Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
January 2009

Mathematics

Module N3 Paper 1
(Non-calculator)
Higher Tier

[GMN31]

GMN31

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 eleven** 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.

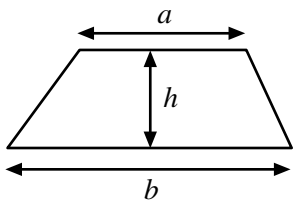
INFORMATION FOR CANDIDATES

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.

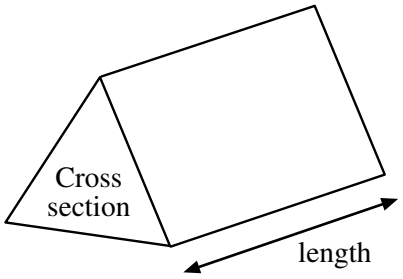
For Examiner's use only	
Question Number	**Marks**
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
Total Marks	

Formula Sheet

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



Volume of prism = area of cross section × length

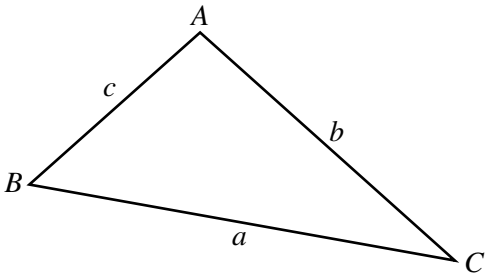


In any triangle ABC

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

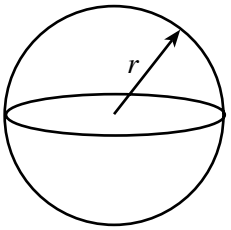
Sine rule : $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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



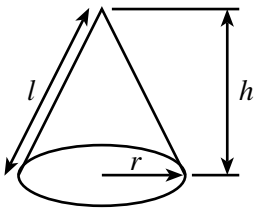
Volume of sphere = $\frac{4}{3}\pi r^3$

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

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

1 (a)

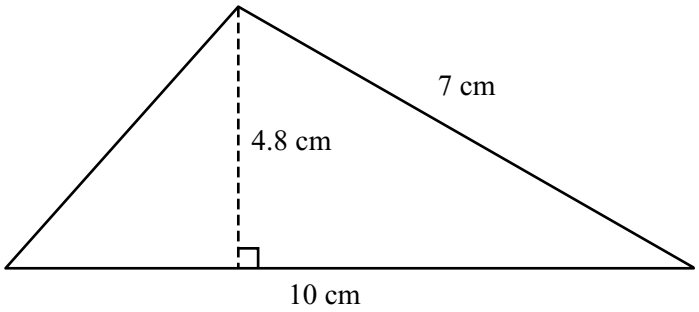


Diagram not drawn accurately

Calculate the area of the triangle.

Answer _____ cm^2 [2]

(b) Convert 8.4 m^2 to cm^2

Answer _____ cm^2 [2]

Examiner Only	
Marks	Remark

2 Joe uses $\frac{3}{4}$ of a tin of paint to paint a garden shed.

What is the least number of tins he requires to paint 10 similar sheds?

Answer _____ [3]

Examiner Only	
Marks	Remark

3 A survey was carried out in Belfast City centre to find out the opinions of people on the subject of 'healthy living'.

A sample of 100 people was questioned.

(a) (i) Explain why these 100 people might not represent the opinions of the Belfast public on 'healthy living'.

_____

_____ [1]

(ii) One of the questions used in the survey was "Do you not think that thin people are healthier than fat people?"
Give a reason why this question may not have been a suitable question for the survey.

Reason _____

_____ [1]

(b) The same survey was carried out inside a leisure centre in Lisburn.
Give **two** reasons why the survey should not have been carried out in this location.

Reason _____

_____ [1]

Reason _____

_____ [1]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

4 The heights, in cm, of 11 children in a nursery class were:

81 86 90 97 88 79 83 91 93 85 88

Illustrate this using a stem and leaf diagram. [3]

5 **(a)** Factorise

(i) $28 - 7y$

Answer _____ [1]

(ii) $p - pt$

Answer _____ [1]

(b) **(i)** Expand $5(3 - y)$

Answer _____ [1]

(ii) Expand and simplify $(x - 3)(x + 1)$

Answer _____ [2]

(c) Write down an expression for the nth term of the sequence

2, 7, 12, 17, ...

Answer _____ [2]

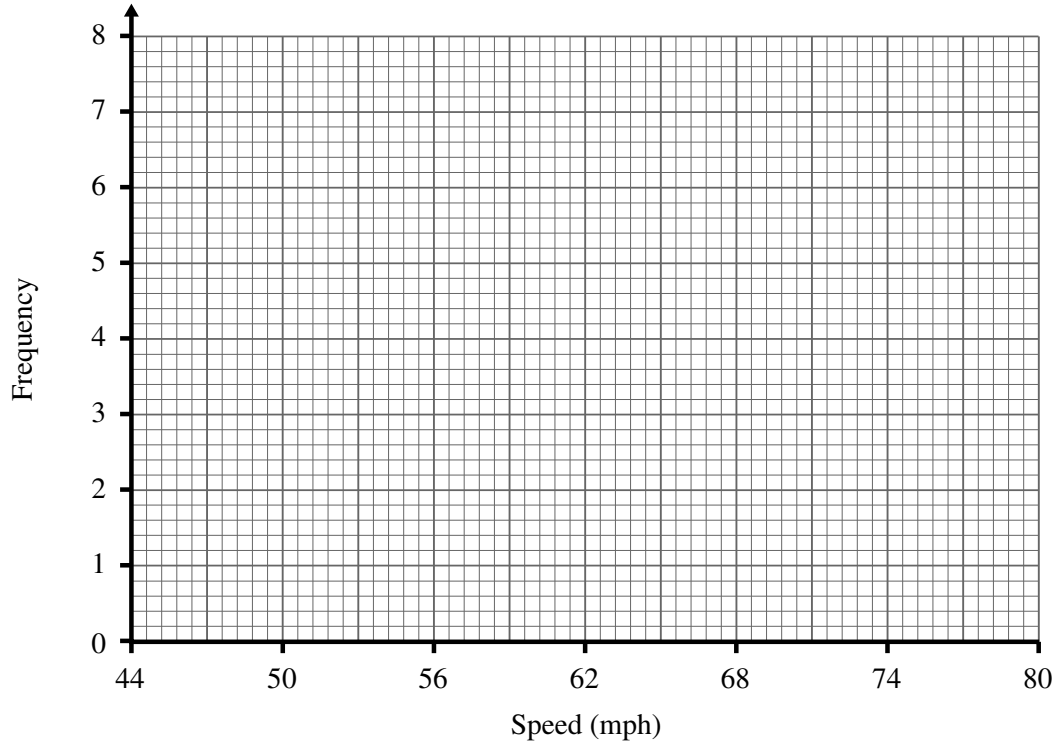
6 The PSNI recorded the speeds of a number of vehicles passing under a bridge on the M2 motorway during a 2 minute period one morning. The speeds recorded are in miles per hour (mph).

Speed x (mph)	Frequency f
$44 \leq x < 50$	3
$50 \leq x < 56$	7
$56 \leq x < 62$	8
$62 \leq x < 68$	6
$68 \leq x < 74$	5
$74 \leq x < 80$	1

(a) Which of the class intervals contains the median speed?

Answer _____ [1]

(b) On the graph paper draw a frequency polygon for the data. [2]



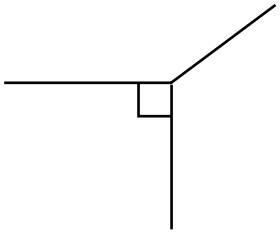
Examiner Only

Marks	Remark

[Turn over

Examiner Only	
Marks	Remark

7 Two identical regular polygons join with a square to form a tiling pattern.



Explain why these polygons must be regular octagons.

_____

_____

_____

_____ [3]

8 Write 120 as a product of prime factors and express your answer in index notation.

Answer _____ [3]

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(Questions continue overleaf)

9 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 interquartile range.

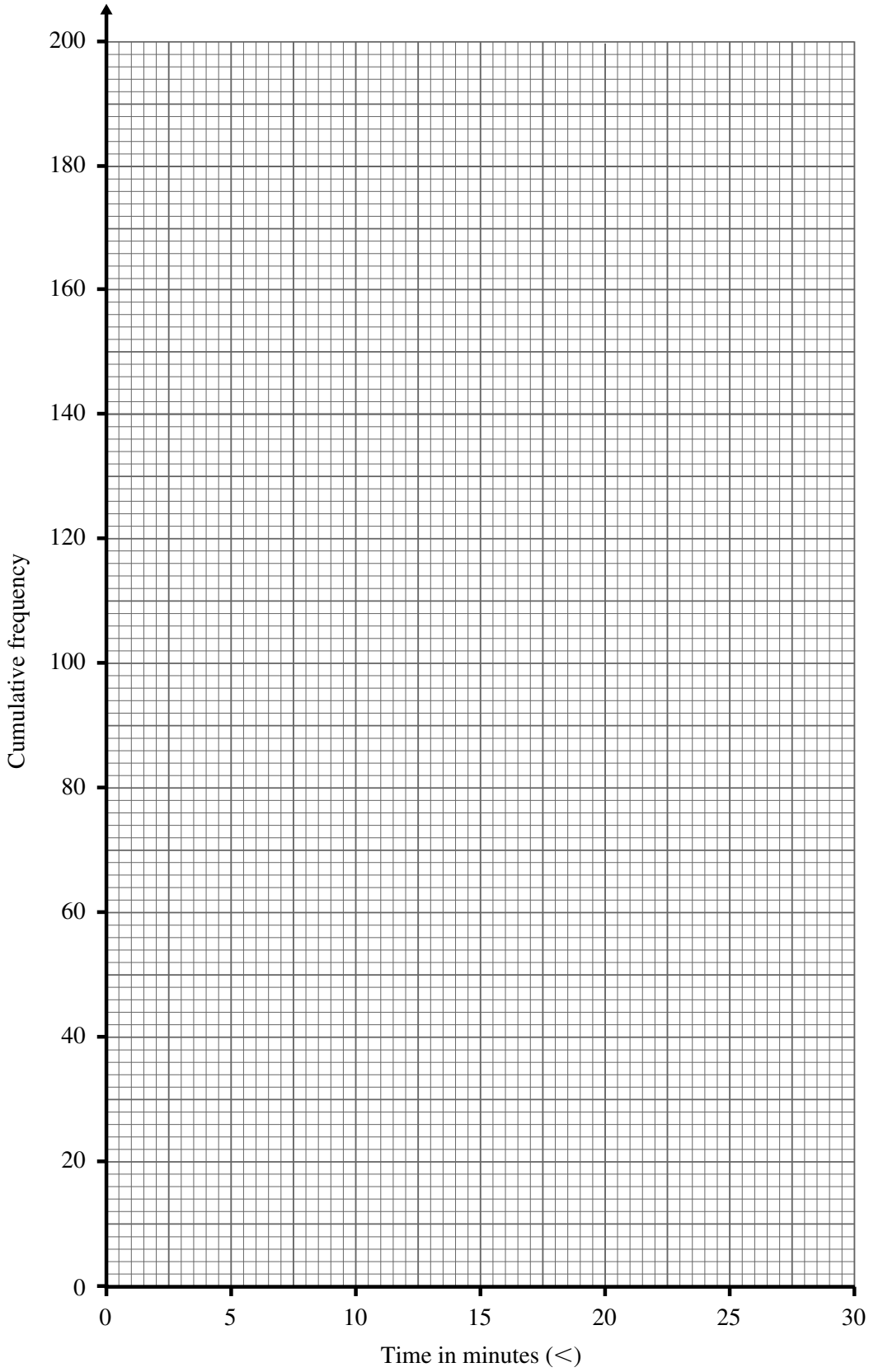
Answer _____ minutes [2]

(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]

Examiner Only

Marks	Remark



[Turn over

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

Give your answer as a mixed number.

Answer _____ [3]

Examiner Only	
Marks	Remark

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11 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]

THIS IS THE END OF THE QUESTION PAPER