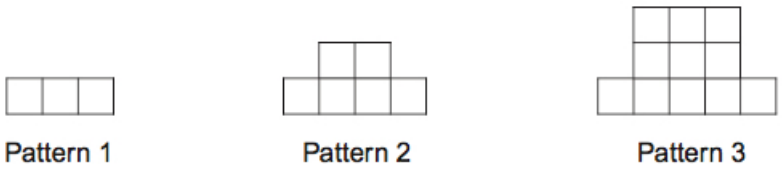
Dr Oliver Mathematics
AQA GCSE Mathematics
2015 November Paper 2: Calculator
2 hours

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

1. Here is a sequence of patterns made with squares.



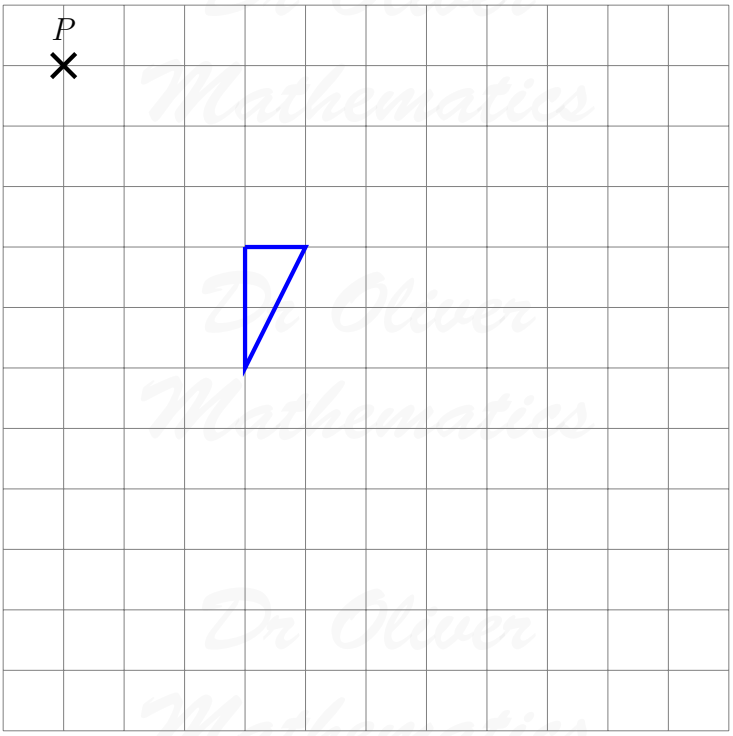
The rule for working out the number of squares in each pattern is

Square the pattern number and then add 2

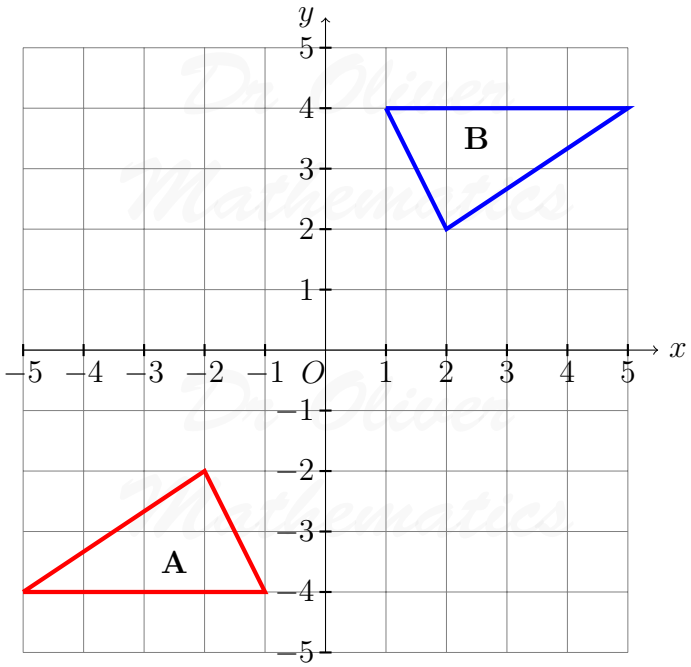
(a) How many squares are in pattern 7? (1)

(b) Which pattern has 123 squares? (2)

2. (a) Enlarge the triangle by scale factor 2, using point P as the centre of enlargement. (3)



(b) Describe fully the **single** transformation that maps shape A onto shape B. (3)

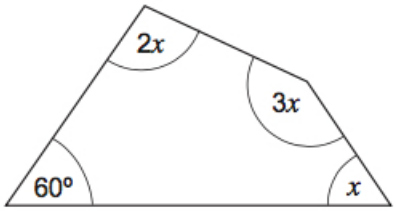


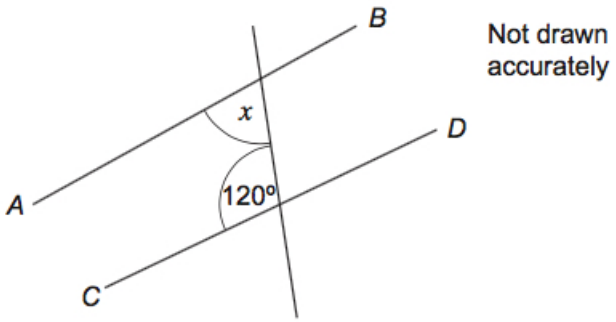
3. A family uses 300 units of gas. (4)

Each unit of gas costs 19p without VAT.
VAT of 5% is added to the bill.

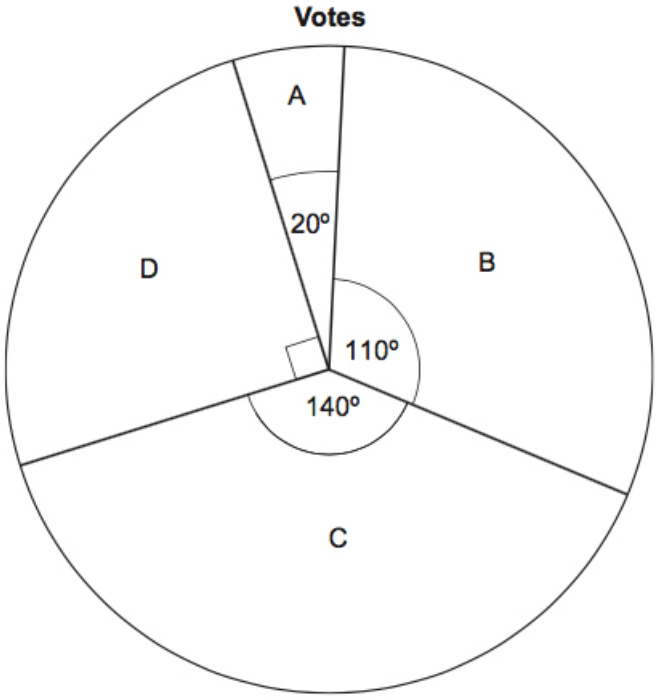
Work out the total gas bill.

4. Show that AB is **not** parallel to CD. (4)





5. The pie chart shows information about how people voted in an election. (3)



1 800 people voted for D.

How many **more** people voted for C than B?

6. (a) Solve (3)

$$6x + 4 = 2(2x - 5).$$

(b) Multiply out (2)

$$y(2 - y^3).$$

7. Abby and Judy share some money.
Abby gets 25%.

(a) Write (2)

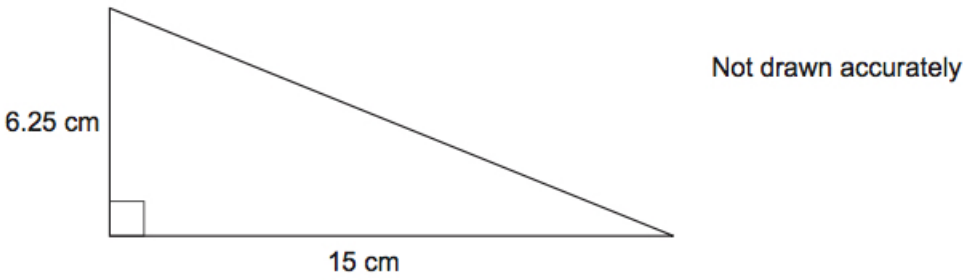
Abby's share : Judy's share

as a ratio.
Give your answer in its simplest form.

Judy gets £19.50

(b) How much does Abby get? (2)

8. Work out the length of the hypotenuse. (3)



9. Here is information about the scores, t, of class A in a test. (4)

Score	Frequency
$0 < t \leqslant 10$	4
$10 < t \leqslant 20$	8
$20 < t \leqslant 30$	9
$30 < t \leqslant 40$	3
$40 < t \leqslant 50$	1

The mean score for class B in the same test is 22.

Dan says, "On average, class A did better than class B."

Is he correct?
You must show your working.

10. a and b are different prime numbers with $a > b$.

    (a) Give an example to show that (1)

    $$a^2 + b^2$$

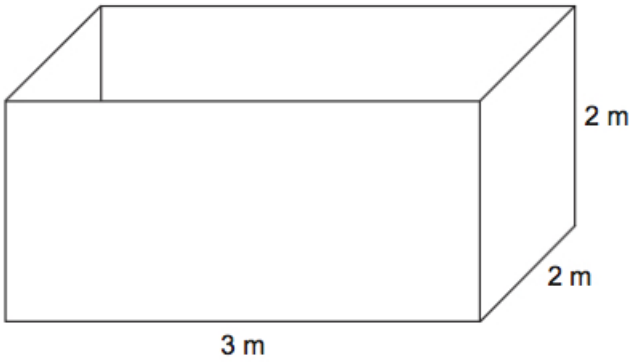
    could be even.

    (b) Give an example to show that (1)

    $$a^2 + b^2$$

    could be odd.

11. An empty tank is in the shape of a cuboid as shown. (5)



The tank is to be filled with water at 1.25 litres per second.

1 m^3 = 1 000 litres.

Work out the time taken to fill the tank.
Give your answer in hours and minutes.

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

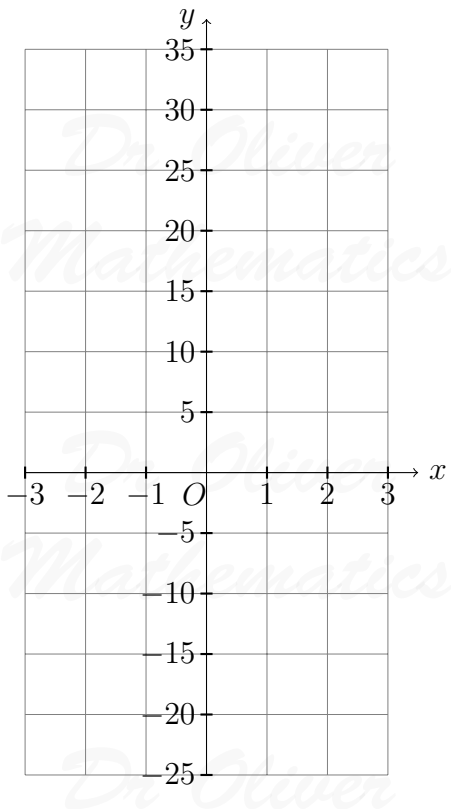
$$y = x^3 + 5.$$

x	-3	-2	-1	0	1	2	3
y	-22		4	5	6	13	

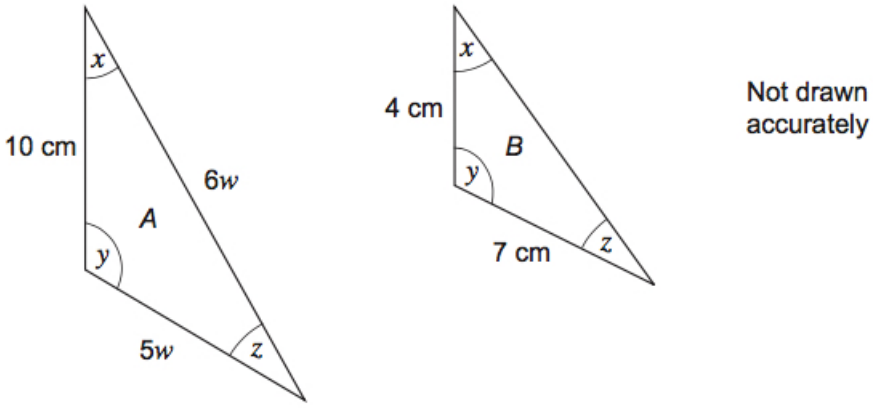
(b) On the grid, draw the graph of (2)

$$y = x^3 + 5$$

for values of x from -3 to 3.



13. A and B are similar triangles.



(a) Circle the scale factor from A to B. (1)

$$-6 \qquad \frac{2}{5} \qquad \frac{5}{2} \qquad 6$$

(b) Work out the perimeter of triangle B. (4)

14. (a) Which calculation works out the total amount after decreasing £50 by 8%? (1)
Circle the correct answer.

$$\pounds 50 \qquad \pounds 50 \times 0.92 \qquad \frac{\pounds 50}{0.08} \qquad \frac{\pounds 50}{1.08}$$

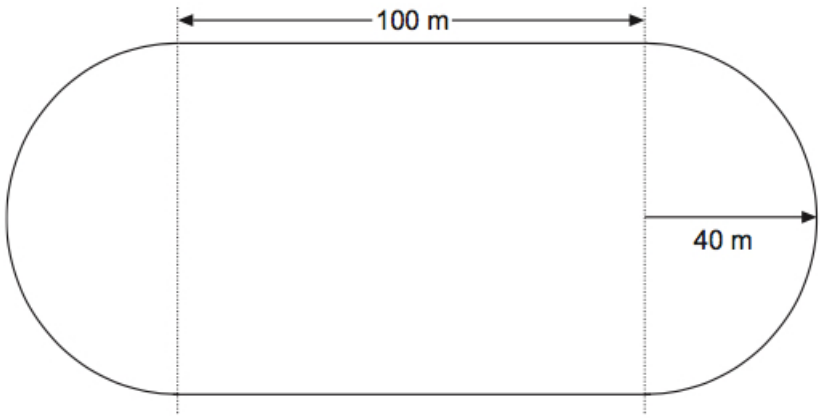
(b) Adrian is going on holiday. (3)

He has two bags.

The mass of one bag is 9 kg.
This is 45% of the total mass of the two bags.

What is the mass of his other bag?

15. A cycle track has two identical semi-circular ends and two straight sides as shown. (4)



Not drawn accurately

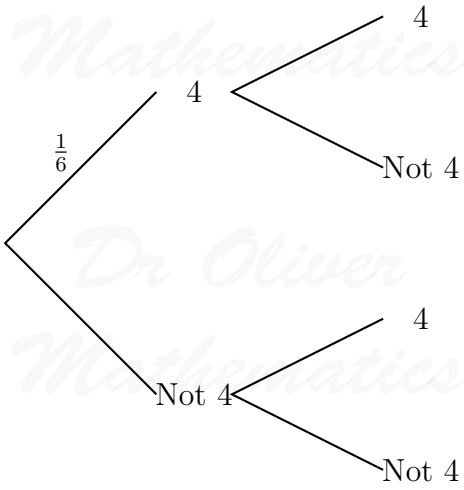
A cyclist completes one lap.

Her average speed is 18 m/s.
Her target time to complete one lap is 30 seconds.

Does she beat her target?
You **must** show your working.

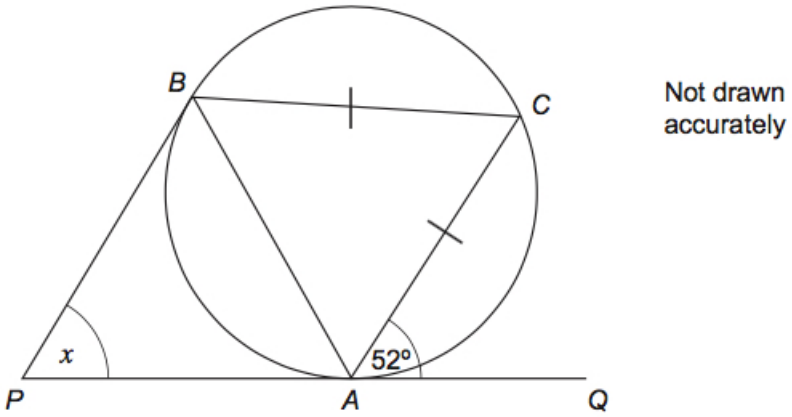
16. An ordinary fair dice is rolled.

(a) Complete the tree diagram for the dice landing on 4. (1)



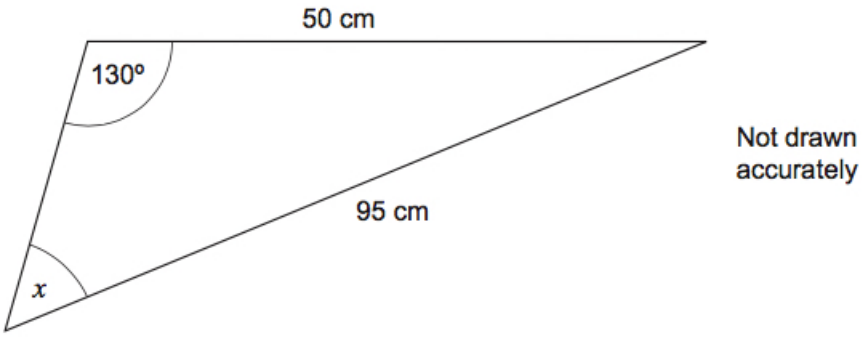
(b) Work out the probability of the dice landing on 4 both times. (2)

17. PAQ and PB are tangents to the circle. (4)
$AC = BC$.

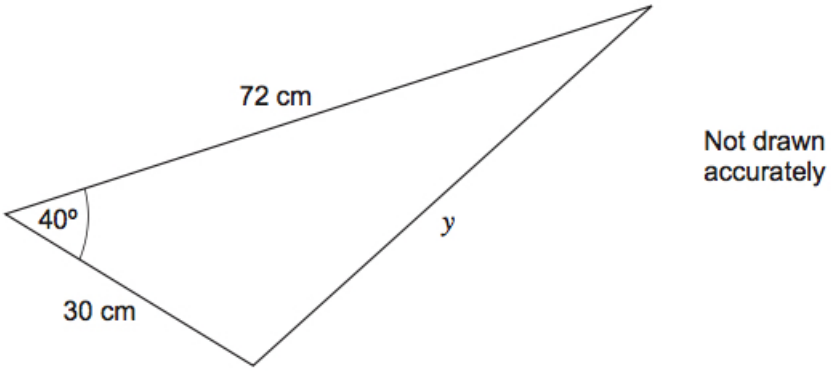


Work out the size of angle x.
You **must** show your working which may be on the diagram.

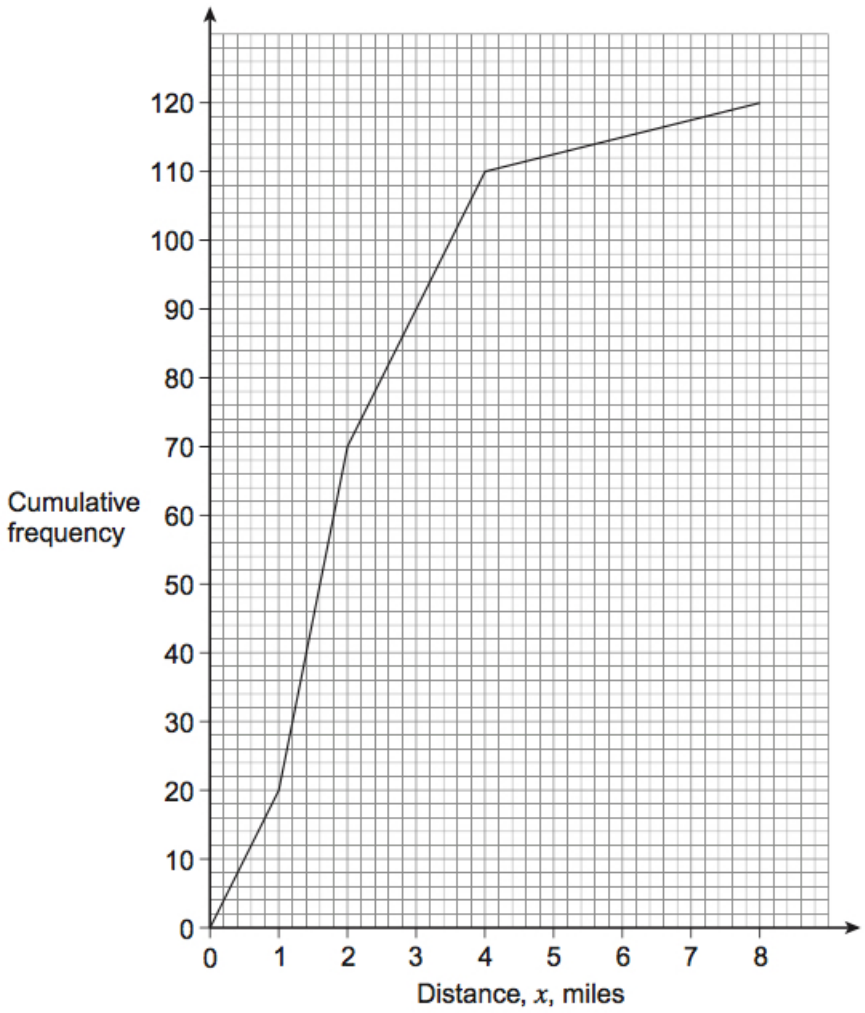
18. (a) Work out the size of angle x. (3)



(b) Work out the size of angle y. (3)



19. The cumulative frequency diagram shows information about the distances, in miles, that 120 students travel to school.



(a) Work out the interquartile range. (2)

A sample of 25 students is taken from the 120 students.
The sample is stratified by distance travelled using the intervals below.

Distance, x miles	$0 \leqslant x < 1$	$1 \leqslant x < 2$	$2 \leqslant x < 4$	$4 \leqslant x < 8$

(b) Work out the number of students in the sample who are in the $2 \leqslant x < 4$ interval. (4)

20. (a) Expand and simplify (3)

$$(5x - 2y)(x + 2y).$$

(b) Solve (3)

$$x^2 - 2x - 2 = 0.$$

Give your answers to 1 decimal place.

(c) Simplify (3)

$$\frac{3x^2 - x - 10}{x^2 - 4}.$$

21. You are given that (3)

$$x^2 + ax + b \equiv (x - 5)^2 + 7.$$

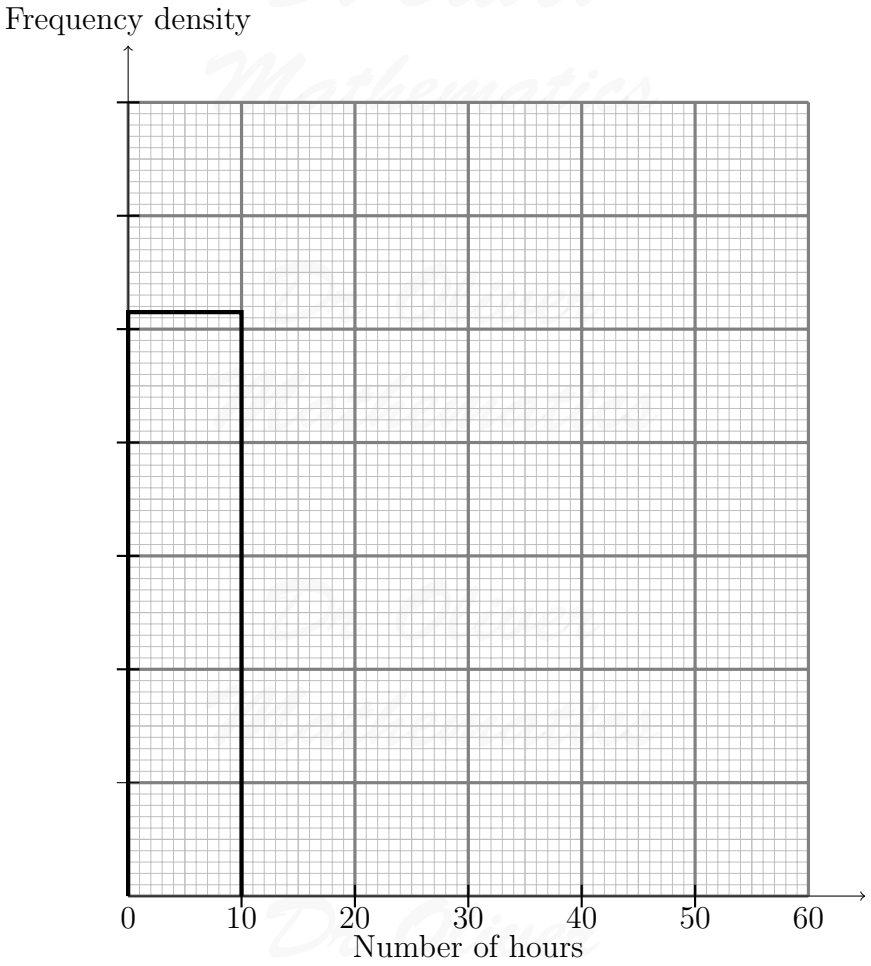
Work out the values of a and b.

22. 70 people gave information about the number of hours they worked in one week. (6)
The table and histogram show some of that information.

Number of hours, n	Frequency
$0 < n \leqslant 10$	21
$10 < n \leqslant 20$	x
$20 < n \leqslant 40$	y
$40 < n \leqslant 50$	17

$x : y = 3 : 5$.

Complete the histogram.
Remember to label the **scale** on the frequency density axis.



23. Solve the simultaneous equations (5)

$$y = 4x + 1$$
$$y = 2x^2 + 7x - 1.$$

24. $x = 400$ to 1 significant figure. (3)
$y = 25$ to 2 significant figures.

Work out the maximum integer value of

$$\frac{x}{y}.$$