

**GENERAL CERTIFICATE OF SECONDARY EDUCATION**  
**MATHEMATICS C**  
**MODULE M10 – SECTION A**  
**SPECIMEN**

**B280/A**

Candidates answer on the question paper.

Additional Materials:

Geometrical instruments  
Tracing paper (optional)

Time: 30 mins



Candidate  
Name

Centre  
Number

--	--	--	--	--

Candidate  
Number

--	--	--	--	--

### 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

- 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.



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

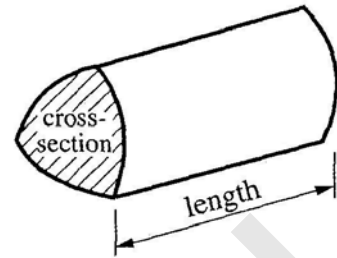
For Examiner's Use

Section A

This document consists of **8** printed pages.

2  
FORMULAE SHEET

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

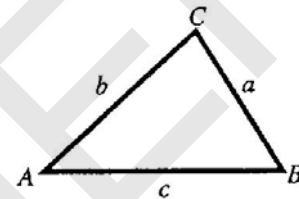


**In any triangle ABC**

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

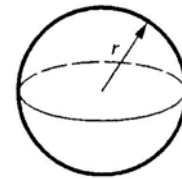
**Cosine rule**  $a^2 = b^2 + c^2 - 2bc \cos A$

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



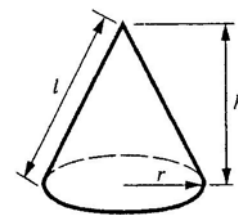
**Volume of sphere**  $\frac{4}{3} \pi r^3$

**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

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

- 1 (a) Change  $0.\dot{4}5$  into a fraction.

(a) \_\_\_\_\_ [2]

- (b) Expand  $(5 - \sqrt{3})^2$ . Write your answer in the form  $a + b\sqrt{3}$ .

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

4

- 2 The expression  $x^2 - 4x - 21$  can be written in the form  $(x - a)^2 - b$ .

Find the values of  $a$  and  $b$ .

$a =$  \_\_\_\_\_

$b =$  \_\_\_\_\_

[3]

3

[Turn over

- 3 A company knows that, during the first year, the probability that a washing machine breaks down is 0.1 and that a tumble drier breaks down is 0.2.

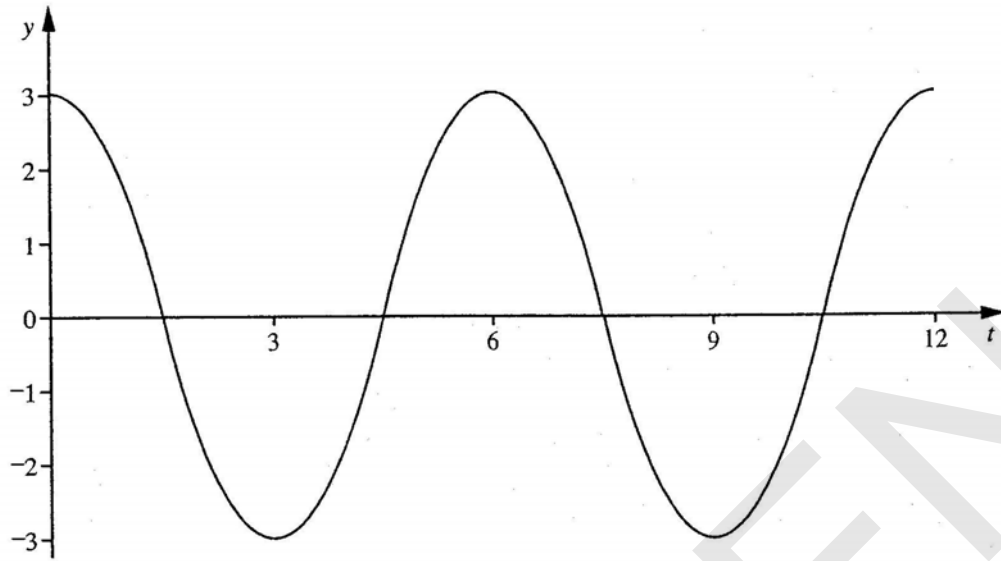
The probabilities of the events are independent.

Find the probability that either the washing machine or the tumble drier (but not both) breaks down during the first year.

----- [3]

3
---

4



Give **three** reasons to justify that  $y = 3 \cos (60t)^\circ$  is the equation of the curve shown above.

1

---

---

2

---

---

3

---

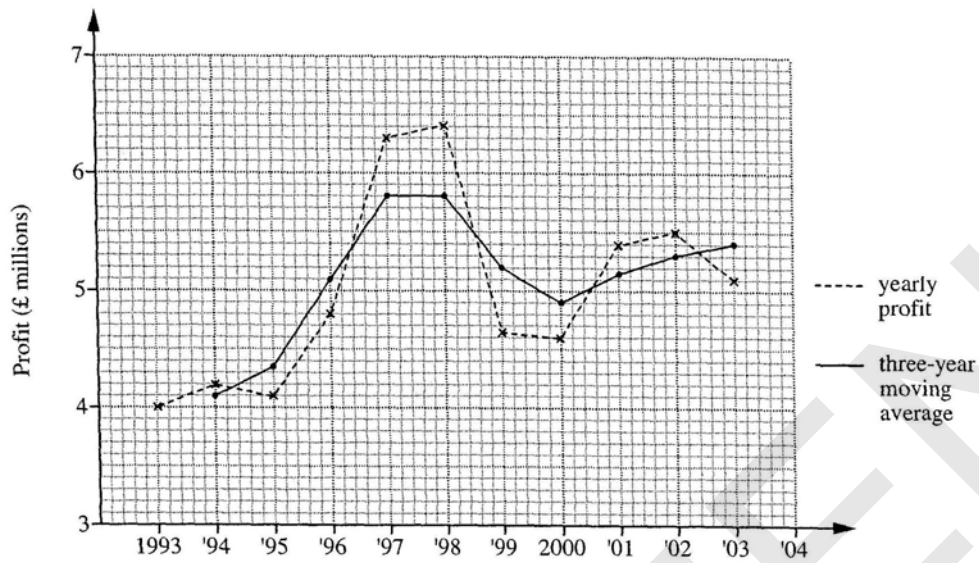
---

[3]

3
---

[Turn over

- 5 This graph shows the yearly profits for a firm and the three-year moving averages.



- (a) Use the graph of the three-year moving averages to describe the trend in yearly profits.

---



---

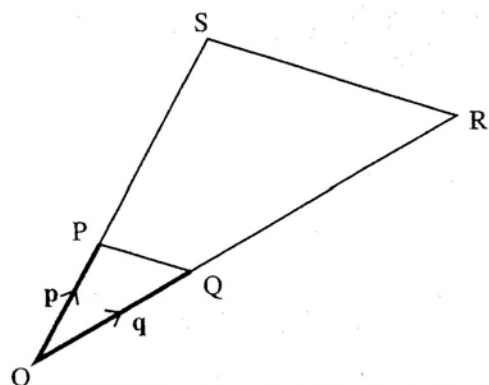
[1]

- (b) The yearly profit for 2004 has been omitted.

Use the graph to help you calculate the yearly profit for 2004.  
Show your method clearly.

(b) £ \_\_\_\_\_ million [2]

3



Not to scale

In the diagram OQR and OPS are straight lines.

$$\vec{OP} = \mathbf{p} \quad \vec{OQ} = \mathbf{q}$$

$$OP : OS = 1 : 4 \text{ and } OQ : OR = 1 : 4.$$

(a) Work out, in terms of  $\mathbf{p}$  and  $\mathbf{q}$ ,

(i)  $\vec{PQ}$ ,

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

(ii)  $\vec{SR}$ .

(ii) \_\_\_\_\_ [1]

(b) Prove that triangles OQP and ORS are similar.

.....

.....

.....

.....

.....

[2]

4

[Turn over

7 Solve algebraically.

$$\frac{2x}{2x-5} - \frac{1}{x-4} = 1$$

\_\_\_\_\_ [5]

5
---

**Section A Total [25]**

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (OCR) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

OCR is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.



The maximum mark for this paper is 25.

SPECIMEN

1	<p>a) <math>\frac{5}{11}</math> or equivalent</p> <p>b) <math>28 - 10\sqrt{3}</math></p>	<p>2</p> <p>2</p> <p>4</p>	<p>M1</p> <p>A1</p> <p>M1</p>	<p><math>100r = 45.45\dots</math></p> <p>45/99</p> <p>28 or <math>10\sqrt{3}</math></p>
2	<p><math>a = 2, b = 25</math></p>	<p>3</p> <p>3</p>	<p>W1</p> <p>W1</p> <p>W1</p>	<p>allow <b>W3</b> for <math>(x-2)^2 - 25</math> isw</p> <p><math>(x-a)^2 - 21 - a^2 (a \pm 2 \text{ or } \pm 4)</math></p> <p><math>a = 2</math> (allow embedded)</p> <p><math>b = 25</math> (allow embedded)</p>
3	<p>0.26</p>	<p>3</p> <p>3</p>	<p>M2</p> <p>or M1</p>	<p><math>0.1 \times 0.8 + 0.9 \times 0.2</math></p> <p><math>0.1 \times 0.8</math> or <math>0.9 \times 0.2</math></p>
4	<p>Amplitude 3</p> <p><i>cos</i> because e.g. <math>\cos 0 = 1</math></p> <p>period of <math>\cos t</math> is 360 so</p> <p>period of <math>\cos 60t</math> is <math>360/60 = 6</math></p>	<p>1</p> <p>1</p> <p>1</p> <p>3</p>		<p>need 60 and 6 and <math>360/\text{wavelength/period}</math></p>
5	<p>a) Up then Down then Stable/Up</p> <p>b) (their 5.4) = <math>\frac{5.5 + 5.1 + x}{3}</math></p> <p>5.6</p>	<p>1</p> <p>M1</p> <p>A1</p> <p>3</p>		<p>accept fluctuating / no trend</p>

6	a)	i) $q - p$ ii) $4q - 4p$ or equivalent	1 1		
	b)	e.g. all lengths of ORS are 4 times lengths of OQP (dependent on (a) correct)  or parallel and all angles the same (dependent on (a) correct)  or common angle and $OS = 4 \times QP$ , $OR = 4 \times OQ$	2      4	W1  W1  W1	$OS = 4 \times OP$ or; $OR = 4 \times OQ$ or; 4 times enlargement or; ft (a)  PQ and SR are parallel   Common angle and use of ratio or; SF3/5
7		$2x(x-4)-(2x-5)$  $2x(x-4)-(2x-5)=(2x-5)(x-4)$  LHS $2x^2-8x-2x+5$  RHS $2x^2-5x-8x+20$  5	M1  M1  M1  M1 W1 5		may be LHS or numerator of LHS; condone 1 error eg no brackets around $2x-5$  for multiplying up, or equating common numerator and denominator  for expanding brackets; condone 1 error  may be denominator of LHS; condone 1 error

Section A Total 25

**Assessment Objectives Grid**

<b>Question</b>	<b>AO2</b>	<b>AO3</b>	<b>AO4</b>	<b>Total</b>
<b>1</b>	4			<b>4</b>
<b>2</b>	3			<b>3</b>
<b>3</b>			3	<b>3</b>
<b>4</b>		3		<b>3</b>
<b>5</b>			3	<b>3</b>
<b>6</b>		4		<b>4</b>
<b>7</b>	5			<b>5</b>
<b>Totals</b>	<b>12</b>	<b>7</b>	<b>6</b>	<b>25</b>

SPECIMEN