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Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
January 2009

Mathematics

Module N4 Paper 1
(Non-calculator)
Higher Tier

[GMN41]

GMN41

FRIDAY 9 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 twelve** 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	
Total Marks	

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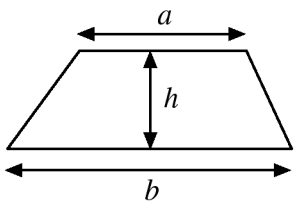
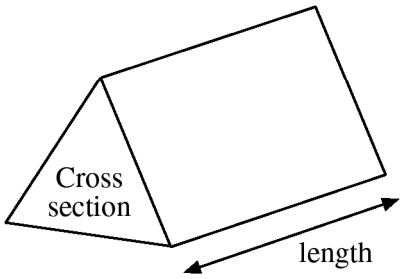
Formula Sheet

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



Volume of prism = area of cross section × length

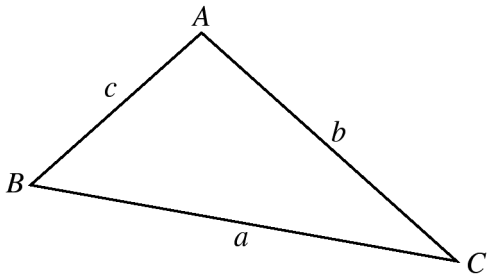


In any triangle *ABC*

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

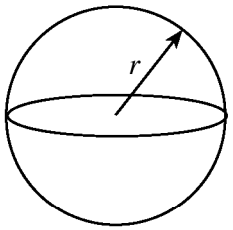
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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



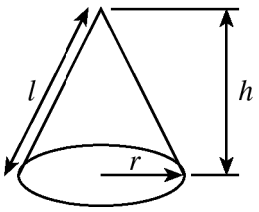
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

Curved surface area of cone = πrl



Quadratic equation:

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

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

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(Questions begin overleaf)

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1 Eileen constructed a cumulative frequency table from her mobile phone bill to display her call times over the previous month. The results are shown in the table below.

Time in minutes	Cumulative frequency
<5	29
<10	62
<15	114
<20	153
<25	179
<30	195

(a) Draw a cumulative frequency graph, on the opposite page, to display the data. [3]

(b) From your graph, estimate the median for Eileen's call times.

Answer _____ minutes [1]

(c) Eileen's pricing plan with the phone company allows her free calls provided that they last no more than 12 minutes.
From your graph, estimate the number of calls which will be charged to Eileen's account by the phone company.

Answer _____ calls [2]

(d) The shortest call took one minute and the longest took 29 minutes.
Draw a box plot on the grid below the cumulative frequency graph to illustrate the data. [3]

Examiner Only

Marks	Remark

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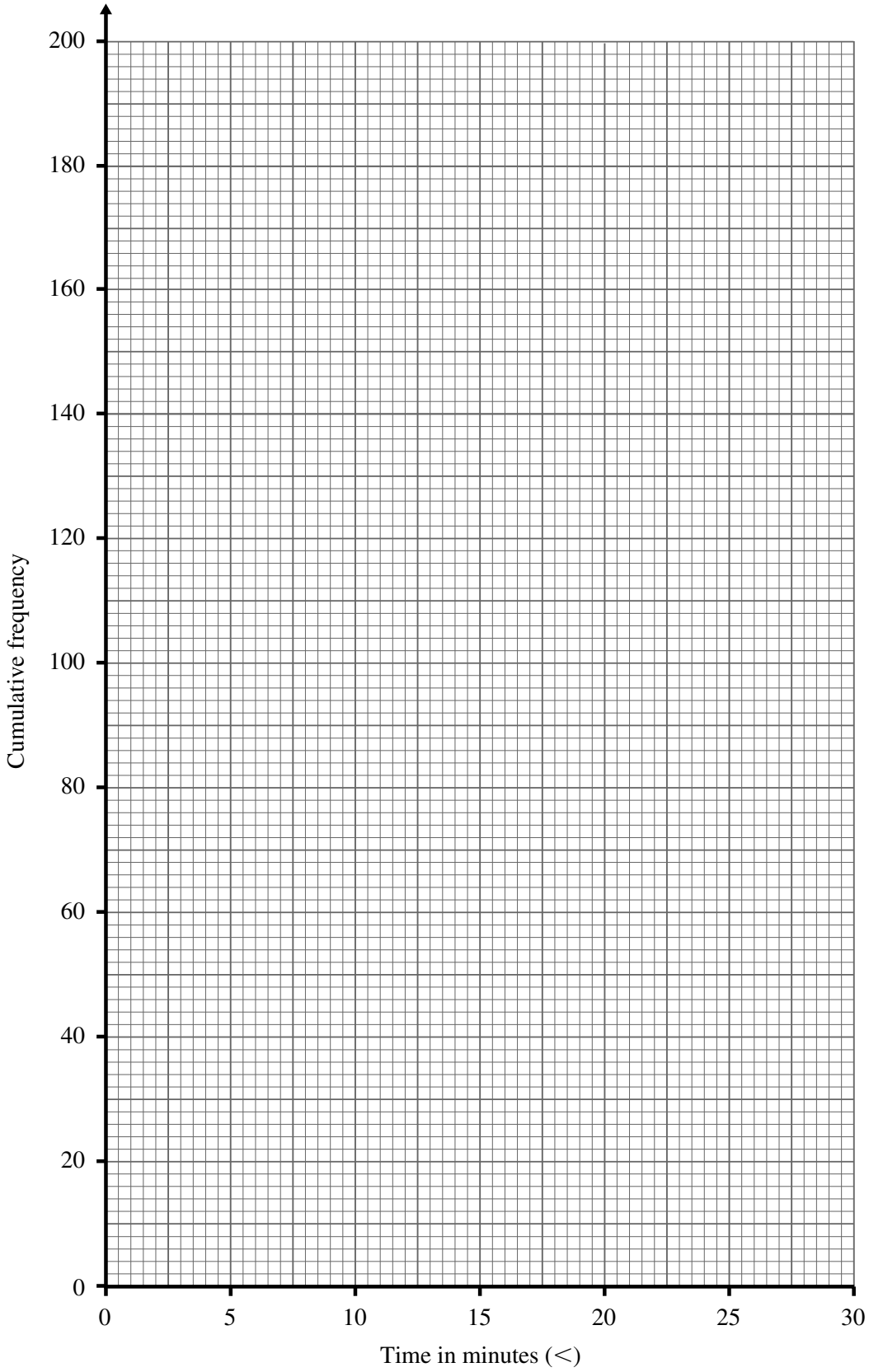

Examiner Only	
Marks	Remark

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Examiner Only	
Marks	Remark

2 Calculate $4\frac{1}{4} \times 2\frac{2}{3}$

Give your answer as a mixed number.

Answer _____ [3]

---

3 Solve the equation $\frac{x+2}{2} - \frac{2x-1}{3} = 2$

Show your working.
A solution by trial and improvement will not be accepted.

Answer x = _____ [4]

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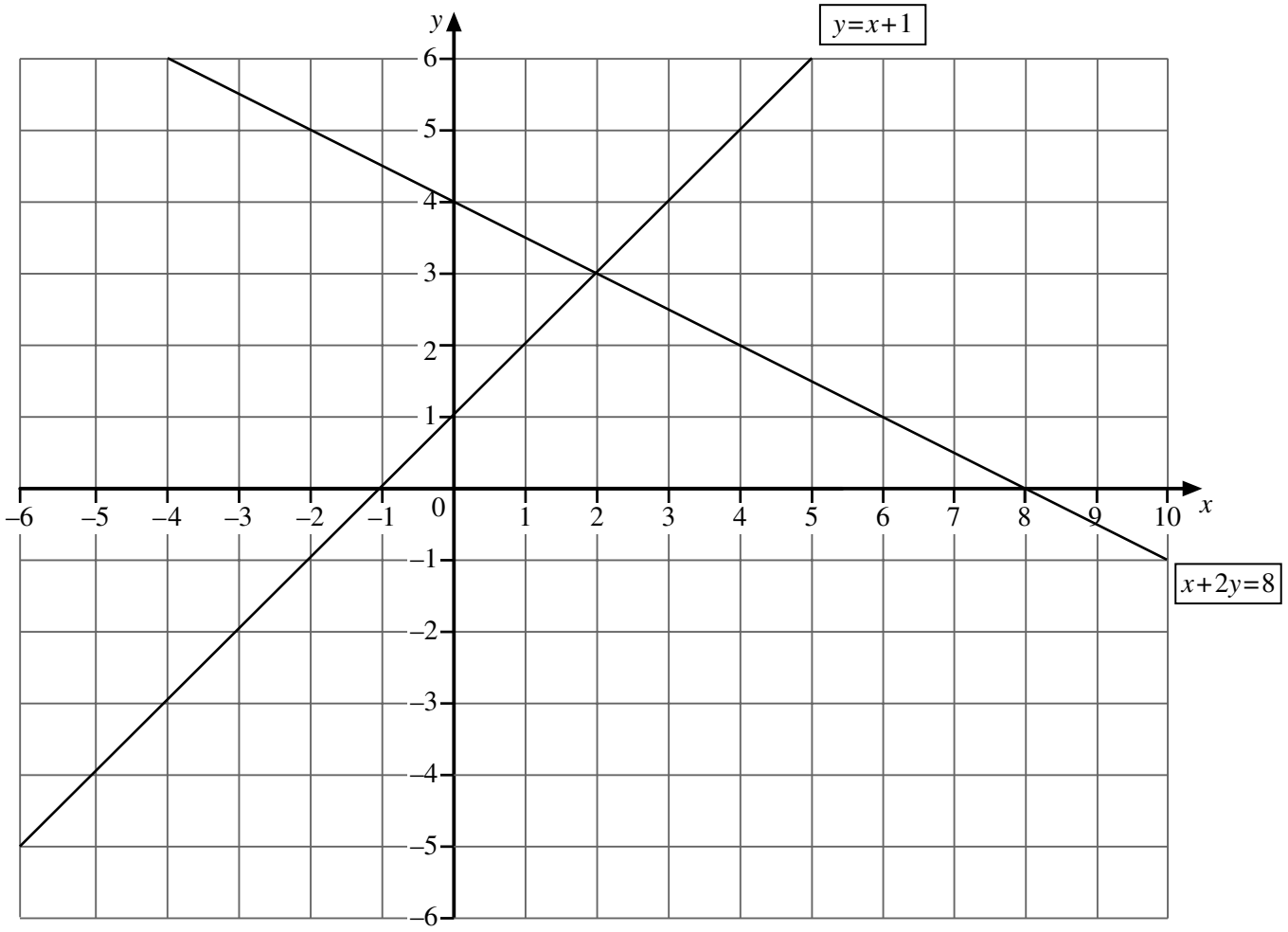
4 The graphs of the lines $y = x + 1$ and $x + 2y = 8$ are shown in the diagram.



Examiner Only	
Marks	Remark

(a) Identify with a letter R, the region which satisfies the inequalities

$y \geq x + 1$ $x + 2y \leq 8$ $x \geq 0$ [2]

(b) What is the greatest value of x in this region?

Answer _____ [1]

(c) What point (x, y) in the region R maximises the value of the expression $y - x$?

Answer x = _____ y = _____ [2]

[Turn over

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Marks	Remark

5 536 pupils attend a secondary school. There are a total of 20 registration classes.

A random sample of 40 pupils is to be chosen to represent the school at a charity event.

The principal suggests that every 10th pupil in alphabetical order in each registration class should be chosen to attend the charity event.

Give **two** reasons why this selection process is flawed.

Reason 1 _____

_____ [1]

Reason 2 _____

_____ [1]

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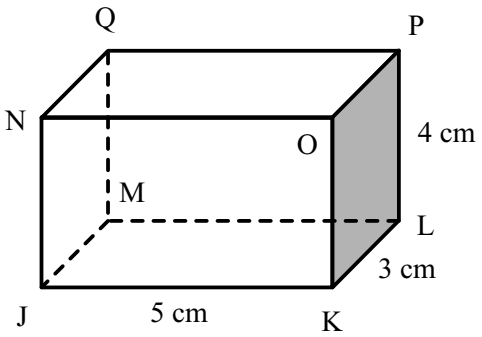
6 Calculate the length of the space diagonal JP in the cuboid shown.
Give your answer in the form $\sqrt{n}$.



Answer _____ cm [2]

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Examiner Only	
Marks	Remark

7 A wedding cake has two tiers, which are similar in shape.
The area to be iced on the small tier is 100 square inches.
The area to be iced on the large tier is 225 square inches.
The width of the larger tier is 12 inches.
What is the width of the smaller tier?

Answer _____ inches [2]

---

8 Evaluate

(a) $64^{0.5}$

Answer _____ [1]

(b) $27^{2/3}$

Answer _____ [2]

(c) $16^{-3/4}$

Answer _____ [2]

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9 Simplify $\dfrac{2x^2 - 3xy + y^2}{4x - 2y}$

Answer _____ [3]

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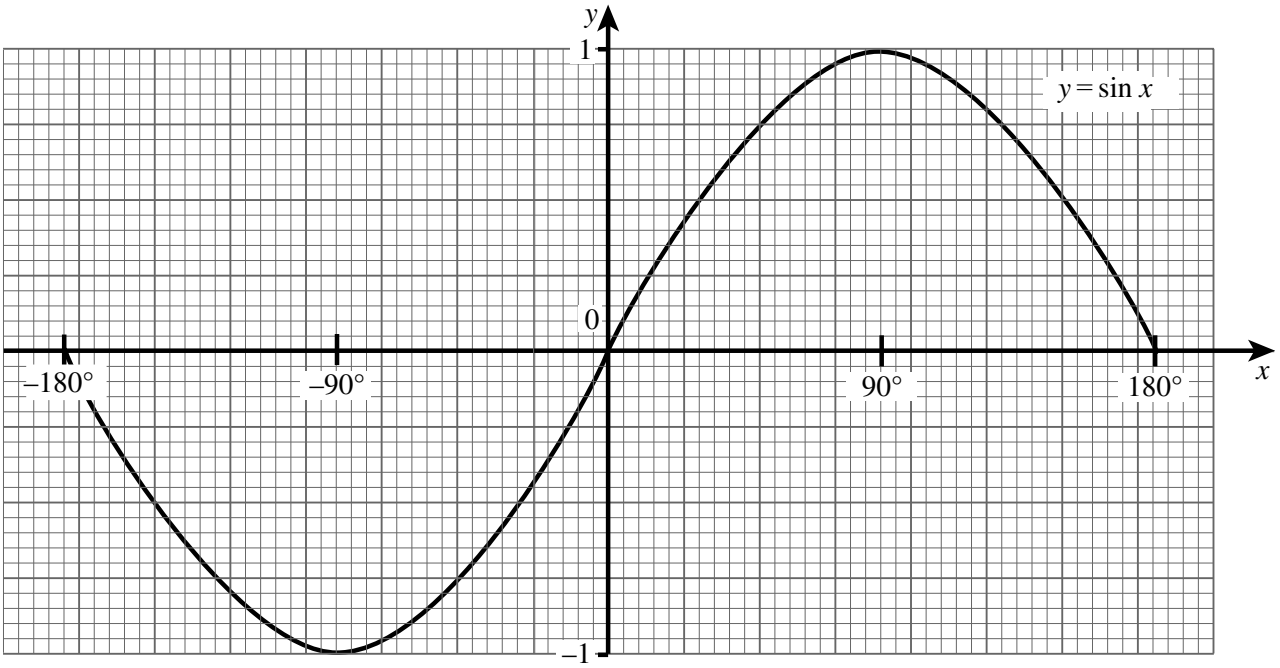
10



Use the graph to find solutions for the equation

(a) $\sin x = -0.95$ Answer $x =$ _____ [2]

(b) $5 \sin x = 3$ Answer $x =$ _____ [2]

Examiner Only	
Marks	Remark

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Examiner Only	
Marks	Remark

11 State which one of the following equations has solutions which are rational. Explain why this is the case.

(a) $\frac{x^3}{3} = 8$

(b) $\frac{8x^3}{3} = 9$

(c) $\frac{x^3}{4} = 9$

Answer _____ because _____

_____ [2]

12 $(x - a)^2 \equiv x^2 - 12x + b$

Find the values for a and b

Answer a = _____ b = _____ [3]

THIS IS THE END OF THE QUESTION PAPER

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