OCR
RECOGNISING ACHIEVEMENT

OXFORD CAMBRIDGE AND RSA EXAMINATIONS
General Certificate of Secondary Education

MATHEMATICS SYLLABUS A 1962/3

PAPER 3 (Intermediate Tier)

Wednesday **11 JANUARY 2006** Morning 2 hours

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

Candidate Name	Centre Number	Candidate Number

TIME 2 hours

INSTRUCTIONS TO CANDIDATES

- Write your name in the space above.
- Write your 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 your working. Marks may be given for working that 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.

WARNING

You are not allowed to use a calculator in this paper.

FOR EXAMINER'S USE

This question paper consists of 18 printed pages and 2 blank pages.

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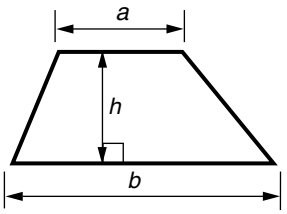
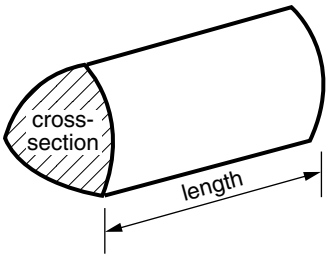
Formulae Sheet: Intermediate Tier

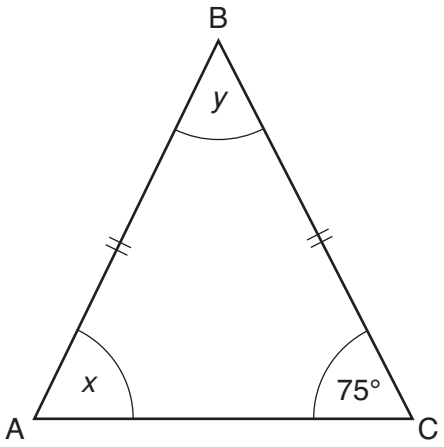
Area of trapezium = $\frac{1}{2}(a + b)h$



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



1 In triangle ABC, AB = BC and angle ACB = 75°.



NOT TO SCALE

(a) What is the size of angle *x*?
Give a reason for your answer.

x = _____ ° because _____

_____[2]

(b) Work out the size of angle *y*.
Give a reason for your answer.

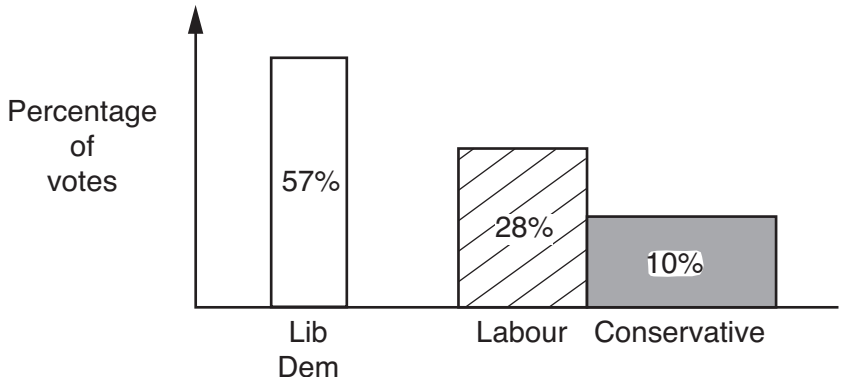
.....

.....

y = _____ ° because _____

_____[2]

2 After a local election, a newspaper produced this bar chart to show all the votes. Only three parties took part.



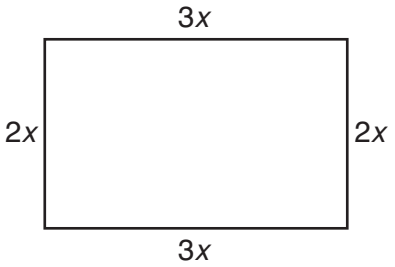
Write down three misleading features of the diagram.

1. _____

2. _____

3. _____[3]

3



(a) Work out an expression, in terms of x, for the perimeter of this rectangle. Give your answer in its simplest form.

.....

(a) _____[2]

(b) Work out an expression, in terms of x, for the area of this rectangle. Give your answer in its simplest form.

.....

(b) _____[2]

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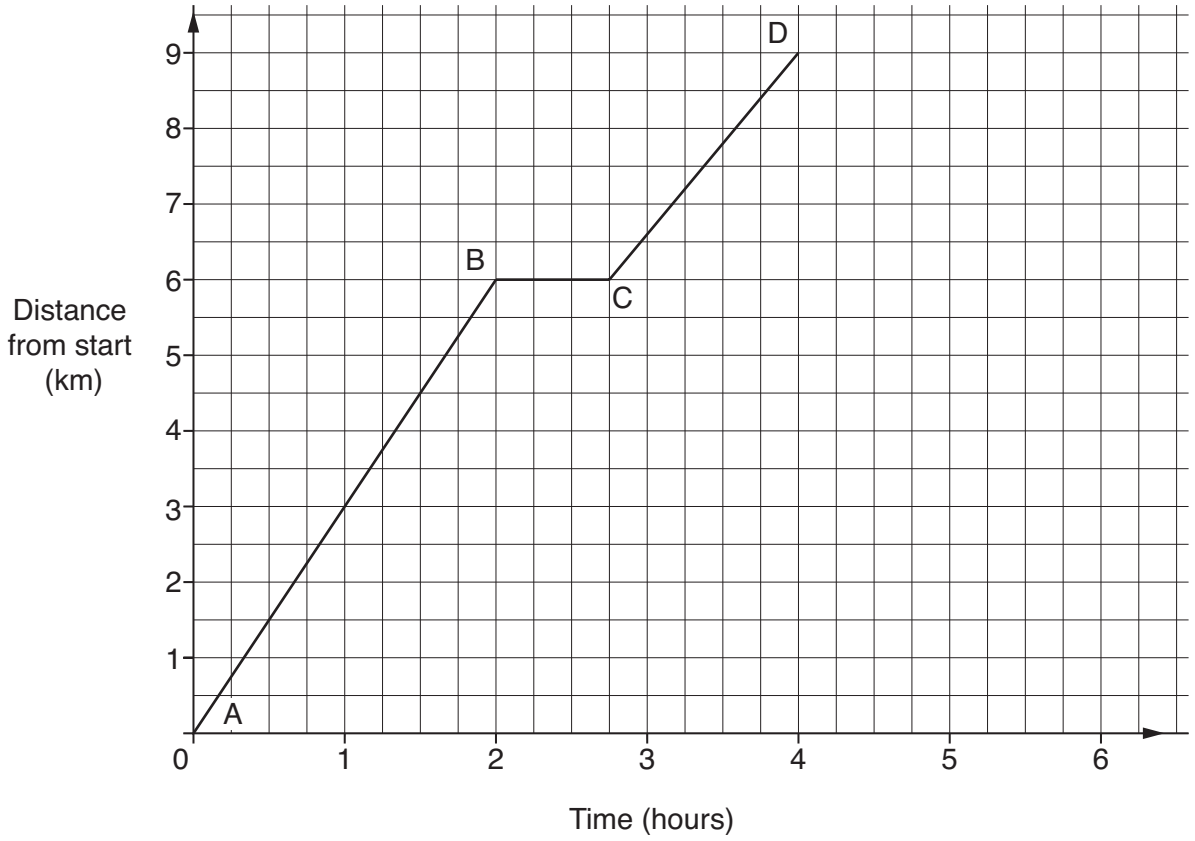
4 Jim went out walking.
The diagram ABCD represents part of his walk.



(a) How far had Jim walked after $1\frac{1}{2}$ hours?

(a) _____ km [1]

(b) What does the part of the graph, BC, represent?

(b) _____[1]

(c) After walking 9 km, Jim turned round and walked straight back to his starting place without stopping. It took him 2 hours to get back.
Draw a line on the grid to show this. [1]

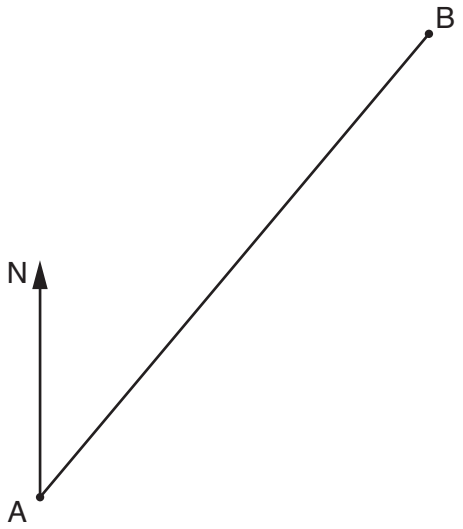
(d) Work out his average speed on the return journey.

.....

.....

(d) _____ km/h [2]

5 The positions of two villages, A and B, are shown on the diagram below.
The scale of the diagram is 1 cm represents 4 km.



(a) What is the bearing of B from A?

(a) _____ ° [1]

(b) What is the **actual** distance of B from A?

.....

(b) _____ km [2]

Another village, C, is 28 km from A on a bearing of 085°.

(c) On the diagram, mark and label the point C. [2]

6 **(a)** In a breakfast cereal, the ratio of the weights of fibre to fruit is 4 : 1.
What weight of fibre is there in a box containing 300 g of cereal?

.....

.....

.....

(a) _____ g [2]

(b) In a special offer, the 300 g of cereal in the box is increased by 30%.
What is the weight of cereal in the special offer box?

.....

.....

.....

.....

(b) _____ g [3]

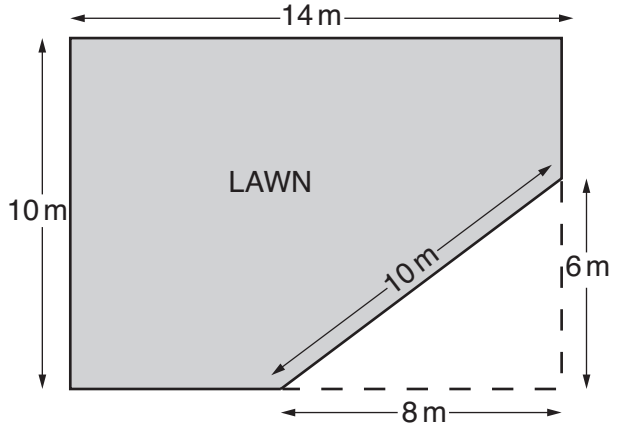
(c) An empty cereal box weighs 42 g, correct to the nearest gram.
Write down the greatest and least possible weight of this box.

(c) greatest _____ g

least _____ g [2]

[Turn over

7 A lawn is in the shape of a rectangle with a triangular corner cut off.



NOT TO SCALE

(a) A gardener wishes to put an edging strip all the way around the edge of the lawn. What length of edging strip will she need?

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.....

(a) _____ m [2]

(b) What is the area of the lawn?
Give the units of your answer.

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.....

.....

.....

.....

(b) _____[5]

8 **(a)** Here are the first four terms of a sequence.

26 20 14 8

Write down the next two terms of this sequence.

(a) _____ , _____[2]

(b) Here are the first five terms of a different sequence.

4 5 8 13 20

(i) What is the next term of this sequence?

.....

(b)(i) _____[1]

(ii) Explain how this sequence is formed.

_____

_____[1]

(c) Here are the first four terms of another sequence.

6 10 14 18

Find a formula for the nth term of this sequence.

.....

.....

.....

(c) _____[2]

9 There are only red, yellow and blue counters in a bag.

(a) Complete the table to show the probability of choosing, at random, a blue counter from the bag.

.....

.....

Colour	Red	Yellow	Blue
Probability	0.45	0.3	

[2]

(b) A counter is chosen from the bag, its colour noted and then replaced.
This is repeated 200 times.
How many times would you expect a yellow counter to be chosen?

……

……

(b) _____[2]

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10 **(a)** Work out.

$$5^2 \times 2^3$$

.....

.....

(a) _____[2]

(b) **(i)** Write 24 as a product of its prime factors.

.....

.....

(b)(i) _____[2]

(ii) Work out the highest common factor (HCF) of 24 and 56.

.....

.....

(ii) _____[2]

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11 Solve.

(a) $2(x - 3) = 9$

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.....

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(a) _____[3]

(b) $7x + 4 = 3x + 16$

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.....

.....

(b) _____[3]

(c) $3x + 4 \leq 1$

.....

.....

.....

(c) _____[2]

12 Calculate an **estimate** of the following.
Show clearly the values you use to obtain your estimate.

$$\frac{3.14^2 + \sqrt{50}}{1.95}$$

_____

_____

_____

_____

_____

_____[3]

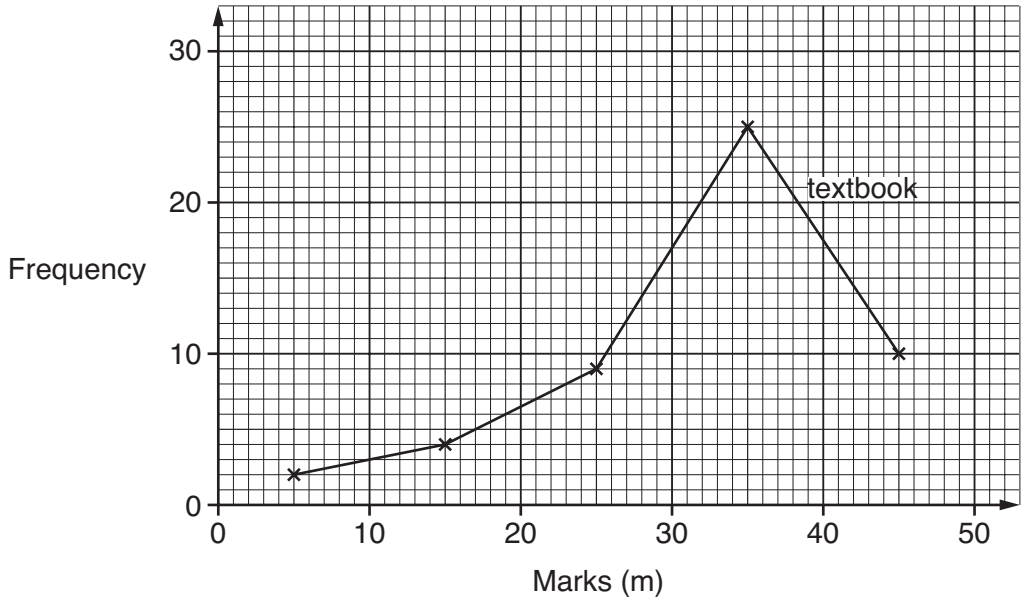
[Turn over

13 The positions of two radio transmitters, A and B, are shown on the diagram below.

(a) A can transmit signals up to a distance of 30 km.
B can transmit signals up to a distance of 25 km.
Indicate on your diagram the region that can receive signals from **both** transmitters.
Use a scale of 1 cm to represent 5 km. [3]

(b) Fran lives exactly the same distance from A and B.
She can receive signals from both transmitters.
Indicate on the diagram all the possible positions where Fran could live. [2]

14 A teacher teaches a topic to one group using textbooks and to another group using computers.
At the end of the teaching he tests each group.
The frequency polygon below shows the distribution of marks obtained by the group of students taught using textbooks.



The table shows the distribution of marks obtained by the group of students taught using computers.

Marks(m)	$0 < m \leq 10$	$10 < m \leq 20$	$20 < m \leq 30$	$30 < m \leq 40$	$40 < m \leq 50$
Frequency	6	10	13	17	4

(a) On the grid above, draw the frequency polygon for these marks. [2]

(b) Make one comment comparing the marks of the two groups of students.

_____

_____ [1]

15 Work out.

(a) $\frac{2}{7} \times 3$

.....

.....

(a) _____[1]

(b) $\frac{3}{5} \div \frac{5}{6}$

.....

.....

.....

(b) _____[2]

(c) $2\frac{1}{3} \times 1\frac{4}{5}$

Give your answer as a mixed number.

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.....

.....

(c) _____[3]

16 **(a)** Write each of these expressions as a single power of y.

(i) $y^6 \times y^2$

.....

(a)(i) _____[1]

(ii) $\frac{y^5}{y^3}$

.....

.....

(ii) _____[1]

(b) **(i)** Factorise completely.

$$6x^2 - 3xy$$

.....

.....

(b)(i) _____[2]

(ii) Factorise.

$$x^2 + 7x + 10$$

.....

.....

(ii) _____[2]

17 **(a)** The fraction $\frac{1}{7}$ can be written as a recurring decimal.

$$\frac{1}{7} = 0.\dot{1}42857\dot{}$$

(i) Write $\frac{2}{7}$ as a recurring decimal.

(a)(i) _____[1]

(ii) What fraction is equivalent to $0.0\dot{1}42857\dot{}$?

(ii) _____[1]

(b) Write 0.0366 in standard form.

(b) _____[1]

(c) The area of England is $1.3 \times 10^5\,km^2$.
The area of Wales is $2.1 \times 10^4\,km^2$.
What is the total area of the two countries?
Give your answer in standard form.

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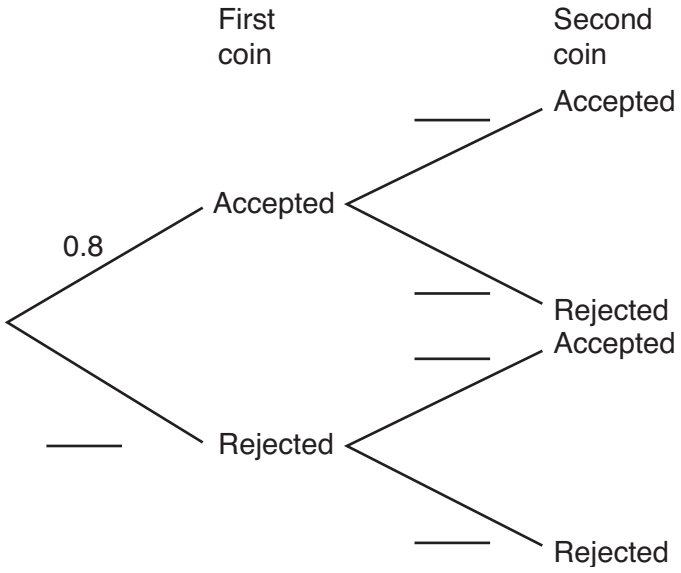
.....

(c) _____ km^2 [3]

18 Emma is paying for a £2 car parking ticket with two £1 coins.
She inserts the coins into the ticket machine one after the other.
The probability that the ticket machine accepts any £1 coin is 0.8.

(a) Complete the tree diagram below.



[2]

(b) A ticket is issued by the machine only if both coins are accepted.
Find the probability that Emma **fails** to get a ticket.

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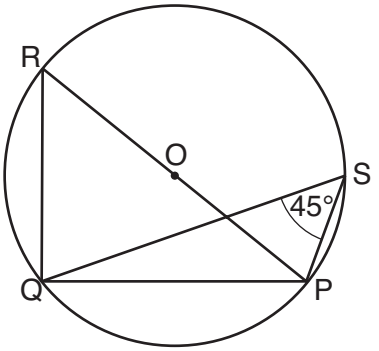
(b) _____[3]

19 O is the centre of the circle passing through the points P, Q, R and S.
POR is a diameter.



NOT TO SCALE

(a) What is the size of angle PRQ?
Give a reason for your answer.

Angle PRQ = _____° because _____

_____[2]

(b) What is the size of angle PQR?
Give a reason for your answer.

Angle PQR = _____° because _____

_____[2]

(c) Show that QP = QR.
Give a reason for each step of your work.

_____

_____

_____

_____[3]

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