Dr Oliver Mathematics
AQA GCSE Mathematics
2015 November 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.

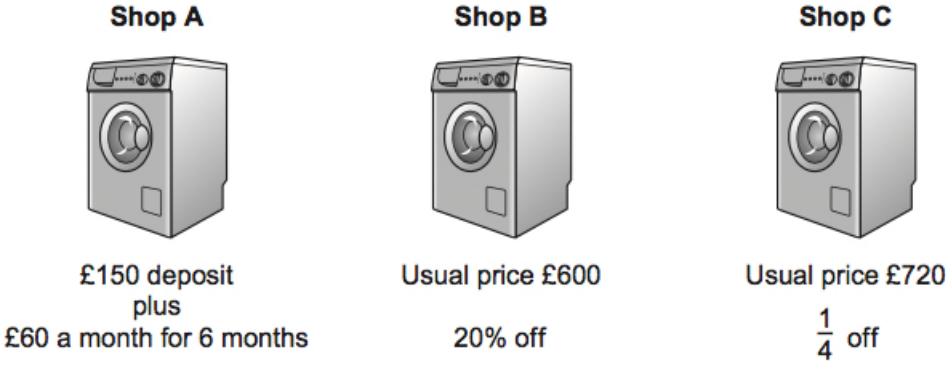
1. Divide 270 in the ratio (3)

$$3 : 2 : 1.$$

2. Solve (3)

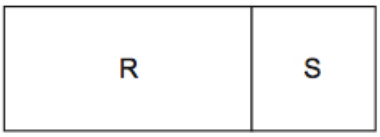
$$\frac{4x - 1}{7} = 2x.$$

3. Three shops sell the same washing machine. (5)



In which shop is the washing machine cheapest?
You **must** show your working.

4. A shape is made from a rectangle R and a square S. (4)

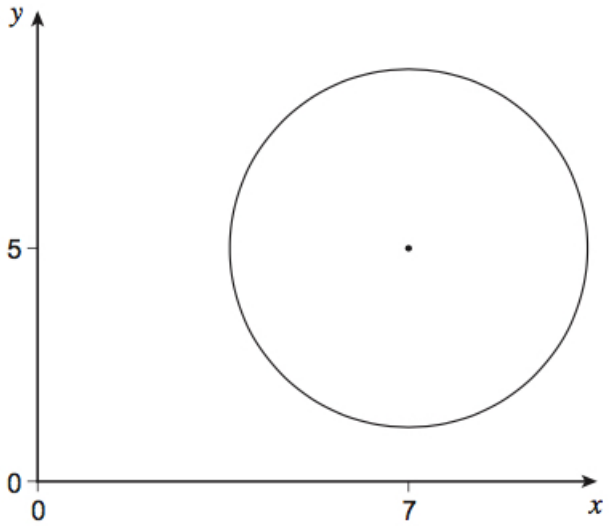


Not drawn accurately

The shape has a perimeter of 44 cm.
The area of the square is 36 cm^2.

Work out the area of the shape.

5. A circle radius 3 units, centre $(7, 5)$ is shown. (2)



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Work out the coordinates of **any** point that lies on the circumference of the circle.
You **must** show your working, which may be on the diagram.

6. Fay is testing an ordinary six-sided dice to see if it is biased.

She throws the dice 120 times.

(a) Work out the number of times the dice is expected to land on 1. (1)

Here are the actual results.

Number on dice	1	2	3	4	5	6	Total
Frequency	5	19	17	20	21	38	120

(b) Is the dice biased? (2)
Tick a box.

Yes ☐ No ☐ Cannot tell ☐

Give a reason for your answer.

7. These expressions represent four numbers. (5)

$2x + 2$	$3x - 1$	$4x - 6$	$5x + 2$

The sum of the first two expressions is 36.

Work out the value of the median of the four numbers.

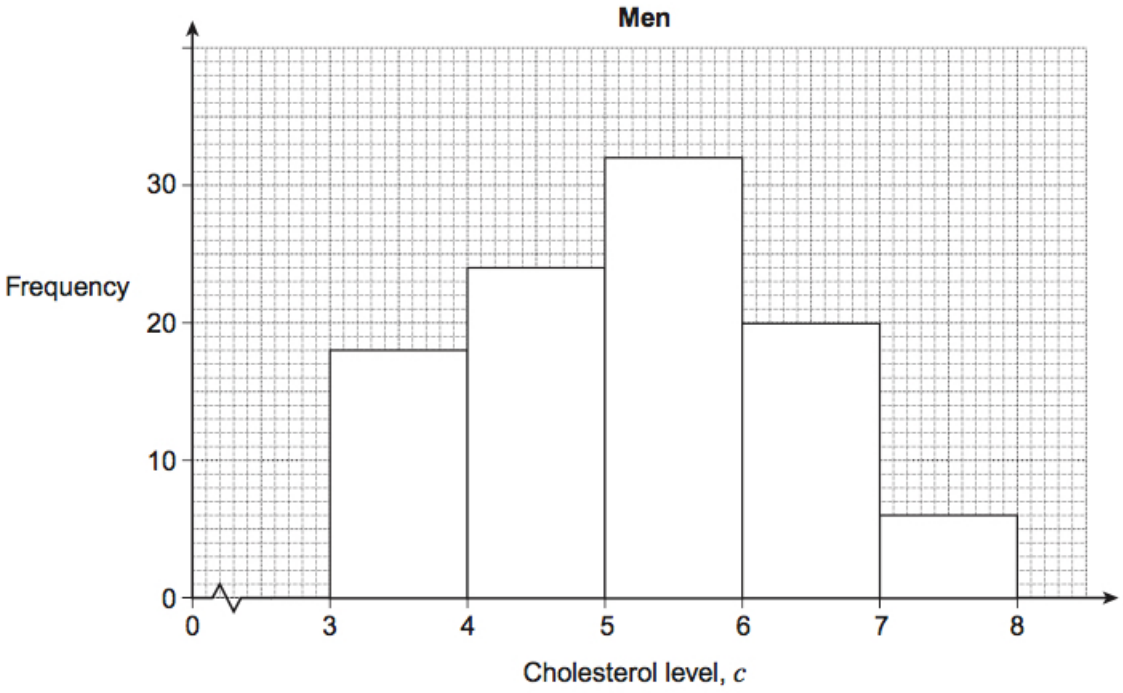
8. (a) Expand and simplify fully (3)

$$4(x - 2) - 2(3 - 5x).$$

(b) Simplify fully (3)

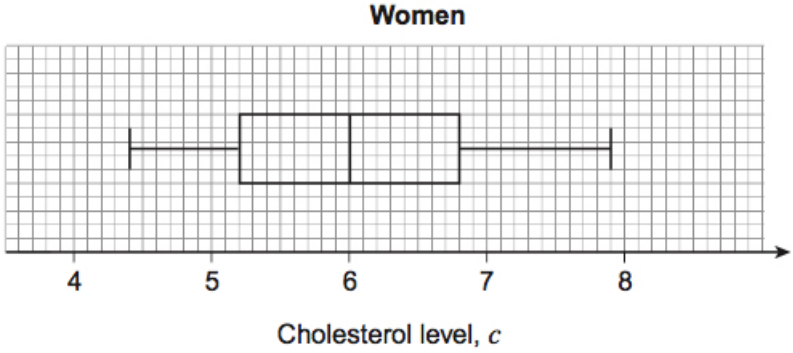
$$\frac{8a^2 + 10ab}{12a + 15b}.$$

9. The frequency diagram shows information about the cholesterol level of 100 men.



(a) Work out an estimate of the median cholesterol level of the men. (3)

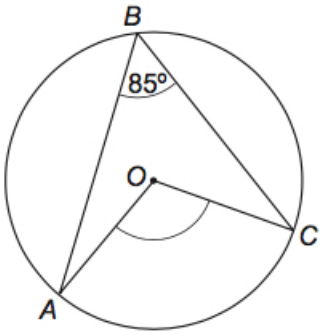
The box plot shows information about the cholesterol level of 100 women.



None of these 100 women have a cholesterol level of 6.8.

(b) Estimate how many of the **200 people** have a cholesterol level above 6.8. (3)
You **must** show your working.

10. The diagram shows a circle, centre O.



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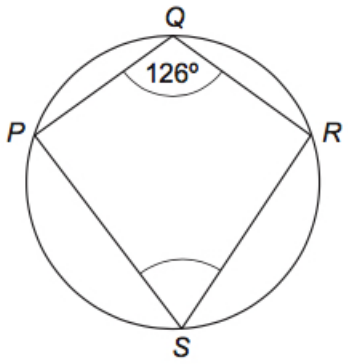
(a) Work out the size of angle AOC. (2)
Give a reason for your answer.

P, Q, R, and S are points on the circumference of a circle.



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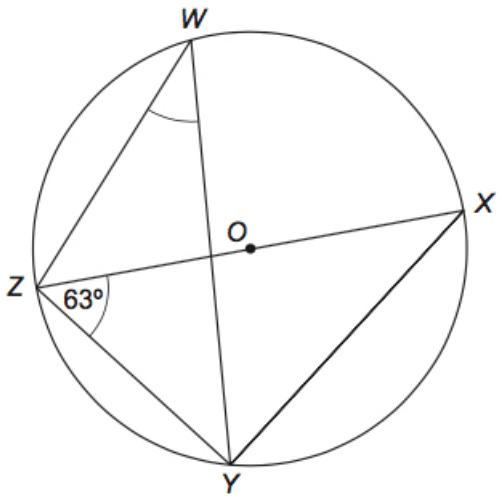
(b) Work out the size of angle PSR. (2)
Give a reason for your answer.

(c) W, X, Y, and Z are points on the circumference of a circle centre O. (2)
ZX is a diameter.
Angle $YZX = 63°$.



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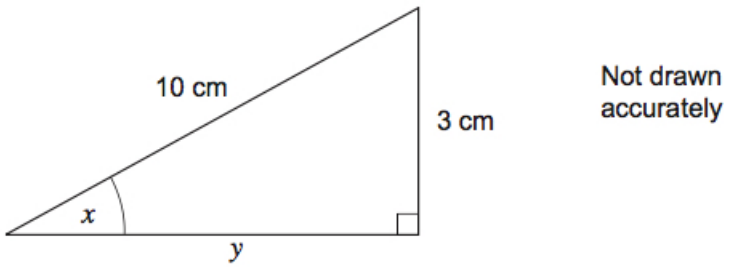
Work out the size of angle ZWY.
You **must** show your working, which may be on the diagram.

11. Solve (3)

$$2(7x + 3) < 4x - 1.$$

12. Here is a triangle.



(a) Work out the length y in the form $\sqrt{a}$ where a is an integer. (2)

(b) Write down the value of $\tan x$. (1)

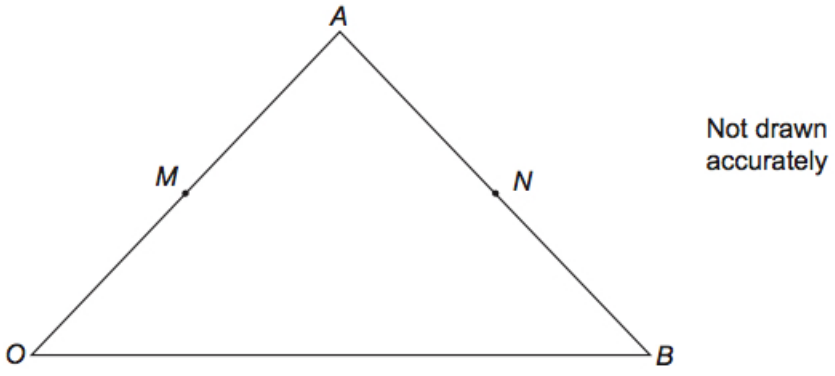
13. The square number sequence is (4)

$$1 \quad 4 \quad 9 \quad 16 \quad 25 \quad \ldots$$

Prove algebraically that the difference of two consecutive square numbers is an odd number.

14. In triangle OAB,

- M is the midpoint of OA,
- N is the midpoint of AB,
- $\overrightarrow{OA} = 2\mathbf{a}$, and
- $\overrightarrow{OB} = 2\mathbf{b}$.



(a) Write down $\overrightarrow{AB}$ in terms of $\mathbf{a}$ and $\mathbf{b}$. (1)

(b) Show that $\overrightarrow{MN} = \mathbf{b}$. (2)

(c) Explain why triangles AMN and AOB are similar. (2)

15. (a) Circle the value of (1)

$$(5\sqrt{3})^2$$

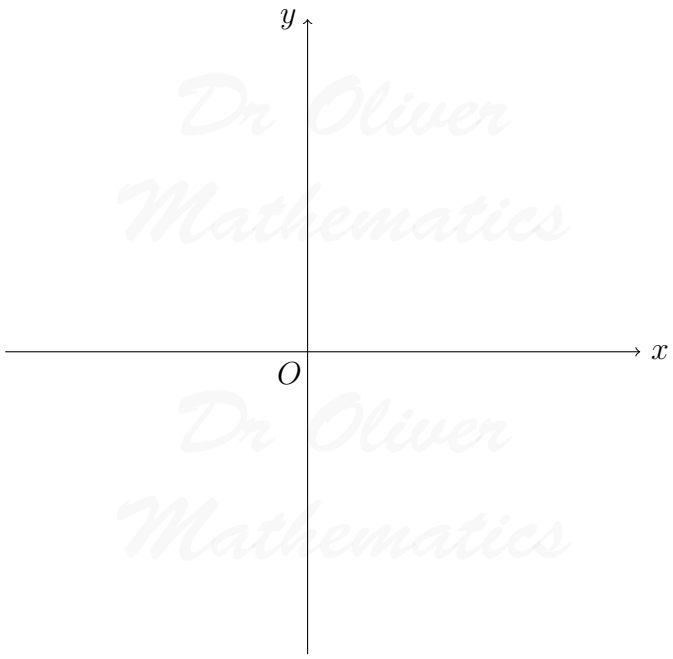
$15 \qquad 25\sqrt{3} \qquad 75 \qquad 225$

(b) Simplify fully (3)

$$(16x^4y^{12})^{\frac{3}{4}}.$$

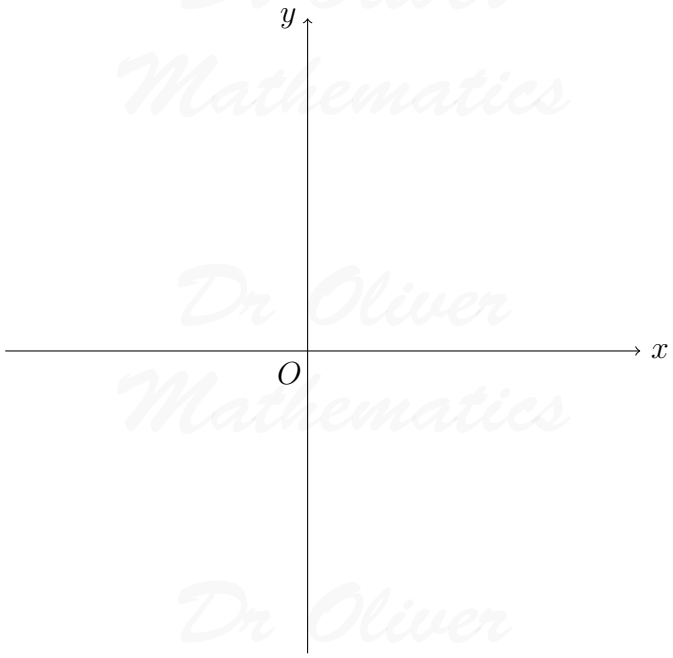
16. (a) Sketch the graph of (1)

$$y = x^3.$$



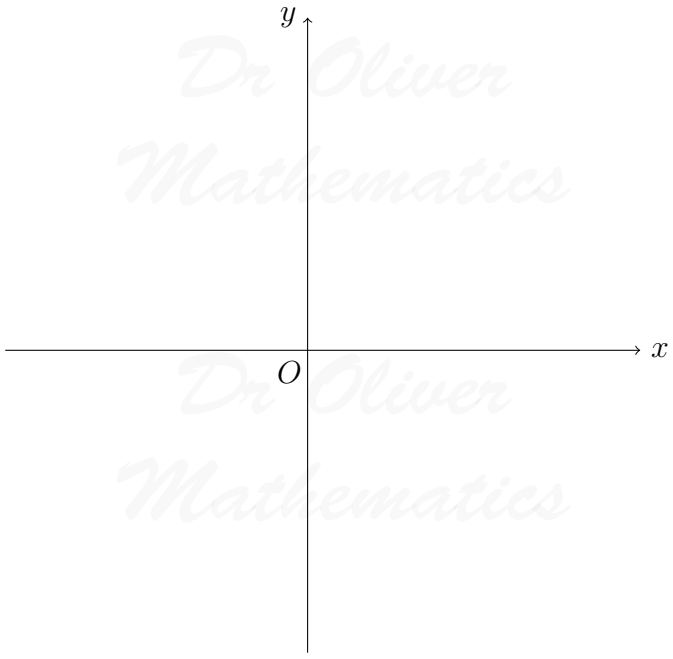
(b) Sketch the graph of (1)

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



(c) Sketch the graph of (1)

$$y = \frac{1}{x}.$$



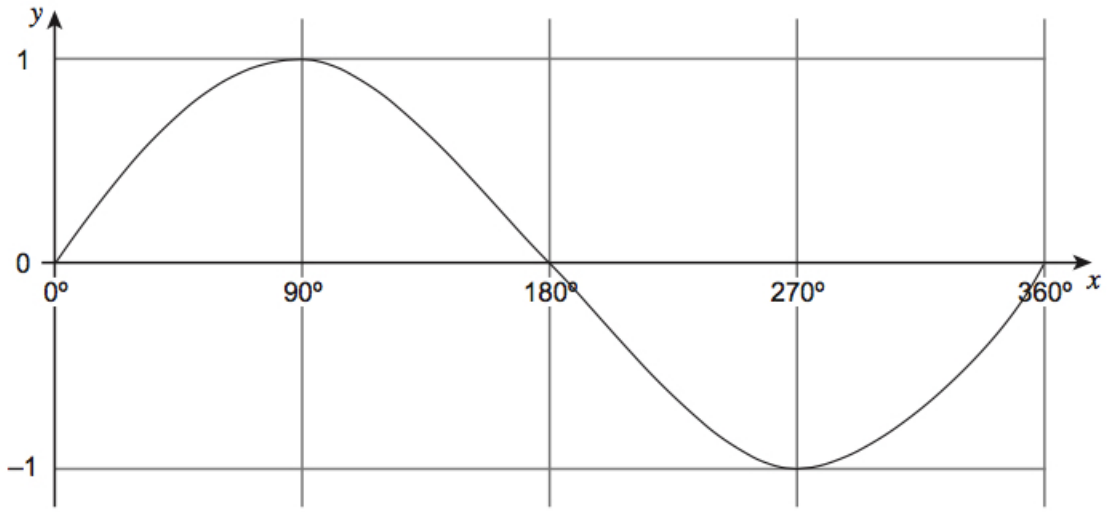
17. y is inversely proportional to x. (3)
When $y = 2$, $x = 5$.

Work out an equation connecting y and x.

18. This is a sketch graph of

$$y = \sin x,$$

for $0^\circ \leqslant x \leqslant 360^\circ$.



(a) Write down the number of solutions for (1)

$$\sin x = 0.5,$$

for $0^\circ \leqslant x \leqslant 360^\circ$.

$$\sin x = \sin 10.$$

(b) Write down the value of x for $90^\circ \leqslant x \leqslant 180^\circ$. (1)