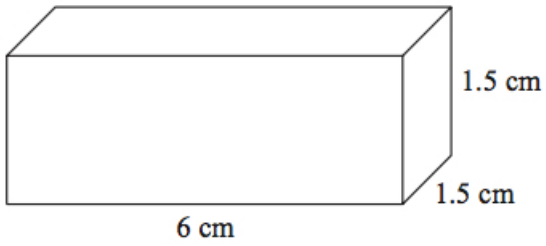
Dr Oliver Mathematics
GCSE Mathematics
2013 June Paper 2H: Calculator
1 hour 45 minutes

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

1. Here is a cuboid. (3)



The cuboid is 6 cm by 1.5 cm by 1.5 cm.
Work out the total surface area of the cuboid.

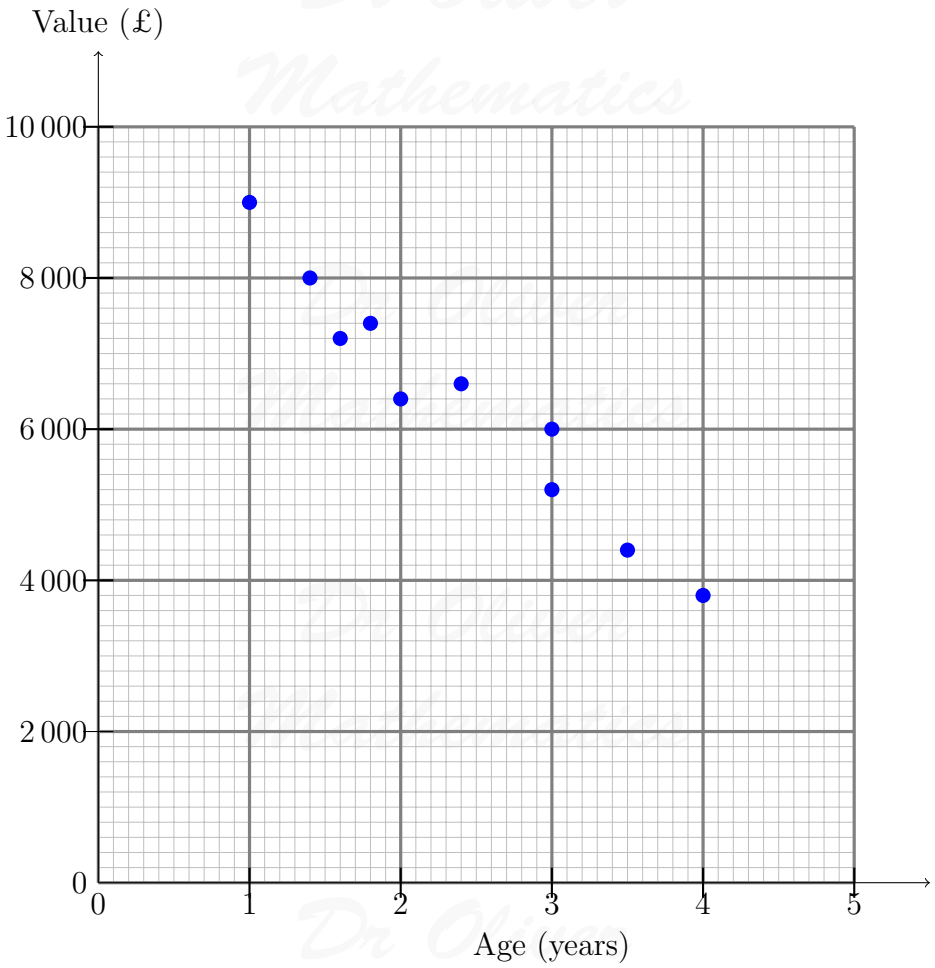
2. Here is a list of ingredients for making 18 mince pies. (4)

Ingredients for 18 mince pies

225 g of butter
350 g of flour
100 g of sugar
280 g of mincemeat
1 egg

Elaine wants to make 45 mince pies.
Elaine has 1 kg of butter, 1 kg of flour, 500 g of sugar, 600 g of mincemeat, and 6 eggs.
Does Elaine have enough of each ingredient to make 45 mince pies?
You must show clearly how you got your answer.

3. The scatter graph shows some information about 10 cars, of the same type and make.
The graph shows the age (years) and the value (£) of each car.



The table shows the age and the value of two other cars of the same type and make.

Age (years)	1	3.5
Value (£)	8 200	5 000

(a) On the scatter graph, plot the information from the table. (1)

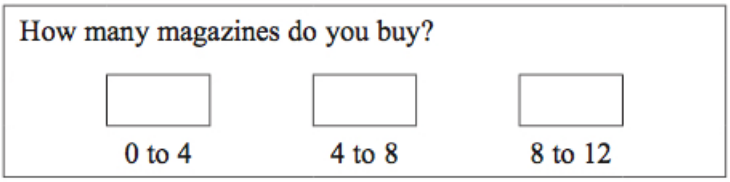
(b) Describe the relationship between the age and the value of the cars. (1)

A car of the same type and make is $2\frac{1}{2}$ years old.

(c) Estimate the value of the car. (2)

4. Rhiana plays a game. (3)
The probability that she will lose the game is 0.32.
The probability that she will draw the game is 0.05.
Rhiana is going to play the game 200 times.
Work out an estimate for the number of times Rhiana will win the game.

5. Mason is doing a survey to find out how many magazines people buy.
He uses this question on his questionnaire.



(a) Write down **two** things wrong with this question. (2)

(b) Write a better question for Mason to use on his questionnaire to find out how many magazines people buy. (2)

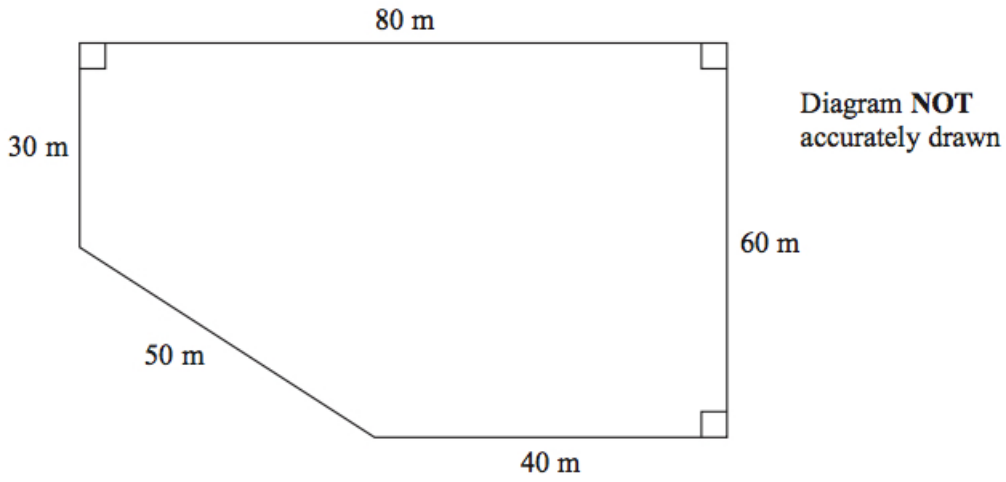
Mason asks his friends at school to do his questionnaire.
This may **not** be a good sample to use.

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

6. Tame Valley is a company that makes yoghurt. (4)
A machine fills trays of 20 pots with yoghurt.
In one hour, the machine fills a total of 15 000 pots.
Work out how many seconds the machine takes to fill each tray of 20 pots.

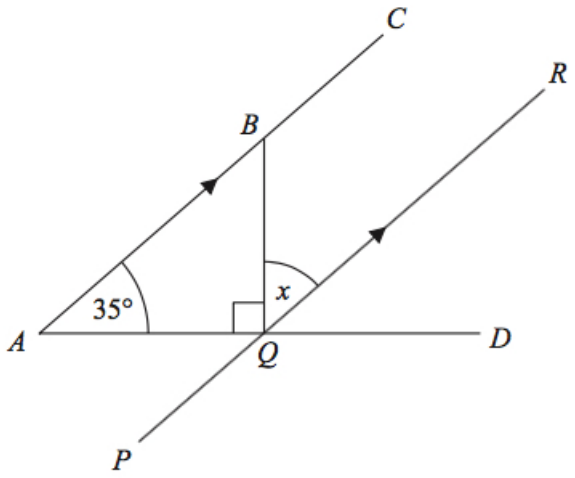
7. Colin, Dave, and Emma share some money. (4)
Colin gets $\frac{3}{10}$ of the money.
Emma and Dave share the rest of the money in the ratio 3 : 2.
What is Dave's share of the money?

8. The diagram shows the plan of a playground. (4)



Bill is going to cover the playground with tarmac.
It costs £2.56 to cover each square metre with tarmac.
Work out the total cost of the tarmac Bill needs.

9. ABC, PQR, and AQD are straight lines. (4)



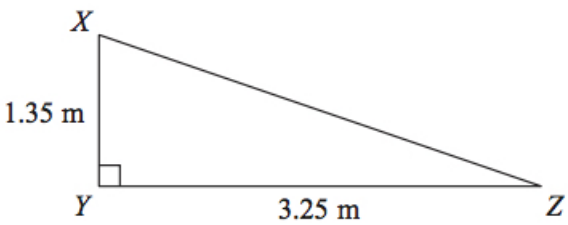
ABC is parallel to PQR.
Angle $BAQ = 35°$.
Angle $BQA = 90°$.
Work out the size of the angle marked x.
Give reasons for each stage of your working.

10. The equation (4)

$$x^3 + 2x = 110$$

has a solution between 4 and 5.
Use a trial and improvement method to find this solution.
Give your answer correct to one decimal place.
You must show **ALL** your working.

11. XYZ is a right-angled triangle. (3)



Calculate the length of XZ.
Give your answer correct to 3 significant figures.

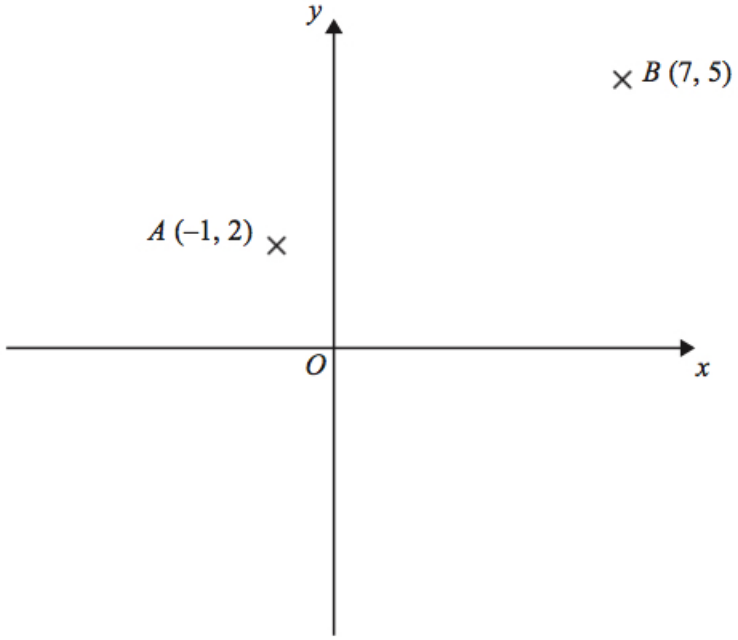
12. (a) Solve (3)

$$3(x - 2) = x + 7.$$

(b) Solve (2)

$$\frac{2 - y}{5} = 1.$$

13. Here is a diagram.



A is the point $(-1, 2)$.
B is the point $(7, 5)$.

(a) Find the coordinates of the midpoint of AB. (2)

P is the point $(-4, 4)$.
Q is the point $(1, -5)$.

(b) Find the gradient of PQ. (2)

14. Viv wants to invest £2 000 for 2 years in the same bank. (4)

The International Bank

Compound Interest

4% for the first year
1% for each extra year

The Friendly Bank

Compound Interest

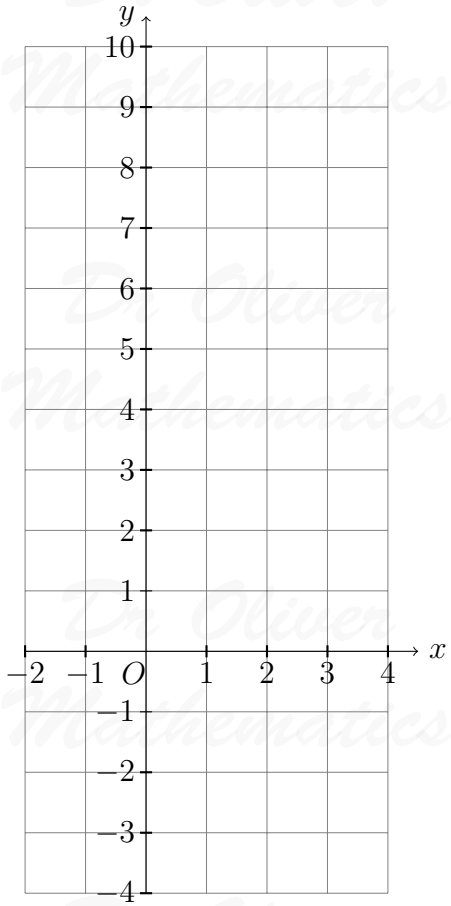
5% for the first year
0.5% for each extra year

At the end of 2 years, Viv wants to have as much money as possible.
Which bank should she invest her £2 000 in?

15. (a) Complete the table of values for $y = x^2 - 2x$. (2)

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

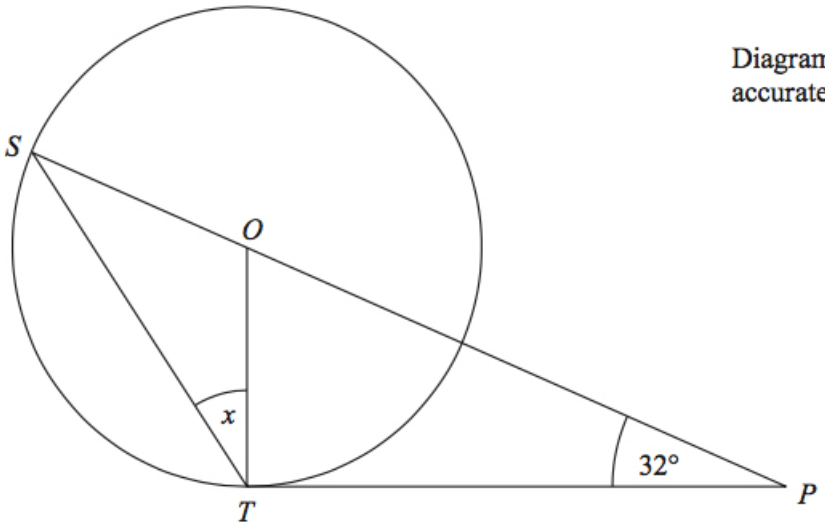
(b) On the grid, draw the graph of $y = x^2 - 2x$ for values of x from -2 to 4. (2)



(c) Solve (2)

$$x^2 - 2x - 2 = 1.$$

16. S and T are points on the circumference of a circle, centre O. (5)

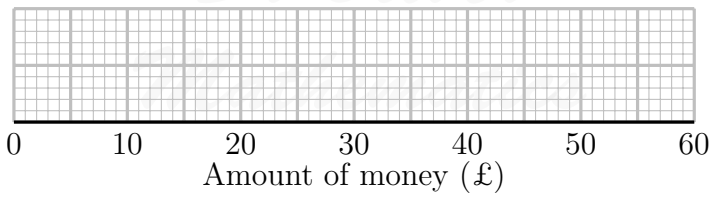


PT is a tangent to the circle.
SOP is a straight line.
Angle $OPT = 32°$.
Work out the size of the angle marked x.
Give reasons for your answer.

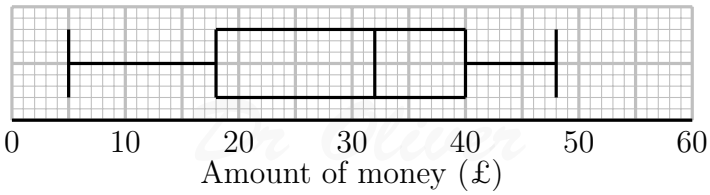
17. Some girls did a sponsored swim to raise money for charity.
The table shows information about the amounts of money (£) the girls raised.

Least amount of money (£)	10
Greatest amount of money (£)	45
Median	25
Lower quartile	16
Upper quartile	42

(a) On the grid, draw a box plot for the information in the table. (2)



Some boys also did the sponsored swim.
The box plot shows information about the amounts of money (£) the boys raised.



(b) Compare the amounts of money the girls raised with the amounts of money the boys raised. (2)

18. Make p the subject of the formula (3)

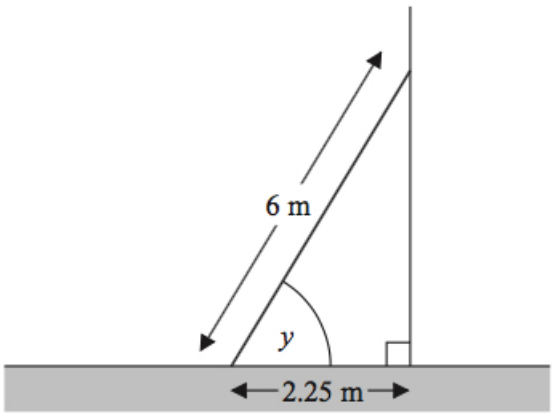
$$y = 3p^2 - 4.$$

19. (a) Factorise $6 + 9x$. (1)

(b) Factorise $y^2 - 16$. (1)

(c) Factorise $2p^2 - p - 10$. (2)

20. The diagram shows a ladder leaning against a vertical wall. (3)



The ladder stands on horizontal ground.
The length of the ladder is 6 m.
The bottom of the ladder is 2.25 m from the bottom of the wall.
A ladder is safe to use when the angle marked y is about 75°.
Is the ladder safe to use?
You must show all your working.

21. In Holborn School there are 460 students in Key Stage 3, 320 students in Key Stage 4, and 165 students in Key Stage 5. (2)
Nimer is carrying out a survey.
He needs a sample of 100 students stratified by Key Stage.
Work out the number of students from Key Stage 3 there should be in the sample.

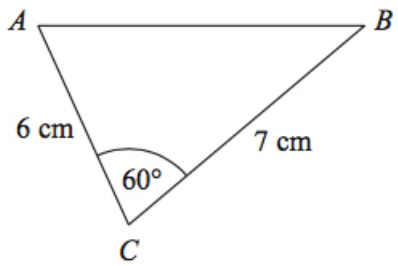
22. h is inversely proportional to the square of r. (3)
When $r = 5$, $h = 3.4$.
Find the value of h when $r = 8$.

23. Dan does an experiment to find the value of π. (4)
He measures the circumference and the diameter of a circle.
He measures the circumference, C, as 170 mm to the nearest millimetre.
He measures the diameter, d, as 54 mm to the nearest millimetre.
Dan uses

$$\pi = \frac{C}{d}$$

to find the value of π.
Calculate the upper bound and the lower bound for Dan's value of π.

24. ABC is a triangle.



(a) Work out the area of triangle ABC. (2)
Give your answer correct to 3 significant figures.

(b) Work out the length of the side AB. (3)
Give your answer correct to 3 significant figures.

25. Solve the simultaneous equations (6)

$$x^2 + y^2 = 9$$
$$x + y = 2.$$

Give your answers correct to 2 decimal places.