Dr Oliver Mathematics
GCSE Mathematics
2012 June Paper 1H: Non-Calculator
1 hour 45 minutes

The total number of marks available is 100.
You must write down all the stages in your working.

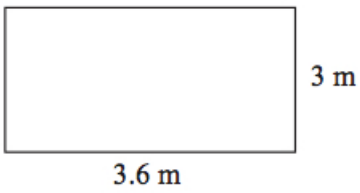
1. Sam wants to find out the types of film people like best.
   He is going to ask whether they like comedy films or action films or science fiction films or musicals best.

   (a) Design a suitable table for a data collection sheet he could use to collect this information. (2)

   Sam collects his data by asking 10 students in his class at school.
   This might **not** be a good way to find out the types of film people like best.

   (b) Give **one** reason why. (1)

2. The diagram shows a patio in the shape of a rectangle.



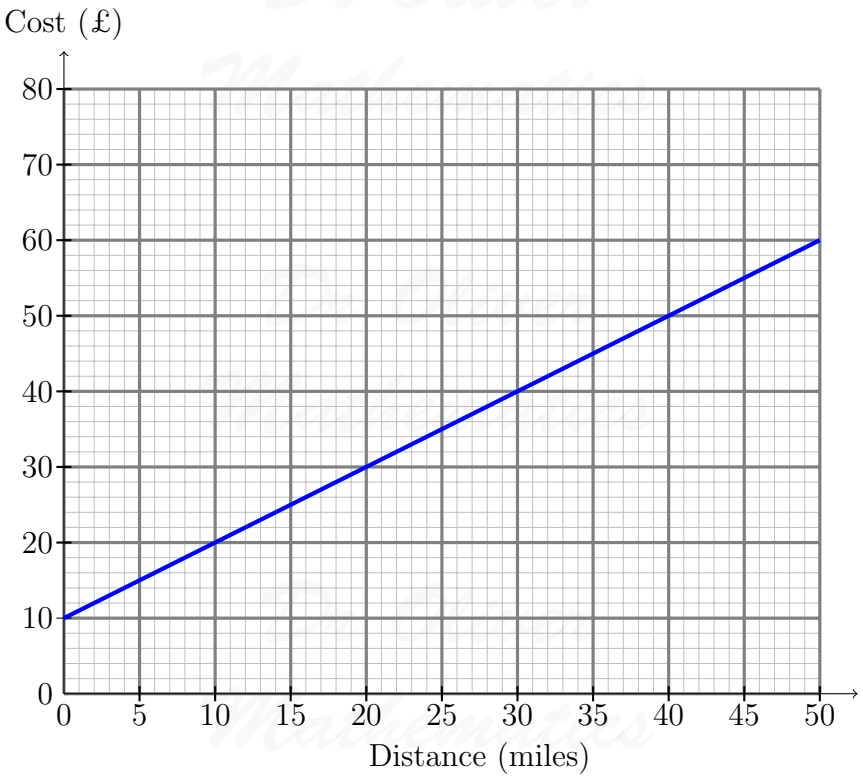
   The patio is 3.6 m long and 3 m wide.
   Matthew is going to cover the patio with paving slabs.
   Each paving slab is a square of side 60 cm.
   Matthew buys 32 of the paving slabs.

   (a) Does Matthew buy enough paving slabs to cover the patio? (3)
   You must show all your working.

   The paving slabs cost £8.63 each.

   (b) Work out the total cost of the 32 paving slabs. (3)

3. Bill uses his van to deliver parcels.
   For each parcel Bill delivers there is a fixed charge plus £1.00 for each mile.
   You can use the graph to find the total cost of having a parcel delivered by Bill.



(a) How much is the fixed charge? (1)

Ed uses a van to deliver parcels.
For each parcel Ed delivers it costs £1.50 for each mile.
There is **no** fixed charge.

(b) Compare the cost of having a parcel delivered by Bill with the cost of having a parcel delivered by Ed. (3)

4. Here are the speeds, in miles per hour, of 16 cars. (3)

31	52	43	49	36	35	33	29
54	43	44	46	42	39	55	48

Draw an ordered stem and leaf diagram for these speeds.

5. You can work out the amount of medicine, c ml, to give to a child by using the formula (2)

$$c = \frac{ma}{150}.$$

m is the age of the child, in months.
a is an adult dose, in ml.
A child is 30 months old.

An adult's dose is 40 ml.
Work out the amount of medicine you can give to the child.

6. Here are the ingredients needed to make 12 shortcakes.

Shortcakes

Makes 12 shortcakes

50 g	of sugar
200 g	of butter
200 g	of flour
10 ml	of milk

Liz makes some shortcakes.
She uses 25 ml of milk.

(a) How many shortcakes does Liz make? (2)

Robert has 500 g of sugar, 1 000 g of butter, 1 000 g of flour, and 500 ml of milk.

(b) Work out the greatest number of shortcakes Robert can make. (2)

7. Buses to Acton leave a bus station every 24 minutes. (3)
Buses to Barton leave the same bus station every 20 minutes.
A bus to Acton and a bus to Barton both leave the bus station at 9:00 am.
When will a bus to Acton and a bus to Barton next leave the bus station at the same time?

8. (a) Expand $3(2y - 5)$. (1)

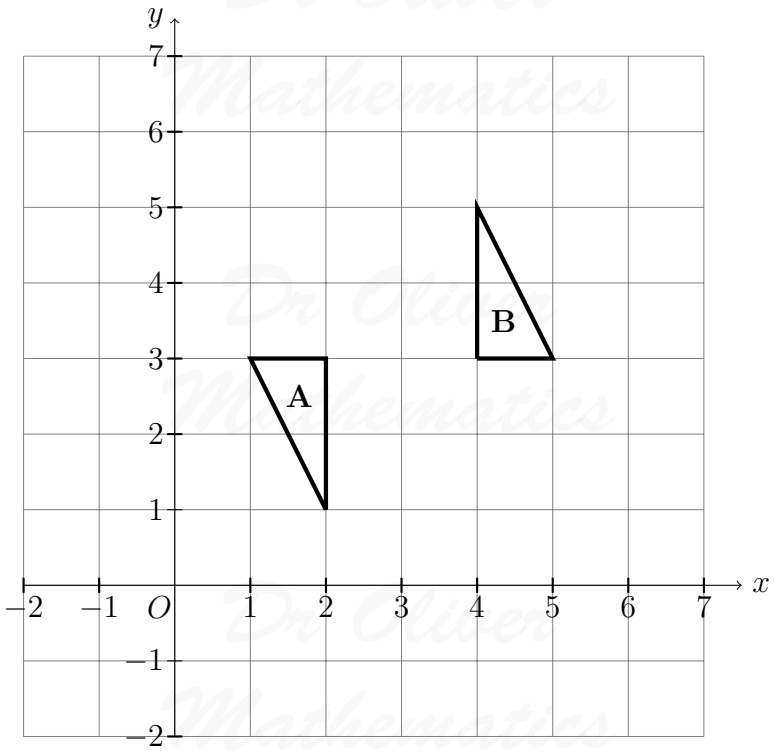
(b) Factorise completely (2)

$$8x^2 + 4xy.$$

(c) Make h the subject of the formula (2)

$$t = \frac{gh}{10}.$$

9. Describe fully the single transformation that maps triangle **A** onto triangle **B**. (3)

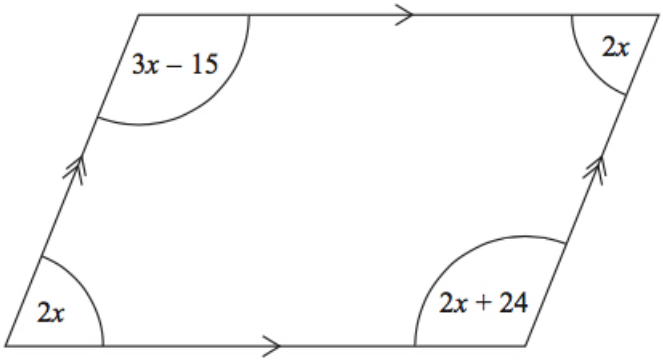


10. Railtickets and Cheaptrains are two websites selling train tickets. (4)
Each of the websites adds a credit card charge and a booking fee to the ticket price.

Railtickets	**Cheaptrains**
Credit card charge: 2.25% of ticket price	Credit card charge: 1.5% of ticket price
Booking fee: 80 pence	Booking fee: £1.90

Nadia wants to buy a train ticket.
The ticket price is £60 on each website.
Nadia will pay by credit card.
Will it be cheaper for Nadia to buy the train ticket from Railtickets or from Cheaptrains?

11. The diagram shows a parallelogram. (3)



The sizes of the angles, in degrees, are $2x$, $(3x - 15)$, $2x$, and $(2x + 24)$.
Work out the value of x.

12. Jane has a carton of orange juice. (3)
The carton is in the shape of a cuboid.

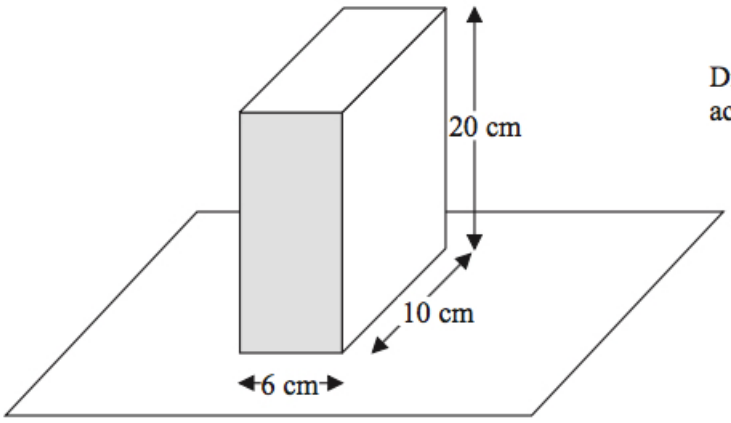
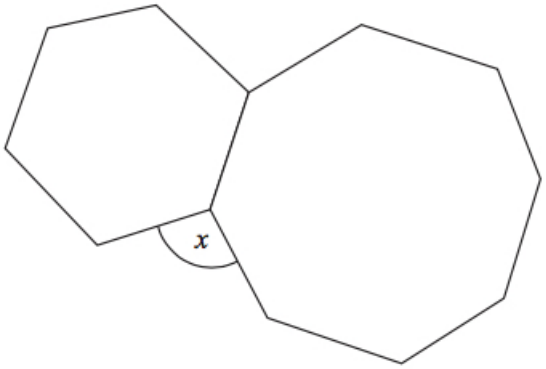


Diagram **NOT** accurately drawn

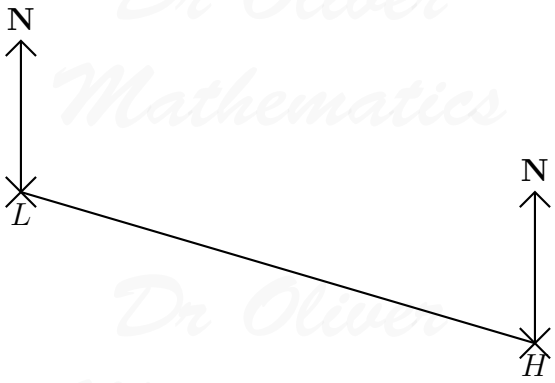
The depth of the orange juice in the carton is 8 cm.
Jane closes the carton.
Then she turns the carton over so that it stands on the shaded face.
Work out the depth, in cm, of the orange juice now.

13. The diagram shows a regular hexagon and a regular octagon. (4)



Calculate the size of the angle marked x.
You must show all your working.

14. The diagram shows the position of a lighthouse L and a harbour H.



The scale of the diagram is 1 cm represents 5 km.

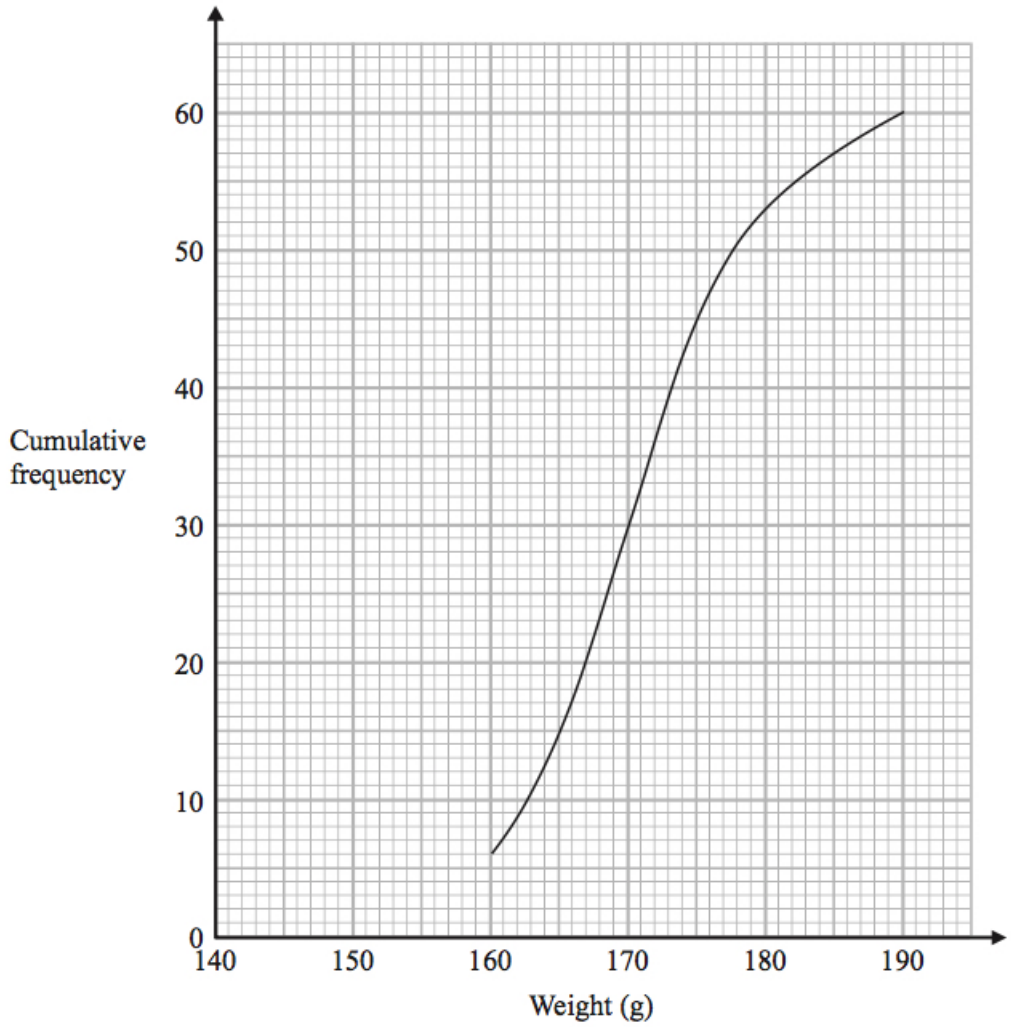
(a) Work out the real distance between L and H. (1)

(b) Measure the bearing of H from L. (1)

A boat B is 20 km from H on a bearing of 040°.

(c) On the diagram, mark the position of boat B with a cross (×). (2)
Label it B.

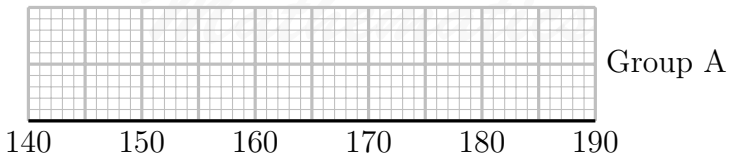
15. Harry grows tomatoes.
This year he put his tomato plants into two groups, group A and group B.
Harry gave fertiliser to the tomato plants in group A.
He did not give fertiliser to the tomato plants in group B.
Harry weighed 60 tomatoes from group A.
The cumulative frequency graph shows some information about these weights.



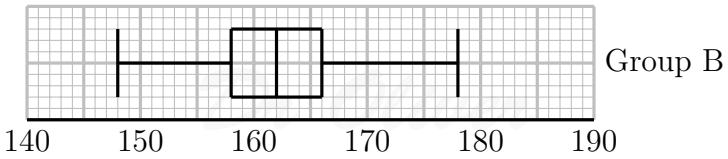
(a) Use the graph to find an estimate for the median weight. (1)

The 60 tomatoes from group A had a minimum weight of 153 grams and a maximum weight of 186 grams.

(b) Use this information and the cumulative frequency graph to draw a box plot for the 60 tomatoes from group A. (3)



Harry did not give fertiliser to the tomato plants in group B.
Harry weighed 60 tomatoes from group B.
He drew this box plot for his results.



(c) Compare the distribution of the weights of the tomatoes from group A with the distribution of the weights of the tomatoes from group B. (2)

16. (a) Simplify (1)

$$(m^{-2})^5.$$

(b) Factorise (2)

$$x^2 + 3x - 10.$$

17. (a) Write down the value of 10^0. (1)

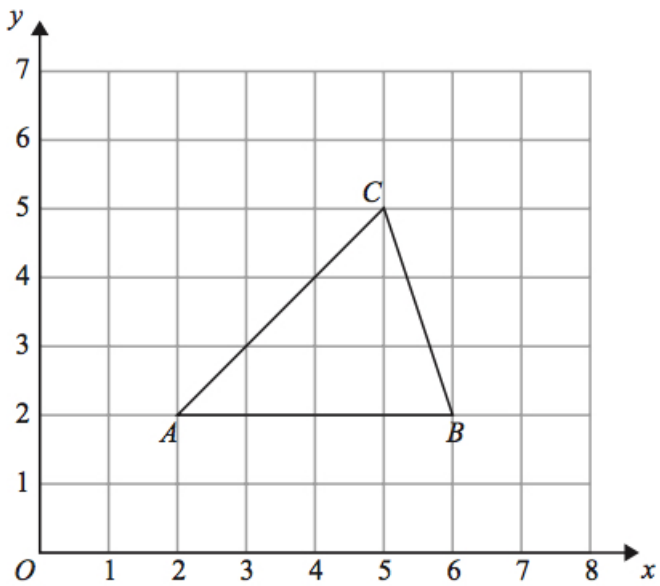
(b) Write 6.7×10^{-5} as an ordinary number. (1)

(c) Work out the value of (2)

$$(3 \times 10^7) \times (9 \times 10^6).$$

Give your answer in standard form.

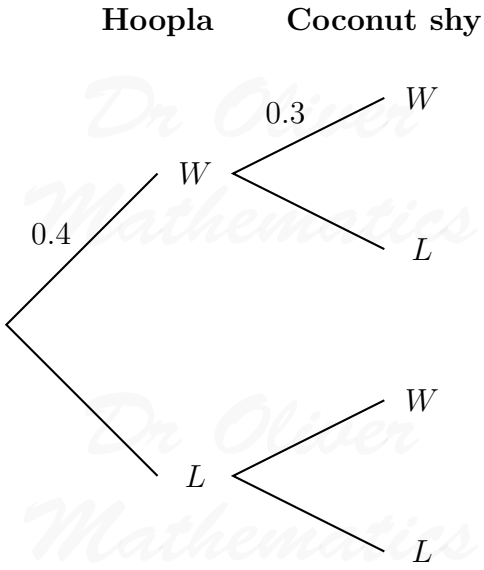
18. Triangle ABC is drawn on a centimetre grid. (3)



A is the point $(2, 2)$.
B is the point $(6, 2)$.
C is the point $(5, 5)$.
Triangle PQR is an enlargement of triangle ABC with scale factor $\frac{1}{2}$ and centre $(0, 0)$.
Work out the area of triangle PQR.

19. Wendy goes to a fun fair.
She has one go at Hoopla.
She has one go on the Coconut shy.
The probability that she wins at Hoopla is 0.4.
The probability that she wins on the Coconut shy is 0.3.

(a) Complete the probability tree diagram. (2)

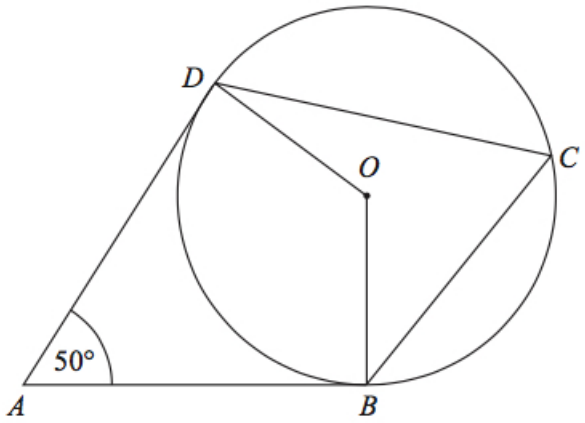


(b) Work out the probability that Wendy wins at Hoopla and also wins on the Coconut shy. (2)

20. Solve the simultaneous equations (4)

$$5x + 2y = 11$$
$$4x - 3y = 18.$$

21. B, C, and D are points on the circumference of a circle, centre O. (4)

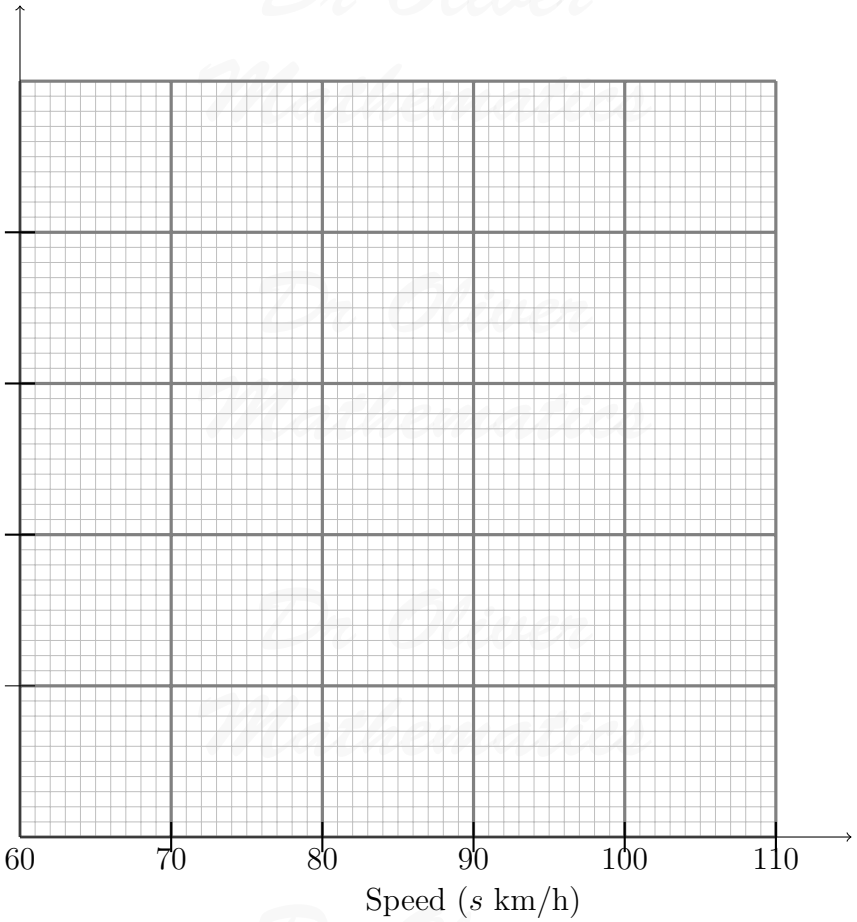


AB and AD are tangents to the circle.
Angle $DAB = 50°$.
Work out the size of angle BCD.
Give a reason for each stage in your working.

22. The table gives some information about the speeds, in km/h, of 100 cars.

Speed (s km/h)	Frequency
$60 < s \leqslant 65$	15
$65 < s \leqslant 70$	25
$70 < s \leqslant 80$	36
$80 < s \leqslant 100$	24

(a) On the grid, draw a histogram for the information in the table. (3)



(b) Work out an estimate for the number of cars with a speed of more than 85 km/h. (2)

23. (a) Simplify fully (3)

$$\frac{x^2 + 3x - 4}{2x^2 - 5x + 3}.$$

(b) Write (3)

$$\frac{4}{x+2} + \frac{3}{x-2}$$

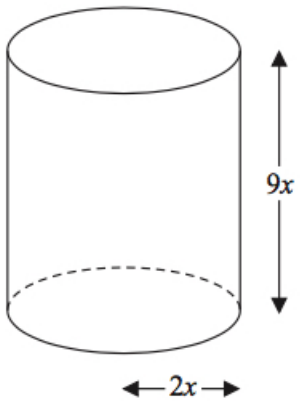
as a single fraction in its simplest form.

24. Express the recurring decimal (3)

$$0.2\dot{8}\dot{1}$$

as a fraction in its simplest form.

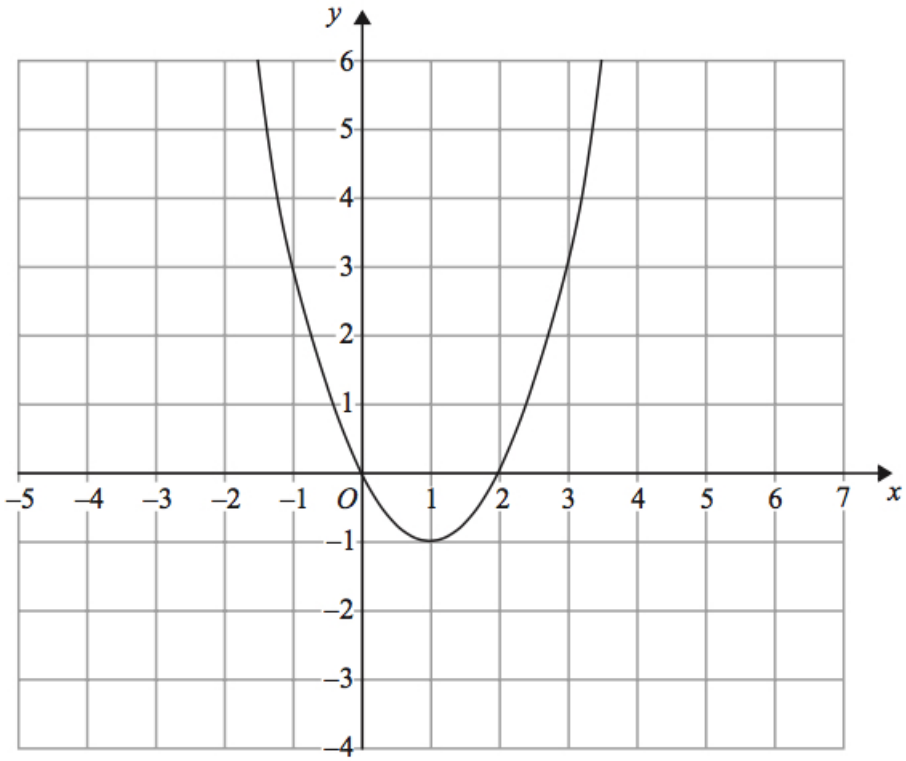
25. The diagram shows a solid metal cylinder. (3)



The cylinder has base radius $2x$ and height $9x$.
The cylinder is melted down and made into a sphere of radius r.
Find an expression for r in terms of x.

26. The graph of $y = \mathrm{f}(x)$ is shown on each of the grids.

(a) On this grid, sketch the graph of $y = \mathrm{f}(x - 3)$. (2)



(b) On this grid, sketch the graph of $y = 2\,\mathrm{f}(x)$. (2)