**Rewarding Learning**

**General Certificate of Secondary Education**
**2011**

# Mathematics

## Module N3 Paper 2
## (With calculator)
### Higher Tier

**[GMN32]**

GMN32

**TUESDAY 31 MAY**

**10.30 am–11.30 am**

| For Examiner's use only | |
|---|---|
| **Question Number** | **Marks** |
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| 8 | |
| 9 | |
| 10 | |
| 11 | |
| 12 | |
| **Total Marks** | |

**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 twelve** 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.

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# Formula Sheet

**Area of trapezium** $= \frac{1}{2}(a + b)h$
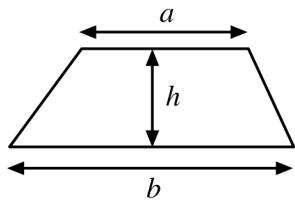
**Volume of prism** = area of cross section × length
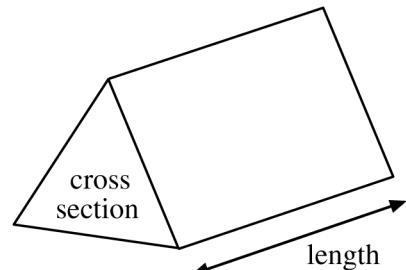
**In any triangle** *ABC*

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

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

**Cosine rule:** $\quad a^2 = b^2 + c^2 - 2bc \cos A$
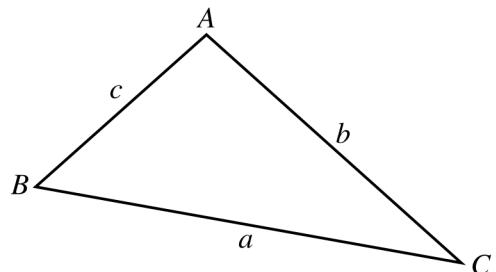
**Volume of sphere** $= \frac{4}{3}\pi r^3$

**Surface area of sphere** $= 4\pi r^2$
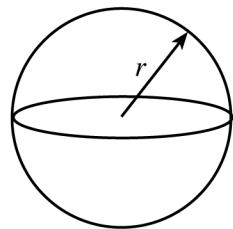
**Volume of cone** $= \frac{1}{3}\pi r^2 h$

**Curved surface area of cone** $= \pi r l$
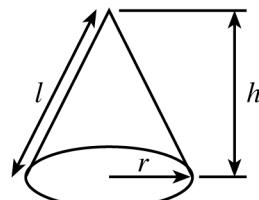
**Quadratic equation:**

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**  A new bicycle is priced at £240

In a sale it is reduced by 35%.

Calculate the sale price.

<div align="right">Answer £ _____ [3]</div>

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**2**  **(a)**

© The Royal Mint

A ten pence piece has a radius of 1.4 cm.

Calculate the circumference of this coin.

<div align="right">Answer _____ cm [2]</div>

**(b)**
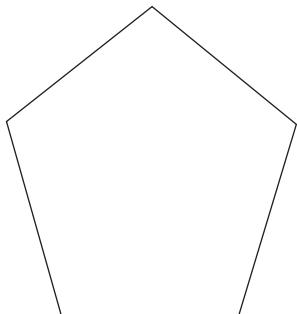
Explain why the sum of the interior angles in a regular pentagon is 540°.

_____

_____

_____

_____

<div align="right">[2]</div>

**3** An adult ticket for a show costs £$a$.

A child ticket costs £4 less than an adult ticket.

Daisy buys two adult tickets and three child tickets. The total cost is £23

**(a)** Use this information to write down an **equation** in terms of $a$.

Answer _____ [3]

**(b)** Solve your equation to find the cost of an adult ticket.

Answer £ _____ [2]

**4**   The increase in weight of 100 children over a period of time was recorded.

| Increase in weight ($w$ kg) | $0 < w \leq 5$ | $5 < w \leq 10$ | $10 < w \leq 15$ | $15 < w \leq 20$ | $20 < w \leq 25$ |
|---|---|---|---|---|---|
| Frequency | 16 | 36 | 22 | 14 | 12 |

**(a)**  Show this information on a grouped frequency diagram.   [3]
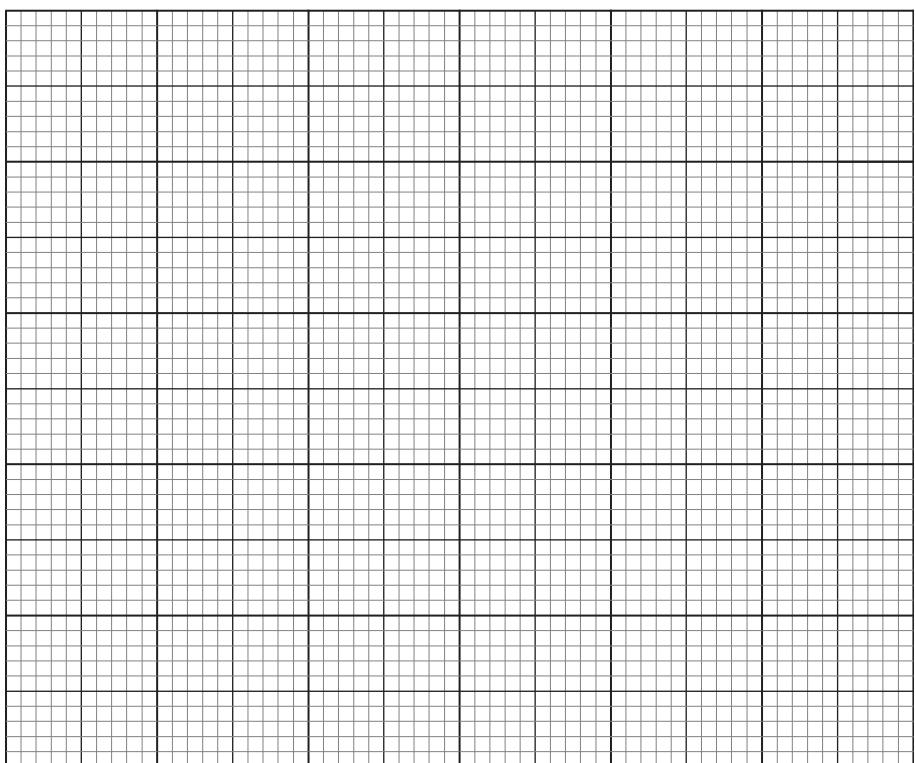
**(b)**  Write down the modal class interval.

Answer_____   [1]

**5** A ramp is placed next to a step to allow wheelchair access.

The ramp is 16 cm high and reaches 85 cm from the step.

Calculate the sloping length, $r$ cm, of the ramp to the edge of the step.
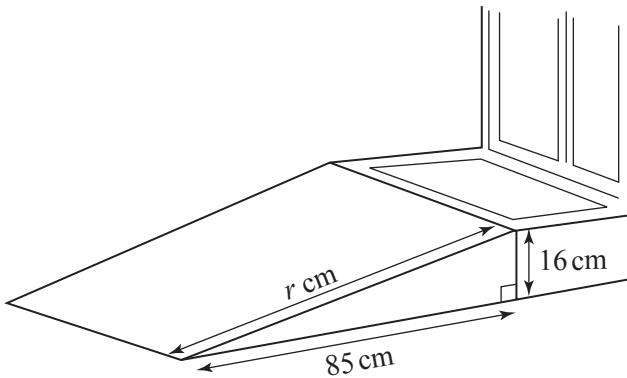


Answer _____ cm [3]

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**6** **(a)** At birth a baby boy weighed 4 kg. Six weeks later he weighed 7 kg.

What was the percentage increase in his weight?

Answer _____ % [2]

**(b)** Colin leaves £4800 in the bank for two years.

It earns compound interest of 3% per year.

Calculate the total amount Colin has in the bank at the end of the two years.

Answer £ _____ [2]

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**7**

**Start**

Input $a$, $b$, $c$

Calculate
$S = a^2 + b^2$
$T = c^2$

Does
$S = T$?

**No** → Add 1 to each of $a$, $b$, $c$

**Yes**

Print $a$, $b$, $c$

**Stop**
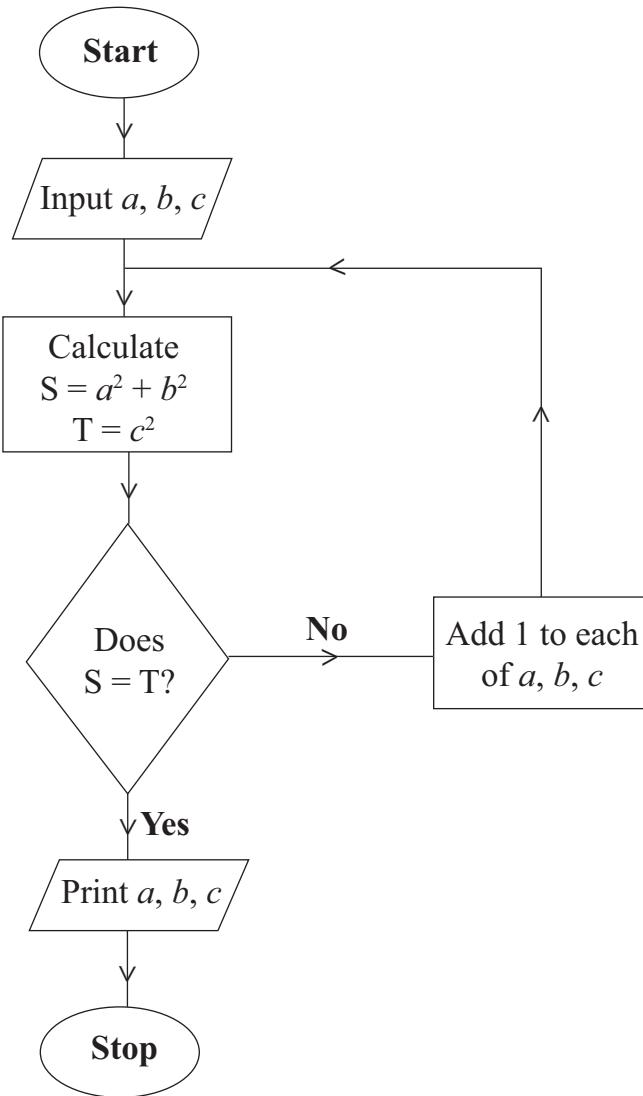
Starting with $a = 2$, $b = 9$, $c = 10$ use the flow chart to find the values printed.

| $a$ | $b$ | $c$ | S | T |
|---|---|---|---|---|
| 2 | 9 | 10 |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

Answer $a =$ _____, $b =$ _____, $c =$ _____ [3]

**8** One solution of $x^2 + 4x = 50$ lies between 5 and 6

Use the method of **trial and improvement** to find this solution correct to one decimal place. **Show all your working**.

Answer $x =$ _____ [3]

**9** A large spherical glass marble has a radius of 2.5 cm:

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

*© iStockphoto/Thinkstock*

Answer _____ [3]

**8**

**10** 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]

**11 (a)** Factorise $10y + 4$

Answer _____ [1]

**(b)** Factorise $9a^2 - 3ay$

Answer _____ [2]

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**12** 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)** how many scores were more than 150

Answer _____ [2]

**10**
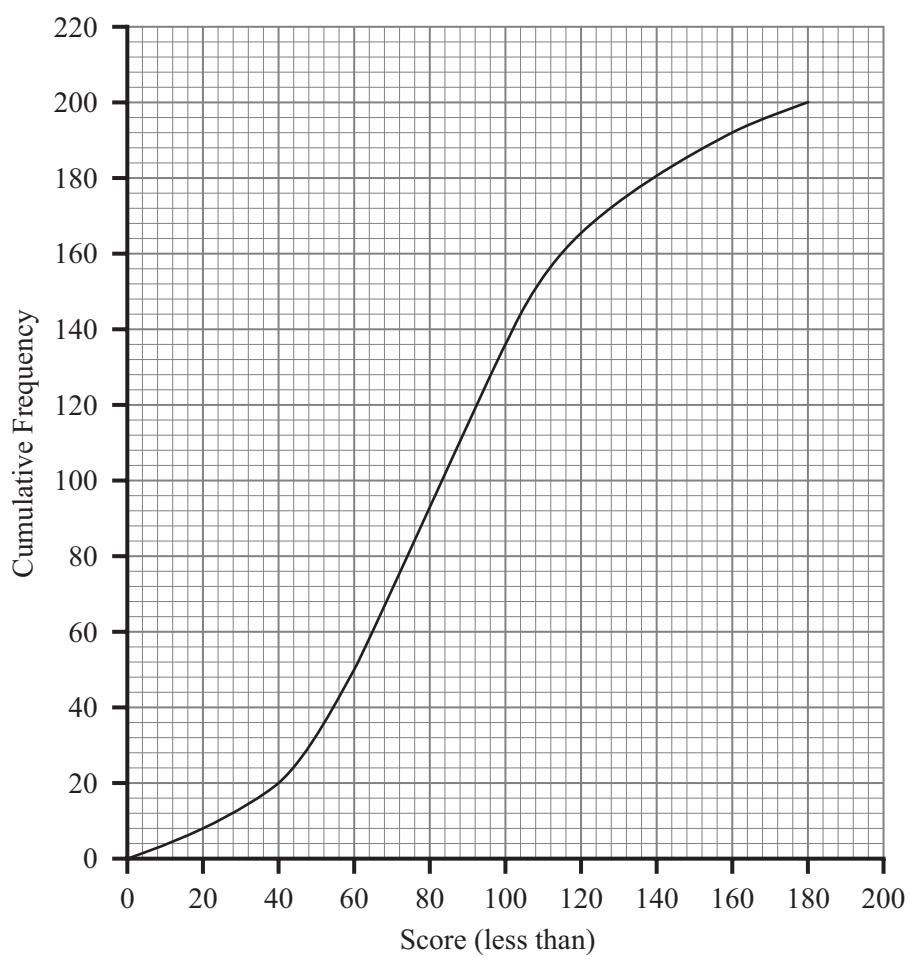
**(b)** From the graph draw a box plot. [3]



Score

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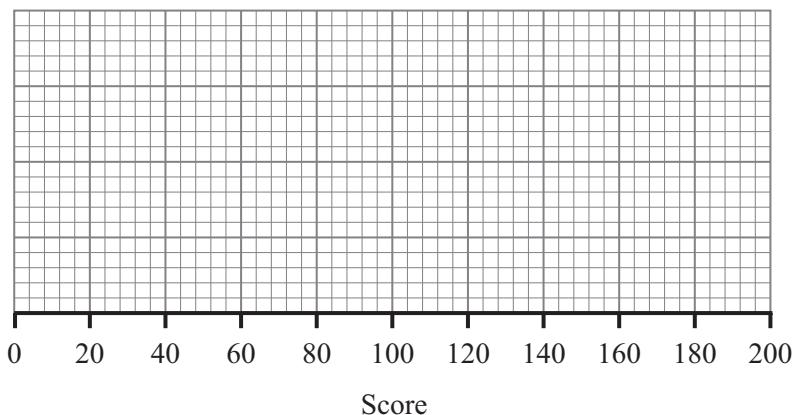
## THIS IS THE END OF THE QUESTION PAPER

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**11**

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