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.

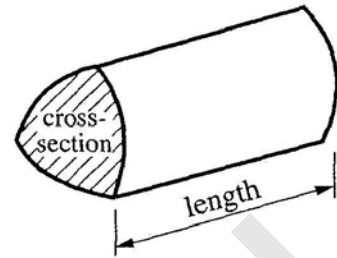**WARNING** You are not allowed to use a calculator in this paper.

For Examiner's Use

Section A

2
FORMULAE SHEET

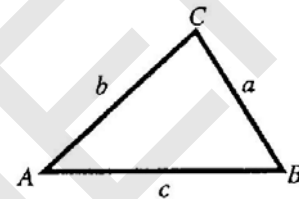**Volume of prism =** (area of cross-section) x length

In any triangle *ABC*

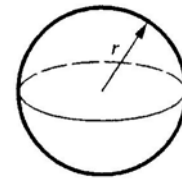**Sine rule** $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

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

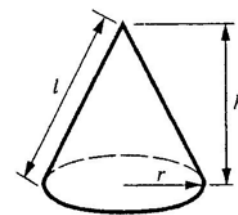**Area of triangle** $= \dfrac{1}{2}ab\sin C$

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

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

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

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

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

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

(a) _____ [2]

(b) Expand (5 - √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.
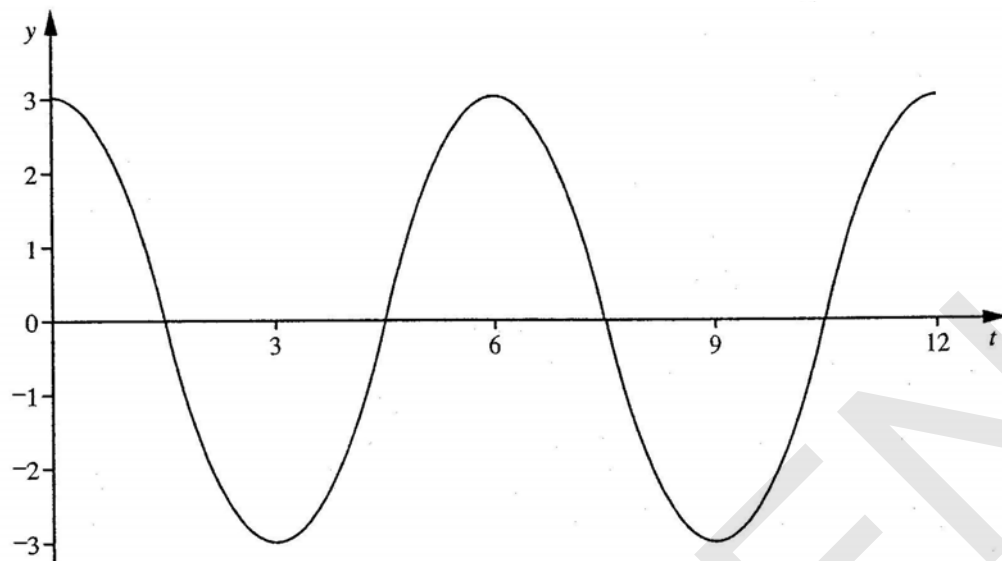
The probabilities of the events are independent.

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

[3]

3

4

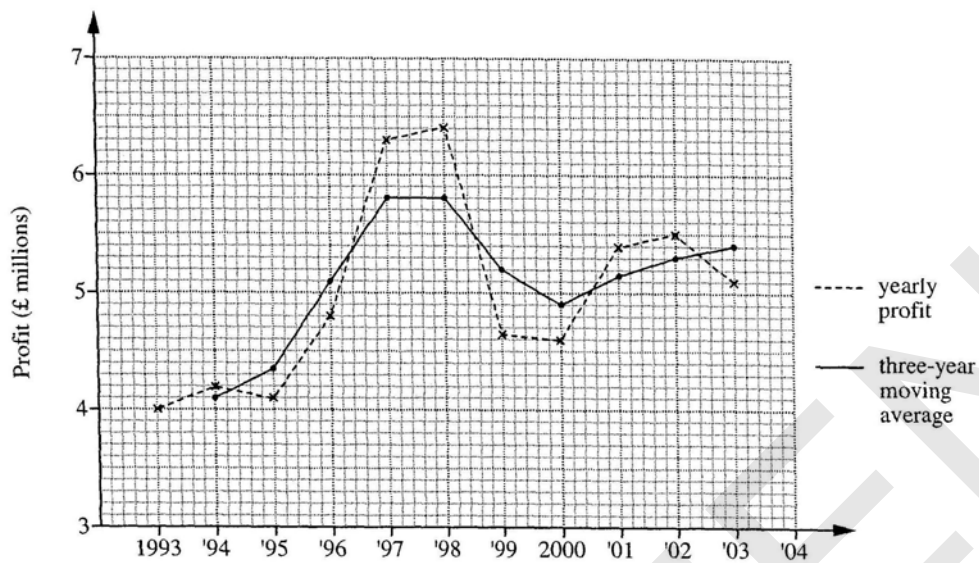Give **three** reasons to justify that $y = 3 \cos (60t)°$ is the equation of the curve shown above.

1 _____

_____

2 _____

_____

3 _____

_____ [3]

3	

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]

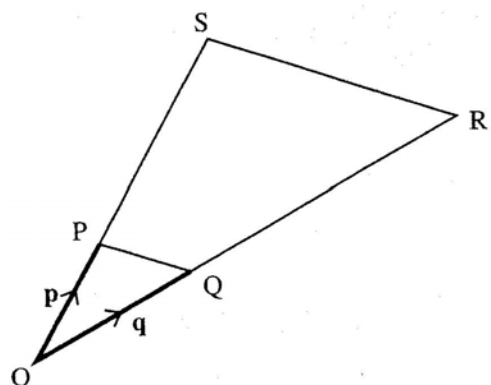---

(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]

<table><tr><td>**3**</td><td></td></tr></table>

6

Not to scale

In the diagram OQR and OPS are straight lines.

$\overrightarrow{OP} = \mathbf{p}$ $\overrightarrow{OQ} = \mathbf{q}$

OP : OS = 1 : 4 and OQ : OR = 1 : 4.

(a) Work out, in terms of **p** and **q**,

   (i) $\overrightarrow{PQ}$,

   (a)(i) _____ [1]

   (ii) $\overrightarrow{SR}$.

   (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]

MATHEMATICS C   B280/A

MODULE M10 – SECTION A

Specimen Mark Scheme

The maximum mark for this paper is 25.

This document consists of **4** printed pages.

1	a)	$\frac{5}{11}$ or equivalent	2		M1	100r = 45.45….
					A1	45/99
	b)	28 - 10√3	2		M1	28 or 10√3
			4			
2		a = 2, b = 25	3			allow **W3** for $(x-2)^2$ - 25 isw
					W1	$(x-a)^2 - 21 - a^2 (a \pm 2 \text{ or } \pm 4)$
					W1	a = 2 (allow embedded)
					W1	b = 25 (allow embedded)
			3			
3		0.26	3		M2	0.1 x 0.8 + 0.9 x 0.2
					or M1	0.1 x 0.8 or 0.9 x0.2
			3			
4		Amplitude 3	1			
		cos because e.g. *cos 0 = 1*	1			
		period of cos*t* is 360 so period of *cos* 60t is 360/60 = 6	1			need 60 and 6 <u>and</u> 360/wavelength/period
			3			
5	a)	Up then Down then Stable/Up	1			accept fluctuating / no trend
	b)	$(their\ 5.4) = \dfrac{5.5 + 5.1 + x}{3}$	M1			
		5.6	A1			
			3			

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6	a)	i) **q - p**	1			
		ii) 4**q** – 4**p** or equivalent	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 x QP, OR = 4 x OQ	2 4		W1 W1 W1	OS = 4 x OP or; OR = 4 x OQ or; 4 times enlargement or; ft (a) PQ and SR are parallel Common angle and use of ratio or; SF3/5
7		$2x(x\text{-}4)\text{-}(2x\text{-}5)$ $2x(x\text{-}4)\text{-}(2x\text{-}5) =(2x\text{-}5)(x\text{-}4)$ LHS $2x^2\text{-}8x\text{-}2x\text{+}5$ RHS $2x^2\text{-}5x\text{-}8x\text{+}20$ 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

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Assessment Objectives Grid

Question	AO2	AO3	AO4	Total
1	4			**4**
2	3			**3**
3			3	**3**
4		3		**3**
5			3	**3**
6		4		**4**
7	5			**5**
Totals	**12**	**7**	**6**	**25**