RECOGNISING ACHIEVEMENT

Oxford Cambridge and RSA Examinations

General Certificate of Secondary Education

Mathematics C (Graduated Assessment) 1966/2340A

MODULE M10 – SECTION A

Specimen Paper 2003

Candidates answer on the question paper.

Additional materials:

Geometrical instruments
Tracing paper (optional)

TIME 30 minutes

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.
- Write your answers, in blue or black ink, in the spaces provided on the question paper.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- There is a space after most questions. Use it to do your working. In many questions marks will be given for correct working even if the answer is incorrect.

INFORMATION FOR CANDIDATES

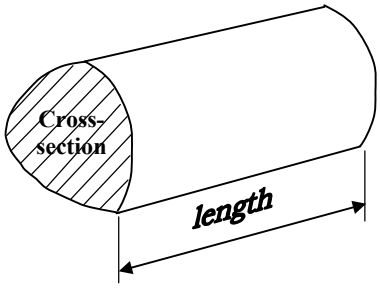
- The number of marks is given in brackets [ ] at the end of each question or part question.
- The total mark available for this section is 25.

For Examiner's use only	
Section A	
Section B	
Total	

WARNING
You are not allowed to use a calculator in Section A of this paper.

FORMULA SHEET: HIGHER TIER

Volume of prism = (area of cross section) × length

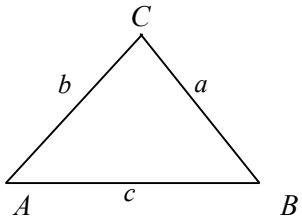


In any triangle ABC

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

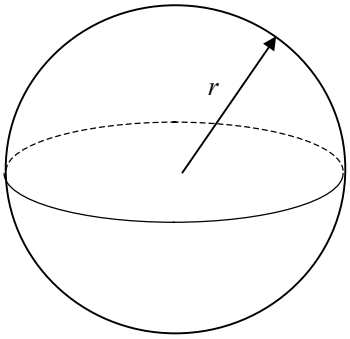
Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

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



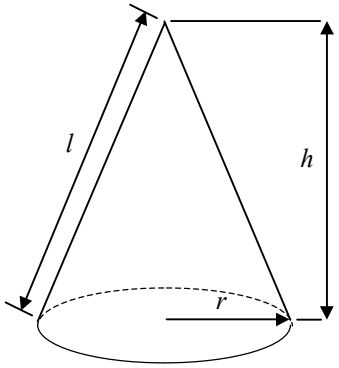
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

Curved surface area of cone = πrl



The Quadratic Equation

The solution of $ax^2 + bx + c = 0$ where $a \neq 0$, area given by $x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$

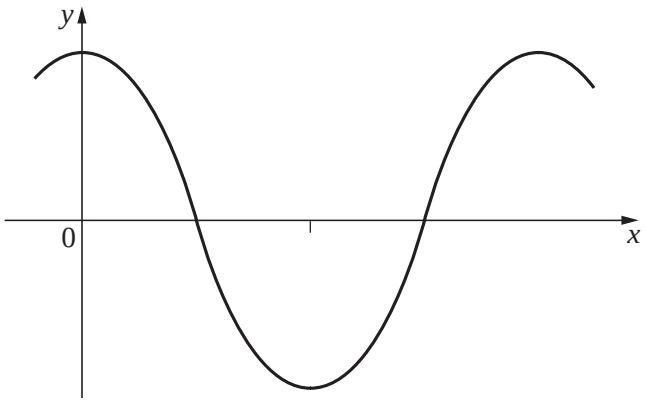
1 Find an equation connecting x and y for the following table of values.

X	4	9	16	25
y	4	6	8	10

_____ [2]

2

2 This is a sketch of the graph of $y = \cos 2x$.



On the same axes, sketch the graph of $y = \frac{1}{2}\cos x$. [2]

2

3 **(a)** $r = 3 + \sqrt{5}$ and $s = 3 - \sqrt{5}$.

Work out the exact value of $r - s$.

(a) _____ [1]

(b) Find the exact value of $\left(\sqrt{3} + \sqrt{27}\right)^2$

(b) _____ [2]

3

4 Write each of the following as a single fraction as simply as possible.

(a) $\frac{f}{gh} - \frac{g}{fh}$

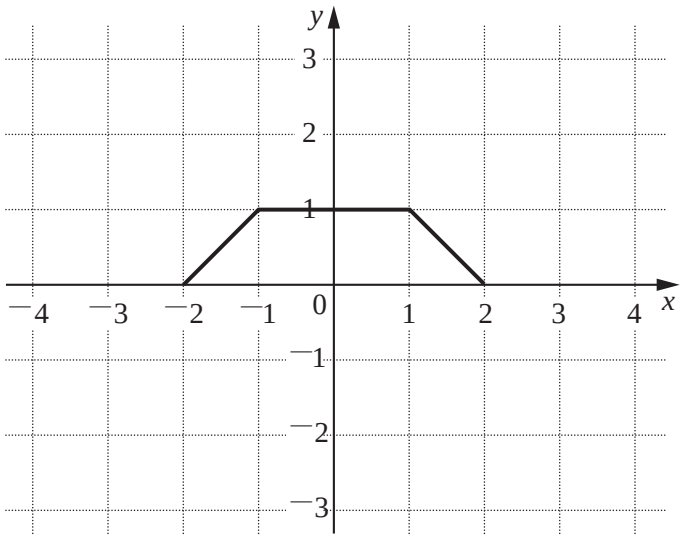
(a) _____ [3]

(b) $\frac{y^{\frac{1}{2}}}{x^{-3}} \div \frac{x^2}{y^{\frac{3}{2}}}$

(b) _____ [2]

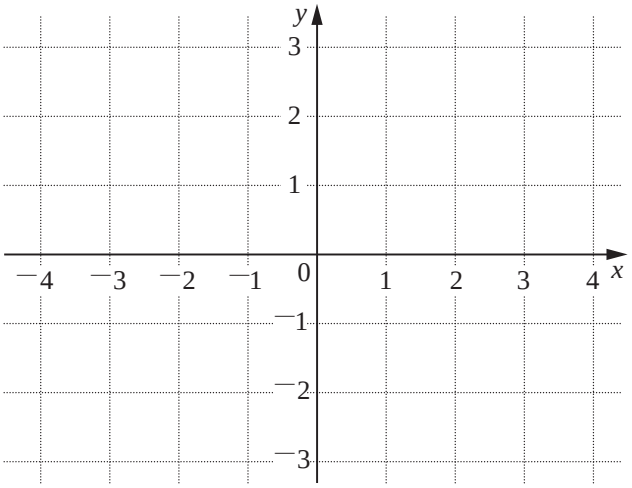
5

5 This diagram shows the graph of the function $y = f(x)$.

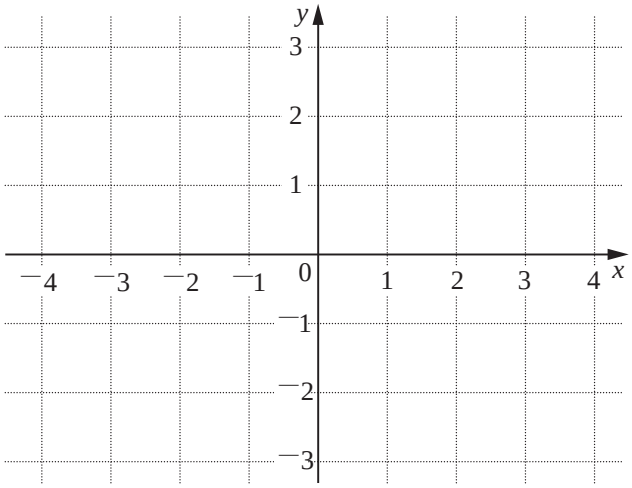


On the axis below draw sketch graphs of each of the following functions.

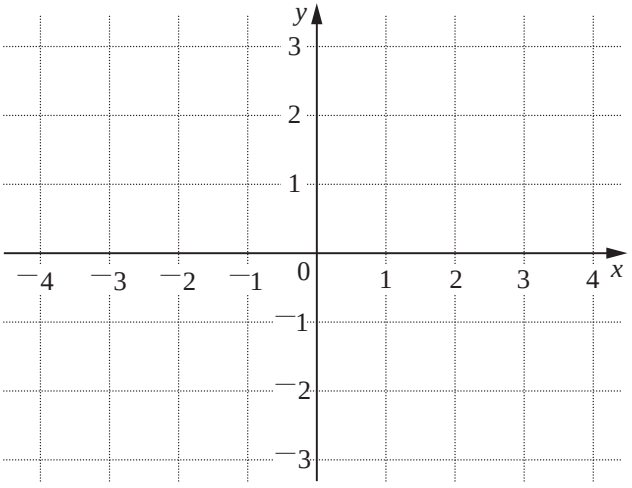
(a) $y = f(x + 2)$ [1]



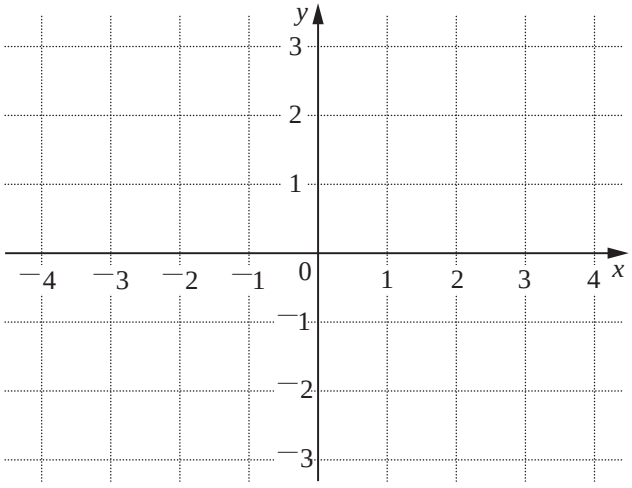
(b) $y = f(x) + 2$ [1]



(c) $y = 2f(x)$ [1]

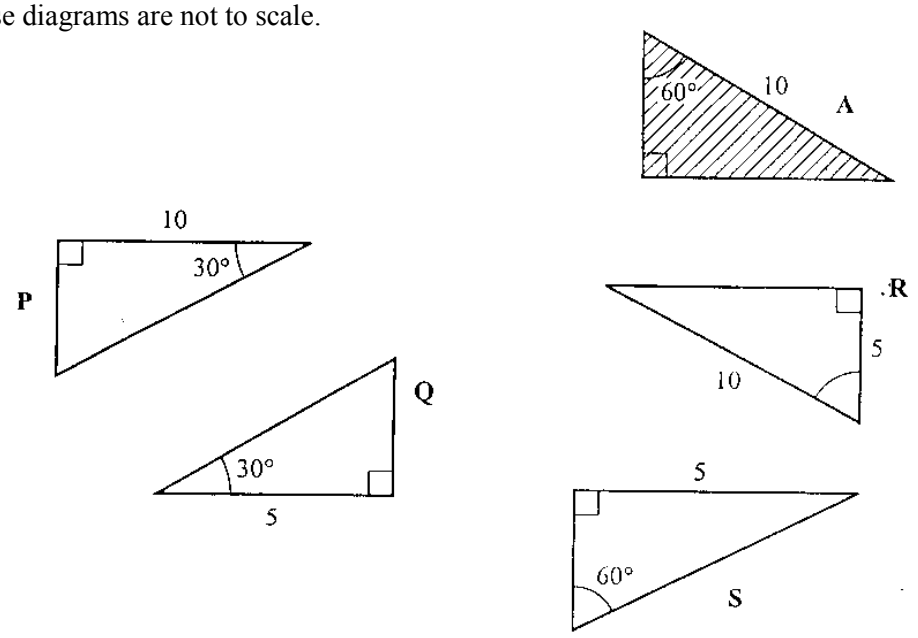


(d) $y = f(2x)$ [1]



4

6 These diagrams are not to scale.



Which triangle is congruent to the shaded triangle A?
Explain how you decided.

Triangle _____ because _____

_____

_____

_____ [4]

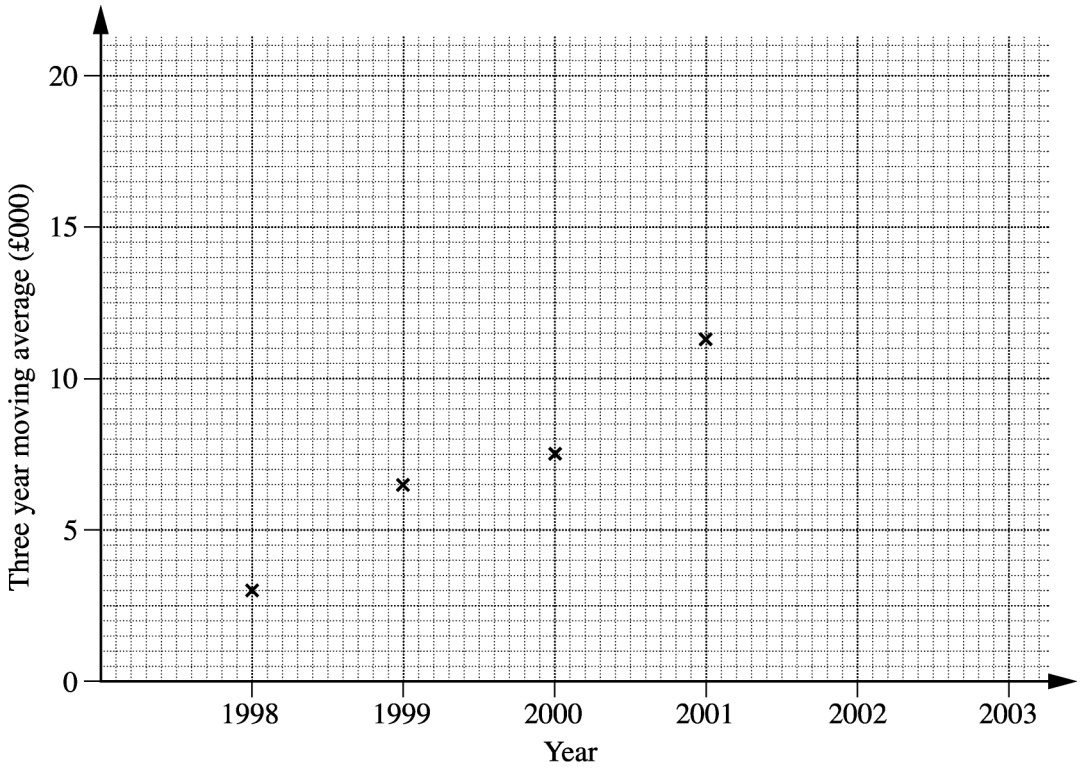
4

7 By completing the square, find the co-ordinates of the minimum point of $y = x^2 + 8x + 7$.

(_____, _____) [2]

2

8 This graph shows the three year moving average of an insurance policy.



The value of the policy was £13 400 in 2001 and £17 600 in 2002.

Estimate the value of the policy in 2003.

£_____ [3]

3

RECOGNISING ACHIEVEMENT

Oxford Cambridge and RSA Examinations

General Certificate of Secondary Education

Mathematics C (Graduated Assessment) 1966/2340B

MODULE M10 – SECTION B

Specimen Paper 2003

Candidates answer on the question paper.

Additional materials:

Geometrical instruments
Tracing paper (optional)
Scientific or graphical calculator

TIME 30 minutes

Candidate Name	Centre Number	Candidate Number

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For Examiner's use only	
Section B	

FORMULA SHEET: HIGHER TIER

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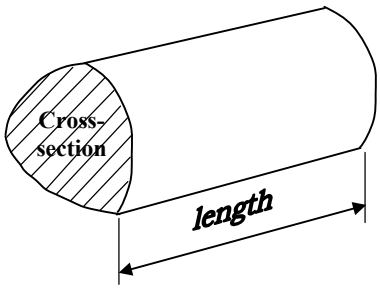

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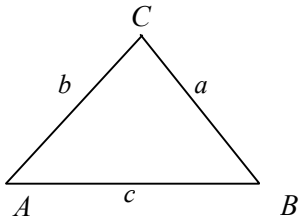

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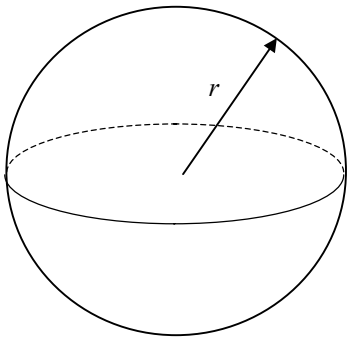
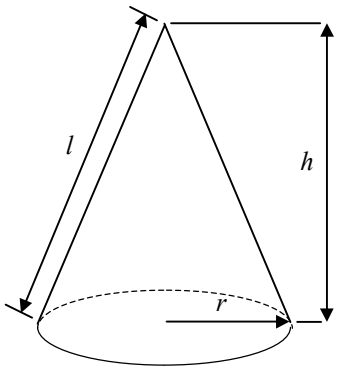


Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = πrl



The Quadratic Equation

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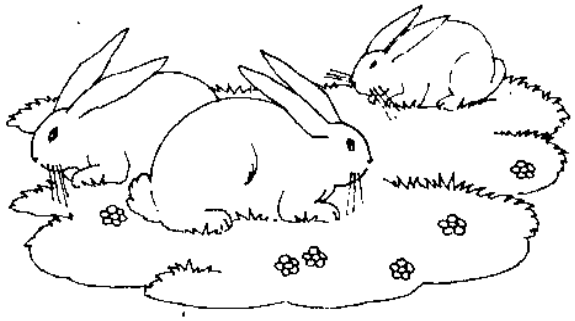
9



It is estimated that the number of rabbits on Warren Island is decreasing at the rate of 12% per year.

In 2002 the number of rabbits was 308.

(a) How many rabbits were there in 2000?

(a)_____ [2]

(b) In which year will there first be less than 180 rabbits?

(b)_____ [2]

4

10 Simplify.

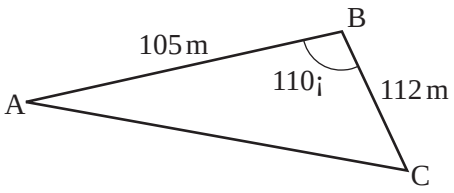
$$\sqrt{p^4 q^{-2}} \times \sqrt{\frac{q^6}{p^{-2}}}$$

_____ [2]

2

11 The diagram shows the plan of a triangular field.

(a) Calculate the length of side AC.



Not to scale

(a)_____ m [2]

(b) Calculate the area of the field.

Give your answer to an appropriate degree of accuracy.

(b)_____ m^2 [3]

5

12 **(a)** Solve this equation.

$$\frac{3}{x+2} = \frac{4}{x}$$

(a) $x =$ _____ [3]

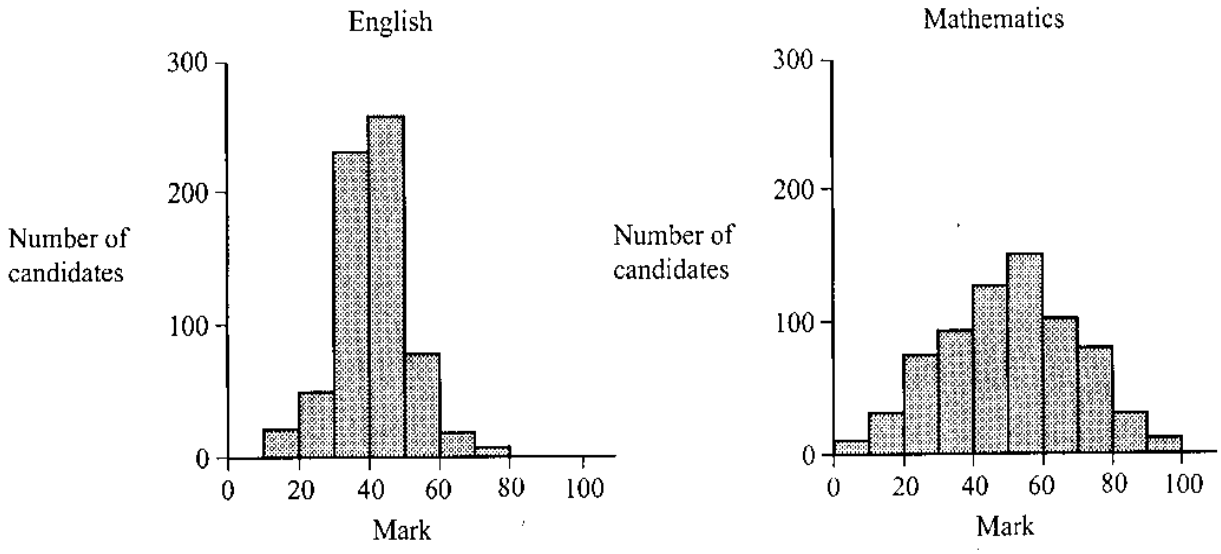
(b) Solve the equation $x^2 - 3x - 5 = 0$

Give your answers correct to 2 decimal places.

(b) $x =$ _____ [3]

6

13 The graphs show the results of 700 candidates in their English and Mathematics examinations.



(a) Without doing any calculations, comment on the performance of the candidates in the two examinations.

Your comments must indicate how you used the two graphs.

[3]

(b) Jack is a little below average in both subjects.

Say, with a reason, in which exam he is likely to have scored fewer marks.

[1]

4

14 The cone in Figure 1 has a slant height of 8 cm and a base radius of 5 cm.

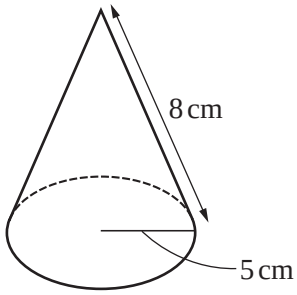


Figure 1

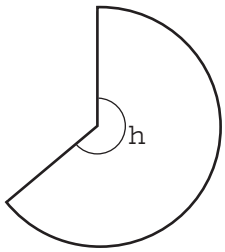


Figure 2

The cone is made from a sector of a circle [see Figure 2].

Calculate the angle, θ, at the centre of the sector.

$\theta =$ _____ ° [4]

4

RECOGNISING ACHIEVEMENT

Oxford Cambridge and RSA Examinations

General Certificate of Secondary Education

Mathematics C (Graduated Assessment) 1966/2340

MODULE M10

MARK SCHEME

Specimen Paper 2003

SECTION A

1		$y = 2\sqrt{x}$ or equivalent.	**2** **2**	M1 for $y \propto \sqrt{x}$ or $x \propto y^2$.
2		half amplitude of original half frequency of original	**1** **1** **2**	
3	**(a)**	$2\sqrt{5}$	**1**	
	(b)	48	**2** **3**	M1 for $3 + 27 + 2\sqrt{3}\sqrt{27}$ o.e.
4	**(a)**	$\dfrac{f^2 - g^2}{fgh}$	**3**	M2 for $\dfrac{f^2h - g^2h}{fgh^2}$ o.e. M1 for den of fgh or fgh^2
	(b)	xy^2	**2** **5**	M1 for $x^3 y^{\frac{1}{2}} \times \dfrac{y^{\frac{3}{2}}}{x^2}$ seen
5	**(a)**	trans 2 to L	**1**	
	(b)	trans 2 up	**1**	
	(c)	stretch x 2, up	**1**	
	(d)	stretch x ½, horizontal	**1** **4**	
6		R RHS 10 cos 60 = 5 AAS ∠ in R = invcos ½ = 60 SAS A: 10 cos 60 = ½ R: invcos ½ = 60 SSS A: 10 cos 60 = 5 and 'base = 8.66 via pythag R: 8.66 via pythag	**M1** **M1 + A1 + A1** **M1 + A1 + A1** **M1 + A1** **+ A1** **M1** **+ A1** **+ A1** **4**	**No marks in** (b) if (a) is wrong.
7		(- 4 , - 9)	**2** **2**	M1 for $y = (x + 4)^2 - 9$ W1 for –4 or –9.
8		20 000	**3** **3**	M1 for 2003 ma = 17 000 (or f.t) M1 for their 17 000 = $\dfrac{x + 13\,400 + 17\,600}{3}$

Section A Total: 25

SECTION B

9	**(a)**	397 or 398	**2**	M1 for sight of 0.88^2
	(b)	2007	**2** **4**	M1 for 308 x 0.88^n for n = two of 2, 3, 4, and 5
10		$p^3 q^2$	**2** **2**	M1 for one term correct
11	**(a)**	177.8(…) or 178	**2**	M1: $b^2 = 105^2 + 112^2 - 2.105.112\cos 110$ implied by $b^2 = 31\,612.(\ldots)$
	(b)	5500 or 5520	**3** **5**	M2 for 5525. (…) M1 for ½.105.112.sin110
12	**(a)**	x = -8	**3**	M1 for 3x = 4 (x + 2) or M2 for 3x = 4x + 8
	(b)	4.19 and –1.19	**3** **6**	M1 for $\frac{3 \pm \sqrt{29}}{2}$ or better M2 for 4.192… and -1.192…
13	**(a)**	M mean higher as peak to right M more varied	**M1** **A1** **1**	
	(b)	E as average lower	**1** **4**	acc mode/ median/ mean
14		225	**4** **4**	M1 for circ = 31.00 –31.42 M3 for $\frac{\theta}{360} \times 2\pi 8 = 2\pi 5$ (but only M2 if = range above) M3 for ans in range 223 – 227

Section B Total: 25

Total mark available: 50

MODULE: M10				7	15	6	14	7	3	2	2	7			Grades		
Question	Topic	Syll Ref	Mod Ref	N	Man A	nMan A	SSM	HD	UA1	UA2	UA3	Multi-s	Units	Acc	B	A	A*
1	Fit data to formula	2/5g	A10.1			2											2
2	Trig graph	3/2g	S10.4				2									2	
3	Simplify surds	3/3n	N10.2	3												3	
4	Simplify algebraic formula	2/5b	A10.2		5												5
5	Transform graph	2/6g	A10.5			4											4
6	Congruency	3/2e,3/1e,3/1f	S10.2				4			1	2						4
7	Completing square	2/5k	A10.3		2												2
8	Time series	4/5b,4/1a	D10.2					3	3			3					3
	Section A total			**3**	**7**	**6**	**6**	**3**	**3**	**1**	**2**	**3**				**5**	**20**
9	Exponential growth	2/3t	N10.1	4													4
10	Simplify powers	3/5d	A10.2		2												2
11	Cosine rule, area of triangle	3/2g	S10.3				5							1			5
12a	Manipulate fractions	2/5b	A10.2		3												3
12b	Quadratic formula	2/5k	A10.2		3												3
13	Compare data sets	4/5d,4/1c,4/1d	D10.1					4		2	2					4	
14	Cone	3/2i,3/1b	S10.1				4		4			4					4
	Section B total			**4**	**8**		**9**	**4**	**4**	**2**	**2**	**4**		**1**		**4**	**21**
	Total			**7**	**15**	**6**	**15**	**7**	**7**	**3**	**4**	**7**		**1**		**9**	**41**