OCR
RECOGNISING ACHIEVEMENT

GCSE

Mathematics C

General Certificate of Secondary Education **J517**

Mark Schemes for the Units

March 2009

J517/MS/R/09M

Oxford Cambridge and RSA Examinations

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of pupils of all ages and abilities. OCR qualifications include AS/A Levels, GCSEs, OCR Nationals, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new syllabuses to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support which keep pace with the changing needs of today's society.

This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by Examiners. It does not indicate the details of the discussions which took place at an Examiners' meeting before marking commenced.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the Report on the Examination.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

Any enquiries about publications should be addressed to:

OCR Publications
PO Box 5050
Annesley
NOTTINGHAM
NG15 0DL

Telephone: 0870 770 6622
Facsimile: 01223 552610
E-mail: publications@ocr.org.uk

CONTENTS

GCSE Mathematics C (J517)

MARK SCHEMES FOR THE UNITS

List of abbreviations

The following abbreviations are commonly found in GCSE Mathematics mark schemes.

- Where you see **cao** in the mark scheme it means **correct answer only.**
- Where you see **figs 237**, for example, this means any answer with only these digits. You should ignore leading or trailing zeros and any decimal point, eg 237000, 2·37, 2·370, and 0·00237 would be acceptable, but 23070 or 2374 would not.
- Where you see **ft** in the mark scheme it means **follow through.**
- Where you see **isw** in the mark scheme it means **ignore subsequent working** (after correct answer obtained).
- Where you see **oe** in the mark scheme it means **or equivalent.**
- Where you see **rot** in the mark scheme it means **rounded or truncated.**
- Where you see **seen** in the mark scheme it means that the mark is earned if that number or expression is seen anywhere in the answer space, including on the answer line, even if it is not in the method leading to the final answer.
- Where you see **soi** in the mark scheme it means **seen or implied.**
- Where you see **www** in the mark scheme it means **without wrong working.**

B272 Module Test M2

Section A

1	**(a)**	8	**1**	
	(b)	84	**2**	**M1** for attempt to multiply 7 × 12
2	**(a)**	$\frac{1}{2}$ oe	**1**	
	(b)	92	**2**	**M1** attempt to find $\frac{1}{2}$ of 184
3	**(a)**	(i) 243	**1**	
		(ii) St Hilaire	**1**	
		(iii) 575	**3**	**M1** 338 and 237 seen **M1** for attempt at adding *their* **two** values
	(b)	800	**2**	**M1** for 100 seen, or attempt to divide by 5
4		Correct reflections	**2**	**W1** each
5	**(a)**	0·2	**1**	
	(b)	$\frac{3}{4}$ oe	**1**	
	(c)	1·91	**2**	**M1** Attempt at subtraction seen
6		150	**2**	**M1** Attempt at 40 × 3 soi by 120
7	**(a)**	68	**2**	**M1** Attempt at 6 × 72 soi by figs 432 www
	(b)	P and R	**2**	**W1** each

Section A Total: 25

Section B

8	**(a)**	1	**1**	
	(b)	2	**2**	**M1** Ordered list of at least 11 numbers
9	**(a)**	17	**1**	
	(b)	+3 oe	**1**	
10	**(a)**	B marked halfway along the line	**1**	
	(b)	T marked on the first line (1/8)	**1**	
11	**(a)**	5°C	**1**	
	(b)	¯4°C	**1**	
12	**(a)**	1·4 to 1·6 m	**1**	
	(b)	0·75 to 0·9 m	**1**	
13	**(a)**	Maths	**1**	
	(b)	25%	**1**	
	(c)	History	**1**	
	(d)	Maths + English gives 55%, half would be 50%	**1**	
14	**(a)**	Acute, Right angle, Reflex	**3**	**W1** each
	(b)	24 to 28°	**1**	
15		400 or 0·4 Correct units	**2** **1**	**W1** 0·4 or 1000 seen 0·3 to 0·5 with kg or 300 to 500 with g
16	**(a)**	5	**2**	**M1** attempt to divide 150 by 35
	(b)	25	**1**	ft *their* (a) if >5

Section B Total: 25

B273 Module Test M3

Section A

1	**(a)**	6 kg	**1**	cao
	(b)	6 m	**1**	cao
	(c)	6 g	**1**	cao
2	**(a)**	22	**1**	cao
	(b)	3	**2**	**M1** for 15 or 5 seen
	(c)	15·6	**1**	
	(d)	2·1	**1**	
3	**(a)**	20	**2**	**M1** for 80 ÷ 4 oe, or for a clear attempt to find 25% of 80 including one correct % found
	(b)	8	**1**	
4	**(a)**	8	**1**	
	(b)	9	**1**	
	(c)	6	**1**	
5	**(a)**	(i) 36	**1**	cao
		(ii) 8	**1**	
	(b)	Example of an odd square number	**1**	
6	**(a)**	2 (or 1·96 to 2·04)	**3**	**W2** for 200 (196 to 204) seen OR **W1** for 10 (9·8 to 10·2) [cm] seen, or attempt at 20 × *their* 10
	(b)	5	**2**	**W1** for 100 cm seen, or attempt to divide by 20 OR **M1** for answer with figs 5
7		5 blue 10 red 5 green	**1** **1** **1**	If **0** scored, **SC1** for three integers which total 20, or numbers given for blue and green are both half of number for red, or 0·25, 0·5, 0·25 or ¼, ½, ¼ linked with correct colours

Section A Total: 25

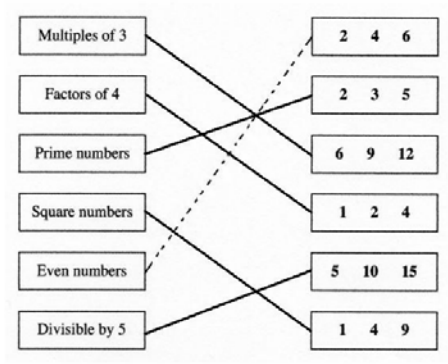
Section B

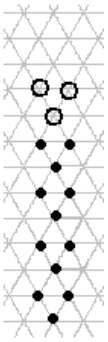
8		× ✓ × ✓	**2**	All correct **W1** for any 2 correct
9	**(a)**	70	**1**	
	(b)	75 to 77	**1**	
	(c)	Bar for males is taller than for all other continents	**1**	Must compare
	(d)	Female life expectancy is longer	**1**	Accept other valid difference
10	**(a)**	10 squares shaded	**1**	Clear intention
	(b)	90	**2**	**W1** for attempt at 120 × 3 ÷ 4 oe, or 30 seen
11	**(a)**	7:55 [pm]	**2**	Accept correct equivalent time **M1** for 15 [minutes] soi
	(b)	(i) 13 www	**3**	**M1** for attempt to add, may be implied by 88 to 110 seen AND **M1** (dependent) ÷ 8 OR **SC2** for answer 91·75
		(ii) 7	**1**	cao
12	**(a)**	70	**2**	**W1** for 20 × 3 + 10 or 60 seen
	(b)	40	**1**	
	(c)	(i) 8	**2**	**M1** for 2000 or 0·25[0] seen, or 2 ÷ 250 soi OR **SC1** for final answer 4
		(ii) 3	**1**	ft (i)
13	**(a)**	(500, 16) marked	**1**	± 1 small square
	(b)	Straight line through 3 points	**1**	Must go from 100g to 500g If **0** scored in (a), **SC1** for single straight line through 2 points going from 100g to 500g
	(c)	(i) 6	**1**	Correct or ft *their* straight line (reading ± 0·4)
		(ii) 12	**1**	Correct or ft *their* straight line (reading ± 0·4)

Section B Total: 25

B274 Module Test M4

Section A

1	**(a)**	(i) (1, 3) indicated	**1**	Within 2 mm (mark intention)
		(ii) (-2, 1)	**1**	
		(iii) (0, 1)	**1**	
	(b)	4 2 2	**2**	**1** for two correct.
	(c)	$P = 6a$ oe	**2**	isw if further "simplification" attempted **1** for "P = " **1** for "$a + a + a + a + a + a$" or better
	(d)	25 cm^2	**1** **1**	 Accept 'sq cm' oe
	(e)	$a = 30^o$ because "triangle" or "180" oe seen 160° "360" or "angles around a point" oe seen	**1** **1** **1**	 This mark is independent
2	**(a)**	Axes not labelled or equivalent implied	**1**	
	(b)	False origin or equivalent	**1**	
	(c)	5	**1**	Condone repeat of "million"
3			**3**	**2** for 4 correct **1** for 2 or 3 correct
4	**(a)**	1·22	**1**	
	(b)	0·45 or ·45	**1**	

5	**(a)**		**1**	Condone correct addition to pattern 4
	(b)	(i) 300	**1**	
		(ii) Multiplied by 3 oe	**1dep**	Need both; accept × 3 as minimum Dependent on (b)(i)
6	**(a)**	105 (g)	**1**	
	(b)	24	**1**	

Section A Total: 25

Section B

7		6·1 www	**4**	**M3** 6·6 or 6·65 seen OR **M2** 24·4 or 26·4 or 26·6 seen **M1** "number" ÷ 4 soi OR **M1** 10·4 or 8·4 or 8·2, or 34·8 – *their* 10·4 seen **M1** "number" ÷ 4 soi
8	**(a)**	j, q, x, z	**1**	Condone 1 omission and/or error
	(b)	(i) 4·8[293 …] www	**2**	**M1** "number" ÷ 27 260 or 5 as final answer, or figures 48 … seen
		(ii) German words are longer oe	**1**	If their statement does not score ft from *their* German mean.
	(c)	(i) T because most frequent	**1+1**	Accept $\frac{3853}{27028}$
		(ii) $\frac{2445}{27028}$ oe	**2**	**M1** for 2445 or 27028 seen, or 10% or 0·1
9	**(a)**	4269· […] or 4270	**2**	**1** for evidence of 70.1 × 60.9
	(b)	4 to 6	**1**	
10		24 and 6 and evidence of at least one correct completed trial	**3**	Correct trial would include 24 and 6 seen as last or only entry in either column 1 or 2 and in column 3, or on the answer line. **M1** pair of numbers summing to 30 **M1** correct product from a pair of numbers summing to 30
11	**(a)**	8 to 12	**1**	
	(b)	(i) Quarter-final	**1**	or 4·538
		(ii) 4·55(0)	**1**	
	(c)	(i) 15 to 25	**1**	
		(ii) 2·3 to 2·4	**1**	
		(iii) 130 to 150	**2**	**M1** for 150 < distance ≤ 170 seen

Section B Total: 25

B275 Module Test M5

Section A

1	**(a)**	6	**1**	
	(b)	$^{-}4$	**1**	
	(c)	10	**1**	
	(d)	64 or 4 × 4 × 4	**1**	Condone both answers stated "correctly"
	(e)	5	**1**	
2		8 6 4	**2**	**W1** any 2 correct Accept expressions, e.g. 8*e*
3	**(a)**	6 [7] 8 9	**1**	All must be correct
	(b)	Correct line	**2**	Ruled line from (1, 6) to (4, 9) at least **W1** any 2 of *their* coordinates plotted correctly, or un-ruled line within 2 mm
4	**(a)**	48·9	**1**	
	(b)	500 ÷ 50 = 10	**2**	**M1** 500 ÷ 50, 500 ÷ 52, 490 ÷ 50, 490 ÷ 52 AND **SC1** for answer 9·[…] following 500 ÷ 52, or 490 ÷ 50, or 490 ÷ 52
	(c)	$[0\cdot]d = \frac{d0}{[100]}$	**1**	*d* = 0 to 9 One digit per box
5	**(a)**	$\frac{2}{6}$	**1**	Accept equivalents
	(b)	(i) H1 H2 H3 H4 T1 T2 T3 T4	**2**	All 8, only, any layout **M1** at least 3 shown
		(ii) $\frac{2}{8}$ oe	**1**	ft *their* (b)(i) list including $\frac{1}{7}$ from a list omitting H3.
6		The diagonals bisect each other, or The diagonals are equal All four sides are equal It has one pair of parallel sides	**1** **1** **1**	 Accept two parallel sides

7	Evidence of correct working **and** choice of $2\frac{12}{16}$	**4**	**W1** $\frac{33}{16}$ soi **W1** first correct equivalent between mixed number and improper fraction **W1** first correct equivalent change of denominator, or change to decimal, even if not helpful to solution **W1** choice of $2\frac{12}{16}$ oe

Section A Total: 25

Section B

8	**(a)**	(¯4, ¯1)	**1**	
	(b)	X plotted at (¯3, 1)	**1**	Mark intention
	(c)	180	**1**	Or ½ turn
9	**(a)**	24	**2**	**M1** 4 × 3 × 2 soi
	(b)	Both A and B indicated	**1**	cao
10	**(a)**	Correct explanation	**1**	eg 6 × 2 ≠ 3, or 3 ÷ 6 ≠ 2, or it (*y*) should be 0·5 oe, or it (*y*) should be less than 1
	(b)	6 indicated	**1**	Condone 6 and 1·5 **W0** if 4*c* and 6 ringed
	(c)	2·5	**2**	**M1** 2*h* = 5
	(d)	$x + 1 + x + 2 = 10$ indicated	**1**	cao
11	**(a)**	(i) 31 to 33	**2**	**M1** 1/3 of 96, or 96 ÷ 3, or 360 ÷ 96 soi, or 33% of 96, or 34% of 96 soi, or 96 ÷ 360 × (118 to 122)
		(ii) 33 to 35	**2**	**M1** 40% of 85, or 0·4 × 85, or 360 ÷ 85 soi, or 39% of 85, or 41% of 85 soi, or 85 ÷ 360 × (143 to 146)
	(b)	(i) 6	**2**	**M1** ordered list of at least 8 items
		(ii) Decision and related reason	**1**	e.g. No – doesn't allow for the 4 values over 15, or the 2 over 30 e.g. Yes – ignores skew values
	(c)	7	**2**	**M1** $\frac{70}{100} \times 10$ oe, or 3 or 70% seen
12	**(a)**	(0)65 to (0)70	**1**	
	(b)	(i) 12 to 18	**2**	**M1** 6 to 9, or *their* measured distance × 2
		(ii) *Their* (b)(i) × 33 ÷ 2 correctly calculated	**2**	Accept to nearest whole number or better **M1** *their* (b)(i) × 33 ÷ 2 soi, or (12 to 18) × 33 ÷ 2 soi

Section B Total: 25

B276 Module Test M6

Section A

1	**(a)**	9·19 0·96	**1** **1**	
	(b)	1·6 0·015 0·8	**1** **1+1**	ft half of *their* 1·6 provided *their* 1·6 has at least 1 dp
2		78 78 84	**3**	Any order **M2** for total of 3 numbers = 240 soi OR **W1** for 78 twice
3	**(a)**	$\frac{1}{8}$ final answer	**2**	**W1** for $\frac{3}{24}$ oe isw
	(b)	$\frac{1}{3}$ final answer	**3**	**W2** for $\frac{4}{12}$ oe from subtraction isw OR **W1** for 3/12 seen or for correctly changing both fractions to other common denominator, e.g. 28/48 and 12/48
4	**(a)**	(1, 84) and (10, 58) plotted correctly	**1**	± 2 mm
	(b)	Negative	**1**	Ignore embellishments, e.g. weak
	(c)	(i) Line of best fit	**L1**	Must be ruled
		(ii) ft *their* reading on LOBF at 7 horizontally, ± 0·5 bpm	**1**	Dep on ruled line with negative gradient
5	**(a)**	(i) 28	**1**	
		(ii) 10	**2**	**W1** for 25 seen www but not if -25 used After 0 scored, **SC1** for answer of -40
	(b)	$5x - 35$ final answer	**1**	
	(c)	$b(b - 4)$ final answer	**1**	Condone omission of final bracket

6		Correct ruled line with intercept at (0, -2) and gradient 3, over range $-1 \leq x \leq 3$	**3**	**W2** for a correct ruled short line (through minimum 3 integer coordinates and none incorrect), or correct good freehand, or 5 correctly plotted integer points, with no incorrect points, but not joined OR **W1** for continuous sloping line (ruled or good freehand) with intercept (0, -2) or gradient 3, or 3 correct pairs of values for the line soi

Section A Total: 25

Section B

7	**(a)**	43·54	**1**	
	(b)	4·1	**2**	**W1** for 4·065… , 4·066, 4·0, 4·06 or 4·07 OR **SC1** for final answer of 3·6
8		131 Angle [sum of a] quadrilateral [is 360°] [Angles on a] line [sum to 180°], or exterior [angle = 180° – interior angle]	**1** **1** **1**	 Indep Indep but not available when 83 is soi in incorrect working with this reason After 0 scored, then **SC1** for 49 seen
9	**(a)**	$4x = 1 - 9$ -2	**M1** **M1**	 for correct answer or for ft from *their* $ax = b$, with $a \neq 1$ Answer alone [$x =$] -2 scores **2** marks
	(b)	$8x + 4 = 5$ or $6x = 1 - 2x$ $8x = 1$ $\frac{1}{8}$ oe isw	**M1** **M1** **M1**	For either collecting x's to $8x$ or collecting numbers to 1 with no errors seen Collects terms in x on one side and numbers on other side correctly, or ft from error in first step For correct answer or for ft from *their* $ax = b$, with $a \neq 1$ Answer [$x =$]1/8 oe isw scores **3** marks
10	**(a)**	Reflection in line $x = -1$ oe	**1** **1**	Spoiled if extras given e.g. reflect then move e.g. $x + 1 = 0$
	(b)	Correct translation to triangle with vertices (2, 3), (0, 3) and (2, 0)	**2**	**W1** for any translation
11		125 625	**2**	Answers in correct order **M1** for 750 ÷ 6 soi

12	**(a)**	37·65 to 37·75 or 38 www	**2**	**M1** for π × 12 oe
	(b)	(i) 120 and 6 isw	**2**	Or alternative complete correct method shown - could be in stages showing that there is no remainder **M1** for 108/0·9 or 87/14·5 oe; could be written in words, e.g. 9 mm goes into 108 cm or 14·5 goes into 87
		(ii) 720 cao	**2**	**M1** for 108/0·9 (or 9) × 87/14·5 (× 12·4/12·4), or *their* 120 × *their* 6 from (i) soi or (108 × 87 × 12·4) ÷ (0·9 (or 9) × 14·5 × 12·4) Answer 72 implies **M1**
13		0·27	**2**	**M1** for 1 − (0·4 + 0·23 + 0·1) OR **SC1** for answer 0·72 from 1 − 0·28

Section B Total: 25

B277 Module Test M7

Section A

1	**(a)**	3 × 3 × 5 × 5 oe fao	**3**	**M2** $3^2 \times 5^n$ oe, or $3^n \times 5^2$ oe, or 3, 3, 5, 5, or $3^2 + 5^2$, or correct factor tree OR **M1** for two correct factors seen from 3, 3, 5, 5 or better, or use of a factor tree with first branch correct, or first correct step in division
	(b)	(i) 15	**1**	
		(ii) 4	**1**	
2		3·2	**2**	**M1** for 4·8 ÷ (2 + 1) or 1·6, or figs 16 or 32
3	**(a)**	Positive	**1**	
	(b)	(i) Correct single ruled line	**1**	On x = 90, y in range 71 − 81 On x = 130, y in range 115 − 125
		(ii) 105 – 114	**1**	Correct or ft *their* ruled straight line
	(c)	No **and** a correct statement	**1**	e.g. 'too wide', or 'not in the cluster', or 'it is an outlier', or 'the length should be greater than the width'
4		2 × (5 × 2 + 5 × 3 + 2 × 3) = 62	**3**	Any complete correct method **M2** all six areas correctly identified OR **M1** for the correct area of two different faces, e.g. 5 × 2, 5 × 3
5		Arcs Correct line	**M1** **A1**	One 'arc' on each line and another pair of 'arcs' in the 'centre' Angle at 55° to 59°
6		3n + 2 oe	**2**	e.g. 3(n − 1) + 5 **W1** for 3n or -3n
7	**(a)**	$(-4/3 <) n \leq 4$ and 5 is greater than 4, or 15 is not between -4 and 12	**1**	Any correct statement
	(b)	-1, 0, 1, 2, 3, 4	**3**	**W2** for at least four correct and at most one extra **W1** for at least four correct and two extras or three correct and at most one extra

8	**(a)**	0·4(0)	**2**	**M1** for attempt at 1 − (0·35 + 0·25)
	(b)	R **and** correct reasoned statement	**1**	e.g. statement confirming we do not know how many counters there are, or number of red counters depends on the total number of counters

Section A Total: 25

Section B

9		9·20 www	**2**	**M1** for 5·35 ÷ 5 or 1·07 or 9·2 or 9·202
10		782 www	**3**	**M2** for 850 × 0·92 OR **M1** for 850 × 0·08 (or 68) AND **M1dep** 850 – *their* 68
11		163·1(25) or 163·13 or 163 www isw	**3**	**M1** for attempt at Σ*mf* or 13 050 seen **M1dep** Σ*mf* ÷ Σ*f* (80)
12	**(a)**	12 and 36 seen	**1**	Allow the substitution of two numbers in the range $2 \le x \le 3$ such that the correct results are on either side of 20, e.g. using $x = 2{\cdot}4$ and 2·5, or -8 and 16 seen
	(b)	2·4 as their final answer **and** one correct attempt in the range $2 < a < 3$, and one correct attempt in the range $2{\cdot}3 \le a \le 2{\cdot}5$	**3**	**M1** one correct attempt in the range $2< a < 3$ AND **M1** one correct attempt in the range $2{\cdot}3 \le a \le 2{\cdot}5$ AND **W1** 2·4 as their final answer
13	**(a)**	$x^2 + 5x + 2x + 10$ oe as final answer	**2**	**M1** for three correct terms (do not have to be added)
	(b)	$\frac{1}{2}$ oe www	**3**	If **3** marks not awarded, then award up to a **maximum of 2** marks from: **W1** $5x + 10$ or $x + 2 = 2{\cdot}4 + 0{\cdot}2x$ **M1** $5x - x + p = q$ **M1** $5x = 12 + x -$ *their* 10 **M1** for $x = \frac{b}{a}$ after $ax = b$, provided $a \neq 1$
14		108 www	**3**	**M2** 270 ÷ (2½ or 2·5) or (270 × 60) ÷ 150 OR **M1** 270 ÷ *their* time or 1·8 If 0 scored, **SC1** for 2½ or 2·5 seen
15		37 700 to 37 720 or 38 000 www	**5**	**M1** for 64 × 82 or 5248 **M1** for ½π × $(64/2)^2$ or 1607 to 1609·2 **M1** *their* '64 × 82' + *their* '½π × 32^2' or 6855 to 6857·2 **M1** *their* '6855 to 6857·2' × 5·5 The final two method marks could be reversed

Section B Total: 25

B278 Module Test M8

Section A

1	**(a)**	$\frac{13}{20}$	**3**	**M2** for 1 − 7/20, or for 48/20 − 35/20, or 28/20 − 15/20 oe OR **M1** for 8/20 or 15/20 or 48/20 or 35/20 oe OR **SC2** for 65/100 or 26/40 oe fraction OR **SC1** for 0·65
	(b)	$4\frac{1}{5}$	**3**	**M1** 12/5 × 7/4 oe **M1** for attempting to multiply numerators and denominators of *their* improper fractions Answers 84/20 or better imply **M2**
2	**(a)**	$x > 2$ or $2 < x$	**2**	**M1** for $5x > 10$, or for 2 found with equation or wrong inequality
	(b)	$(x - 6)(x - 1)$ [x =] 6 or 1	**M2** **A1**	**M1** for factors $(x + a)(x + b)$ with a and b non-zero giving two terms correct, or for other versions of $(x \pm 6)(x \pm 1)$ If no factors seen, correct solution of both 6 and 1 earns **W1** only If wrong factors seen (earning M1 or M0), allow **W1** for solutions ft *their* factors
3	**(a)**	Triangle with vertices at (2, 1) (3, 1) and (3, −1)	**2**	**M1** for rotation through wrong angle about (2, 1), or for rotation through 180° about wrong centre
	(b)	Triangle with vertices at (6, −1) (7, −1) and (7, −3), or ft *their* B	**2**	**M1** for translation with movement in one direction correct or for translation of $\begin{pmatrix} -2 \\ 4 \end{pmatrix}$ OR **SC1** for ΔC with vertices at (5, 1) (5, −1) and (6, −1) (i.e. a translation of A not B)
	(c)	Rotation [through] 180° [About] (4, 0), ft *their* translation of B	**1** **1**	**0** if second transformation also mentioned e.g. translation or a vector Allow **1** if their point (4, 0) mentioned, independent of rotation ,but must ft *their* diagram

4	**(a)**	(0, 5) (−2·5, 0) oe	**1** **2**	 **M1** for −5 ÷ 2, or for $2x = -5$ seen, or for 2·5 found as horizontal distance (may be on diagram) OR **SC1** for (5, 0) and (0, −2·5)
	(b)	$y = 2x$ [+ k]	**1**	Allow any letter or any real value of k but ≠ 5
5		0·72 or 72/100 oe isw (wrong cancelling)	**2**	**M1** for 0·9 × 0·8 or figs 72 in answer
6		Scale factor 1·5 or 2/3 oe [Included] angle same in both triangles	**1** **1**	Or showing two pairs of sides in same ratio

Section A Total: 25

Section B

7	**(a)**	1·6 or 8/5 or $1\frac{3}{5}$ oe	**2**	**M1** for 2·5*x* = 4 or 5*x* = 8 oe, or for 6*x* = 8 + *x* oe, or for *their* final answer correct, ft one error
	(b)	(i) $x = y/2$	**2**	**M1** for $y = 2x$ or $-y = -2x$
		(ii) $x = [\pm]\sqrt{9y}$ *or* $x = [\pm]3\sqrt{y}$ as final answer	**2**	**M1** for $9y = x^2$ or for correct square root of initial equation, or for $\sqrt{9y}$ oe OR **SC1** for $x = k\sqrt{y}$, $k \neq 3$ oe as final answer
8	**(a)**	11 950 www	**3**	**M2** for 12 667 ÷ 1·06, or for 12 667 ÷ 106 (× 100) OR **M1** for 12 667 = 106% of ? oe
	(b)	(i) 1·06 = 106%	**1**	Allow '6% increase means the multiplier is 1·06'
		Squared (or $1{\cdot}06^2$) since it is two years after	**1**	
		(ii) 14 232 to 14 233 or 14 230 or 14 200	**1**	
9		Acute angle at P = 75°, or angle B = 15°	**M1**	
		x = 8·6 × sin 75° or 8·6 × cos 15°	**M2**	**M1** for sin 75 = x/8·6 or cos 15 = x/8·6
		8·3	**A1**	Condone 8·31 for **A1**
10	**(a)**	Whiskers with min at 145, max at 176	**1**	± 1 mm throughout
		Box from 154 to 168	**1**	
		Median line at 160	**1**	Accept solid or dashed median line
	(b)	Range of heights is greater for boys or IQRs are the same	**1**	ft *their* box plot for all marks
		Median shows that girls are shorter on average	**1**	
		Numerical evidence for at least one of these	**1**	ft numbers ± 1 mm from correct readings e.g. accept 160·5 for median of girls Also ft readings from *their* box plot for girls

11	**(a)**	(1091 + 854 + 1527 + 2053) ÷ 4 = 1381(·25) or 1380	**M1** **A1**	 or **W2**
	(b)	[Slight] decrease in use oe	**1**	(May also refer to initial rise in use)

Section B Total: 25

B279 Module Test M9

Section A

1		$\frac{12 \times 10^7}{6 \times 10^4}$ or $\frac{1{\cdot}2 \times 10^8}{6 \times 10^4}$ or $\frac{2 \times 10^{2} \times 10^9}{10^4}$ 2×10^3 as final answer www	**M2** **A1**	12 implies figs 4 and 3 OR **M1** two of figs 4, 3, 6 or 2×10^n or $k \times 10^3$ Allow W3 www OR **SC2** 2000 or $0{\cdot}2 \times 10^4$
2	**(a)**	1	**1**	
	(b)	$\frac{1}{8}$ or 0·125	**1**	
	(c)	9	**1**	Ignore +/–
3	**(a)**	$\frac{5}{40}$ and $\frac{35}{40}$ or $\frac{1}{8}$ and $\frac{7}{8}$ seen in correct places on both pairs of branches	**2**	**M1** for top or bottom pair correct Accept equivalent fractions, decimals or percentages
	(b)	$\frac{3}{80}$ oe www	**2**	**M1** for multiplying *their* correct pair of probabilities **A1** ft **SC2** for $\frac{21}{80}$ after $\frac{1}{8}$ and $\frac{7}{8}$ seen reversed on tree

4	**(a)**	$3x^2 + 7x - 6$ final answer	**3**	**M2** for $3x^2 + 9x - 2x - 6$ OR **M1** for 3 terms out of 4 correct, or 2 terms of *their* 3 terms correct
	(b)	(i) $(x - 6)(x + 4)$ final answer	**2**	**M1** for $(x \pm 6)(x \pm 4)$, or for 2 factors leading to 2 of the 3 terms correct Inner brackets essential
		(ii) $\frac{x - 6}{x - 4}$ www	**3**	**M1** for $(x - 4)(x + 4)$ seen **M1** for correct cancelling seen **A1ft** if $(x - 4)$ or $(x + 4)$ factor in (i), and cancelled correctly
5	**(a)**	140	**3**	**M2** for 24 + 30 + 40 + 26 + 20 (condone one error) OR **M1** for any 3 correct values or all of 3 × 8 + 7·5 × 4 + 10 × 4 + 6·5 × 4 + 2·5 × 8
	(b)	Comment referring to range or average	**1**	Comment about average should use key words such as taller or shorter
6	**(a)**	Angle in a semi-circle	**1**	Accept angle on a straight line **and** angle at the centre (is twice the angle at the circumference)
	(b)	72° (Angles in a triangle) and alternate segment theorem	**1** **1**	 Dependent on an answer of 72° or angle EBC identified as 18° (could be on diagram)

Section A Total: 25

Section B

7	**(a)**	8·9(4…) or $4\sqrt{5}$ www	**3**	**M2** for $\sqrt{(8^2 + 4^2)}$ or $\sqrt{80}$ OR **M1** for $8^2 \pm 4^2$ or 80 or 48
	(b)	(i) ½ oe	**1**	Accept ½x but not y = ½x (+ c)
		(ii) $y = -2x + 3$ oe, correct or ft (i)	**2**	**W1** for $-2x + 3$, or $\frac{-1}{0\cdot5}x + 3$, or $y = -2x +$ c, or $y = mx + 3$
8	**(a)**	(i) $M = 75r^2$ cao www	**3**	**M2** for $36k = 2700$ or (k =) 75 or $M \propto 75r^2$ OR **M1** for $M = kr^2$ or $M \propto r^2$ or $\frac{2700}{36}$ OR **SC1** $2700 = \frac{1}{3}\pi 6^2 h$ seen
		(ii) C	**1**	May be indicated on diagram
	(b)	$r = \sqrt{\frac{3V}{\pi h}}$ www	**3**	**W1** for correctly multiplying by 3 **W1** for correctly transposing πh **W1** for correctly taking the square root All marks independent and can be applied in any order
9	**(a)**	It gives a proportional sample of students from each year group	**1**	The number surveyed reflects the size of each year group
	(b)	26	**2**	**M1** for $\frac{312}{1200} \times 100$ oe

10		339 – 340 www	**5**	**M2** for $\frac{2}{3} \times \pi \times 3^3$ or 56 - 57 or 18π OR **M1** for $\frac{4}{3} \times \pi \times 3^3$, or 113 - 113·5, or 36π AND **M1** for $\pi \times 3^2 \times 10$, or 282 - 283, or 90π **M1** for addition of volumes (dep on **M1**) 108π implies M4 OR **SC3** for consistent use of 6 (or 1·5) as the radius implied by 452·38, 1130·9 and 1583·28 (or 7·068, 70·68 and 77·75) Numbers may be rot
11	**(a)**	3 : 5 or 5 : 3	**1**	Accept 0·6 : 1, or 1 : 1·66, or 1 : 1·67, or better
	(b)	250 cao www	**3**	ft *their* (a) for both method marks only but not if (a) is 27 : 125 oe **M2** for $90 \times \left(\frac{5}{3}\right)^2$ or better OR **M1** for $\left(\frac{5}{3}\right)^2$ or $\left(\frac{3}{5}\right)^2$ oe, or 9 : 25 or 25 : 9

Section B Total: 25

B280 Module Test M10

Section A

1		$\frac{41}{99}$	**W2**	**M1** 99r = 41 or 100r = 41.41(..)
2		$6x^2y$	**W3**	**M2** 2 terms from 6, x^2 and y in *their* final answer OR **M1** 1 term from 6, x^2 and y in *their* final answer, or $36x^4y^2$ seen
3	**(a)**	Histogram with heights 0, 2, 5, 4, 1·5, 1·5 cm	**W2**	**W1** 5 heights correct OR **SC1** Histogram with all bars in correct proportion but ignoring key (i.e. used frequency density calculation)
	(b)	2 comments. For **2** marks comments must come from 2 of these 5 categories: - Lower prices - Higher prices - Middle range of prices (from 100 to 600 or subgroup within) - Average price (condone 'generally') - Spread / consistency	**W2**	**W1** Each comment from correct data (i.e. no ft from incorrect histogram)

4	**(a)**	$-2\mathbf{b} - 2\mathbf{a} + 4\mathbf{b}$	**W1**	
	(b)	(i) Clear indication of correct vectors $\mathbf{b} + \mathbf{b} - \mathbf{a}$	**M1** **A1**	**M1** ½ QR + ½ RS Vectors may be shown on diagram
	(b)	(ii) Parallelogram or rhombus $\overrightarrow{EH} = 2\mathbf{b} - \mathbf{a}$ $\overrightarrow{EH} = \overrightarrow{FG}$	**W1** **M1** **A1**	<u>Alternative method for marks 2 and 3:</u> Or $\overrightarrow{EF} = \mathbf{a} + \mathbf{b}$, or $\overrightarrow{HG} = \mathbf{a} + \mathbf{b}$ Or other vector given and $\overrightarrow{HG} = \overrightarrow{EF}$ OR Following W1 only, **W1** for opposite sides equal and parallel, or both pairs of opposite sides parallel
5		$x = 4/5$, $y = 7/5$ $x = -2$, $y=7$	**W5**	**W4** $x = 4/5$ and $x = -2$ OR **M1** $3 - 2x = 5x^2 + 4x - 5$, or $2x + 5x^2 + 4x - 5 = 3$ **M1** $5x^2 + 6x - 8 = 0$ (ft first step) **M1** $(5x - 4)(x + 2)$ (ft their equation) **M1** ft *their* factorisation = 0 for 2 values of x (only if finding solution is of comparable difficulty)
6	**(a)**	$4\sqrt{3}$	**W2**	**M1** Multiplying numerator and denominator by $\sqrt{3}$ isw
	(b)	$28 - 10\sqrt{3}$ or $2(14 - 5\sqrt{3})$ cao	**W3**	**M1** $\sqrt{3}\sqrt{3} + 25 - 5\sqrt{3} - 5\sqrt{3}$ **M1** 28 (or 3 + 25) or $-10\sqrt{3}$

Section A Total: 25

Section B

7		1·38 to 1·39 and -2·88 to -2·89	**W3**	**W2** 1·38 to 1·39 or -2·88 to -2·89 OR **M2** $\frac{-3 \pm \sqrt{73}}{4}$ OR **M1** Substitution in quadratic formula: $\frac{-3 \pm \sqrt{(9 - 4 \times 2 \times -8)}}{2 \times 2}$
8		6·08(..) to 6·09 or 6·1cm	**W4**	**W3** $\sqrt[3]{225}$ OR **M1** Cylinder = π × 25 × 12, or 942 ... **M1** $\frac{4\pi r^3}{3}$ = *their* cylinder volume **A2** 6 (cm) dependent on M2
9	**(a)**	12%	**W1**	
	(b)	Graph with 4 correct points from (0, 4000), (1, 3520), (2, 3098), (3, 2726) and (4, 2399) Smooth curve through all 5 correct points	**P2** **C1**	**P1** 3 correct points or 3 values of P ± 1 mm
10	**(a)**	$\frac{BD}{\sin 40^\circ} = \frac{8.2}{\sin 115^\circ}$ 5·81... or $\frac{8.2 \sin 40^\circ}{\sin 115^\circ}$	**M1** **A1**	**W1** $\frac{5.8}{\sin 40^\circ}$ = 9·02 … and $\frac{8.2}{\sin 115^\circ}$ = 9·04 …
	(b)	5·3 to 5·4 www	**W3**	**M2** (CD^2) = 28·5 to 28·7 OR **M1** $(CD^2) = 3{\cdot}4^2$ + *their* $BD^2 - 2 \times 3{\cdot}4 \times$ *their* BD (×) cos 65°

11	**(a)**	$\frac{12}{240}$ or $\frac{1}{20}$ oe	**W2**	**M1** $\frac{4}{16} \times \frac{3}{15}$
	(b)	$\frac{4}{5}$ oe www	**W3**	**M1** $4 \times \frac{1}{20}$ or 4 × *their* (a) or 4 routes identified on tree diagram **M1** $1 - \frac{4}{20}$ or 1 - 4 × *their* (a) OR **M1** $\frac{4}{16} \times \frac{12}{15}$ $(= \frac{3}{15})$ **M1** $\frac{3}{15} \times 4$
12		Numerator LHS: $(a - 2)(a + 3) - (a + 2)(a - 3)$ $(a^2 - 2a + 3a - 6) - (a^2 + 2a - 3a - 6)$ Denominator LHS: $(a - 3)(a + 3) = a^2 - 3a + 3a - 9$ Numerator $2a$ and Denominator $a^2 - 9$ www	 **M1** **M1** **M1** **A1**	

Section B Total: 25

Grade Thresholds

General Certificate of Secondary Education
Mathematics C – Graduated Assessment (Specification Code J517)
March 2009 Examination Series

Unit Threshold Marks (Module Tests)

Unit		Maximum Mark	a*	a	b	c	d	e	f	g	p	u
B272	Raw	50							39	24	14	0
	UMS	70							60	40	30	0
B273	Raw	50							28	13		0
	UMS	79							60	40		0
B274	Raw	50						35	20	12		0
	UMS	90						80	60	50		0
B275	Raw	50						28	15			0
	UMS	99						80	60			0
B276	Raw	50					24	11				0
	UMS	119					100	80				0
B277	Raw	50				27	14					0
	UMS	139				120	100					0
B278	Raw	50			32	16						0
	UMS	159			140	120						0
B279	Raw	50		31	15							0
	UMS	179		160	140							0
B280	Raw	50	29	13								0
	UMS	200	180	160								0

Notes
The table above shows the raw mark thresholds and the corresponding key uniform scores for each unit entered in the March 2009 session. Raw marks in between grade boundaries are converted to uniform marks by a linear map. For example, 28 raw marks on unit B278 would score 135 UMS in this series.

For a description of how UMS marks are calculated see:
http://www.ocr.org.uk/learners/ums_results.html

For a spreadsheet designed to calculate UMS scores for this specification, please visit the Graduated Assessment e-community at:
http://community.ocr.org.uk/community/maths-gcse-ga/home

The grade shown in the table as 'p' indicates that the candidate has achieved at least the minimum raw mark necessary to access the uniform score scale for that unit but gained insufficient uniform marks to merit a grade 'g'. This avoids having to award such candidates a 'u' grade. Grade 'p' can only be awarded to candidates for B271 (M1) and B272 (M2). It is not a valid grade within GCSE Mathematics and will not be awarded to candidates when they aggregate for the full GCSE (J517).

Statistics are correct at the time of publication.

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

14 – 19 Qualifications (General)
Telephone: 01223 553998
Facsimile: 01223 552627
Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored

Oxford Cambridge and RSA Examinations
is a Company Limited by Guarantee
Registered in England
Registered Office; 1 Hills Road, Cambridge, CB1 2EU
Registered Company Number: 3484466
OCR is an exempt Charity

OCR (Oxford Cambridge and RSA Examinations)
Head office
Telephone: 01223 552552
Facsimile: 01223 552553