OCR
RECOGNISING ACHIEVEMENT

OXFORD CAMBRIDGE AND RSA EXAMINATIONS
General Certificate of Secondary Education

MATHEMATICS B (MEI) 1968/2313B

PAPER 1 SECTION B
HIGHER TIER

Monday **5 JUNE 2006** Afternoon 45 minutes

Candidates answer on the question paper.
Additional materials:
Geometrical instruments
Scientific or graphical calculator
Tracing paper (optional)

Candidate Name	Centre Number	Candidate Number

TIME 45 minutes

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.
- Show all your working. Marks may be given for working which shows that you know how to solve the problem, even if you get the answer wrong.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [ ] at the end of each question or part question.
- Unless otherwise instructed in the question, take π to be 3.142 or use the π button on your calculator.
- The total number of marks for this section is 36.
- Section B starts with question 10.

FOR EXAMINER'S USE	
Section B	

This question paper consists of 8 printed pages.

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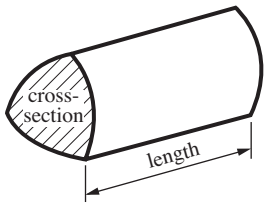
[Turn over

Formulae Sheet: Higher Tier

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

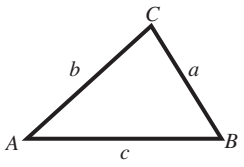


In any triangle *ABC*

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

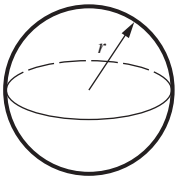
Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

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



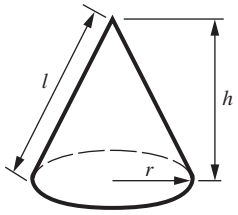
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

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



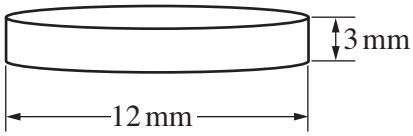
The Quadratic Equation

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

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

10 A £1 coin is 3 mm thick and has a diameter of length 12 mm.
Its mass is 10 g.

Calculate the density of the coin.



.....g/mm^3 [4]

11 **(a)** Solve.

$8x - 14 = 4(x + 7)$

(a) .....[3]

(b) Solve algebraically these simultaneous equations.

$6x + 5y = 11$
$4x - 3y = 20$

(b) x = ...

y = ...[4]

[Turn over

12 The table summarises the times spent on mobile phones by 100 girls during one day.

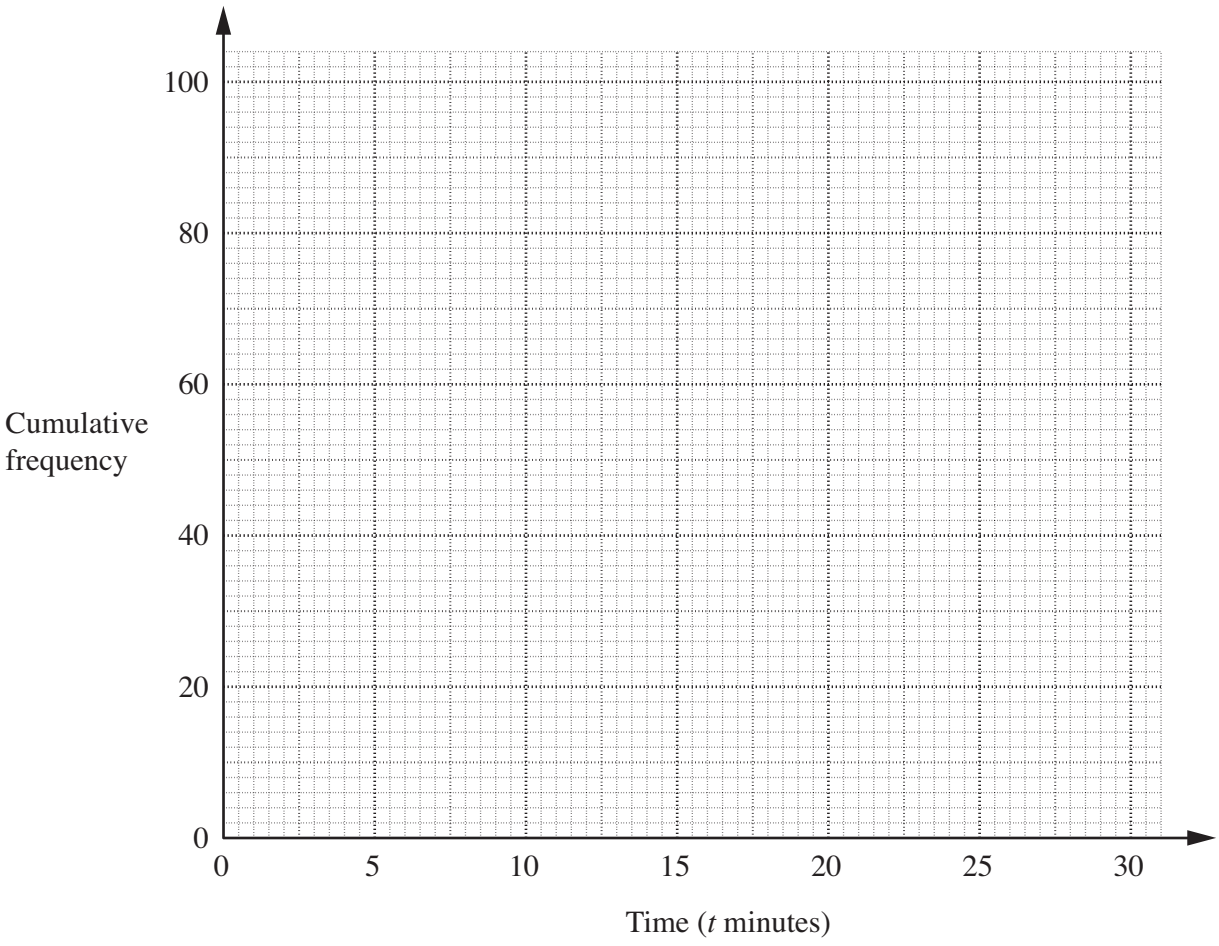
Time (t minutes)	$0 \leqslant t < 5$	$5 \leqslant t < 10$	$10 \leqslant t < 15$	$15 \leqslant t < 20$	$20 \leqslant t < 25$	$25 \leqslant t < 30$
Number of girls	8	12	18	32	20	10

(a) Complete the cumulative frequency table.

Time (t minutes)	$t < 5$	$t < 10$	$t < 15$	$t < 20$	$t < 25$	$t < 30$
Cumulative Frequency	8	20				

[1]

(b) On the grid, draw the cumulative frequency graph for these data.



[3]

(c) Use your graph to find

(i) the median,

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

(ii) the interquartile range.

(ii) .....minutes [2]

(d) A similar survey was done with a group of 100 boys.
The median for the boys was 14 minutes.
The interquartile range for the boys was 18 minutes.

Make two comparisons between the results for the girls and the boys.

1 .....

.....

2 .....

.....[2]

(e) The 100 girls in part **(a)** were selected by stratified sampling from a school of 900 girls.

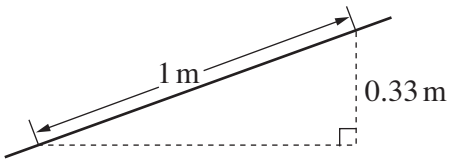
Explain briefly how to select a stratified sample in this situation.

.....

.....

.....[2]

13 The slope of the road through Hardknott Pass (in the Lake District) is 33% in places. This means that the road rises 0.33 m for each metre measured along the road surface.



Not to scale

Calculate the angle the road makes with the horizontal.

.....° [3]

14 A journey into London took 48 minutes by public transport.
The same journey took 75 minutes by car.
Both times are to the nearest minute.

Calculate the upper bound for the difference in these times.

..... minutes [2]

15 When looking out to sea, the distance to the horizon is proportional to the square root of your height above sea level.
When you are 5 m above sea level the distance to the horizon is 8 km.

What is the distance to the horizon when you are 120 m above sea level?

..... km [3]

TURN OVER FOR QUESTION 16

16 A designer cut a 270° sector of a circle from a copper sheet.
The sector has radius 40 cm, as shown in Fig. 1.
The designer then joined the two straight edges together to form the cone shown in Fig. 2.

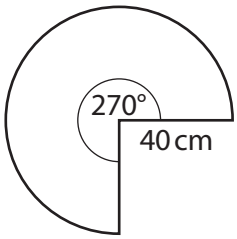


Fig. 1

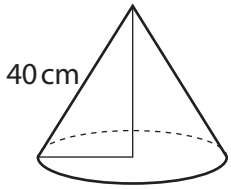


Fig. 2

(a) Explain why the base radius of the cone is 30 cm. [2]

(b) Calculate the capacity of the cone.

(b) ..... cm ^{3} [4]