Oxford Cambridge and RSA Examinations

General Certificate of Secondary Education

Mathematics C (Graduated Assessment) 1966/2343A (H)
HIGHER TIER TERMINAL PAPER – SECTION A

Specimen Paper 2003

Candidates answer on the question paper.

Additional materials:

Tracing paper
Geometrical instruments

TIME 1 hour

Candidate Name	Centre Number	Candidate Number

INSTRUCTIONS TO CANDIDATES

- Write your name, Centre number and candidate number in the boxes above.
- Answer **all** the questions.
- Write your answers, in blue or black ink, in the spaces provided on the question paper.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- There is a space after most questions. Use it to do your working. In many questions marks will be given for correct working even if the answer is incorrect.
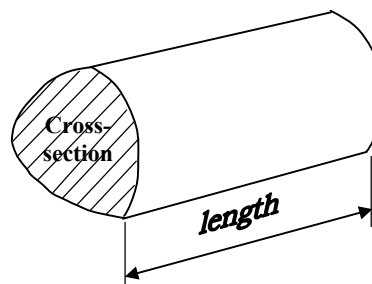
INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [ ] at the end of each question or part question.
- The total mark available for this section is 50.

For Examiner's use only	
Section A	
Section B	
Total	

WARNING
You are not allowed to use a calculator in Section A of this paper.

FORMULA SHEET: HIGHER TIER

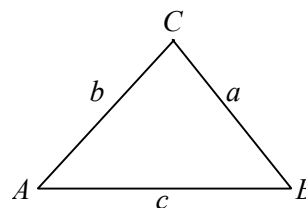**Volume of prism** = (area of cross section) × length

In any triangle ABC

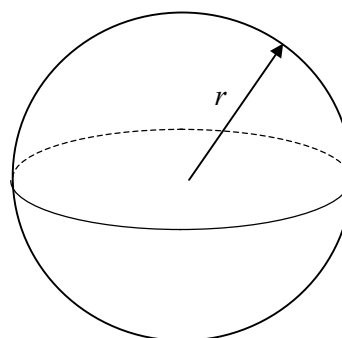**Sine rule** $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$
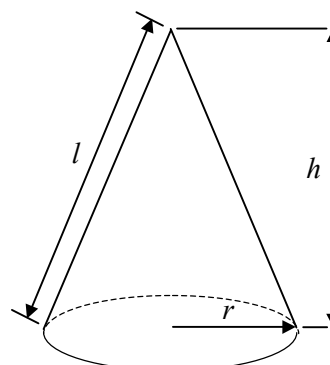
Area of triangle = $\dfrac{1}{2} ab \sin C$

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

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

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

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

The Quadratic Equation

The solution of $ax^2 + bx + c = 0$ where $a \neq 0$, area given by $x = \dfrac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$

1 **(a)** A machine produces pieces of wood.
The length of each piece of wood measures 34 mm, correct to the nearest millimetre.

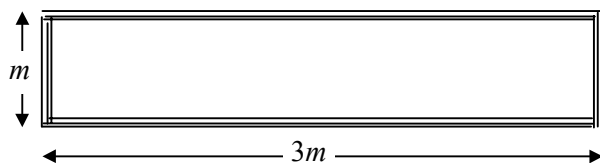Between what limits does the actual length lie?

(a) The length is between _____ mm and _____ mm   [2]

(b) Three of these pieces of wood are put together to make a triangle.

What is the greatest possible perimeter of the triangle?

(b) _____ mm   [1]

(c) Another machine produces pieces of metal of length m.
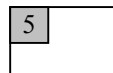Some pieces of metal are fixed together to make this rectangle.

The maximum possible perimeter of this rectangle is 52 millimetres.
The minimum possible perimeter of this rectangle is 44 millimetres.

(i) Write down one inequality in m.

(c)(i) _____   [1]

(ii) Between what limits does m lie?

(ii) between _____ and _____   [1]

5

2 **(a)** Multiply out and simplify $3(2x + 1) - 2(x - 1)$.

(a)＿＿＿＿＿＿＿＿＿＿＿ [2]

(b) Rearrange the formula $A = 2\pi rh + \pi r^2$
to make h the subject.
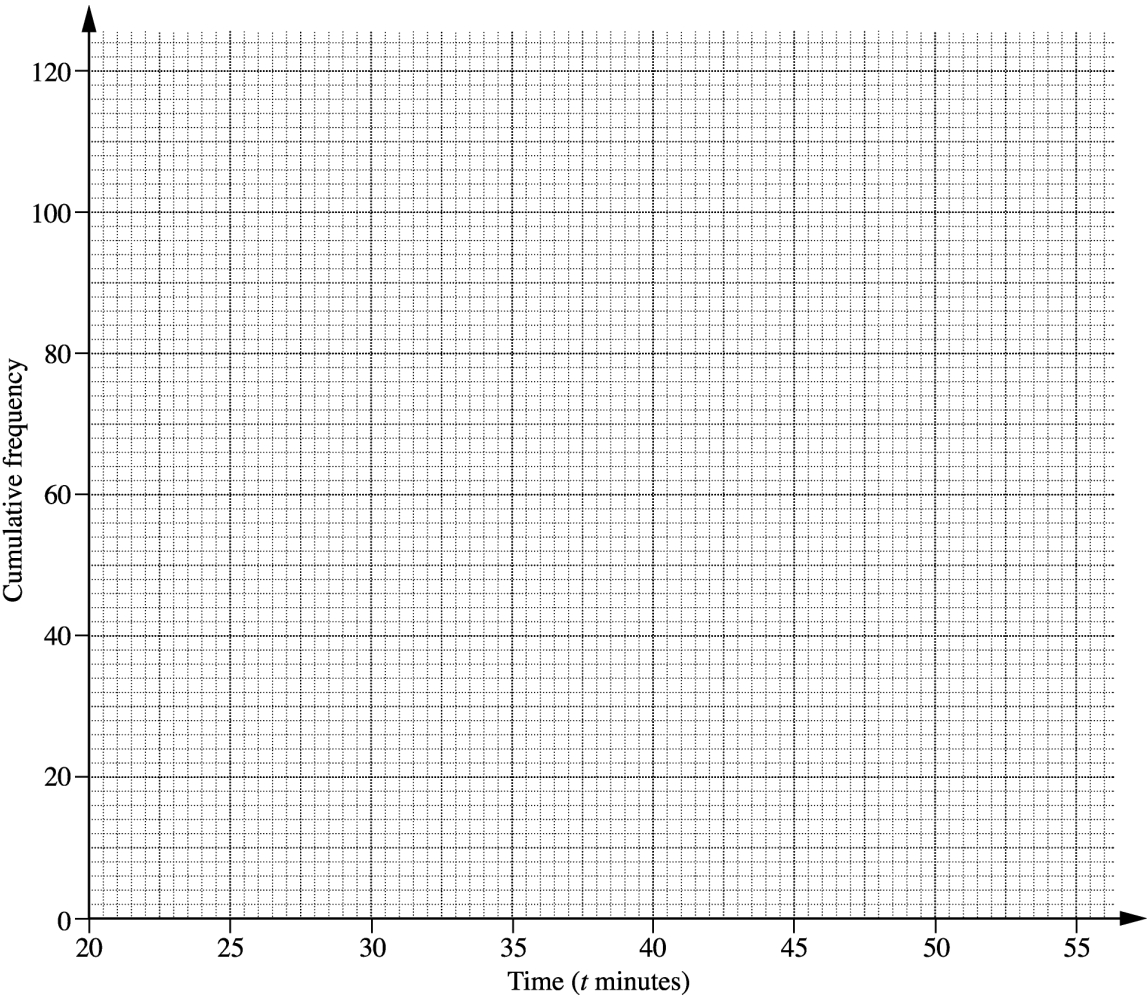
(b) $h =$ ＿＿＿＿＿＿＿＿＿ [2]

4

3   The times taken by 120 students to complete a problem were recorded.

The results are shown in the table below.

Time (t minutes)	$20 < t \leq 25$	$25 < t \leq 30$	$30 < t \leq 35$	$35 < t \leq 40$	$40 < t \leq 45$	$45 < t \leq 50$
Frequency	2	17	35	42	17	7

(a)   Draw a cumulative frequency graph for the data.
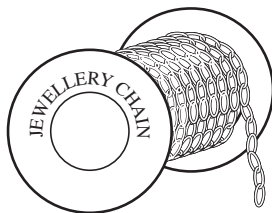

[3]

(b)   Find the median time.

(b) ＿＿＿＿＿＿minutes   [1]

4

4 This gold chain is sold in inches.

(a) One inch of the chain weighs $1\frac{1}{2}$ ounces.

Jane buys a $6\frac{1}{2}$ inch chain.

(i) How much does it weigh?

(a)(i) _____ ounces   [1]

(ii) She makes a necklace using this chain, a clip weighing $\frac{3}{16}$ ounce

and a pendant weighing $\frac{1}{8}$ ounce.

How much does the necklace weigh altogether?

(ii) _____ ounces   [1]

(b) Fred buys a $22\frac{3}{4}$ inch chain and cuts it into a length for a necklace and
a length for a bracelet in the ratio 9 : 4.

Calculate the length of the chain for the necklace.

(b) _____ inches   [2]

4

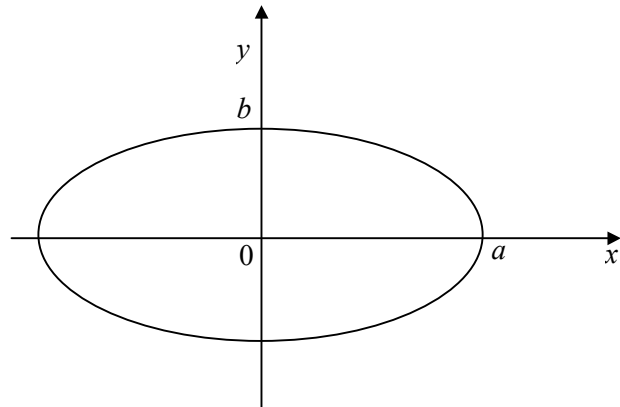**5** **(a)** Simplify $\frac{4a^4b^3}{6ab^2}$.

(a) _____ [2]

(b) Solve the equation $x^2 + 7x + 12 = 0$.

(b) $x =$ _____ [3]

5

6 This is a sketch of an ellipse.

It is symmetrical about both axes.

Which of the following could possibly be an expression for its area?

$$2\pi\sqrt{ab} \qquad \pi(a+b) \qquad \frac{1}{2}\pi\sqrt{a^2+b^2} \qquad \pi ab \qquad \pi(ab)^2$$

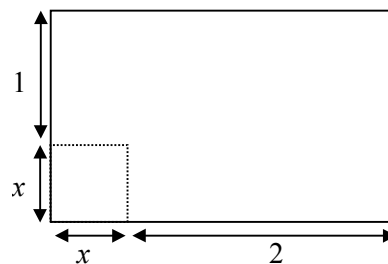You must explain how you made your choice.

_____ because _____

_____

_____ [2]

2

7 A rectangle has sides of length $x + 1$ and $x + 2$.
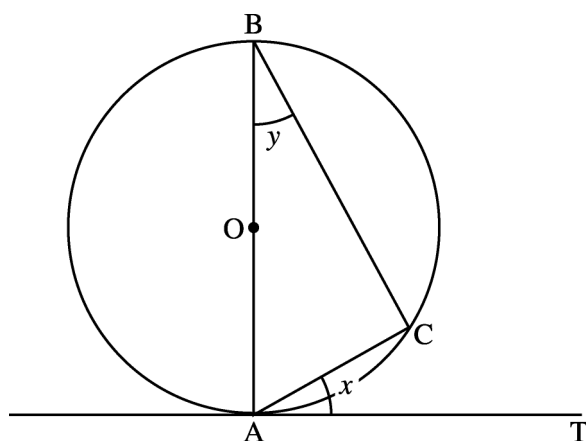The area of the rectangle is 42.

Form an equation in x and solve it to find x.

$x =$ _____ [4]

4

8

O is the centre of the circle. AT is a tangent to the circle at A.

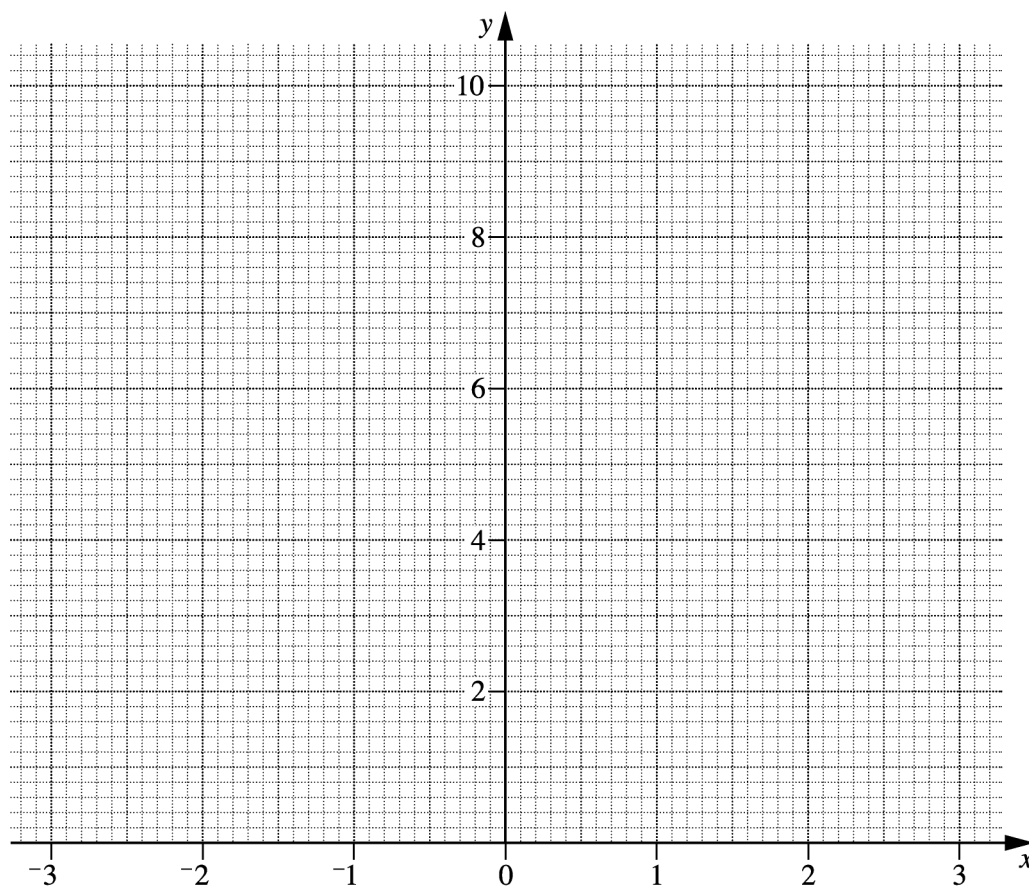Show clearly that the angles marked x and y are equal.
You must give a clear reason for each statement you make.
(It is not sufficient merely to quote 'angles in the alternate segment').

_____

_____

_____

_____

_____

_____

_____

_____ [4]

4

9 **(a)** Draw a graph of $y = 2^x$ for values of x from $^-3$ to 3.

[2]

(b) Use your graph to estimate the positive solution of the equation.

$2^x - x = 3$

correct to one decimal place.

(b) ＿＿＿＿＿＿＿＿ [2]

4

10 **(a)** The mass of a radioactive element decays exponentially.

At time t the mass was 1 gram.
At time $t + 1$ the mass was $0 \cdot \dot{7}\dot{5}$ gram.

Find the decay factor as a fraction in its simplest form.

(a) _____ [2]

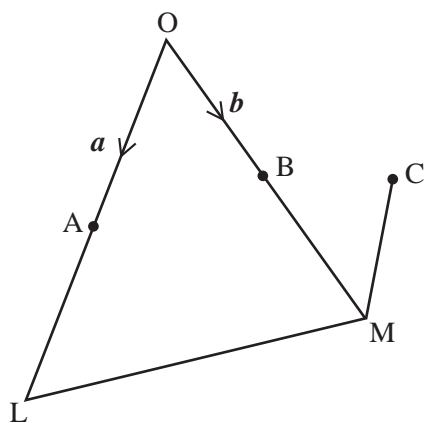**(b)** The surface area of a mould grows exponentially.

At time t the area was $\sqrt{6} - \sqrt{2} \; \text{cm}^2$.
At time $t + 1$ the area was $\sqrt{6} + \sqrt{2} \; \text{cm}^2$.

Find the growth factor, giving your answer in its simplest form.

(b) _____ [2]

4	

11

In the diagram $\overrightarrow{AO} = \mathbf{a}$ and $\overrightarrow{OB} = \mathbf{b}$.

A and B are the midpoints of OL and OM respectively.

$\overrightarrow{MC} = \overrightarrow{LA}$.

(a) Write down $\overrightarrow{AB}$ in terms of $\mathbf{a}$ and $\mathbf{b}$.

(a) $\overrightarrow{AB} = $ _____ [1]

(b) Show that B is the midpoint of AC.

_____

_____

_____

_____

_____

_____ [4]

5
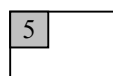
12   The straight line with equation $y = x + 6$ meets the circle with equation $x^2 + y^2 = 50$ at two points P and Q.

By solving two simultaneous equations, find the coordinates of P and Q.

(_____,_____) and (_____,_____)   [5]

5	