

**GENERAL CERTIFICATE OF SECONDARY EDUCATION  
MATHEMATICS B (MEI)**

**B293A**

Paper 3 Section A  
(Higher Tier)

**Friday 9 January 2009  
Morning**

**Duration: 45 minutes**

Candidates answer on the question paper

**OCR Supplied Materials:**  
None

**Other Materials Required:**

- Geometrical instruments
- Tracing paper (optional)



Candidate Forename		Candidate Surname	
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Centre Number						Candidate Number				
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**INSTRUCTIONS TO CANDIDATES**

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- 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 all your working. Marks may be given for a correct method even if the answer is incorrect.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.

**INFORMATION FOR CANDIDATES**

- 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 **36**.
- This document consists of **12** pages. Any blank pages are indicated.

**WARNING**

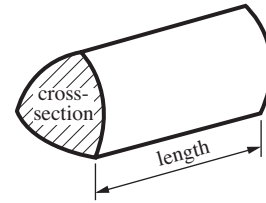


No calculator can be used for Section A of this paper

FOR EXAMINER'S USE	
<b>SECTION A</b>	
<b>SECTION B</b>	
<b>TOTAL</b>	

## Formulae Sheet: Higher Tier

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

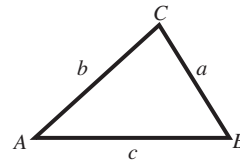


**In any triangle ABC**

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

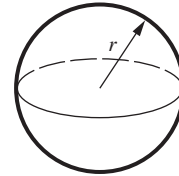
**Cosine rule**  $a^2 = b^2 + c^2 - 2bc \cos A$

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



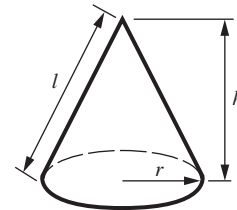
**Volume of sphere** =  $\frac{4}{3} \pi r^3$

**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**

- 1 Arrange these fractions in order of size, smallest first.  
Show clearly how you decide.

$$\frac{7}{10} \quad \frac{11}{15} \quad \frac{2}{3} \quad \frac{19}{30}$$

....., ....., ....., ..... [2]  
*smallest*

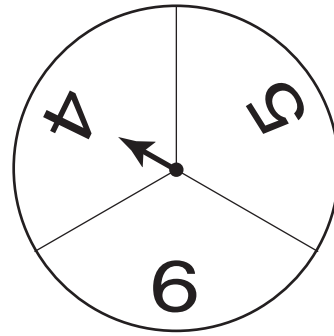
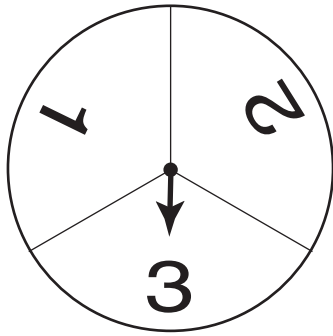
- 2 (a) Solve the equation  $\frac{x}{4} = 20$ .

(a) ..... [1]

- (b) Multiply out  $x^2(x - 5)$ .

(b) ..... [2]

3 In a game Asif spins each of these spinners once.



(a) The diagram shows the outcome (3, 4).

List all the possible outcomes.

[2]

(b) Asif adds the score shown on each spinner to find his total.  
The spinners are both fair.

Find the probability that his total is

(i) 6,

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

(ii) less than 8.

(ii) ..... [1]

4 There are 300 sixth-formers in a school.

$\frac{7}{12}$  of these sixth-formers are boys.

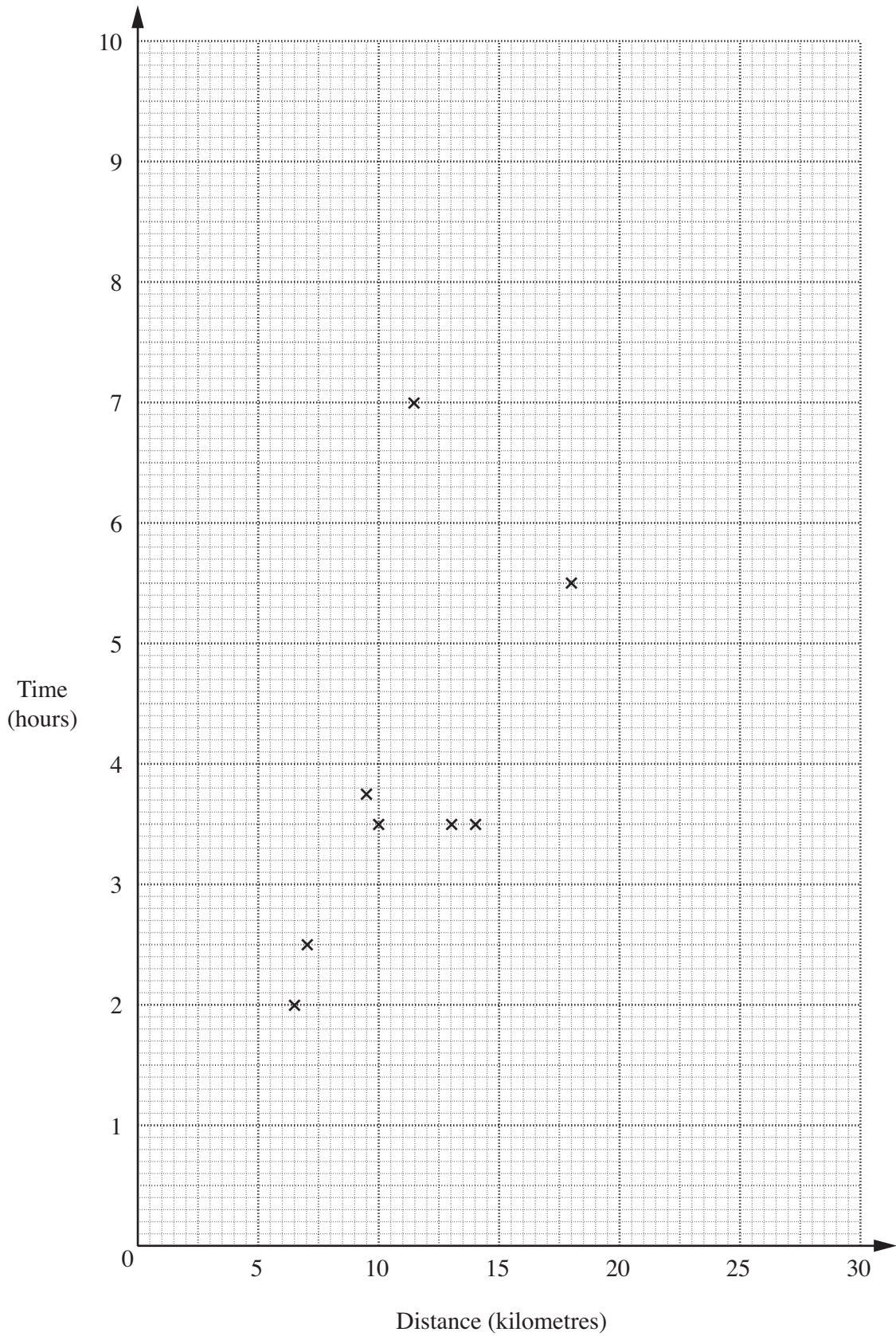
There are 800 other students in the school.

$\frac{9}{20}$  of these other students are boys.

How many boys are there in the school altogether?

..... [4]

- 5 A guide book on walks gives the distance, in kilometres, and the time needed, in hours, for each walk. The scatter diagram shows this information for each of eight walks.



(a) One point does not fit with the rest of the data.

Put a circle round this point.

[1]

(b) Here is the information for two other walks.

Distance (kilometres)	8	15
Time (hours)	3	4½

Add this information to the diagram.

[1]

(c) (i) Ignoring the point you circled in part (a) draw a line of best fit on the diagram.

[1]

(ii) The length of another walk is 12 kilometres.

Use your line of best fit to estimate the time needed for this walk.

(c)(ii) .....hours [1]

(iii) The longest walk in the book is 30 kilometres.

Explain why you should not use your line of best fit to estimate the time needed for this walk.

.....  
 ..... [1]

- 6 (a) Gita is taking part in a swimming race. She writes down what she thinks are the probabilities that she will come first, second and third. These are shown below.

<i>First</i>	<i>Second</i>	<i>Third</i>
0.2	0.4	0.6

Give a mathematical reason why she must be wrong.

.....  
 ..... [1]

- (b) Nicholas is predicting the weather for Christmas day. He writes down what he thinks are the probabilities that it will snow, be sunny and be dry. These are shown below.

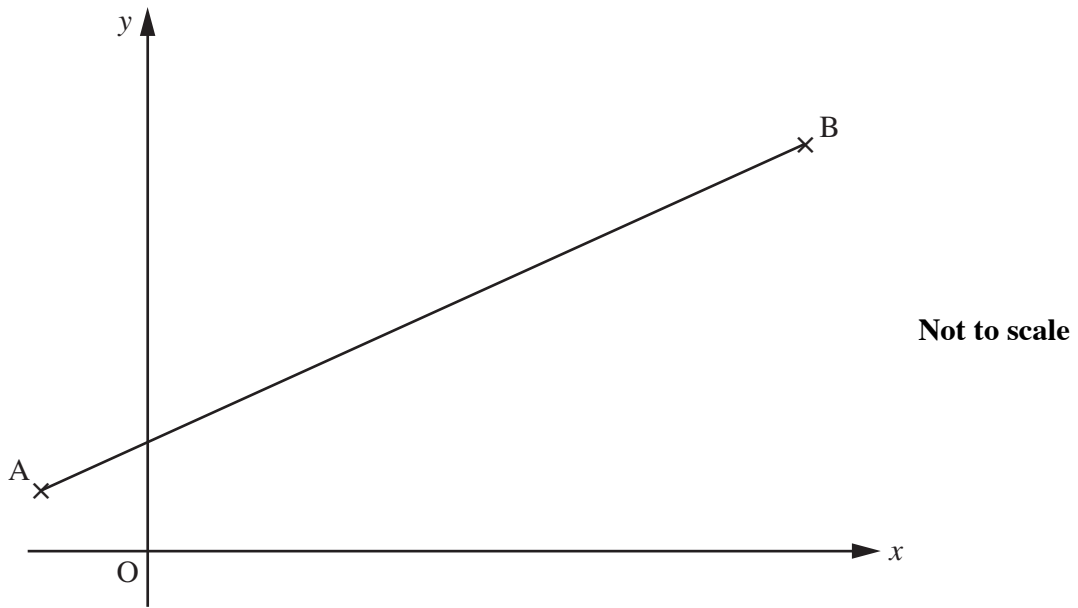
<i>Snow</i>	<i>Sunny</i>	<i>Dry</i>
0.2	0.4	0.6

Explain why he could be correct.

.....  
 ..... [1]



- 7 The diagram shows the line joining points A(-3, 1) and B(17, 11).



- (a) Write down the coordinates of the midpoint of AB.

(a) (....., .....)[2]

- (b) Calculate the gradient of AB.

(b) ..... [2]

8 (a) Solve algebraically these simultaneous equations.

$$\begin{aligned} 4x + 3y &= 9 \\ 3x - 2y &= 28 \end{aligned}$$

(a)  $x = \dots\dots\dots$

$y = \dots\dots\dots$  [4]

(b) Simplify the following expressions.

(i)  $a^3 \times a^4$

(b)(i)  $\dots\dots\dots$  [1]

(ii)  $\frac{m^8}{m^2}$

(ii)  $\dots\dots\dots$  [1]

(iii)  $(4xy^2)^3$

(iii)  $\dots\dots\dots$  [2]

- 9 Given that  $A^2 = X^2 + Y^2$ , find the value of  $A$  when  $X = 4\sqrt{3}$  and  $Y = 5\sqrt{2}$ .  
Give your answer in the form  $a\sqrt{2}$ .

..... [4]

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