

Ma

KEY STAGE

3

TIER

5–7

Mathematics test

Paper 2

Calculator allowed

First name _____

Last name _____

School _____

Remember

- The test is 1 hour long.
- You may use a calculator for any question in this test.
- You will need: pen, pencil, rubber, ruler, tracing paper (optional) and a scientific or graphic calculator.
- 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.

For marker's use only

TOTAL MARKS	
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Instructions

Answers



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

Calculators



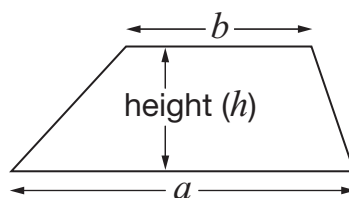
You **may** use a calculator to answer any question in this test.

Formulae

You might need to use these formulae

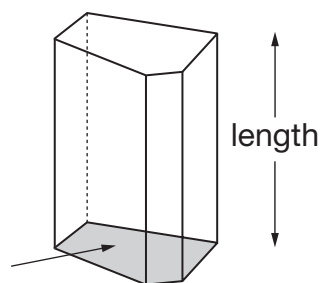
Trapezium

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



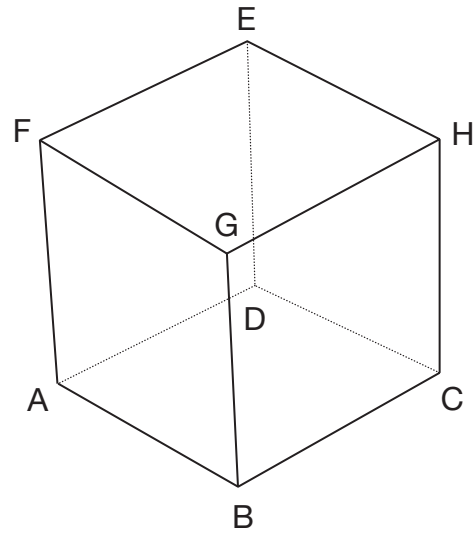
Prism

area of cross-section



$$\text{Volume} = \text{area of cross-section} \times \text{length}$$

1. Look at the diagram of Megan's cube.



Megan puts her finger on point A.

She can move her finger along **3 edges** to get from point **A** to point **H** without taking it off the cube.

Complete the table below to show **all 6 ways** she can do this.

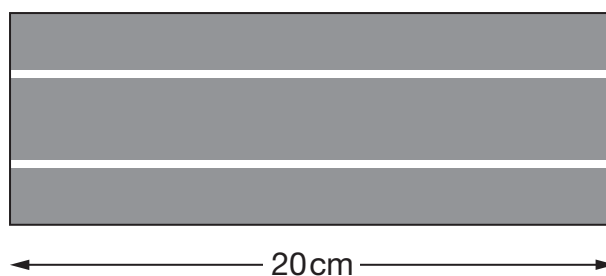
One way is done for you.

Ways of moving from A to H	
	A → B → C → H

2 marks



2. (a) A straight piece of model car track is 20cm in length.

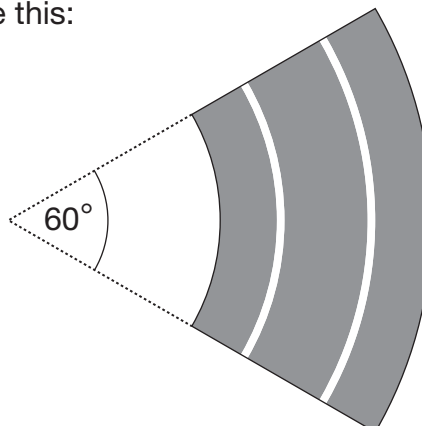


How many of these straight pieces are needed to make a **1 metre** track?



1 mark

- (b) A curved piece of track looks like this:



How many of these curved pieces are needed to make a **complete circle** of track?



1 mark

3. Match each statement to the correct expression.

The first one is done for you.



Add 2 to a	2
Subtract 2 from a	$2 - a$
Multiply a by 2	$a + 2$
Divide a by 2	$2a$
Multiply a by itself	$a - 2$
	$\frac{2}{a}$
	a^2
	$\frac{a}{2}$

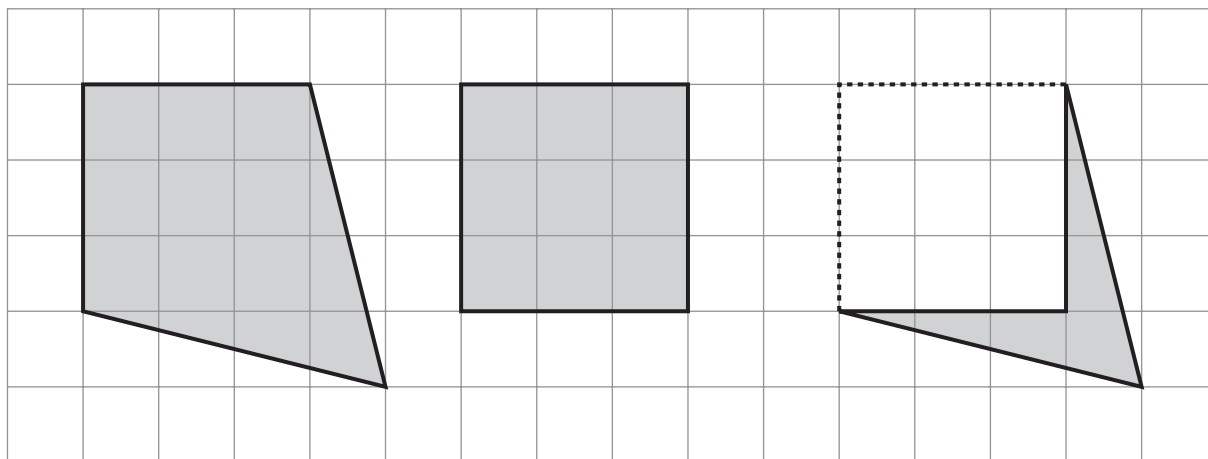
2 marks



4. Look at the shapes drawn on the centimetre square grid.

For each one, work out the **area** that is **shaded**.

The first one is done for you.



Area = 12 cm²

Area = _____ cm²

Area = _____ cm²

1 mark

5. (a) Look at the equation.

$$n + 3 = 12$$

Use it to work out the value of $n - 3$



1 mark

- (b) Now look at this equation.

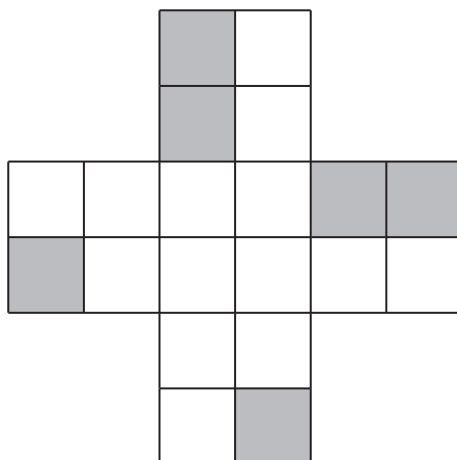
$$n + 3 = 7$$

Use it to work out the value of $n - 6$



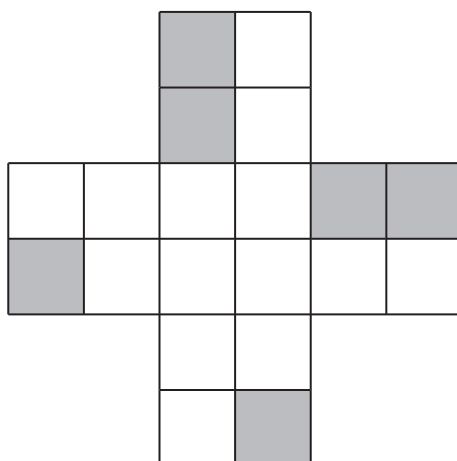
1 mark

6. (a) Shade **two** more squares on the shape below so that it has **rotation symmetry** of order 4



1 mark

- (b) Now shade **four** more squares on the shape below so that it has **rotation symmetry** of order 2

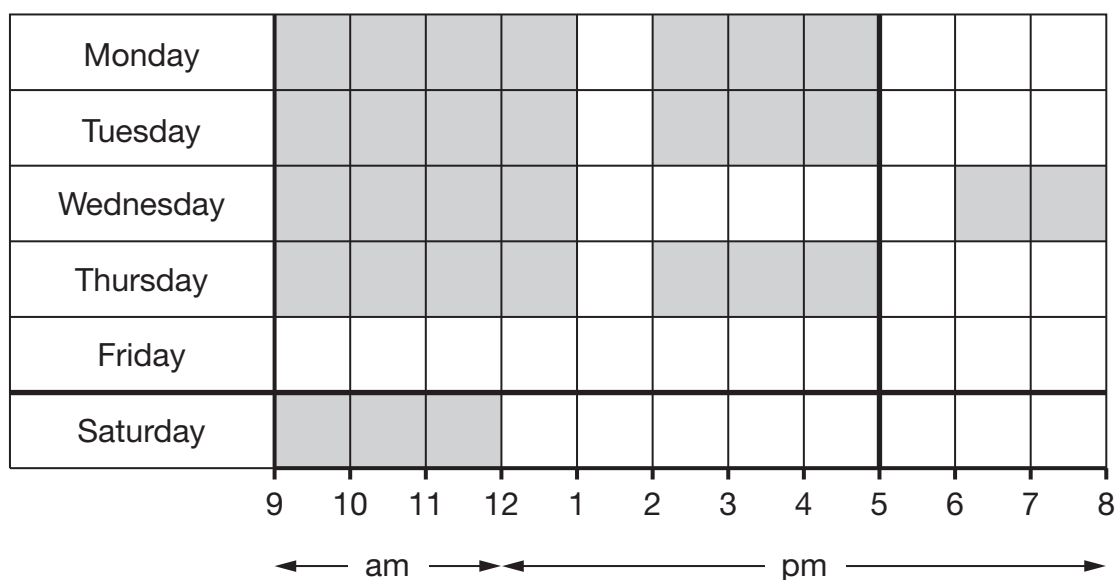


1 mark



7. Kim works in a shop.

The shaded squares on the diagram below show the hours she worked in one week.



The table shows her pay for each hour worked.

	Pay for each hour worked
Monday to Friday, 9am to 5pm	£6.35
Monday to Friday, after 5pm	£7.50
Saturday	£7.50

How much was Kim's pay for this week?



£

2 marks

8. Here is some information about three people.

- Jo is 2 years older than Harry.
- Kate is twice as old as Jo.

Write an expression for each person's age using n

The first one is given.

Harry's age n



Jo's age

1 mark



Kate's age

1 mark



9. A famous mathematician claimed that:

Every **even** number greater than 4 can be written as the **sum of a pair of prime** numbers.

For example: 8 can be written as the sum of 3 and 5, and 3 and 5 are both prime numbers.

- (a) Write a pair of **prime** numbers that **sum to 16**



_____ and _____

1 mark

Now write a **different** pair of prime numbers that sum to 16



_____ and _____

1 mark

- (b) Now choose an **even** number that is **greater than 16**, then write a pair of **prime** numbers that sum to your even number.

Complete the sentence below.



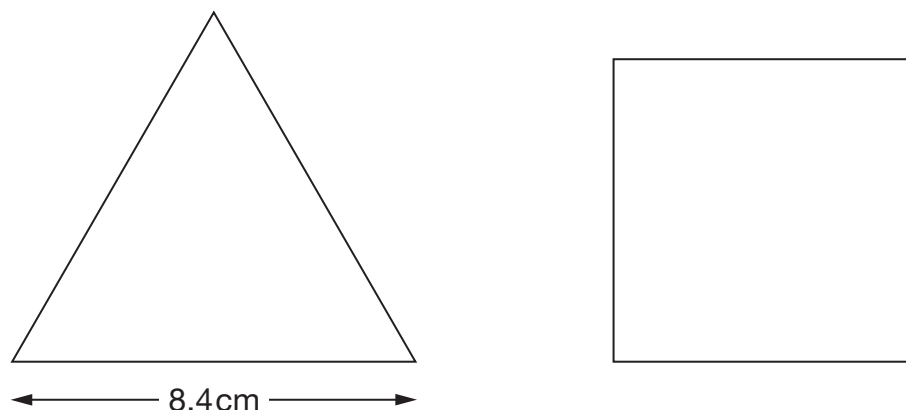
The even number _____ can be written as

the sum of the prime numbers _____ and _____

1 mark

10. The diagrams show an **equilateral triangle** and a **square**.

The shapes are not drawn accurately.



The side length of the equilateral triangle is 8.4 cm.

The **perimeter** of the square is the **same** as the perimeter of the equilateral triangle.

Work out the **side length** of the square.



cm

2 marks



11. (a) Look at the equation.

$$5x + 1 = 2x - 8$$

Complete the sentence below by ticking (✓) the correct box.

The value of x is ...

☐

... one particular number.

☐

... any number less than zero.

☐

... any number greater than zero.

☐

... any whole number.

☐

... any number at all.

1 mark

(b) Now look at this equation.

$$y = 3x - 2$$

Complete the sentence below by ticking (✓) the correct box.

The value of x is ...

☐

... one particular number.

☐

... any number less than zero.

☐

... any number greater than zero.

☐

... any whole number.

☐

... any number at all.

1 mark

12. Gita threw three darts.

Use the information in the box to work out what numbers she threw.

The lowest number was 10

The range was 10

The mean was 15



Gita's numbers were _____, _____ and _____

1 mark

13. A cookery book shows this conversion table.

Mass in ounces	Mass in grams
1	25
2	50
3	75
4	110
5	150
10	275

Use the table to explain how you can tell the conversions **cannot all be exact**.

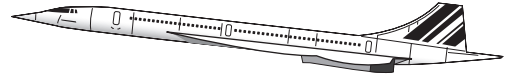


1 mark



14. Concorde could travel **1 mile every 3 seconds**.

How many miles per hour (mph) is that?



_____ mph

2 marks

15. In a bag, there are only red, white and yellow counters.

I am going to take a counter out of the bag at random.

The probability that it will be **red** is **more than** $\frac{1}{4}$
It is **twice as likely** to be **white** as **red**.

Give an example of how many counters of each colour there could be.

Write numbers in the sentence below.

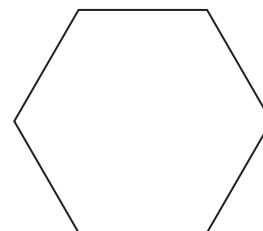


There could be _____ red, _____ white and _____ yellow counters.

2 marks

16. (a) The **perimeter** of a regular hexagon is $42a + 18$

Write an expression for the length of **one** of its sides.



1 mark

- (b) The **perimeter** of a different regular polygon is $75b - 20$

The length of one of its sides is $15b - 4$

How many sides does this regular polygon have?



1 mark

- (c) The **perimeter** of a square is $4(c - 9)$

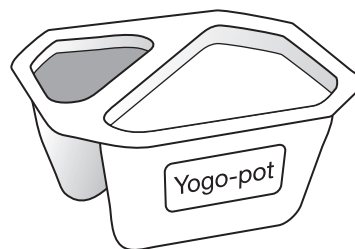
Find the perimeter of the square when $c = 15$



1 mark



17. A dessert has both fruit and yoghurt inside.



Altogether, the mass of the fruit and yoghurt is **175g**.

The **ratio** of the mass of **fruit** to the mass of **yoghurt** is **2 : 5**

What is the mass of the yoghurt?



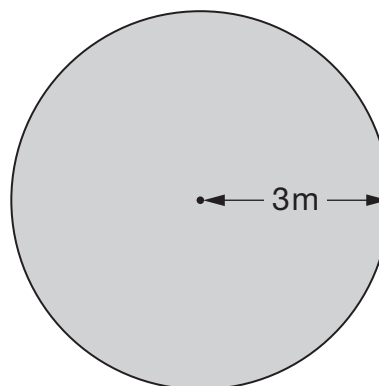
_____ g

2 marks

18. The diagram shows a plan of Luke's new lawn.

The lawn is a circle with radius 3m.

Work out the area of the lawn.



_____ m²

2 marks

19. To find the n th triangular number, you can use this rule.

$$n\text{th triangular number} = \frac{n}{2}(n + 1)$$

$$\begin{aligned}\text{Example: 3rd triangular number} &= \frac{3}{2}(3 + 1) \\ &= 6\end{aligned}$$

- (a) Work out the **10th** triangular number.



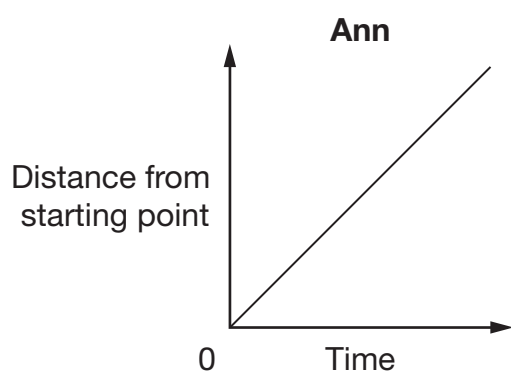
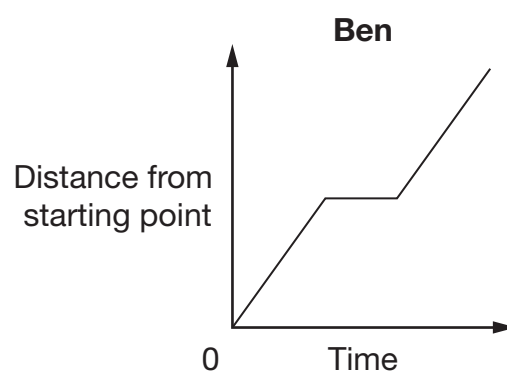
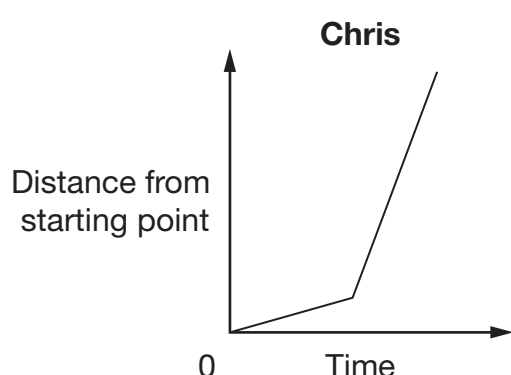
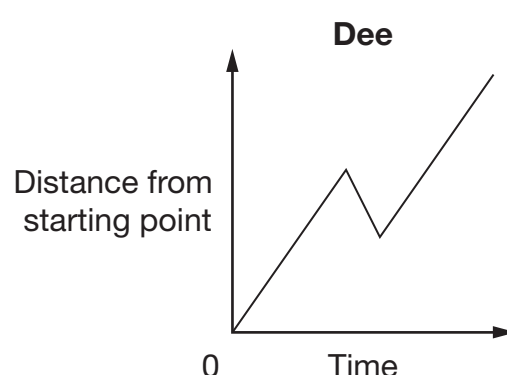
1 mark

- (b) Now work out the **100th** triangular number.



1 mark

20. (a) The graphs show information about the different journeys of four people.



Write the correct names next to the journey descriptions in the table below.



Name	Journey description
	This person walked slowly and then ran at a constant speed.
	This person walked at a constant speed but turned back for a while before continuing.
	This person walked at a constant speed without stopping or turning back.
	This person walked at a constant speed but stopped for a while in the middle.

1 mark

(b) Ella made a different journey of **4km**.

She walked to a place 4km away from her starting point.

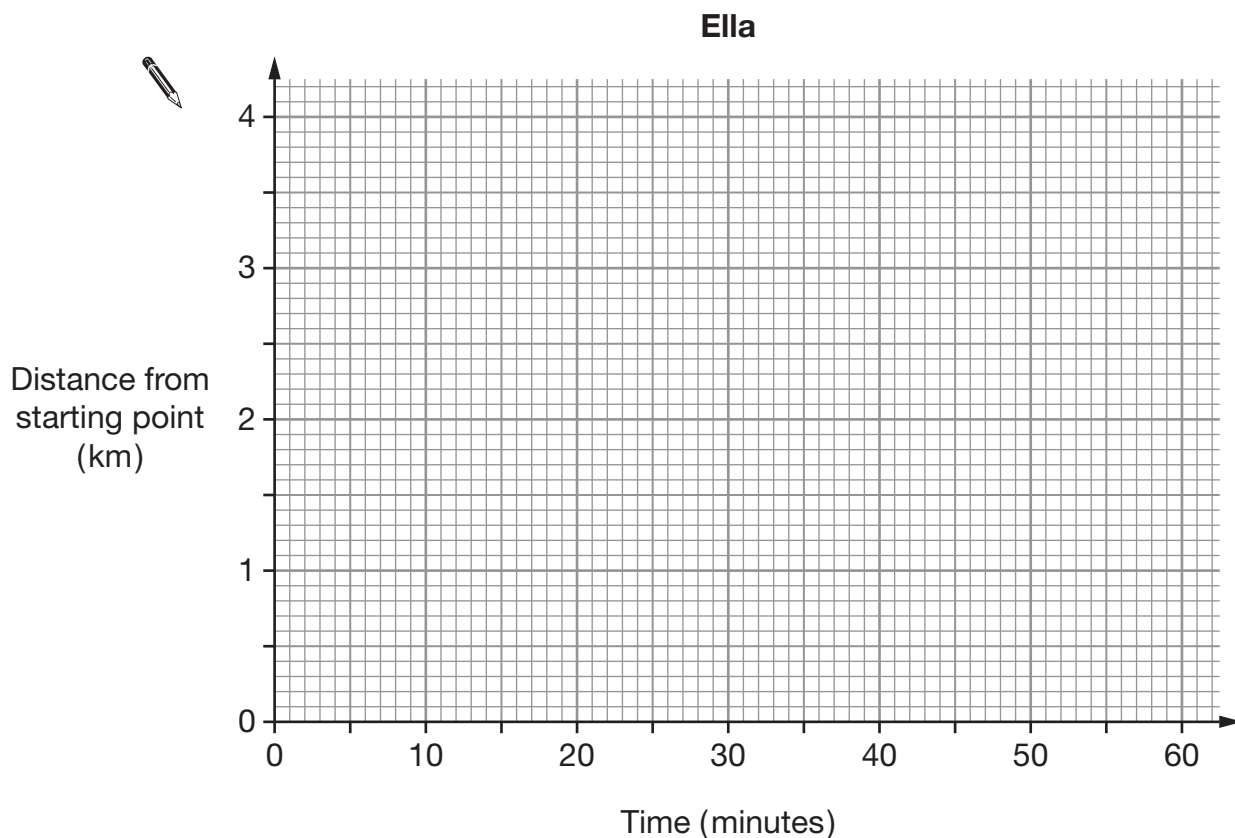
Here is the description of her journey.

For the first 15 minutes she walked at 4km per hour.

For the next 15 minutes she walked at 2km per hour.

For the last 30 minutes she walked at a constant speed.

Show Ella's journey **accurately** on the graph below.



2 marks

(c) For the last 30 minutes of her journey, what was Ella's speed?



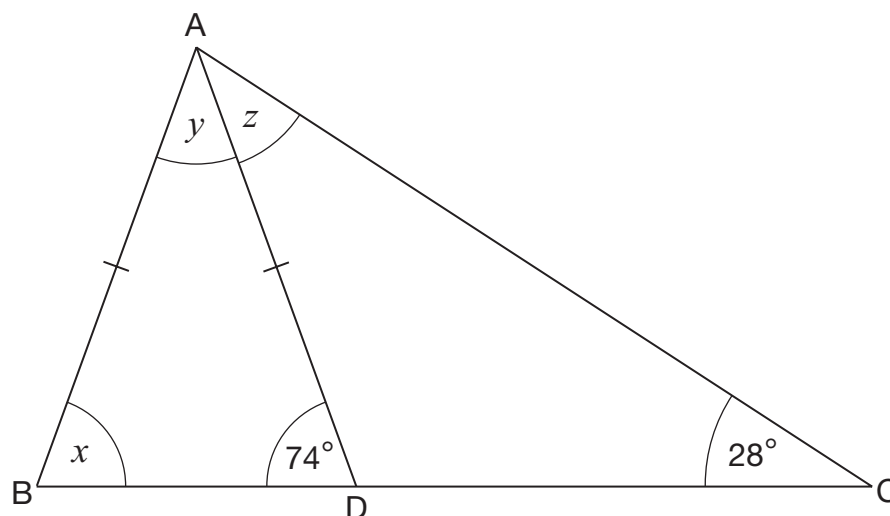
_____ km per hour

1 mark



21. Look at triangle ABC.

ABD is an **isosceles** triangle where $AB = AD$.



Not drawn
accurately

Work out the sizes of angles x , y and z

Give reasons for your answers.



$x =$ _____ $^{\circ}$ because _____

$y =$ _____ $^{\circ}$ because _____

$z =$ _____ $^{\circ}$ because _____

2 marks

22. A shop has this special offer.

Reduction of 10% when your bill is between £50 and £100
Reduction of 20% when your bill is more than £100

Before the reductions, Marie's bill is **£96** and Richard's bill is **£108**

After the reductions, who paid more?

You **must** show working to explain your answer.



Tick (✓) the correct answer.

☐

Marie

☐

Richard

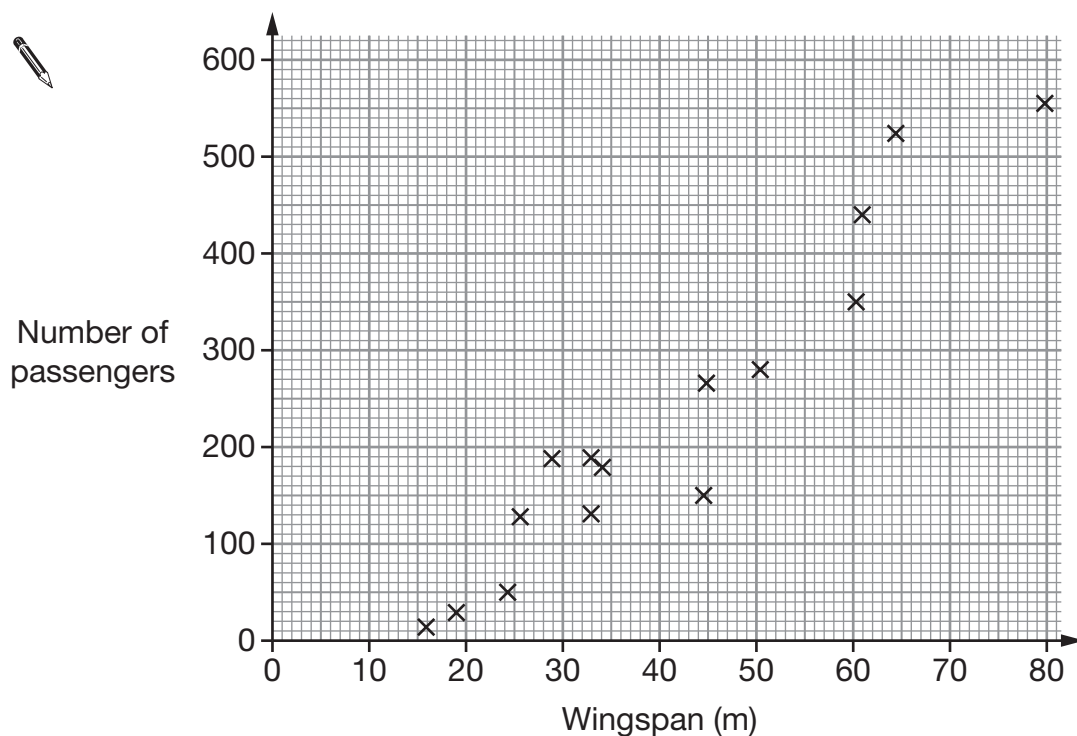
☐

Both paid the same

2 marks



23. The scatter graph shows the maximum number of passengers plotted against the wingspans of some passenger planes.



- (a) What type of correlation does the scatter graph show?



1 mark

- (b) Draw a **line of best fit** on the scatter graph.

1 mark

- (c) Another passenger plane has a **wingspan** of **40m**. The plane is full of passengers. If each passenger takes **20kg** of bags onto the plane, estimate how much their bags would weigh altogether.

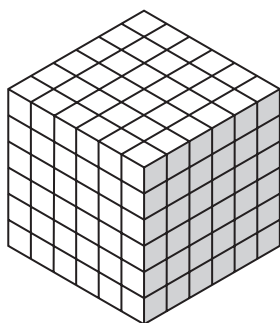


_____ kg

2 marks

24. Kaylee has some 1cm cubes.

She makes a solid cube with side length **6cm** out of the cubes.



Not drawn
accurately

Then she uses all these cubes to make some cubes with side length **2cm**.

How many of these **2cm** cubes can Kaylee make?

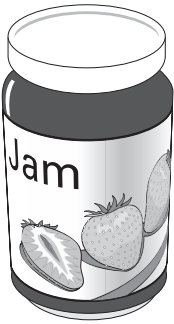


2 marks



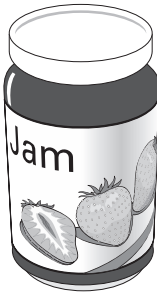
25. You can buy jars of the same jam in two sizes.

A



454g for £1.59

B



340g for £1.25

Which jar is better value for money?
You **must** show working to explain your answer.



Tick (✓) your answer.

☐

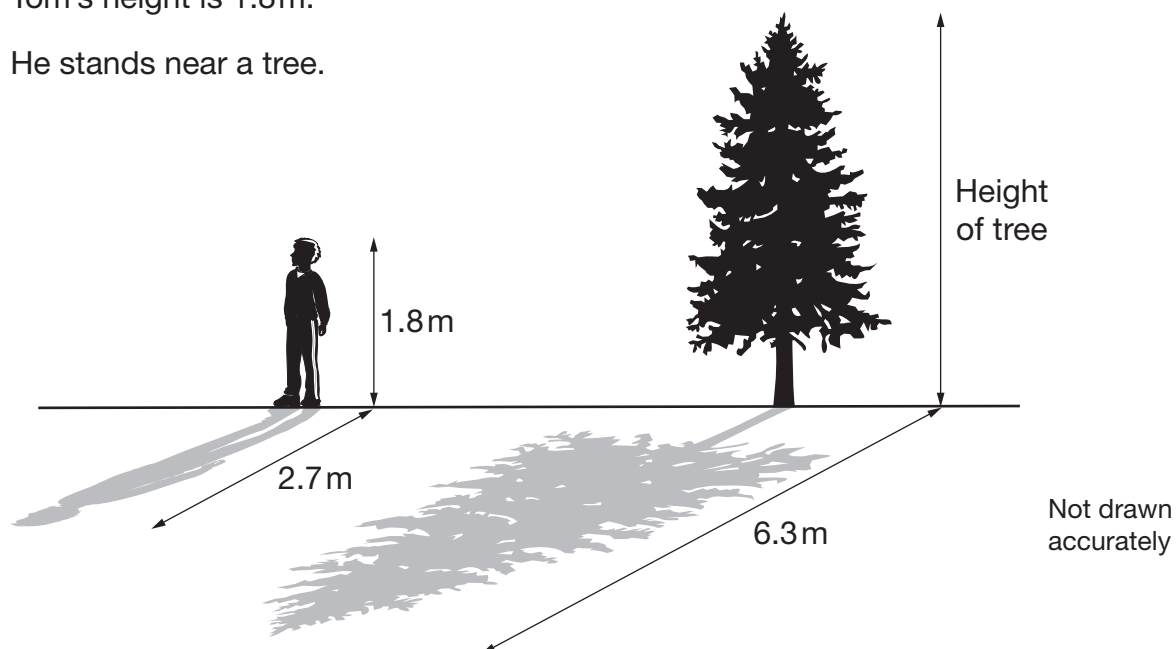
A

☐

B

2 marks

26. Tom's height is 1.8m.
He stands near a tree.



At 4pm, the length of Tom's shadow is 2.7m.

At 4pm, the length of the tree's shadow is 6.3m.

What is the height of the tree?



m

2 marks



27. Here are the n th term expressions for three different sequences.

$$2^{(n-1)}$$

Sequence A

$$\frac{n^2 - n + 2}{2}$$

Sequence B

$$\frac{n(n^2 - 3n + 8)}{6}$$

Sequence C

The first three terms of each sequence are 1, 2 and 4

What is the **4th term** of each sequence?

You **must** show your working.



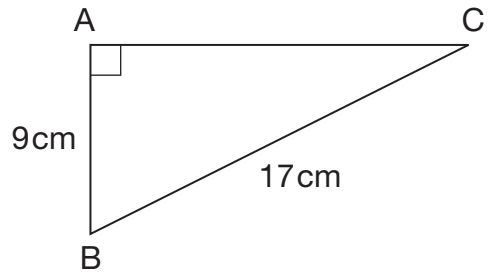
Sequence A _____

Sequence B _____

Sequence C _____

3 marks

28. Look at this triangle.
Work out length AC.



Not drawn
accurately

AC = _____ cm

2 marks



END OF TEST