Ma

KEY STAGE 3

TIER 6–8

Year 9 mathematics test

Paper 1

Calculator **not** 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 **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.

For marking use only	Total marks	

Instructions

Answers

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

Calculators

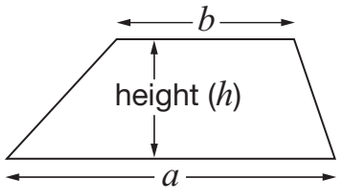
You **must not** use a calculator to answer any question in this test.

Formulae

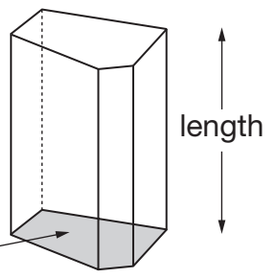
You might need to use these formulae

Trapezium

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



Prism



Volume = area of cross-section × length

1. Look at the equation.

$$14n = 98$$

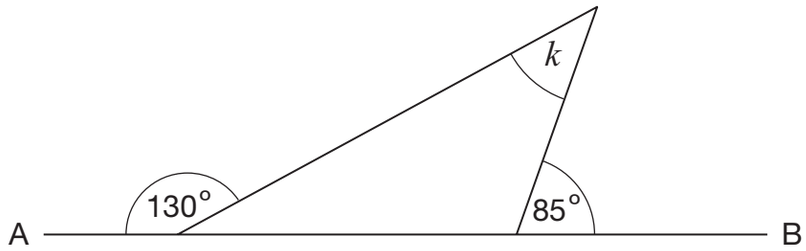
(a) Work out the value of **140*n***

1 mark

(b) Work out the value of **14(*n* + 1)**

1 mark

2. Look at the diagram.



Not drawn accurately

AB is a straight line.

Work out the size of angle k

$k =$ _____ °

2 marks

3. Look at the sequence below.

To get the next term in the sequence, **subtract 90** from the term before.

500 410 320 …

Write the first two terms of the sequence that are **less than zero**.

_____ , _____

2 marks

4. (a) Look at this information.

$$x \leq 0$$

Give an example of what the value of x could be.

Give a **different** example of what the value of x could be.

1 mark

(b) Now look at this information.

$$2y + 3 \leq 11$$

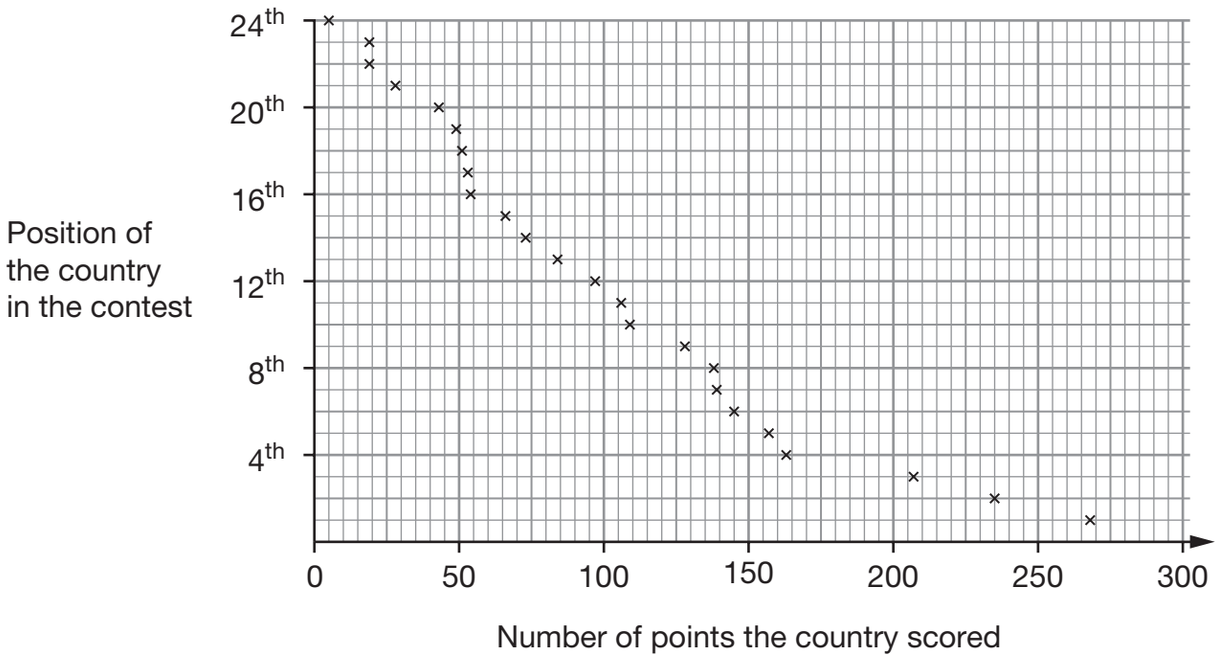
What is the **largest** value that y could be?

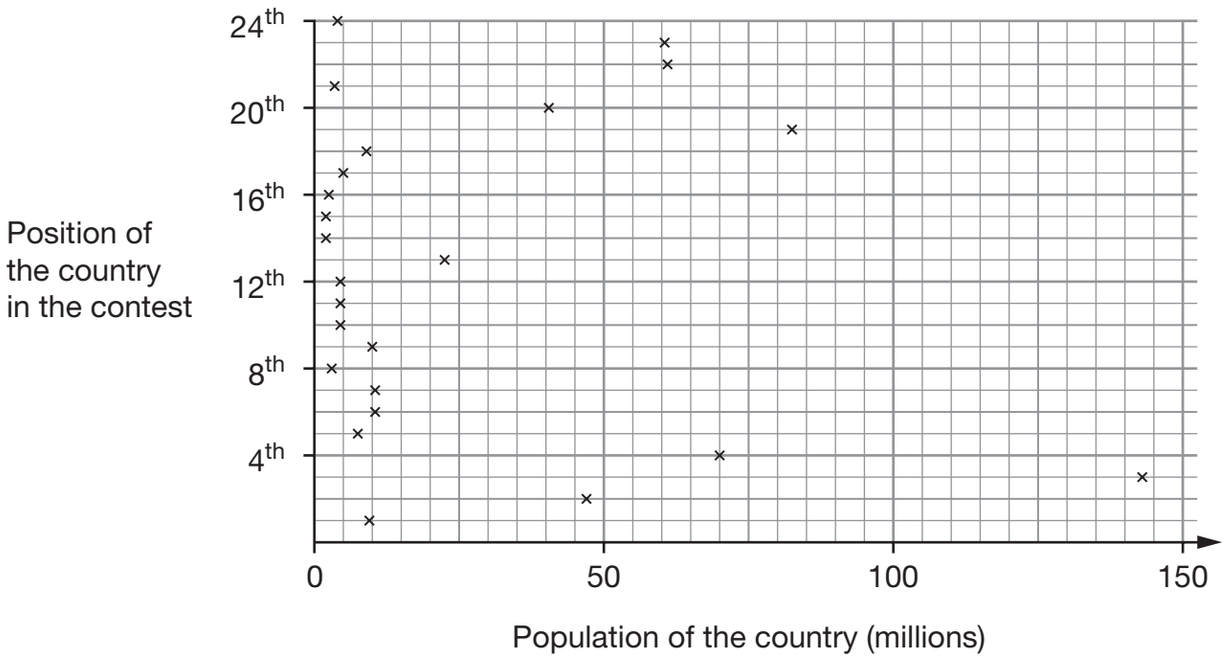
1 mark

5. Each year a song contest is held in Europe.

The country with the greatest number of points wins.

The scatter graphs show information about the contest in 2007.





Use the graphs to answer these questions.

(a) About how many points did the winning country score?

_____ 1 mark

(b) How many countries scored **fewer than 60** points?

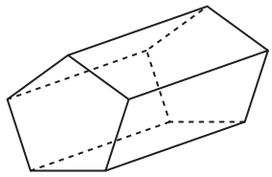
_____ 1 mark

(c) What is the population of the country that scored **84** points?

_____ million 1 mark

6. The table shows information about a **pentagonal** prism.

	Pentagonal prism
Number of **vertices**	10
Number of **rectangular faces**	5
Total number of **faces**	7



Pentagonal prism

(a) Complete the table to show information about a **triangular** prism.

	Triangular prism
Number of **vertices**	
Number of **rectangular faces**	
Total number of **faces**	

1 mark

(b) Complete the table.

	_____ prism	_____ prism
Number of **vertices**	12	
Number of **rectangular faces**	6	
Total number of **faces**	8	10

3 marks

7. Write numbers in the boxes so that the fractions are in size order.

$\frac{1}{4}$ $\frac{\square}{7}$ $\frac{1}{\square}$ $\frac{3}{5}$ $\frac{2}{\square}$

2 marks

8. (a) I **add** the expressions n and $n + 2$

Put a ring round the expression that shows the result.

$2n$ $4n$ $n(n + 2)$

$n^2 + 2$ $2n + 2$

1 mark

(b) Now I **multiply** the expressions n and $n + 2$

Put a ring round the expression that shows the result.

$2n$ $4n$ $n(n + 2)$

$n^2 + 2$ $2n + 2$

1 mark

9. Jerry has a bag of counters.

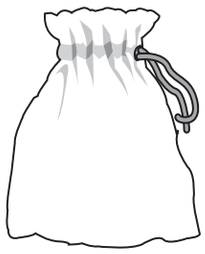
Inside his bag are

2 blue,

4 green,

5 red, and

9 yellow counters



Jerry is going to take a counter at random from his bag.

Write the correct **colours** to complete these sentences.

The probability that it will be _____ is **0.2**

The probability that it will **not** be _____ is $\frac{3}{4}$

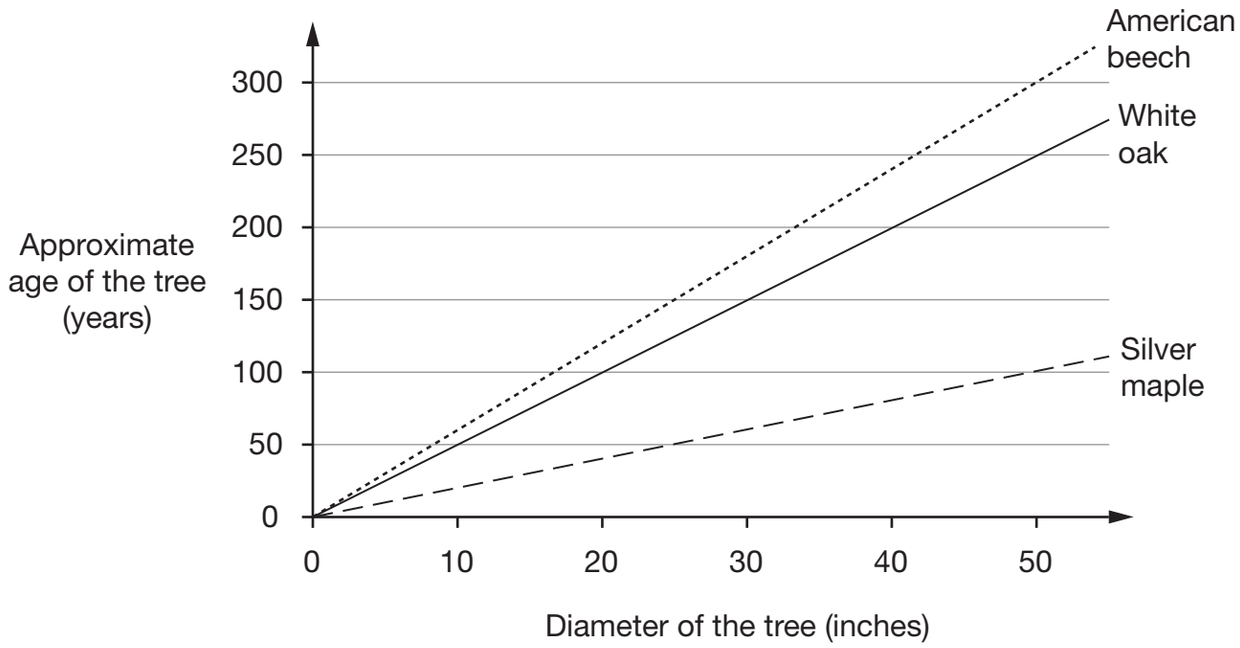
1 mark

The probability that it will be _____ **or** _____ is **70%**

1 mark

10. You can work out the approximate age of a tree if you know its diameter.

The graph shows information about three types of trees.



An American beech, a silver maple and a white oak all have the **same diameter**.

Complete these sentences.

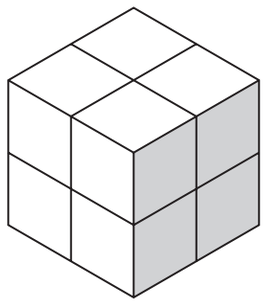
The age of the American beech is about _____ times the age of the silver maple.

1 mark

The age of the American beech is about _____ times the age of the white oak.

1 mark

11. (a) Eight small cubes of side length 1 cm are used to make a larger cube.



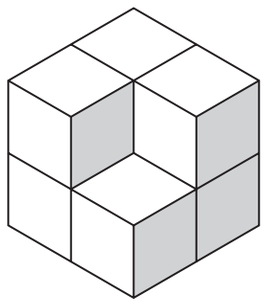
Complete the table to show the information for the larger cube.

Larger cube	
Volume	_____
Surface area	_____
Total length of its edges	_____

2 marks

1 mark

(b) One of the small cubes is removed to make this new shape.



Tick (✓) the correct box in each row below.

	Has increased	Has stayed the same	Has decreased
Volume			
Surface area			
Total length of its edges			

2 marks

12.

$(y + 3)$ is always **5 more** than $(y - 2)$

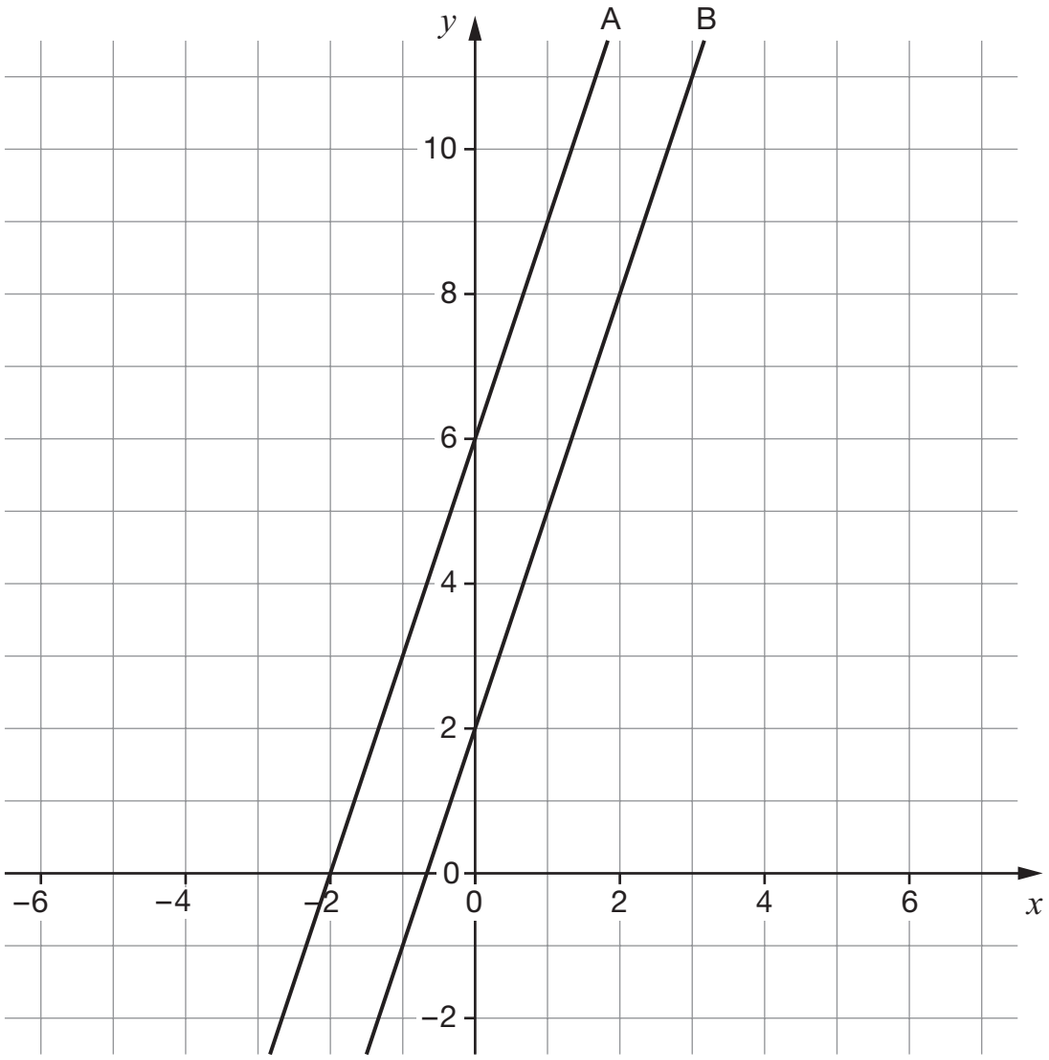
so $(y + 3) - (y - 2) = 5$

Complete the following.

$(y + 4) - (y - 3) =$ _____ 1 mark

$(y - 2) - (y - 3) =$ _____ 1 mark

13. (a) The graph shows two straight lines, A and B.



The equations of the lines are $y = 3x + 2$ and $y = 3(x + 2)$

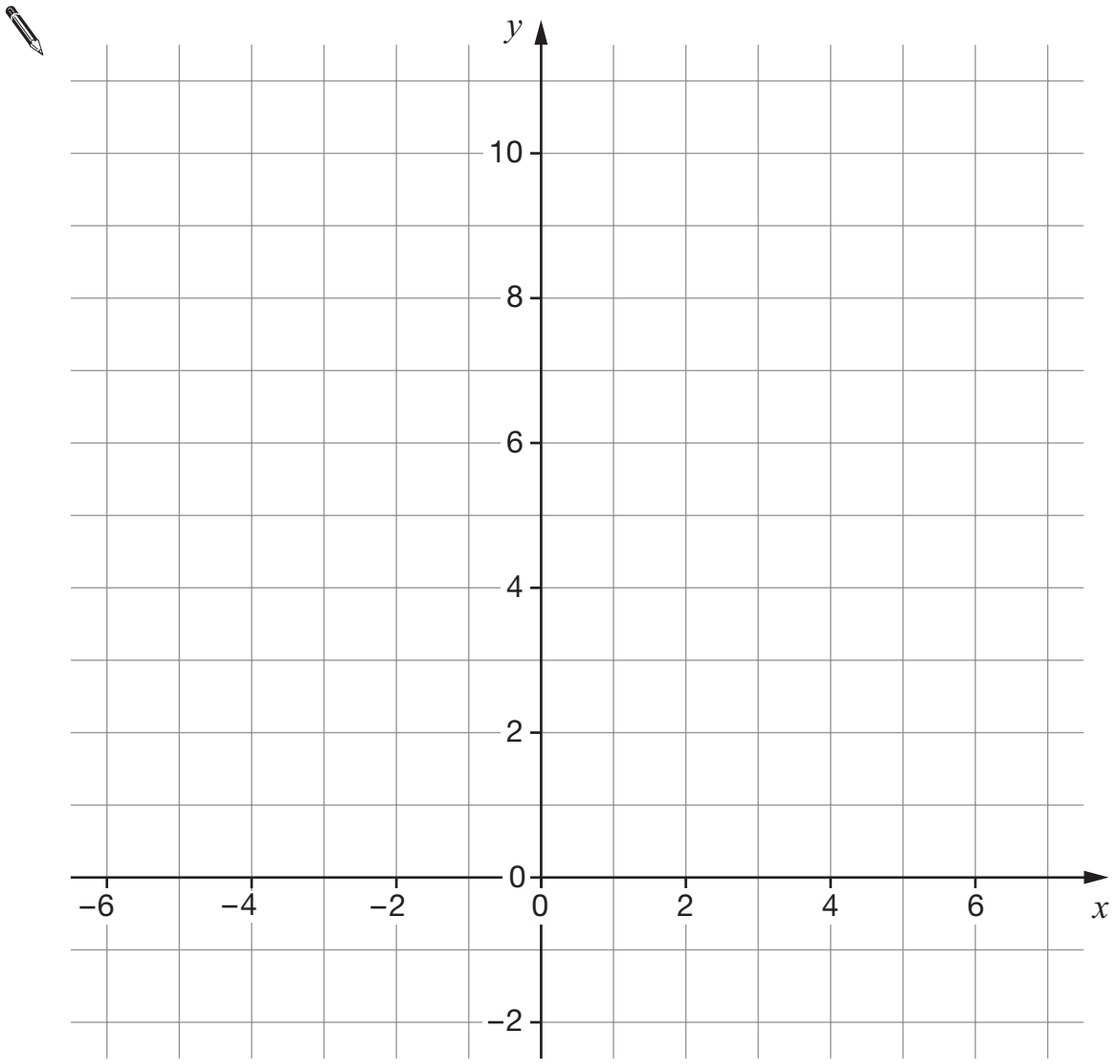
Tick (✓) the equation for **line A**.

☐ $y = 3x + 2$ ☐ $y = 3(x + 2)$

Explain how you know.

1 mark

(b) Draw the straight lines with equations $y = 2x + 2$ and $y = 2(x + 2)$ on the graph below.



2 marks

14. Here are the first seven terms in three number sequences.

Powers of 2	Powers of 3	Powers of 4
2	3	4
4	9	16
8	27	64
16	81	256
32	243	1024
64	729	4096
128	2187	16384

Use the number sequences to work out the answers.

$3^5 \times 9 =$ _____ 1 mark

$4^5 \div 2^2 =$ _____ 1 mark

$4^6 \div 2^{12} =$ _____ 1 mark

15. (a) Multiply out the brackets, then write this expression as simply as possible.

$x(5 - x) + 4(x^2 + 1)$

2 marks

(b) Factorise this expression.

$3x - x^2$

1 mark

16. Write the missing fractions.

The first one is done for you, with diagrams to help.

For any number, x 

Add half the number 

Then subtract *one third* of the result.

The answer is x 

For any number, y

Add one third of the number

Then subtract _____ of the result.

1 mark

The answer is y

For any number, t

Add two thirds of the number

Then subtract _____ of the result.

1 mark

The answer is t

17. (a) Here are the equations of four straight lines.

$y = 6$	$y = 2$	$x = 3$	$x = 4$

The intersections of these straight lines form the vertices of a rectangle.

What is the **perimeter** of this rectangle?

_____ units

1 mark

(b) The diagonals of the rectangle have these equations:

$$y = 4x - 10$$

$$y = -4x + 18$$

Find where these lines intersect.

(_____ , _____)

2 marks

18. Sam has two fair, **six-sided** dice. Both dice are numbered 1 to 6

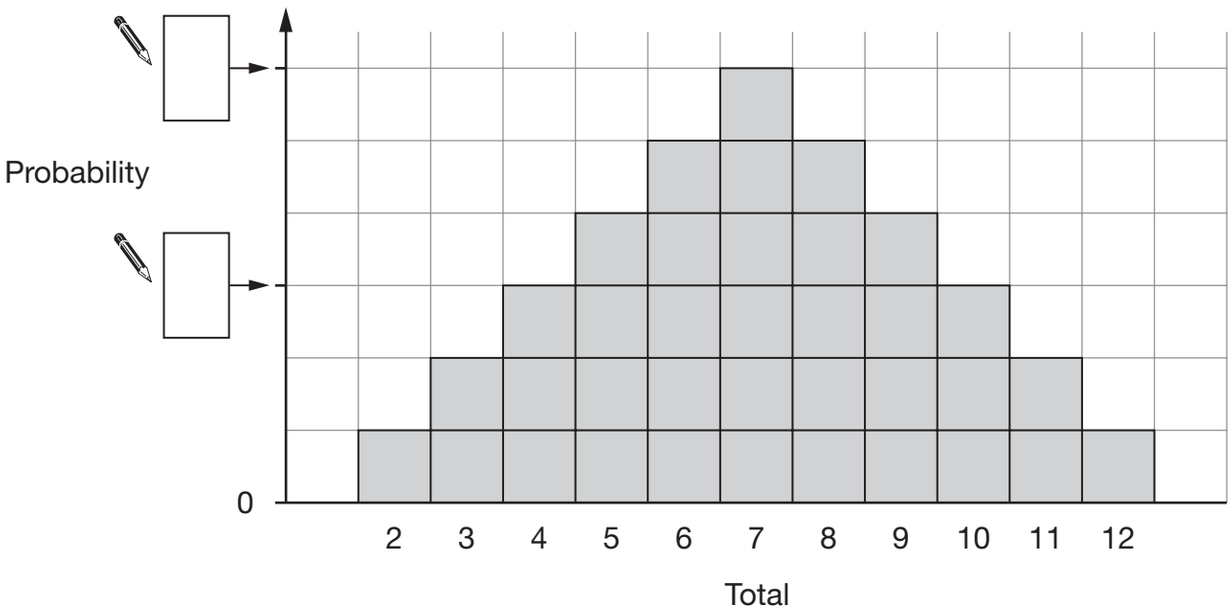
He is going to throw the dice and **add** the scores.

(a) What is the probability that Sam will throw a total of 12?

1 mark

(b) The chart shows the probability of different totals.

Write in the missing **fractions** to complete the diagram.

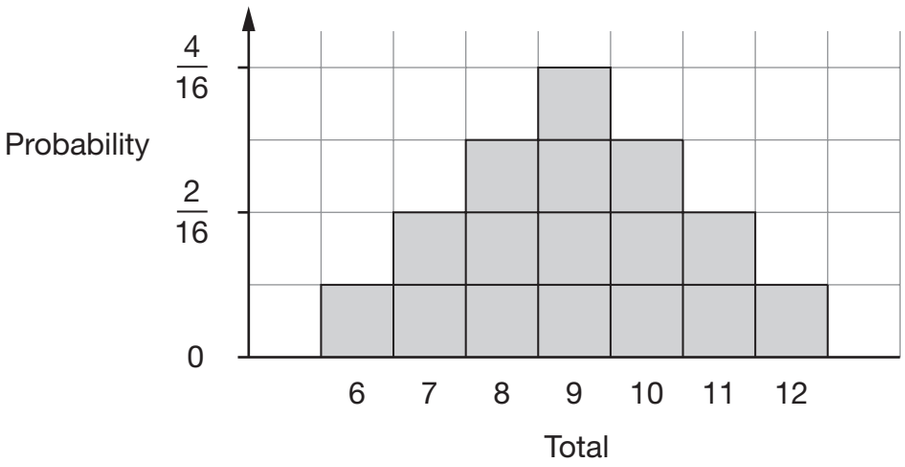


2 marks

(c) Lisa also has two fair dice but hers are **four-sided**.

She is going to throw her dice and **add** the scores.

The chart shows the probability of different totals.



The same numbers are on both dice. What are the numbers?

_____, _____, _____, _____

1 mark

19. A bag contains coloured beads.

The table shows numbers and fractions of each colour.

Write the missing numbers and fractions in the table.

Colour	Number of beads	Fraction
Blue	12	
Red		$\frac{1}{12}$
Green	4	
Other		$\frac{1}{4}$

2 marks

20. Look at the expressions in the shaded boxes.

Draw lines to match them to the expressions on the right.

$(y + 7)(y + 7)$	$y^2 + 49$
$(y + 7)(y - 7)$	$y^2 - 49$
$(y - 7)(y + 7)$	$y^2 + 14y + 49$
$(y - 7)(y - 7)$	$y^2 - 14y + 49$
	None of the above

2 marks

21. A teacher has a set of ten cards numbered 1 to 10

She takes one of the cards at random but does not show it to the class.

(a) The teacher says:

> The number on this card is an **odd** number.

What is the probability that the number is also a **square** number?

1 mark

(b) The teacher puts the card back, then again takes a card at random.

She says:

> The number on this card is a **square** number.

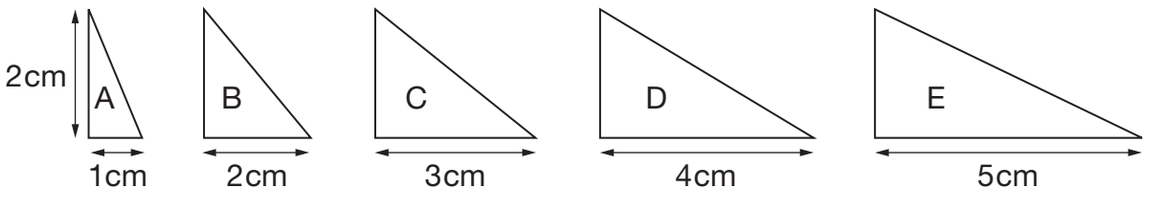
What is the probability that the number is also an **odd** number?

1 mark

22. This question is about right-angled triangles.

None of the diagrams are drawn accurately.

(a) The height of each triangle below is 2cm.



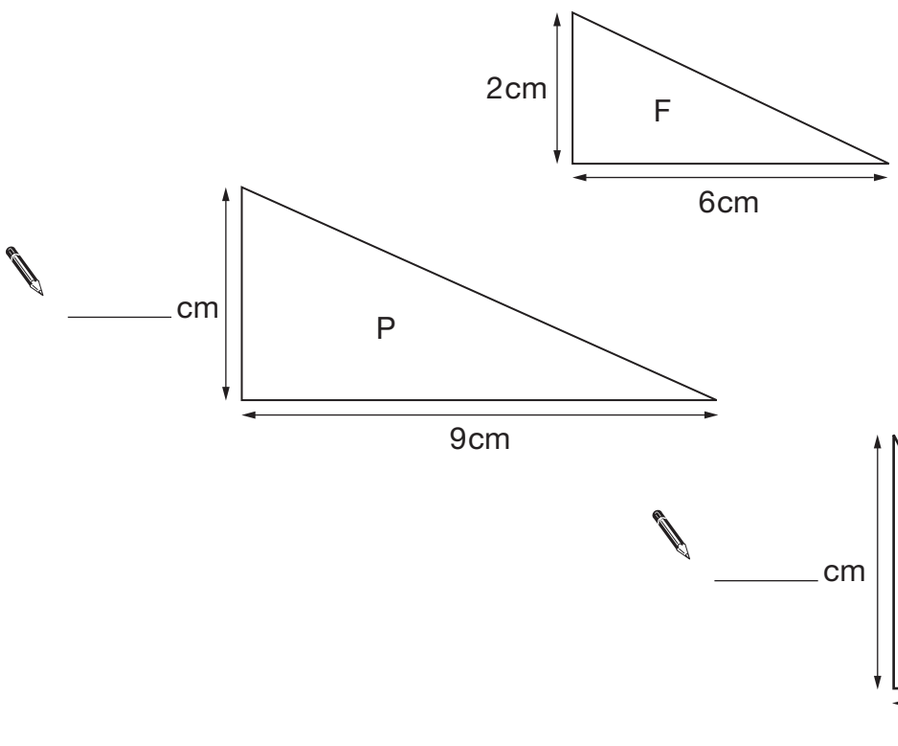
Which two of these triangles are similar?

_____ and _____

1 mark

(b) Triangles P and Q are similar to triangle F.

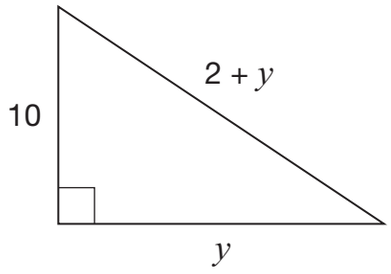
Write the missing dimensions.



1 mark

1 mark

23. Look at the right-angled triangle.



(a) Use **Pythagoras' theorem** to complete the equation below.

$(2 + y)^2 =$ _____

1 mark

(b) Now work out the value of y

$y =$ _____

2 marks

END OF TEST

QCDA/10/4337 (Pupil pack)
QCDA/10/4333 (Teacher pack)
092009