Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GENERAL CERTIFICATE OF SECONDARY EDUCATION

B293B

MATHEMATICS B (MEI)

Paper 3 Section B (Higher Tier)

MONDAY 7 JUNE 2010: Afternoon
DURATION: 45 minutes

SUITABLE FOR VISUALLY IMPAIRED CANDIDATES

Candidates answer on the Question Paper

OCR SUPPLIED MATERIALS:

None

OTHER MATERIALS REQUIRED:

Geometrical instruments
Scientific or graphical calculator
Tracing paper (optional)

READ INSTRUCTIONS OVERLEAF

DC (LEO/SW) MEP60290 29425/1

INSTRUCTIONS TO CANDIDATES

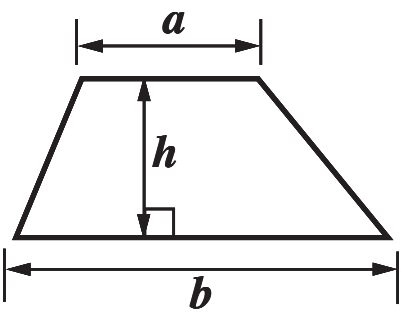
- **Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes on the first page.**
- **Use black ink. Pencil may be used for graphs and diagrams only.**
- **Read each question carefully and make sure that you know what you have to do before starting your answer.**
- **Show your working. Marks may be given for a correct method even if the answer is incorrect.**
- **Answer ALL the questions.**
- **Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your Candidate Number, Centre Number and question number(s).**

INFORMATION FOR CANDIDATES

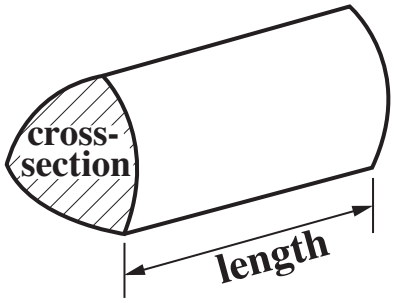
- **The number of marks is given in brackets [ ] at the end of each question or part question.**
- **Section B starts with question 10.**
- **You are expected to use a calculator in Section B of this paper.**
- **Use the π button on your calculator or take π to be 3.142 unless the question says otherwise.**
- **The total number of marks for this Section is 36.**

FORMULAE SHEET: HIGHER TIER

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



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

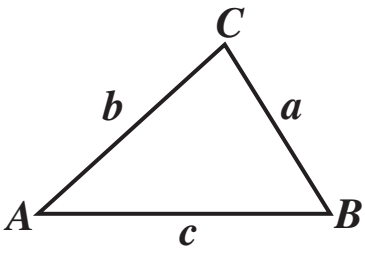


In any triangle ABC

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

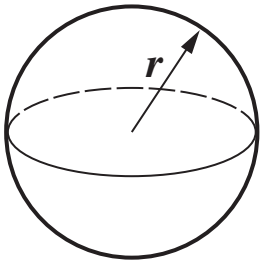
Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

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



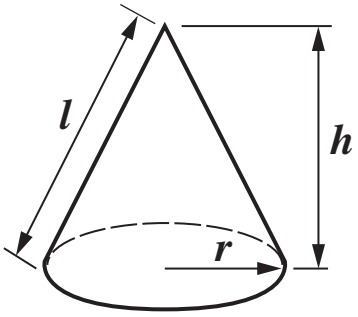
Volume of sphere $= \frac{4}{3}\pi r^3$

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



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

Curved surface area of cone $= \pi rl$



The Quadratic Equation

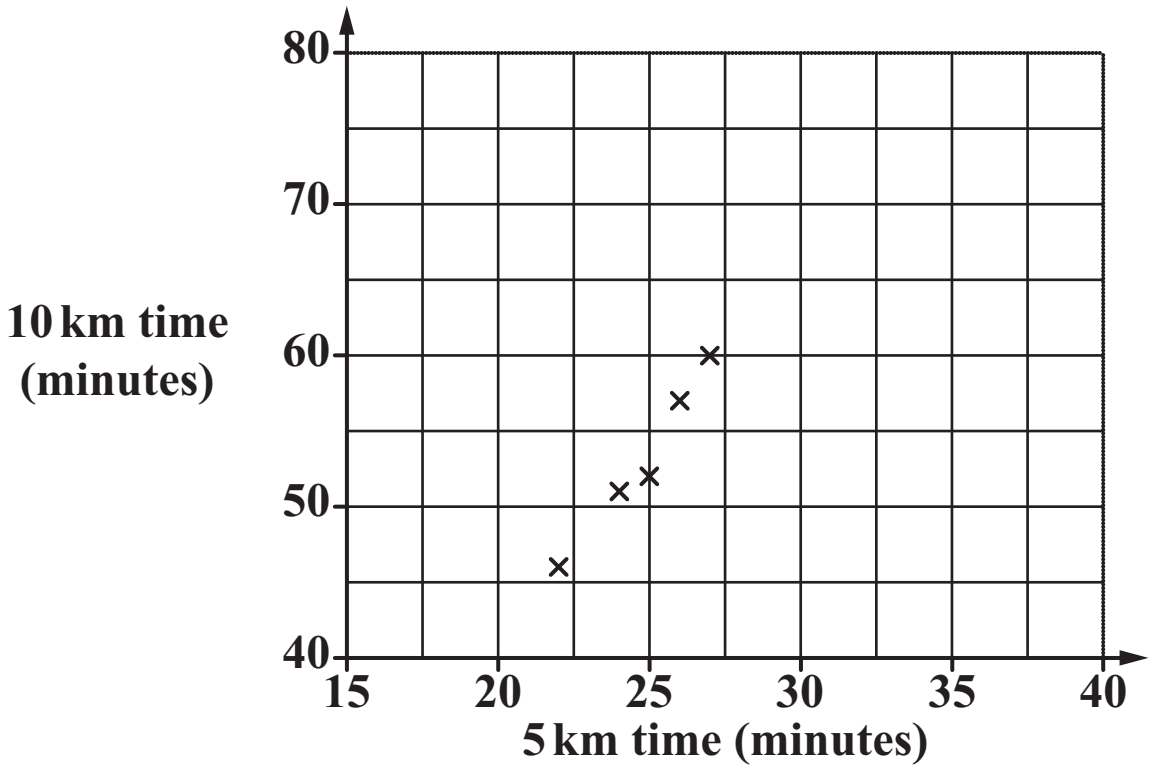
The solutions of $ax^2 + bx + c = 0$**, where** $a \neq 0$**, are given by**

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

10 Ten runners recorded their times for both a 5 km run and a 10 km run.
Their times are recorded to the nearest minute.

Runner	A	B	C	D	E	F	G	H	I	J
5 km time (minutes)	22	24	25	26	27	28	30	31	35	35
10 km time (minutes)	46	51	52	57	60	60	62	66	70	72

(a) Complete the scatter graph of the data on the grid.
The first five points have been plotted for you.
[2 marks]



(b) (i) Draw a line of best fit on the scatter graph.
[1 mark]

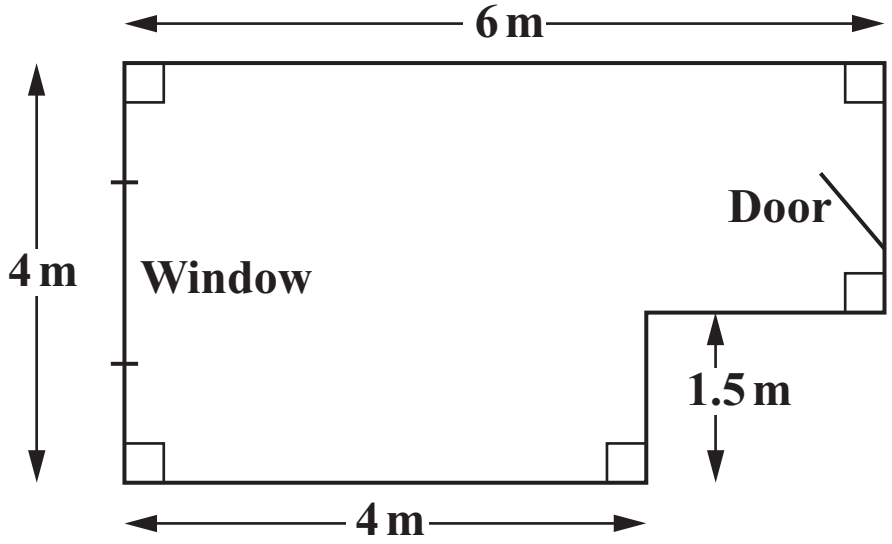
(ii) Use your line of best fit to predict the 10 km time of a runner who took 33 minutes to run 5 km.
[1 mark]

(b) (ii) _____ minutes

(c) Describe the correlation between the times for the 5 km run and the 10 km run.
[1 mark]

(c) _____

11 (a) This is the floor plan of Ryan's office.

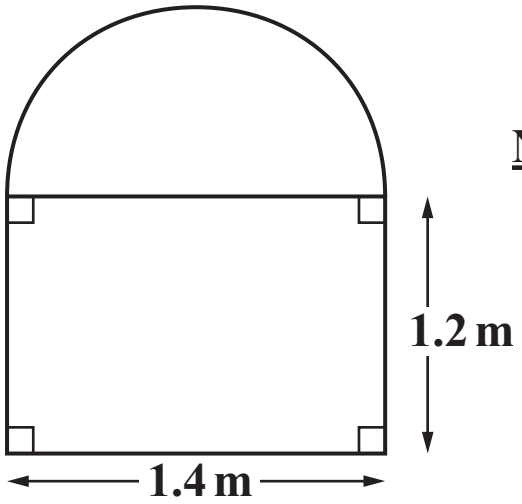


NOT TO SCALE

Work out the area of the floor.
[2 marks]

(a) _____ m^2

(b) This is the shape of the window in Ryan's office. The top is a semi-circle and the bottom is a rectangle.



NOT TO SCALE

Work out the area of the window.
[4 marks]

(b) _____ m^2

(c) In an office, the area of the window should be at least 10% of the area of the floor.

Is the area of the window in Ryan's office large enough?

Explain your answer.
[2 marks]

_____

_____

_____

12 Find all the integers that satisfy this inequality.
[2 marks]

$$1 < 2n - 3 < 8$$

_____

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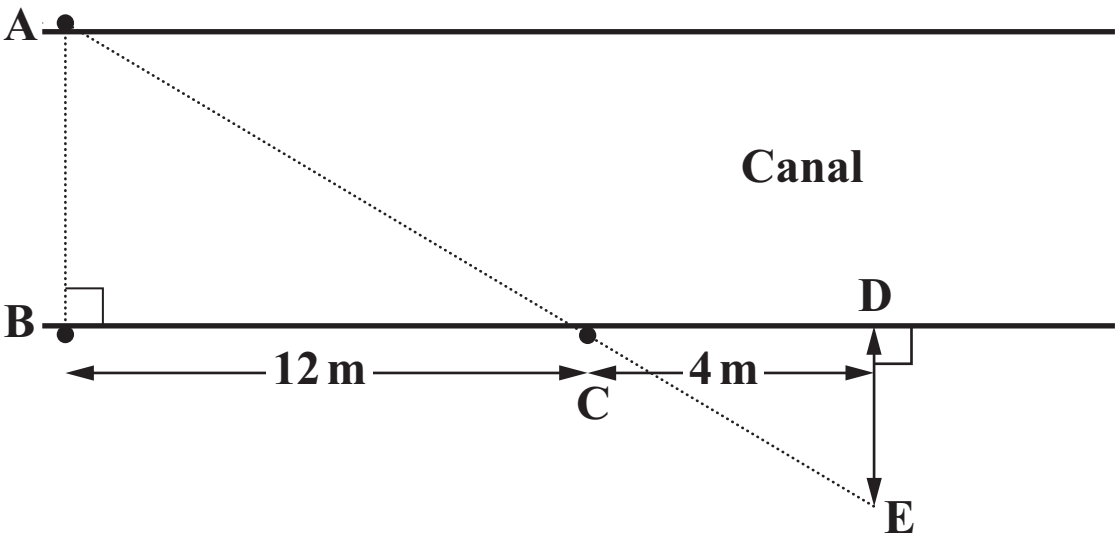
13 Ken used the following method to find the width of a straight section of canal.



He placed a stake at B on the towpath, directly opposite a tree at A on the other bank.
He walked 12 metres along the path to a point C, where he placed another stake.
He walked a further 4 metres to a point D.
He then walked directly away from the canal to a point E so that E, A and C were in a direct line.

(a) Show that the triangles ABC and EDC are similar.
[3 marks]

(b) The distance DE is 3 metres.

Calculate the width, AB, of the canal.
[2 marks]

(b) _____ m

14 Solve, algebraically, the following simultaneous equations. [4 marks]

$2x + 3y = 7$

$3x + 2y = 13$

$x =$ _____

$y =$ _____

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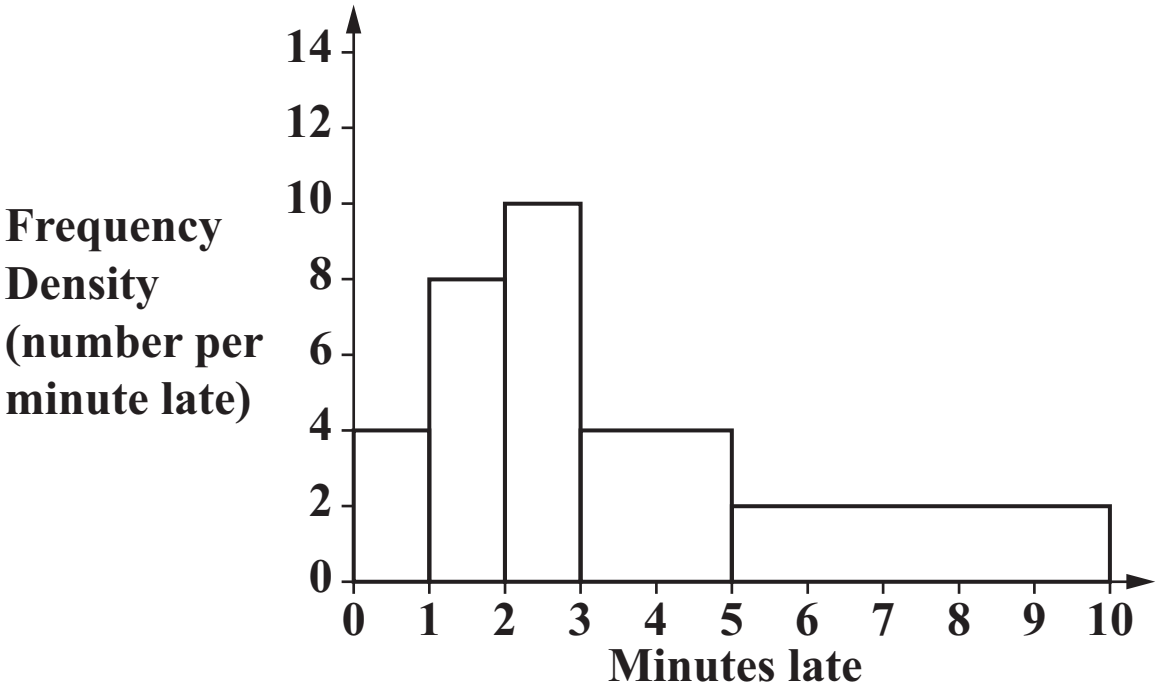
15 **Tanya often travels to London on business. In the spring she went 40 times.**
For each of these journeys, she recorded the number of minutes that the train was late in reaching London. (The train was never early.)
These data are summarised in the table.

MINUTES LATE	FREQUENCY
$0 \leq t < 1$	16
$1 \leq t < 2$	12
$2 \leq t < 3$	10
$3 \leq t < 5$	0
$5 \leq t < 10$	2

(a) Calculate an estimate of the mean number of minutes that the train was late reaching London.
[4 marks]

(a) _____ minutes

In the summer she also recorded the number of minutes that the train was late reaching London.
The histogram summarises the data for the summer.



(b) Use the histogram to work out the number of trains that were between 3 and 5 minutes late.
[2 marks]

(b) _____

(c) An estimate of the mean number of minutes late in the summer is 3.65.

Make two comparisons between the punctuality of the trains in the spring and in the summer.
[2 marks]

_____

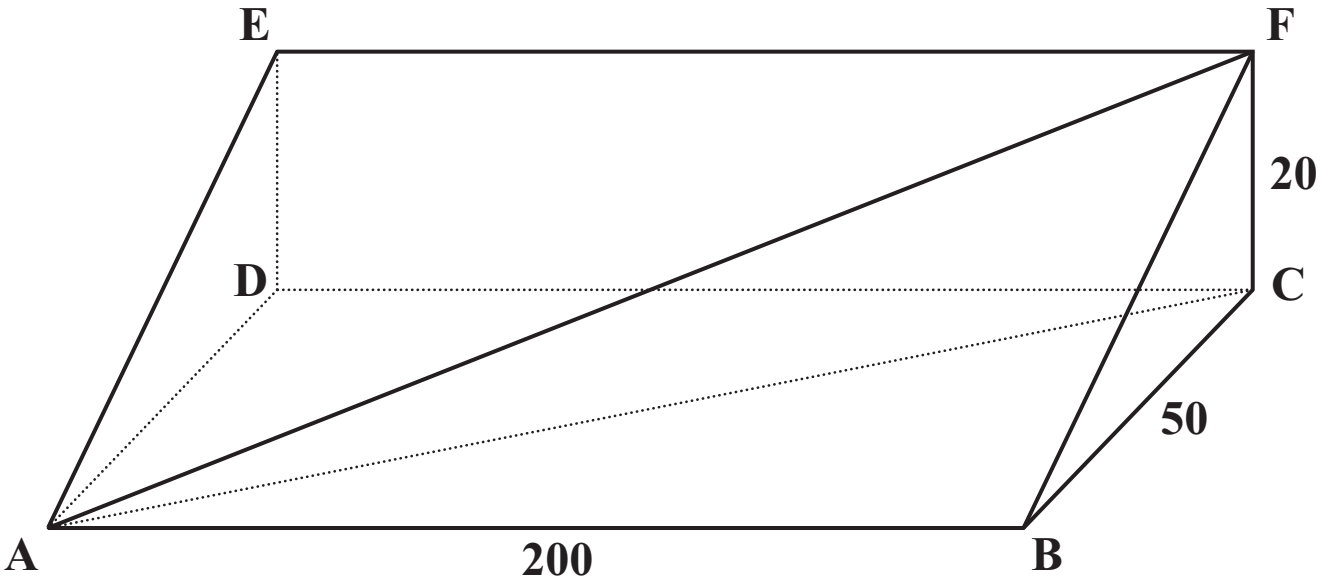
_____

_____

_____

TURN OVER FOR QUESTION 16

16 The side of a hill is in the form of a triangular prism as shown.



The rectangle ABCD is horizontal with AB = 200 m and BC = 50 m.
The rectangle CDEF is vertical with CF = 20 m.

The line AF represents a footpath that goes in a straight line up the hill from A to F.

Find the angle the footpath makes with the horizontal.
[4 marks]

_____ °