



Rewarding Learning

General Certificate of Secondary Education
January 2010

Mathematics

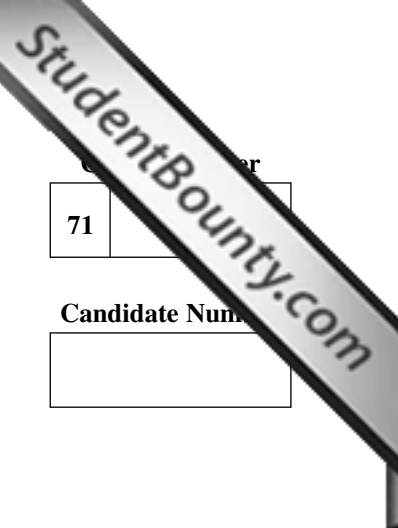
Module N4 Paper 1
(Non-calculator)
Higher Tier

[GMN41]

TUESDAY 12 JANUARY
9.15 am – 10.15 am



GMN41



71	
Candidate Number	
<input type="text"/>	

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
 Write your answers in the spaces provided in this question paper.
 Answer **all fourteen** questions.
 Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.
 You **must not** use a calculator for this paper.

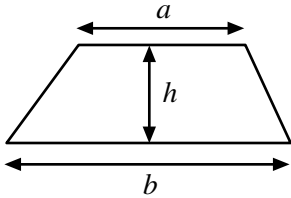
INFORMATION FOR CANDIDATES

The total mark for this paper is 44.
 Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
 You should have a ruler, compasses, set-square and protractor.
 The Formula Sheet is on page 2.

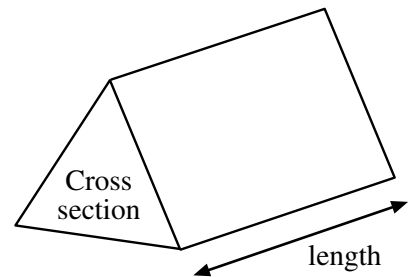
For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
Total Marks	

Formula Sheet

Area of trapezium = $\frac{1}{2}(a + b)h$



Volume of prism = area of cross section \times length

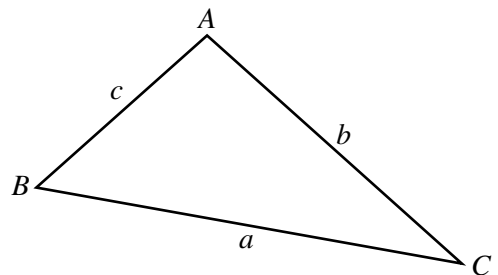


In any triangle ABC

Area of triangle = $\frac{1}{2}ab \sin C$

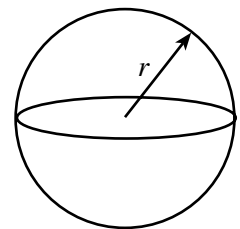
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule: $a^2 = b^2 + c^2 - 2bc \cos A$



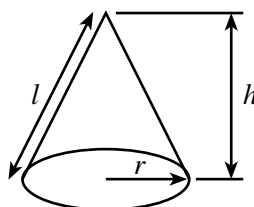
Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$



Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = $\pi r l$

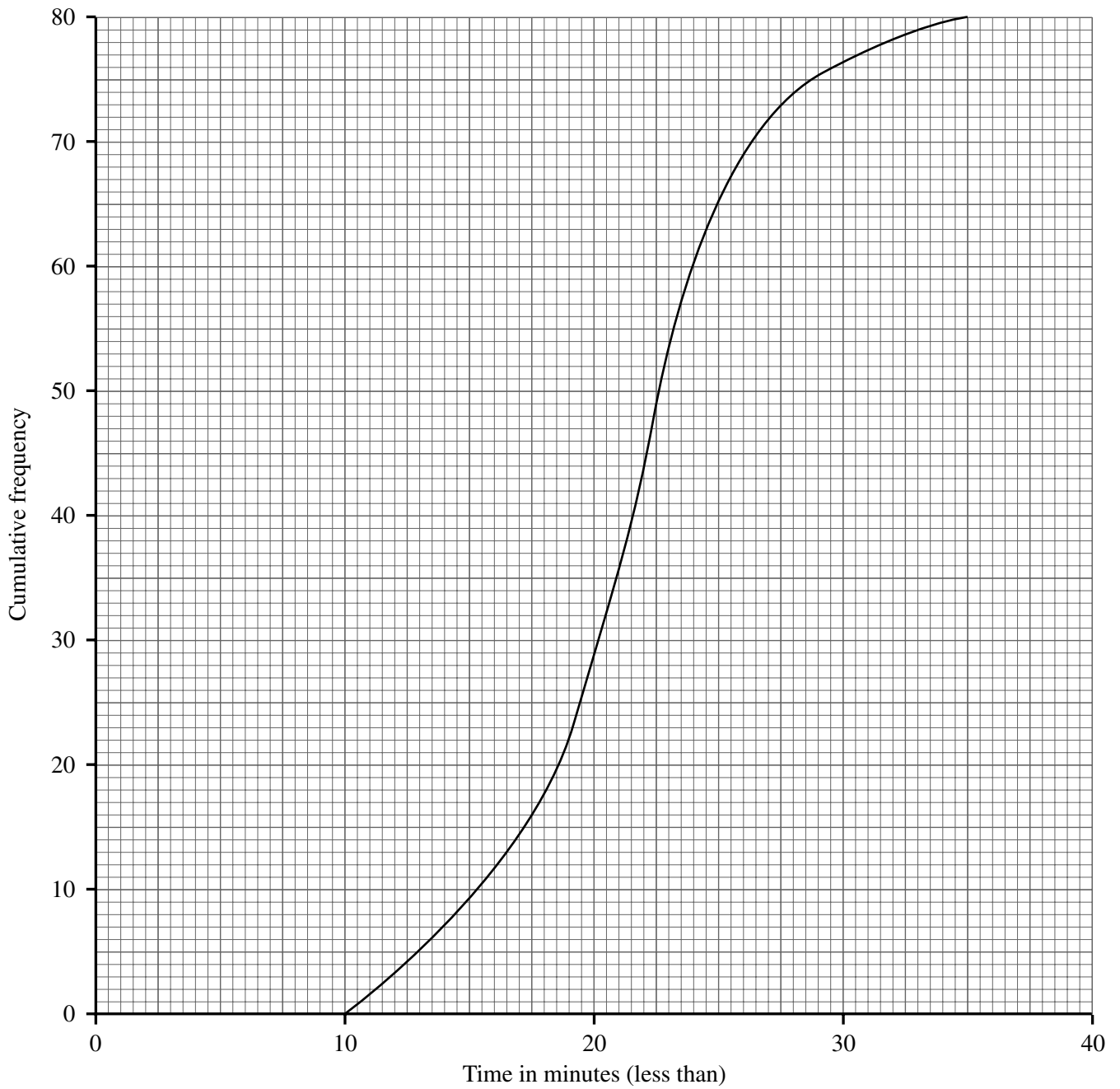


Quadratic equation:

The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

- 3 The time taken by a number of adults to complete a Sudoku puzzle was recorded.
The cumulative frequency graph for the results is shown.



Use the graph to estimate

(a) the median time,

Answer _____ minutes [1]

(b) the interquartile range,

Answer _____ minutes [2]

(c) the **percentage** of adults who took more than 28 minutes to complete the puzzle.

Answer _____ % [2]

Examiner Only	
Marks	Remark

- 4 A, B, C and D are points on the circumference of a circle with centre O.
Angle DAC = 20°

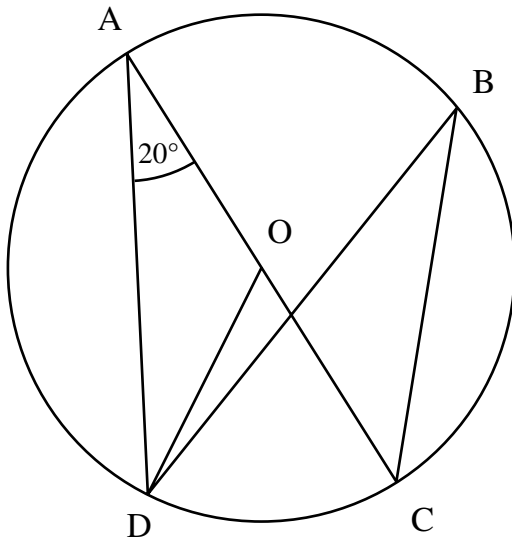


Diagram not
drawn accurately

- (a) Find the size of angles:

(i) DOC,

Answer _____ $^\circ$ [1]

(ii) ADC.

Answer _____ $^\circ$ [1]

- (b) Explain why angle DBC = 20°

Answer _____ [1]

Examiner Only	
Marks	Remark

5 A questionnaire designed to gather information on the use of the local library included the question:

‘How many times have you visited your local library in the last year?’

less than 5 5–10 10 or more

Explain why this is unsuitable in its present form.

Answer _____ [1]

Examiner Only	
Marks	Remark

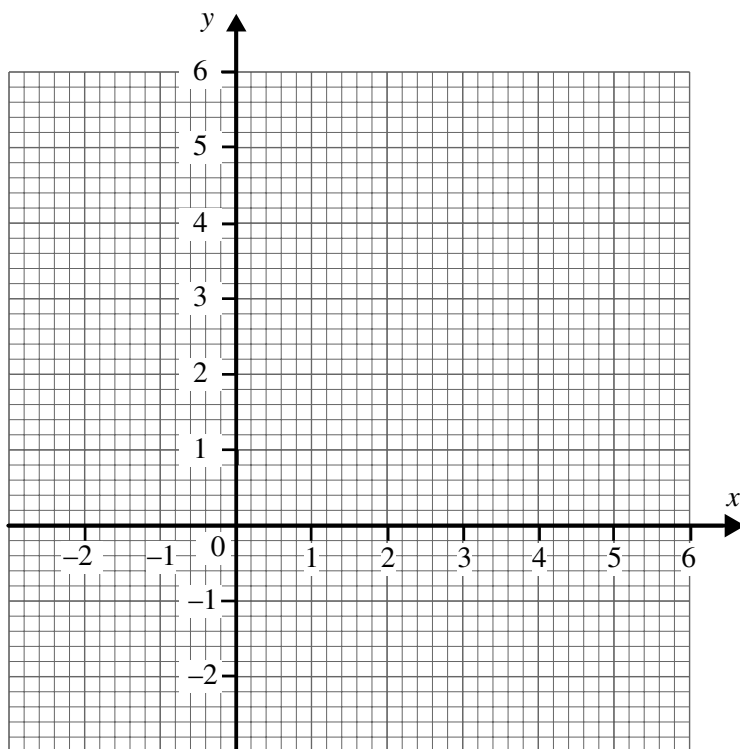
6 (a) On the grid below, draw the lines $3x + 4y = 12$

$$y = 3 - 3x$$

$$\text{and } y = -1$$

Hence indicate clearly the region **R** where

$$3x + 4y \leq 12 \quad y \geq 3 - 3x \quad \text{and} \quad y \geq -1$$



[3]

(b) Use your graph to find the minimum value of $x + 3y$ which satisfies these inequalities when x and y are integers.

Answer _____ [2]

Examiner Only	
Marks	Remark

7 The table shows the number of employees working in various departments of a supermarket chain.

Department	Fruit & Veg.	Frozen Food	Meat & Fish	Tinned & Dried Food	Bakery
Number of employees	30	90	75	75	180

A survey on job satisfaction is to be carried out.

(a) Explain why a simple random sample of employees is unsuitable.

_____ [2]

(b) A stratified sample of size 30 is used.
How many employees from the Frozen Food Department should be included?

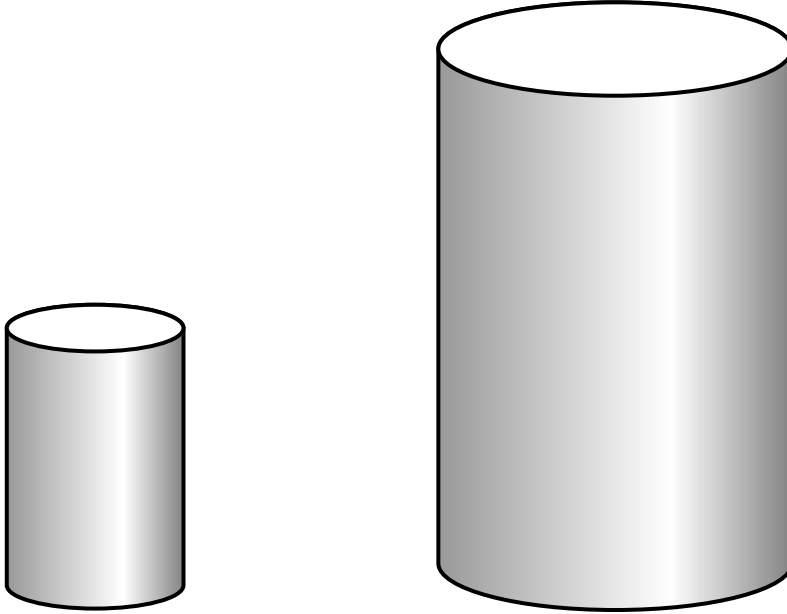
Answer _____ [2]

8 Factorise $49 - 9x^2$

Answer _____ [2]

Examiner Only	
Marks	Remark

9



Two similar waste containers are made from thin metal sheet.
The large container has volume 8 times that of the smaller one.

What is the ratio of their surface areas?

Answer _____ [2]

Examiner Only	
Marks	Remark

10 (a) Evaluate $27^{\frac{2}{3}}$

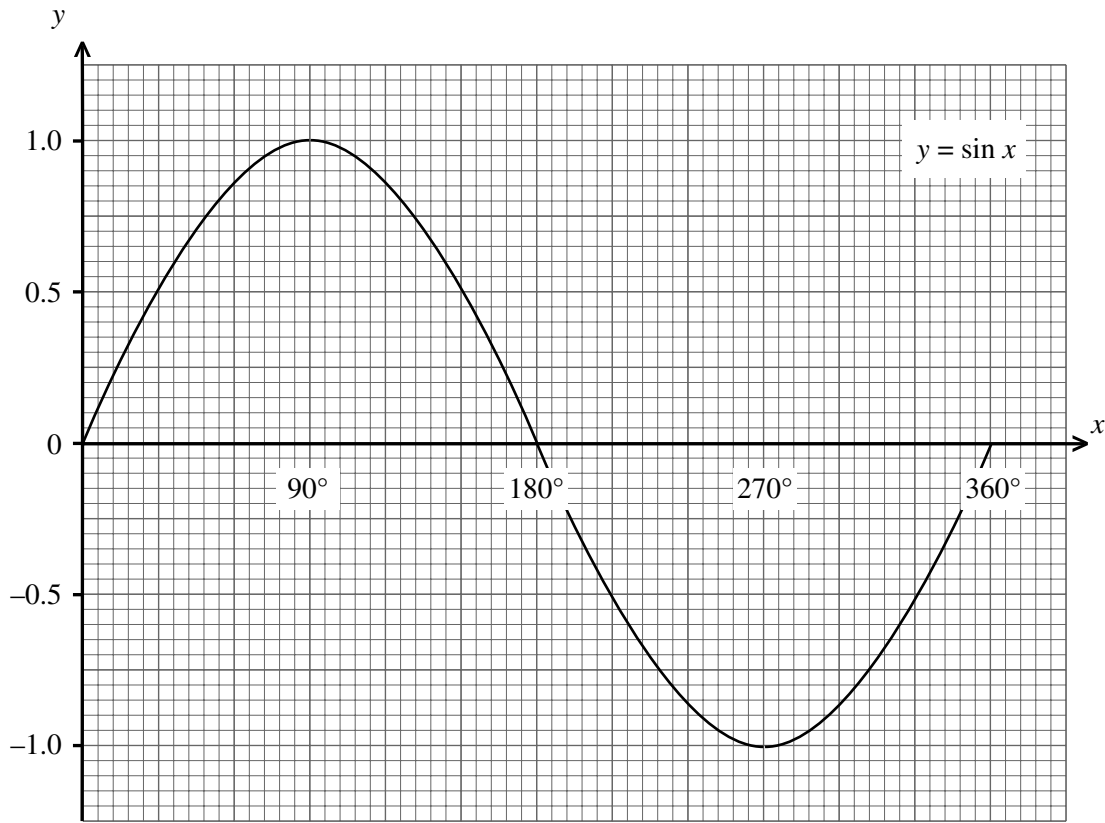
Answer _____ [2]

(b) Given that $3^y = \frac{1}{27}$ find the value of y .

Answer $y =$ _____ [2]

Examiner Only	
Marks	Remark

11



Use the graph to find the solutions of

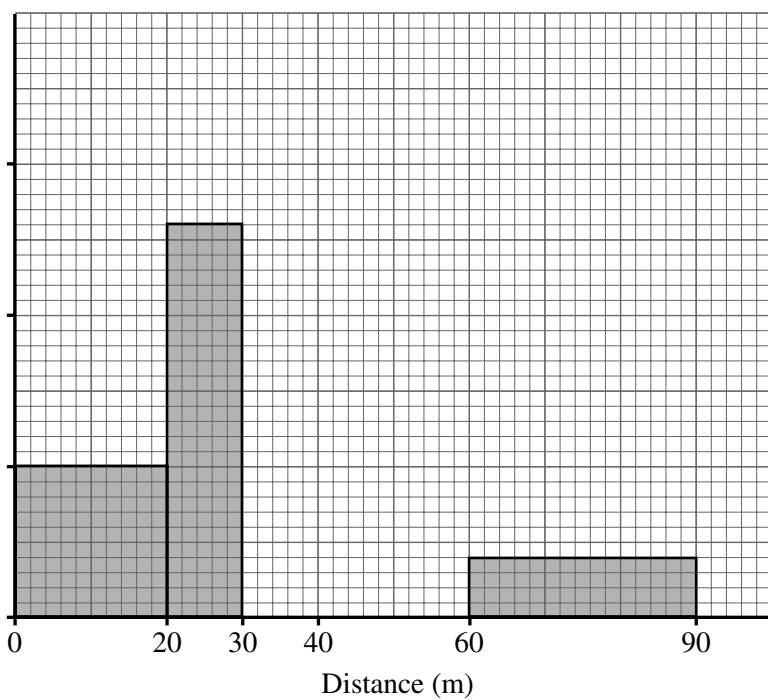
(a) $\sin x = -0.75$ Answer _____ ° [2]

(b) $4 \sin x = 1$ Answer _____ ° [2]

Examiner Only	
Marks	Remark

- 12 Data relating to distances thrown in a javelin competition was recorded. Some information is recorded in the table and some is displayed in the histogram.

Distance (m)	Frequency
$0 < d \leq 20$	10
$20 < d \leq 30$	
$30 < d \leq 40$	16
$40 < d \leq 60$	5
$60 < d \leq 90$	



Complete both the table and the histogram.

[3]

Examiner Only	
Marks	Remark

- 13 (a) Given that $\sqrt{62.3} = 7.893$ correct to four significant figures, explain how $\sqrt{6230}$ can be found correct to four significant figures without the use of a calculator.

[2]

- (b) Which of the following is **not** irrational? Circle your answer.

$\sqrt{7}$

$\sqrt[3]{65}$

$3.\dot{1}4$

[1]

- 14 Factorise $9ax^2 - 9axy + 2ay^2$ fully.

Answer _____ [3]

THIS IS THE END OF THE QUESTION PAPER

Examiner Only	
Marks	Remark

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