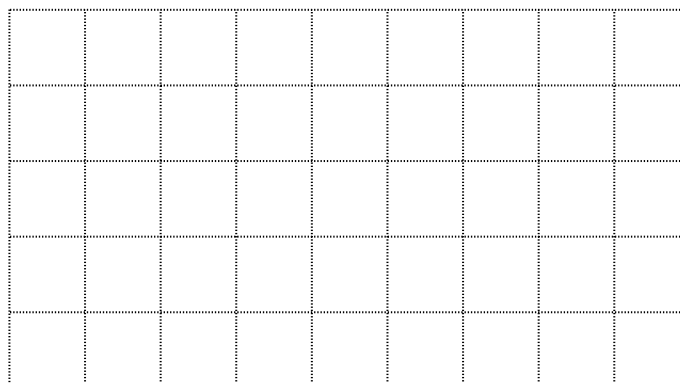
Turn over ▶

15 The bar chart shows the percentage of households that recycled different types of waste in 2002 and 2005.
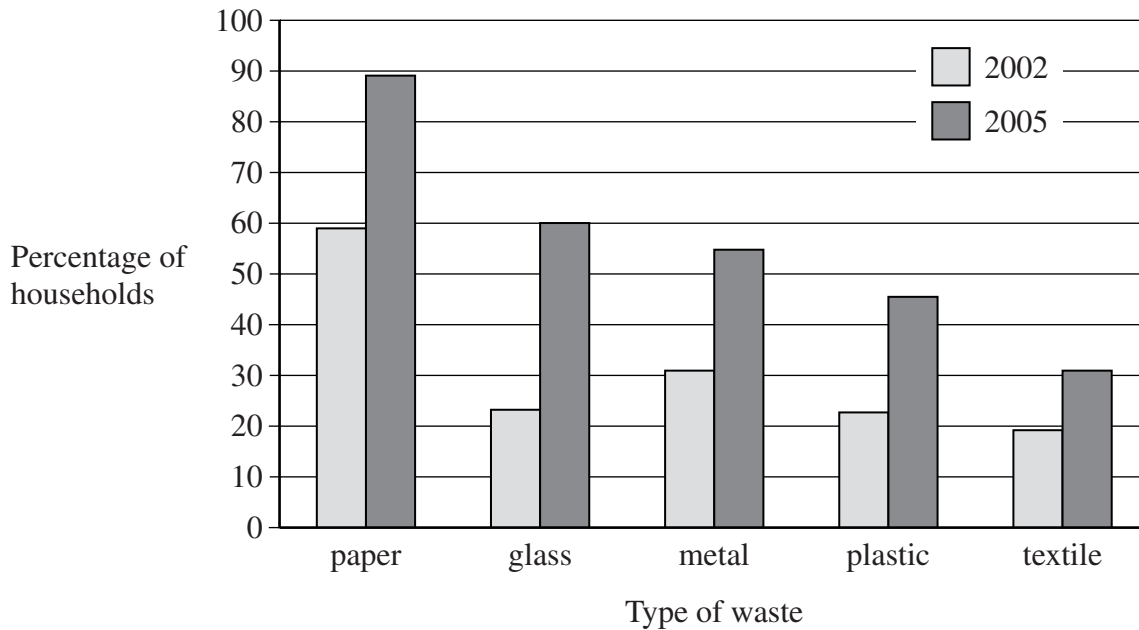
15 (a) Which type of waste had the highest percentage recycled in 2005?

Answer .... *(1 mark)*

15 (b) Which **two** types of waste had the same percentage recycled in 2002?

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

15 (c) What is the difference in the percentages of paper recycled in 2002 and 2005?

....

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

15 (d) Between 2002 and 2005 the percentage of households that recycled glass more than doubled.

Explain how you can tell this from the diagram.

....

....

....

(1 mark)

15 (e) In 2002, an average household threw away 5.5 kg of recycled waste each week. 1.7 kg of this was paper.

Work out 1.7 as a percentage of 5.5
Give your answer to the nearest whole number.

....

....

....

Answer .... % *(2 marks)*

16 (a) Solve $6w - 4 = 14$

....

....

Answer $w =$ .... *(2 marks)*

16 (b) Solve $\dfrac{z}{3} = 12$

....

....

Answer $z =$ .... *(1 mark)*

16 (c) x and y are connected by the equation $y = 2x + 5$

16 (c) (i) Write down a pair of **positive** numbers x and y so that the equation above is true.

....

Answer $x =$ .... , $y =$ .... *(1 mark)*

16 (c) (ii) Write down a pair of **negative** numbers x and y so that the equation above is true.

....

Answer $x =$ .... , $y =$ .... *(1 mark)*

Turn over ▶

$\dfrac{}{11}$

17 An online digital photo printing site has the following charges.

Number of prints	Cost per print (p)	Postage
0 – 50	12p	£2 for up to 100 prints
51 – 100	10p	
101 – 150	8p	£3 for more than 100 prints
More than 150	6p	

17 (a) James orders 40 prints.

Explain why it will cost him £6.80

....

....

(1 mark)

17 (b) The cost, including postage, is less for 101 prints than for 100 prints.

How much less?
Give your answer in pence.

....

....

....

Answer .... p   *(3 marks)*

17 (c) Zoe spends £9 on prints and postage.

How many prints does she order?

....

....

....

Answer ....   *(2 marks)*

18 A firework display costs £32 400
The display lasts for 12 minutes.
On average 10 fireworks are set off every second.

What is the average cost of a firework?

....

....

....

....

Answer £ .... *(3 marks)*

19 Enlarge the shape in the diagram by a scale factor 3, centre (0, 6).

(2 marks)

11

Turn over ▶
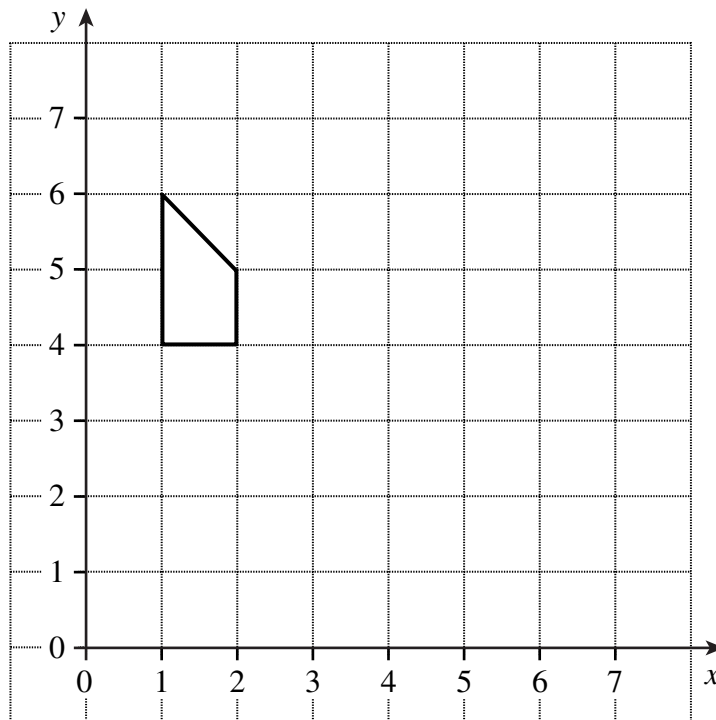
20 The amount of money that a group of teenagers earn each week is shown in the stem-and-leaf diagram.

```
0 | 8   8   9
1 | 2   6   8
2 | 5   5
3 | 0   2   3   7
4 | 6
5 | 0   6   9
```
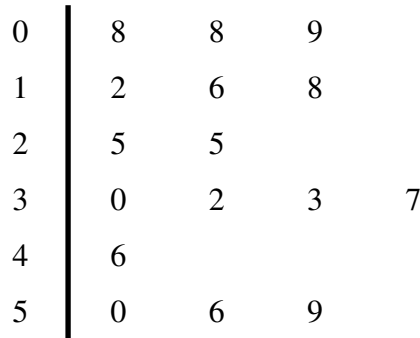
| Key   1 | 8 represents £18 |

20 (a) How many teenagers are there in the group?

....

Answer .... *(1 mark)*

20 (b) What is the median amount earned?

....

Answer £ .... *(1 mark)*

20 (c) What is the probability that a teenager in the group earns more than £35?

....

Answer .... *(1 mark)*

20 (d) What is the probability that a teenager in the group earns less than £35?

....

Answer .... *(1 mark)*

20 (e) Calculate the mean amount of money earned by the group.

....

....

....

....

Answer £ .... *(3 marks)*

21 A television company is to carry out a survey on the popularity of its programmes.

21   (a) The company decides to phone 10 people at home between 9 am and 4 pm.

Give **two** reasons why this may **not** give any useful data.

Reason 1 ....

....

....

Reason 2 ....

....

....

(2 marks)

21   (b) One of the questions in the survey is

Sports programmes are better than chat shows.
Do you agree?

☐ Yes   ☐ Don't know

Give a reason why this is **not** a good question.

....

....

....

(1 mark)

22 Solve the inequality $5x + 3 < 9$

....

....

....

Answer .... *(2 marks)*

12

Turn over ▶

23 Ali says that for any number x, x^2 is always less than x^3.

For example, when $x = 3$, $\quad 3^2 < 3^3$ as $9 < 27$

Find an example to show that Ali is wrong.

....

....

....

(2 marks)

24 (a) Calculate the area of a semicircle of radius 12 cm.
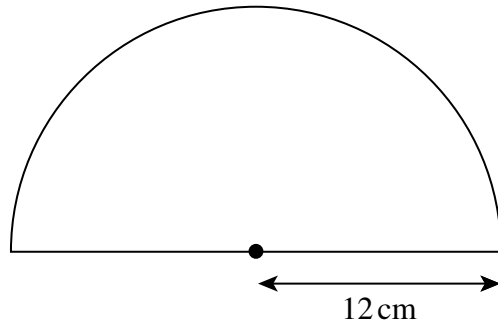
Not drawn accurately

12 cm

....

....

....

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

24 (b) The area of another semicircle is $40\,000$ cm^2.

Show clearly that this is equal to 4 m^2.

....

....

....

....

(2 marks)

25 The table shows information about two types of light bulbs, Standard and Energy Saving. Both types of light bulb give out the same amount of light.

	Standard	Energy Saving
A = Cost of bulb (pounds)	£0.50	£3.50
B = Power of bulb (kilowatts)	0.1 kW	0.02 kW
C = Expected lifetime of bulb (hours)	1500 h	12 000 h
D = Cost per kilowatt hour (pounds)	£0.10	£0.10

The total cost for a light bulb over its expected lifetime is given by the formula

Total cost = A + B × C × D

25 (a) Find the total cost, in pounds, of a Standard bulb over its expected lifetime.

....

....

....

Answer £ .... *(2 marks)*

25 (b) The expected lifetimes of Standard bulbs to Energy Saving bulbs are in the ratio 1500 : 12 000

Write the ratio 1500 : 12 000 in its simplest form.

....

Answer .... *(1 mark)*

25 (c) One Energy Saving bulb has an expected lifetime of 12 000 hours.
How much cheaper would it be, in terms of total cost, to use one Energy Saving bulb rather than Standard bulbs?

....

....

....

....

Answer £ .... *(3 marks)*

END OF QUESTIONS

There are no questions printed on this page

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