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 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	

Instructions

Answers

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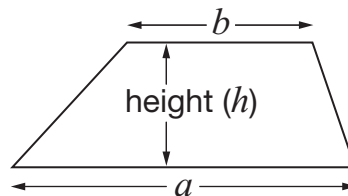
Calculators

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

Formulae
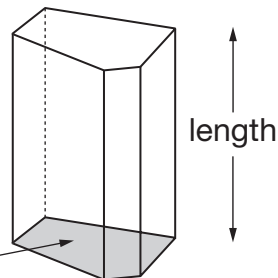
You might need to use these formulae

Trapezium

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

Prism
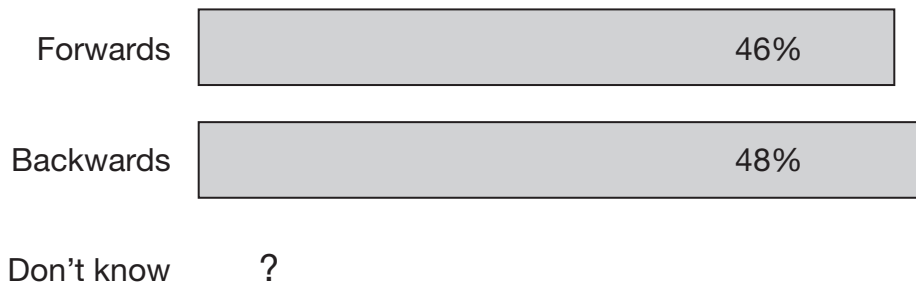
Volume = area of cross-section × length

1. Here is a question from a survey.

> In a time machine, would you like to go forwards or backwards in time?

People said 'Forwards', 'Backwards' or 'Don't know'.

Results:

Forwards	46%
Backwards	48%
Don't know	?

The bar for 'Don't know' has not been drawn.

What percentage of people said 'Don't know'?

_____ %

2 marks

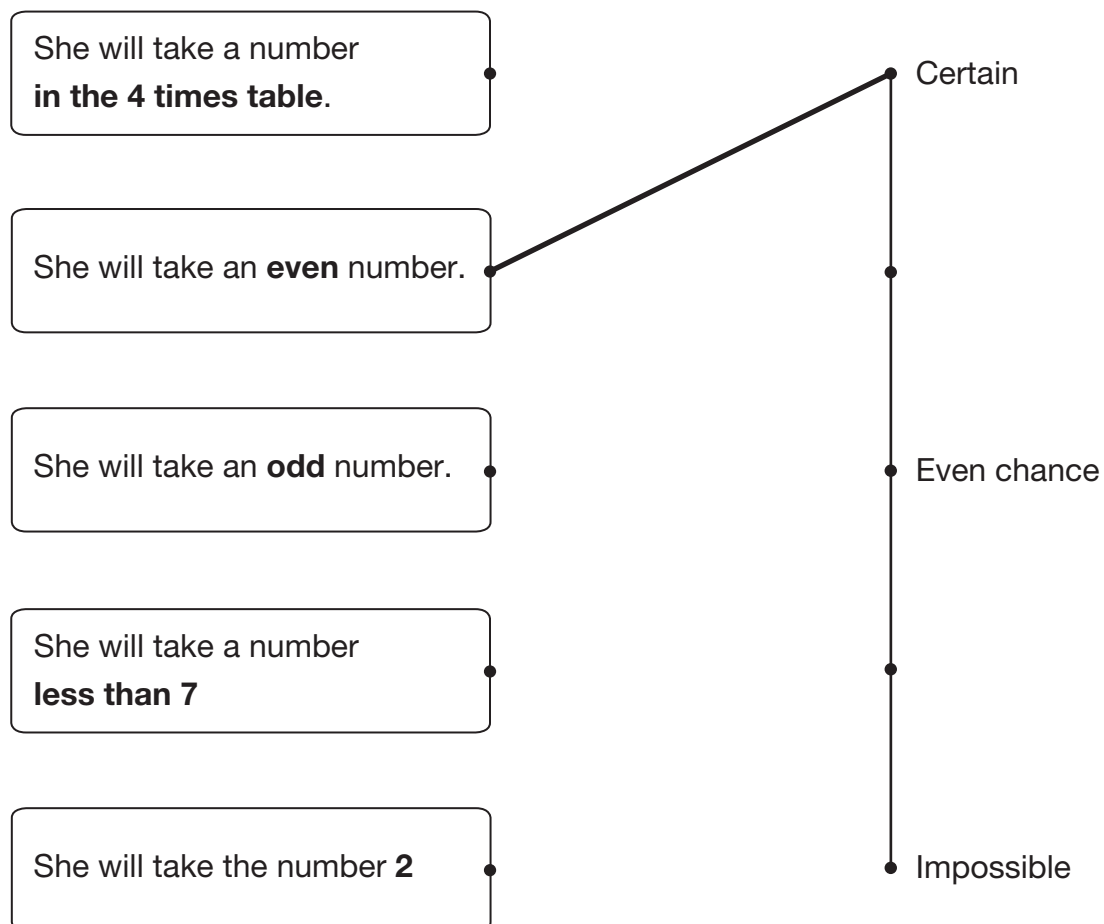**2.** A pupil has these four number cards.

| 2 | | 4 | | 6 | | 8 |

She is going to mix them up and take one card at random.

Match each statement to the correct position on the probability scale.

One is done for you.

She will take a number **in the 4 times table**. •————————————————• Certain

She will take an **even** number. •

She will take an **odd** number. • • Even chance

She will take a number **less than 7** •

She will take the number **2** • • Impossible

2 marks

3.   Some people use this rule to work out how many hours' sleep each night young children need.

> **Subtract** the child's age in years **from 30**,
> then **divide** the result by **2**

(a)   Sanjay is **8** years old.

Use the rule to work out how many hours' sleep he needs.

_____ hours

1 mark

(b)   Lisa is **6** years old.

She wakes up every morning at **7 am**.
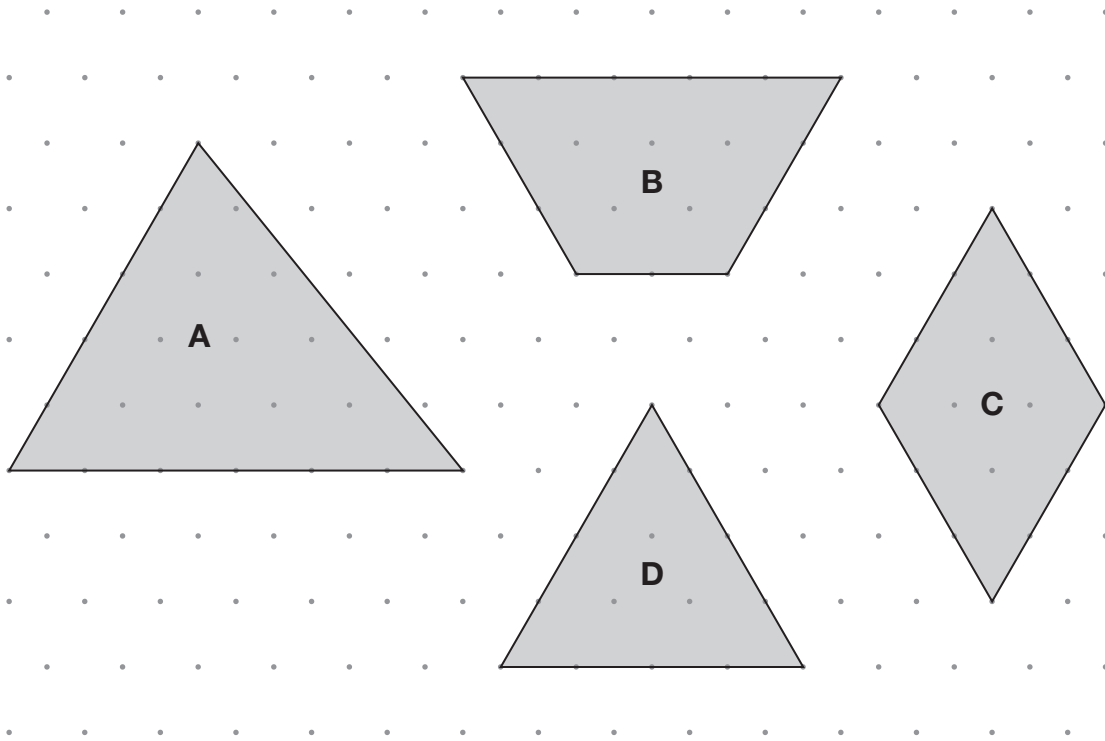
Use the rule to work out what time she needs to go to sleep.

2 marks

4. Look at the shaded shapes drawn on an isometric grid.

Write each of B, C and D in its correct place in the table below.

	No equal sides	Exactly 2 equal sides	More than 2 equal sides
Has 3 sides	A		
Has more than 3 sides			

2 marks

5. Some people in a supermarket are shopping for food.

(a) **100g** of cheese costs **46p**.

Peter buys **250g** of the cheese.

How much does he pay?
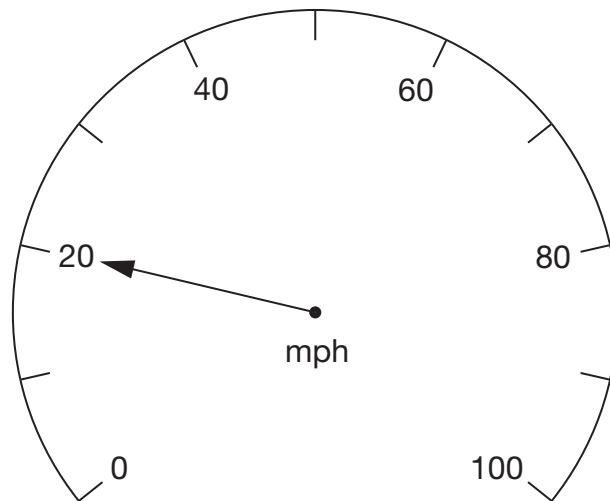
£ [   ]

1 mark

(b) Tins of beans cost **36p each**.

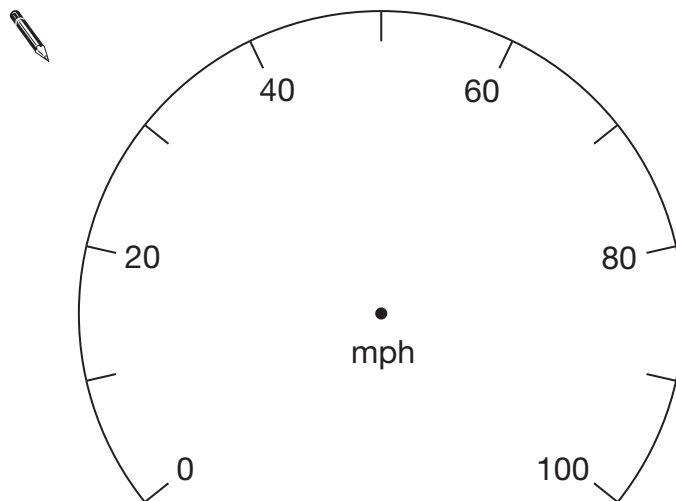What is the largest number of these tins John can buy with **£2**?

_____

1 mark

6. The arrow on this dial shows a speed of **20 mph**.

(a) Draw an arrow on the dial below to show a speed of **65 mph**.

1 mark

(b) **160 km/h** is about the same as **100 mph**.

What speed in **km/h** is about the same as **25 mph**?

_____ km/h

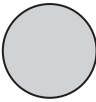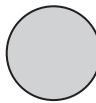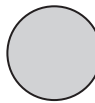1 mark

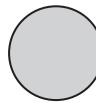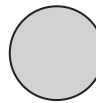**7.** Sam asked pupils in his class:

> Do you like American football?

There were **30** pupils in his class.

The same number of pupils said 'Yes' as said 'No'.

12 pupils said 'Don't know'.

Complete the key and the rows for Yes and No in Sam's pictogram.

	Key: ⬤ represents _____ people
Yes	
No	
Don't know	⬤ ⬤ ⬤ ⬤

2 marks

8. A jug measures in litres and in millilitres.
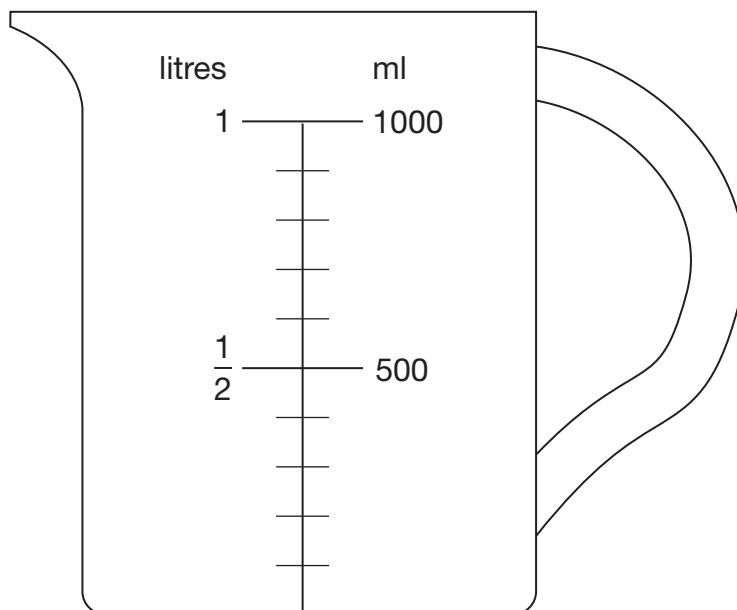
You can use the diagram to help you write the missing values below.

The first one is done for you.

$\dfrac{1}{2}$ litre = *500* ml

$\dfrac{3}{4}$ litre = _____ ml

$\dfrac{1}{10}$ litre = _____ ml

_____ litre = 200 ml

9.   Look at the shaded shapes drawn on a square grid.
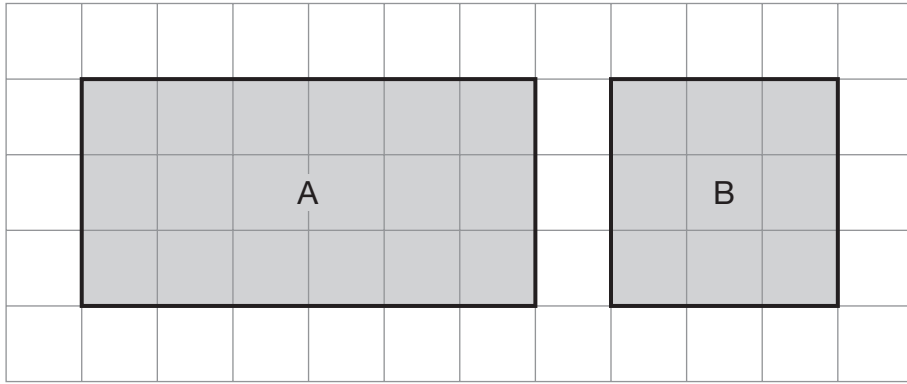
(a)   Nick says:

> The **area** of rectangle A is **double** the area of square B.

Is he correct?

☐ Yes   ☐ No

Explain your answer.

1 mark

(b)   Alice says:

> The **perimeter** of rectangle A is **double** the perimeter of square B.

Is she correct?

☐ Yes   ☐ No

Explain your answer.

1 mark

10. Look at the diagram of Megan's cube.
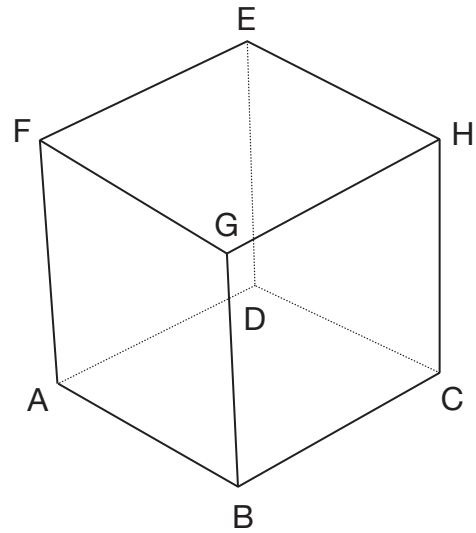
Megan puts her finger on point A.

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

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

←——————— 20cm ———————→
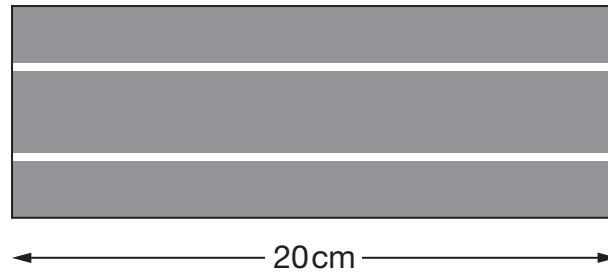
How many of these straight pieces are needed to make a **1 metre** track?

_____

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

60°
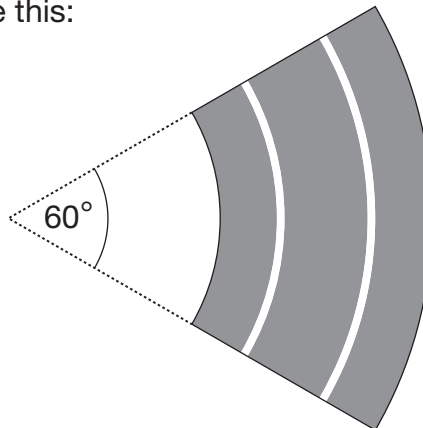
How many of these curved pieces are needed to make a **complete circle** of track?

_____

12. Match each statement to the correct expression.

The first one is done for you.

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

2 marks

13. 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.
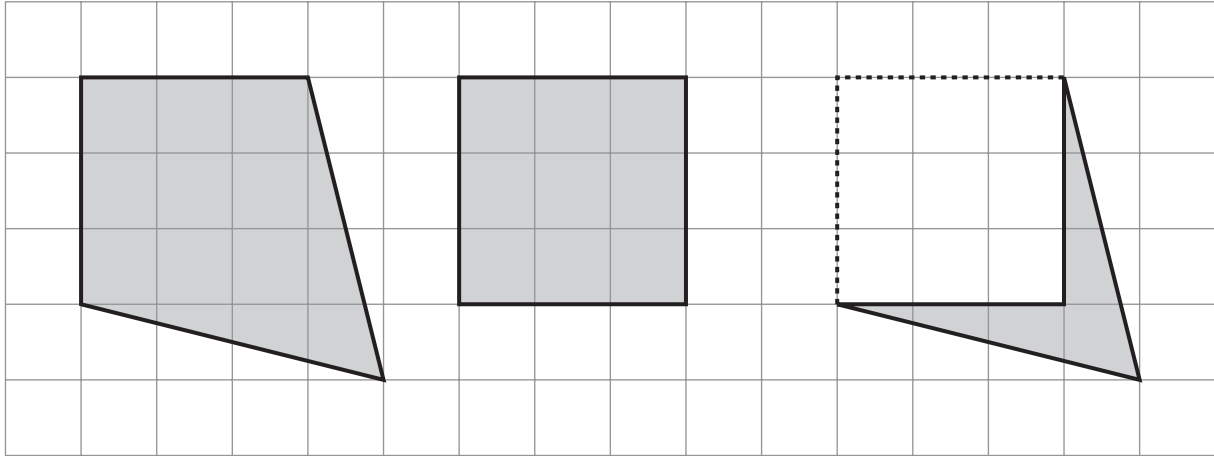
Area = _12_ cm² 　　 Area = _____ cm² 　　 Area = _____ cm²

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14. (a) Look at the equation.

$$n + 3 = 12$$

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

_____

(b) Now look at this equation.

$$n + 3 = 7$$

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

_____

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

(b)   Now shade **four** more squares on the shape below so that it has
rotation symmetry of order **2**
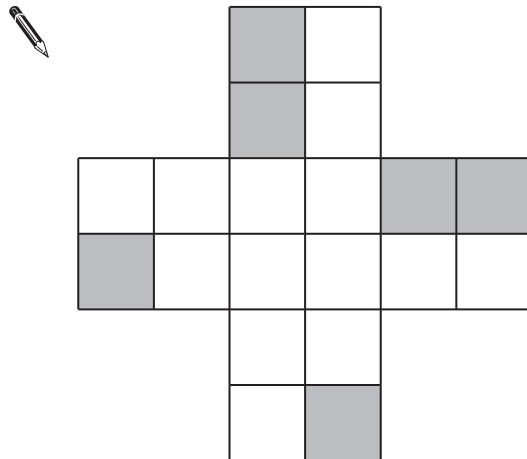
16. A famous mathematician claimed that:

> 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.

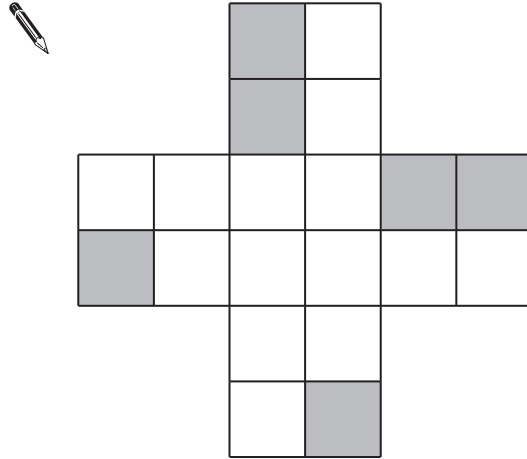(a) Write a pair of **prime** numbers that **sum to 16**

_____ 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

17. Kim works in a shop.

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

	9	10	11	12	1	2	3	4	5	6	7	8
Monday	▓	▓	▓		▓	▓	▓					
Tuesday	▓	▓	▓		▓	▓	▓					
Wednesday	▓	▓	▓						▓	▓		
Thursday	▓	▓	▓		▓	▓	▓					
Friday												
Saturday	▓	▓	▓									

← am →   ← pm →
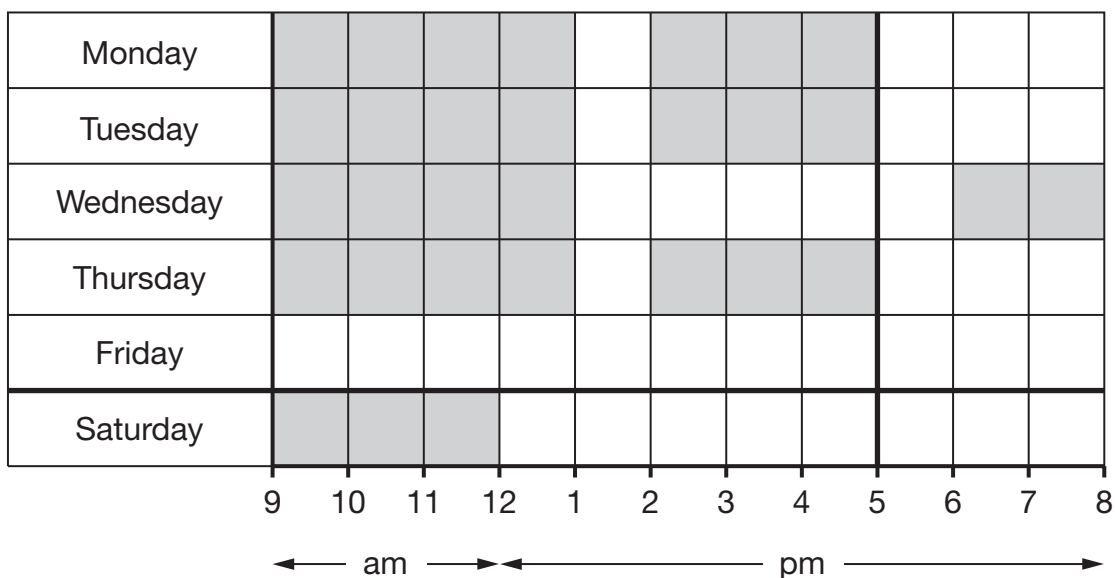
The table shows her pay for each hour worked.

	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?

£ |
<table>
<tr><td>£</td><td></td></tr>
</table>

2 marks

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18.   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

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

The shapes are not drawn accurately.
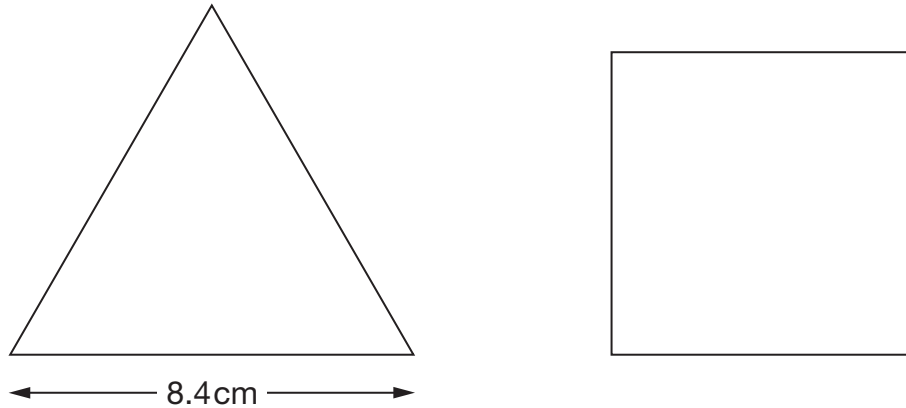
The side length of the equilateral triangle is 8.4 cm.

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

20. (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

21. 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 _____

22. A cookery book shows this conversion table.

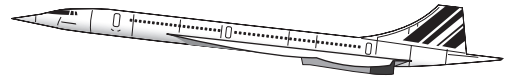| Mass in ounces	Mass in grams
1	25
2	50
3	75
4	110
5	150
10	275

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

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

How many miles per hour (mph) is that?

_____ mph

2 marks

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24.   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.
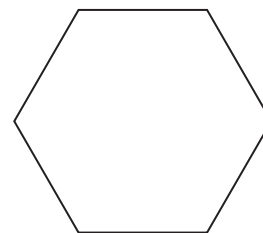
Write numbers in the sentence below.

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

2 marks

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

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

_____

(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?

_____

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

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

_____

26.   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**
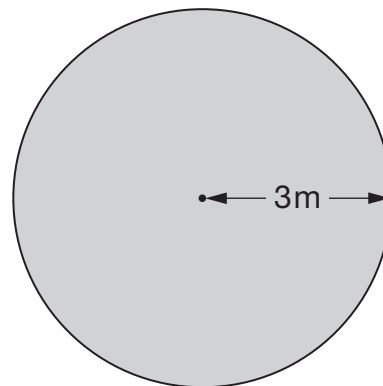
     What is the mass of the yoghurt?

_____ g

2 marks

27.   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

28.   To find the nth triangular number, you can use this rule.

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

Example: 3rd triangular number $= \frac{3}{2}(3+1)$

$$= 6$$
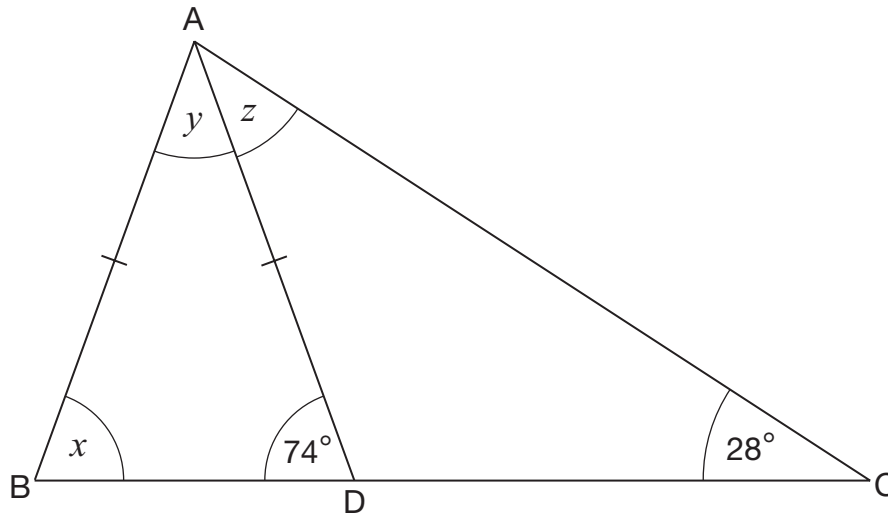
(a)   Work out the **10th** triangular number.

_____

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

_____

29.   Look at triangle ABC.

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

A

y   *z*

Not drawn
accurately

x   74°   28°

B   D   C

Work out the sizes of angles x, y and z
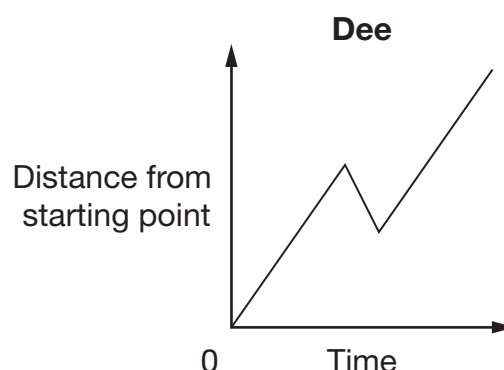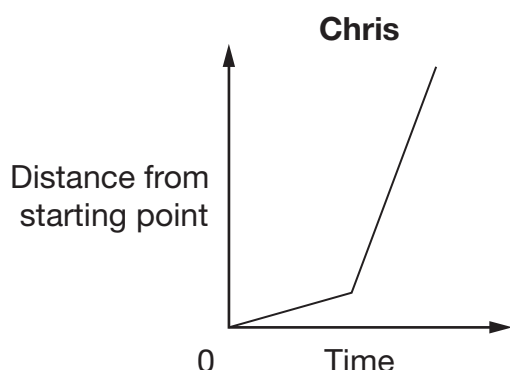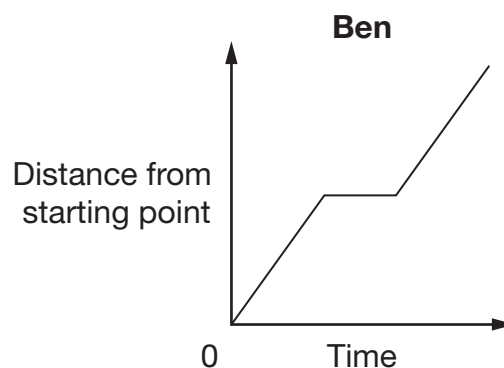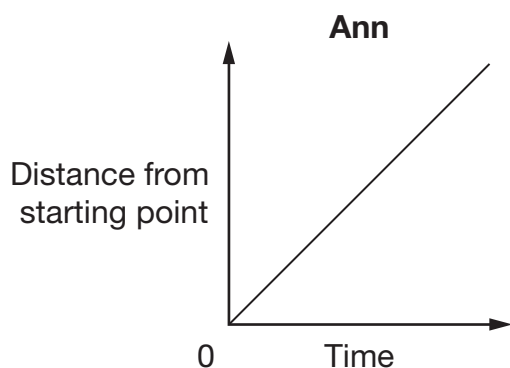
Give reasons for your answers.

$x =$ _____ ° because _____

_____

$y =$ _____ ° because _____

_____

$z =$ _____ ° because _____

_____

2 marks

PLEASE TURN OVER

30. The graphs show information about the different journeys of four people.

Ann

Distance from starting point

0   Time

Ben

Distance from starting point

0   Time

Chris

Distance from starting point

0   Time

Dee

Distance from starting point

0   Time

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

END OF TEST