

Dr Oliver Mathematics
GCSE Mathematics
2008 November Paper 4H: 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 are the ingredients for making cheese pie for 6 people.

Cheese pie for 6 people

180 g flour
240 g cheese
80 g butter
4 eggs
160 ml milk

Bill makes a cheese pie for 3 people.

- (a) Work out how much flour he needs. (2)

Jenny makes a cheese pie for 15 people.

- (b) Work out how much milk she needs. (2)

2. Use a calculator to work out

$$\sqrt{\frac{21.6 \times 15.8}{3.8}}$$

- (a) Write down all the figures on your calculator display. (2)

- (b) Give your answer to part (a) correct to 3 significant figures. (1)

3. The cost of a radio is the list price plus VAT at $17\frac{1}{2}\%$. (3)

The list price of a radio is £240.

Work out the cost of the radio.

4. (a) Expand $4(x - 3)$. (1)

- (b) Solve $4t + 1 = 19$. (2)

5. The n th term of a sequence is $n^2 + 4$. (2)

Alex says, "The n th term of the sequence is always a prime number when n is an odd number."

Alex is **wrong**.

Give an example to show that Alex is wrong.

6. A circle has a radius of 6 cm.
A square has a side of length 12 cm.

(4)

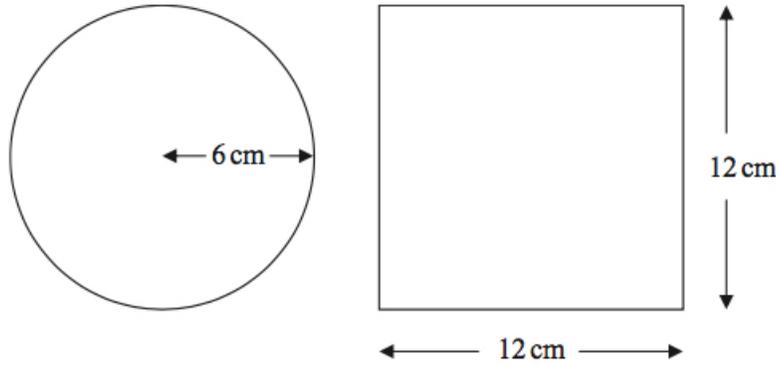


Diagram NOT accurately drawn

Work out the difference between the area of the circle and the area of the square.
Give your answer correct to one decimal place.

7. PQ is parallel to RS .

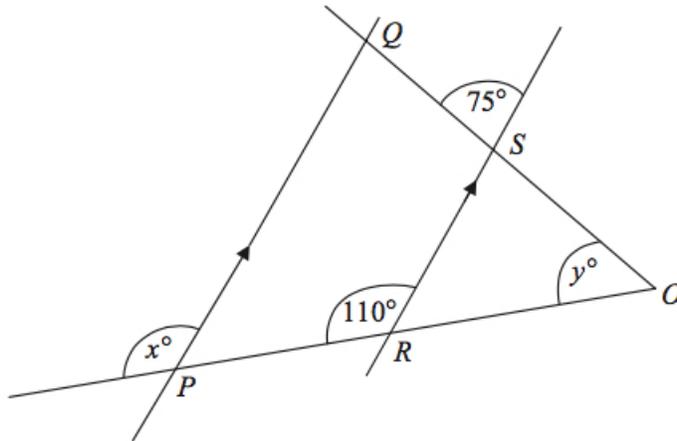


Diagram NOT accurately drawn

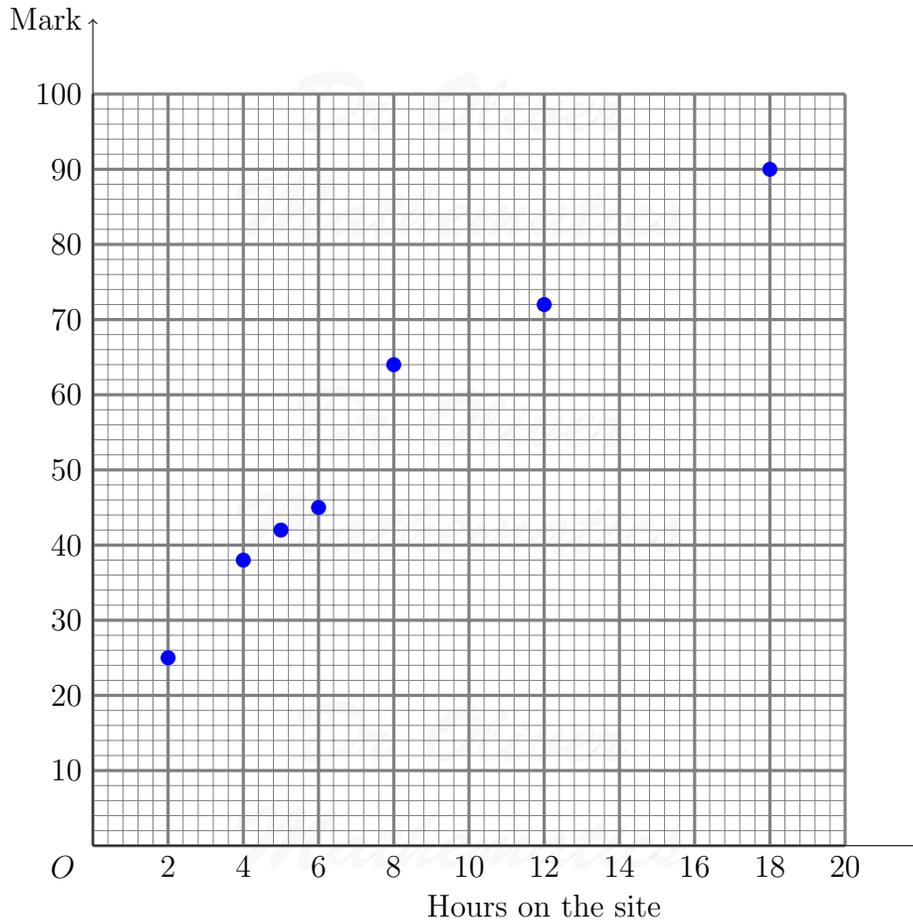
OSQ and ORP are straight lines.

- (a) (i) Write down the value of x .
(ii) Give a reason for your answer.
(b) Work out the value of y .

(2)

(2)

8. Some students revised for a mathematics exam.
They used an internet revision site.
The scatter graph shows the times seven students spent on the internet revision site and the marks the students got in the mathematics exam.



Here is the information for 3 more students.

Hours on the site	7	10	16
Mark	50	56	78

- (a) Plot this information on the scatter graph. (1)
- (b) What type of correlation does this scatter graph show? (1)
- (c) Draw a line of best fit on the scatter graph. (1)

A student spent 11 hours on the internet revision site.

- (d) Use the line of best fit to estimate this student's mathematics exam mark. (1)

9. Jack invests £3 000 for 2 years at 4% per annum compound interest. (3)
Work out the value of the investment at the end of 2 years.

10. Jason collected some information about the heights of 19 plants. (2)
This information is shown in the stem and leaf diagram.

1	1	2	3	3		
2	3	3	5	9	9	
3	0	2	2	6	6	7
4	1	1	4	8		

Key 4|8 means 48 mm

Find the median.

11. (a) Complete the table of values for $y = x^2 - 4x - 2$. (2)

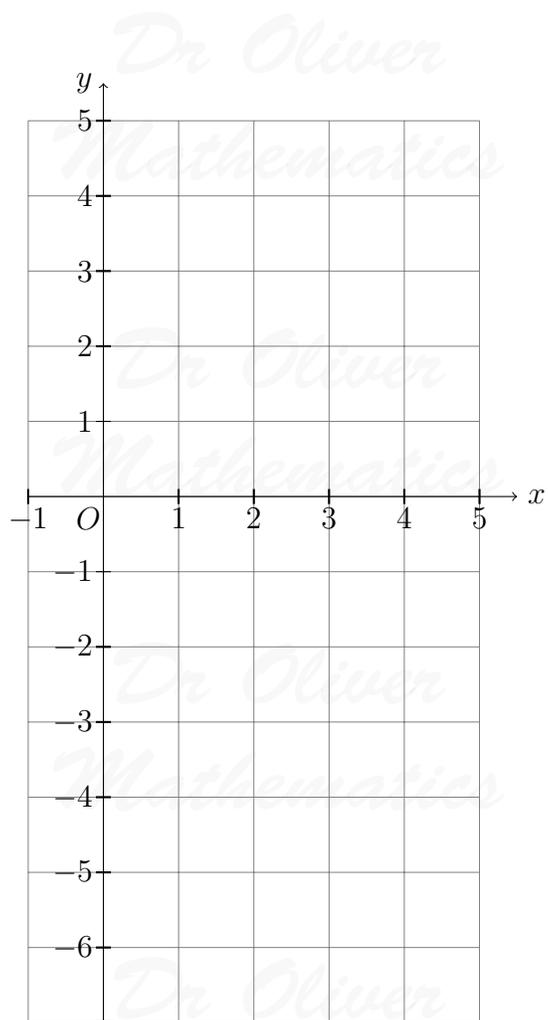
x	-1	0	1	2	3	4	5
y	-2	-5				-2	3

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

Dr Oliver
Mathematics

Dr Oliver
Mathematics

Dr Oliver
Mathematics



- (c) Use your graph to estimate the values of x when $y = -3$. (2)
12. (a) Draw the locus of all points which are equidistant from the points A and B . (2)

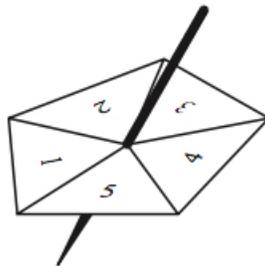
$A \times$

$\times B$

- (b) Draw the locus of all points that are exactly 3 cm from the line PQ . (2)



13. Find the Lowest Common Multiple (LCM) of 24 and 36. (2)
14. (a) Expand and simplify $3(x + 4) + 5(2x + 1)$. (2)
(b) Simplify $t^4 \times t^6$. (1)
(c) Simplify $p^8 \div p^5$. (1)
(d) Simplify $(x^4)^3$. (1)
15. Here is a 5-sided spinner. (2)



The sides of the spinner are labelled 1, 2, 3, 4 and 5.

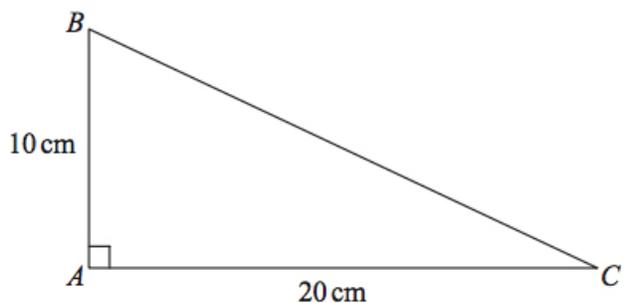
The spinner is biased.

The probability that the spinner will land on each of the numbers 1, 2, 3, and 4 is given in the table.

Number	1	2	3	4	5
Probability	0.15	0.05	0.2	0.25	x

Work out the value of x .

16. In triangle ABC , $AB = 10$ cm, $AC = 20$ cm, and angle $BAC = 90^\circ$. (4)

Diagram NOT
accurately drawn

Work out the length of BC .

Give your answer correct to 3 significant figures.

You must state the units in your answer.

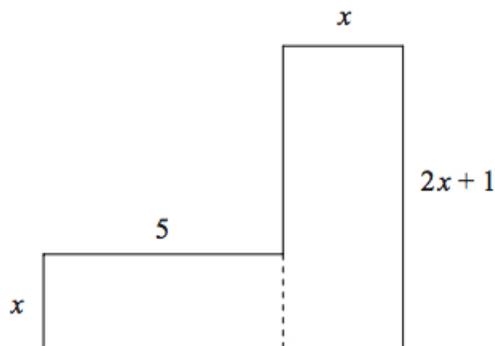
17. Majid carried out a survey of the number of school dinners 32 students had in one week. (3)
The table shows this information.

Number of school dinners	Frequency
0	0
1	8
2	12
3	6
4	4
5	2

Calculate the mean.

18. The value of a car depreciates by 35% each year. (3)
At the end of 2007, the value of the car was £5 460.
Work out the value of the car at the end of 2006.
19. The diagram below shows a 6-sided shape.
All the corners are right angles.
All the measurements are given in centimetres.

Diagram NOT accurately drawn



The area of the shape is 95 cm^2 .

(a) Show that $2x^2 + 6x - 95 = 0$. (3)

(b) Solve the equation $2x^2 + 6x - 95 = 0$. (3)

Give your solutions correct to 3 significant figures.

20. The n th even number is $2n$.

The next even number after $2n$ is $2n + 2$.

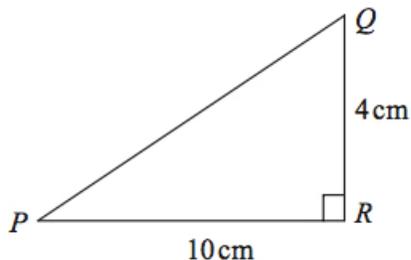
(a) Explain why. (1)

(b) Write down an expression, in terms of n , for the next even number after $2n + 2$. (1)

(c) Show algebraically that the sum of any 3 consecutive even numbers is always a multiple of 6. (3)

21. PQR is a right-angled triangle. (3)

Diagram NOT accurately drawn



$QR = 4 \text{ cm}$.

$PR = 10 \text{ cm}$.

Work out the size of angle RPQ .

Give your answer correct to 3 significant figures.

22. D is proportional to S^2 . (4)
 $D = 900$ when $S = 20$.
 Calculate the value of D when $S = 25$.

23. A ball is thrown vertically upwards with a speed V metres per second. (3)
 The height, H metres, to which it rises is given by

$$H = \frac{V^2}{2g},$$

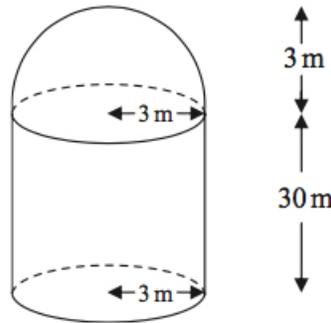
where $g \text{ m/s}^2$ is the acceleration due to gravity.

$V = 24.4$ correct to 3 significant figures.

$g = 9.8$ correct to 2 significant figures.

- (a) Write down the lower bound of g .
 (b) Calculate the upper bound of H .
 Give your answer correct to 3 significant figures.

24. The diagram shows a storage tank.



The storage tank consists of a hemisphere on top of a cylinder.

The height of the cylinder is 30 metres.

The radius of the cylinder is 3 metres.

The radius of the hemisphere is 3 metres.

- (a) Calculate the total volume of the storage tank. (3)
 Give your answer correct to 3 significant figures.

A sphere has a volume of 500 m^3 .

- (b) Calculate the radius of the sphere. (3)
 Give your answer correct to 3 significant figures.

25. The table gives information about the numbers of students in the two years of a college course. (3)

	Male	Female
First year	399	602
Second year	252	198

Anna wants to interview some of these students.

She takes a random sample of 70 students stratified by year and by gender.

Work out the number of students in the sample who are male and in the first year.

26. Here is a diagram.

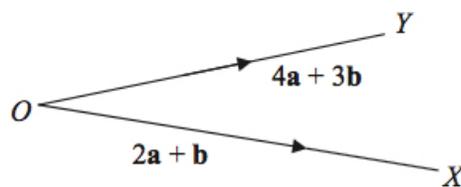


Diagram NOT
accurately drawn

$$\overrightarrow{OX} = 2\mathbf{a} + \mathbf{b}.$$

$$\overrightarrow{OY} = 4\mathbf{a} + 3\mathbf{b}.$$

(a) Express the vector \overrightarrow{XY} in terms of \mathbf{a} and \mathbf{b} .

(2)

Give your answer in its simplest form.

Here is another diagram.

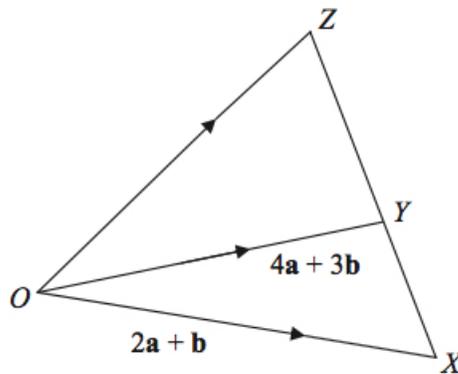


Diagram NOT
accurately drawn

XYZ is a straight line.

$$XY : YZ = 2 : 3.$$

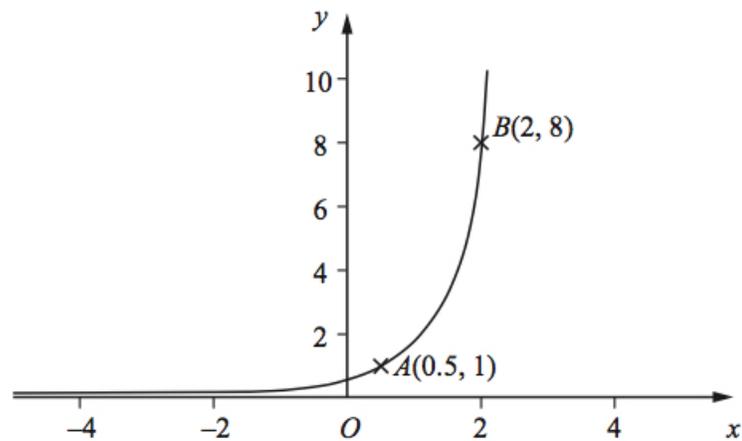
(b) Express the vector \overrightarrow{OZ} in terms of \mathbf{a} and \mathbf{b} .

(3)

Give your answer in its simplest form.

27. The diagram shows a sketch of the graph $y = ab^x$.

(4)



The curve passes through the points $A(0.5, 1)$ and $B(2, 8)$.
The point $C(-0.5, k)$ lies on the curve.
Find the value of k .