Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
January 2011

Mathematics

Module N4 Paper 1
(Non-calculator)
Higher Tier

[GMN41]

TUESDAY 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.

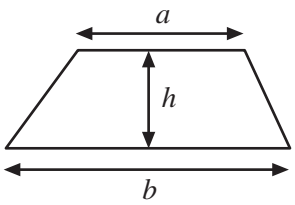
INFORMATION FOR CANDIDATES

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.

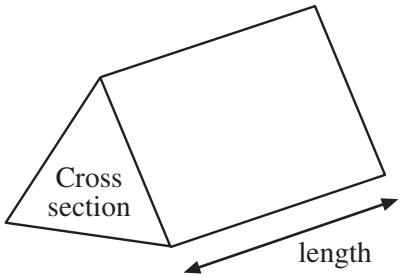
For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
Total Marks	

Formula Sheet

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



Volume of prism = area of cross section × length

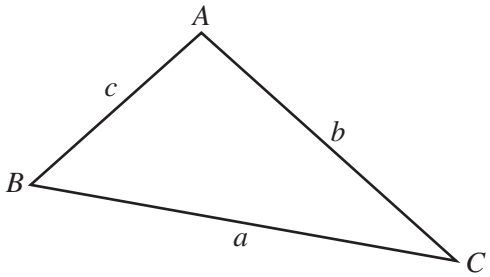


In any triangle *ABC*

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

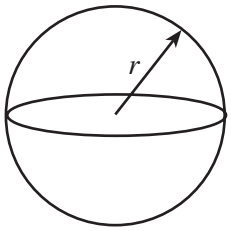
Sine rule : $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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



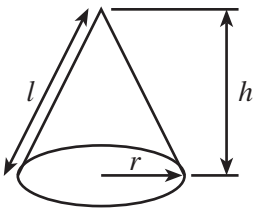
Volume of sphere = $\frac{4}{3}\pi r^3$

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

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

Examiner Only	
Marks	Remark

1 A green light flashes every 6 minutes while a red light flashes every 32 minutes.

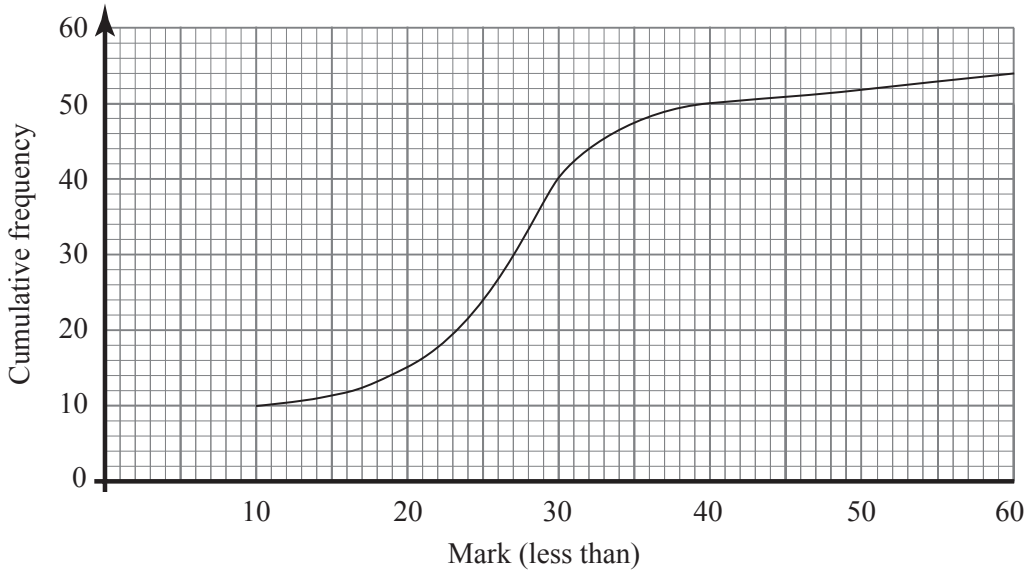
Both lights flash together at 12 noon.

When is the next time that both lights will flash together?

Answer _____ [2]

Examiner Only	
Marks	Remark

2



The cumulative frequency graph above illustrates the marks scored by pupils in a Physics test.

(a) Estimate the median mark.

Answer _____ [1]

(b) Estimate the interquartile range.

Answer _____ [2]

(c) The pass mark was set at 34. Estimate the number of pupils who passed.

Answer _____ [2]

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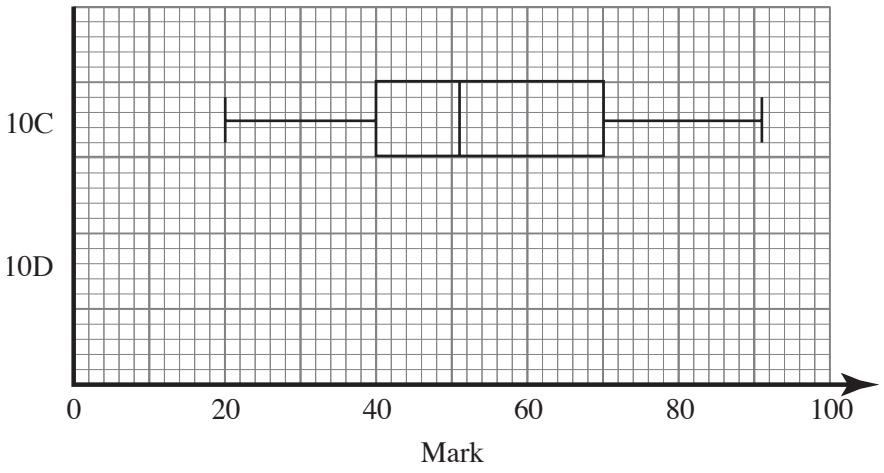
3 Solve the simultaneous equations $4x - 2y = 19$
$2x - 2y = 9$

Show all working

Answer $x =$ ___ $y =$ ___ [2]

4 The box plot shows the marks in a test for class 10C.



(a) Class 10D did the same test and the median mark was 52, the lower quartile was 35, the upper quartile was 82, the lowest mark was 22 and the highest mark was 93.

Draw a box plot for 10D on the grid above. [2]

(b) The head of the mathematics department says that these classes performed similarly in the test. Do you agree with her comment? Give **two** reasons to support your decision.

Answer _____ because _____

_____

_____ [2]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

5 **(a)** The diagram shows a circle with centre O.

A, B and C are three points on the circumference of the circle.

Angle AOC is 130°

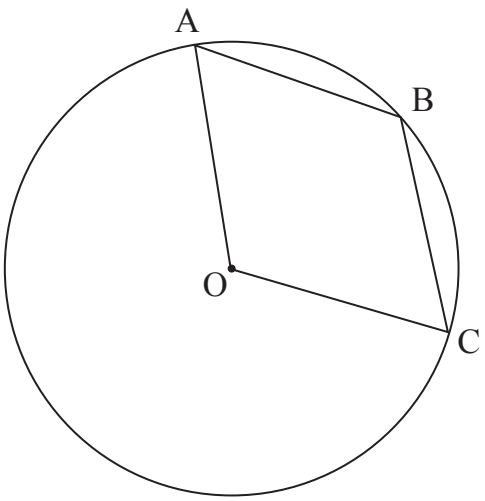


Diagram not drawn accurately.

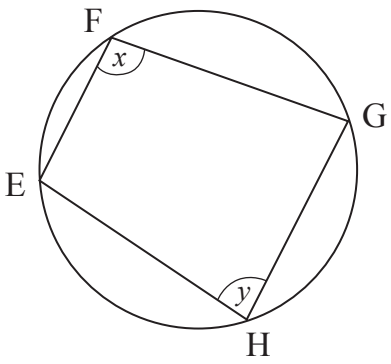
(i) Explain why angle ABC is 115°

[2]

(ii) The lengths AB and OB are equal. Calculate angle OBC.

Answer _____ ° [1]

(b)



Prove that opposite angles of a cyclic quadrilateral add up to 180°

[3]

Examiner Only	
Marks	Remark

6 **(a)** Expand and simplify

$(5a - d)(a + 2d)$

Answer _____ [3]

(b) Factorise

$6cd - 7c - 6d + 7$

Answer _____ [2]

7 Evaluate

(a) $16^{1.5} \times 2^{-4}$

Answer _____ [2]

(b) $81^{-\frac{3}{4}}$

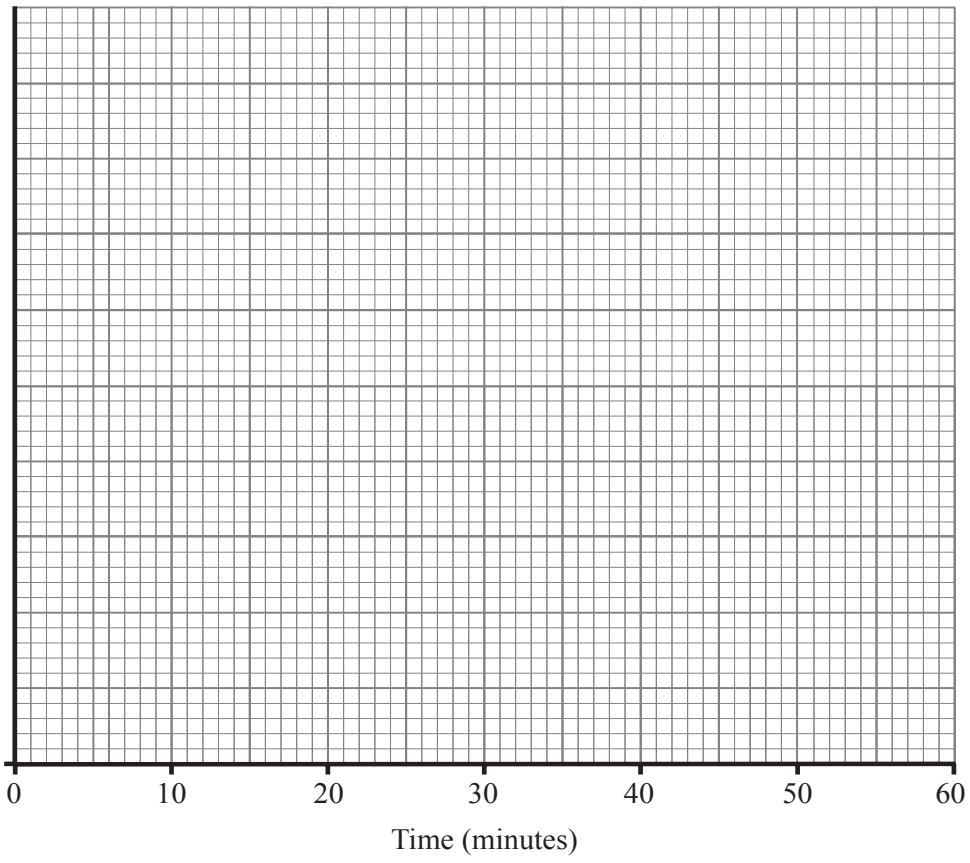
Answer _____ [2]

Examiner Only	
Marks	Remark

8 The times taken by a group of men to complete a questionnaire were recorded.

Time (t minutes)	Frequency
$0 < t \leq 5$	36
$5 < t \leq 15$	60
$15 < t \leq 20$	49
$20 < t \leq 35$	30
$35 < t \leq 60$	25

(a) Draw on the axes provided a clearly labelled histogram to illustrate this data.



[3]

(b) A stratified sample of 18 men is required from the men who took more than 25 minutes to complete the questionnaire. Calculate an estimate for how many of the stratified sample took more than 35 minutes.

Answer _____ [3]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

9 **(a)** Given that sin 30° = 0.5 write down the value of sin 210°

Answer _____ [1]

(b) Complete the blank with a different angle between 0° and 360°

cos _____ = cos 120° [1]

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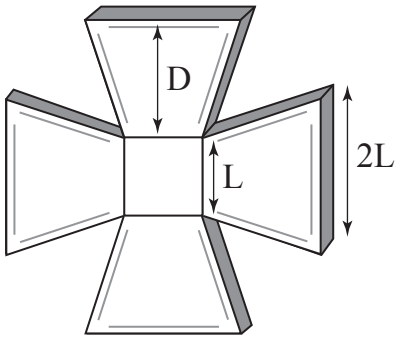
10 Which of these equations has a rational solution?

A: $\frac{2}{5}x^3 = 36$, B: $\frac{3}{5}x^2 = 54$, C: $\frac{2}{5}x^3 = 50$

Answer _____ [2]

Explain your answer.

11



The medal shown is cut from a square block of bronze, side L + 2D cm and thickness $\frac{1}{4}$L cm.

The centre piece is a square of side L with its sides parallel to the original square.

Find an expression, in terms of L and D, for the volume of bronze wasted.

Answer _____ cm^3 [6]

Examiner Only	
Marks	Remark

THIS IS THE END OF THE QUESTION PAPER