

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS**  
**General Certificate of Secondary Education**

**MATHEMATICS C**  
**(Graduated Assessment)**



**1966/2343B**

**HIGHER TERMINAL PAPER – SECTION B**

Monday **5 JUNE 2006** Afternoon 1 hour

Candidates answer on the question paper.

Additional materials:

- Geometrical instruments
- Scientific calculator
- Tracing paper (optional)

Candidate  
Name

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Centre  
Number

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Candidate  
Number

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**TIME** 1 hour

**INSTRUCTIONS TO CANDIDATES**

- Write your name, Centre number and candidate number in the boxes above.
- Answer **all** the questions.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- In many questions marks will be given for a correct method even if the answer is incorrect.
- Do **not** write in the bar code.
- Do **not** write outside the box bordering each page.
- **WRITE YOUR ANSWER TO EACH QUESTION IN THE SPACE PROVIDED. ANSWERS WRITTEN ELSEWHERE WILL NOT BE MARKED.**

**INFORMATION FOR CANDIDATES**

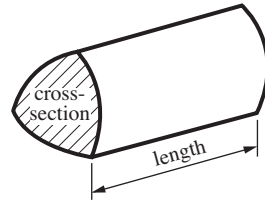
- You are expected to use a calculator in Section B of this paper.
- The number of marks is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this Section is 50.
- Section B starts with question 11.
- Use the  $\pi$  button on your calculator or take  $\pi$  to be 3.142 unless the question says otherwise.

|                           |  |
|---------------------------|--|
| <b>FOR EXAMINER'S USE</b> |  |
| <b>Section B</b>          |  |

**This question paper consists of 12 printed pages.**

## Formulae Sheet: Higher Tier

**Volume of prism** = (area of cross-section)  $\times$  length

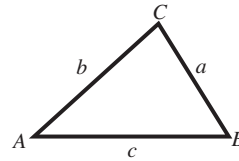


**In any triangle ABC**

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

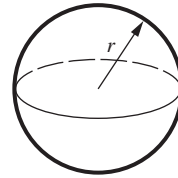
**Cosine rule**  $a^2 = b^2 + c^2 - 2bc \cos A$

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



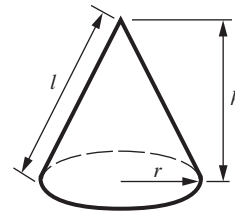
**Volume of sphere** =  $\frac{4}{3} \pi r^3$

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



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

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



**The Quadratic Equation**

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

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

**PLEASE DO NOT WRITE ON THIS PAGE**

11 In January 2004 Anne's house was valued at £180 000.  
In January 2005 her house was valued at £202 500.

(a) Find the percentage increase in the value of her house.

(a) .....% [3]

(b) Anne assumes that the value of her house continues to increase at the same rate,  
and calculates that it will be worth more than £500 000 in January 2013.

Is her calculation correct?  
Show how you decide.

.....  
.....[2]

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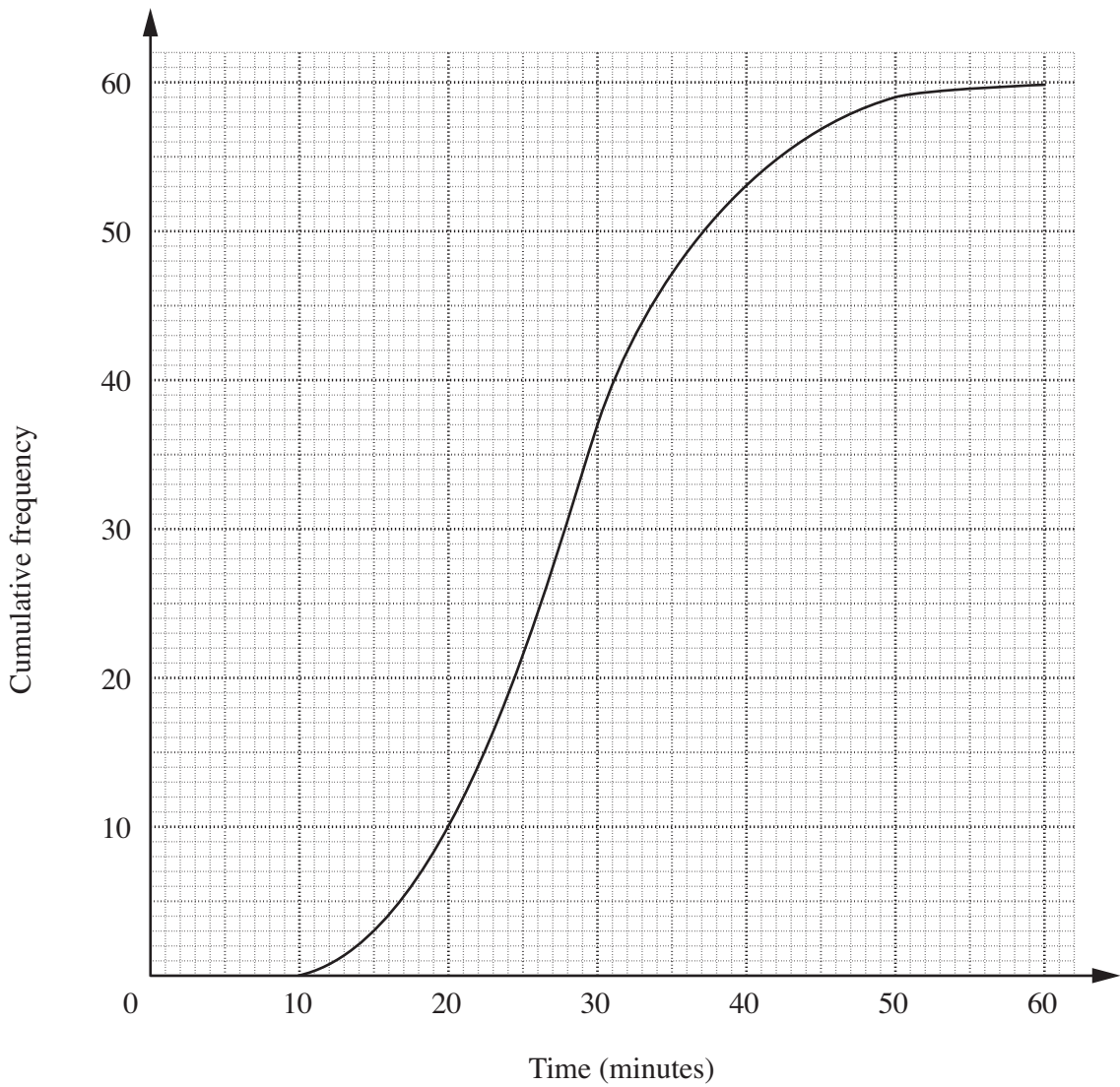
- 12 In a snooker competition, the length of time,  $t$  minutes, taken to complete each of 60 frames was recorded. The results are summarised in the table below.

| Time ( $t$ minutes) | Frequency |
|---------------------|-----------|
| $10 < t \leq 20$    | 10        |
| $20 < t \leq 30$    | 27        |
| $30 < t \leq 40$    | 16        |
| $40 < t \leq 50$    | 6         |
| $50 < t \leq 60$    | 1         |

- (a) Calculate an estimate of the mean time.

(a) .....minutes [4]

(b) This cumulative frequency diagram represents the same results.



Use the diagram to estimate

(i) the median time,

(b)(i) .....minutes [1]

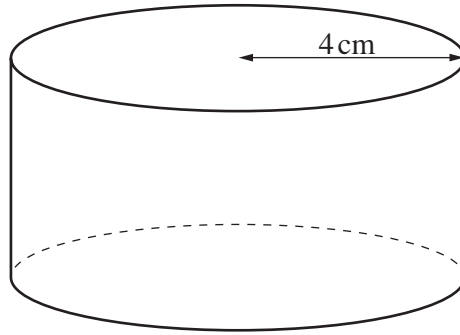
(ii) the number of frames which lasted more than 35 minutes.

(ii) .....[2]

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[Turn over

13



The diagram shows a solid cylinder.

The radius of the cylinder is 4 cm.

The volume of the cylinder is  $186 \text{ cm}^3$ .

(a) Work out the height of the cylinder.

(a) .....cm [3]

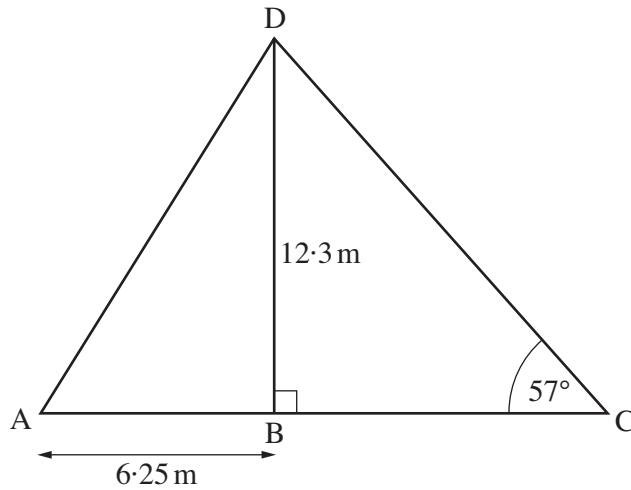
(b) The cylinder is made from platinum.  
The density of platinum is  $21.5 \text{ g/cm}^3$ .

Work out the weight, in grams, of the cylinder.

(b) .....g [2]

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14



Not to scale

The diagram shows a vertical flagpole,  $BD$ , standing on level ground.

The flagpole is supported by two ropes,  $AD$  and  $CD$ .

$AB = 6.25$  m,  $BD = 12.3$  m and angle  $BCD = 57^\circ$ .

- (a) Calculate the length of  $AD$ .  
Give your answer to a sensible degree of accuracy.

(a) .....m [4]

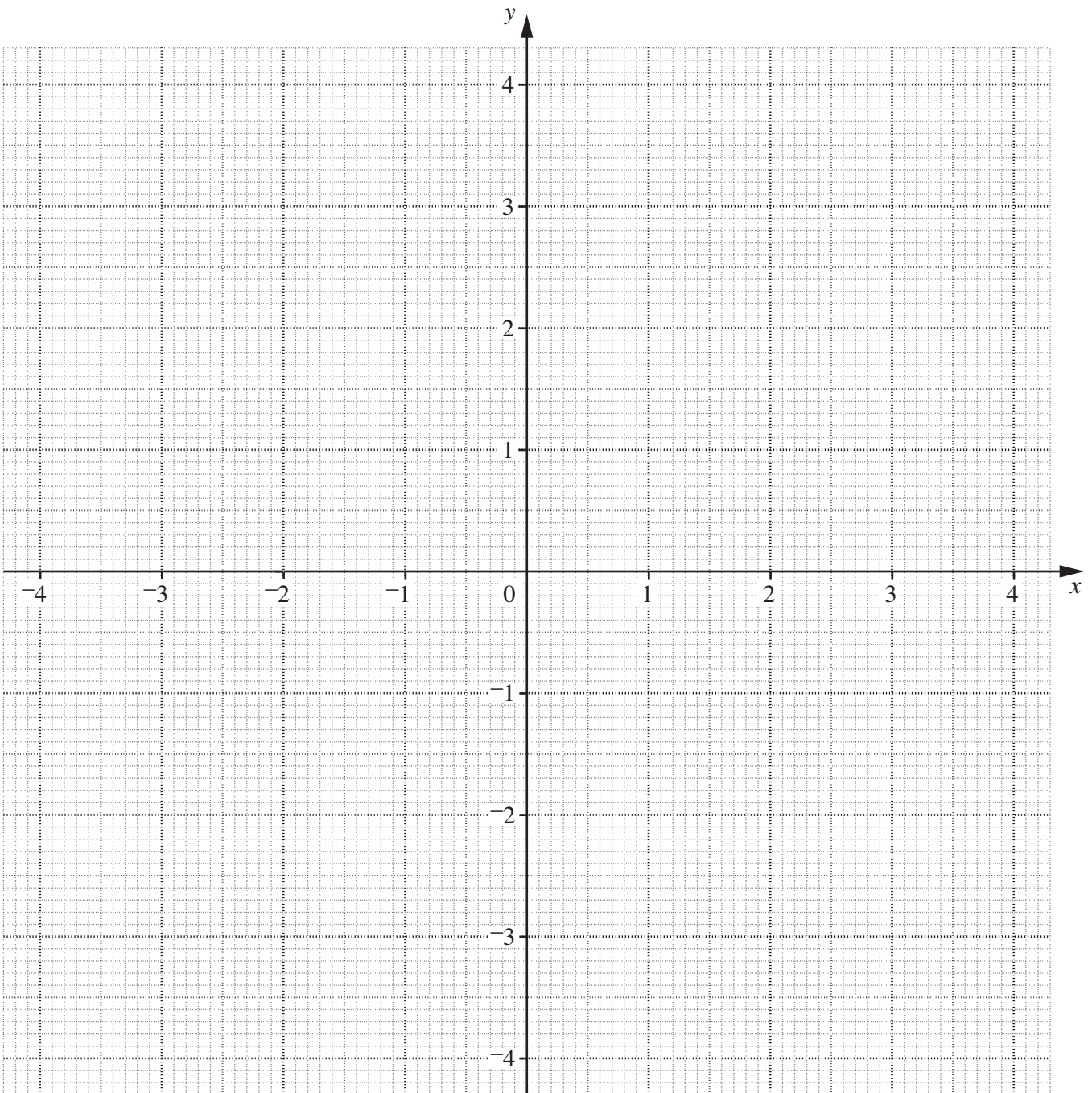
- (b) Calculate the length of  $CD$ .

(b) .....m [3]



[Turn over

15 (a) Construct the graph of  $x^2 + y^2 = 16$ .



[2]

(b) Solve these simultaneous equations **graphically**.

$$\begin{aligned} x^2 + y^2 &= 16 \\ x + y &= 2 \end{aligned}$$

(b)  $x = \dots\dots\dots$   $y = \dots\dots\dots$

$x = \dots\dots\dots$   $y = \dots\dots\dots$

[3]

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- 16 (a) The population of Southampton in 1991 was 210 000 correct to three significant figures. The population in 2001 was 217 000 correct to three significant figures.

Find the lower and upper bounds for the **increase** in the population.

(a) Lower bound .....

Upper bound .....[3]

- (b) This table shows the composition of the population of Southampton in 2001.

| Age in years | Number of males | Number of females |
|--------------|-----------------|-------------------|
| 0 – 14       | 19 000          | 18 000            |
| 15 – 29      | 32 000          | 29 000            |
| 30 – 49      | 29 000          | 27 000            |
| 50 – 69      | 20 000          | 20 000            |
| 70 – 99      | 9 000           | 14 000            |
| Total        | 109 000         | 108 000           |

To survey opinion about leisure facilities, a stratified sample of 500 people were selected and interviewed.

Work out how many females aged between 15 and 29 were interviewed.

(b) .....[2]

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[Turn over

17 (a) Write  $x^2 - 14x + 60$  in the form  $(x - a)^2 + b$ .

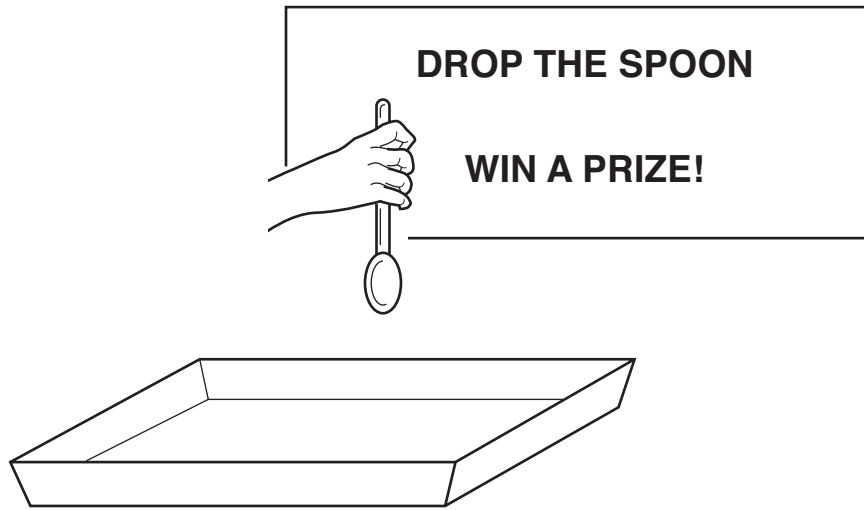
(a) .....[3]

(b) Use your answer to (a) to find the minimum value of  $x^2 - 14x + 60$ .

(b) .....[1]

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- 18 In a game at a summer fete a player has to drop a spoon three times.  
For each drop the probability that the spoon lands 'up' is 0.6.



- (a) Work out the probability that the spoon lands 'down' all three times.

(a) .....[2]

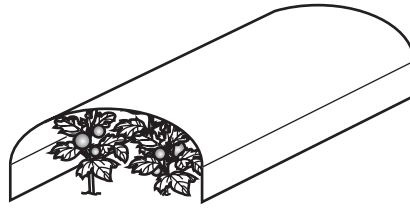
- (b) To win a prize the spoon has to land 'down' more times than it lands 'up'.  
Alex drops the spoon three times.

Work out the probability that he wins a prize.

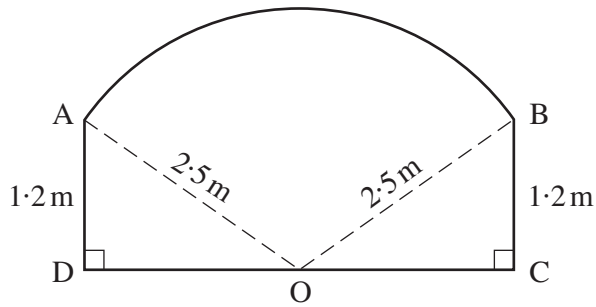
(b) .....[3]

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19 Tomatoes are grown in a tunnel, made with plastic sides and top, open at both ends.



The diagram below shows the cross-section of the tunnel.  
 AB is the arc of a circle, centre O.



Not to scale

(a) Show that angle AOB = 123°, correct to the nearest degree.

.....  
 .....[3]

(b) The tunnel is 6 m long.

Work out the total area of plastic required to make the sides and the top of the tunnel.

(b) .....m<sup>2</sup> [4]

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