Ma

KEY STAGE
3

TIER
5–7

2009

Mathematics test

Paper 1

Calculator **not** allowed

First name _____

Last name _____

School _____

Remember

- The test is 1 hour long.
- You **must not** use a calculator for any question in this test.
- You will need: pen, pencil, rubber and a ruler.
- Some formulae you might need are on page 2.
- This test starts with easier questions.
- Try to answer all the questions.
- Write all 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.

TOTAL MARKS	

Instructions

Answers

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

Calculators

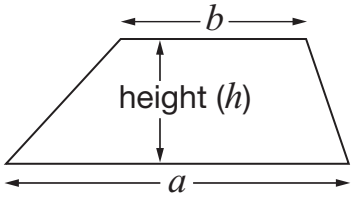
You **must not** use a calculator to answer any question in this test.

Formulae

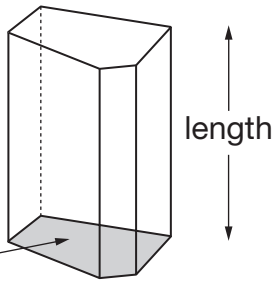
You might need to use these formulae

Trapezium

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



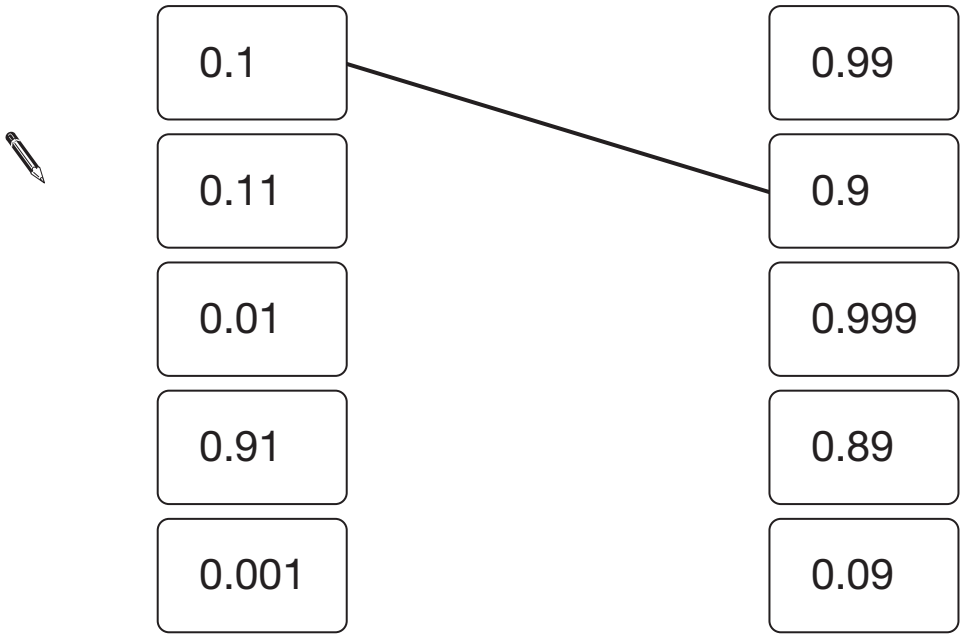
Prism



Volume = area of cross-section × length

1. (a) Join all the pairs of numbers that **add** together to equal **1**

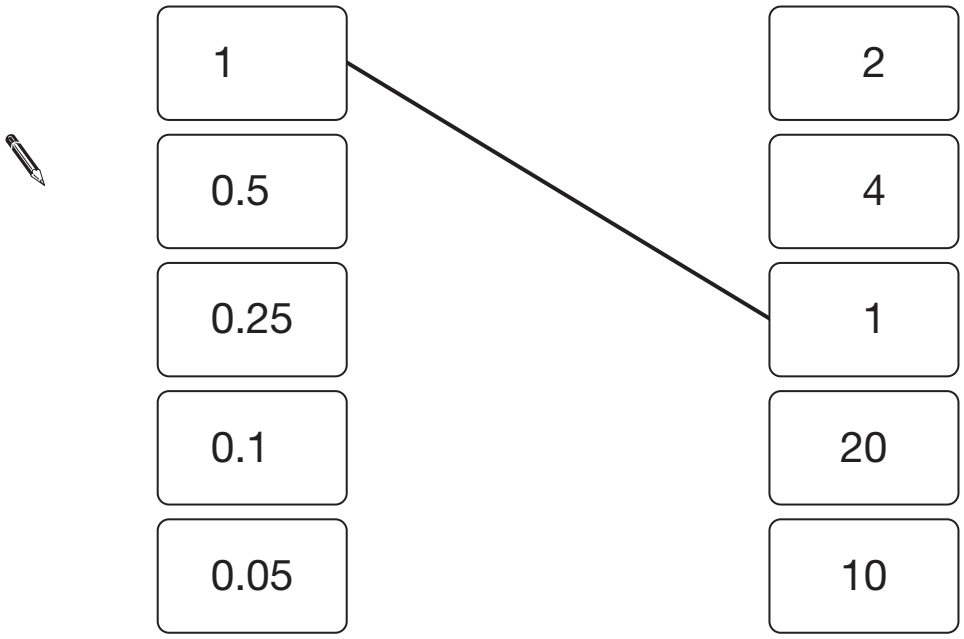
The first one is done for you.



2 marks

(b) Now join all the pairs of numbers that **multiply** to equal **1**

The first one is done for you.



2 marks

2. Paul has **15** T-shirts.

The information shows the colours of his T-shirts.

5 black

3 white

3 red

2 dark blue

1 light blue

1 yellow

Paul is going to take one of his T-shirts at random.

(a) What is the probability that the T-shirt will be **red**?

1 mark

(b) What is the probability that the T-shirt will **not** be **black**?

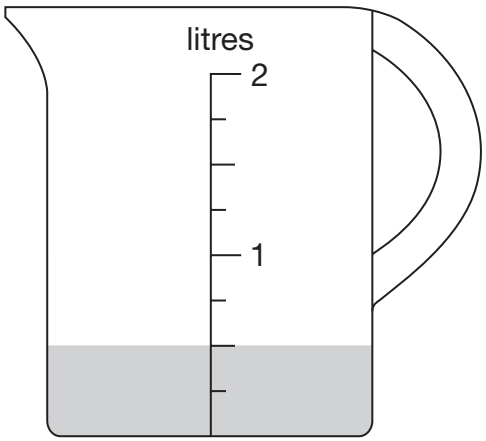
1 mark

(c) He takes one of his **blue** T-shirts at random.

What is the probability that the T-shirt is **light blue**?

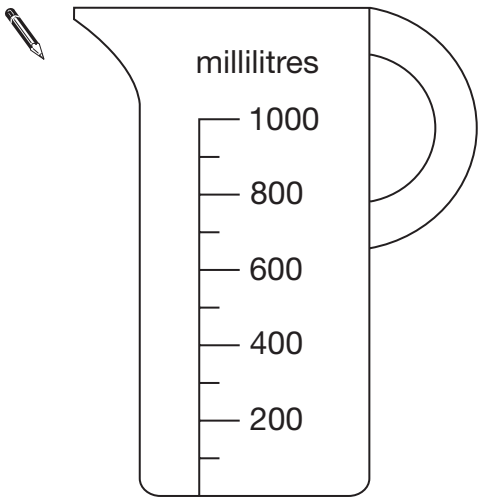
1 mark

3. Zak has some water in a jug.



He pours this water into the jug below.

Draw the correct level of the water on the jug.

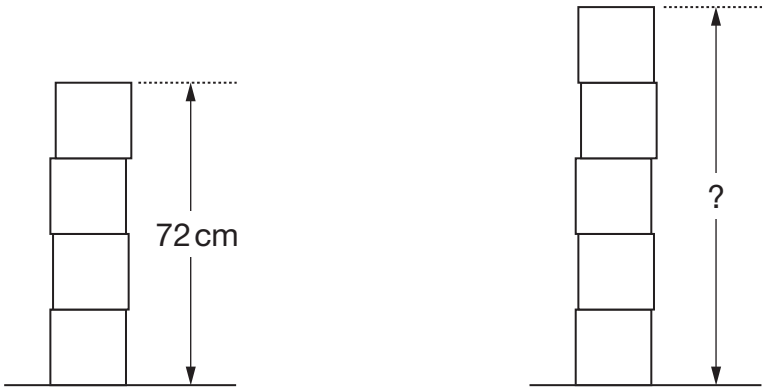


1 mark

4. Lisa has some boxes that are all cubes of the same size.

She uses four of the boxes to make a pile with a height of **72 cm**.

She puts one more box on top of the pile.



Work out the height of the pile of **five** boxes.

_____ cm

2 marks

5. (a) Work out **5%** of **360**

1 mark

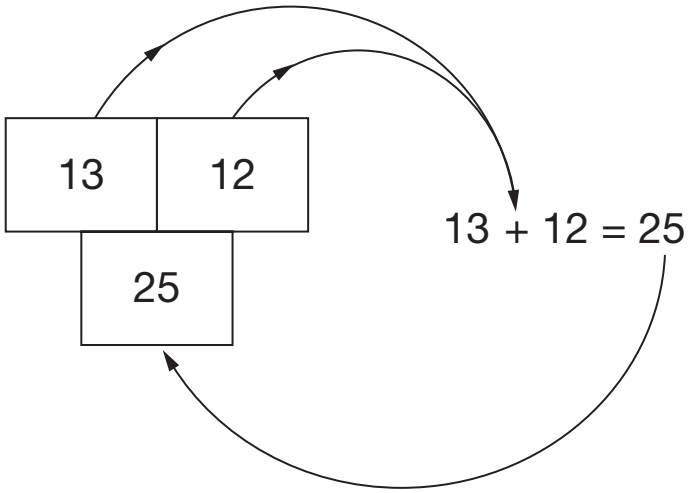
(b) Work out **15%** of **360**

You can use part (a) to help you.

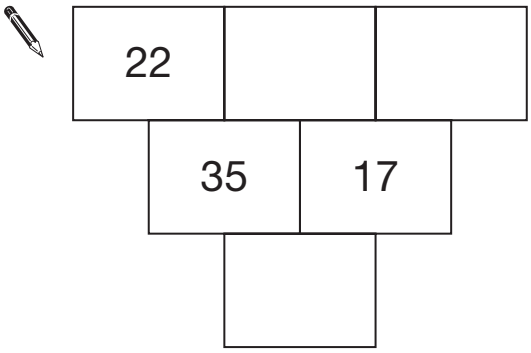
1 mark

6. In these number grids, two numbers are added to give the number below.

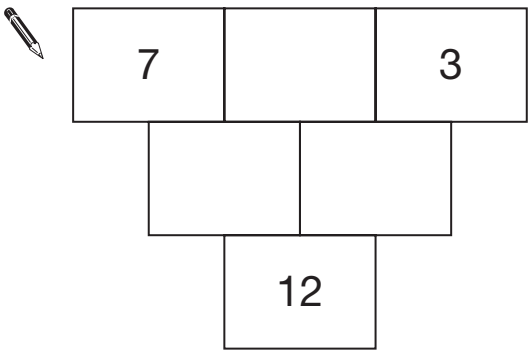
Example:



Write numbers in the number grids below to make them correct.

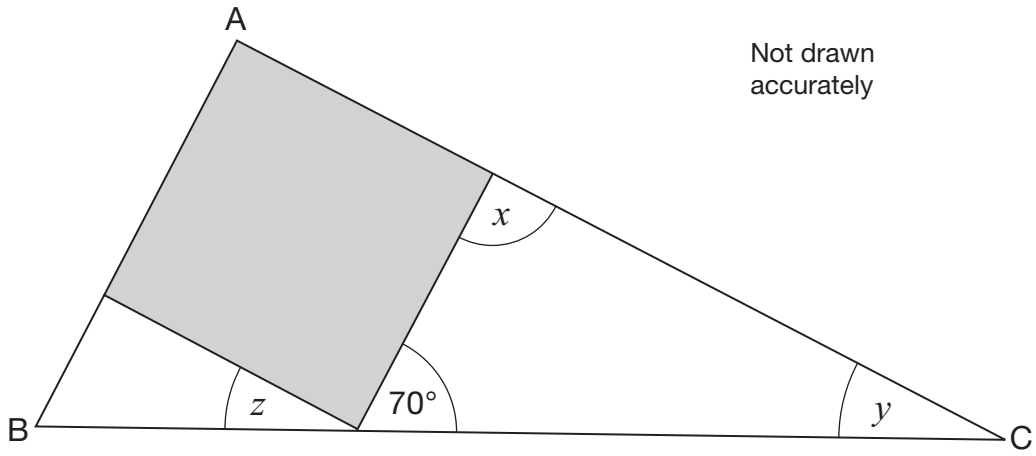


1 mark



1 mark

7. Look at the right-angled triangle ABC.



The square fits exactly inside the triangle.

Work out the sizes of angles x, y and z

$x =$ _____ °

$y =$ _____ °

$z =$ _____ °

3 marks

8. Look at these equations.

$$11 = 6 + a$$

$$a + 7 = 10 + b$$

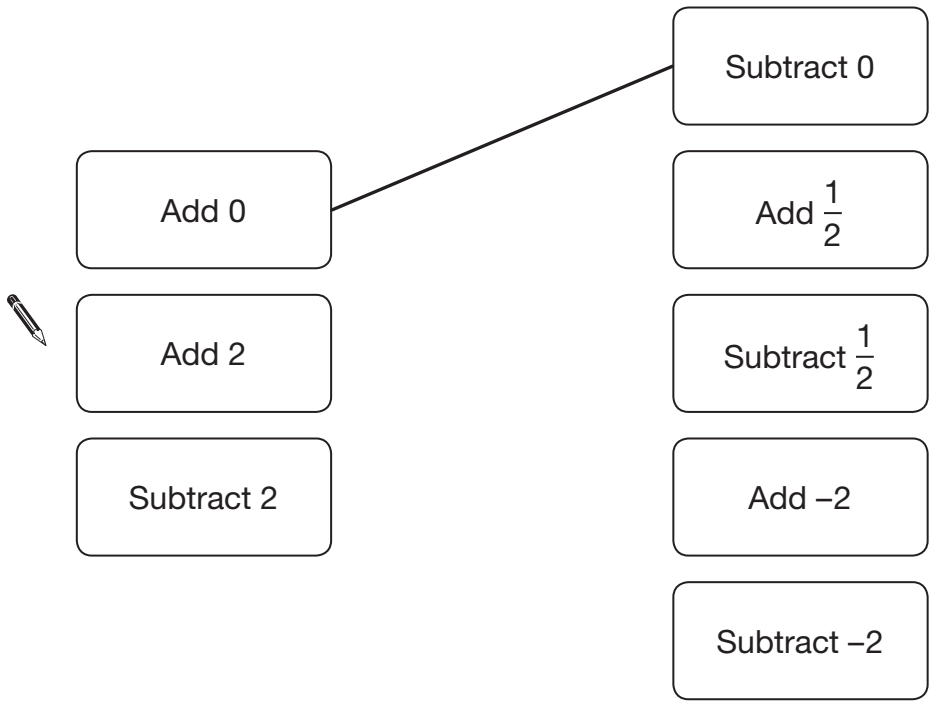
Use **both** equations to work out the value of b

$b =$ _____

2 marks

9. Match each instruction on the left with an instruction on the right that has **the same effect**.

The first one is done for you.



1 mark

10. Pupils are investigating oak leaves.

They want to collect a sample of oak leaves.

Here is their plan for how to collect the sample.

Plan
Choose one oak tree. Take 10 leaves from the lowest branches of the tree.

Give **two** reasons why this sample of leaves may **not be representative** of all oak leaves.

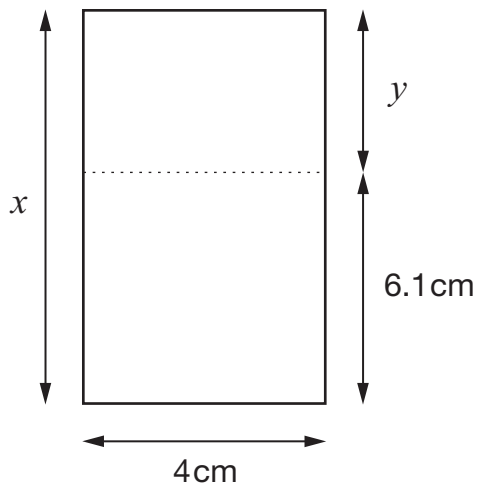
First reason:

1 mark

Second reason:

1 mark

11. Look at the rectangle.



Not drawn accurately

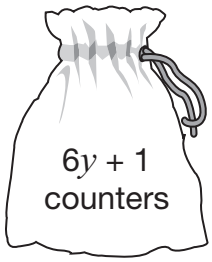
The **total area** of the rectangle is **40 cm^2**

Work out lengths x and y

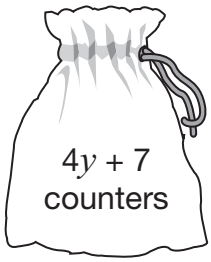
x = _____ cm y = _____ cm

2 marks

12. (a) Bags A and B contain some counters.



Bag A



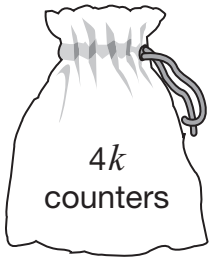
Bag B

The number of counters in each bag **is the same**.

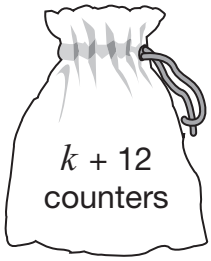
Work out the value of y

2 marks

(b) Bag **C** contains **more** counters than bag **D**.



Bag C



Bag D

What is the **smallest** possible value of k?

2 marks

13. Gary took part in a quiz show and won a **million pounds**.

He spent **£20 000** on a holiday.

Then he spent **half** of the **money left** on a house.

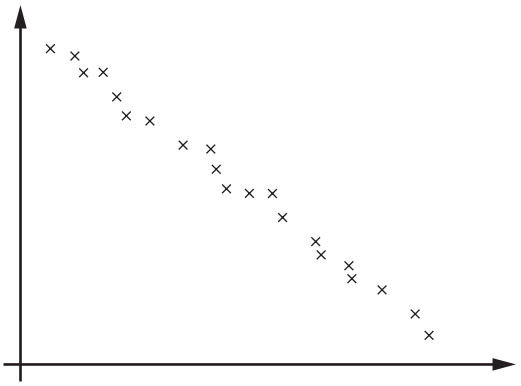
How much did Gary's house cost?

£

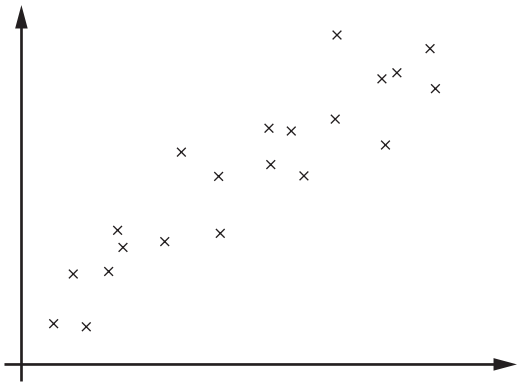
2 marks

14. Look at these two scatter graphs. They are both drawn using the same scale.

Graph A



Graph B



(a) Which scatter graph shows **positive** correlation?

☐ A ☐ B

Explain your answer.

1 mark

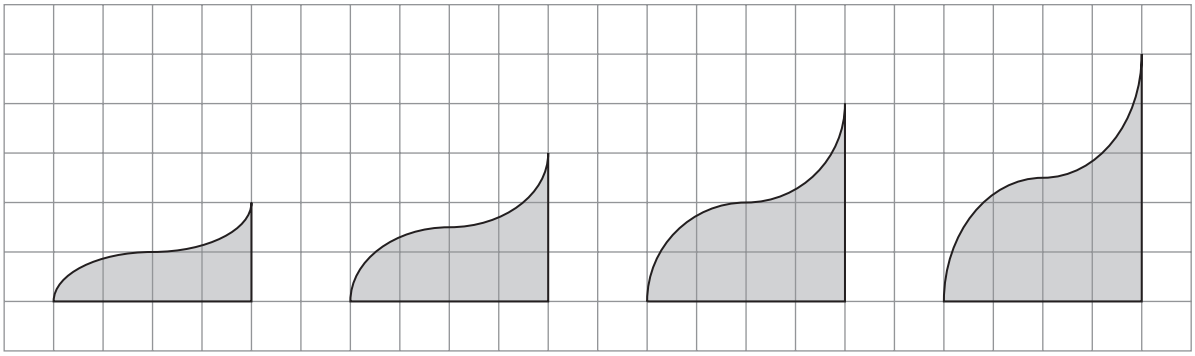
(b) Which scatter graph shows **stronger** correlation?

☐ A ☐ B

Explain your answer.

1 mark

15. Look at the sequence of shapes on a square grid.



Shape number 1 | Shape number 2 | Shape number 3 | Shape number 4

The table shows information about these shapes.

Shape number N	Base B	Height H	Area A
1	4	2	4
2	4	3	6
3	4	4	8
4	4	5	10

Rules connect N, B, H and A.

Write one missing letter in each space below to complete the rule.

H = _____ + 1

A = _____ × 2

_____ = $2N$ + 2

2 marks

16. Look at this information.

$$\frac{27}{40} = 0.675$$

$$\frac{29}{40} = 0.725$$

Use this information to write the missing **decimals** below.

$$\frac{31}{40} = \_\_\_\_\_$$

1 mark

$$\frac{23}{40} = \_\_\_\_\_$$

1 mark

17. In this question, n stands for any **whole number**.

(a) For the expression $\mathbf{2}\boldsymbol{n}$, tick (✓) the correct statement below.

☐ $\mathbf{2}\boldsymbol{n}$ must be odd.

☐ $\mathbf{2}\boldsymbol{n}$ must be even.

☐ $\mathbf{2}\boldsymbol{n}$ could be odd or even.

Explain your answer.

1 mark

(b) For the expression $\mathbf{3}\boldsymbol{n}$, tick (✓) the correct statement below.

☐ $\mathbf{3}\boldsymbol{n}$ must be odd.

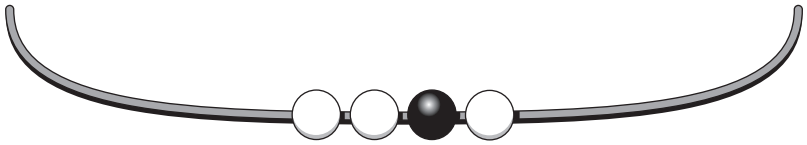
☐ $\mathbf{3}\boldsymbol{n}$ must be even.

☐ $\mathbf{3}\boldsymbol{n}$ could be odd or even.

Explain your answer.

1 mark

18. (a) On this necklace the ratio of black beads to white beads is **1 : 3**

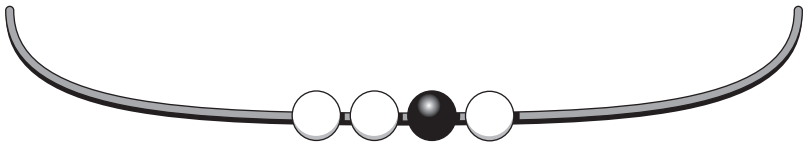


How many **more** black beads do you need to add to make the ratio of black to white **3 : 1**?

_____ black beads

1 mark

(b) Here is the necklace again.



How many **more** black beads and white beads do you need to add to make the ratio of black to white **3 : 2**?

_____ black beads, _____ white beads

1 mark

19. Show that the **difference** between 3^2 and 3^3 is **18**

1 mark

20. Sophie says:

> If n represents a prime number, then
> $2n + 1$ will also represent a prime number.

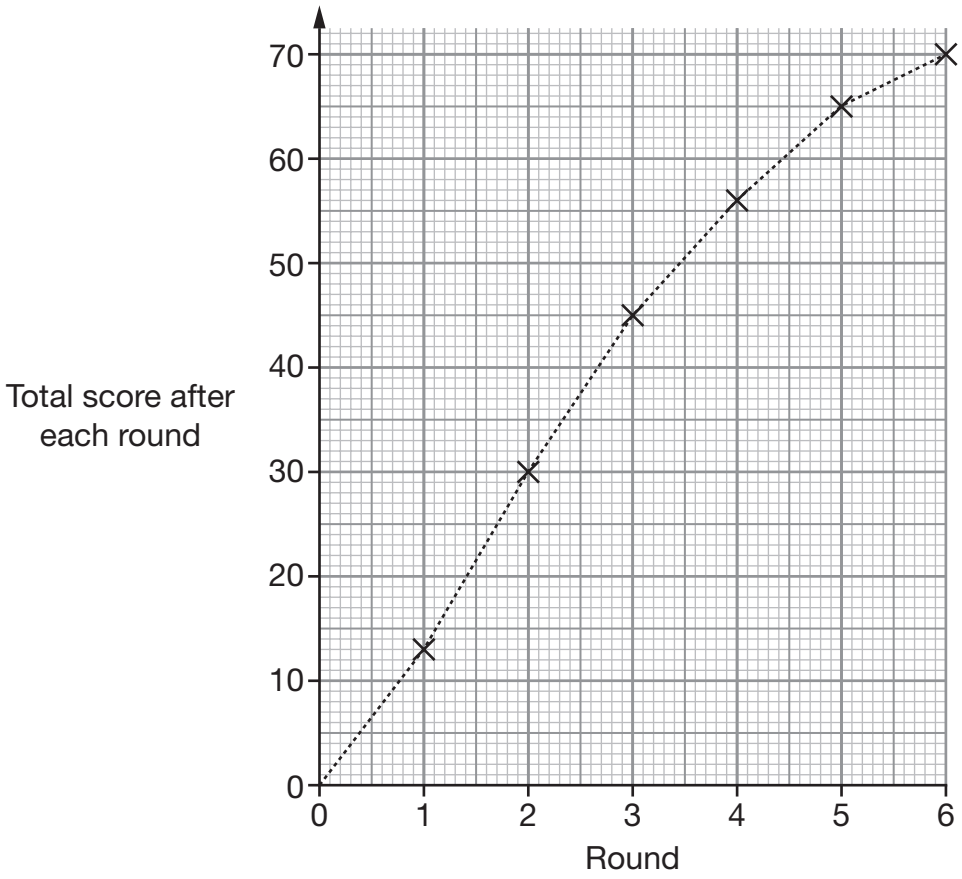
Use an example to explain why she is **wrong**.

1 mark

21. A game has six rounds.

In each round of the game, the player gains points which are added to their total score.

(a) The graph shows Sue's total score after each round of her game.



How many points did Sue gain in **round 4**?

2 marks

(b) Derek plays the game.

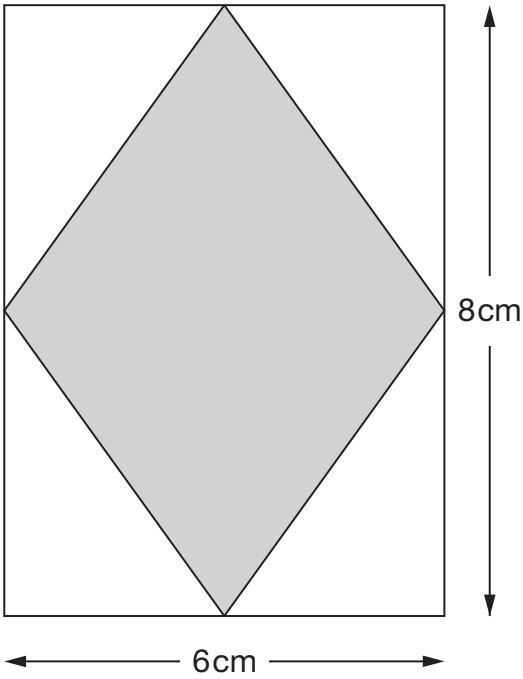
The graph of his total score after each round is a **straight line**.

What can you say about the number of points Derek gained in each round?

1 mark

22. Inside the rectangle below is a shaded rhombus.

The vertices of the rhombus are the midpoints of the sides of the rectangle.



Not drawn accurately

What is the **area** of the shaded rhombus?

2 marks

1 mark

23. (a) Sandra is thinking of two numbers.

Her two numbers have a **negative sum**, but a **positive product**.

Give an example of what her numbers could be.

_____ and _____

1 mark

(b) Mark is also thinking of two numbers.

His two numbers have a **positive sum**, but a **negative product**.

Give an example of what his numbers could be.

_____ and _____

1 mark

24. The mean of five numbers is **10**

I add one more number and the mean is now **11**

What number did I add?

_____

2 marks

25. Solve these simultaneous equations using an algebraic method.

$$3x + 6y = 30$$

$$x + 6y = 20$$

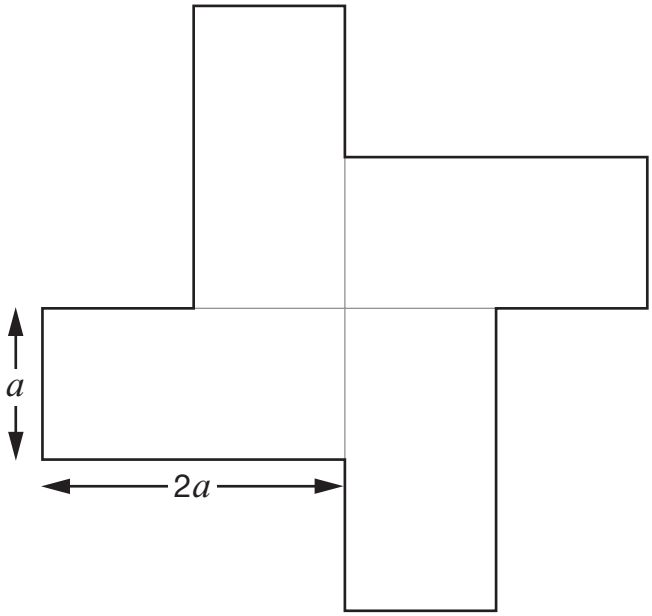
You **must** show your working.

$x =$ _____ $y =$ _____

3 marks

26. This shape is made of four congruent rectangles.

Each rectangle has side lengths $2a$ and a



Not drawn accurately

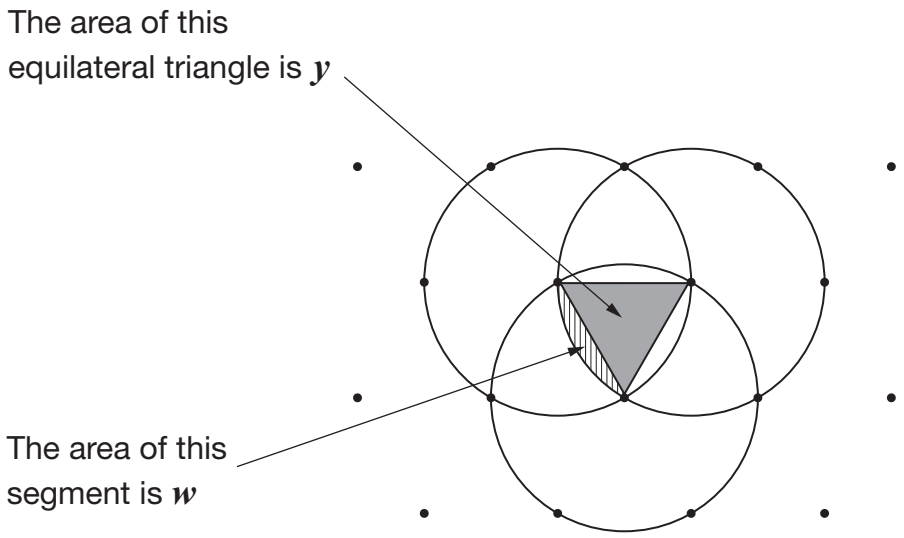
The **perimeter** of the shape is **80 cm**.

Work out the **area** of the shape.

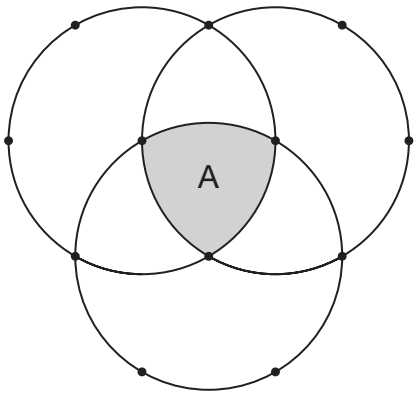
_____ cm^2

2 marks

27. The diagram shows three congruent circles drawn on an isometric grid.



Write an expression, using y and w, for the area A.



Area A = _____

1 mark

28. A pupil wrote:

> For all numbers j and k,
> $(j + k)^2 = j^2 + k^2$

Show that the pupil is **wrong**.

2 marks

END OF TEST

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