Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
January 2010

Mathematics

Module N4 Paper 1
(Non-calculator)
Higher Tier

[GMN41]

GMN41

TUESDAY 12 JANUARY

9.15 am – 10.15 am

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.

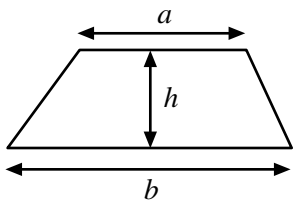
INFORMATION FOR CANDIDATES

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.

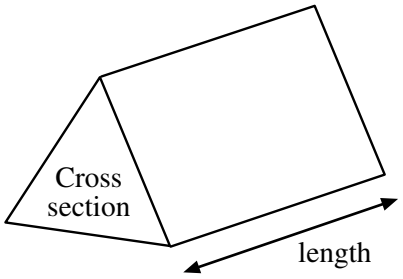
For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
Total Marks	

Formula Sheet

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



Volume of prism = area of cross section × length

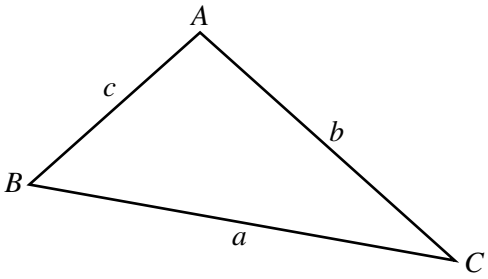


In any triangle ABC

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

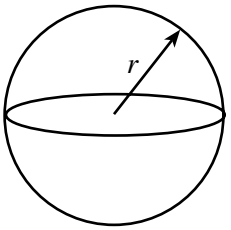
Sine rule : $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

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



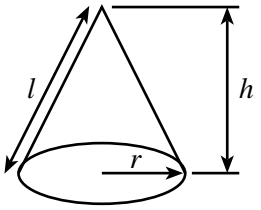
Volume of sphere = $\frac{4}{3}\pi r^3$

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

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

Examiner Only	
Marks	Remark

1 A new HD ready TV was sold at the reduced price of £434 because the surround was slightly damaged.

30% of the original price had been deducted.
What was the original price?

Answer £ _____ [3]

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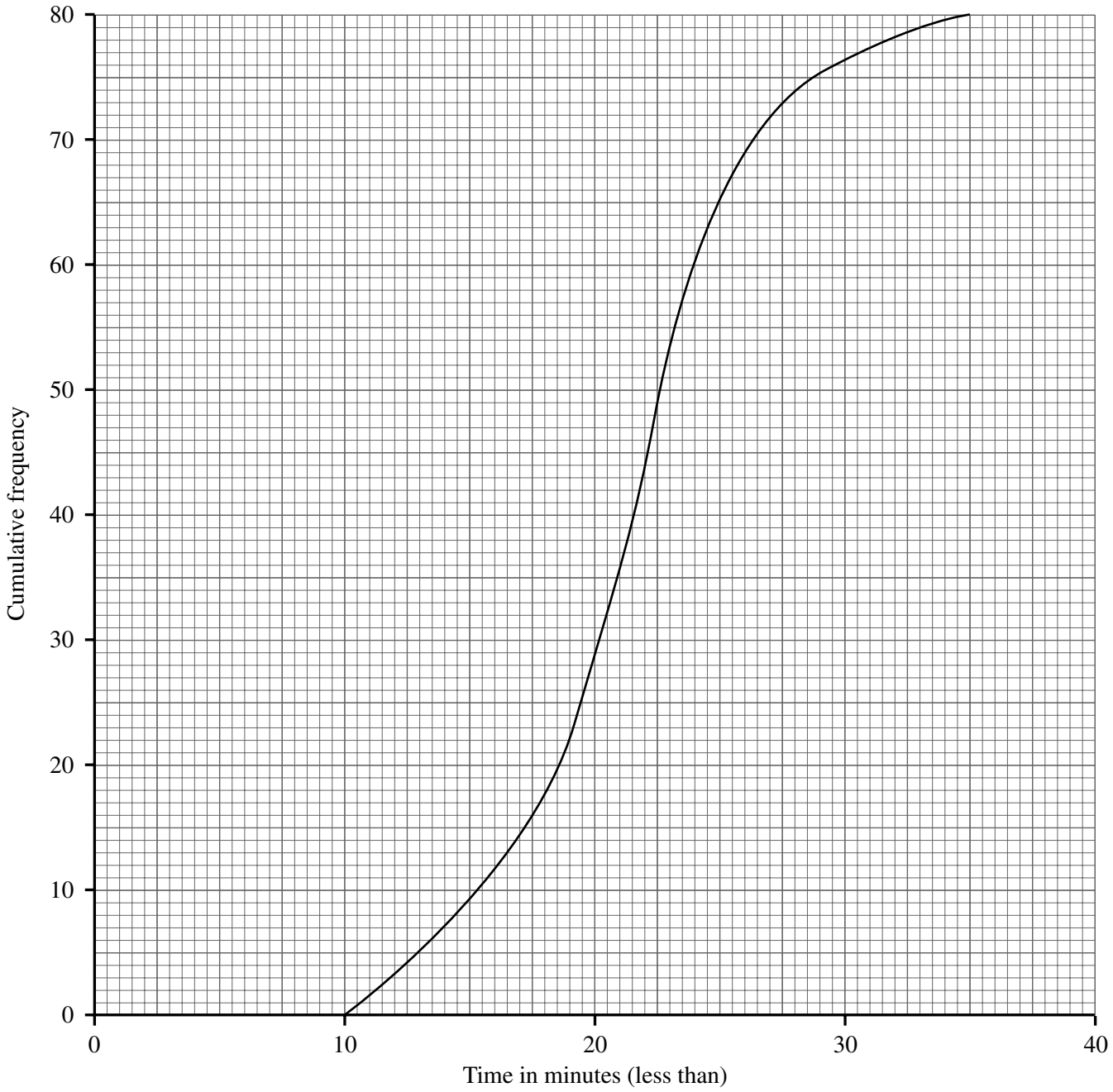
2 Bags of potatoes weigh 15 kg to the nearest kilogram.
Find the greatest and least total weights of 10 of these bags.

Answer greatest _____ kg

least _____ kg [2]

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

Examiner Only	
Marks	Remark

(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°

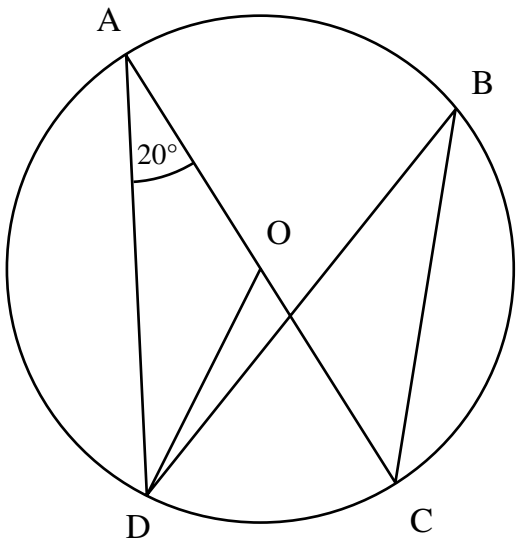


Diagram not drawn accurately

(a) Find the size of angles:

(i) DOC, Answer _____ ° [1]

(ii) ADC. Answer _____ ° [1]

(b) Explain why angle DBC = 20°

Answer _____ [1]

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

Examiner Only	
Marks	Remark

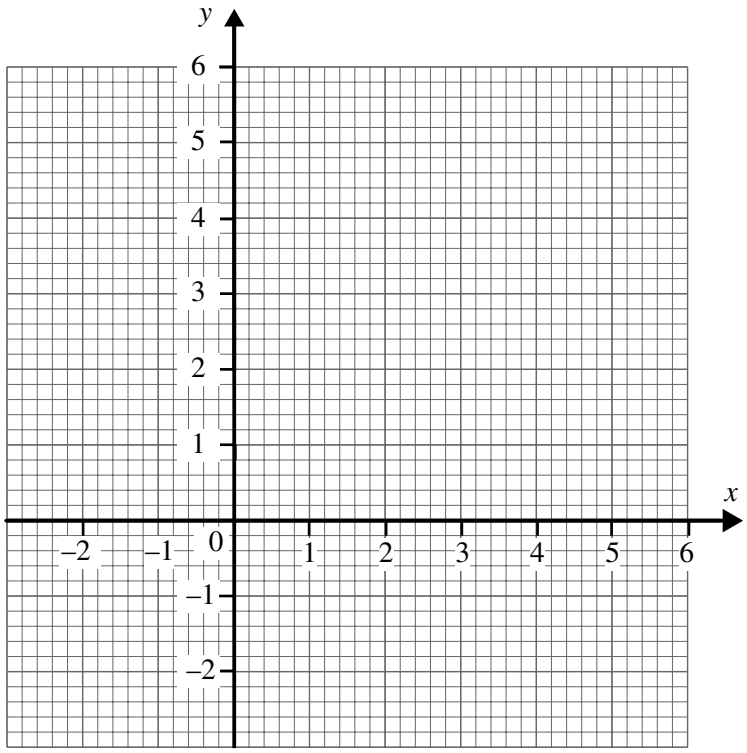
6 **(a)** On the grid below, draw the lines $3x + 4y = 12$

$y = 3 - 3x$

and $y = -1$

Hence indicate clearly the region R where

$3x + 4y \leqslant 12 \quad y \geqslant 3 - 3x \quad$ and $\quad y \geqslant -1$



[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]

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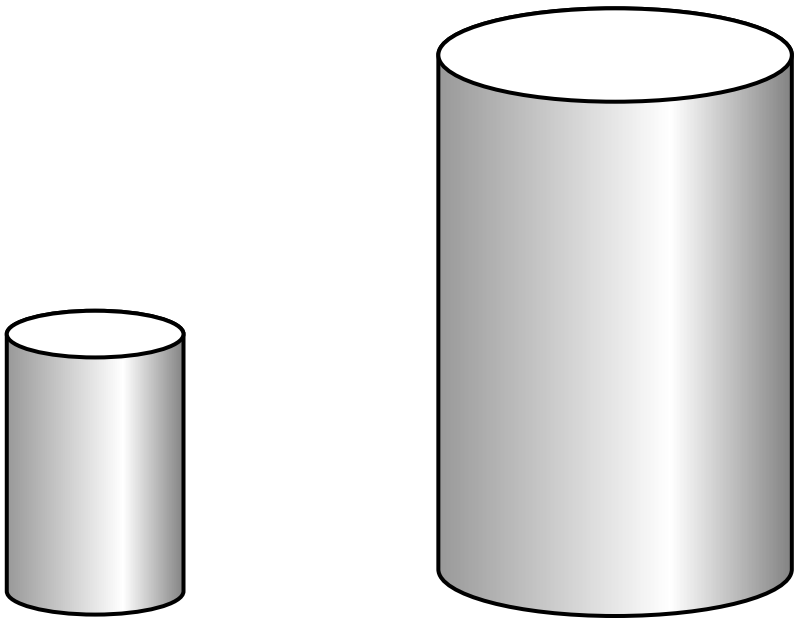
8 Factorise $49 - 9x^2$

Answer _____ [2]

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 $27^{\frac{2}{3}}$

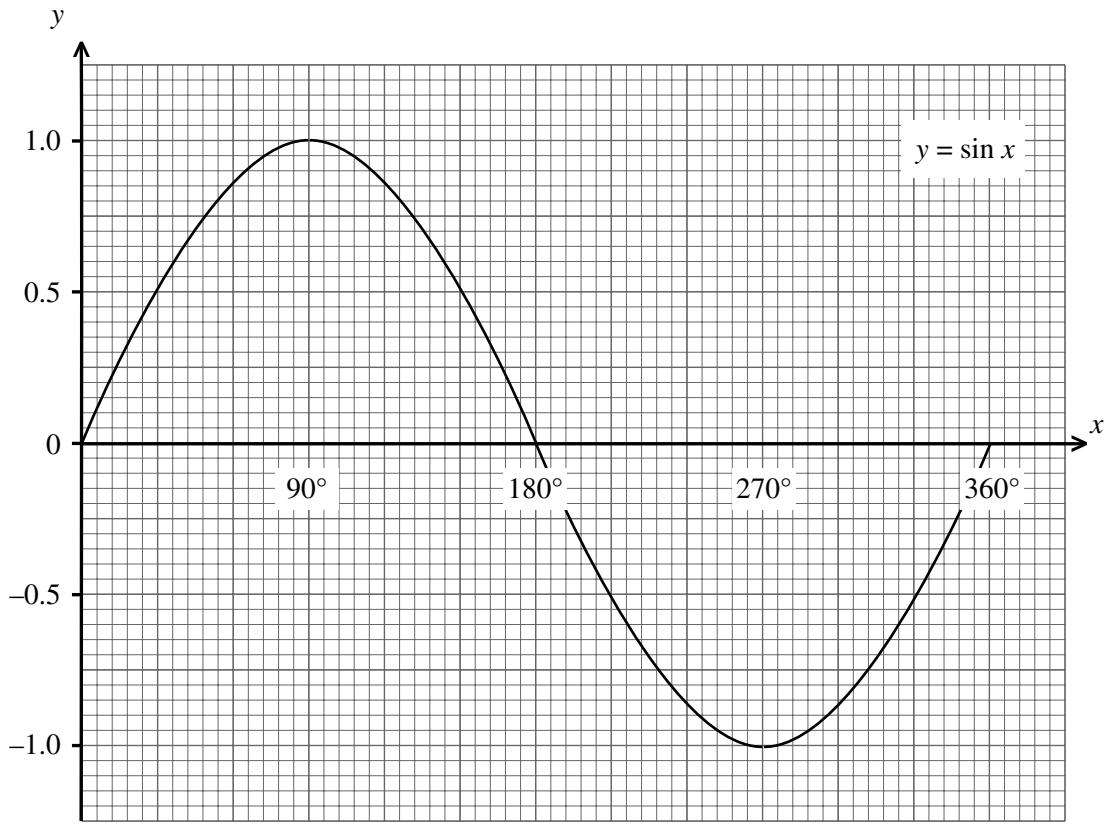
Answer _____ [2]

(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

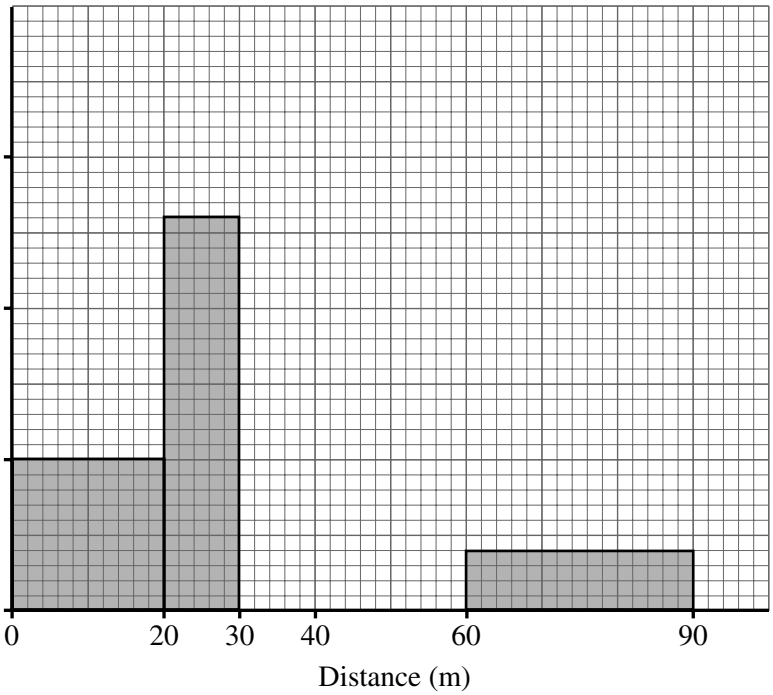
(a) sin $x = -0.75$ Answer _____ ° [2]

(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
$0 < d \leqslant 20$	10
$20 < d \leqslant 30$	
$30 < d \leqslant 40$	16
$40 < d \leqslant 60$	5
$60 < d \leqslant 90$	



Complete both the table and the histogram. [3]

Examiner Only

Marks	Remark

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.

$\sqrt{7}$ $\quad$ $\sqrt[3]{65}$ $\quad$ $3.\dot{1}\dot{4}$ [1]

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

Answer _____ [3]

THIS IS THE END OF THE QUESTION PAPER

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