

**GENERAL CERTIFICATE OF SECONDARY EDUCATION**

**B280/B**

**MATHEMATICS C**

**MODULE M10 – SECTION B**

**SPECIMEN**

Candidates answer on the question paper.

Time: 30 mins

Additional Materials:

- Geometrical instruments
- Tracing paper (optional)
- Scientific or graphical calculator



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.
- Use blue or black ink. 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.
- In many questions marks will be given for a correct method even if the answer is incorrect.
- 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 for this section is 25.
- Section B starts with Question 8.
- Use the  $\pi$  button on your calculator or take  $\pi$  to be 3.142 unless the question says otherwise.

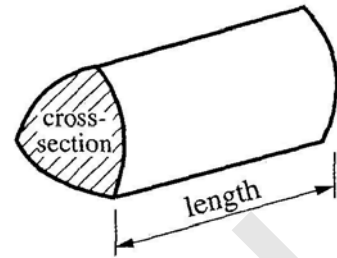
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Section B	
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This document consists of **9** printed pages and **3** blank pages.

2  
FORMULAE SHEET

**Volume of prism** = (area of cross-section) x length

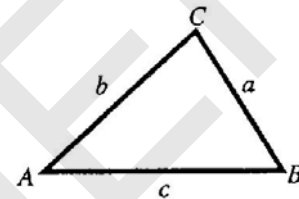


**In any triangle ABC**

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

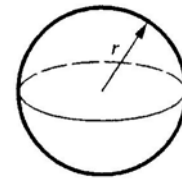
**Cosine rule**  $a^2 = b^2 + c^2 - 2bc \cos A$

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



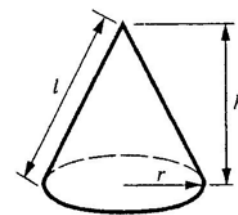
**Volume of sphere**  $\frac{4}{3} \pi r^3$

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



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

**Curved surface area of cone**  $= \pi rl$



**The Quadratic Equation**

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

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

- 8 In 1990 the population of animals in a colony was 640.  
The population,  $P$ ,  $t$  years after 1990 is given by the equation  $P = 640 \times 0.9^t$ .

(a) By what percentage is the population changing each year?

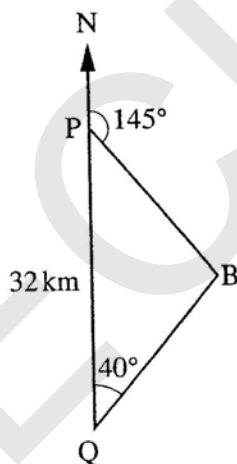
(a) \_\_\_\_\_ % [1]

(b) Work out an estimate of the population in 2015.

(b) \_\_\_\_\_ [2]

3

- 9 Two coastguard stations, P and Q, are 32 kilometres apart.  
Q is due south of P.  
A boat, B, is on a bearing of  $145^\circ$  from P and  $040^\circ$  from Q.



Not to scale

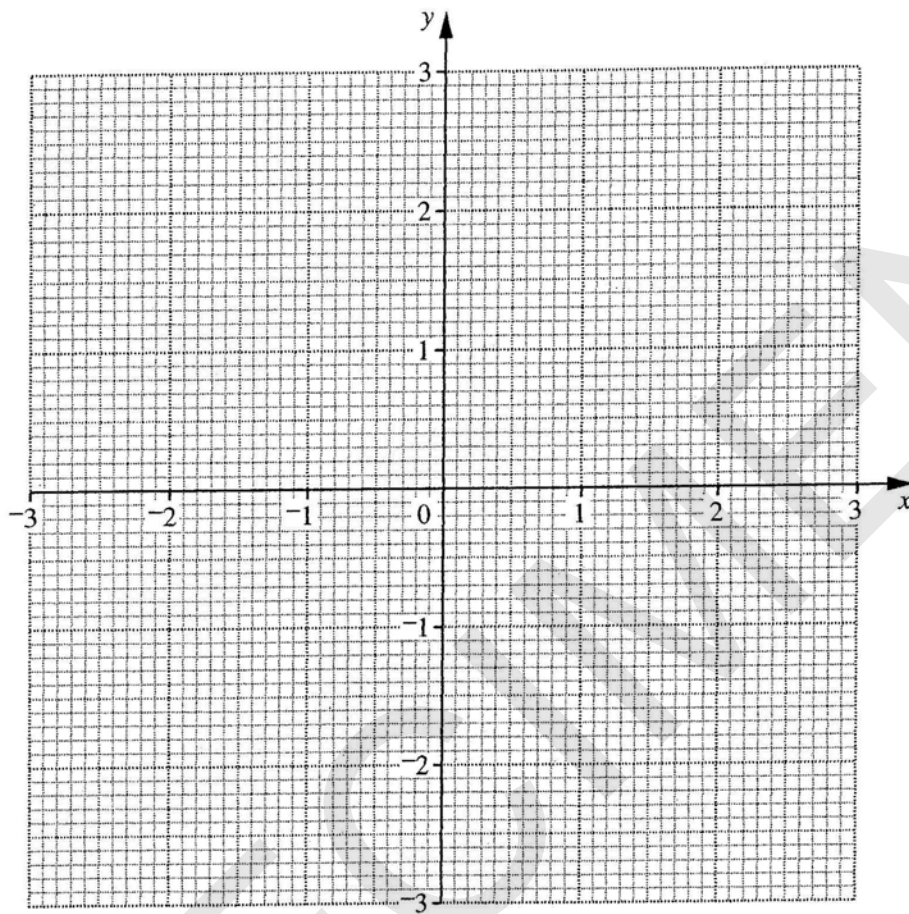
Calculate the distance QB.

\_\_\_\_\_ km [3]

3

[Turn over

- 10 (a) (i) Draw the graphs of  $x^2 + y^2 = 4$  and  $y = 2x + 1$ .



[3]

- (ii) The graphs intersect at two points.

Write down the coordinates of these two points.

Give your answers correct to 1 decimal place.

(a)(ii) ( \_\_\_\_\_ , \_\_\_\_\_ )

( \_\_\_\_\_ , \_\_\_\_\_ ) [2]

- 10 (b) Solve, algebraically, these simultaneous equations.  
Give your answers correct to 2 decimal places.

$$x^2 + y^2 = 4$$

$$y = 2x + 1$$

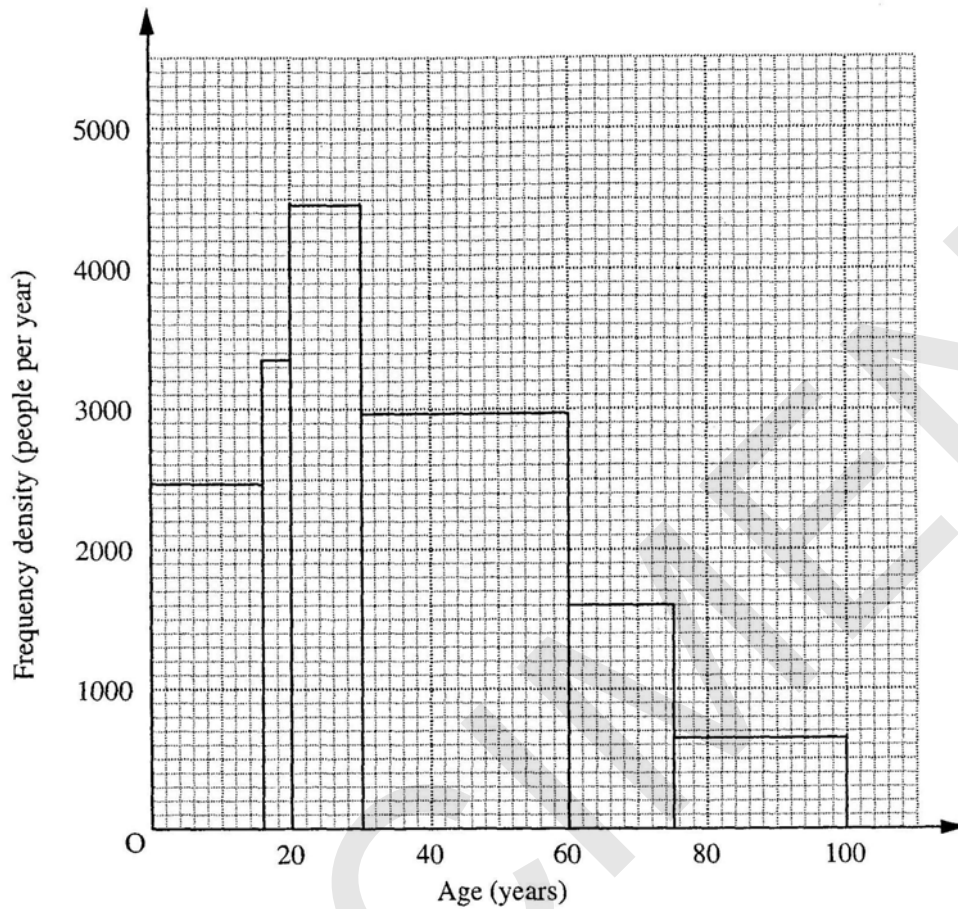
(b)  $x =$  .....  $y =$  .....

$x =$  .....  $y =$  ..... [6]

11
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[Turn over

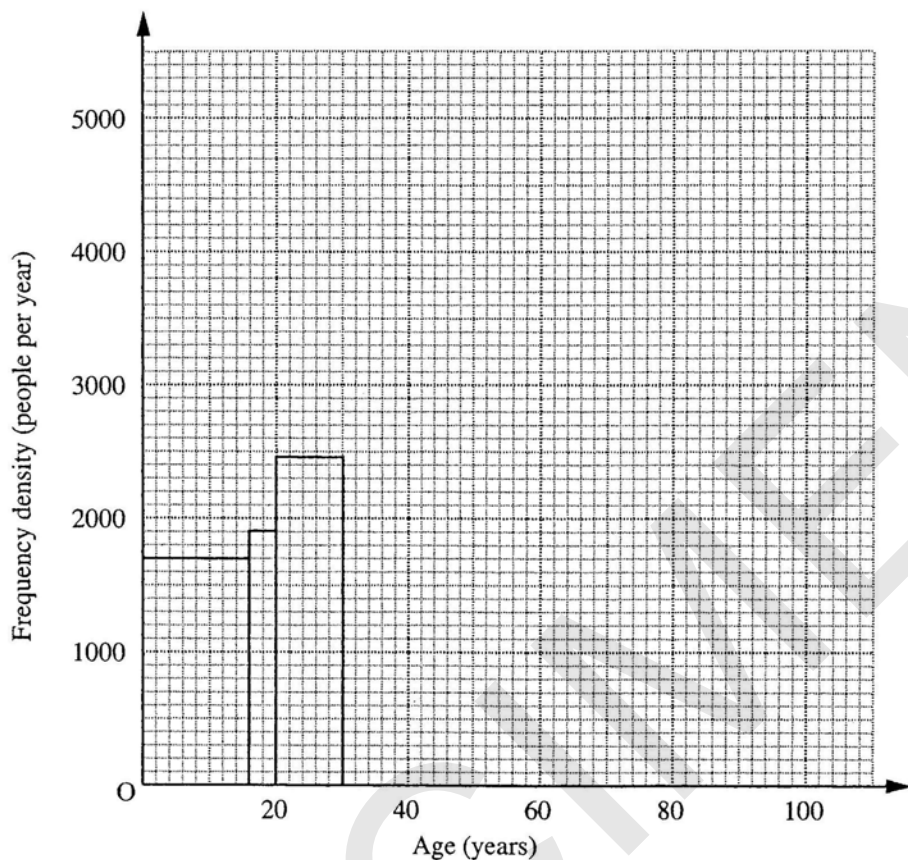
11 The histogram below shows the distribution of ages of people in Southampton in 2001.



The table shows the distribution of ages of people in Bournemouth in 2001.

Ages ( $t$ years)	Number of people (to the nearest hundred)
$0 \leq t < 16$	27 200
$16 \leq t < 20$	7 600
$20 \leq t < 30$	24 700
$30 \leq t < 60$	61 800
$60 \leq t < 75$	23 100
$75 \leq t < 100$	18 800

- 11 (a) On the grid below, complete the histogram to show the distribution of ages of people in Bournemouth in 2001.



[2]

- (b) Tom wants to know which of the two places has the larger population.

Explain how he can tell from the histograms without doing any calculations.

[1]

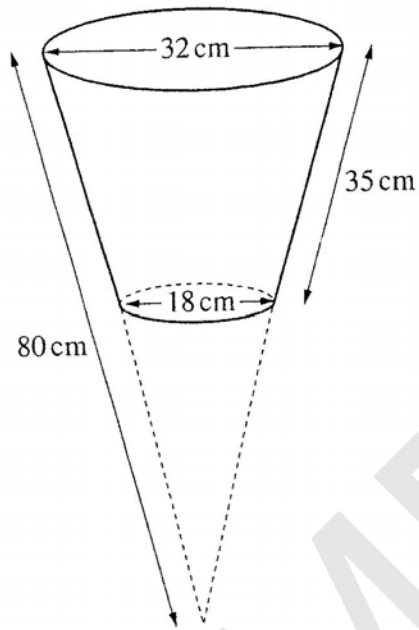
- (c) Make one comparison between the distribution of ages in Southampton and Bournemouth.

[1]

4

[Turn over]

- 12 This metal rubbish bin is the frustum of a hollow cone. It is open at the top and closed at the bottom.



Calculate the **total** surface area of the **outside** of the bin.

\_\_\_\_\_  $\text{cm}^2$  [4]

4
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**Section B Total [25]**



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**MATHEMATICS C**

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**MODULE M10 – SECTION B**

**Specimen Mark Scheme**

The maximum mark for this paper is 25.

SPECIMEN

8	a)	10% or -10%	1		
	b)	45 to 46	2 3	M1	$0.9^{25}$
9		19.0.... km	3  3	M1 M2 A1	QB/sin 35 = 32/sin 105 (=33.1...) or QB = 3sin 35/sin 105 18.6 to 19.0...
10	a)	i) circle radius 2, centre (0,0) $y=2x+1$ drawn	2 1	M1	circle wrong radius or freehand circle  f.t. (i) dependent on M1
		ii) (0.5, 1.9) (-1.3, -1.5)	1 1		
	b)	Sub $y=2x+1$ in $x^2+y^2=4$ $x^2+4x^2+4x+1=4$ $\frac{-4 \pm \sqrt{76}}{10}$ ; allow $\sqrt{16+60}$ or $\frac{-4 \pm \sqrt{4^2-4 \times 5 \times 3}}{2 \times 5}$ (0.47, 1.94) (-1.27, -1.54)	M1 M1 M2  M1 W1 W1 11		[f.t. their quadratic for M1 but not M2]  or W1 for 0.47... and -1.27...

11	a)	Histogram bars correct	2	W1	2 correct bars or 2 frequency densities (2060/1540/752)
	b)	Histogram with the larger area	1		
	c)	e.g. More young people in Southampton or more older people in B	1 4		
12		3003 (...) or $956\pi$	4	W3	2748 to 2749 or $875\pi$
				M1	$\pi \times 9 \times 45$ or $1272 \cdot \dots$
				M1	$\pi \times 16 \times 80$ or $4021 \cdot \dots$
				M1	$\pi \times 9^2$ or $254 \cdot \dots$
				A1	3003 (...) or $956\pi$
			4		[SC1 for $\pi \times 18 \times 45$ and $\pi \times 32 \times 80$ or SC2 if $\pi \times 18^2$ also seen]

Section B Total 25

**Assessment Objectives Grid**

<b>Question</b>	<b>AO2</b>	<b>AO3</b>	<b>AO4</b>	<b>Total</b>
<b>8</b>	3			<b>3</b>
<b>9</b>		3		<b>3</b>
<b>10</b>	11			<b>11</b>
<b>11</b>			4	<b>4</b>
<b>12</b>		4		<b>4</b>
<b>Totals</b>	<b>14</b>	<b>7</b>	<b>4</b>	<b>25</b>

SPECIMEN