Ma

KEY STAGE 3

TIER 6–8

2005

Mathematics test

Paper 2

Calculator allowed

Please read this page, but do not open your booklet until your teacher tells you to start. Write your name and the name of your school in the spaces below.

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 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	
	Borderline check	

QCA/05/1436

Instructions

Answers

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

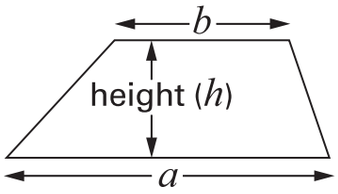
Calculators

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

Formulae

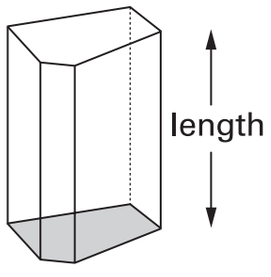
You might need to use these formulae

Trapezium



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

Prism



Volume = area of cross-section × length

1. Each year, there is a tennis competition in Australia and another one in France.

The table shows how much money was paid to the winner of the men's competition in each country in 2002.

Country	Money
Australia	1 000 000 Australian dollars (£1 = 2.70 Australian dollars)
France	780 000 Euros (£1 = 1.54 Euros)

Which country paid **more** money?

You **must** show your working.

Tick (✓) the country that paid more.

☐ Australia ☐ France

. . . .

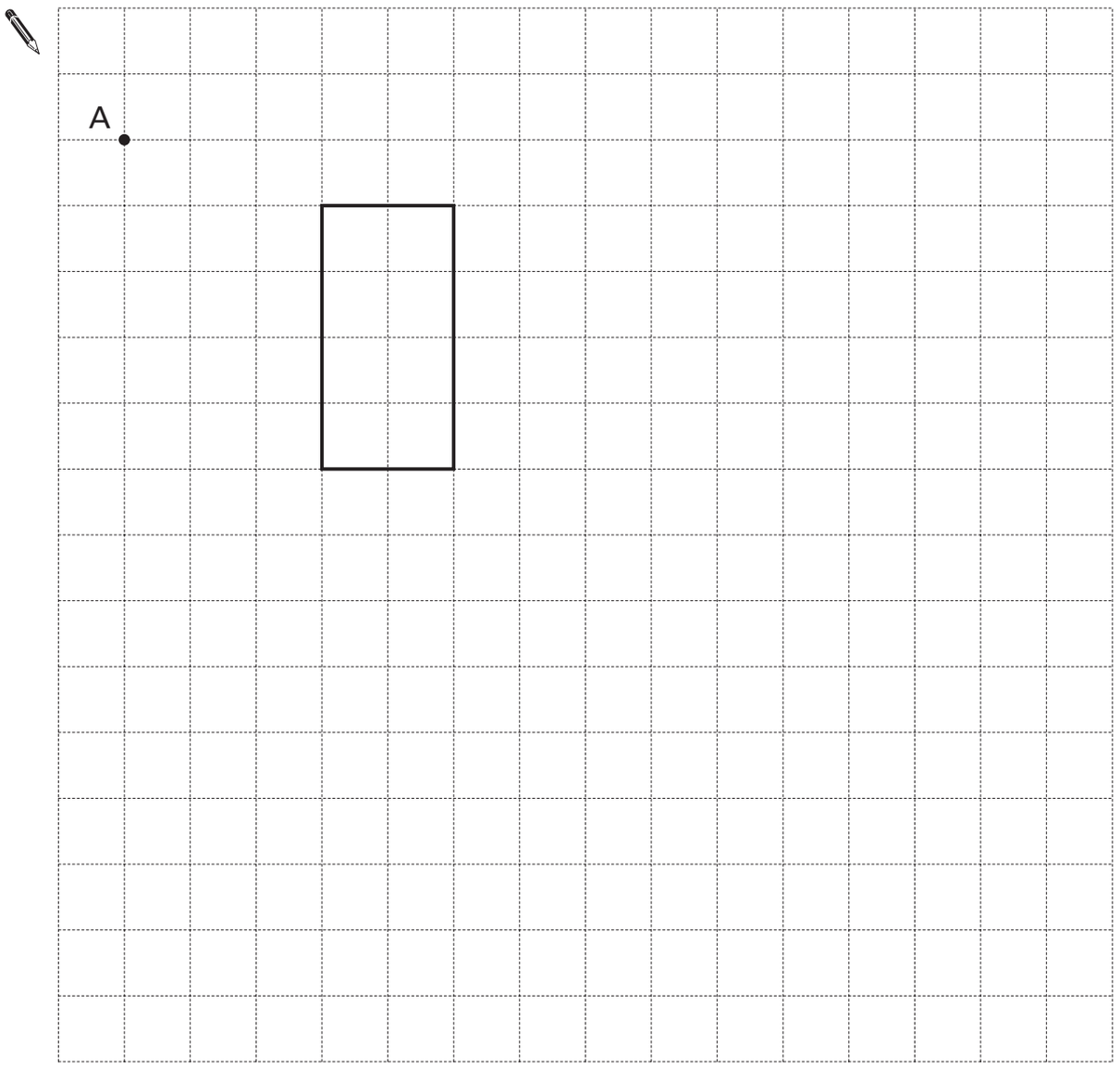
. . . .

2 marks

2. Look at the rectangle drawn on a square grid.

Draw an **enlargement** of this rectangle with **scale factor 2**

Use **point A** as the **centre** of enlargement.



. . . .

. . . .

2 marks

3. About 2000 years ago, a Greek mathematician worked out this formula to find the area of any triangle.

For a triangle with sides a, b and c

Area = $\sqrt{s(s-a)(s-b)(s-c)}$

where $s = \dfrac{a+b+c}{2}$

A triangle has sides, in cm, of 3, 5 and 6

Use $a = 3$, $b = 5$ and $c = 6$ to work out the area of this triangle.

. . . .

cm^2

. . . .

2 marks

4. Here is some information about all the pupils in class 9A.

	girls	boys
right-handed	13	14
left-handed	1	2

A teacher is going to choose a pupil from 9A at random.

(a) What is the probability that the pupil chosen will be a **girl**?

. . . .
1 mark

(b) What is the probability that the pupil chosen will be **left-handed**?

. . . .
1 mark

(c) The teacher chooses the pupil at random.

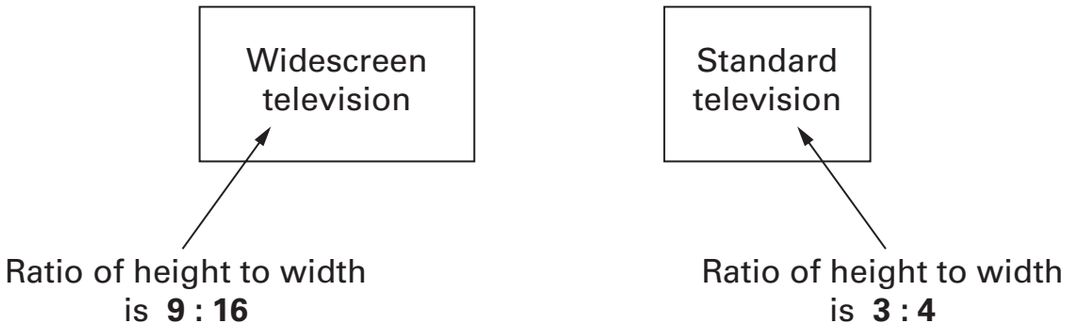
She tells the class the pupil is **left-handed**.

What is the probability that this left-handed pupil is a **boy**?

. . . .
1 mark

5. The screens of widescreen and standard televisions look different.

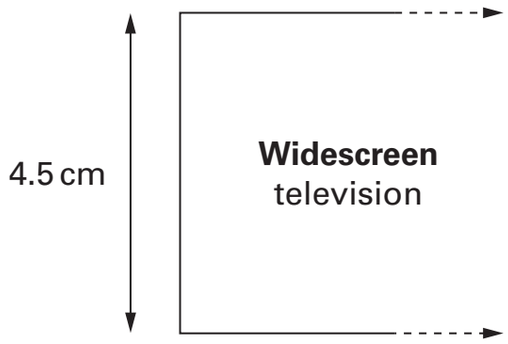
They have different proportions.



Keri starts to draw scale drawings of the televisions.

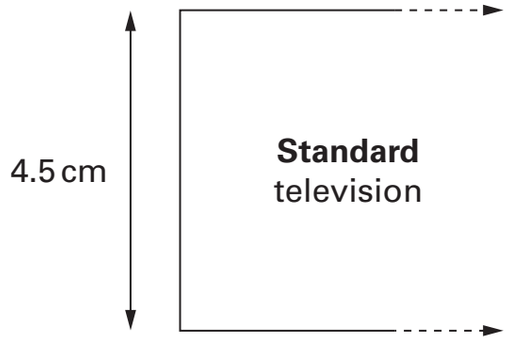
For each, the height is 4.5 cm.

What should the **width** of each scale drawing be?



The width of this scale drawing should be ..... cm

1 mark



The width of this scale drawing should be ..... cm

1 mark

6. A spinner has the numbers 1 to 4 on it.

The probability of spinning a number 4 is 0.1

The probability of spinning a number 1 is 0.6

The probability of spinning a number 2 is the same as the probability of spinning a number 3

Calculate the probability of spinning a **number 3**

. . . .

. . . .

2 marks

7. I think of a number.

I multiply this number by **8**, then subtract **66**

The result is twice the number that I was thinking of.

What is the number I was thinking of?

. . . .

. . . . . .

. . . .

2 marks

8. Here is some information about A levels in 2002.

	English	Mathematics
Number of students	72 000	54 000
Percentage gaining grade A	19%	37%

How many more students gained grade A in mathematics than in English?

....

2 marks

9. (a) Look at this equation.

$$14y - 51 = 187 + 4y$$

Is $y = 17$ the solution to the equation?

☐ Yes ☐ No

Show how you know.

1 mark

(b) Now look at this equation.

$$3y^2 = 2601$$

Is $y = 17$ a solution to the equation?

☐ Yes ☐ No

Show how you know.

1 mark

10. Write these expressions as simply as possible.

$9 - 3k + 5k$ = ...

1 mark

$k^2 + 2k + 4k$ = ...

1 mark

$3k \times 2k$ = ...

1 mark

$\frac{9k^2}{3k}$ = ...

1 mark

11. Here are four charts drawn by a computer.

Charts to show the average amount of milk produced by different breeds of cow

Chart 1

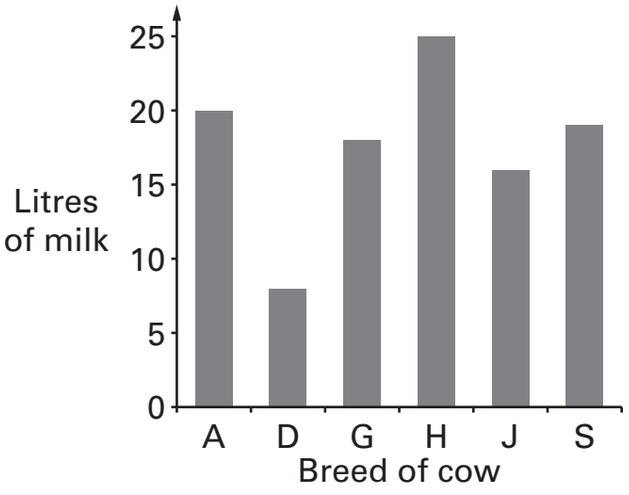


Chart 2

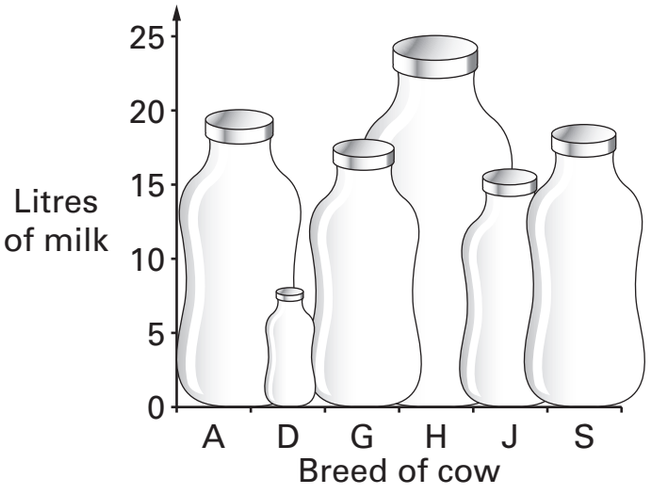


Chart 3

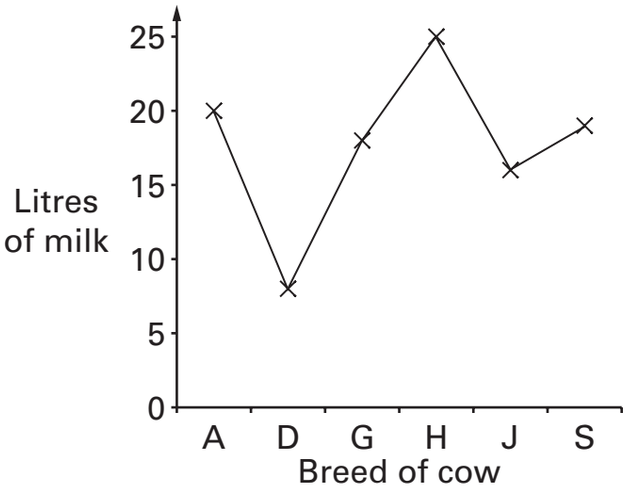
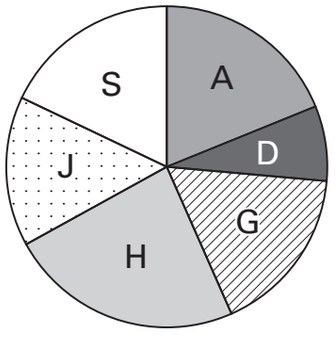


Chart 4



Key:

A - Ayrshire D - Dexter G - Guernsey H - Holstein J - Jersey S - Shorthorn

Only one of these charts is a good way of showing the data.

For each of the other three charts, explain why the type of chart is **not** a good way of showing the data.

Chart .....

because .....

.....

.....

1 mark

Chart .....

because .....

.....

.....

1 mark

Chart .....

because .....

.....

.....

1 mark

12. In one week Jamal watched television for **26 hours**.

In that week:

> He watched television for the **same** length of time on Monday, Tuesday, Wednesday and Thursday.
>
> On each of Friday, Saturday and Sunday, he watched television for **twice as long** as on Monday.

How long did he spend watching television on **Saturday**?

Write your answer in hours and minutes.

..... hours ..... minutes

2 marks

13. (a) The nth term of a sequence is $3n + 4$

What is the **8th** term of this sequence?

....
1 mark

(b) The nth term of a different sequence is $\frac{n-2}{n^2}$

Write the first **three** terms of this sequence.

. . . .

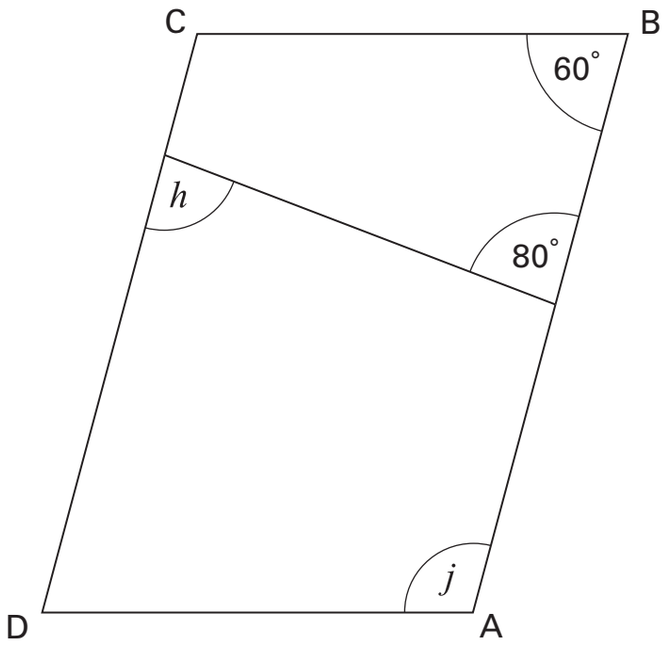
. . . .
2 marks

14. Multiply out the brackets in these expressions.

$y(y - 6) =$ ....
1 mark

$(k + 2)(k + 3) =$ ....
1 mark

15. ABCD is a **parallelogram**.



Not drawn accurately

Work out the sizes of angles h and j

Give reasons for your answers.

h = ... ° because .....

.....

.....

..... 1 mark

j = ... ° because .....

.....

.....

..... 1 mark

16. A newspaper printed this information about the world's population.

> If the world was a village of 100 people,
>
> **6 people** would have **59%** of the total wealth.
>
> The other 94 people would have the rest.

On average, **how many times** as wealthy as one of the other 94 people would one of these 6 people be?

....

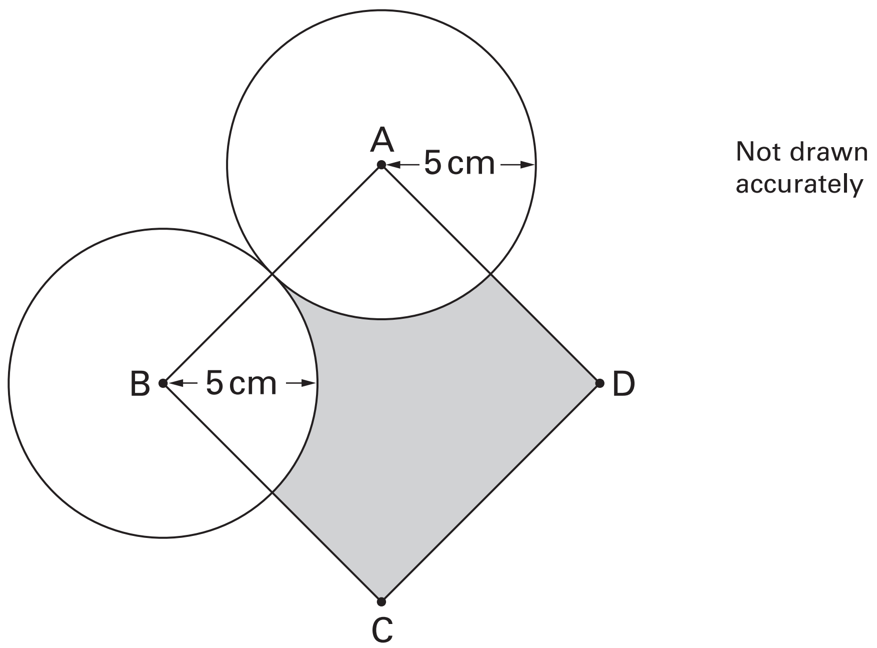
2 marks

As reported in the Metro newspaper, Feb 2001

17. The diagram shows two circles and a square, ABCD.

A and B are the centres of the circles.

The radius of each circle is **5 cm**.



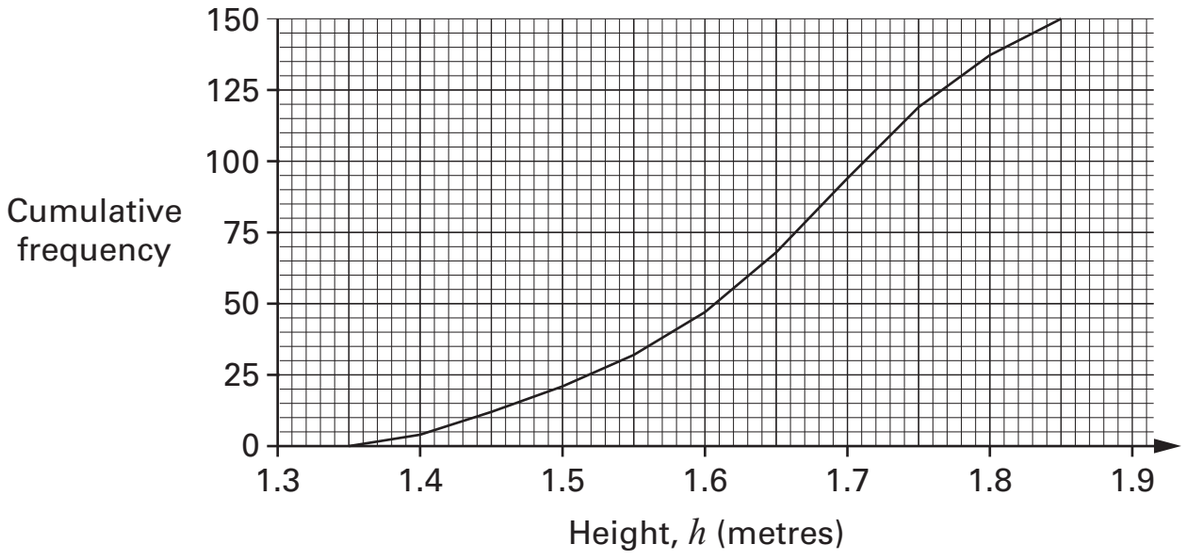
Calculate the area of the **shaded part** of the square.

. . . .

2 marks

1 mark

18. The graph shows the heights of **150** fir trees.



The table shows the price of fir trees of different heights.

	$1.2\,\text{m} < h \leq 1.5\,\text{m}$	$1.5\,\text{m} < h \leq 1.75\,\text{m}$	$1.75\,\text{m} < h \leq 2\,\text{m}$
Cost	£18.00	£22.00	£26.00

Use this information to calculate the total price of the 150 fir trees.

You **must** show your working.

. . . .

. . . .

£ . . . .

3 marks

19. (a) Each side of a square is **increased** by **10%**

By what percentage is the **area** increased?

. . . . .

..... %

. . . . .

2 marks

(b) The length of a rectangle is **increased** by **20%**

The width is **decreased** by **20%**

By what percentage is the area changed?

. . . . .

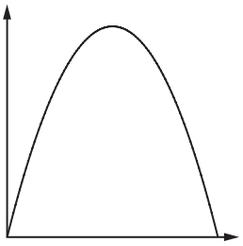
..... %

. . . . .

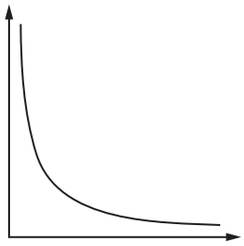
2 marks

20. Here are sketches of five different graphs.

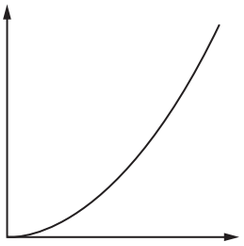
Graph A



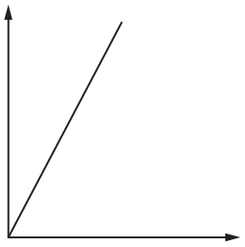
Graph B



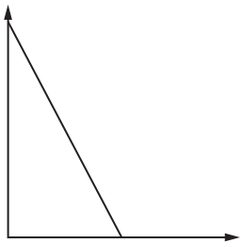
Graph C



Graph D



Graph E



Which graph best matches each relationship below?

For each relationship, give the letter of the correct graph.

(a) The circumference of a circle plotted against its diameter.

Graph .....

1 mark

(b) The area of a circle plotted against its radius.

Graph .....

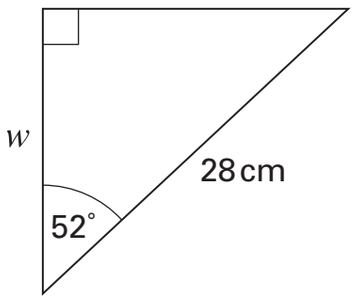
1 mark

(c) The length of a rectangle of area 30 cm^2 plotted against its width.

Graph .....

1 mark

21. (a) Calculate the length w

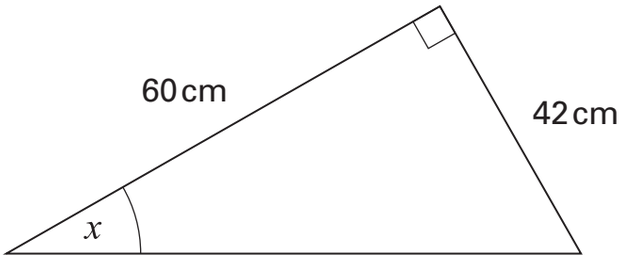


Not drawn accurately

w = ... cm

. . . .
. . . .
2 marks

(b) Calculate the size of angle x



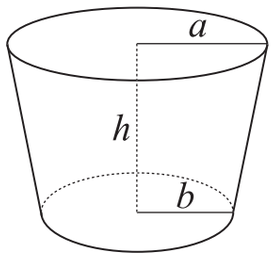
Not drawn accurately

x = ... °

. . . .
. . . .
2 marks

22. A formula to find the volume, V, of this bowl is

$$V = \frac{1}{3}\pi h\left(\frac{a^3 - b^3}{a - b}\right)$$



(a) When $a = 10\,\text{cm}$, $b = 7\,\text{cm}$ and $h = 5\,\text{cm}$, what is the volume of the bowl?

Give your answer correct to **3 significant figures**.

. . . . .
1 mark

..... cm^3

. . . . .
1 mark

(b) When $b = 0$, the bowl is a cone.

Write a simplified formula for the volume of this cone.

V = ...

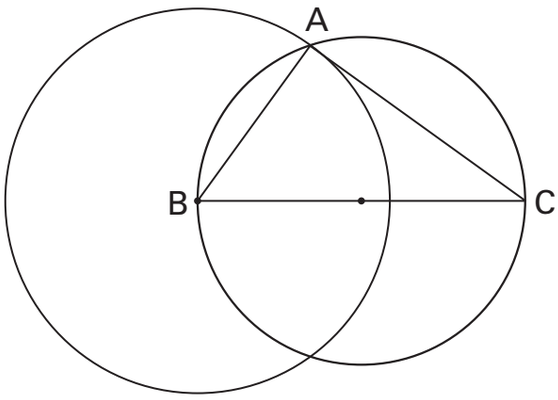
. . . . .
1 mark

PLEASE TURN OVER

23. The diagram shows two circles with a point of intersection at A.

The centre of the larger circle is B. The **radius** of this circle is **6 cm**.

BC is a diameter of the smaller circle. The **radius** of this circle is **5 cm**.



Not drawn accurately

(a) Explain why angle BAC **must** be a right angle.

. . . .

1 mark

(b) What is the length of AC?

. . . . . cm

. . . .

2 marks

END OF TEST