Ma

KEY STAGE 3

TIER 5–7

Year 8 mathematics test

Paper 2

Calculator allowed

First name _____

Last name _____

Class _____

Date _____

Please read this page, but do not open your booklet until your teacher tells you to start. Write your name, the name of your class and the date in the spaces above.

Remember

- The test is 1 hour long.
- You will need a pen, pencil, rubber, ruler, pair of compasses and a calculator. You may find tracing paper useful.
- Some formulas you might need are on page 2.
- This test starts with easier questions.
- Try to answer all of the questions.
- Write all of your answers and working on the test paper – do not use any rough paper. Marks may be awarded for working.
- Check your work carefully.
- Ask your teacher if you are not sure what to do.

For marking use only

Total marks	

Instructions

Answers

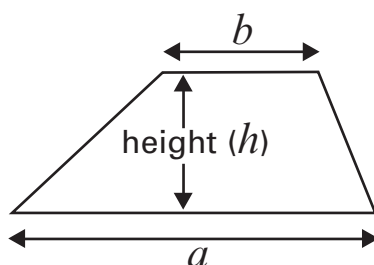This means write down your answer or show your working and write down your answer.

Calculators

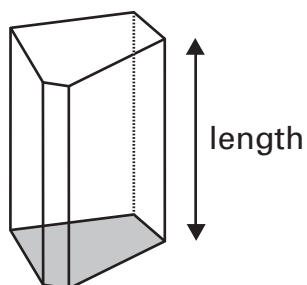You **may** use a calculator to answer any question in this test.

Formulas
You might need to use these formulas.

Trapezium

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

Prism

Volume = area of cross-section × length

3 The timetable shows the times and cost of the tickets for the ferry between Uig and Tarbert.

Times of the Ferry

UIG – TARBERT					
		🚢 UIG	🚢 TARBERT	🚢 TARBERT	🚢 UIG
		Depart	Arrive	Depart	Arrive
MON		05:30	07:10	07:30	09:10
		14:00	15:40	16:00	17:40
TUE		09:40	11:20	11:50	13:30
		18:00	19:40	-	-
WED		-	-	07:30	09:10
		14:00	15:40	16:00	17:40
THU		09:40	11:20	11:50	13:30
		18:00	19:40	-	-
FRI		-	-	07:30	09:10
		14:00	15:40	16:00	17:40
SAT		09:40	11:20	11:50	13:30
		18:00	19:40	20:00	21:40

Cost of the Tickets

FARES: UIG – TARBERT			SINGLE	SAVER 5 DAY RETURN	6 JOURNEY
🚶	Driver/Passenger (each)		9.40	16.05	40.50
🚗	Car (each)		45.00	77.00	166.00
🚐	Caravan, Baggage	up to 5m	45.00	77.00	166.00
🚚	Trailer (over 2.5m), Motorhome	up to 8m	68.00	116.00	249.00
🏍	Motorcycle, Baggage trailer (up to 2.5m)		22.50	38.50	83.00
🚲	Bicycle		2.00	-	-

(a) At what time does the last ferry on Wednesday leave Tarbert to go to Uig?

....
1 mark

(b) Tracey and Gary have a motorhome. It is 6m long.

They take the motorhome on a ferry from Uig to Tarbert.

Work out the cost of single tickets for Tracey, Gary and their motorhome.

£.............. . . . .
1 mark

4 What is the approximate length of wire in **one** of these paper clips?

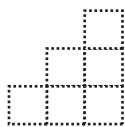Drawn actual size
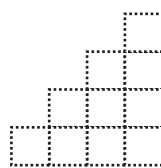
.... cm . . . .
1 mark

5 The number of squares in each of these shapes is a triangle number.
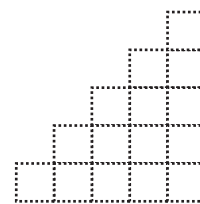
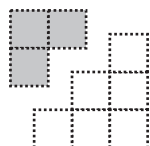3 squares   6 squares   10 squares   15 squares

Rule 1: Add two consecutive triangle numbers to get a square number.
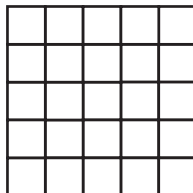
| Example |

3 + 6   = 9
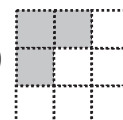
(a) Show how the square number below can be made from two consecutive triangle numbers.

Shade in one of the triangle numbers.

. . . .
1 mark

(b) Here are some more triangle numbers.

1,   3,   6,   10,   15,   21,   28,   36,   45 …

Use rule 1 to show how to get 81 with triangle numbers.

☐ + ☐ = 81

. . . .
1 mark

(c)   Number 6 is in position 3 in the sequence.

1,   3,   6,   10,   15,   21,   28,   36,   45 …

Rule 2: Double a triangle number, minus its position number to get a square number.

$$2 \times 6 - 3 = 9$$

Example

Number 6 is in position 3 in the sequence
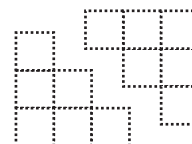
Use rule 2 to show how to get 81 with triangle numbers.

| 2 | × | | − | | = | 81 |

. . . . .
1 mark

(d)   Show how you can get 121 with triangle numbers, using rule 2.

| 2 | × | | − | | = | 121 |

. . . . .
1 mark

6 Bari has a lot of tiles like these.
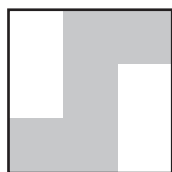
$\dfrac{5}{9}$ of this tile is shaded
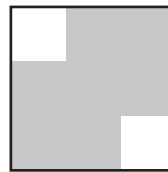
$\dfrac{7}{9}$ of this tile is shaded

Bari uses some of his tiles to make patterns.

Write what fraction of each pattern is shaded.
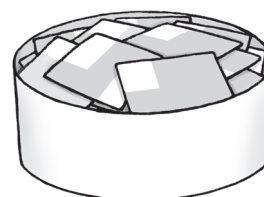
(a)

. . . .
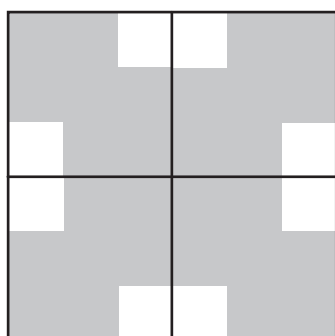
(b)

. . . .
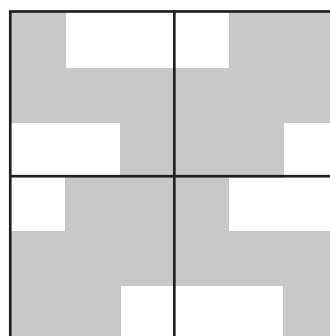
. . . .
1 mark

. . . .
1 mark

7 Work out the values of these expressions, when x equals 6

$5x + 2 =$ . . . .

. . . .
1 mark

$5(x + 2) =$ . . . .

. . . .
1 mark

8 Esha counted the number of cars in a car park at different times one morning.

She drew this graph to show her data.

Number
of cars
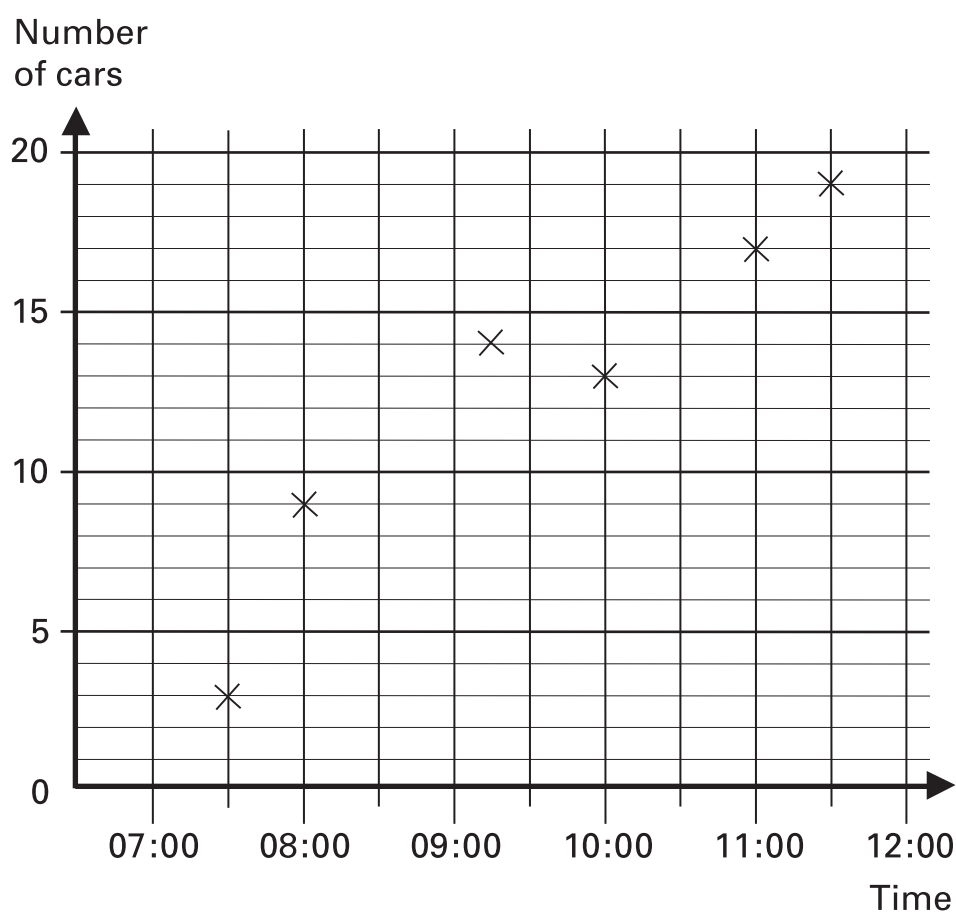
Jack says:

> Esha's graph shows that there were 15 cars in the car park at 10:30

Explain why Esha's graph does not show this.

. . . . .
1 mark

9 Jack and Vanessa each make a decoration with tiles.

They each have a **1m by 1m** space to fill.

They can use three different types of tile.

Tile 1
10cm
by 10cm
10p each tile

Tile 2
20cm
by 20cm
20p each tile

Tile 3
10cm
by 20cm
30p each tile
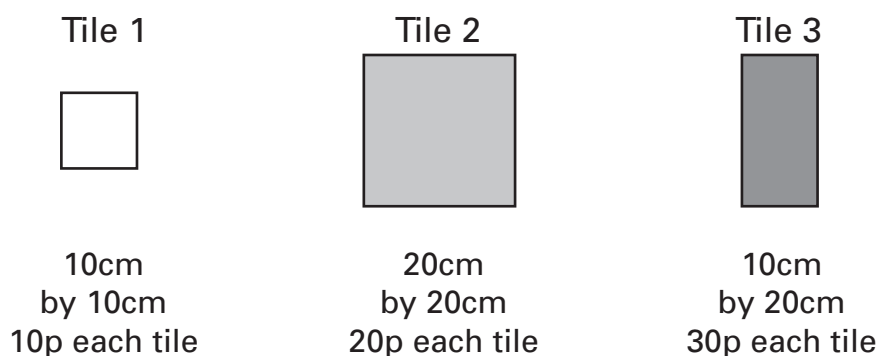
(a) Jack wants to fill the **1m by 1m** space with the greatest number of tiles.

He uses 100 of tile 1 and no other tiles.

1m

1m
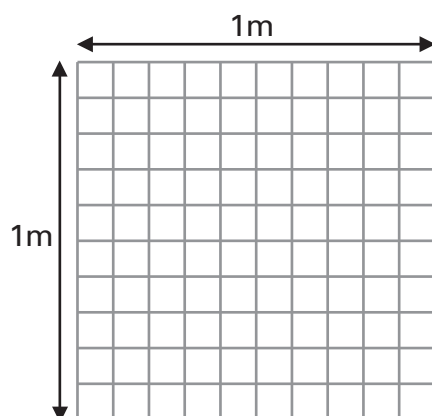
not drawn to scale

100 of tile 1

0 of tile 2

0 of tile 3

How much does it cost?

£ ....

1 mark

(b) Vanessa wants to fill the **1 m by 1 m** space by repeating this pattern.

1m

1m

not drawn to scale
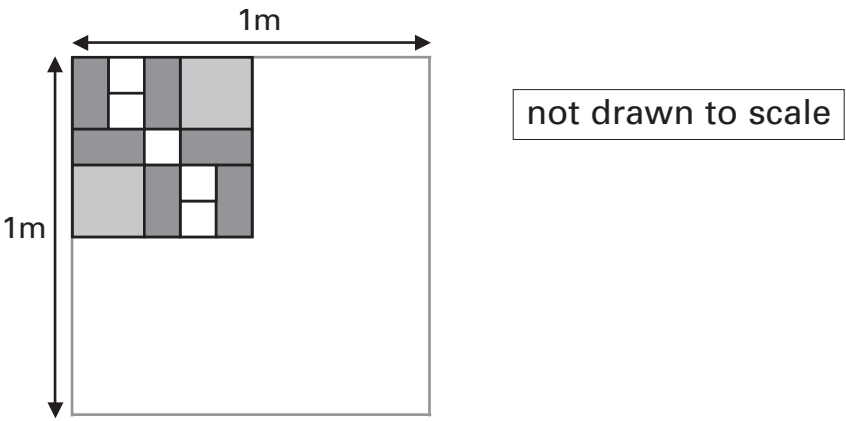
How many of each tile should she use?

..... of tile 1   ..... of tile 2   ..... of tile 3

How much does it cost?

£ ....

2 marks

10 A school ran three different first aid courses on Monday and Tuesday.

The bar chart shows the percentage of pupils who went on each course on each day.
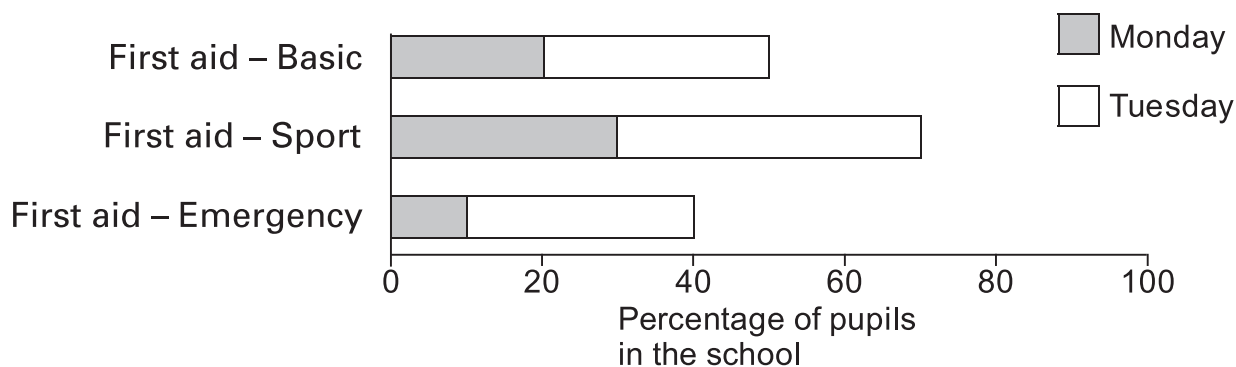
(a) About what percentage of the pupils in the school went on the Sport first aid course on Tuesday?

. . . . % . . . .
1 mark

(b) There are 1200 pupils in the school.

About how many pupils altogether went on the Basic first aid course?

. . . . pupils . . . .
1 mark

(c) None of the pupils did the same course twice.

Did some pupils go on more than one course?

Put a tick (✓) in one box.

☐ Yes ☐ No ☐ Cannot tell

Explain your answer.

. . . . .
1 mark

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11 **$4n + 2 = 14$**

What is the value of $2n + 1$?

. . . .
1 mark

Use n to write a different expression that is equal to 21

. . . . = 21 . . . .
1 mark

12 Look at these two rectangles.

1cm | A | 4cm

2cm | B | 3cm
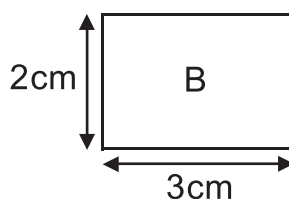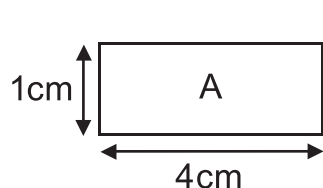
not drawn to scale

They can fit together to make different shapes.

Work out the perimeters of the shapes below.

A B

Perimeter: .... cm

1 mark

A B
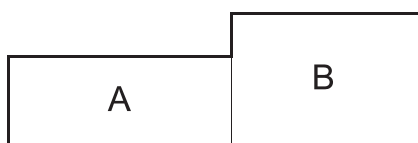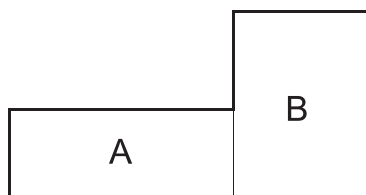
Perimeter: .... cm

1 mark

13 Alisha says:

All prime numbers are odd.

Explain why Alisha is wrong.

1 mark

14 Look at this equation.

$$x + 3y = 16$$

Use it to find the value of these expressions.

$2x + 6y$ = ...

1 mark

$\dfrac{x + 3y}{8}$ = ...

1 mark

$\sqrt{x + 3y}$ = ...

1 mark

---

15 Look at the information about this triangle.

The size of Angle B is 3 times the size of angle A
The size of Angle C is 5 times the size of angle A

not drawn to scale

Work out the sizes of angles A, B and C

A = ...° B = ...° C = ...°

2 marks

16 The frequency tables show information about Luke's class and Nia's class.

The tables show how many days pupils were absent during one week.

Luke's class: 25 pupils

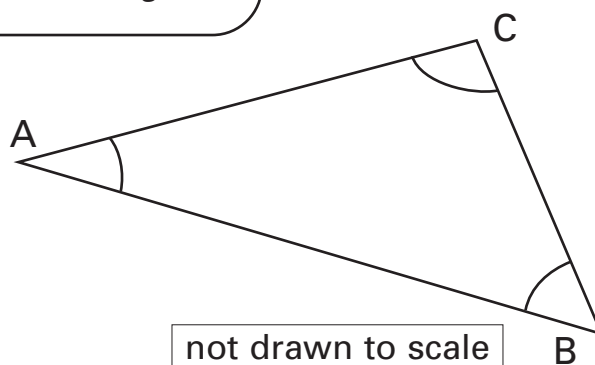| Days absent	0	1	2	3	4	5
Number of pupils	21	0	1	1	0	2

Nia's class: 25 pupils

Days absent	0	1	2	3	4	5
Number of pupils	18	4	2	0	1	0

(a) Look at the data for the pupils in Luke's class.

How many pupils were absent at some time during the week in Luke's class?

.... pupils   . . . .

1 mark

(b)   Luke and Nia said:

The attendance was worse in my class than in Nia's during the week.

The attendance was worse in my class than in Luke's during the week.

Explain why Luke could be right.

Explain why Nia could be right.

17 Four pupils each make a regular tetrahedron.

They paint the faces of their tetrahedrons different colours.

Then they each throw their tetrahedron into the air a different number of times.

They record which face their tetrahedron lands on each time.

The table shows their results.

	Red (R)	Yellow (Y)	Black (B)	Green (G)	White (W)	Total
Adam	36	70	0	0	44	150
Bala	31	19	18	22	0	90
Chris	50	0	52	59	39	200
Delia	0	27	34	52	37	150

(a) Which pupil's tetrahedron landed on Red the greatest **proportion** of times?
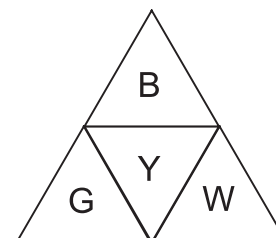
Put a ring around your answer.

Adam   Bala   Chris   Delia

. . . . .
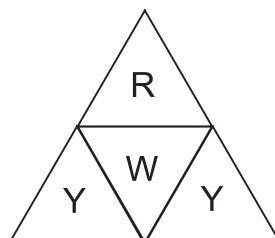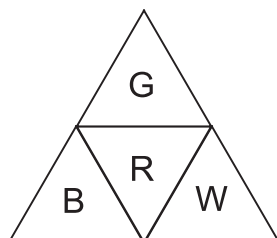1 mark

(b) The diagrams show the nets of the four tetrahedrons, with the colours of the faces indicated.

Write the name of the pupil who made it underneath each net.

....
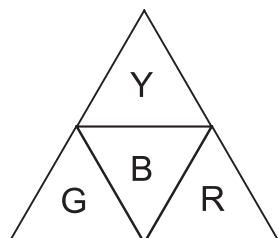
. . . .
1 mark

18 Here is a property that every square and every oblong has:

They each have **four sides**.

(a) Give another property that every square and every oblong has.

. . . .
1 mark

(b) Give a property of the square that is not a property of the oblong.

. . . .
1 mark

19 During the summer holidays, some pupils go to a sports centre every day for five days. They choose one activity each day.

They record the activities they do each day.

Joe and Eva present the results on different charts.

Joe's chart

Key

◯ Trampoline

◯ Badminton

△ Swimming

☐ Table tennis

☆ Wall climbing

Eva's chart

Number of times the activity is chosen
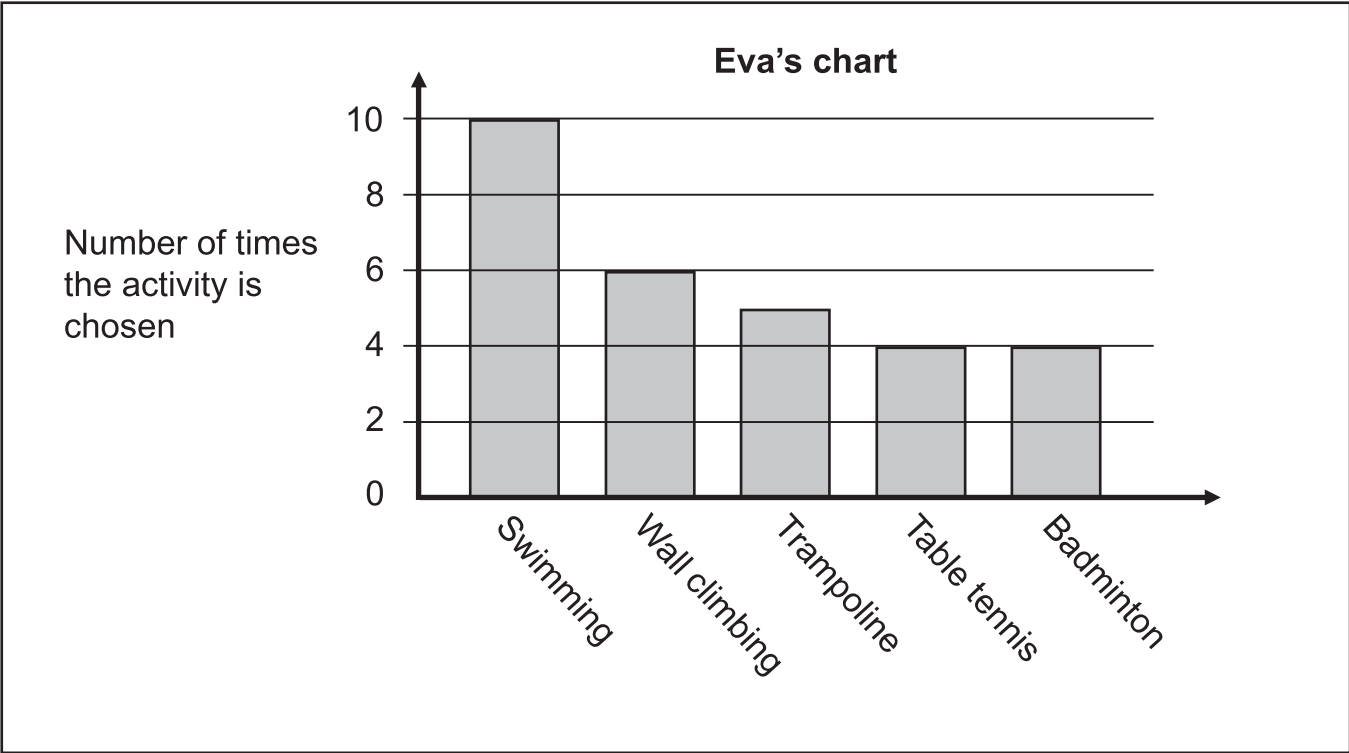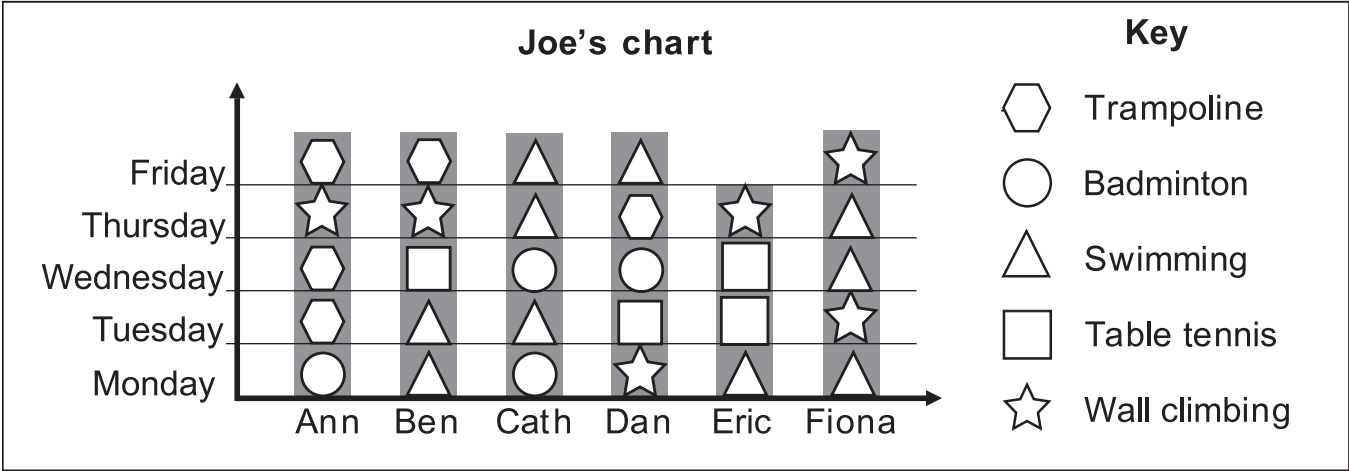
Whose chart is the most useful for answering these questions?

Put a ring around Joe or Eva for each one.

Which activity did Ann do most often?	Joe	Eva
Which activity was the most popular overall?	Joe	Eva
Who did the greatest number of different activities?	Joe	Eva
Who missed one day?	Joe	Eva
Who did all the activities?	Joe	Eva
What was the range of the number of activities that each pupil did?	Joe	Eva

. . . .

. . . .

. . . .

3 marks

20 People use suntan cream to stop their skin from burning in the sun.

This formula shows what percentage protection is provided by cream that has a Sun Protection Factor (SPF) of p

Percentage Protection = $\dfrac{(p-1)}{p} \times 100$

For example, for a cream that has an SPF of 4,

Percentage Protection = 75

(a) Use the formula to work out what percentage protection is provided by a cream that has an SPF of 20

. . . .

1 mark

(b) Lucy uses a cream that has an SPF of 15

Kate uses a cream that has an SPF of 30

Is Kate's percentage protection double Lucy's percentage protection?

Tick (✓) Yes or No.

☐ Yes ☐ No

Explain your answer.

. . . . .
1 mark

(c)   Harry says:

'Some SPFs provide 100% protection.'

Is Harry right?

Tick (✓) Yes or No.

☐ Yes   ☐ No

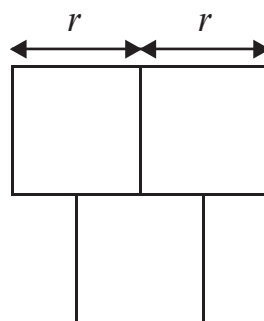Use your understanding of $\dfrac{(p-1)}{p} \times 100$ to explain your answer.

. . . .
1 mark

21 Look at this diagram of
three identical squares
with sides length r

(a) Write an expression in terms of r for the total area of the three
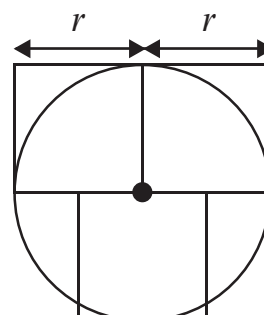squares.

. . . .
1 mark

(b) Write an expression in terms of r for the area of a circle with radius r

. . . .
1 mark

(c) Look at the diagram of the
three identical squares
and a circle with radius r

Which is bigger, the area of the three squares or the area of the circle?

Tick (✓) one box.

the area of the three squares ☐   the area of the circle ☐

Explain your answer.

. . . . .
1 mark

22 Giri plotted the line graph of each of these equations on a set of axes.

A) $2y = 4x + 2$ B) $y = 3x + 2$

C) $4y = 8x + 4$ D) $2y = 3x + 6$

E) $y = 3x + 3$

(a) Which two lines are identical?

.... and ....

1 mark

(b) Which two lines are parallel?

.... and ....

1 mark

(c) Which two lines go through the point (0, 3)?
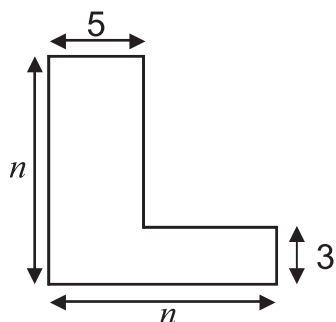
.... and ....
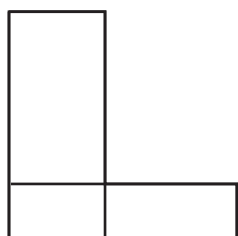
1 mark

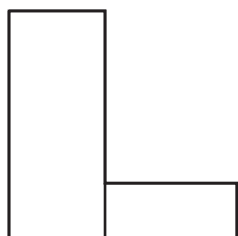**23** Four pupils want to find the area of this shape.

They each draw a different diagram and write a different expression for the area.

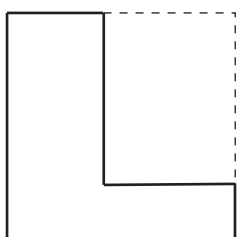Draw an arrow from each diagram to the expression that it represents.
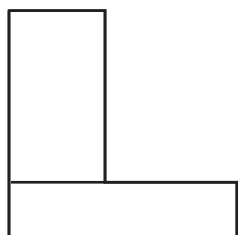
The first is done for you.

$3(n - 5) + 5n$

$5(n - 3) + 3n$

$5(n - 3) + 3(n - 5) + 15$

$n^2 - (n - 3)(n - 5)$

. . . . .
1 mark

24 There are 31 536 000 seconds in one year.

31 536 000 is a little more than 3×10^7

A computer starts counting seconds on January 1st 2007.

In which month does the number of seconds reach 10^7?

....
1 mark

25 Lela cycles along a road for one hour at a constant speed of 12 kilometres an hour.

Then she walks back to where she started at a constant speed of 6 kilometres an hour.

(a) How far did Lela travel altogether?

...............................km . . . .
1 mark

(b) Jacob says:

'Lela's mean speed there and back was 9 kilometres an hour.'

Explain why Jacob is wrong.

. . . .
1 mark

26 This diagram shows a rectangle divided into four smaller rectangles.

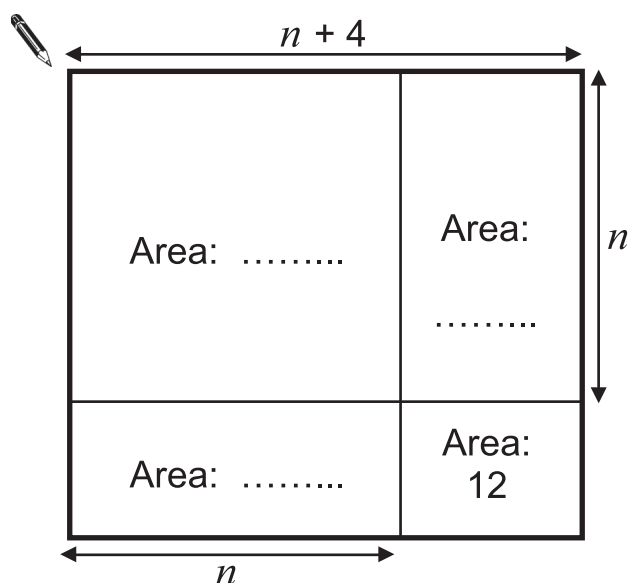Some of the lengths in centimetres and areas in square centimetres are shown on the diagram.

$n + 4$

Area: ……...	Area: ……...
Area: ……...	Area: 12

n

n

Diagram not actual size

. . . .
1 mark

(a) Write expressions for the missing areas in the diagram.

(b) Use your answer to part (a) to write an expression for the area of the whole rectangle.

Write your expression as simply as possible.
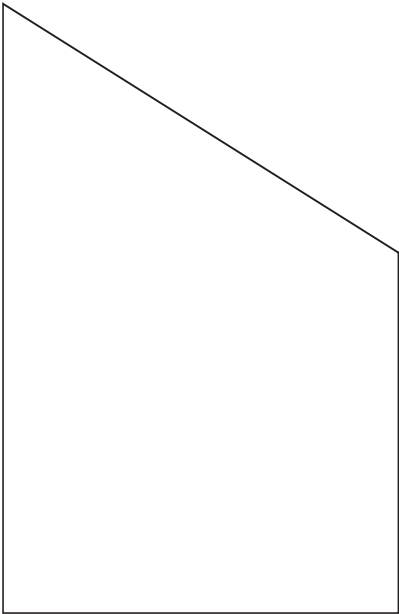
. . . .
. . . .
2 marks

27 The diagram below shows a quadrilateral.

Draw a line all the way round the quadrilateral that is always exactly 4cm away from the quadrilateral.

. . . .

. . . .

. . . .
3 marks

1 The factors of 16 are 1, 2, 4, 8 and 16

The number 16 has ...*5*... factors.

Write a number **less than 10** in each space to complete the sentence.

The number .... has 4 factors.

The number .... has 3 factors.

The number .... has 2 factors.
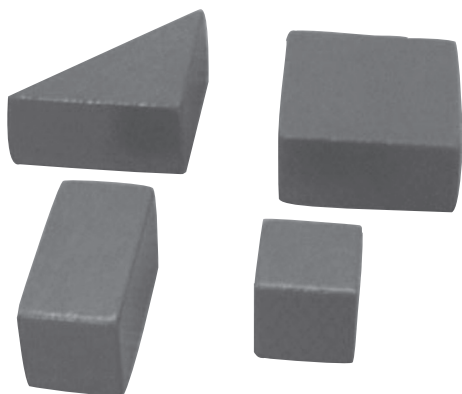
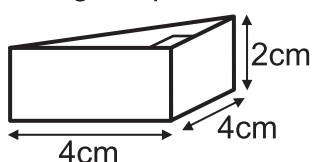The number .... has 1 factor.

. . . .
. . . .
2 marks

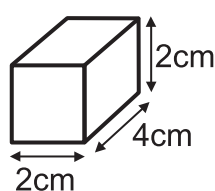**2** Ali has these four wooden blocks.
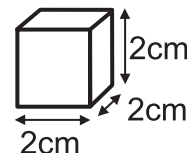
not drawn to scale

Right-angled triangular prism — 2cm, 4cm, 4cm

Cuboid — 2cm, 4cm, 4cm

Cuboid — 2cm, 4cm, 2cm

Cube — 2cm, 2cm, 2cm
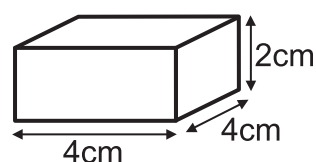
Ali builds the tallest tower possible with all four of the blocks.

What is the height of Ali's tower?

.... cm

. . . .
1 mark

END OF TEST

END OF TEST

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