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Ma

KEY STAGE 3

TIER 4–6

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 and a calculator.
- 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.

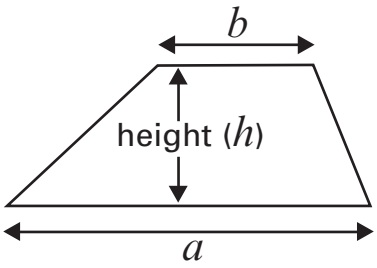
Calculators

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

Formulas

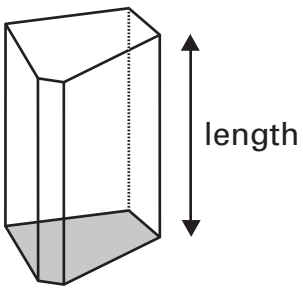
You might need to use these formulas.

Trapezium



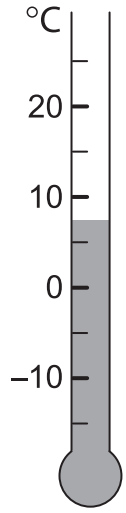
Area = $\frac{1}{2}(a + b)h$

Prism



Volume = area of cross-section × length

1 (a) What is the temperature on this thermometer?



..... °C

1 mark

(b) The temperature goes down by 10°C.

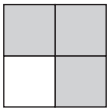
What is the new temperature?

..... °C

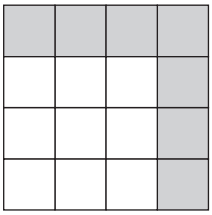
1 mark

2 This series of patterns is made with grey and white tiles.

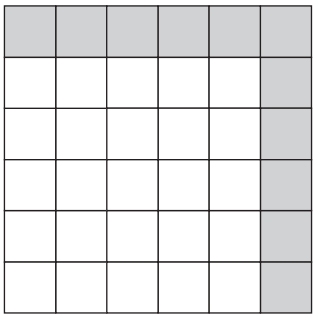
Look at the first three patterns in the series.



First pattern



Second pattern



Third pattern

(a) Write a **number** to complete this sentence.

Each new pattern in the series has ..... more grey tiles than the pattern before.

. . . .
1 mark

(b) How many grey tiles are there in the **fifth** pattern?

....
1 mark

3 This is a recipe to make hummus dip for **10** people.

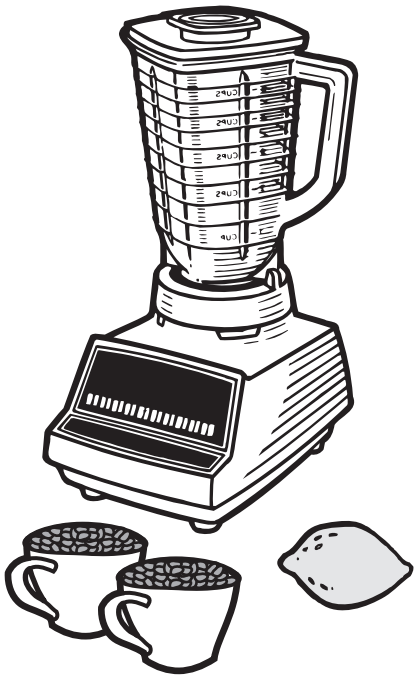
2 cups chickpeas

6 cups water

$\frac{1}{2}$ cup lemon juice

$\frac{1}{2}$ cup olive oil

4 cloves garlic



Lucy wants to make hummus dip for **5** people.

What should she use?

1 ..... cup chickpeas

..... cups water

..... cup lemon juice

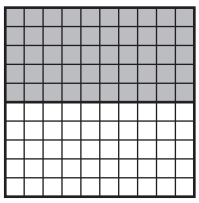
..... cup olive oil

..... cloves garlic

1 mark

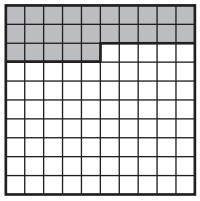
4 0.5 of this diagram is shaded.

50% of this diagram is shaded.

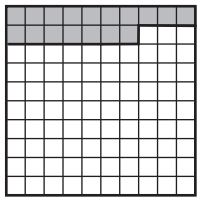


$\frac{50}{100}$ → 0.5, 50%

Write the decimal and the percentage of these diagrams that is shaded.



$\frac{\square}{100}$ → 0. ..... , ...%



$\frac{\square}{100}$ → 0. ..... , ...%

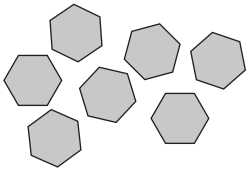
. . . .

. . . .

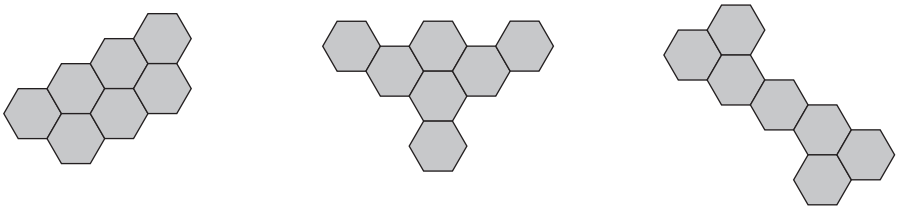
2 marks

5 Kate has 7 tiles like this.

They are regular hexagons.



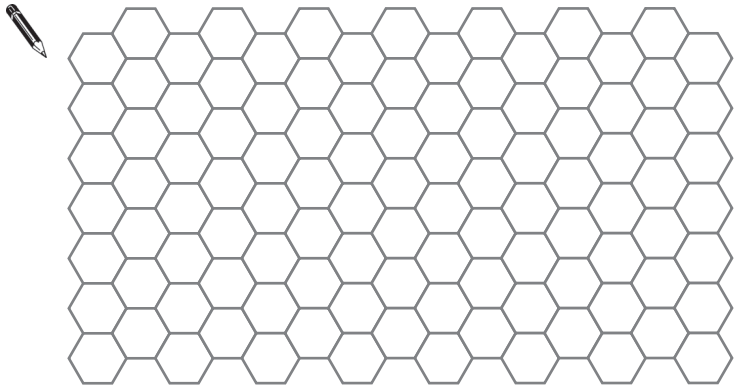
She fits her 7 tiles edge-to-edge to make each of these shapes.



(a) Kate wants to fit her 7 tiles edge-to-edge to make a new shape.

The shape must have the smallest perimeter possible.

Show how she can do this.

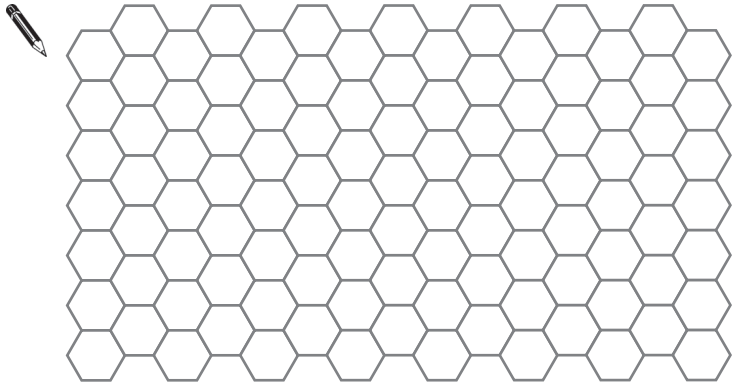


. . . . .
1 mark

(b) Kate wants to fit her 7 tiles edge-to-edge to make another new shape.

The shape must have the largest perimeter possible.

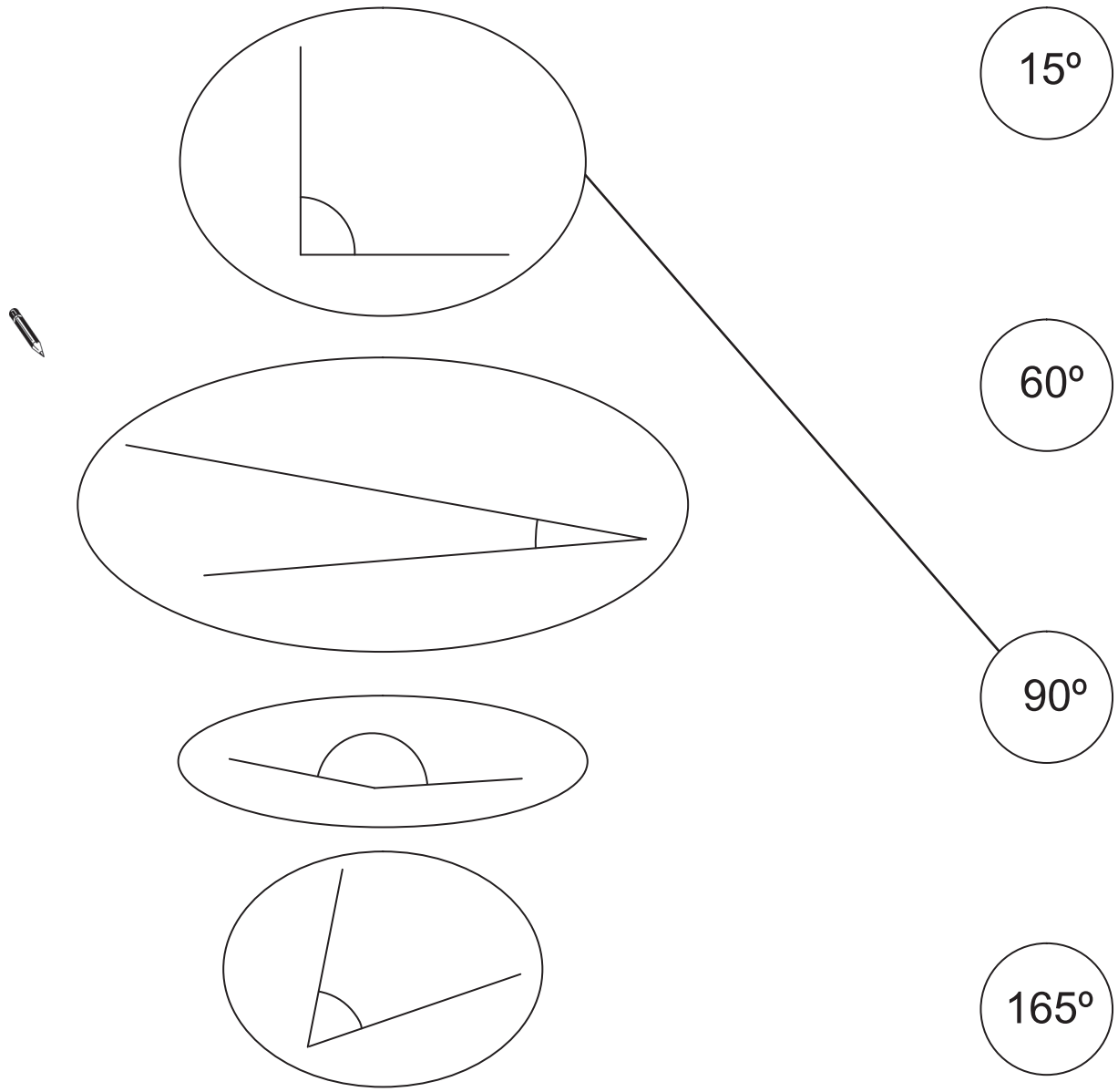
Show how she can do this.



. . . . .
1 mark

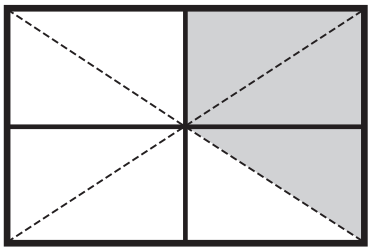
6 Match each angle to its size.

The first is done for you.



1 mark

7 What fraction of this rectangle is shaded?

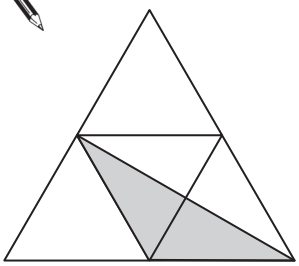


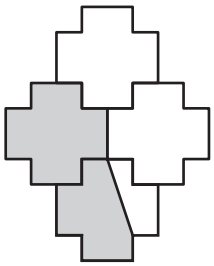
. . . . . .

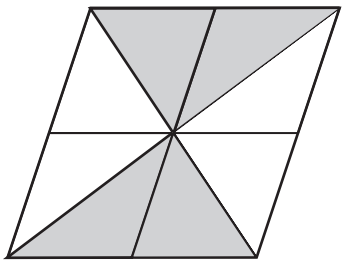
1 mark

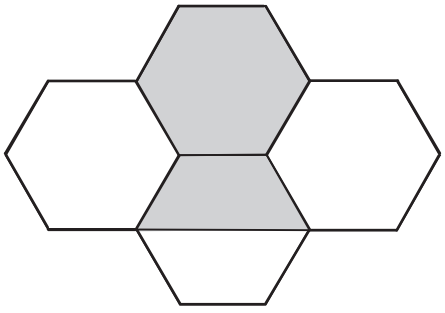
Which shape has the same fraction shaded as the rectangle?

Put a ring around the shape.



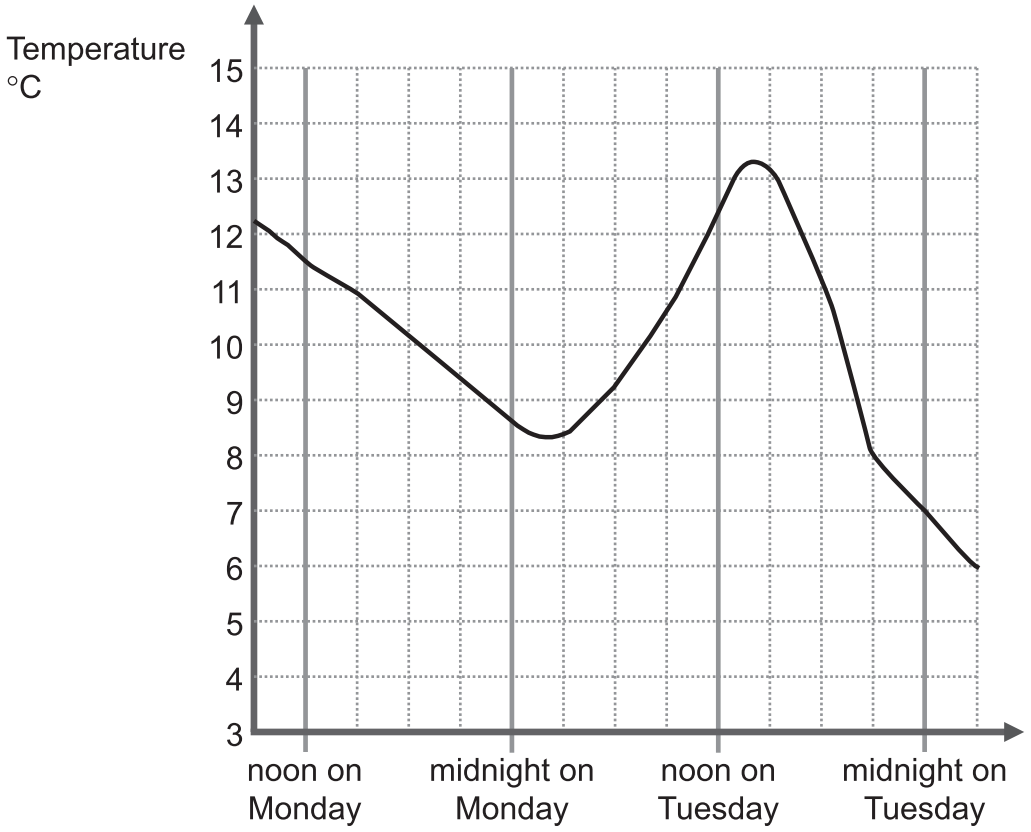






1 mark

8 This graph shows the temperature in York from noon on Monday to midnight on Tuesday.



(a) What was the highest temperature?

..... °C

1 mark

(b) When was the temperature 7°C?

.....

1 mark

(c) What was the temperature at noon on Monday?

..... °C

1 mark

(d) At which one of these times was the temperature going up?

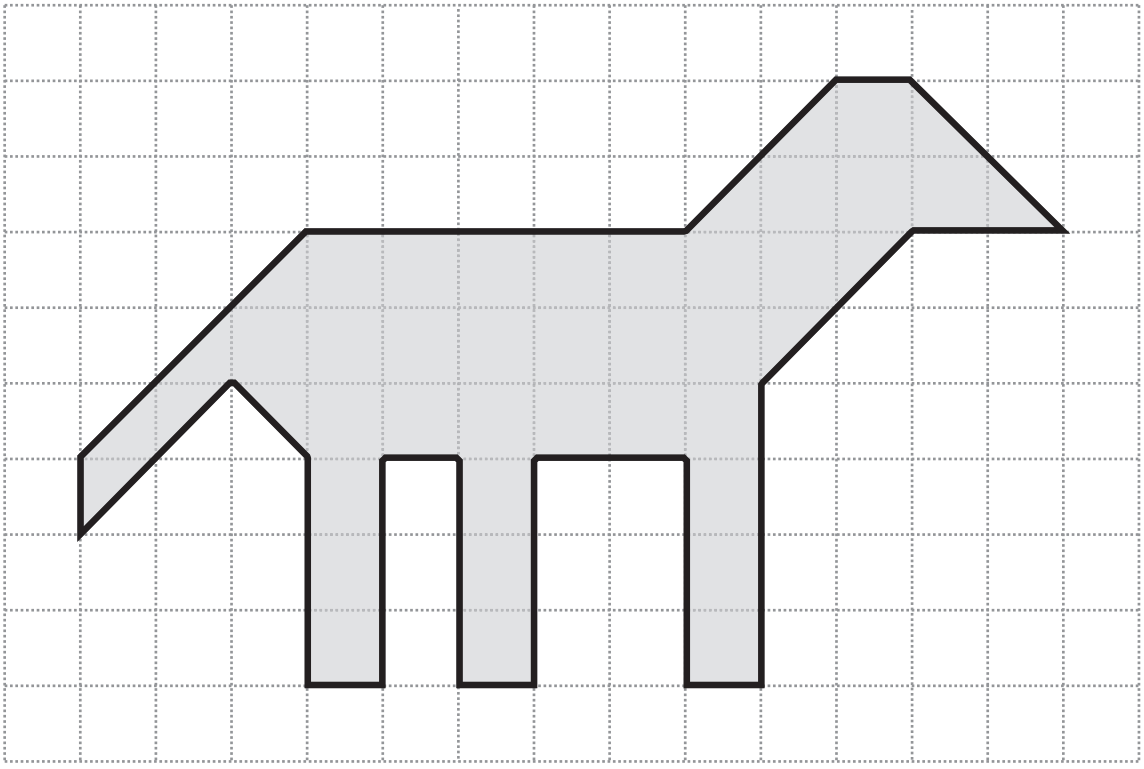
Put a ring around your answer.

noon on Monday midnight on Monday

noon on Tuesday midnight on Tuesday

. . . .
1 mark

9 Harry drew this picture on centimetre squared paper.



What is the area of Harry's picture?

. . . . . cm^2 . . . .
1 mark

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

The number 16 has ..5.. factors.

(a) Fill the gaps.

The factors of 12 are .....

The number 12 has ..... factors.

. . . .
1 mark

(b) 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.

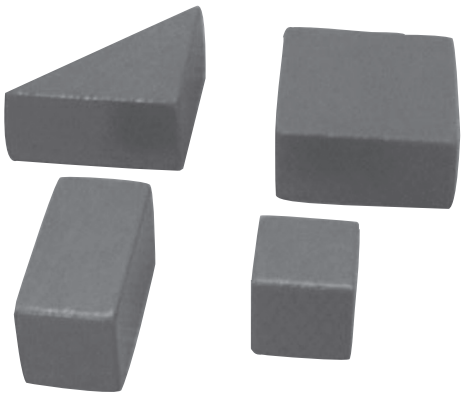
. . . .

The number ..... has 1 factor.

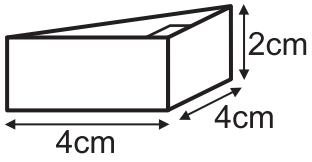
. . . .
2 marks

11 Ellen has these four wooden blocks.

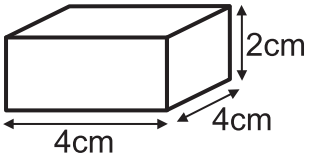
not drawn to scale



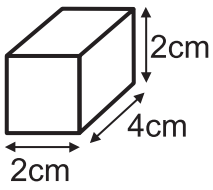
Right-angled triangular prism



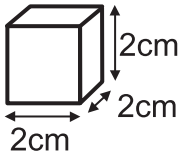
Cuboid



Cuboid

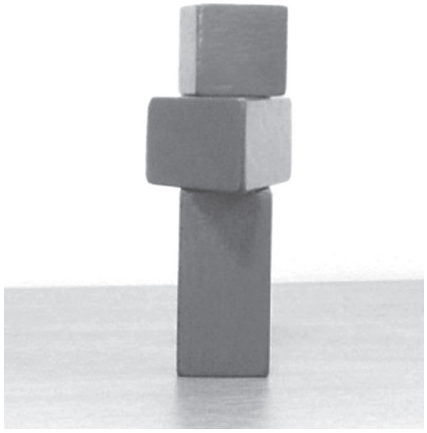


Cube



(a) Ellen builds this tower with three of the blocks.

What is the height of Ellen's tower?



..... cm

1 mark

(b) Ali builds the tallest tower possible with all four of the blocks.

What is the height of Ali's tower?

..... cm

1 mark

12 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) How long does the ferry journey from Uig to Tarbert take?

Give your answer in hours and minutes.

..... hours and ..... minutes

1 mark

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

.....

1 mark

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

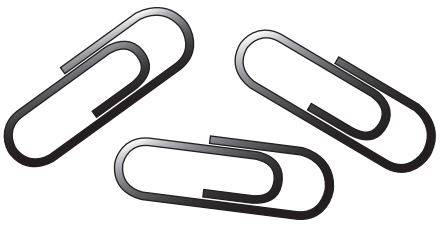
They take the motorhome on a ferry from Uig to Tarbert.

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

£.....

1 mark

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

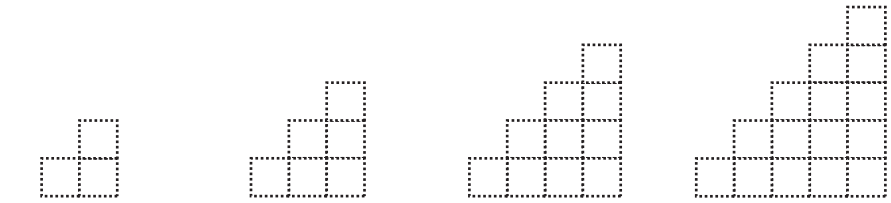


Drawn actual size

..... cm

1 mark

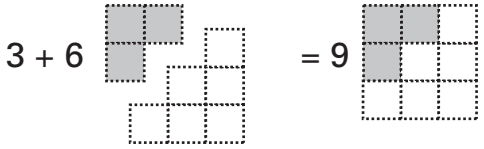
14 The number of squares in each of these shapes is a triangle number.



3 squares 6 squares 10 squares 15 squares

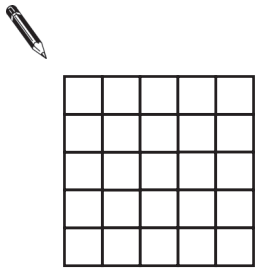
Rule 1: Add two consecutive triangle numbers to get a square number.

Example



(a) Show how the square number below can be made from two consecutive triangle numbers.

Shade in one of the triangle numbers.

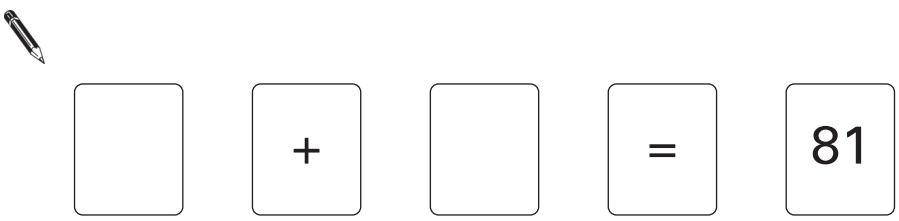


. . . .
1 mark

(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.



. . . .
1 mark

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

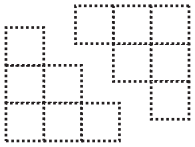
1, 3, 6, 10, 15, 21, 28, 36, 45 ...

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

Example

$2 \times 6 - 3 = 9$

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

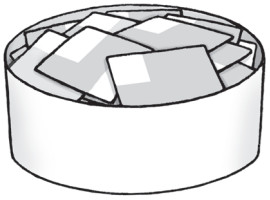
15 Bari has a lot of tiles like these.

$\frac{5}{9}$ of this tile is shaded

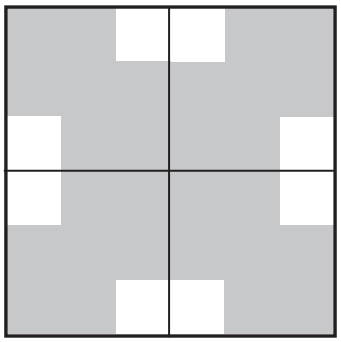
$\frac{7}{9}$ of this tile is shaded

Bari uses some of his tiles to make patterns.

Write what fraction of each pattern is shaded.

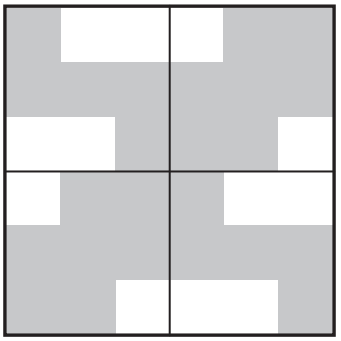


(a)



..... 1 mark

(b)



..... 1 mark

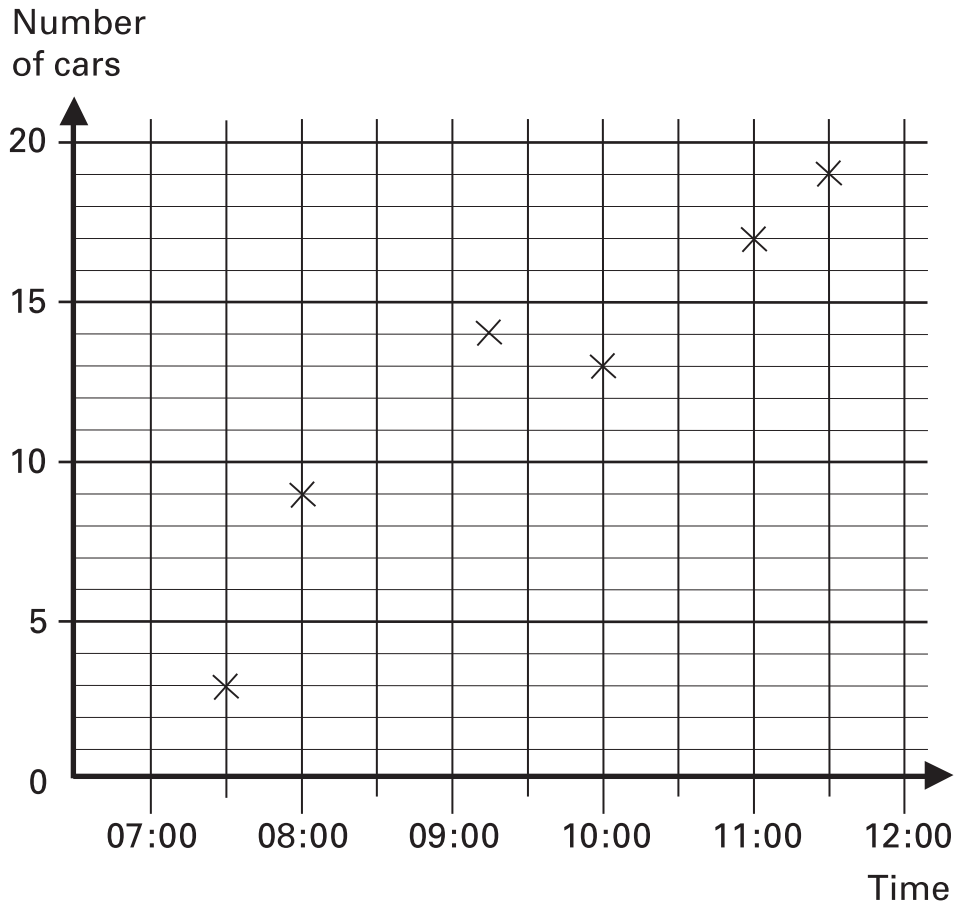
16 Work out the values of these expressions, when x equals 6

$5x + 2 =$ ..... 1 mark

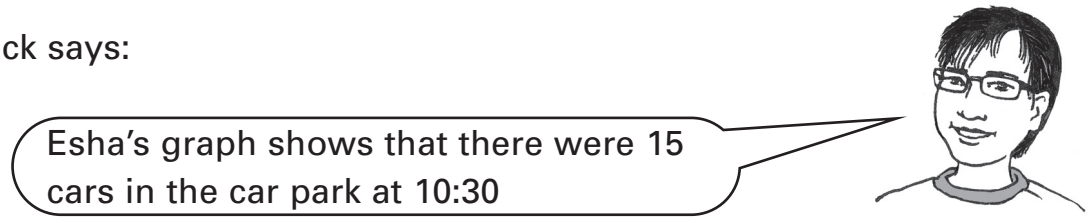
$5(x + 2) =$ ..... 1 mark

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

She drew this graph to show her data.



Jack says:



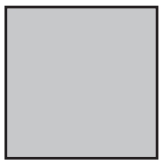
Explain why Esha's graph does not show this.

. . . .
1 mark

18 Jack and Vanessa each make a decoration with tiles.

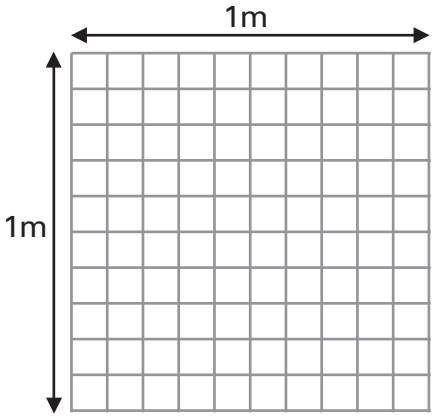
They each have a **1m by 1m** space to fill.

They can use three different types of tile.

Tile 1	Tile 2	Tile 3
		
10cm by 10cm 10p each tile	20cm by 20cm 20p each tile	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.



not drawn to scale

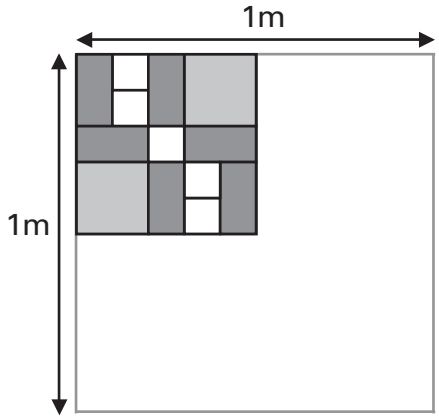
100 ..... of tile 1 0 ..... of tile 2 0 ..... of tile 3

How much does it cost?

£ ....

1 mark

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



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How many of each tile should she use?

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

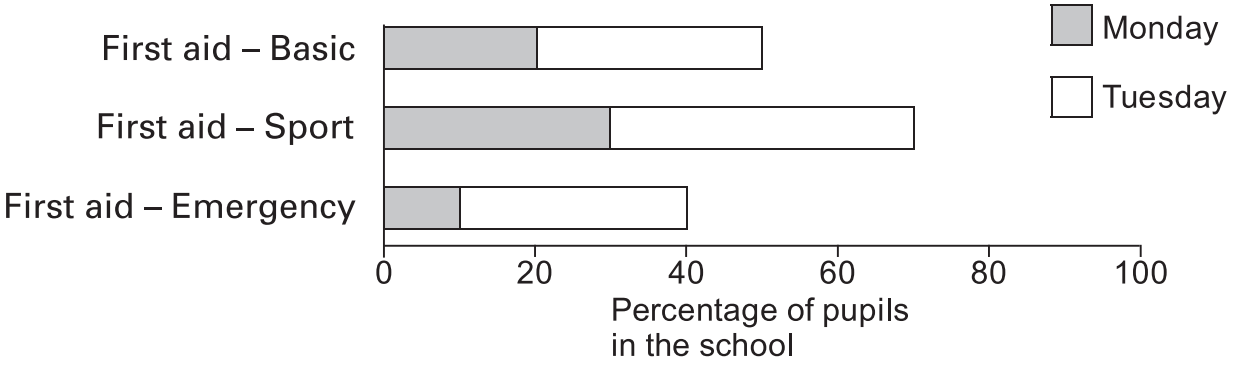
How much does it cost?

£ ....

2 marks

19 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

20 **$4n + 2 = 14$**

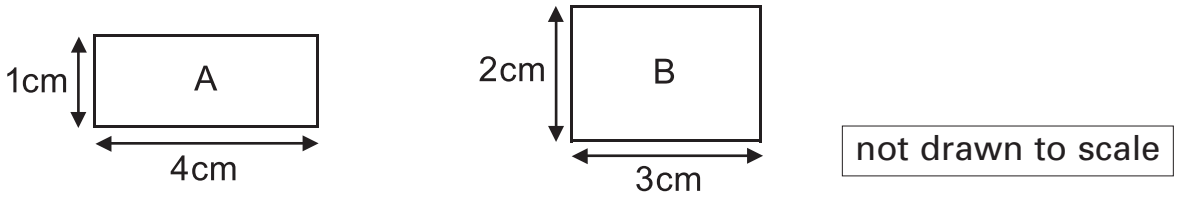
What is the value of $2n + 1$?

. . . .
1 mark

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

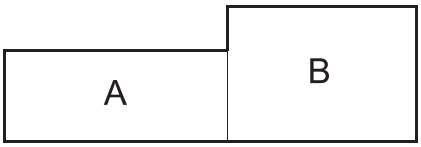
. . . . . = 21
1 mark

21 Look at these two rectangles.



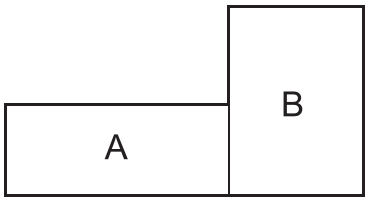
They can fit together to make different shapes.

Work out the perimeters of the shapes below.



Perimeter: . . . . . cm

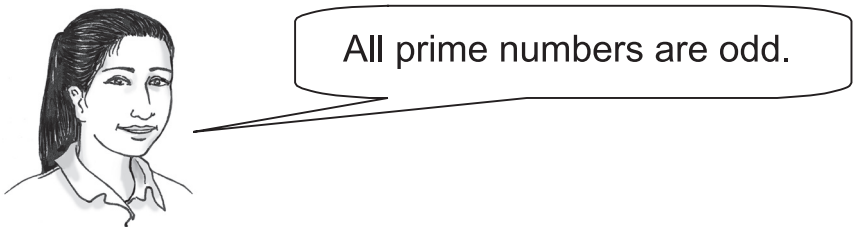
1 mark



Perimeter: . . . . . cm

1 mark

22 Alisha says:



Explain why Alisha is wrong.

. . . .
1 mark

23 The frequency table shows information about Luke's class.

It shows 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

Look at the data.

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

. . . . . pupils

. . . .
1 mark

24 Look at this equation.

$$x + 3y = 16$$

Use it to find the value of these expressions.

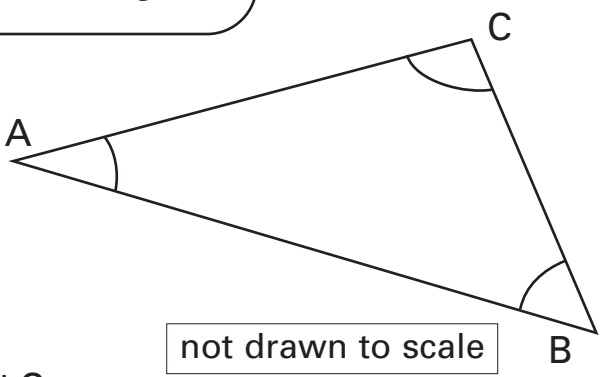
$2x + 6y$ = ... 1 mark

$\frac{x + 3y}{8}$ = ... 1 mark

$\sqrt{x + 3y}$ = ... 1 mark

25 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

26 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?

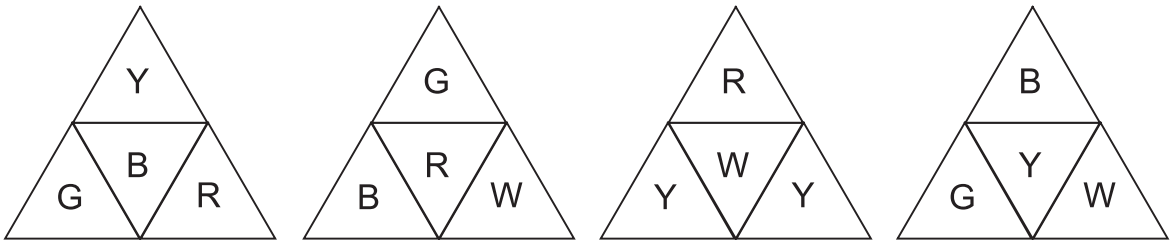
Put a ring around your answer.

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.



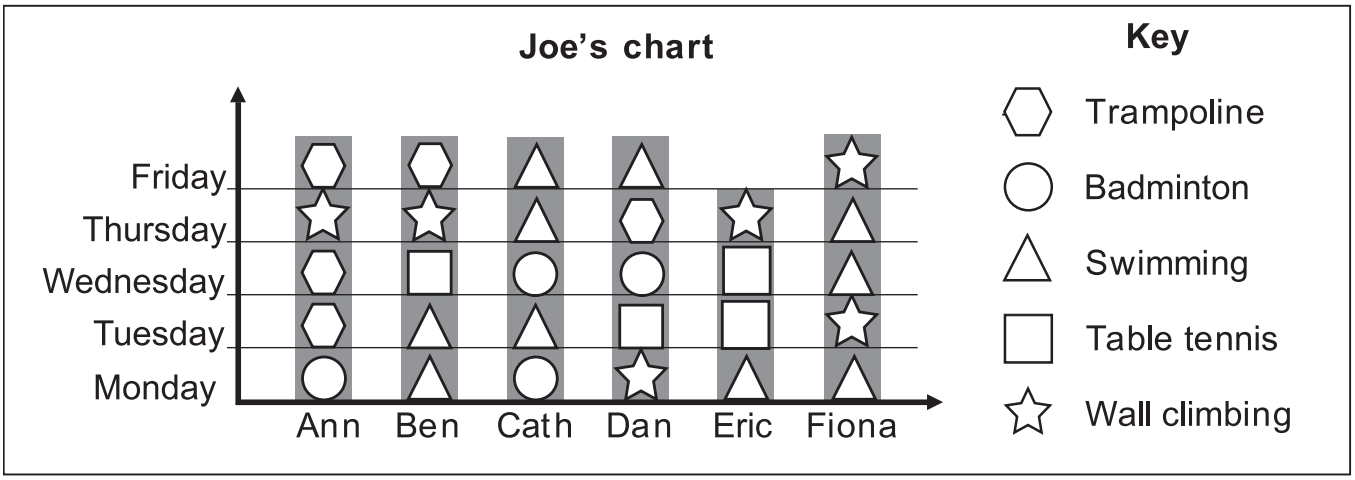
....

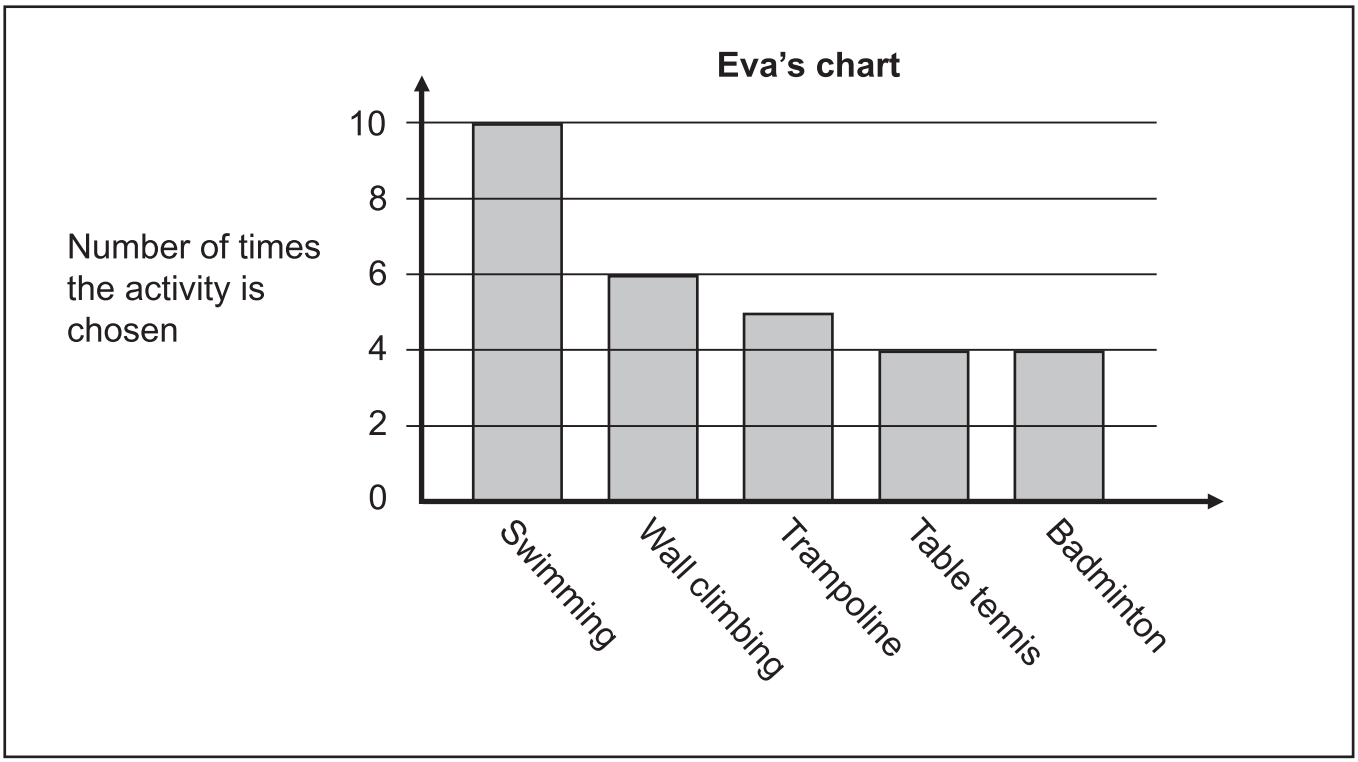
1 mark

27 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.





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

28 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

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

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

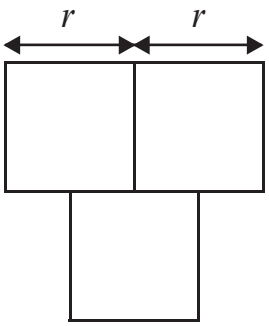
Percentage Protection = 75

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

. . . .

1 mark

29 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

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END OF TEST

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