OCR
RECOGNISING ACHIEVEMENT

GCSE

Mathematics C

General Certificate of Secondary Education **J517**

Mark Schemes for the Units

January 2009

J517/MS/R/09J

Oxford Cambridge and RSA Examinations

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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.**

B271 Module Test M1

Section A

1	**(a)**	7 45 57 cao	**2**	**W1** for 2 correct
	(b)	20 cao	**1**	
	(c)	28 cao	**1**	
	(d)	45 cao	**1**	
2	**(a)**	51	**1**	
	(b)	62	**1**	
3	**(a)**	10:25	**1**	
	(b)	6134	**1**	
	(c)	45 minutes	**1**	
	(d)	(i) Jacksonville	**1**	
		(ii) Naples	**1**	
		(iii) South-east	**1**	
		(iv) 250	**1**	
4	**(a)**	Evens	**1**	
	(b)	Impossible	**1**	
5	**(a)**	32	**1**	
	(b)	Add 3 oe	**1**	
6	**(a)**	$\frac{3}{4}$ of shape shaded	**1**	
	(b)	$\frac{1}{4}$ of shape shaded	**1**	
	(c)	$\frac{1}{2}$ oe $\frac{3}{6}$ isw	**1**	
7		5 mm, 5 cm, 500 mm, 5 m	**2**	**W1** for 1 incorrectly placed or completely reversed.
8	**(a)**	Pentagon	**1**	
	(b)	Hexagon drawn	**1**	

Section A Total: 25

Section B

9	**(a)**	7	**1**	
	(b)	23	**1**	
	(c)	8	**1**	
10	**(a)**	(9, 3)	**1**	
	(b)	(7, 2) marked on grid	**1**	
	(c)	34 - 35 inclusive	**2**	**M1** 33 ≤ area < 34 or 35 < area ≤ 36
11	**(a)**	12 shown on bar chart	**1**	
	(b)	(i) 22	**1**	
		(ii) Fish	**1**	
	(c)	11	**2**	**M1** 19 and 8 seen or attempt at subtraction
12		Correct enlargement drawn	**2**	**M1** one line correct other than given line
13	**(a)**	£24·76	**W4**	www **W3** for figs 2476 OR **M1** figs 1936 or figs 176 × 11 **M1** figs 54(0) or figs 36 × 15 **M1** attempt to add *their* 19·36 and *their* 5·40. Need evidence that values added are the result of multiplication
	(b)	£20·25	**1**	
14	**(a)**	4·4 – 4·8 inclusive	**1**	
	(b)	Radius	**1**	
15		284	**2**	**M1** attempt to divide 14200 by 50
16		5 other correct arrangements	**2**	**M1** 3 other correct arrangements

Section B Total: 25

B272 Module Test M2

Section A

1	**(a)**	$\frac{3}{8}$	**1**	Accept any correct equivalent fraction
	(b)	2 squares shaded	**1**	
	(c)	(0)·1 $\frac{3}{4}$	**1** **1**	Accept any correct equivalent fraction
2	**(a)**	St Aldate's	**1**	
	(b)	R(ight)	**1**	
	(c)	Pembroke (Street), left, right	**2**	**W1** for any two correct
3		2222 × 9 + 222 [= 20220] [22222 × 9 + 2222 =] 202220	**1** **1**	
4	**(a)**	168	**1**	cao
	(b)	27	**1**	cao
5	**(a)**	(i) 6	**1**	
		(ii) 3	**1**	**SC1** for 5 in (i) **and** 2 in (ii)
	(b)	£2·60 or 260p	**2**	**W1** for figs 26 as answer, or attempt at 65 × 4, or answer of £2·(xx), or answer of 2xxp
	(c)	0·17	**3**	**M1** for attempt at 1·45 + 0·48 (= 1·93) **M1** for clear attempt at 2·1 – *their* 1·93 OR **M1** for 2·1 – 1·45 or 2·1 – 0·48 (= 0·65 or 1·62) **M1** for *their* (0·65 or 1·62) – 0·48 or 1·45 OR **SC2** for figs 17 as final answer
6	**(a)**	Cube, cuboid, cylinder, cone	**3**	**W2** for 3 correct **W1** for 2 correct
	(b)	(i) White	**1**	
		(ii) B C	**1** **1**	

Section A Total: 25

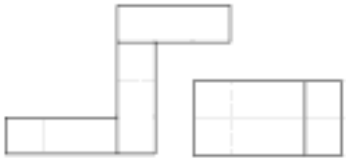
Section B

7	**(a)**	8	**1**	
	(b)	June	**1**	
	(c)	October	**1**	
	(d)	1	**1**	
	(e)	6	**1**	
	(f)	4	**1**	or −4
8	**(a)**	(i) no, yes, yes, no	**2**	**W1** 3 correct
		(ii) Top right circle or middle left circle shaded	**1**	**0** if more than one circle shaded
	(b)	15	**2**	**W1** for 0·6 × 10 + 9, or 0·6 × 10 = 6, or figs 15 as answer
9	**(a)**	D	**1**	
	(b)	53 – 57°	**1**	
10		3	**2**	**W1** for ordered list of at least 6 values
11	**(a)**	(i) $\frac{1}{4}$	**1**	oe fraction
		(ii) 30	**2**	**W1** for 50(%) or $\frac{1}{2}$ seen or attempt at 60 ÷ 2
	(b)	(i) 20	**1**	
		(ii) 30 – 35	**1**	
12		12	**2**	**W1** for 1500 or 0·125 seen, or figs 12 as answer, or 1·5 ÷ 125 soi
13	**(a)**	25	**1**	May be indicated on grid
	(b)	Add 4	**1**	oe
	(c)	Numbers are always odd	**1**	oe

Section B Total: 25

B273 Module Test M3

Section A

1	**(a)**	6:50 oe	**1**	Accept common time formats
	(b)	30	**1**	Allow full ft from (a)
	(c)	2	**1**	
2	**(a)**	3·1	**1**	
	(b)	8·8	**1**	
	(c)	5120	**1**	
	(d)	49	**1**	
3	**(a)**	(i) 100	**1**	
		(ii) 30	**2**	**M1** '15% of 100 = 15' or '10% of 200 = 20' soi
	(b)	16	**2**	**M1** for 2 × 4 × 2 or 8 or 4 × 2 seen
	(c)	50 to 70 and cm	**2**	**1** for number + **1** for cm (units) Accept equivalent measurements given in other metric or imperial units for **2** marks, only if units are stated.
	(d)	12·1 to 12·9	**1**	
	(e)	All correct	**2**	**1** for 2 correct
	(f)	Correct and in order 	**3**	**2** for 1 correct OR **M1** for 2 out of 3 correct 'limbs' in view A OR **SC1** for correct drawings in wrong order
4	**(a)**	$\frac{1}{5}$ oe	**1**	
	(b)	$\frac{2}{5}$ oe	**1**	If **0** for (a) and (b), **M1** for correct denominator in both cases
5	**(a)**	14	**1**	
	(b)	1	**2**	**M1** for 9 or 8 seen

Section A Total: 25

Section B

6		$^{-}4$ $^{-}3\frac{1}{2}$ 0 1 $1\frac{1}{2}$	**2**	**1** for correct coldest or warmest
7	**(a)**	4	**1**	Condone embedded answer
	(b)	10	**1**	Condone embedded answer
8	**(a)**	(i) 15	**1**	
		(ii) 7	**1**	
	(b)	(i) 10	**1**	
		(ii) 1956 / 1931 / 1906 (are not the driest for June or July) plus a month (not June or July) or its rainfall	**2**	**M1** for just year mentioned
	(c)	5·5 www	**3**	**M1** for 44 seen **M1** for clear attempt at *their* 44 ÷ 8
	(d)	28 to 32 (cm)	**1**	
	(e)	7	**1**	
	(f)	2	**1**	
9		Correct	**3**	**2** for any two correct length sides OR **1** for 1 correct length side OR **SC1** for correct ×2 enlargement
10	**(a)**	6·2 to 6·4	**1**	
	(b)	44 to 46	**2**	**M1** for 80 or (4·4 to 4·6) seen, or 8 and (4·4 to 4·6) indicated on graph
11	**(a)**	80	**2**	**M1** for 16 or 20 seen
	(b)	22	**2**	**M1** for 484 or 49·(193 …) seen

Section B Total: 25

B274 Module Test M4

Section A

1	**(a)**	$\frac{2}{10}$	**1**	oe $\frac{1}{5}$, $\frac{20}{100}$
	(b)	$\frac{90}{100}$	**1**	oe $\frac{9}{10}$
	(c)	$\frac{65}{100}$	**1**	oe $\frac{13}{20}$
	(d)	$\frac{8}{100}$	**1**	oe $\frac{4}{50}$, $\frac{2}{25}$ etc
2		……. 19 …..…….	**1**	
		……. ……. $^{-}6$	**1**	Accept in words
		9·5(0), 9(·0..), 8·5(0) oe	**1**	
3	**(a)**	6100	**1**	
		(20)01	**1**	
		3800 cao	**2**	**M1** Attempt *their* 6100 – 2300, or figs 38 as answer, or *their* first answer – 2300 correct
	(b)	Yes, with a statement that implies the graph drops from 2004	**1**	Must have reason Accept any statement clearly indicating reduction in last two values
4	**(a)**	Any correct pair	**1**	1, 20 or 2, 10 or 4, 5
	(b)	24, 48, 72 or 96	**1**	
	(c)	1, 2 or 4	**1**	
	(d)	4 or 36	**2**	**W1** 1 or 2 or 6 or 9 or 16 or 18 or 64 **0** 1 × 1, 6 × 6, etc
5		× ✓ × × ✓ Non ambiguous, including numbers (1/0) 4 (1/0) 5 4	**2**	**W1** any 3 correct including at least one ✓ OR **SC1** blank, ✓, blank, blank, ✓

6		11232 or £112·32, with working	**3**	**W2** figs 11232 with working If in £, the sign must be clear OR **M1** complete attempt at multiplication **W1** 432 or 10800 or 2160 or 10400, or 520 or 312 seen, or 4 correct rectangles in grid method OR **SC1** figs 11232 without supporting working
7	**(a)**	Angles on a straight line add up to 180°	**1**	cao
	(b)	95 angles in triangle or triangle … 180°	**1** **1**	 Correct reason (must mention triangle) ignore other non contradictory reasons

Section A Total: 25

Section B

8	**(a)**	$T = 5x$ oe	**2**	**W1** $5x$ or $T = 540$ or $5x = 540$ or $x = 108$
	(b)	90	**1**	cao
9	**(a)**	22·2	**2**	**W1** 7·4 × 3 soi, e.g. by 21·12
	(b)	Vertical *and* horizontal line	**2**	Only **W1** either line only **0** both correct plus other extra line(s), e.g. diagonals
	(c)	(i) $(^{-}2, 5)$	**1**	
		(ii) $(^{-}6, 5)$, $(^{-}6, ^{-}2)$ plotted	**2**	**W1** Each
		(iii) $(^{-}2, ^{-}2)$ plotted and recorded	**2**	ft *their* 3 points but MUST be rectangle for **2** or for **W1** **W1** point plotted to form rectangle, or rectangle drawn, or coordinates given to form rectangle but point not shown on diagram
10	**(a)**	$\frac{1}{2}$ or 50% or 0·5 or half	**2**	**W1** Any fraction equivalent to ½ or evens but not a ratio or $\frac{25}{50}$ seen
	(b)	$\frac{5}{50}$ oe	**1**	e.g. $\frac{1}{10}$, 10%, 0·1
	(c)	20	**1**	ft *their* (b) provided working shown using *their* answer to (b)

11	37·78 www as answer	**5**	**W4** figs 3778 as answer *(No further marks awarded after **W4** earned)* **W3** 2(4·5 litre), 1(2 litre), 1(1 litre) as answer soi by 26·98, 7(·00), 3·8(0) OR **W2** Combination of tubs giving 12 – 13·5 litres as answer OR **W1** Combination of tubs giving 11 – 11·5 or above 13·5 (litres) as answer If **W0**, **M1** for 100 ÷ 8·6 soi by 11·6(…) or 12 litres [required] AND **W2** *their* (£)37·78 correctly calculated OR ***M1** Attempt to multiply at least one of the numbers of tubs in their combination by the price, soi by "correct" price*
12	**(a)** 10:10	**1**	Any acceptable format but not pm
	(b) 145	**1**	
	(c) C - D or place names **and** steepest oe	**1**	Accept 'from C' or 'last part' Accept statement comparing roughly 30mph and 60mph in first and last stages
	(d) 18:30	**1**	Condone 6:30 [pm]

Section B Total: 25

B275 Module Test M5

Section A

1	**(a)**	30 × 20 = 600 or 28 × 20 = 560 or 30 × 19 = 570	**2**	**M1** 30 × 20 or 28 × 20 or 30 × 19 OR **W1** 600 or 560 or 570
	(b)	Bigger … numbers rounded up	**1**	
2		6 and 20	**2**	**W1** 6 or 20
3	**(a)**	Centre marked	**1**	
	(b)	180	**1**	
	(c)	Trapezium	**1**	
4	**(a)**	45	**1**	
	(b)	(i) 90 110 130	**2**	**M1** 2 correct values
		(ii) Correct ruled straight line	**2**	Line ±1mm of correct points **W1** Any 3 correct points plotted, or ruled straight line from (0, 30) to (20, 70)
		(iii) 30	**1**	Or ft intersection of *their* graphs, ±1 visit, but <u>not</u> for intersection at (0, 0)
5	**(a)**	$^{-}3 + {}^{-}2$	**1**	
	(b)	$^{-}3 \times 2$ or $^{-}2 \times 3$	**1**	
	(c)	$3 - {}^{-}2$ or $2 - {}^{-}3$	**1**	
6		$7x - 3y$	**2**	**M1** $7x$ or $^{-}3y$
7	**(a)**	5(p) and 20(p)	**1**	
	(b)	20(p) and 50(p), or 2(p) and 5(p)	**2**	**M1** Correct method for 40% of any coin or two coins correctly compared, e.g. 1p as a percentage of 5p = 1/5 = 20%
8	**(a)**	22	**1**	
	(b)	5	**2**	**M1** $4x = 20$ or $x = 4{\cdot}5$ (from $4x = 18$)

Section A Total: 25

Section B

9		8·3 cm line drawn 53° and 64° in completed triangle	**1** **2**	±0·2cm **M1** Either angle correct ±2°, or both angles correct but triangle incomplete
10	**(a)**	8 pairs listed	**2**	Condone 3, 1 repeated **W1** 8 correct pairs plus other repeats OR **M1** 6 additional correct pairs (ignore repeats)
	(b)	$\frac{2}{9}$	**2**	ft from (a) for 1 or 2 marks Accept equivalents e.g. 4/18 (fraction equivalents only from simplifying or doubling) or 22% or 0·22(...) **M1** incorrect notation e.g. '2 out of 9', or fraction with num'r 2, or denom'r 9
11	**(a)**	(i) B	**1**	
		(ii) 12	**1**	
	(b)	64 cm^3	**2**	**M1** Either 64 or cm^3
12		✓ ✓ ✓ ✓	**2**	**M1** 2 or 3 correct
13	**(a)**	£63	**2**	**M1** 0·35 × 180, or 10% × 3 + 5% and 10% = £18
	(b)	£117	**1**	Or ft 180 - *their* (a)
14	**(a)**	(1 cm to) 2 m	**1**	Or 200 cm
	(b)	180 www	**2**	**M1** 12 and 15 seen in working, or 6 × 7·5 or 45 ft *their* scale in (a) for M1, which may be implied by their answer to (b)
	(c)	30% www	**3**	**M1** *their* 180/*their* (20 × 30) or *their* 45/*their* 150 **M1** 600 or 150

15		Pie chart correct and labelled	**3**	Sectors 90°, 210°, 60°, correct ±2° Allow 15/35/10 as labels **M2** 2 sectors correct and labelled, or 3 sectors correct but not labelled or mislabelled OR **M1** 1 sector correct, or 1 person = 6°, or 1·66...%, or any one correct angle or % given

Section B Total: 25

B276 Module Test M6

Section A

1	**(a)**	(i) 95	**2**	**1** for 25, 75 or 20 seen
		(ii) $\frac{24}{35}$	**2**	**M1** for $\frac{3}{5} \times \frac{8}{7}$ oe or $\frac{24}{40} \div \frac{35}{40}$ oe
	(b)	(0)·8	**2**	**M1** for 4 ÷ 5 or $\frac{8}{10}$ oe (not $\frac{4}{5}$), or (0)·8 seen in working.
2		Alternate (angle)	**1**	condone Z (angle)
		Corresponding (angle)	**1**	condone F (angle)
3	**(a)**	Two correct points	**1**	
	(b)	Negative	**1**	Accept equivalent expressions
	(c)	Correct ruled line	**1**	Must be a single ruled straight line from at least m = 100 to m = 500
	(d)	21·2 - 21·8	**1**	Correct or ft *their* ruled line
4	**(a)**	$3x - 15$	**1**	
	(b)	(i) 2·5 oe www	**2**	**M1** for $4x = 7 + 3$ or better, or $x = \frac{k}{4}$ after $4x = k$
		(ii) $^{-}3$ oe www	**3**	**M1** for $5x - 3x + m = n$ or better, or for $mx = nx + 4 - 10$ or better **M1** for $x = \frac{k}{a}$ after $ax = k$
5	**(a)**	120	**2**	**M1** for 600 ÷ (4 + 1) or 480 as answer
	(b)	114·75 www	**5**	**M1** complete correct method for 2·5 × 32·3(0) **W1** for figs 646, 1615 or 8075 **M1** for 10 × 3·4(0) or 34 seen **M1** for *their* 80·75 + *their* 34

Section A Total: 25

Section B

6	**(a)**	Correct reflection	**1**	Ignore labels
	(b)	Correct translation	**1**	Ignore labels
7	**(a)**	5 … 1	**1**	
	(b)	Correct ruled line	**2**	**M1** for 2 correct points plotted, ft *their* table The line should go from $x = 0$ to $x = 4$
	(c)	Correct ruled line	**1**	The line should go from $x = 0$ to $x = 2$
	(d)	(1, 4)	**1**	Correct or ft *their* ruled lines
8	**(a)**	16	**2**	**M1** for $5 \times 6{\cdot}4 \div 2$
	(b)	50·2 - 50·3	**2**	**M1** for $\pi \times 4^2$
9		A (or 22 or $3x^2 + 10$) **and** B = C = 25 correct www	**3**	**M2** for 2 correct values indicated OR **M1** for 1 correct value indicated
10	**(a)**	72	**2**	**M1** for $360 \div 5$ as a complete method
	(b)	108	**2**	**M1** for $180 - (360 \div 5)$; accept any complete method OR **W1** for $360 \div 5 = 72$ or just 72 seen www following after
11		A E	**2**	**1** for one correct
12	**(a)**	(i) 224	**1**	
		(ii) 41	**1**	
	(b)	Reference to median (or number), mean (or number), or 220 row of stem and leaf **and** statement to say correct or incorrect	**1**	Accept any correct statement
	(c)	0·1 oe	**2**	**M1** for attempt at $1 - (0{\cdot}43 + 0{\cdot}21 + 0{\cdot}26)$

Section B Total: 25

B277 Module Test M7

Section A

1	**(a)**	16 cao	**2**	**M1** 24 ÷ 3 or 8
	(b)	8	**2**	**M1** 20 ÷ 5 or for 4 × 2 Alternative method: [total no. of grapes = 40] then 40 ÷ 10 [= 4] gets **M1**
2	**(a)**	13 cao	**1**	
	(b)	$0\cdot\dot{2}$	**2**	**M1** 0·22(…)
3		25	**2**	**M1** 10 ÷ 0·4 or better, or 2·5 jugs to 1 litre oe, or list of correct multiples of 0·4 up to 10(·0) OR **SC1** for answer of 2·5
4	**(a)**	$C = 180 + 120n$	**2**	**M1** $120n$
	(b)	8	**2**	**M1** $1200 = 480 + 90n$ seen or for $720 = 90n$ or for 720 ÷ 90 or for *their* (1200 − 480) ÷ 90
5	**(a)**	−5	**1**	If table blank, allow mark if (3, −5) correctly plotted in (b)
	(b)	(3, −5) plotted and all 7 points joined with a smooth curve	**1**	Tolerance 1 mm for plot, 2 mm for curve Allow ft from wrong value in table
	(c)	Answer in range 0·6 to 0·8 Answer in range 5·2 to 5·4	**1** **1**	

6		Area of trapezium = ½ × (7 + 5) × 4 oe [= 24] Area × 15 360	**M1** **M1** **A1**	May be split into rectangle + triangle ft *their* good attempt at area of trapezium Alternative method: **M1** vol of triangular prism = (½ × 2 × 4) × 15 [= 60] **M1** 7 × 4 × 15 [=420] [large cuboid], or 5 × 4 × 15 [=300] [small cuboid] Alternative method: (Two prisms combined to make a cuboid) **M1** 12 × 4 × 15 [= 720] **M1dep** *their* 720 ÷ 2
7	**(a)**	$6x - 15$	**1**	Mark final answer
	(b)	$x > 4$	**2**	**M1** 4 obtained or for one correct constructive step in solving inequality
	(c)	$100 - 3n$ oe	**2**	e.g. $97 - 3(n - 1)$ **M1** $[-]3n$

Section A Total: 25

Section B

8	**(a)**	18·8 to 18·9 or 19	**2**	**M1** 2 × π × 3 oe
	(b)	35 or 35·3 to 35·4 www	**3**	**M2** π × $4{\cdot}5^2$ − π × 3^2, or 63·6…− 28·(27…) OR **M1** π × $4{\cdot}5^2$ or 63·6… www, or π × 3^2 or 28·(27…) www
9		(5, 4)	**2**	**1** each or **M1** for evidence of adding the coordinates and dividing by 2
10		Left: Strong negative Right: Weak/moderate positive	**1** **1**	If **0**, **M1** for identifying negative in LH diagram and positive in RH diagram, or for identifying strong in LH diagram and weak/moderate in RH diagram
11	**(a)**	Corresponding [angles are equal]	**1**	Or angles on straight line [add to 180°] and allied angles [add to 180°], or [vertically] opposite angles [are equal] and alternate angles [are equal] Condone 'F' angles etc
	(b)	83	**2**	**M1** for other angle in triangle 62° and 180° sum in triangle used
12	**(a)**	118·6 to 118·7 or 119 www	**4**	**M1** for midpoints 90, 110 etc soi **M1** for *their* midpoints × frequency **M1** for 2730 ÷ 23, or *their* (sum of midpoints × frequency) ÷ *their* (total of frequencies) Allow **A1** for 120 only if correct method seen Allow **W4** for $118\frac{16}{23}$ www
	(b)	$\frac{92\cdot7-85\cdot9}{92\cdot7}$[×100] or 7·33(…) or 7·34 7·3	**M2** **A1**	or **M1** for 85·9/92·7 (× 100) or 92·66.. then **M1dep** for subtraction of their answer from 100 allow **W1** for 7·3 www or with just 100 − 92·7 seen

13	**(a)**	0·16	**2**	**M1** for 80 ÷ 500
	(b)	(i) Comparison with 1/6 soi	**1**	Or 0·84 ÷ 5 = 0·168, or 0·17 and 'about the same' oe, or '0·16 × 6 is about 1'
	(b)	(ii) Larger number of trials needed or No evidence about results for 1 - 5	**1**	Allow comment about not knowing which numbers are on faces, or how many faces there are
14		[x =] $\frac{10+y}{5}$ or $2+\frac{y}{5}$	**2**	**M1** for a correct first step or for other answer [x =] $\frac{\pm 10 \pm y}{\pm 5}$ or $\pm 2 \pm \frac{y}{5}$ **SC1** for 10 + y ÷ 5 or $10+\frac{y}{5}$

Section B Total: 25

B278 Module Test M8

Section A

1	**(a)**	$1\frac{5}{12}$ oe mixed number, eg $1\frac{15}{36}$ isw after $1\frac{15}{36}$ oe	**3**	**M2** $\frac{37}{12} - \frac{20}{12}$ or $\frac{17}{12}$ or $\frac{51}{36}$, or $1 + \frac{13}{12} - \frac{8}{12}$, oe OR **M1** $\frac{20}{12}$ or $(1)\frac{8}{12}$ or $\frac{37}{12} - \frac{5}{3}$ or $2 - \frac{7}{12}$
	(b)	$4\frac{2}{3}$ or $4\frac{4}{6}$ oe isw after $4\frac{4}{6}$ oe	**3**	**W2** $\frac{14}{3}$ or $\frac{28}{6}$ OR **M1** $\frac{7}{2}$ and $\frac{4}{3}$ oe seen
2		$x \leq 2½$ or $x \leq \frac{5}{2}$ oe or $x \leq 2{\cdot}5$	**2**	**M1** for $4x \leq 10$ OR **W1** for 2·5 seen
3		Triangle with vertices at (¯1, 2) (¯1, 4) (0, 4)	**3**	**W2** for Δ with correct size in the wrong position OR **W1** for enlargement centre (¯3, 3) but wrong scale factor less than 1, or Δ with two vertices correct OR **SC1** Δ at (5, ¯1) (5, 7) (9, 7)
4		$4x - 7 = 2x - 2$ or $2x - 3{\cdot}5 = x - 1$ $2x = 7 - 2$ or $4x - 2x = 5$, or $x = 3{\cdot}5 - 1$ or $2x - x = 2{\cdot}5$ $x = 2½$ or $x = \frac{5}{2}$ or $x = 2{\cdot}5$	**W1** **M1** **A1**	 Re-arrangement of the four terms in *their* equation to obtain either $2x$ or 5 or ft from error in first step to equivalent stage correct or **ft** their 4-term equation after W0 Allow **W3** for answer 2½ oe www

5	**(a)**	12	**1**	
	(b)	6	**2**	**M1** 44 seen as final answer **SC1** $\frac{6}{50}$ isw
	(c)	Comment about average and Comment about spread of data	**1** **1**	e.g. On average, worms have the same lengths, and Worms in B have greater variation of lengths, or greater IQR, or greater range
6	**(a)**	(i) $(x – 10)(x – 2)$	**2**	**M1** for $(x \pm 2)(x \pm 10)$ or factors using integers excluding 0 giving two terms of $x^2 – 12x + 20$ when expanded
		(ii) Strict ft from (a)(i) or 2 and 10 unless factors are $(x + 10)(x + 2)$	**1ft**	Dep on at least M1 in part (a) Both solutions required If (b) blank, accept correct ft answers given in (a)
	(b)	$3x + 3y$ or $\frac{5}{3}y = x + y – \frac{4}{3}$ $5y – 3y = 3x – 4$, or $\frac{5}{3}y – y = x – \frac{4}{3}$ Final answer of $y = \frac{3x – 4}{2}$ or $y = \frac{3}{2}(x – \frac{4}{3})$ or $y = 1{\cdot}5x – 2$	**M1** **M1** **M1**	$3x + 3y – 12$ scores **M0** Correct or ft from error in first step Correct or ft from previous step NB $y = \frac{3x – 4}{5 – 3}$ scores M1 M1 M0 $y = \frac{3x – 12}{2}$ oe scores M0 M1 M1 $x = \frac{2y + 4}{3}$ scores M1 only

Section A Total: 25

Section B

7	**(a)**	0	**1**	
	(b)	(i) 6 points plotted within 1 square Smooth curve	**1** **1**	
		(ii) $^{-}2{\cdot}4$ to $^{-}2{\cdot}2$ 2·7 to 2·9	**1** **1**	
8	**(a)**	$\frac{3}{10}$ oe for all missing probabilities	**1**	
	(b)	$\frac{21}{50}$ or $\frac{42}{100}$ or 0·42 or 42% as final answer or ft *their* (a)	**3**	**M2** $2 \times \frac{7}{10} \times \frac{3}{10}$ oe OR **M1** $\frac{7}{10} \times \frac{3}{10}$ or $\frac{21}{100}$ oe OR **SC1** 0·58 oe
9	**(a)**	$2{\cdot}83 \times 10^5$, $5{\cdot}42 \times 10^6$, $6{\cdot}01 \times 10^6$, $1{\cdot}70 \times 10^7$	**2**	**W1** One error (three in correct order), or reverse order
	(b)	$7{\cdot}5 \times 10^5$ www	**3**	**M2** $\frac{1{\cdot}23 \times 10^6}{1{\cdot}64}$ oe or figs 75 OR **W1** figs 164 seen
10	**(a)**	Two of the following: $\angle Q = \angle S$ $\angle R = \angle T$ $\angle P$ is common/shared	**2**	**W1** each
	(b)	(i) 18	**1**	If both PQ and QS given then it must be clear that PQ = 18
		(ii) 32	**2**	**M1** $\frac{PT}{24} = \frac{24}{\textit{their}\ 18}$ or 24 + 24/3
11		23·16 - 23·4 www	**6**	**W3** AC = 10·8 - 10·9 or 11 www OR **M2** for $\sqrt{(12{\cdot}5^2 - 6{\cdot}2^2)}$ or $\sqrt{117{\cdot}81}$ OR **M1** for $2{\cdot}5^2 \pm 6{\cdot}2^2$ or 117·81 or 194·69 AND **M2** for tan 65 × *their* AC OR **M1** for tan 65 = $\frac{CD}{\textit{their}\ AC}$

Section B Total: 25

B279 Module Test M9

Section A

1	**(a)**	110·998 to 111	**2**	**W1** for 50·499… to 50·5, or 60·499… to 60·5 used in calculation
	(b)	0·5	**2ft**	ft 111·5 – *their* (a) correctly evaluated **M1** for 111·5 – *their* (a) soi
2	**(a)**	1	**1**	
	(b)	$\frac{1}{25}$ or 25^{-1} or 0·04	**1**	
	(c)	3	**1**	Accept –3
3	**(a)**	[Opposite angles of a] cyclic quadrilateral [add to 180°]	**1**	Must mention cyclic quadrilateral or opposite angles of quadrilateral with vertices on circumference of circle, with no incorrect reason seen
	(b)	[BCO or OBC =] 35°, or [BOC =] 110°, or [ECB or CBE] = 55°	**W1**	Could be written on diagram
		Angle between tangent and radius [= 90]	**1**	Accept tangent/radius, tangent/diameter, tangent/line from centre
		[Δ BOC or Δ BEC =] isosceles [triangle] seen	**1**	Not for incorrect statement about isosceles Δ
		70° final answer	**W1**	Could be written on diagram
4	**(a)**	$2x^2$ - [1]x –15 final answer	**2**	**W1** for <u>any 3</u> of $2x^2$, -6x, 5x, -15 seen or <u>any 2</u> correct of simplified <u>3 term</u> final answer
	(b)	2x(3x – 4y) final answer	**2**	Or for $2x^2$ - x –15 seen, then spoilt **W1** correct answer seen then spoilt, or 2(3x^2- 4xy) or x(6x – 8y) or 2x (…...) final answer
	(c)	(5x - 9)(x + 2) [= 0]	**M2**	Accept 5x – 9 = 0 and x + 2 = 0 **M1** for (5x ± 9)(x ± 2) seen, or 5x ± 9 = 0 and x ± 2 = 0 seen
		9/5 oe and –2 final answer	**A1**	ft *their* factors dependent on **M1** earned After M0, **SC1** for answers only 9/5 oe <u>and</u> –2

5	**(a)**	3 www	**2**	**M1** for (19 - 7)/(6 - 2) or (7 - 19)/(2 - 6) or better
	(b)	Calculation for gradient of CD shown Shows that (a) × (b) is –1 oe	**M1** **A1**	Must show (16 − 12)/(-2 − 10) or better, or (12 – 16)/(10 − -2) or better Accept negative reciprocal oe After M0, **SC1ft** for gradient is –1/*their* (a) oe. The gradient could be implied within an equation for this mark
6		Refers to location or time limiting the population Must refer to systematic (or every 20th) sampling not producing a sample across the gender or age distribution or having other relevant limiting factors	**1** **1**	Reason must link either location and people, or time and people, in some way Could explain a reasonable method of obtaining a stratified random sample rather than every 20th person. Must link 20th person or systematic or picking in a pattern to *their* reason

Section A Total: 25

Section B

7		$\frac{20}{132} = \left(\frac{5}{33}\right)$ oe (0·151.. or 0·152)	**3**	isw e.g. cancelling/conversion after correct answer seen **M2** for $\frac{5}{12} \times \frac{4}{11}$ oe OR **M1** for showing 5/12 and 4/11 correctly on tree or in working, or for the product of *their* probabilities for 'green, green' provided they are between 0 and 1 After M0, **SC1** for answer 25/144 or 20/144 or 25/132 oe
8	**(a)**	[x =] $\sqrt[3]{\frac{V}{6}}$ oe final answer	**2**	**M1** for division by 6 first step, or $\sqrt[3]{V} = \sqrt[3]{6}[\times]x$, or correct ft cube root after incorrect first step provided the steps are clearly shown
	(b)	$(x + 5)(x – 5)$	**1**	Ignore solution of $(x + 5)(x – 5) = 0$
9	**(a)**	$4 = \frac{k}{10^2}$ or better, or k = 400 $F = \frac{400}{d^2}$ oe cao	**M1** **A1**	Condone $4\alpha \frac{k}{10^2}$ Allow if in (b) and condone $F = \frac{400}{dcm^2}$ if used correctly in (b)
	(b)	8	**2**	**M1** for 6·25 = $\frac{\textit{their } k}{d^2}$ or better
10	**(a)**	32·70 to 32·73	**2**	**M1** for $\frac{2}{3} \times \pi \times 2 \cdot 5^3$ oe
	(b)	71·95 to 72·05	**2**	**M1** for $\frac{1}{3} \times \pi \times 2 \cdot 5^2 \times 6$ + *their* (a) (39·2 to 39·3) + *their* (a)
11	**(a)**	64·95	**3**	**M2** for 12990 or Σ*fx*/200. Allow one error in midpoints 30, 45, 65, 110 OR **M1** for three of 540, 2250, 6240, 3960 shown in method selected
	(b)	4 bars of correct <u>width</u> and <u>position</u> at heights 0·9, 5, 3·2, 0·6	**3**	**M2** for 3 bars completely correct on graph OR **M1** for 2 completely correct on graph, or 3 correct frequency densities soi, e.g. on table or bar heights

12		$\sqrt{30^2+30^2}$ or $\sqrt{15^2+15^2}$	**M1**	Accept correct trig methods using 45°, method mark awarded at the explicit stage i.e. AC = …
		42·4[…] or 21·2[…] seen	**A1**	Implies **M1**
		tan [ECO] = $\frac{18}{their\,21\cdot2}$	**M1**	**Dep** on first **M1**. Allow *their* 21·2 = 42·4
		$\tan^{-1}\frac{18}{their\,21\cdot2}$ soi	**M1**	**Dep** on previous **M1** If 42·4… used then answer 22·9 − 23·1 implies this mark
		40·3 to 40·4 cao	**A1**	Allow 5 www

Section B Total: 25

Grade Thresholds

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

Unit Threshold Marks (Module Tests)

Unit		Maximum Mark	a*	a	b	c	d	e	f	g	p	u
B271	Raw	50								30	15	0
	UMS	59								40	20	0
B272	Raw	50							36	23	14	0
	UMS	70							60	40	30	0
B273	Raw	50							27	14		0
	UMS	79							60	40		0
B274	Raw	50						37	22	14		0
	UMS	90						80	60	50		0
B275	Raw	50						28	14			0
	UMS	99						80	60			0
B276	Raw	50					30	15				0
	UMS	119					100	80				0
B277	Raw	50				26	13					0
	UMS	139				120	100					0
B278	Raw	50			28	14						0
	UMS	159			140	120						0
B279	Raw	50		28	14							0
	UMS	179		160	140							0

Notes
The table above shows the raw mark thresholds and the corresponding key uniform scores for each unit entered in the January 2009 session. Raw marks in between grade boundaries are converted to uniform marks by a linear map. For example, 21 raw marks on unit B278 would score 130 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.

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