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Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
January 2012

Mathematics

Module N4 Paper 1
(Non-calculator)
Higher Tier

[GMN41]

WEDNESDAY 11 JANUARY
9.15 am–10.15 am

GMN41

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	

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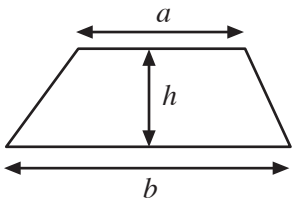
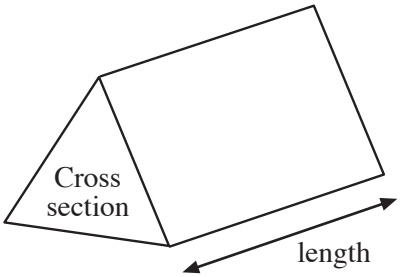
Formula Sheet

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



Volume of prism = area of cross section × length

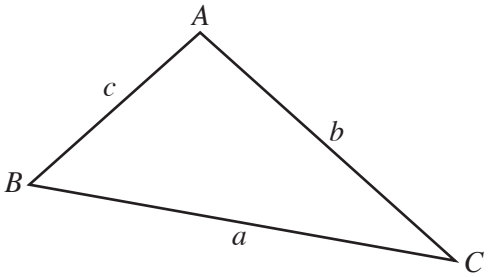


In any triangle ABC

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

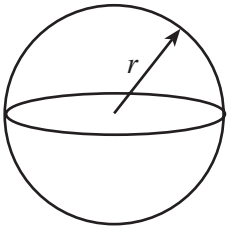
Sine rule : $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

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



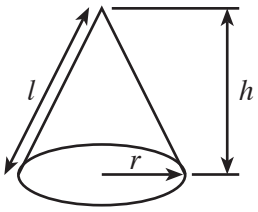
Volume of sphere $= \frac{4}{3}\pi r^3$

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

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

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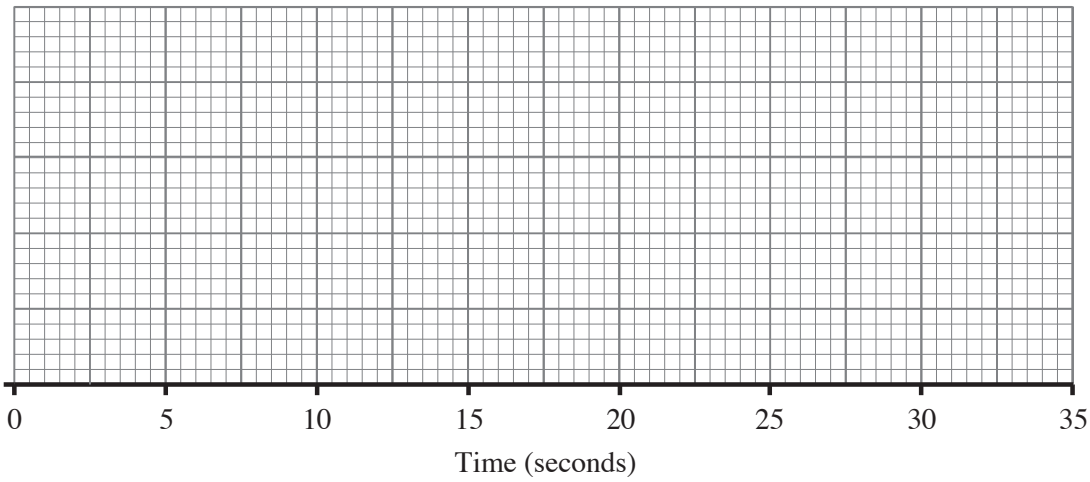
Examiner Only	
Marks	Remark

1 The times, in seconds, taken by 11 teachers to solve a puzzle are listed in order below.

4, 12, 13, 17, 18, 20, 22, 24, 25, 30, 34

Draw a box plot for this data on the grid below.



[3]

2 Solve the equation $\frac{4x+1}{12}+\frac{2x-3}{6}=\frac{7}{4}$

Answer $x =$ _____ [4]

3 There are 14 boys and 16 girls in a class.

In a test the mean mark for the boys was b.

In the same test the mean mark for the girls was g.

Find an expression for the mean mark of the whole class of 30 pupils.

Answer _____ [3]

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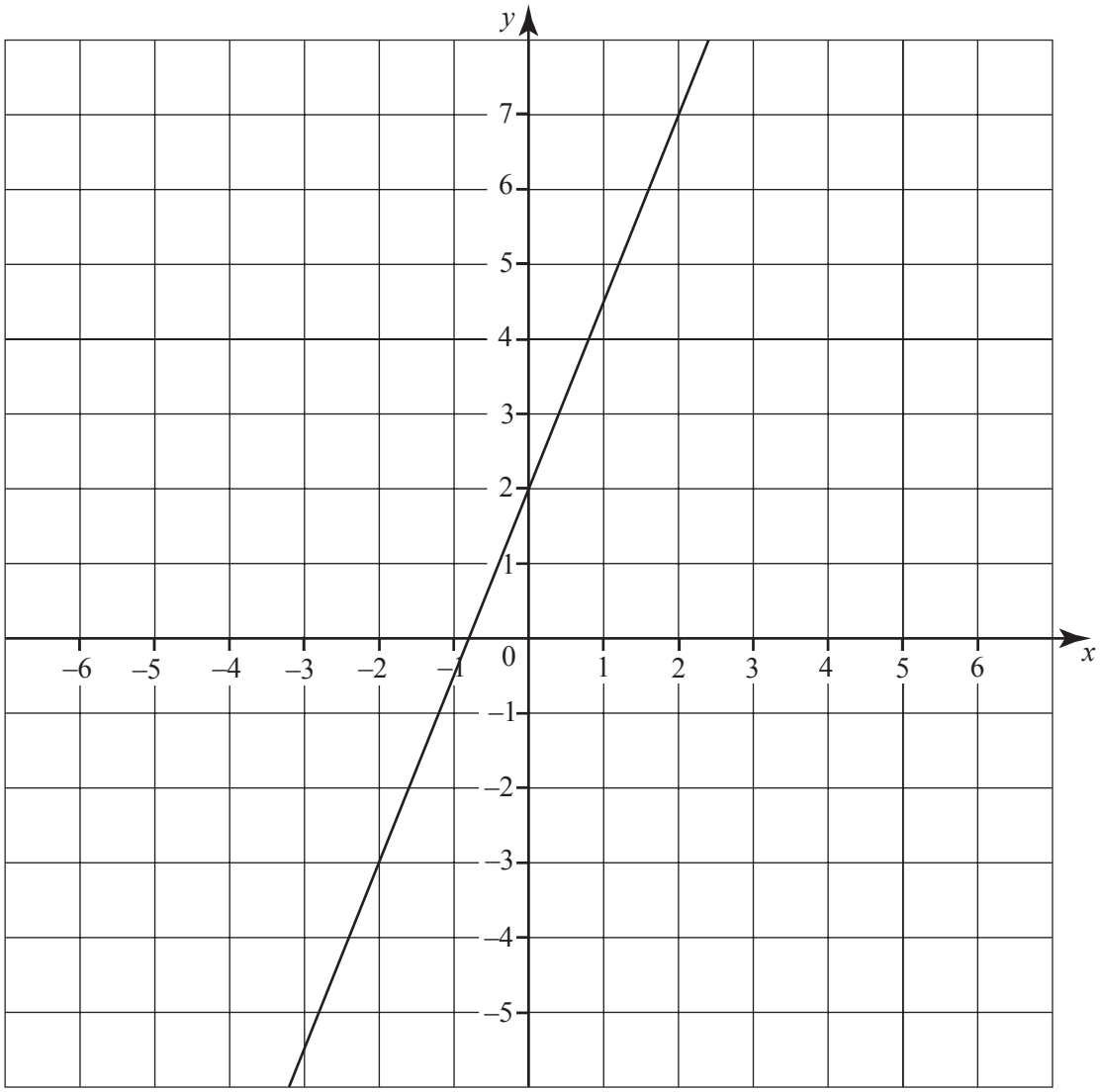
4



(a) Write down the gradient of the line drawn above.

Answer _____ [1]

(b) Hence write down the equation of this line.

Answer _____ [2]

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Marks	Remark

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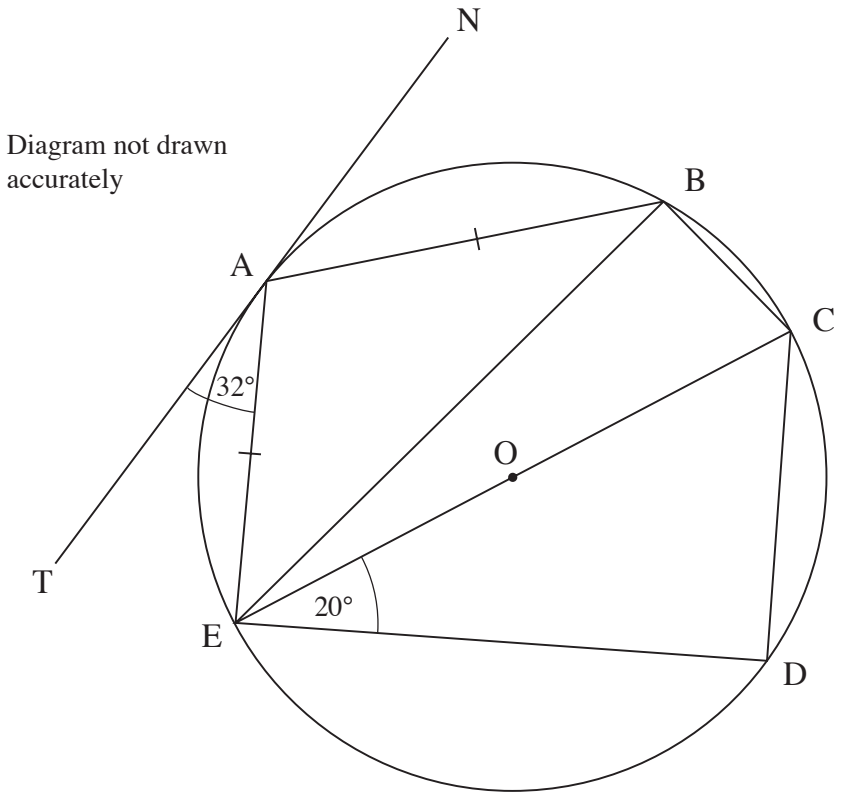
5 In the diagram EC is a diameter of the circle and AE = AB.

The line TN is the tangent at A.



Given that angle TAE = 32° and angle CED = 20°, calculate the size of each of the following:

(a) Angle ABE = _____° [1]

(b) Angle BAE = _____° [1]

(c) Angle BCE = _____° [1]

(d) Angle BED = _____° [1]

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Marks	Remark

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Marks	Remark

6 Write each of the following values in the correct column in the table as either rational or irrational.

5π $\quad \frac{2\pi}{3\pi}$ $\quad \sqrt{30}$ $\quad \sqrt[3]{64}$ $\quad 2.\dot{3}$ $\quad 1.62444$

Rational	Irrational

[2]

7 There are 600 pupils at Willow High School.

The table below shows information about the pupils.

Year group	Number of boys	Number of girls
8	82	65
9	74	64
10	57	55
11	55	58
12	49	41

Andrew, Karan and Caroline are carrying out a survey in the school to get some information about the use of the school library.

They each decide that they will survey 50 pupils but each of them selects their sample in a different way.

(a) Andrew is going to visit a different Year 8 class each morning for a week and will survey 5 boys and 5 girls each day.

Comment on this method of sampling.

_____

_____ [1]

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(b) Karan gets an alphabetical list of all 600 pupils in the school and selects every 10th name on the list until she has 50 names. She then surveys these pupils.

Comment on this method of sampling.

_____

_____ [1]

(c) Caroline takes a sample, stratified both by Year group and by gender, of 50 of the 600 pupils.

(i) Calculate the number of Year 10 boys in her sample.

Answer _____ [2]

(ii) Caroline stated that "There will be twice as many Year 8 boys as Year 12 girls in my sample."

Is Caroline's statement correct?

You must explain how you reached your decision.

[2]

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8 Find the equation of the line through (0, 4) perpendicular to the line $y = 3x + 7$

Answer _____ [2]

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Marks	Remark

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9 Martin recorded the length, in minutes, of the films shown on television in one week.

Below is a partially completed frequency table and opposite is a partially completed histogram for his data.

Length in minutes (m)	Frequency
$0 < m \leq 60$	30
$60 < m \leq 80$	
$80 < m \leq 90$	68
$90 < m \leq 100$	96
$100 < m \leq 140$	

(a) Use the information in the histogram to complete the frequency table. [2]

(b) Complete the histogram by drawing the missing bars. [2]

(c) Estimate the number of films whose length is between $\frac{3}{4}$ hour and $1\frac{1}{4}$ hours.

Answer _____ [2]

Martin also recorded the lengths, in minutes, of all the films shown on television the following week. He made a new histogram.

Some of his data are given in the table below.

Length in minutes (m)	Frequency	Height of bar (mm)
$60 < m \leq 100$	144	72
$100 < m \leq 160$	x	

(d) Complete the table by finding the height of the second bar, giving your answer **in terms of x**. [2]

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Marks	Remark

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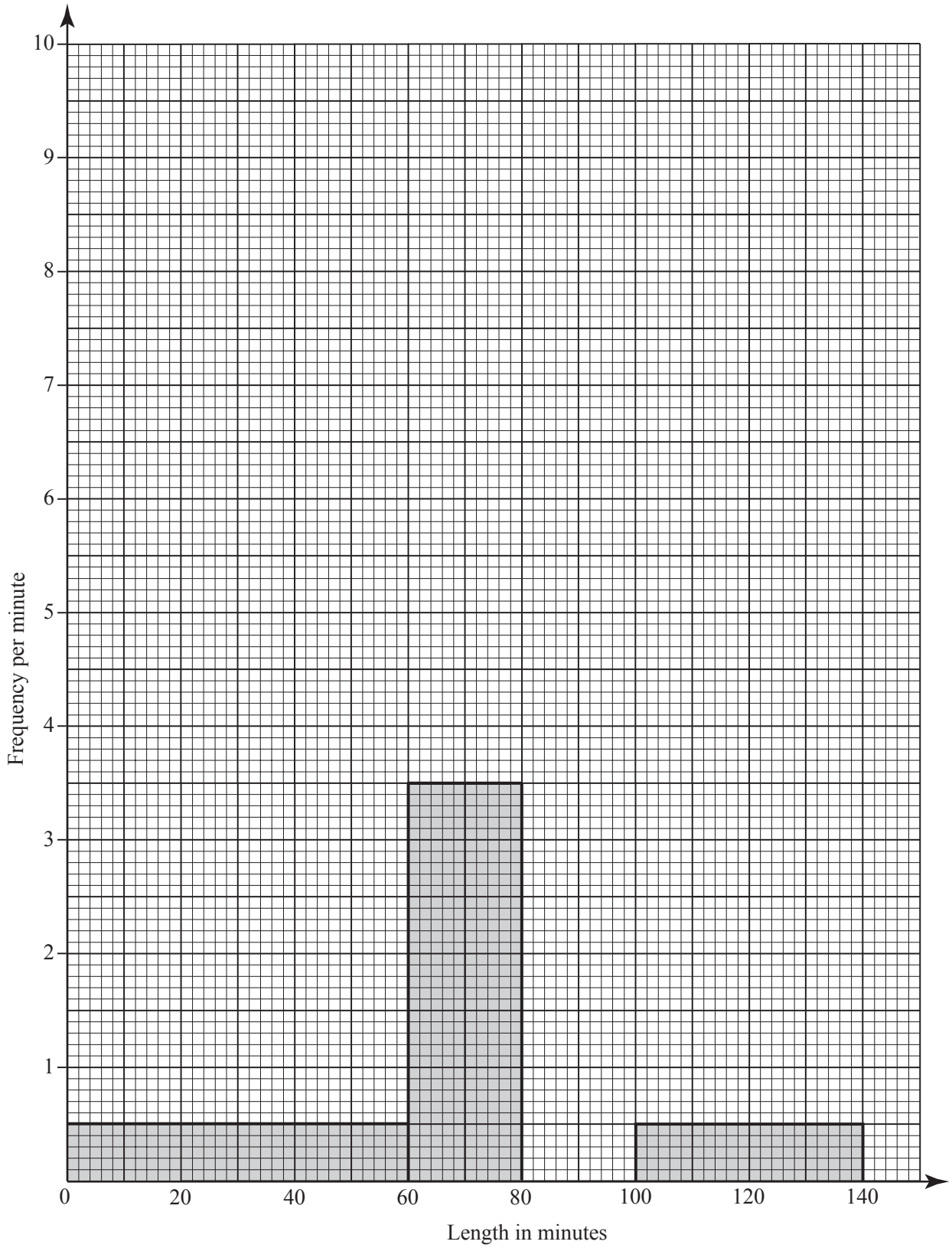

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Marks	Remark

10 **(a)** Evaluate $16^{\frac{3}{4}}$

Answer _____ [2]

(b) Prove that

$$\left(\frac{8}{27}\right)^{-\frac{4}{3}} \times 0.25^{-2} = 81$$

Show each step of your working.

[4]

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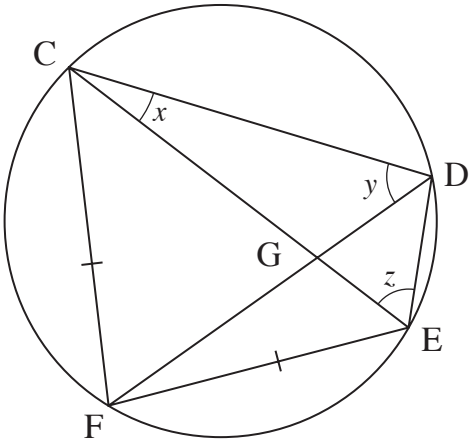
11



The diagonals CE and DF of a cyclic quadrilateral CDEF intersect at G.

Given that CF = FE, prove that angle CGD = angle FED

[3]

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Marks	Remark

THIS IS THE END OF THE QUESTION PAPER

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