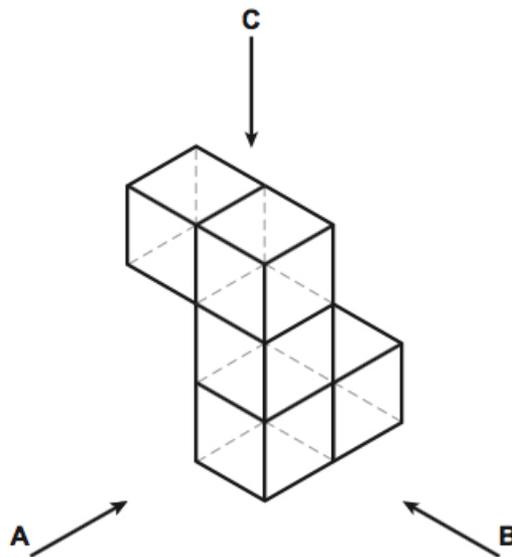


Dr Oliver Mathematics
AQA GCSE Mathematics
2013 June Paper 1: Non-Calculator
1 hour 30 minutes

The total number of marks available is 70.
You must write down all the stages in your working.

1. This shape is made from **five** cubes.

(3)



Draw what the shape looks like when seen from A, B, and C.

From A

From B

From C

2. Work out an approximate value of (2)

$$\frac{41 \times 198}{77}.$$

3. Which of the following expressions will give the median value when $n = 10$? (3)

$$\frac{1}{n} \quad n - 1 \quad n + 1 \quad n^2 \quad \sqrt{n}$$

You **must** show your working.

4. p is an even number.
 q is an odd number.

Tick the correct box for each part.

(a) Is pq an odd number, an even number, or could it be either? (1)

odd

even

could be either

(b) Is $3(p + q)$ an odd number, an even number, or could it be either? (1)

odd

even

could be either

(c) Is $p \div q$ an odd number, an even number, or could it be either? (1)

integer

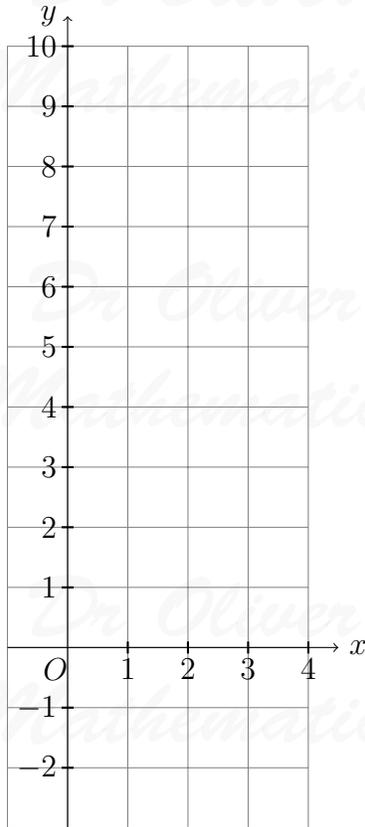
not an integer

could be either

5. (a) Draw the graph of (3)

$$y = 2x - 1$$

for values of x from 0 to 4.



(b) Solve

$$2x - 1 = 2.$$

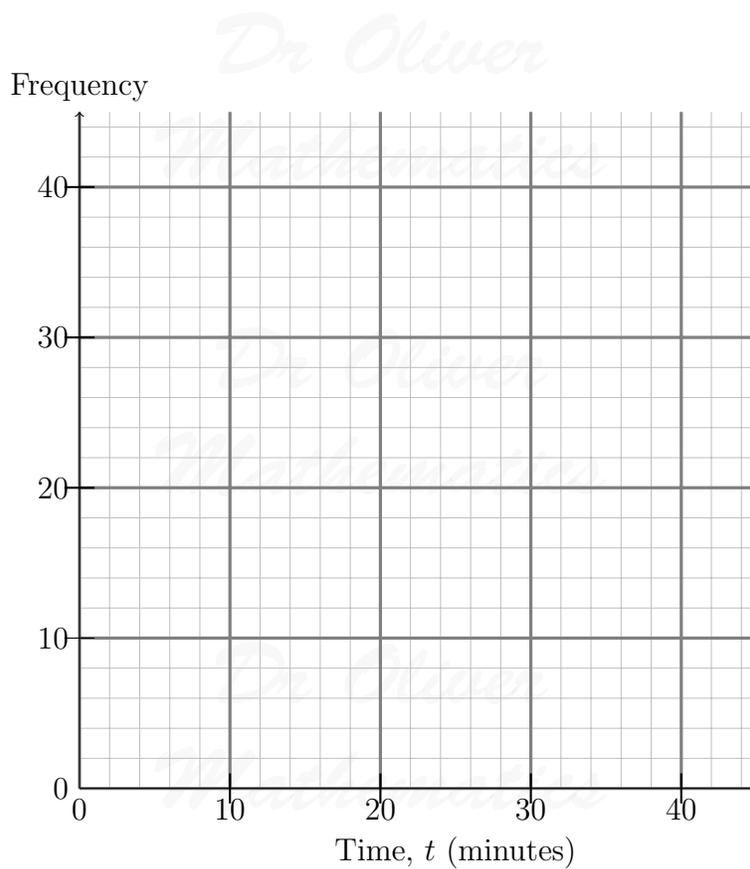
(1)

6. The times taken by 100 students to travel to school are shown.

Time, t (minutes)	Frequency
$0 < t \leq 10$	36
$10 < t \leq 20$	34
$20 < t \leq 30$	18
$30 < t \leq 40$	12

(a) Draw a frequency diagram for the data.

(2)



The school has 600 students.

(b) Estimate how many students take more than 20 minutes to travel to school. (2)

7. The total number of people living in a street is 30. (3)

The table shows the number of people living in each house.

Number of people	Number of houses
2	4
3	3
4	a
5	1

Work out the value of a .

You **must** show your working.

8. (a) Factorise (3)

$$3x - 15.$$

(b) Multiply out

$$5(y + 4t - 2).$$

(2)

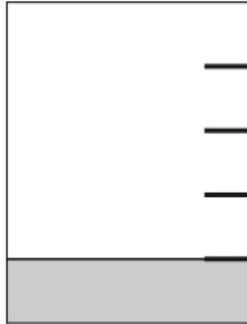
(c) Solve

$$3(w + 2) = 2w - 1.$$

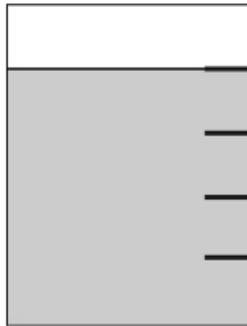
(1)

9. When a jug is $\frac{1}{5}$ full of water it weighs 250 grams.

(4)



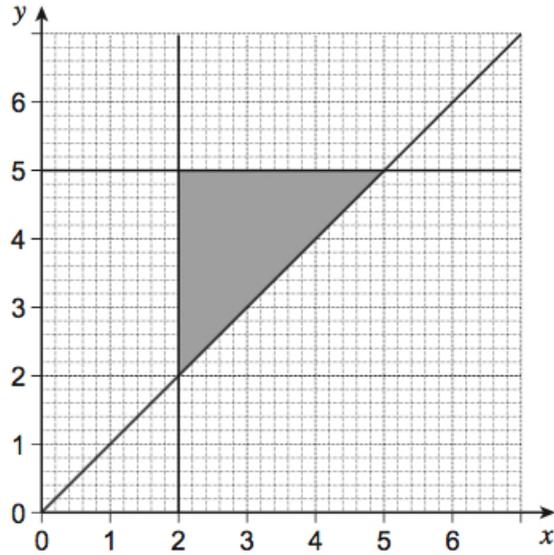
When the same jug is $\frac{4}{5}$ full of water it weighs 550 grams.



How much does the jug weigh when it is empty?

10. Work out the three inequalities that describe the shaded region.

(3)



11. A triangle, square, and pentagon have a total area of 48 cm^2 . (3)
 The areas of the shapes are in the ratio of their number of sides.

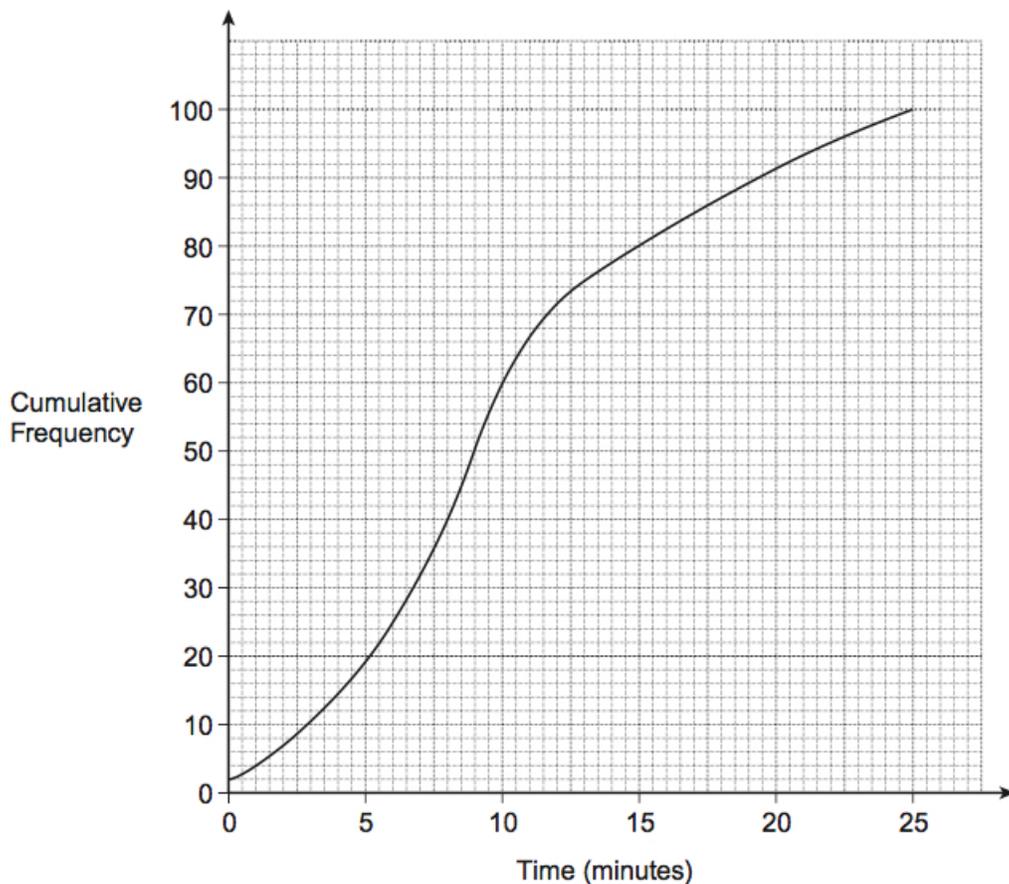
Work out the area of the pentagon.

12. Rearrange (3)

$$2(a + c) = 5(a - b)$$

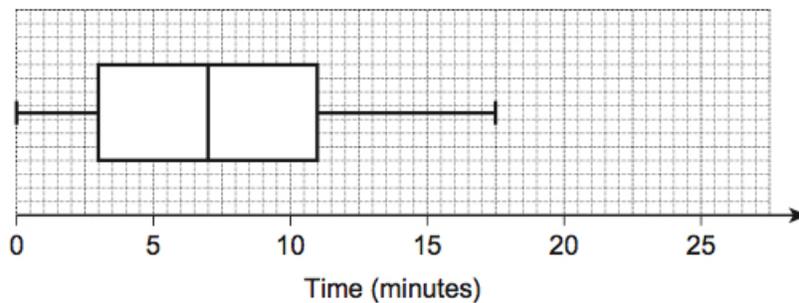
to make c the subject.

13. The times that 100 customers spent queuing in a post office were recorded.
 The cumulative frequency diagram shows the results.



- (a) How many customers queued for more than 15 minutes? (1)
- (b) Work out the median queuing time. (1)

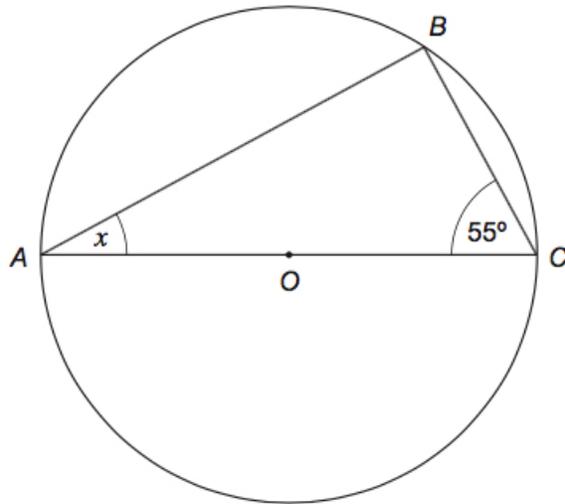
A new serving window was opened in the post office. The times that 100 customers spent queuing were then recorded. The box plot shows the results.



- (c) Work out the inter-quartile range of these times. (2)

- (d) Compare the queuing times before and after the new serving window was opened. (2)
Give **two** comparisons.

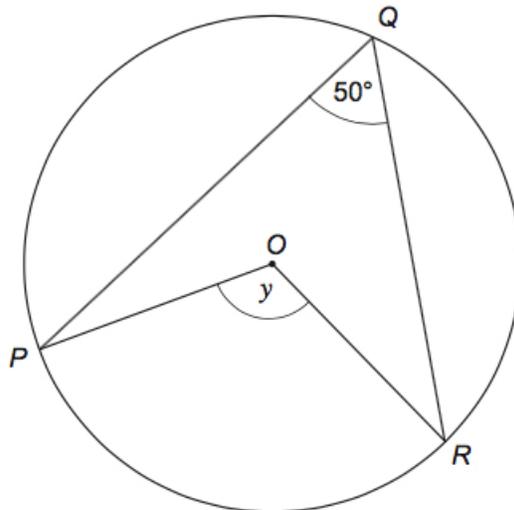
14. (a) A , B , and C are points on the circumference of a circle with centre O . (1)



Not drawn accurately

Work out the size of angle x .

- (b) P , Q , and R are points on the circumference of a circle with centre O . (2)



Not drawn accurately

Work out the size of angle y .
Give a reason for your answer.

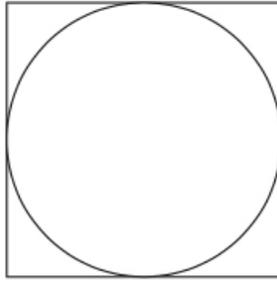
15. (a) Expand and simplify (2)

$$(3x + 2)(2x + 5).$$

(b) Simplify fully (2)

$$(3x^2y^4)^2.$$

16. A circle is drawn inside a square as shown. (4)



Show that the area of the circle is more than 75% of the area of the square.

17. n is an integer. (3)

Show that

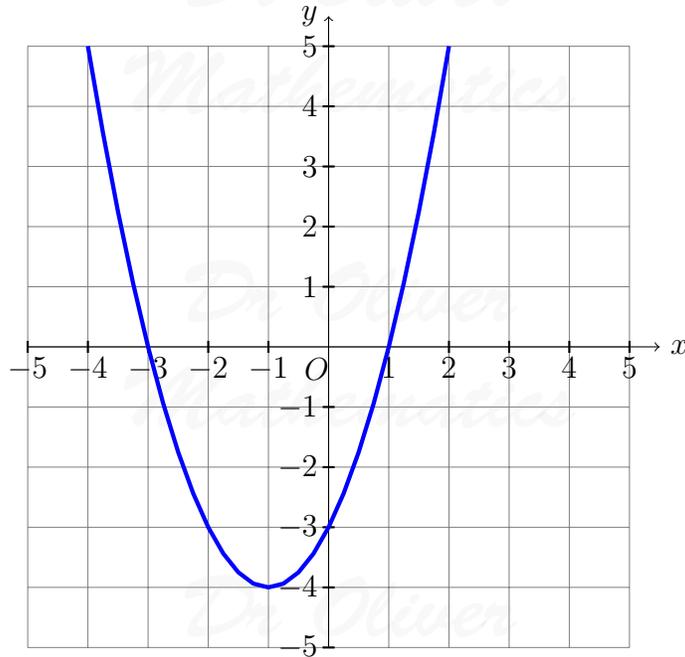
$$\frac{n(n-1)}{2} + \frac{n(n+1)}{2}$$

is a square number.

18. The graph of (3)

$$y = x^2 + 2x - 3$$

is drawn.



Draw an appropriate straight line on the graph to work out the approximate solutions of

$$x^2 + x - 3 = 0.$$

19. (a) Show clearly that

$$(3\sqrt{3})^2 = 27.$$

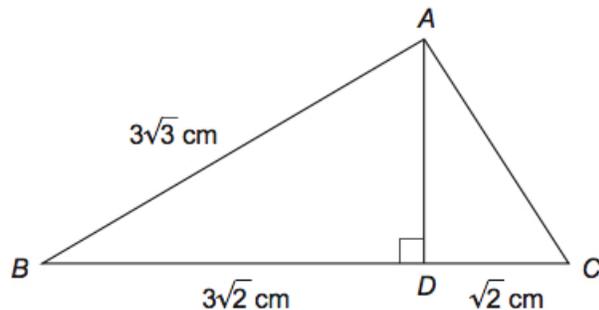
(1)

- (b) ABC is a triangle.

AD is perpendicular to BC .

$AB = 3\sqrt{3}$ cm, $BD = 3\sqrt{2}$ cm, and $DC = \sqrt{2}$ cm.

(5)



Not drawn accurately

Work out the area of triangle ABC .

Give your answer in the form $a\sqrt{2}$, where a is an integer.