Dr Oliver Mathematics
# GCSE Mathematics
2008 November Paper 3H: 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. (a) Simplify $5bc + 2bc - 4bc$. (1)

    (b) Simplify $4x + 3y - 2x + 2y$. (2)

    (c) Simplify $m \times m \times m$. (1)

    (d) Simplify $3n \times 2p$ (1)

2. A tin of cat food costs 40p.
    A shop has a special offer on the cat food.

Special offer

Pay for 2 tins and get 1 tin free

40p 40p Free
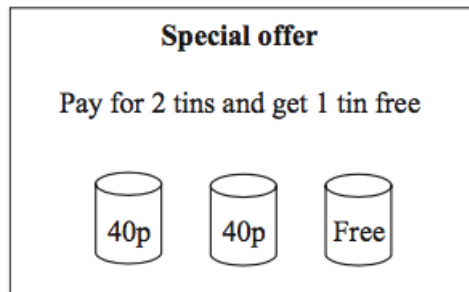
Julie wants 12 tins of cat food.

(a) Work out how much she pays. (3)

The normal price of a cat basket is £20.
In a sale, the price of the cat basket is reduced by 15%.

(b) Work out the sale price of the cat basket. (3)

3. Here are six temperature/time graphs. (3)
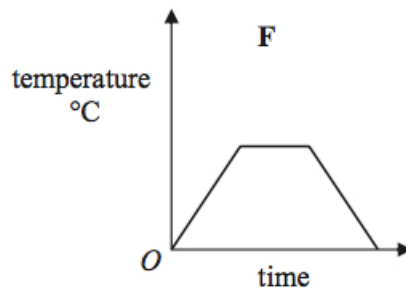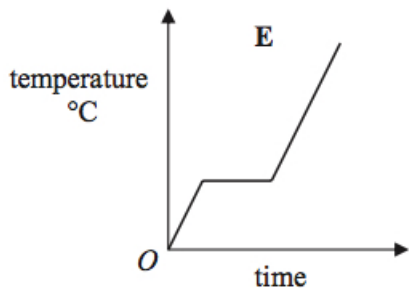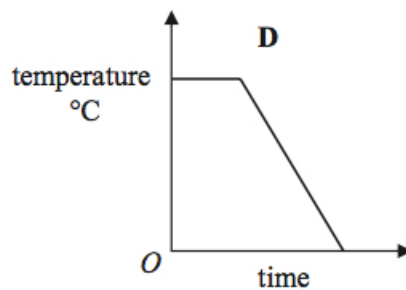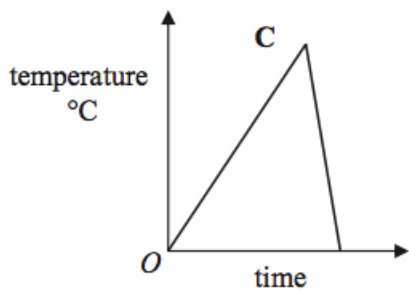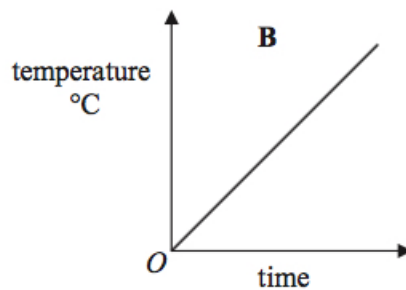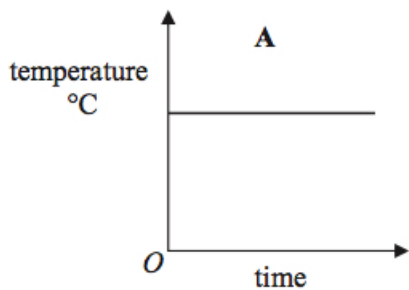
Each sentence in the table describes one of the graphs.
Write the letter of the correct graph next to each sentence.
The first one has been done for you.

The temperature starts at 0°C and keeps rising	**B**
The temperature stays the same for a time and then falls	
The temperature rises and then falls quickly	
The temperature is always the same	
The temperature rises, stays the same for a time, and then falls	
The temperature rises, stays the same for a time, and then rises again	

4. The diagram represents a solid made from 5 identical cubes.   (2)
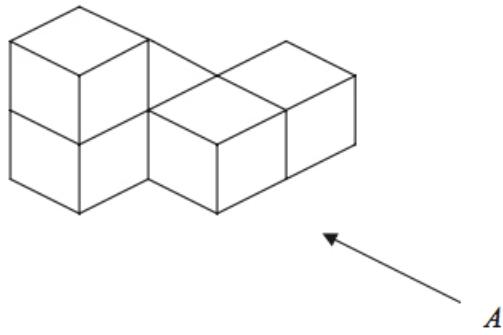
On the grid below, draw the view of the solid from direction A.

5. Work out (2)
$$\tfrac{2}{5} + \tfrac{1}{7}.$$

6. Work out the area of the shape. (4)
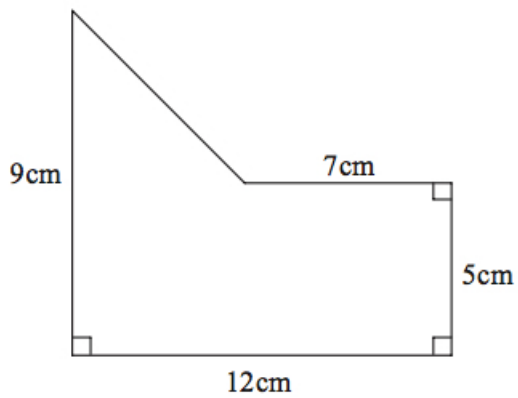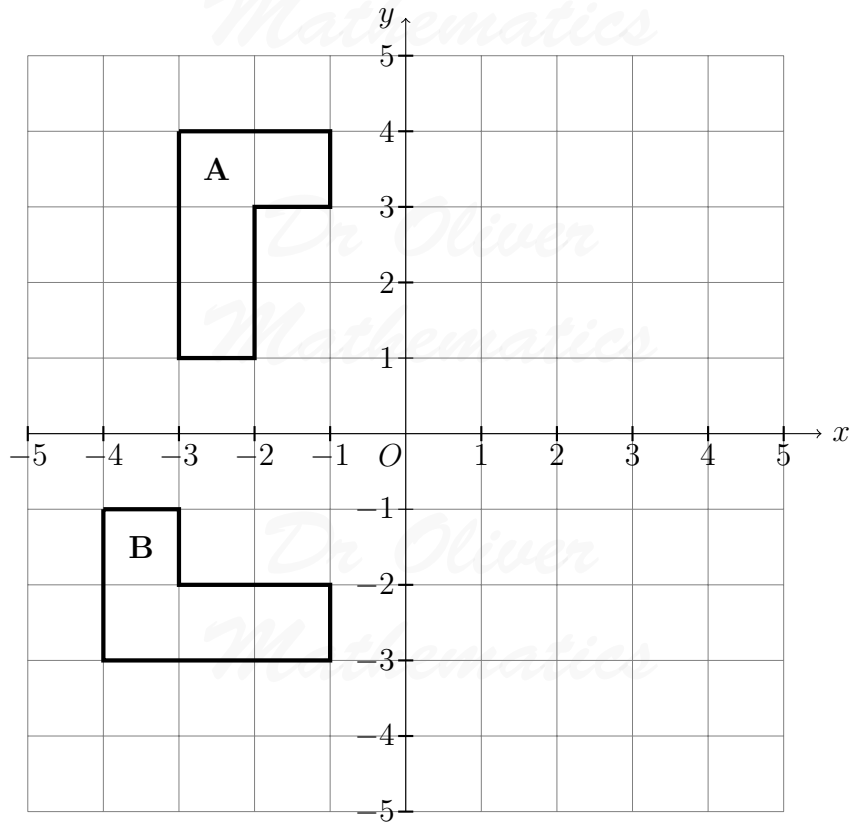

9cm

7cm

Diagram **NOT** accurately drawn

5cm

12cm

7. Here are two shapes.

(a) Reflect shape **A** in the y-axis. (2)

(b) Describe fully the **single** transformation which takes shape **A** to shape **B**. (3)

8. Naomi wants to find out how often adults go to the cinema.
   She uses this question on a questionnaire.

"How many times do you go to the cinema?"

Not very often   Sometimes   A lot

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

(b) Design a better question for her questionnaire to find out how often adults go to the cinema. (2)
   You should include some response boxes.

9. (a) Factorise $5m + 10$. (1)

    (b) Factorise $y^2 - 3y$. (1)

10. Sidra and Gemma share £48 in the ratio 5 : 3. (3)
    Work out how much more money Sidra gets than Gemma gets.

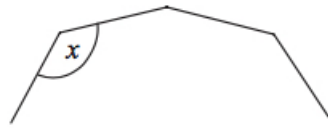11. The diagram shows part of a **regular** 10-sided polygon. (3)

Diagram **NOT** accurately drawn

Work out the size of the angle marked x.

12. The diagram shows a triangle. (3)

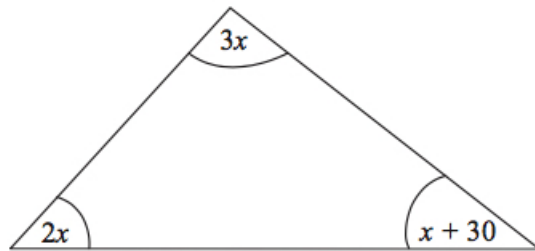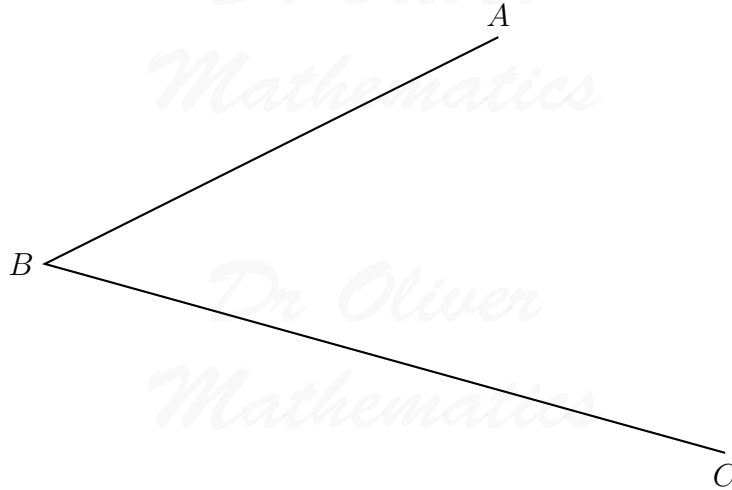Diagram **NOT** accurately drawn

The sizes of the angles, in degrees, are $3x$, $2x$, and $x + 30$.
Work out the value of x.

13. $-2 < n \leqslant 4$.
    n is an integer.

    (a) Write down all the possible values of n. (2)

    (b) Solve the inequality $6x - 3 < 9$. (2)

14. Use ruler and compasses to construct the bisector of angle ABC. (2)
   You must show all your construction lines.

15. (a) Express 84 as a product of its prime factors. (3)

    (b) Find the Highest Common Factor (HCF) of 84 and 35. (2)

16. $v^2 = u^2 + 2as$.
    $u = 6$.
    $a = 2.5$.
    $s = 9$.

    (a) Work out a value of v. (3)

    (b) Make s the subject of the formula $v^2 = u^2 + 2as$. (2)

17. (a) Write the number $39\,000$ in standard form. (1)

    (b) Write 7.21×10^{-3} as an ordinary number. (1)

18. The table shows information about the amount spent by 100 customers in a supermarket.

Amount spent (£n)	Frequency
$0 < n \leqslant 20$	18
$20 < n \leqslant 40$	22
$40 < n \leqslant 60$	35
$60 < n \leqslant 80$	15
$80 < n \leqslant 100$	8
$100 < n \leqslant 20$	2

    (a) Complete the cumulative frequency table for this information (1)

6

Amount spent (£n)	Cumulative Frequency
$0 < n \leqslant 20$	18
$0 < n \leqslant 40$	
$0 < n \leqslant 60$	
$0 < n \leqslant 80$	
$0 < n \leqslant 100$	
$0 < n \leqslant 120$	

(b) On the grid, draw a cumulative frequency graph for your table. (2)
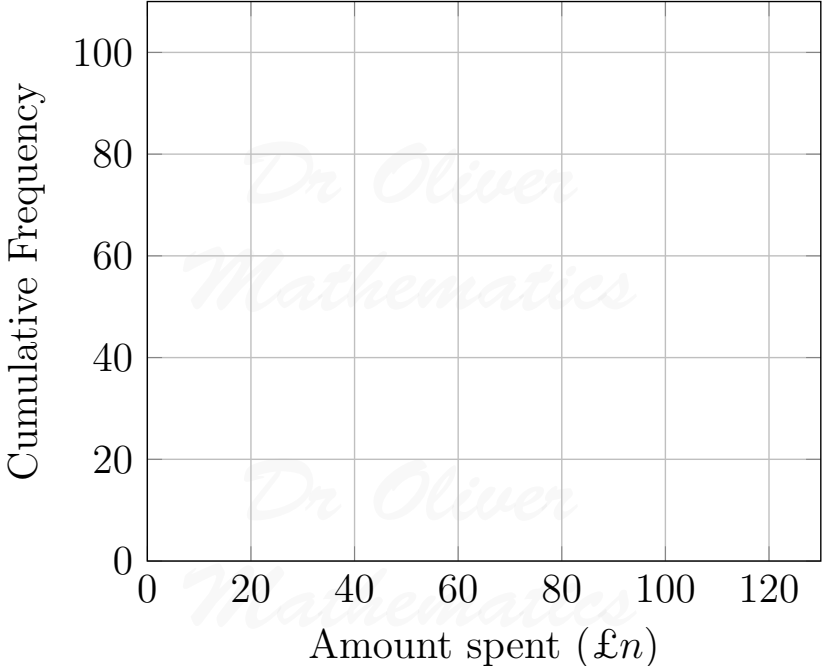
(c) Use your graph to find an estimate for the median amount spent. (1)

19. The table shows some expressions. (3)
    a, b, c, and d represent lengths.
    π and 2 are numbers that have no dimensions.

abc	$\frac{1}{2}ab$	πbc	πd	$ab + cd$	$\pi(a + b)$	bc^2

Three of the expressions could represent areas.
Tick (✓) the boxes underneath these three expressions.

20. A, B, and C are points on the circumference of a circle, centre O.

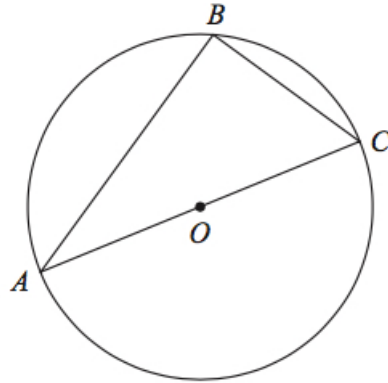
Diagram **NOT** accurately drawn

AC is a diameter of the circle.

(a) (i) Write down the size of angle ABC. (2)

    (ii) Give a reason for your answer.

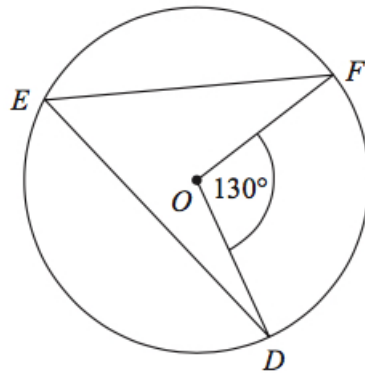D, E, and F are points on the circumference of a circle, centre O.


Diagram **NOT** accurately drawn

Angle $DOF = 130°$.

(b) (i) Write down the size of angle DEF. (2)

    (ii) Give a reason for your answer.

21. Matthew puts 3 red counters and 5 blue counters in a bag.
He takes at random a counter from the bag.
He writes down the colour of the counter.
He puts the counter in the bag again.
He then takes at random a second counter from the bag.

(a) Complete the probability tree diagram. (2)
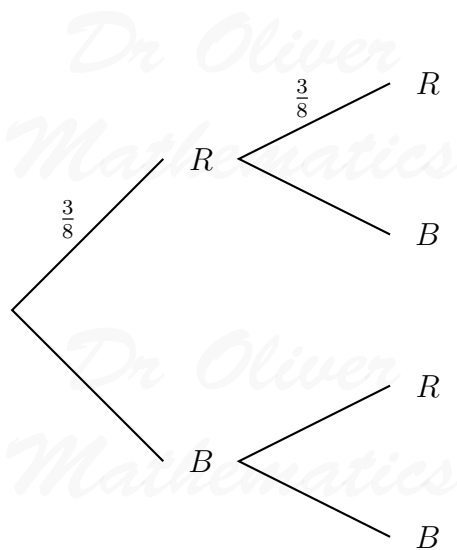
(b) Work out the probability that Matthew takes two red counters. (2)

22. (a) Factorise fully $6x^2 + 9xy$. (2)

(b) Expand and simplify $(2x + 5)(x - 2)$. (2)

23. The incomplete histogram and table give some information about the distances some teachers travel to school.
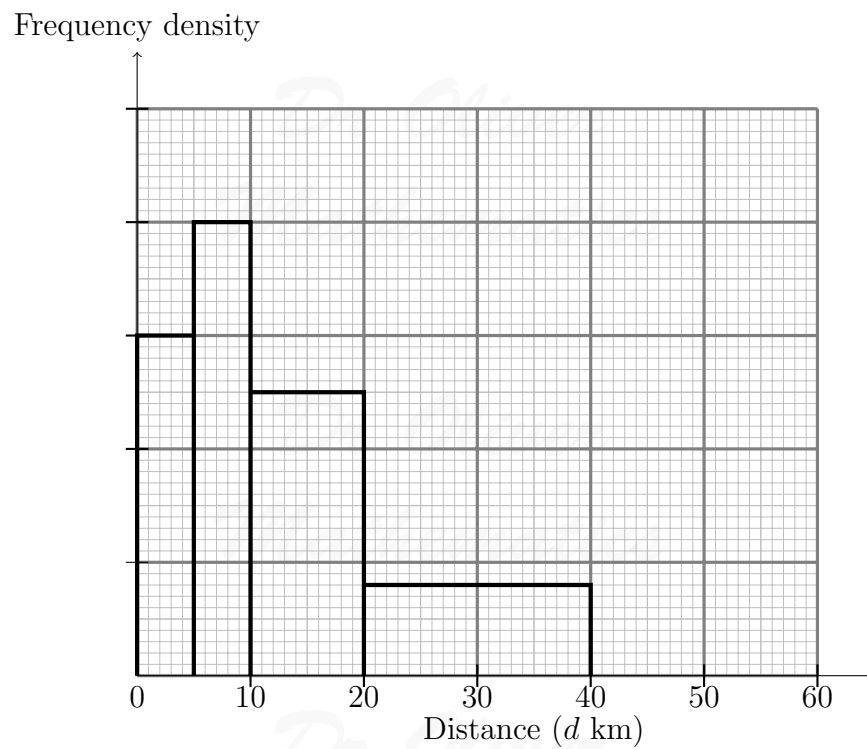
(a) Use the information in the histogram to complete the frequency table. (2)

9

Distance (d km)	Frequency
$0 < d \leqslant 5$	15
$5 < d \leqslant 10$	20
$10 < d \leqslant 20$	
$20 < d \leqslant 40$	
$40 < d \leqslant 60$	10

     (b) Use the information in the table to complete the histogram. (1)

24. Express the recurring decimal $0.2\dot{1}\dot{3}$ as a fraction. (3)

25.   (a) Write down the value of $49^{\frac{1}{2}}$. (1)

     (b) Write $\sqrt{45}$ in the form $k\sqrt{5}$, where k is an integer. (1)
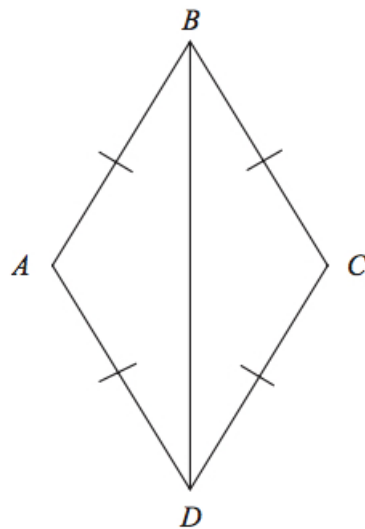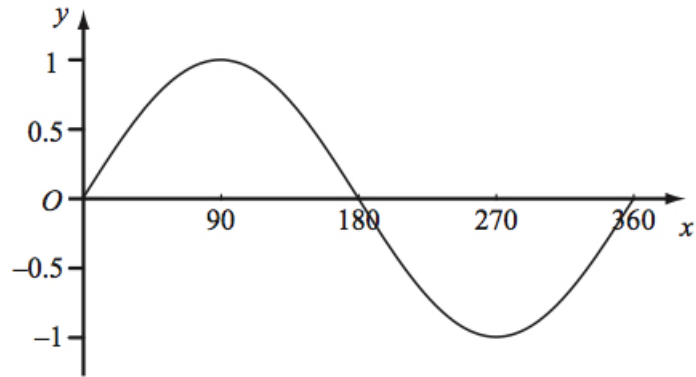
26. In the diagram, $AB = BC = CD = DA$. (3)

B

Diagram **NOT**
accurately drawn

A   **C**

D

    Prove that triangle ADB is congruent to triangle CDB.

27. The diagram shows a sketch of the curve $y = \sin x°$ for $0 \leqslant x \leqslant 360$.
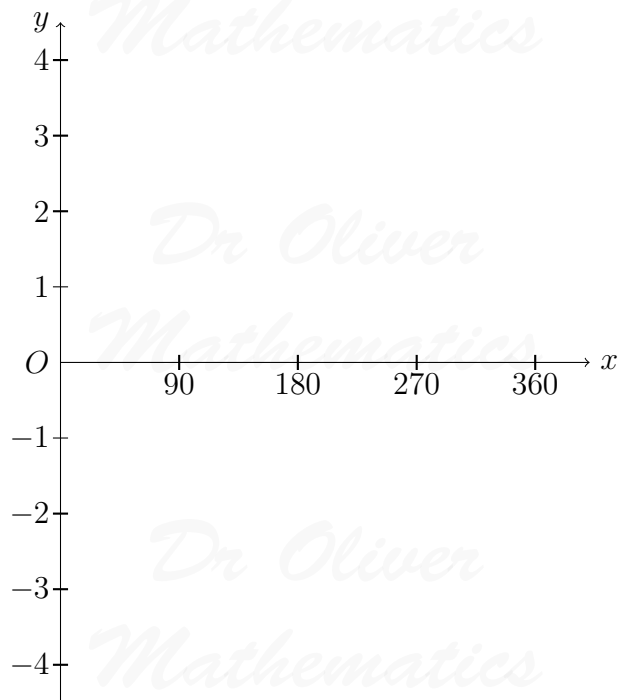
10

The exact value of $\sin 60° = \frac{\sqrt{3}}{2}$.

(a) Write down the exact value of   (2)
    (i) $\sin 120°$,
    (ii) $\sin 240°$.

(b) On the grid below, sketch the graph of $y = 4\sin 2x°$ for $0 \leqslant x \leqslant 360$.   (2)

28. Solve the simultaneous equations   (6)

$$x^2 + y^2 = 5$$
$$y = 3x + 1.$$

11