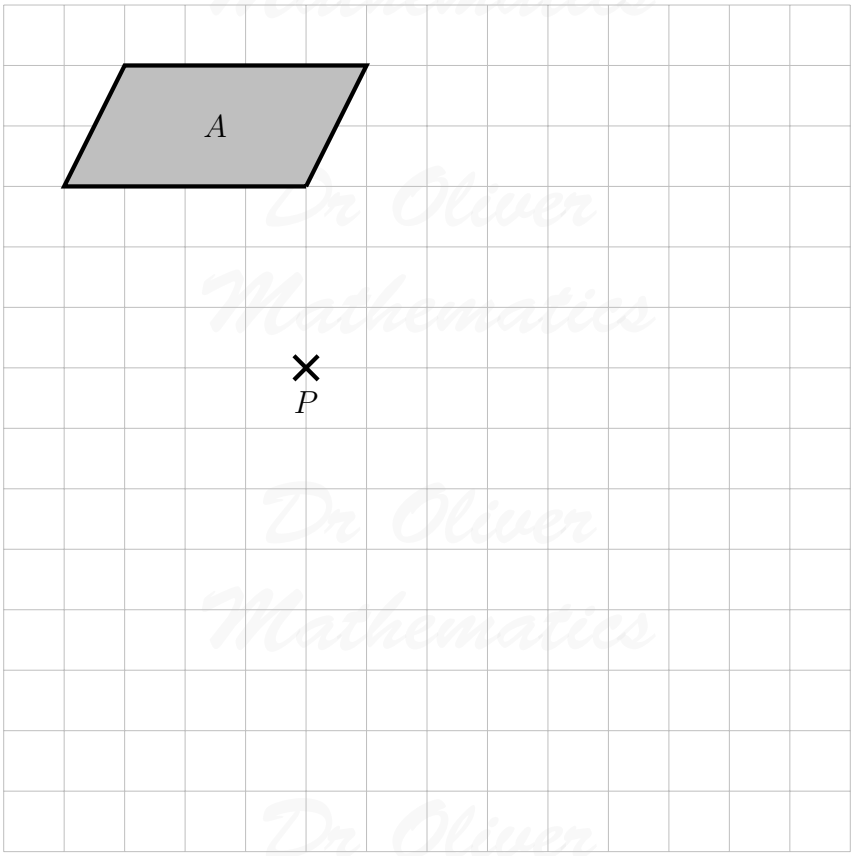
Dr Oliver Mathematics
AQA GCSE Mathematics
2016 November Paper 2: Calculator
2 hours

The total number of marks available is 105.
You must write down all the stages in your working.

1. On this grid, rotate shape A by 90° clockwise about point P. (3)



2. 100 people are asked about their work.
   Here are some of the results.

	Full-Time	Part-Time	Not Working	Total
Men	24	9		60
Women	18			40
Total	42			100

(a) The total number working **part-time** is the same as the total number of people **not working**. (4)

Complete the table.

In this survey, there are 60 men and 40 women.

(b) Which is greater: (3)

the percentage of the men who work full time

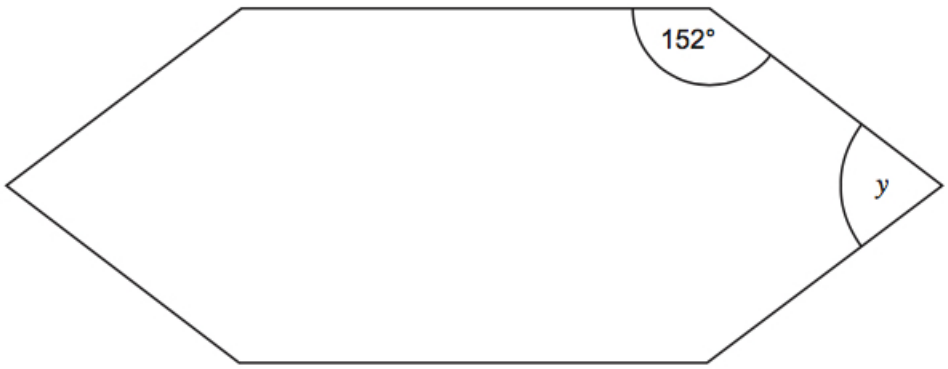
or

the percentage of the women who work full time?

You **must** show your working.

3. This hexagon has two lines of symmetry. (3)

Not drawn accurately



Work out the size of angle y.

4. A builder mixes sand and cement in the ratio 4 : 1.

(a) Altogether he mixes 250 kg. (2)

How much sand and cement does he use?

Cement is sold in 25 kg bags.

(b) Work out the **maximum** amount of mix that the builder can make with 3 bags of cement. (3)

5. (a) Complete the table of values for (2)

$$y = x^2 - 5$$

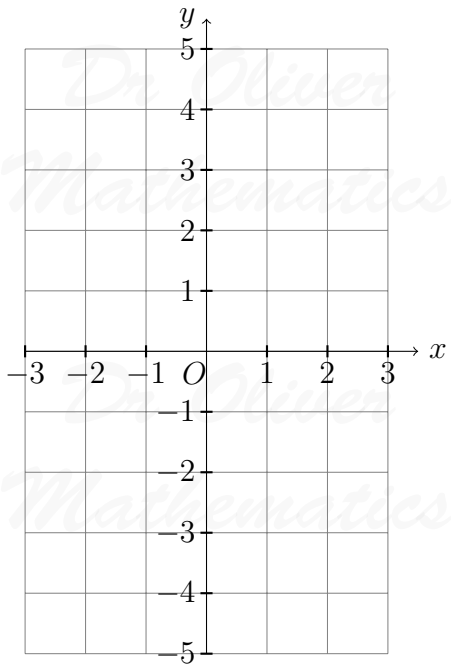
for values of x from -3 to 3.

x	-3	-2	-1	0	1	2	3
y	4		-4			-1	4

(b) Draw the graph of (2)

$$y = x^2 - 5$$

for values of x from -3 to 3.



(c) Use the graph of (1)

$$y = x^2 - 5$$

to write down the values of x when $y = 0$.

6. The table shows the proportions of left-handed and right-handed students in a school.

	Left-handed	Right-handed
Boys	15%	85%
Girls	12%	88%

(a) 20 boys and 10 girls are chosen at random from the school. (3)

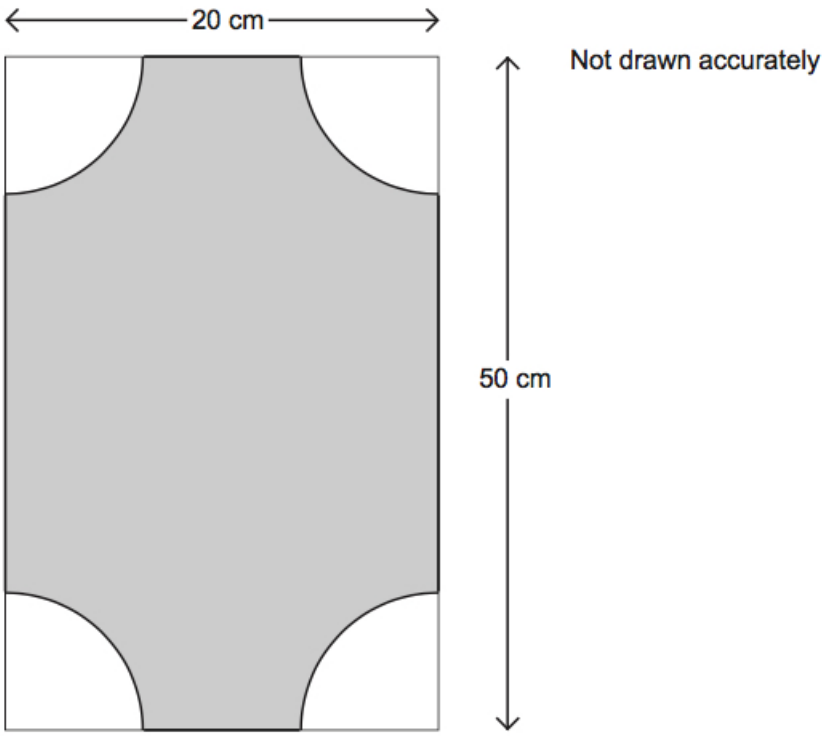
Estimate the number of left-handed students chosen.

(b) There are an equal number of boys and girls in the school. (2)
A student is chosen at random.

Work out the probability that the student is right-handed.

7. (a) Work out the area of a circle of radius 6 cm. (2)

(b) Quarter circles of radius 6 cm are cut from the corners of a rectangle as shown. (3)



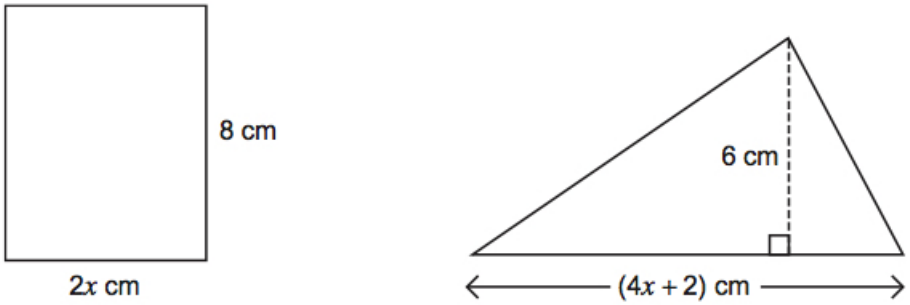
Work out the shaded area.

8. In 1981, the population of England was 46 million. (3)
In 2011, the population of England was 53 million.

Work out the increase in population as a percentage of the 1981 figure.

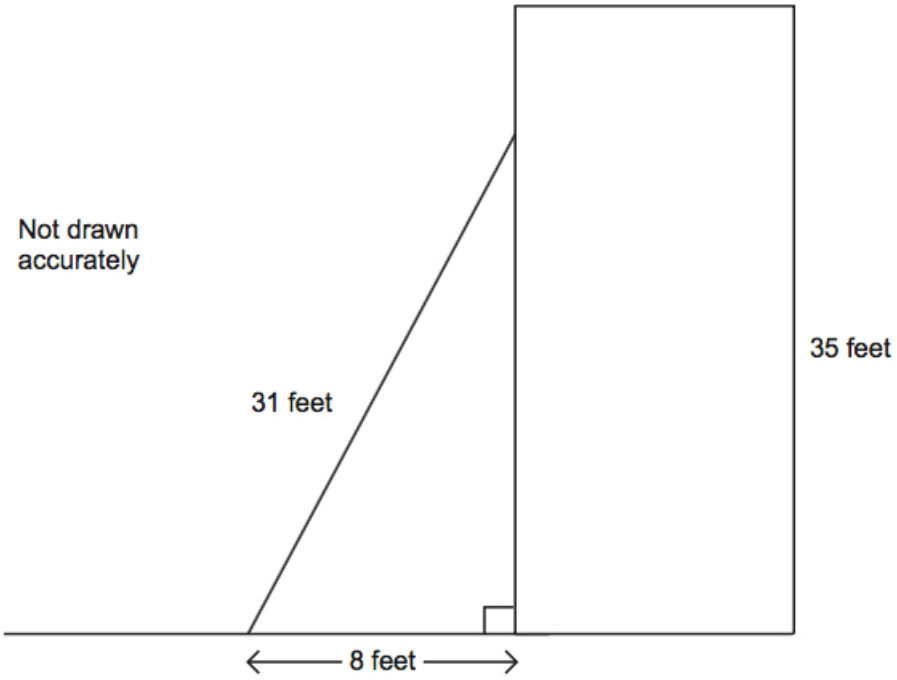
9. The area of the rectangle and the area of the triangle are equal. (4)

Not drawn accurately



Work out the value of x.

10. A ladder of length 31 feet is leaning against a wall as shown. (4)
The foot of the ladder is 8 feet from the wall.
The wall is 35 feet tall.

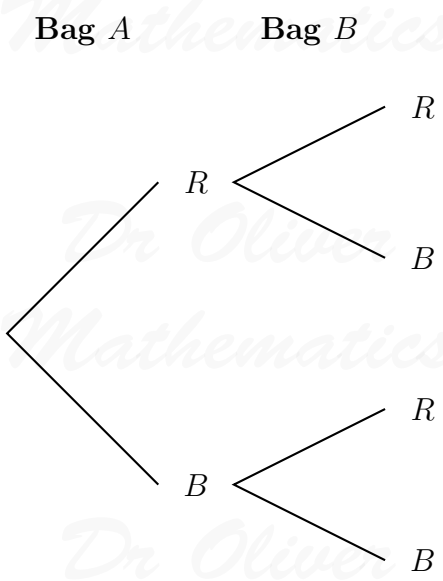


Work out the distance from the top of the ladder to the top of the wall.

11. Bag A contains 3 red balls and 7 blue balls.
Bag B contains 8 red balls and 2 blue balls.

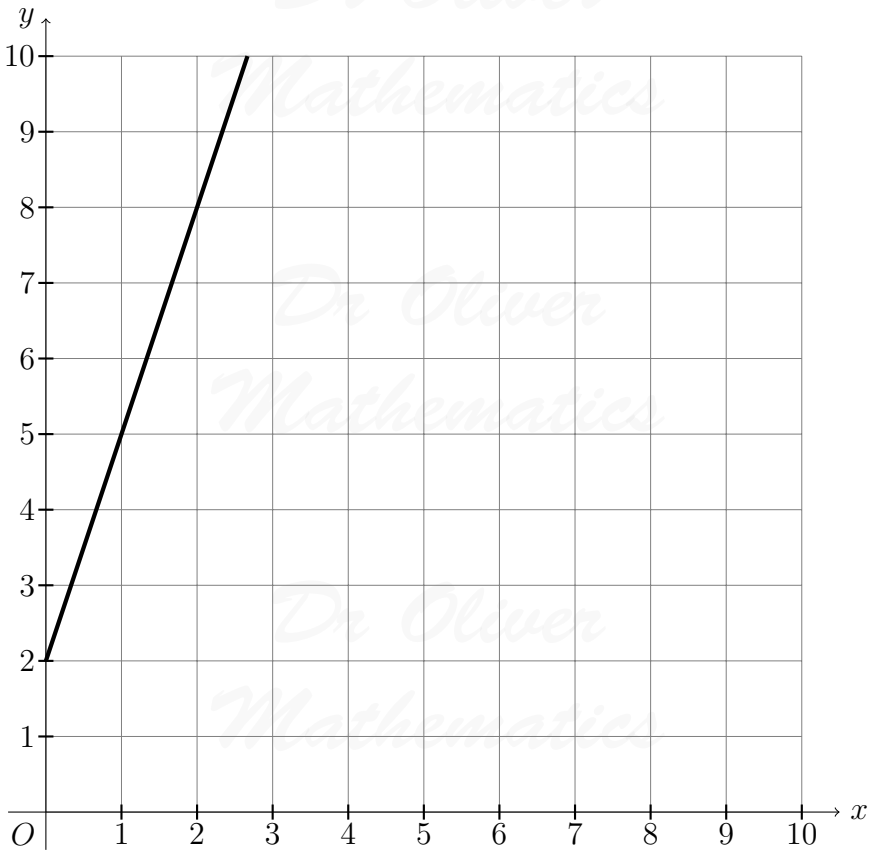
A ball is picked at random from each bag.

(a) Complete the tree diagram to show all the probabilities. (3)



(b) Work out the probability of picking a **red** ball from Bag A and a **blue** ball from Bag B. (2)

12. The straight line passes through points $(0, 2)$ and $(2, 8)$.

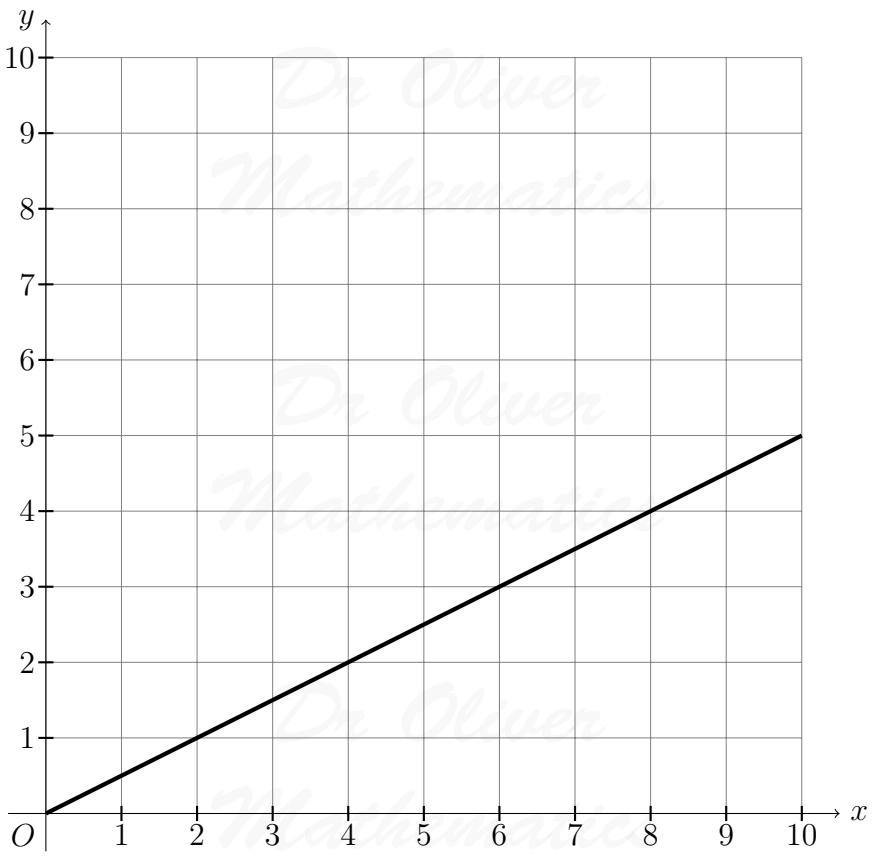


(a) Work out the equation of the straight line. (3)

On this grid the line

$$y = \tfrac{1}{2}x$$

is shown.



(b) On the same grid, draw the line (2)

$$x + y = 9$$

for values of x from 0 to 9.

(c) Solve the simultaneous equations (2)

$$y = \tfrac{1}{2}x \text{ and } x + y = 9.$$

13. (a) Simplify fully (2)

$$5x^2 \times 3y^4 \times 2x \times y^3.$$

(b) Expand and simplify (2)

$$(x + 7)(x - 3).$$

(c) Solve (1)

$$(x - 8)(x + 2) = 0.$$

(d) Factorise (2)

$$8x^2y + 6xy^2.$$

14. In a sale the normal price of a dress is reduced by 25%. (5)
The sale price is then reduced by £10.

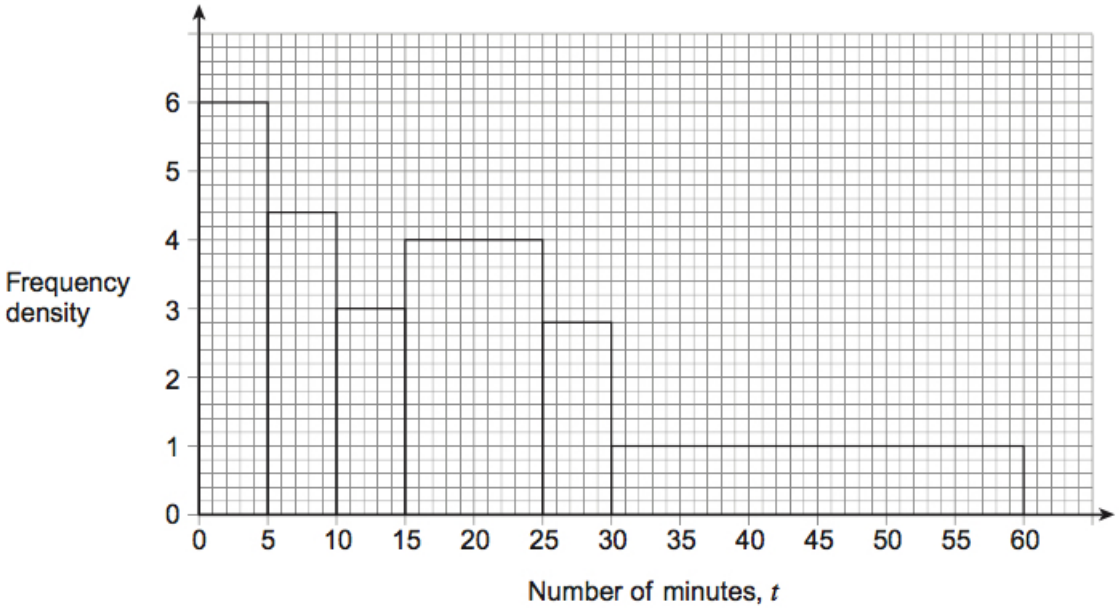
The dress is now priced at £80.

The manager says, "The price is now one-third less than the normal price."

Show that he is correct.

15. A train company records the number of minutes, t, some trains were late in one month.

The histogram summarises the results.



(a) How many trains were **more** than 15 minutes late? (3)

(b) Which is the modal class? (1)
Circle your answer.

$0 < t \leqslant 5$ $15 < t \leqslant 25$ $25 < t \leqslant 30$ $30 < t \leqslant 60$

16. Which of these when converted to decimals are recurring decimals? (2)
Circle your answers.

$\frac{1}{3}$ π $\sqrt{3}$ $\frac{3}{16}$ $\frac{5}{7}$.

17. The surface area of a solid cylinder is given by the formula

$$S = 2\pi rh + 2\pi r^2.$$

(a) Rearrange the formula to make h the subject. (2)

(b) Work out the value of h when (4)

$$S = 95\pi \text{ cm}^2 \text{ and } r = 5.3 \text{ cm}.$$

Give your answer to a suitable degree of accuracy.

18. y is inversely proportional to x^2 where $x > 0$.

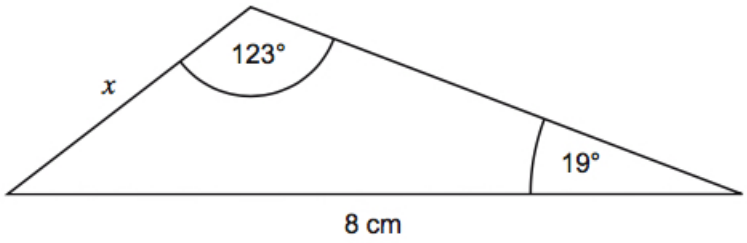
When $x = 2$, $y = 20$.

(a) Form an equation for y in terms of x. (3)

(b) Work out the value of x when $y = 5$. (2)

19. (a) Work out the length x. (3)

Not drawn accurately



(b) Circle the statements that are true. (2)

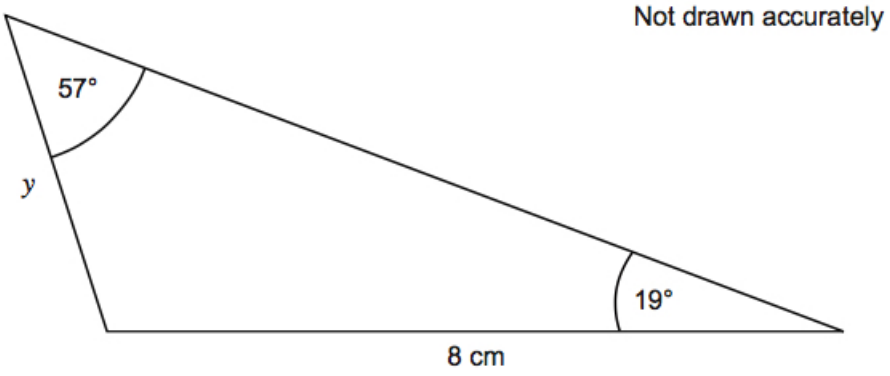
$\sin 123^\circ = \sin 57^\circ$

$\sin 123^\circ = \cos 57^\circ$

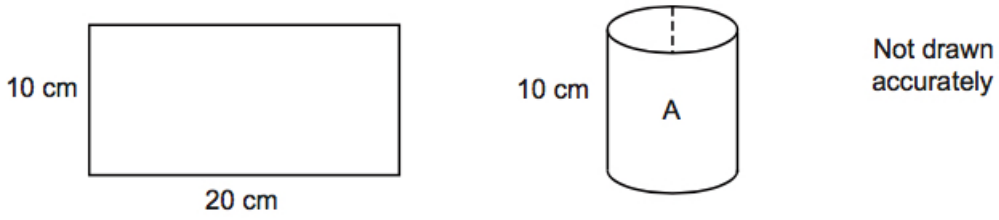
$\cos 123^\circ = \cos 57^\circ$

$\cos 123^\circ = -\cos 57^\circ$

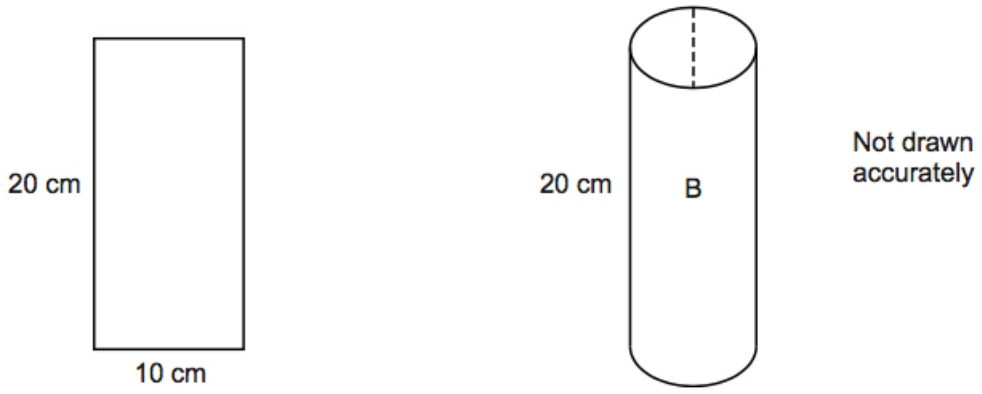
(c) Work out the length y. (1)



20. A rectangle of card, 20 cm by 10 cm, is used to make a cylindrical tube A, as shown. (4)
The card does **not** overlap.



Another rectangle of card, 20 cm by 10 cm, is used to make a cylindrical tube B, as shown.
The card does **not** overlap.



The tubes are filled with clay.

Which tube uses more clay?
You **must** show your working.

21. Use algebra to work out the x-coordinates of the points of intersection of (5)

$$y = 3x^2 \text{ and } y = 4x + 2.$$

Give your answers to 1 decimal place.

22. Work out the height h of the triangle ABC. (5)