Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2011

Mathematics

Module N4 Paper 2
(With calculator)
Higher Tier

[GMN42]

TUESDAY 31 MAY
10.30 am – 11.30 am

GMN42

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.

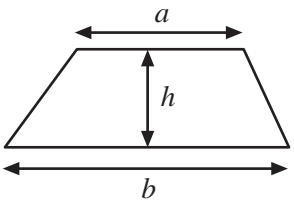
INFORMATION FOR CANDIDATES

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 calculator, ruler, compasses, set-square and protractor.
The Formula Sheet is on page 2.

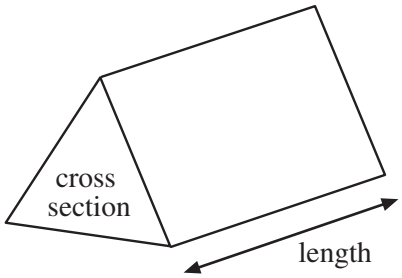
For Examiner's use only	
Question Number	**Marks**
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
Total Marks	

Formula Sheet

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



Volume of prism = area of cross section × length

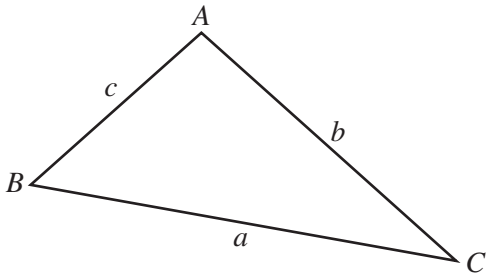


In any triangle ABC

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

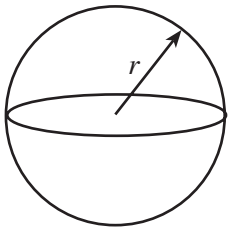
Sine rule : $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

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



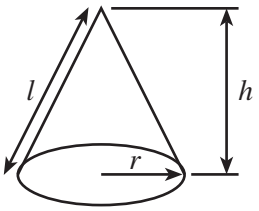
Volume of sphere $= \frac{4}{3}\pi r^3$

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

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

Examiner Only	
Marks	Remark

1 A large spherical glass marble has a radius of 2.5 cm.

© *iStockphoto/Thinkstock*

Calculate the volume of glass in this marble correct to 2 decimal places.

Answer _____ [3]

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2 A tea set has a sale price of £63.36 which is a saving of 12% on the original price.

What was the original price of the tea set?

Answer £ _____ [3]

Examiner Only	
Marks	Remark

3 The graph opposite shows the cumulative frequency of scores obtained in a darts tournament.

(a) Use the graph to estimate

(i) the median,

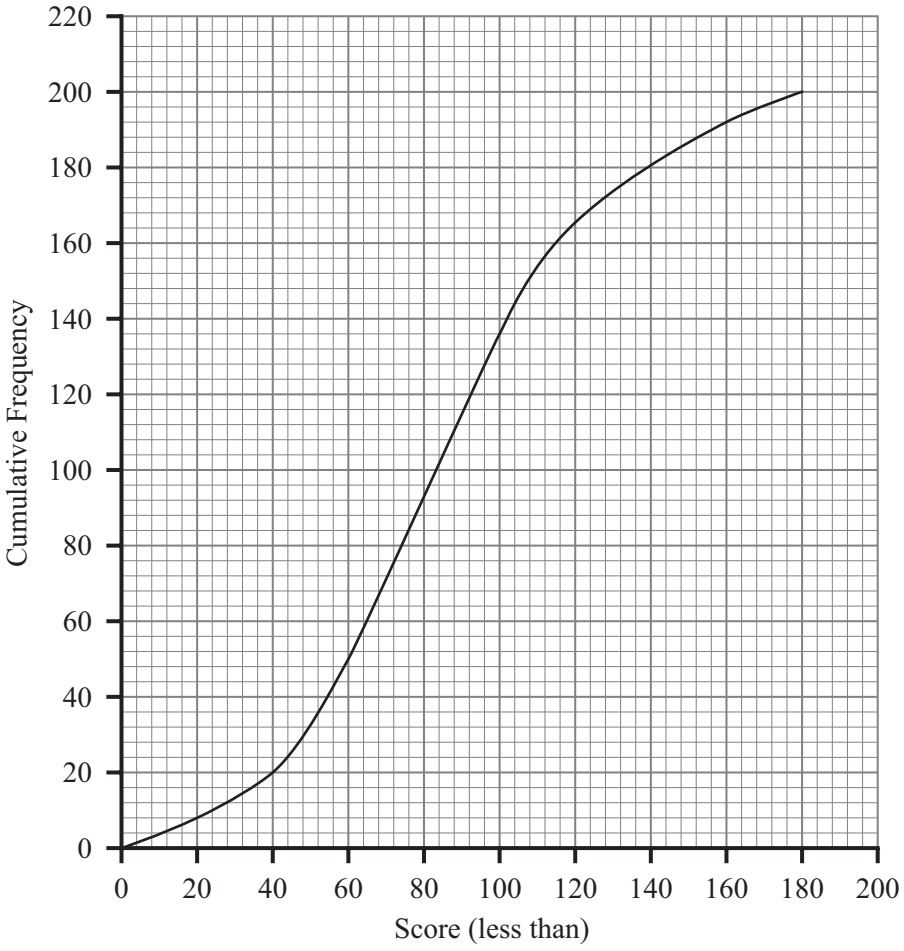
Answer _____ [1]

(ii) the inter-quartile range,

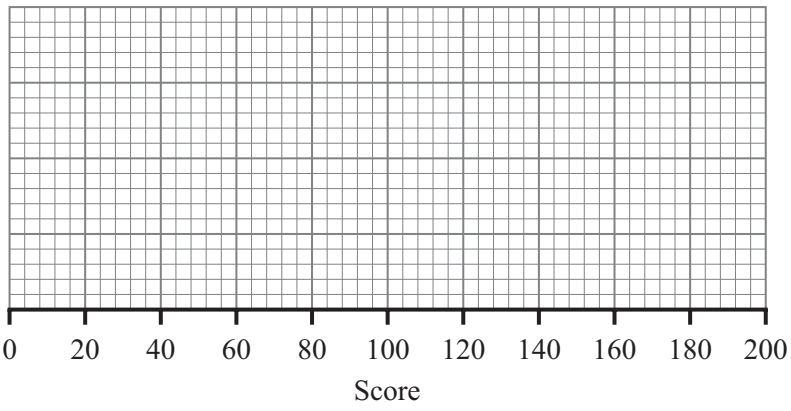
Answer _____ [2]

(iii) how many scores were more than 150

Answer _____ [2]



(b) From the graph draw a box plot. [3]



Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

4 **(a)** Simplify $\frac{2}{3c} - \frac{1}{4c}$

Answer _____ [2]

(b) Factorise $4x^2 - 25y^2$

Answer _____ [2]

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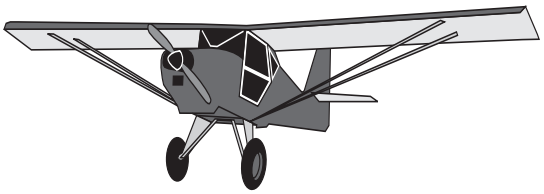
5 A small aircraft, located at position A in the sketch diagram, develops an engine fault while flying between two landing strips located at positions X and Y in the diagram.



The angles from X and Y to the aircraft are 50° and 35° respectively. The aircraft must land as quickly as possible. How much closer is X than Y from A?

Show all working.

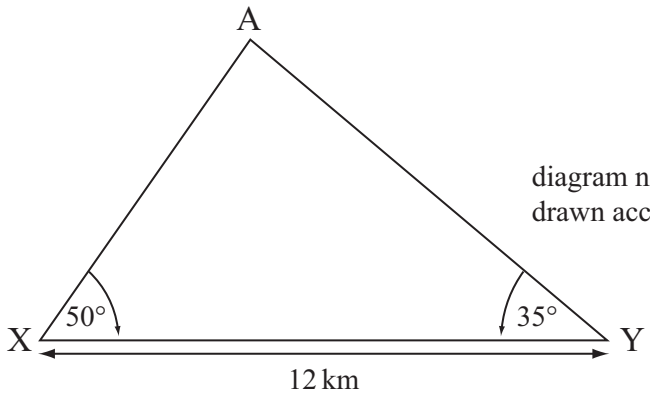
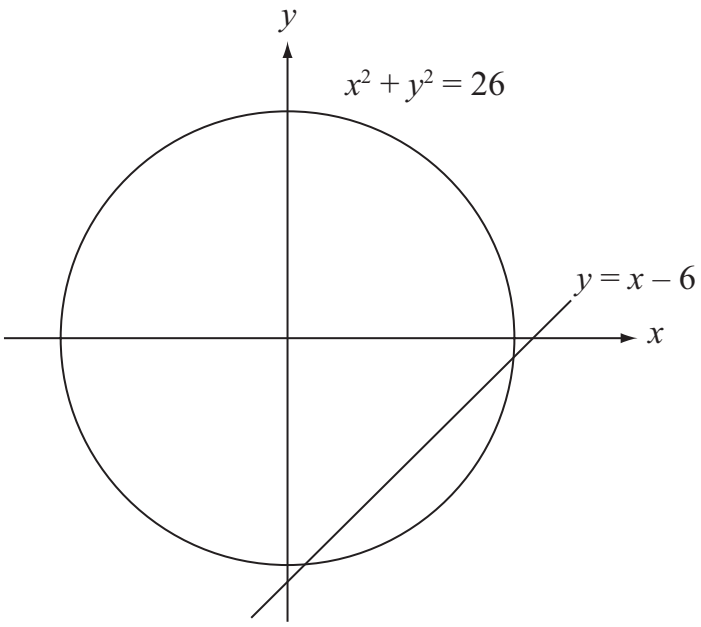


diagram not drawn accurately

Answer _____ km [4]

Examiner Only	
Marks	Remark

6 The diagram shows the intersection of the line $y = x - 6$ with the circle with equation $x^2 + y^2 = 26$



(a) Show that the x co-ordinates of the points of intersection of the line with the circle can be found from the solutions to the equation $x^2 - 6x + 5 = 0$

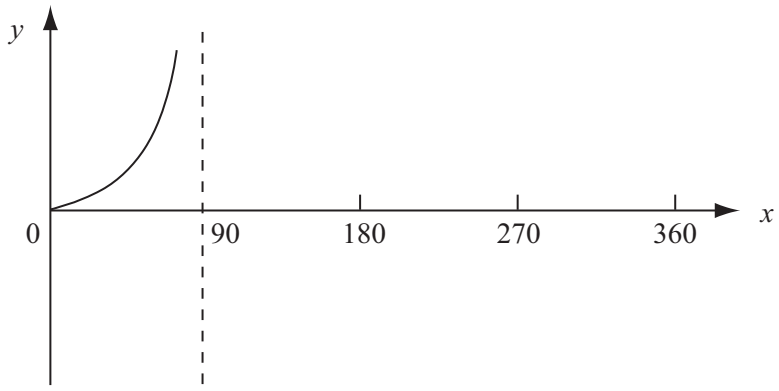
[3]

(b) Hence find the co-ordinates of the points of intersection of the line and the circle.

Answer (____,____) (____,____) [3]

Examiner Only	
Marks	Remark

7 **(a)** Complete this sketch for $y = \tan x°$ for $0 \leq x \leq 360$



[1]

(b) Solve the equation

$3 \tan x° = 4$ for $0 \leq x < 360$

Answer _____ [2]

8 The table shows information about 600 workers in a factory.

Age, a years	Number of Males	Number of Females
$20 \leq a < 30$	99	26
$30 \leq a < 40$	142	48
$40 \leq a < 50$	124	64
$50 \leq a < 60$	55	22
$60 \leq a < 70$	20	0

The manager wants to carry out a survey of the workers' views on the workplace. He decides to choose a sample of 80 workers to take part in the survey.

(a) From an alphabetical list of workers' names, he selects every 5th name until he has 80 names.

Explain why this may not produce a fair sample.

Answer _____

_____ [2]

(b) If the manager decides to use a stratified sample, how many males aged under 40 should be in his sample of 80 workers?

Answer _____ [2]

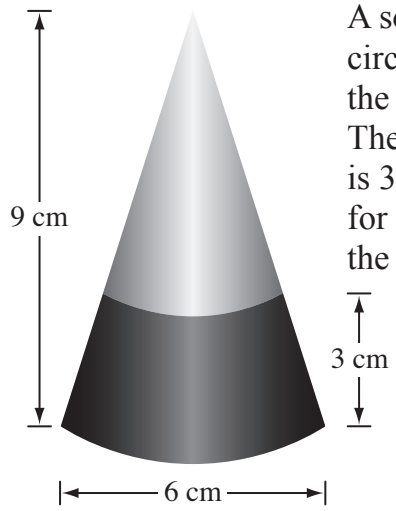
Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

9 Simplify $\dfrac{x^2 + 3xy - 5x - 15y}{2x^2 - 10x}$ fully.

Answer _____ [4]

10 

A solid paper weight is made in the shape of a right circular cone. Its height is 9 cm and the diameter of the base is 6 cm.
The top section is glass and the base section, which is 3 cm high, is made of metal which weighs 14 g for each cubic centimetre. Calculate the weight of the metal in the base.

Answer _____ g [5]

Examiner Only	
Marks	Remark

THIS IS THE END OF THE QUESTION PAPER