

Dr Oliver Mathematics
GCSE Mathematics
2008 June Paper 4H: Calculator
1 hour 45 minutes

The total number of marks available is 100.

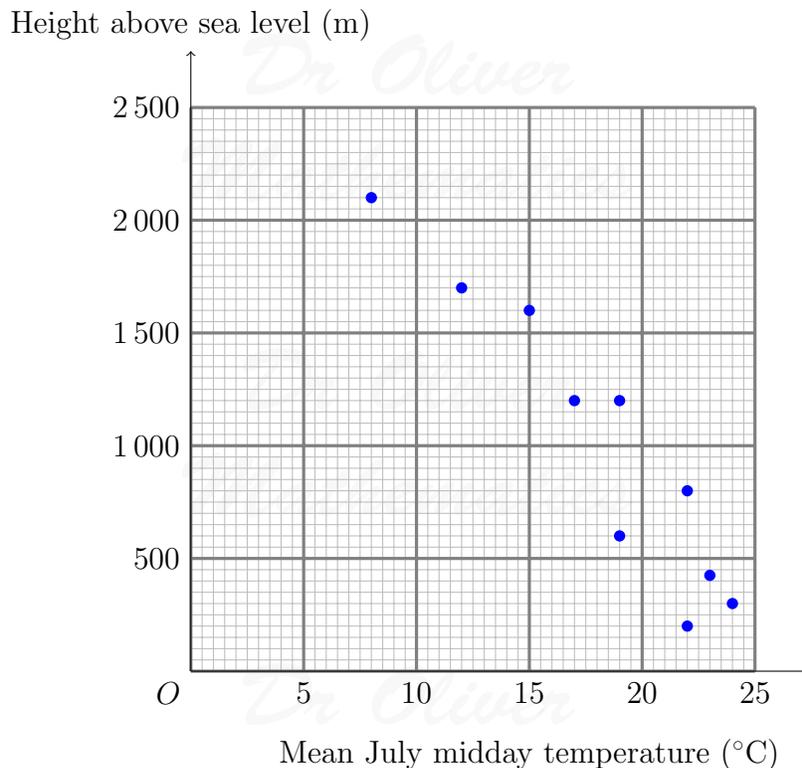
You must write down all the stages in your working.

1. There are 3 red pens, 4 blue pens, and 5 black pens in a box.
Sameena takes a pen, at random, from the box.
 - (a) Write down the probability that she takes a black pen. (2)
 - (b) Write down the probability that Sameena takes a pen that is **not** black. (1)
2. Use your calculator to work out (2)

$$\frac{22.4 \times 14.5}{8.5 \times 3.2}$$

Write down all the figures on your calculator display.

3. The scatter graph shows information for some weather stations.
It shows the height of each weather station above sea level (m) and the mean July midday temperature ($^{\circ}\text{C}$) for that weather station.



The table shows this information for two more weather stations.

| | | |
|-----------------------------------------------------|-------|-----|
| Height of weather station above sea level (m) | 1 000 | 500 |
| Mean July midday temperature ($^{\circ}\text{C}$) | 20 | 22 |

- (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 weather station is 1800 metres above sea level.

- (d) Estimate the mean July midday temperature for this weather station. (1)

At another weather station the mean July midday temperature is 18°C .

- (e) Estimate the height above sea level of this weather station. (1)

4. AB is parallel to CD .

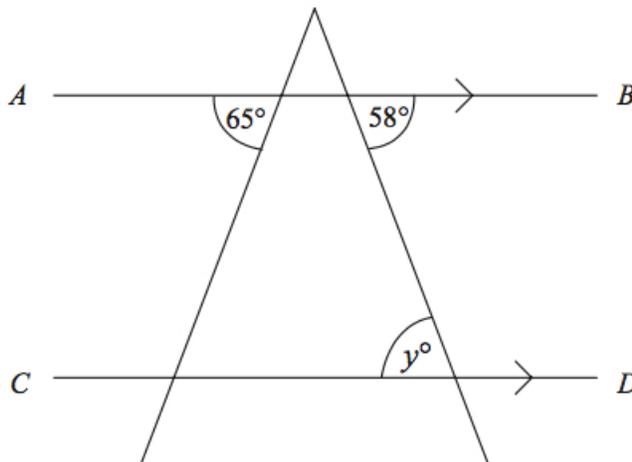
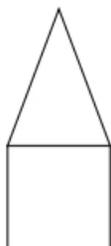


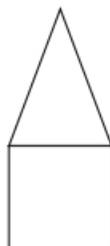
Diagram **NOT**
accurately drawn

- (a) Write down the value of y . (1)
- (b) Give a reason for your answer. (1)
5. Here are the front elevation, side elevation and the plan of a 3-D shape. (2)

Front elevation



Side elevation



Plan



In the space below, draw a sketch of the 3-D shape.

6. Here are the first four terms of an arithmetic sequence. (2)

5 8 11 14

Find an expression, in terms of n , for the n th term of the sequence.

7. The equation (4)

$$x^3 + 2x = 26$$

has a solution between 2 and 3.

Use a trial and improvement method to find this solution.

Give your answer correct to one decimal place.

You must show **all** your working.

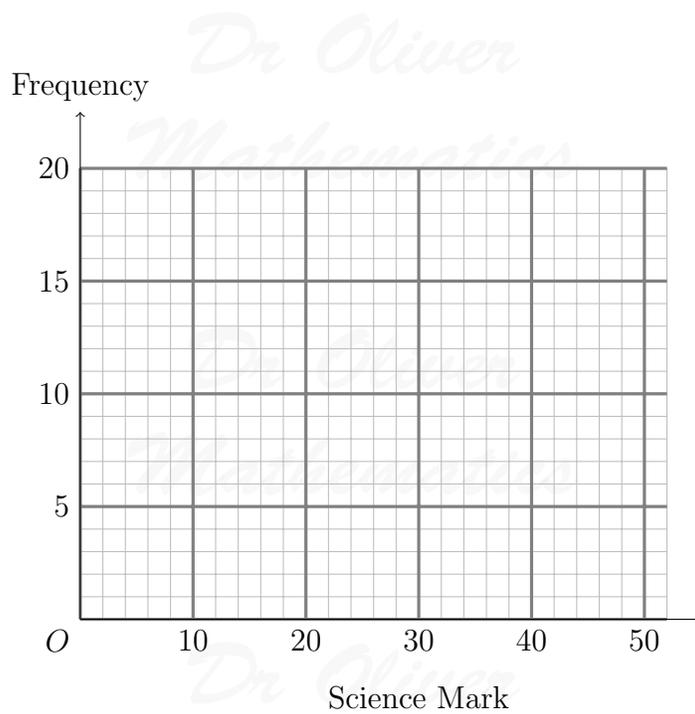
8. 60 students take a science test. (2)

The test is marked out of 50.

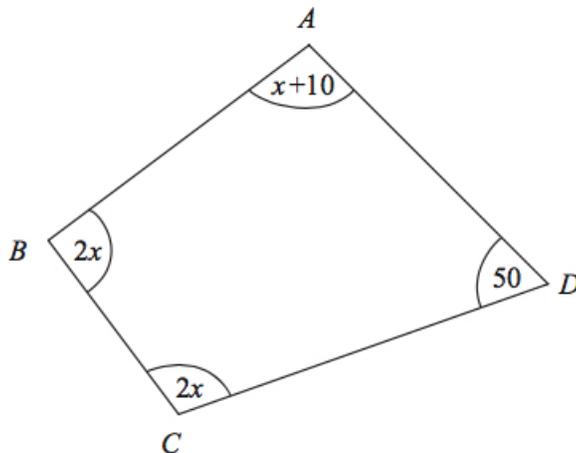
This table shows information about the students' marks.

| | | | | | |
|--------------|--------|---------|---------|---------|---------|
| Science mark | 0 – 10 | 11 – 20 | 21 – 30 | 31 – 40 | 41 – 50 |
| Frequency | 4 | 13 | 17 | 19 | 7 |

On the grid, draw a frequency polygon to show this information.



9. In this quadrilateral, the sizes of the angles, in degrees, are $x + 10$, $2x$, $2x$, and 50 .



**Diagram NOT
accurately drawn**

- (a) Use this information to write down an equation in terms of x . (2)
- (b) Work out the value of x . (3)
10. A garage sells British cars and foreign cars.
The ratio of the number of British cars sold to the number of foreign cars sold is $2 : 7$.
The garage sells 45 cars in one week.
- (a) Work out the number of British cars the garage sold that week. (2)

A car tyre costs £80 plus VAT at $17\frac{1}{2}\%$.

- (b) Work out the total cost of the tyre. (3)

The value of a new car is £12 000.
The value of the car depreciates by 20% per year.

- (c) Work out the value of the car after 2 years. (3)

11. (a) Simplify $4a + 3c - 2a + c$. (1)

(b) $S = \frac{1}{2}at^2$. (2)

Find the value of S when $t = 3$ and $a = \frac{1}{4}$.

- (c) Factorise $x^2 - 5x$. (2)

- (d) Expand and simplify $(x + 3)(x + 4)$. (2)

- (e) Factorise $y^2 + 8y + 15$. (2)

12. A shop sells mobile phones.

The table shows the number of mobile phones sold each month from January to May.

| Jan | Feb | Mar | Apr | May |
|-----|-----|-----|-----|-----|
| 70 | 64 | 73 | 85 | 91 |

- (a) Work out the percentage increase in the number of mobile phones sold from April to May. (3)

Give your answer correct to 3 significant figures.

- (b) Work out the 3-month moving averages for the information in the table. (2)

The first one has been worked out for you.

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13. A solid cylinder has a radius of 4 cm and a height of 10 cm.

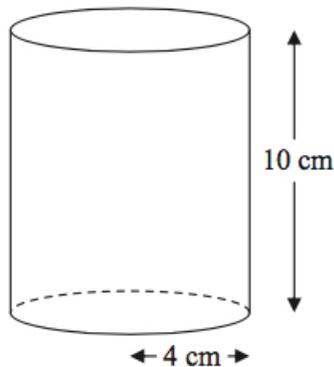


Diagram **NOT**
accurately drawn

- (a) Work out the volume of the cylinder. (2)
Give your answer correct to 3 significant figures.

The cylinder is made from wood.
The density of the wood is $0.6 \text{ grams per cm}^3$.

- (b) Work out the mass of the cylinder. (2)
Give your answer correct to 3 significant figures.

14. ABC is a right-angled triangle.

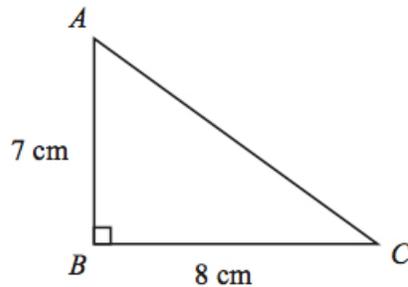


Diagram **NOT**
accurately drawn

$AB = 7 \text{ cm}$.
 $BC = 8 \text{ cm}$.

- (a) Work out the area of the triangle. (2)
(b) Work out the length of AC . (3)
Give your answer correct to 2 decimal places.

DEF is another right-angled triangle.

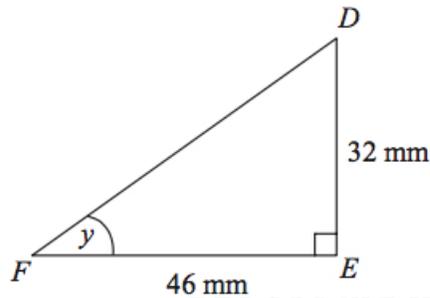
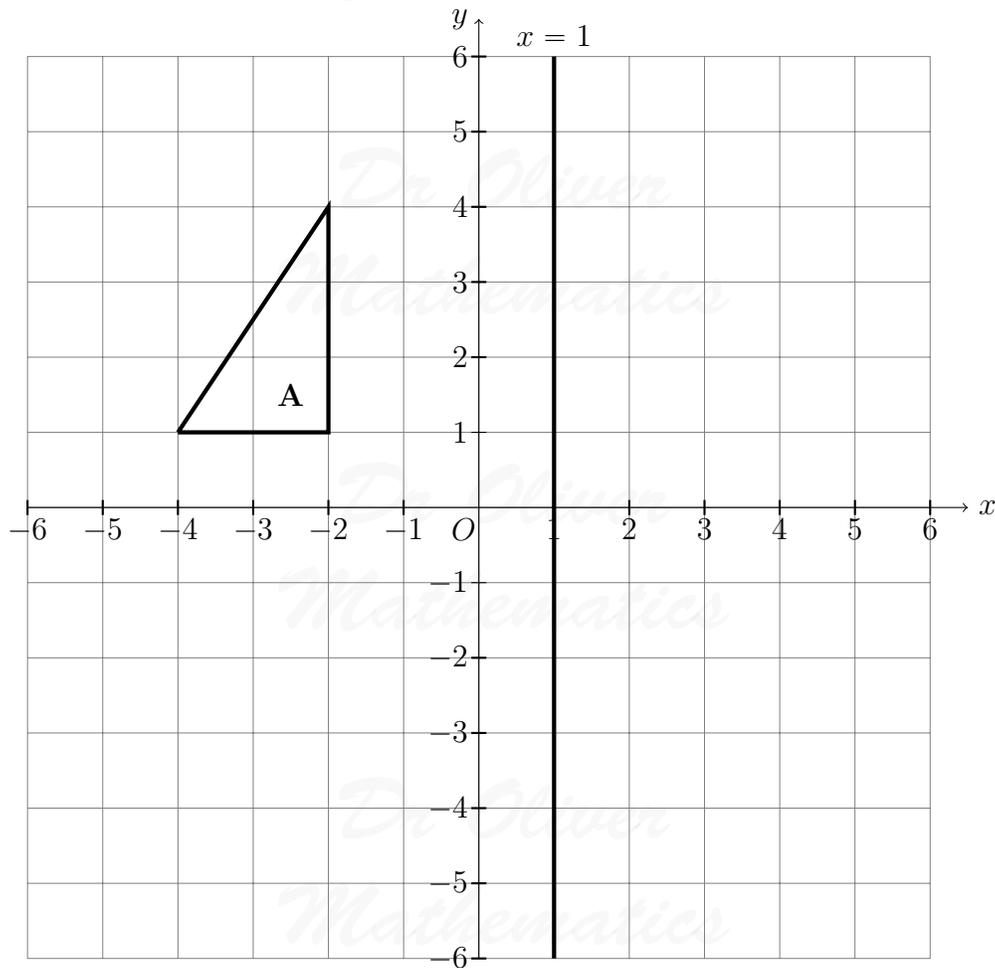


Diagram **NOT**
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$DE = 32 \text{ mm}$.
 $FE = 46 \text{ mm}$.

- (c) Calculate the size of angle y . (3)
Give your answer correct to 1 decimal place.

15. Triangle **A** is reflected in the x -axis to give triangle **B**.
 Triangle **B** is reflected in the line $x = 1$ to give triangle **C**. (3)



Describe the single transformation that takes triangle **A** to triangle **C**.

16. (a) Express 252 as a product of its prime factors. (3)

James thinks of two numbers.

He says, “The Highest Common Factor (HCF) of my two numbers is 3.
 The Lowest Common Multiple (LCM) of my two numbers is 45.”

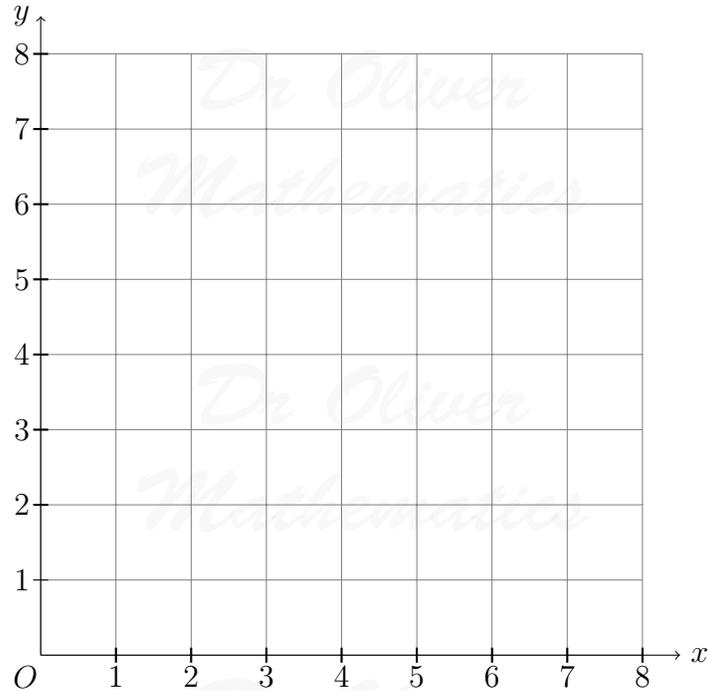
- (b) Write down two numbers that James could be thinking of. (3)
17. The number of atoms in one kilogram of helium is 1.51×10^{26} . (2)
 Calculate the number of atoms in 20 kilograms of helium.
 Give your answer in standard form.

18. The region **R** satisfies the inequalities

(3)

$$x \geq 2, y \geq 1, \text{ and } x + y \leq 6.$$

On the grid below, draw straight lines and use shading to show the region **R**.



19. The diagram shows a sector of a circle, centre *O*.

(2)

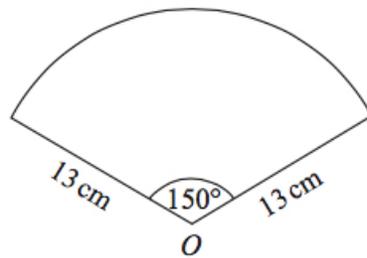


Diagram **NOT**
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The radius of the circle is 13 cm.

The angle of the sector is 150° .

Calculate the area of the sector.

Give your answer correct to 3 significant figures.

20. q is inversely proportional to the square of t .

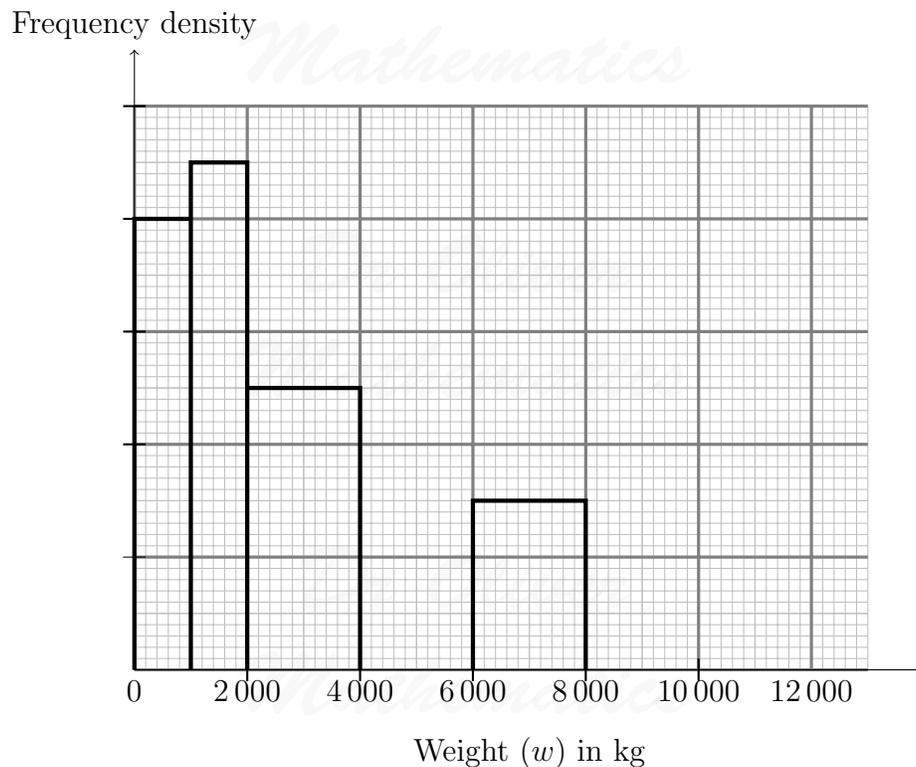
When $t = 4$, $q = 8.5$.

- (a) Find a formula for q in terms of t . (3)
- (b) Calculate the value of q when $t = 5$. (1)

21. The incomplete histogram and table show information about the weights of some containers.

| Weight (w) in kg | Frequency |
|------------------------|-----------|
| $0 < w < 1\,000$ | 16 |
| $1\,000 < w < 1\,000$ | |
| $2\,000 < w < 4\,000$ | |
| $4\,000 < w < 6\,000$ | 16 |
| $6\,000 < w < 8\,000$ | |
| $8\,000 < w < 12\,000$ | 8 |

Here is part of the histogram.



- (a) Use the information in the histogram to complete the table. (2)
- (b) Use the information in the table to complete the histogram. (2)

22. Katy drove for 238 miles, correct to the nearest mile. (3)
 She used 27.3 litres of petrol, to the nearest tenth of a litre.

$$\text{Petrol consumption} = \frac{\text{Number of miles travelled}}{\text{Number of litres of petrol used}}$$

Work out the upper bound for the petrol consumption for Katy's journey.
 Give your answer correct to 2 decimal places.

23. (a) Show that the equation (3)

$$\frac{5}{x+2} = \frac{4-3x}{x-1}$$

can be rearranged to give

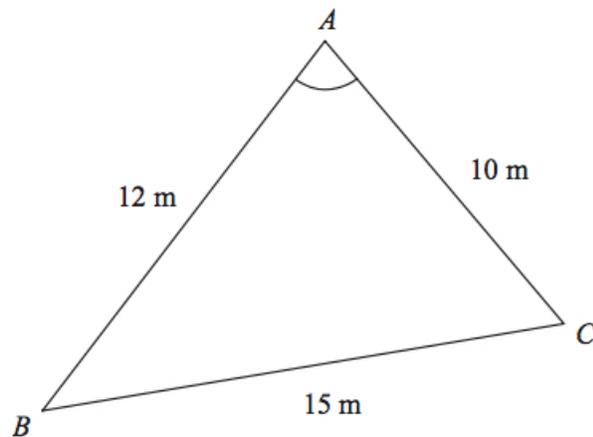
$$3x^2 + 7x - 13 = 0.$$

- (b) Solve (3)

$$3x^2 + 7x - 13 = 0.$$

Give your solutions correct to 2 decimal places.

24. ABC is a triangle. (3)



**Diagram NOT
 accurately drawn**

$$AB = 12 \text{ m.}$$

$$AC = 10 \text{ m.}$$

$$BC = 15 \text{ m.}$$

Calculate the size of angle BAC .

Give your answer correct to one decimal place.

25. The sketch shows a curve with equation (3)

$$y = ka^x$$

where k and a are constants, and $a > 0$.

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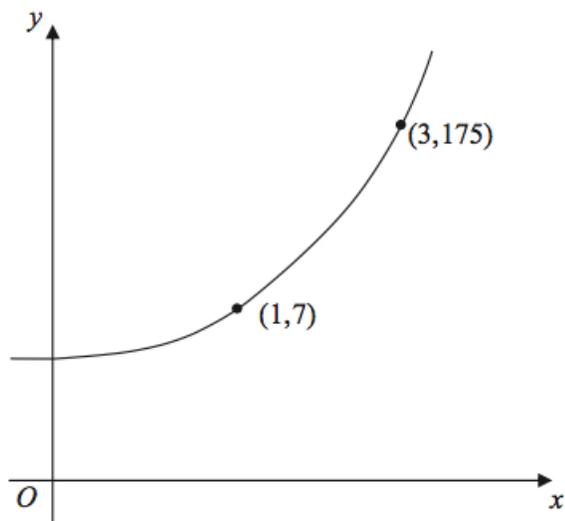


Diagram **NOT**
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The curve passes through the points (1, 7) and (3, 175).
Calculate the value of k and the value of a .

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