

**GENERAL CERTIFICATE OF SECONDARY EDUCATION  
MATHEMATICS B  
Higher Tier**

# H B293/B

**MODULAR PAPER – SECTION B**

### Specimen

Candidates answer on the question paper.

Time: 45 minutes

Additional Materials:

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



Candidate Name

Centre Number

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Candidate Number

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### 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. 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.
- 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.
- 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 in this section is 36.
- This section starts at question 10.
- Unless otherwise instructed take  $\pi$  to be 3.142 or use the  $\pi$  button on your calculator.

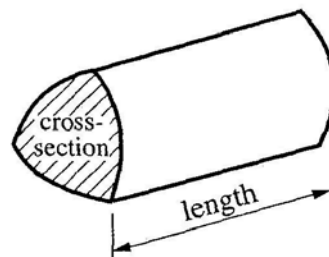
For Examiner's Use

Section B

This document consists of **11** printed pages.

## FORMULAE SHEET

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

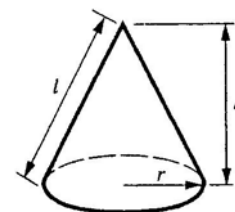
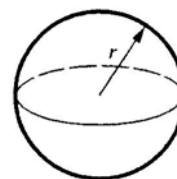
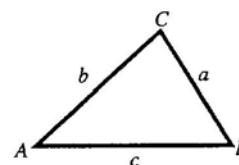
**Area of triangle** =  $\frac{1}{2} ab \sin C$

**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**

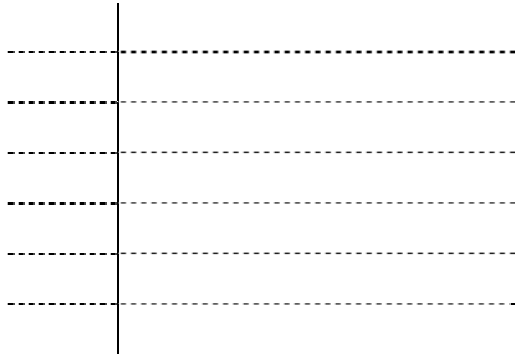
The solutions of  $ax^2 + bx + c = 0$ , where  $a \neq 0$ , are given by

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

**10** Twenty people took a reaction time test. Their times, in seconds, are shown below.

4.1 3.2 3.0 5.7 6.2 5.3 5.4 3.6 4.6 4.7  
 3.4 5.0 5.1 4.5 3.4 4.4 4.2 5.9 5.3 4.2

(a) Construct an ordered stem and leaf diagram to represent these data.



[3]

Key: |

(b) Find the median time.

(b).....s [2]

**11** (a) Solve the following equation.

$$2(3x - 1) = 5$$

(a) .....[3]

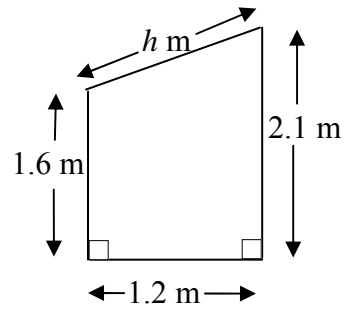
(b) Factorise the following completely.

$$4x^2 + 12xy$$

(b) ..... [2]

[Turn Over

- 12 The diagram shows the cross-section of a garden shed.



- (a) Calculate the area of the cross-section.

(a) .....m<sup>2</sup> [2]

- (b) The volume of the shed is 5.55 m<sup>3</sup>.

Calculate the length of the shed.

(b) .....m [2]

- (c) Use Pythagoras' theorem to calculate  $h$ .

(c) ..... [3]

- 13 The table shows the distribution of the weekly wages earned by 200 students working part-time.

Weekly wage (£ $w$ )	Frequency	Mid-point
$20 \leq w < 40$	61	30
$40 \leq w < 50$	52	
$50 \leq w < 60$	43	
$60 \leq w < 70$	27	
$70 \leq w < 100$	17	

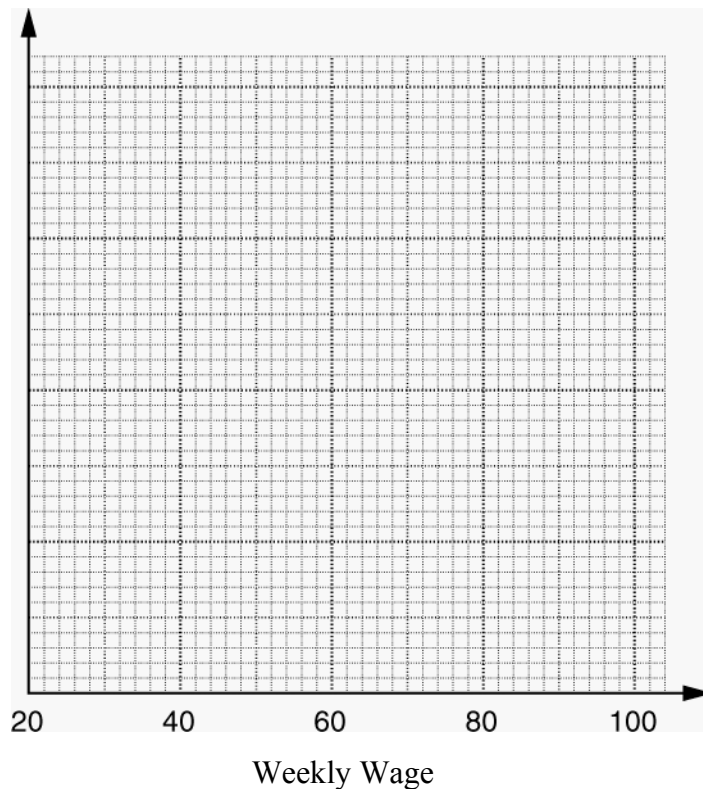
- (a) (i) Calculate an estimate of the mean weekly wage.

(a)(i) £.....[3]

- (ii) Explain why the answer to part (i) is only an **estimate** of the mean.

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

- (b) Draw a histogram to illustrate these data.



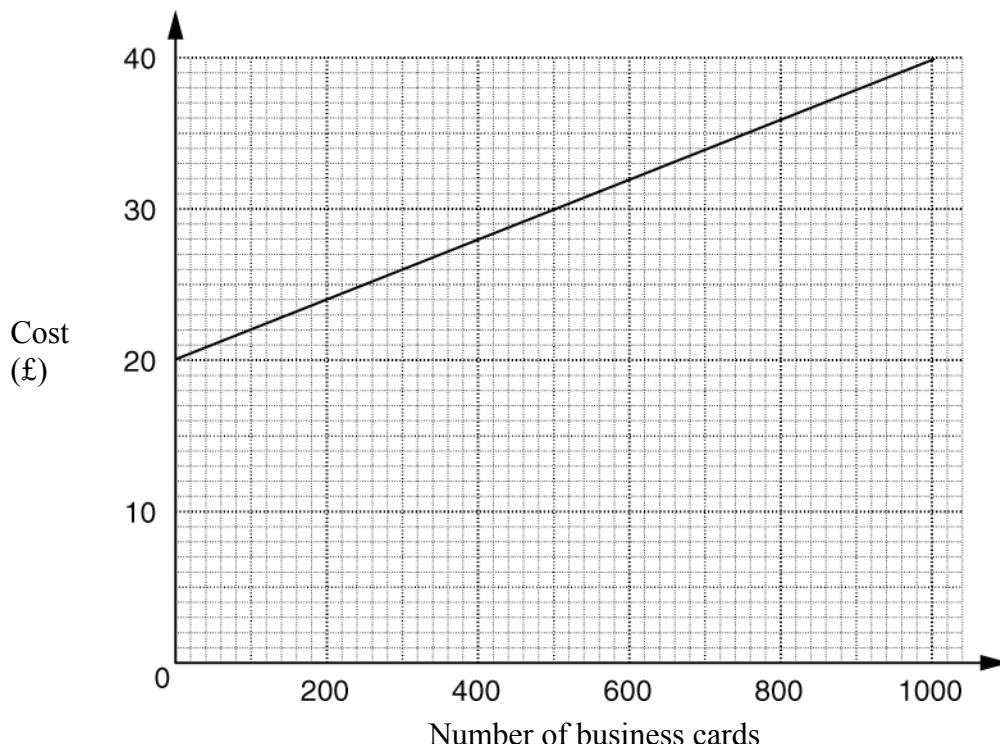
[3]  
 [Turn Over]

(c) David says that £40 - £50 is the modal class.

Give a reason in support of his choice.

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

14 The graph shows the cost of printing personal business cards.



(a) (i) Calculate the gradient of the line.

(a) (i).....[2]

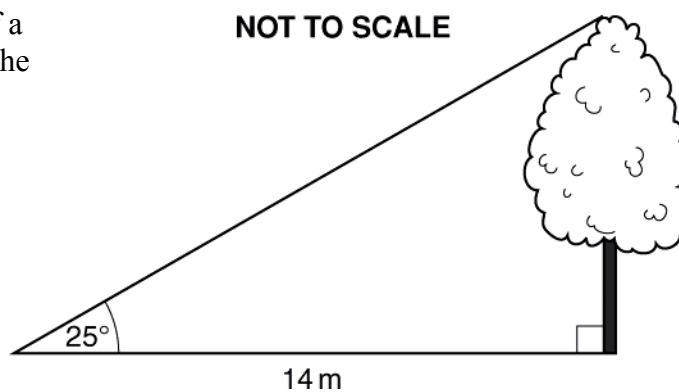
(ii) Explain briefly what this gradient represents.

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

(b) Find the equation in the form  $y = mx + c$ , where £ $y$  is the cost of printing  $x$  business cards.

(b).....[2]

- 15** From a point 14 metres from the base of a tree the angle of elevation of the top of the tree is  $25^\circ$ .



Calculate the height of the tree.

.....[3]

- 16** The population of a town is 217 600 correct to the nearest hundred.  
The area of the town is  $140 \text{ km}^2$ , correct to the nearest  $10 \text{ km}^2$ .

Calculate the upper bound for the population density.

..... people per  $\text{km}^2$  [3]



**OXFORD CAMBRIDGE AND RSA EXAMINATIONS**

**General Certificate of Secondary Education**

**MATHEMATICS B**

**B293/B**

**MODULAR PAPER – SECTION B**

**Specimen Mark Scheme**

The maximum mark for this paper is 36.



Section B				
10	(a)	$\begin{array}{c cccccc} 3 & 0 & 2 & 2 & 4 & 4 & 6 \\ 4 & 1 & 2 & 4 & 5 & 6 & 7 \\ 5 & 0 & 1 & 3 & 3 & 4 & 7 & 9 \\ 6 & 2 & & & & & & \end{array}$	B1	Correct stem and leaves
			B1	
			B1	
	(b)	45.5	M1 A1	Attempt at a middle value - accept 45 or 46 for M1
<b>5</b>				
11	(a)	$\begin{aligned} 2(3x-1) &= 5 \\ \Rightarrow 6x-2 &= 5 \\ \Rightarrow 6x &= 7 \\ \Rightarrow x &= \frac{7}{6} \end{aligned}$	M1 A1	Expand bracket Correctly Accept $x = 1\frac{1}{6}$
	(b)	$4x^2 + 12xy = 4x(x + 3y)$	B1 B1	
<b>5</b>				
12	(a)	$\begin{aligned} A &= \frac{1}{2}(2.1+1.6) \times 1.2 \\ &= 2.22 \end{aligned}$	M1 A1	Area of trapezium formula
	(b)	$l = \frac{5.55}{\text{their area from (i)}} = \frac{5.55}{2.22} = 2.5$	M1 A1	
	(c)	$\begin{aligned} h^2 &= 1.2^2 + (2.1-1.6)^2 \\ &= 1.2^2 + 0.5^2 \\ &= 1.44 + 0.25 = 1.69 \\ \Rightarrow h &= \sqrt{1.69} = 1.3 \end{aligned}$	M1  A1 A1	
<b>7</b>				
13	(a)(i)	Midpoints 45, 55, 65, 85	B1	Midpoints
		$\begin{aligned} \text{Sum} &= 61 \times 30 + 52 \times 45 + 55 \times 43 + 65 \times 27 + 85 \times 17 \\ &= 9745 \\ \Rightarrow \text{Mean} &= \frac{9745}{200} = \text{£}48.68 \end{aligned}$	M1  A1	Multiply frequency by midpoint, add and divide by 200
	(ii)	Because we do not have the actual values and have assumed all in each group are at the midpoint.	B1	
	(b)	Correct histogram	B1 B1 B1	Widths correct Relative heights correct Frequency density correct
(c)	Modal group is frequency divided by width, so the larger frequency (20 - 40 group) is relatively only 30.5	B1		
<b>8</b>				

<b>14</b>	<b>(a)(i)</b>	20 divided by 1000 = 0.02	<b>M1</b>	<b>5</b>	<i>m</i> correct <i>c</i> correct
	<b>(ii)</b>	Cost per card	<b>A1</b>		
	<b>(b)</b>	$y = 0.02x + 20$	<b>B1</b> <b>B1</b>		
<b>15</b>		$h = 14 \tan 25$ $= 6.528.....$	<b>M1</b> <b>A1</b> <b>A1</b>	<b>3</b>	Tan ratio Correct values Correct answer
<b>16</b>		Population Density = $\frac{217650}{135}$ $= 1612.2.....$	<b>M1</b> <b>A1</b> <b>A1</b>	<b>3</b>	Correcting both numbers Both correctly Correct answer

**Section B Total 36**

### Assessment Objectives Grid

<b>Question</b>	<b>AO2</b>	<b>AO3</b>	<b>AO4</b>	<b>Total</b>
<b>10</b>	0	0	5	<b>5</b>
<b>11</b>	5	0	0	<b>5</b>
<b>12</b>	0	7	0	<b>7</b>
<b>13</b>	0	0	8	<b>8</b>
<b>14</b>	5	0	0	<b>5</b>
<b>15</b>	0	3	0	<b>3</b>
<b>16</b>	3	0	0	<b>3</b>
<b>Totals</b>	<b>13</b>	<b>10</b>	<b>13</b>	<b>36</b>