Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
January 2012

Mathematics

Module N3 Paper 1
(Non-calculator)
Higher Tier

[GMN31]

WEDNESDAY 11 JANUARY
9.15 am–10.15 am

GMN31

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 ten** 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.

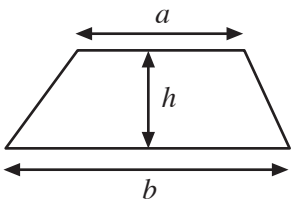
INFORMATION FOR CANDIDATES

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.

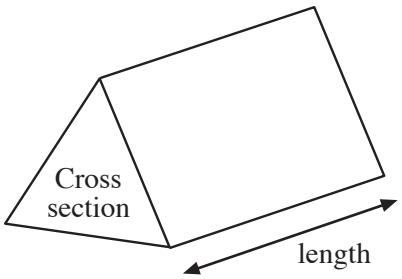
For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
Total Marks	

Formula Sheet

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



Volume of prism = area of cross section × length

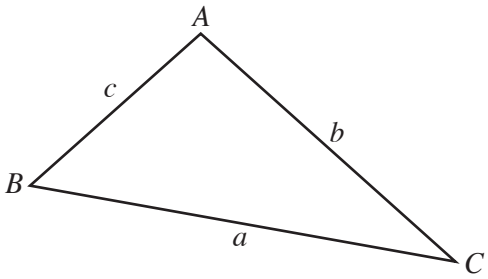


In any triangle ABC

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

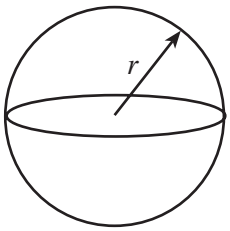
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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



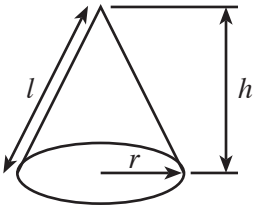
Volume of sphere $= \frac{4}{3}\pi r^3$

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



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

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



Quadratic equation:

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

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

1 Factorise

(a) $20d + 35$

Answer _____ [1]

(b) $y^2 + y$

Answer _____ [1]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

2 Aaron wants to find out how often people go to the cinema.
He designs the following questionnaire to use to gather data for his survey.

> How often do you go to the cinema?
>
> Tick one box below.
>
> Not very often ☐ Sometimes ☐ A lot ☐

(a) Write down two things that are wrong with this questionnaire.

1. _____

_____

2. _____

_____ [2]

(b) Design a better questionnaire for him to use to find out how often people go to the cinema.
You should include some response boxes.

[2]

(c) Aaron intends to give out his questionnaire to all the men leaving the cinema.
Give two reasons why the data he will collect from his survey will be biased.

1. _____

2. _____ [2]

Examiner Only	
Marks	Remark

3 **(a)** A square just touches an equilateral triangle as shown.

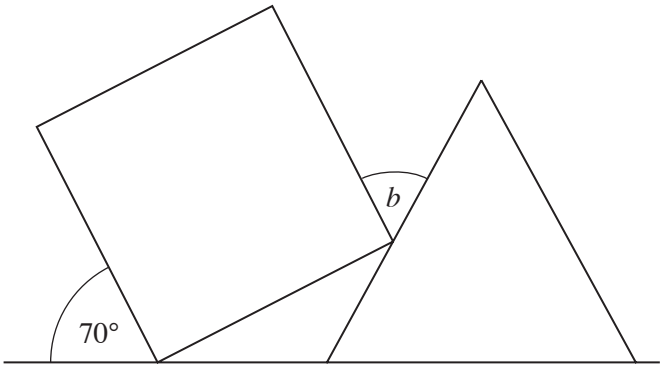


Diagram not drawn accurately

Calculate the size of angle b.

Answer b = _____° [3]

(b) AB is parallel to CD. EF is a straight line. BC = BD. Angle ABC = 42°

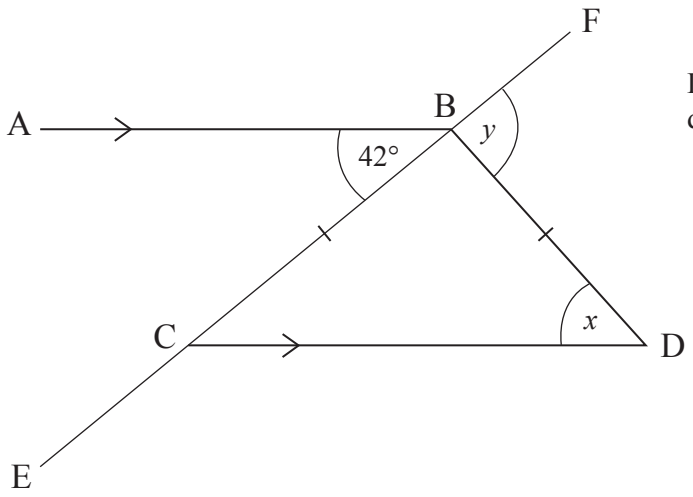


Diagram not drawn accurately

(i) Calculate the size of angle x.

Answer x = _____° [1]

(ii) Calculate the size of angle y.

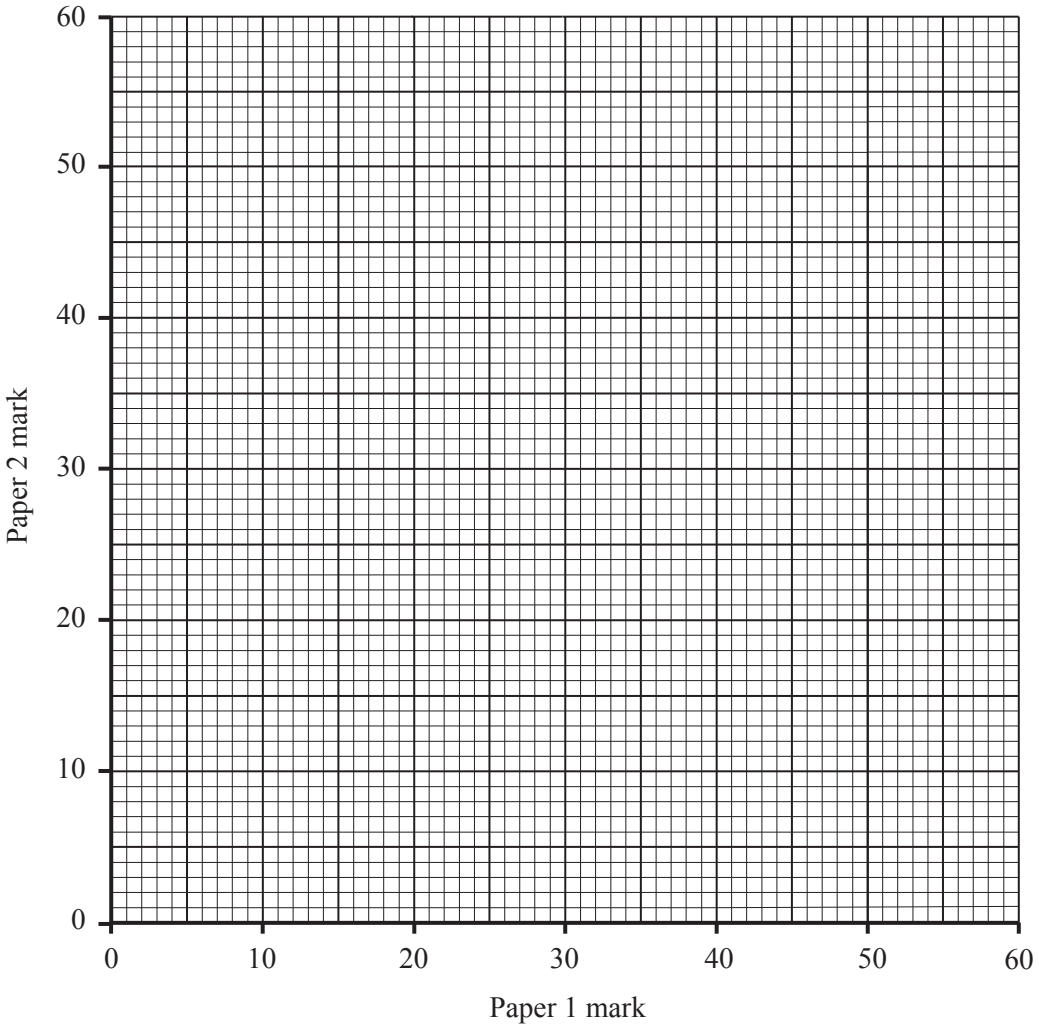
Answer y = _____° [2]

Examiner Only	
Marks	Remark

4 The table below shows the marks scored by 8 students in two papers in a Mathematics examination.

Paper 1 mark	20	7	14	23	31	35	41	35
Paper 2 mark	20	2	9	28	41	46	58	50

(a) Draw a scatter graph below.



[2]

(b) Draw a line of best fit on the grid. [1]

Another student was absent for Paper 1 but scored 35 marks on Paper 2.

(c) Use your line of best fit to estimate a mark for Paper 1 for this student.

Answer _____ [1]

Examiner Only	
Marks	Remark

5 **(a)** **(i)** Write 24 as a product of prime factors.

Answer _____ [2]

(ii) What is the smallest whole number 24 could be multiplied by to make it a square number?

Answer _____ [2]

(b) From a large bottle containing $2\frac{1}{2}$ litres of lemonade, a girl pours four full glasses each holding $\frac{2}{5}$ litre.

How many **more** full glasses can she pour before running short of lemonade?

Answer _____ [3]

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6 **(a)** Expand and simplify $7(2a + 3) + 3(4a - 2)$.

Answer _____ [2]

(b) Kyle bought 6 pears at x pence each and 3 tins of meat at $4x$ pence each. He got £4.24 change from £10.

Write down an equation in terms of x and solve it to find the value of x.

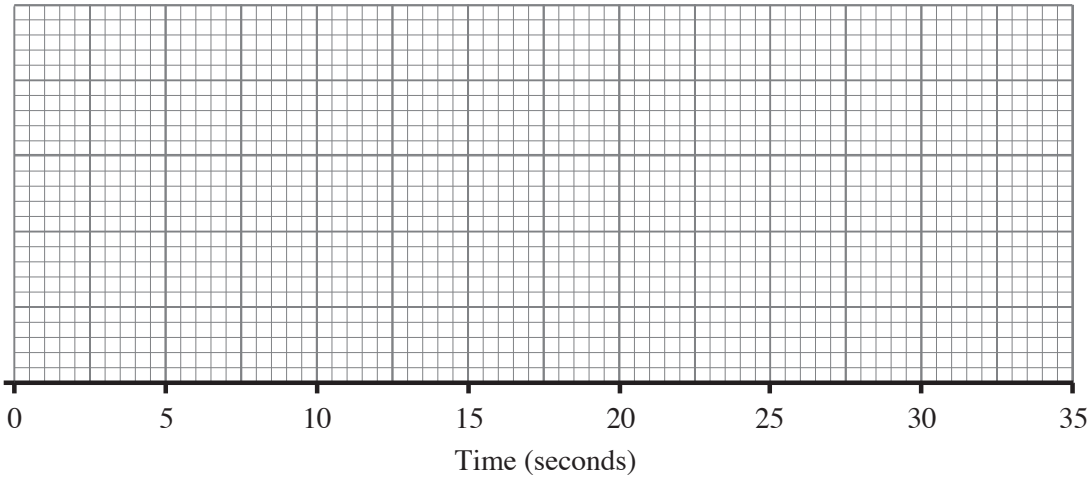
Answer x = _____ [4]

Examiner Only	
Marks	Remark

7 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]

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

Answer $x =$ _____ [4]

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

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

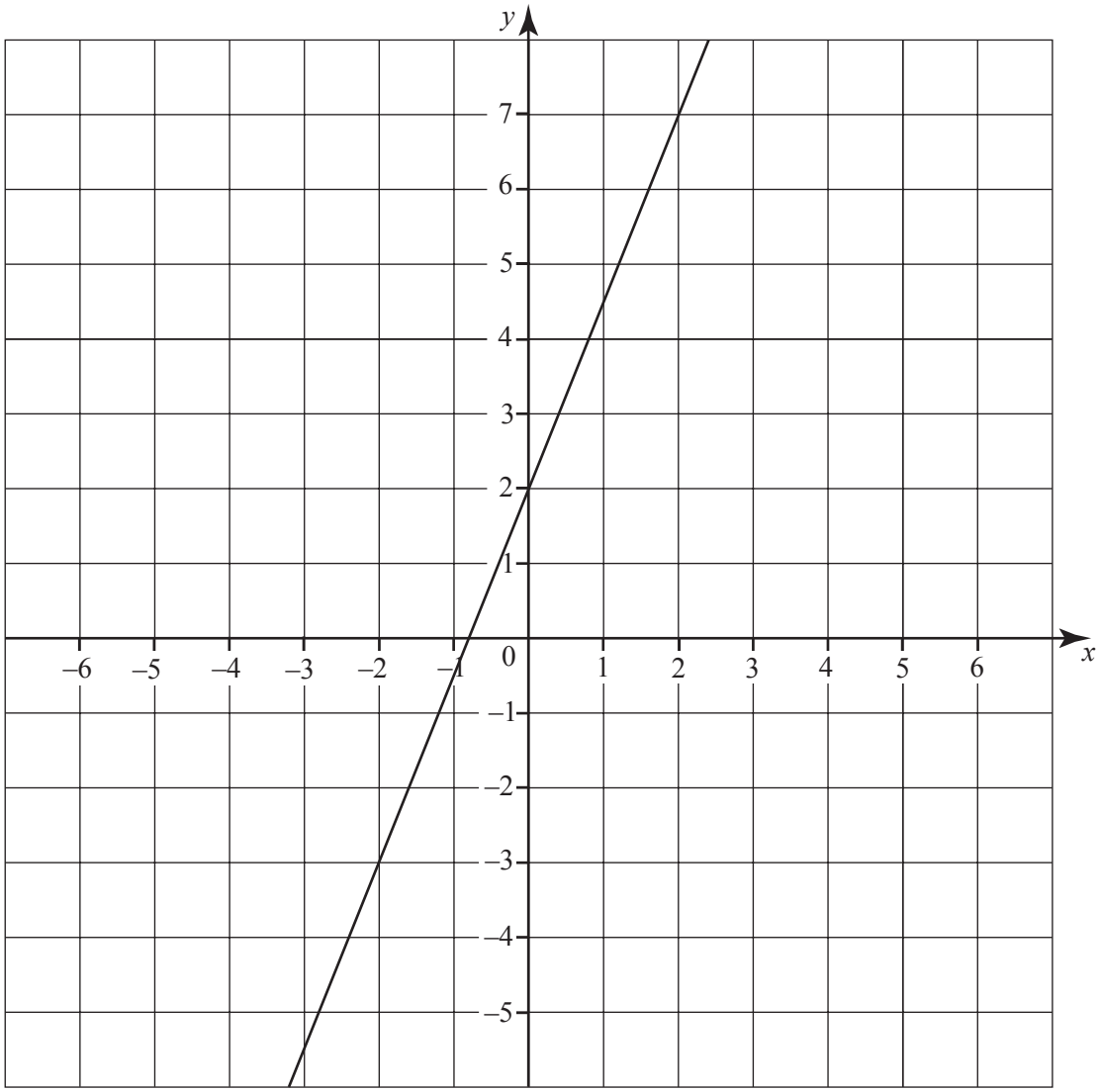
In the same test the mean mark for the girls was g.

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

Answer _____ [3]

Examiner Only	
Marks	Remark

10



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

Answer _____ [1]

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

Answer _____ [2]

Examiner Only	
Marks	Remark

THIS IS THE END OF THE QUESTION PAPER