GCSE

Mathematics C

General Certificate of Secondary Education **GCSE 1966**

Mark Schemes for the Units

June 2007

CONTENTS

GCSE Mathematics C (1966)

MARK SCHEMES FOR THE UNITS

Mark Scheme 2331
June 2007

SECTION A

1	(a)	79	**1**	
	(b)	12	**1**	
	(c)	30	**1**	
2	(a)	Platinum or 1772	**1**	
	(b)	1060	**1**	
	(c)	3410	**1**	
	(d)	1600	**1**	
	(e)	1535	**2**	**M1** for 1064 + 471 seen or implied
3		D F	**2**	1 + 1
4		All 4 correct	**2**	**1** for 2 correctly indicated
5	(a)	The correct 5 only ACB BAC BCA CAB CBA	**2**	**1** for 3 correct, condoning errors or repeats
	(b)	(i) 3:40 or equivalent	**1**	Allow alternative common time formats
		(ii) 4 o'clock or equivalent	**1**	Allow alternative common time formats. Follow through from part (ii)
6	(a)	Evens Unlikely Impossible	**1** **1** **1**	**SC2** for all the probabilities correctly given numerically ie $\frac{1}{2}$ $\frac{1}{12}$ 0
	(b)	(i) 60	**1**	
		(ii) 25	**1**	
7	(a)	79	**1**	
	(b)	24	**1**	
	(c)	Forton	**1**	

Section A Total: 25

SECTION B

8	(a)	(i)	7	**1**	
		(ii)	9	**1**	
		(iii)	7	**1**	
	(b)	(i)	(2, 5)	**1**	
		(ii)	(0, 4) indicated in some way	**1**	Correct by eye (± 2 mm)
9	(a)	(i)	3 1 2 3	**1**	
		(ii)	Sensible (true) comment	**1**	For example, "numbers go 1 2 3" or "number are diagonal" or pattern 123", "1st line is the same as the 4th line" (or 2nd / 5th line or 3rd / 6th) or equivalent. Not just" I followed the pattern" or equivalent - must have a relevant description.
	(b)			**1** **1**	
10	(a)	(i)	1 hexagon	**1**	
		(ii)	2 pentagons	**1**	
	(b)		$\frac{1}{4}$ or $\frac{2}{8}$ or equivalent	**1**	Condone 2/8 and 1/4
	(c)		Correct	**3**	**2** for correct sail regardless of position. (**1** for two correct sides) **1** for correctly drawn mast height **and** position on the board.

11	(a)		(£)1370	1	
	(b)		6(g)	2	**M1** for "2" or "8÷4" or "24" or " 8 x 3" o.e. seen.
	(c)	(i)	200 (cm)	1	
		(ii)	8	1	Allow follow through (i) ÷ 25
		(iii)	8.2 cm to 8.8 cm or82 mm to 88 mm	2	**1** for the less accurate correct "number" outside this range (7.8 – 9.2 or 78 – 92)
			Matching unit	1	**1** for (5 – 15) **cm** or (50 – 150) **mm** for the units mark. If zero scored for question SC1 for 3.2 ± 0.2 and 3.2 ± 0.2 and 2 ± 0.2 or 6.4 ± 0.2 and 2 ± 0.2 (or x 10 equivalent) seen.
	(d)	(i)	8	1	
		(ii)	(£) 250	1	Allow follow through 2000 ÷ "their (i)"

Section B Total: 25

4
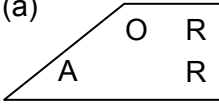
SECTION A

1	(a) – no – no no –	**1**	All correct
	(b) Correct line of symmetry drawn on shapes 3 and 6	**2**	**W1** for each
2	**123** + **321** = **444** 1234 + 4321 = **5555** **123456** + **654321** = 777777	**1** **1** **1**	
3	(a)(i) 6½	**1**	
	(ii) 1	**1**	**SC1** for 20½ in (i) **and** 3 in (ii)
	(b) 150	**1**	
	(c) 6:55	**1**	Accept any correct equivalent time
4	(a) Half of the cards are not clouds	**1**	
	(b) Mark 4·3 to 6 cm from 0	**1**	

5	(a) 45 or attempt at 3 × 15
	     64 or 'their 45' + 19
	     'their 64' – 60
	      4
		M1
		M1
		M1
		A1
			
			Seen or implied
			Or **W4** for 4 as answer without wrong working
			If 0 awarded then
			SC3 for 23 as answer
			Or **SC1** for 83 seen

	(b) 15	**2**	**W1** for 1·4 – 1·25 **or** 140 – 125 **or** 140 cm seen **or** figs 15 seen
	(c) 1·60 to 2·00 inclusive	**1**	Or 160 cm to 200 cm
6	(a) 168	**2**	**W1** for attempt at 6 × 28 seen **or** figs 168 seen
	(b) 13	**2**	**W1** for 78 ÷ 6 seen in correct order **or** figs 13
	(c)(i) 10	**1**	
	(ii) 26 – 28	**1**	

Section A Total: 25

SECTION B

7	(a) 1 (hour) 40 (minutes)	2	**W1** for attempt at valid time interval **or** 40 mins seen **or** answer between 1 hr 30 mins and 2 hrs **not** inclusive
	(b) 12:50	1	Accept valid equivalents
8	(a) 9	2	**M1** for attempt at ordered list seen, minimum 7 numbers ordered.
	(b) 14	1	
9	(a)(i) North West	1	Accept NW
	(ii) Bank (Street) left, Mill (Street) left	2	**W1** for any 2 correct
	(b) 4·25	2	**M1** for attempt to add all three weights **or** 0·75(0) seen **or** figs 425 **or** 4(·…)
10	(a) 180	1	
	(b) 175	1	
	(c) 525 or ft their (b)	1	
11	(a) B D A C	2	**W1** for any 2 correct
	(b) Cylinder	1	
12	(a)	2	**W1** for any 3 correct
	(b) 46° (± 2°) **must** f.t. their A	1	
13	(a) 104·5(0)	2	**W1** for 18 × 5·25 + 10 **or** 94·5(0) seen **or** figs 1045
	(b) 2 is enough for 16 (so need 3)	1	Or 2 children would be without a helper
	(c) 6 (sweets) 12 (left over)	2	**W1** for each

Section B Total: 25

Mark Scheme 2333
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SECTION A

1	(a) 17 isw	1	
	(b) add 3	1	
2	(a) 6742·7	1	
	(b) 3·404	1	
	(c) 14·4	2	M1 for attempt at 2·4 × 6 or digits 144
3	$\frac{1}{2}$ = 0·5	1	
	$\frac{1}{5}$ = 0·2	1	
	$\frac{1}{4}$ = 0·25	1	
4	(a) 18	1	
	(b) 6	1	
	(c) 11	1	
5	(a) 20	1	
	(b) (4 + 5) × 3 = 27	1	or ((4+5)×3) = 27
6	(a) 128	2	M1 for 640 ÷5
	(b) 30	1	
7	(a) Monday	1	
	(b) ⁻6 ⁻3 ⁻1 2 5	2	W1 for three in the correct order or correct reverse order
	(c) 2	1	
8	(a) all correct and none incorrect	2	W1 for three correct squares condoning errors and omissions
	(b) 125	1	
	(c) 6·5(0)	1	

Section A Total: 25

SECTION B

9	(a) (9) 15 12 7 11	**2**	W1 for two correct
	(b) 54	**1**	or ft their table
	(c) Red	**1**	
	(d) 4	**3**	M1 for attempt to add all the numbers
			M1 a total ÷ 9 soi
10	(a) D	**1**	
	(b) E	**1**	
	(c)	**1**	any orientation
	(d) 745	**2**	M1 for 20× 35 (+45) or 700 seen
11	(a) 12 – 14	**2**	M1 for 3 - 3.25 oe seen
	(b) 12-16	**1**	M1 for 24
	(c) 8	**2**	
	(d)(i) 22 to 22·5	**1**	M1 for use of an amount which is a factor of 80 eg
	(ii) 72	**2**	5,8,10,20,or 40
			or W1 for 36
12	(a) correct right-angle	**1**	±2°
	correct length (4cm)	**1**	±2mm
	(b) 123 - 130	**2**	M1 for 12·3 – 13(·0) seen
13	$\frac{5}{14}$	**1**	accept 0·36 or 0·35(..)

Section B Total: 25

Mark Scheme 2334
June 2007

SECTION A

1(a)	(-2,3) cao	1	
(b)(i)	C and D correctly plotted	1	
(ii)	(-2,-2) or (3,-2)	1	**Must** f.t *their* D
(c)	20cm	1	Or f.t *their* **square** or **rectangle** only.
2(a)	16 cao	1	
(b)	5 cao	1	
(c)	7 cao	1	
3(a)	0·029 0·125 0·2 0·204 0·27	2	**W1** for one incorrect or all reversed
(b)	$\dfrac{27}{100}$	1	
4(a)	Line *x*= 1 drawn	1	
(b)	Correct reflection	1	
5(a)	175g	1	
(b)	30	1	
(c)	75g	2	**W1** for 25 seen
6	£8970 with working	3	**W1** for 8970 with no working shown. **or** **M1** for a complete attempt at multiplication or addition of boxes if grid method used. If choice of method, mark the one which leads to answer on answer line. **and** **W1** for figs 69, 207, 78, 104, 13 or 1725 seen, or 4 correct boxes if using grid method. **or** **W1** if repeated addition of 26 lots of 345 seen award **W1** for 2 of digits 8970 in correct position.
7(a)	W=6*x*. Accept W=*x*+*x*+*x*+*x*+*x*+*x* or W=6x*x*	2	**W1** for 6*x* o.e seen.
(b)	T=6*x*+y or T=w+y o.e	1	f.t from **(a)**
8(a)	$\dfrac{109}{300}$	2	**W1** for wrong form **or** **W1** for $\dfrac{109}{\text{Sum of frequencies}}$
(b)	Valid reason	1	

Section A Total: 25

SECTION B

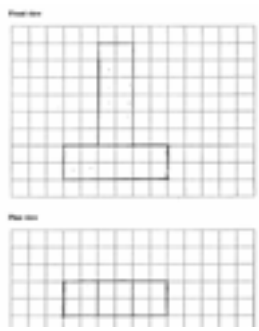|				
9(a)	29		1	
(b)	15		3	**M1** intention to add 7 numbers (total not needed), can be soi by 80 – 130 **and** **M1** Division of a total between 80 and 130 by 7 **or** **W2** Final answer of 11·4 to 18·6 inclusive **or** **W1** Final answer of 80 -130
10(a)	70		2	**M1** for 14 x 5 (soi by method)
(b)	33		2	**W1** for 15, 8 or 20 seen
11(a)	5·6km		1	
(b)	1 hour 10 minutes		1	
(c)	Correct line drawn		1	
12	£1·50		3	**W2** 18·5(0) or 1.5 **or** **M1** 2 x 5·35 or 2 x 3·9(0) seen. **or** **W1** for 10·7(0) or 7·8(0) seen **And** **M1** for intention to add *their* 10·7(0) and 7·8(0)
13(a)	145°		1	
	(Angles on a)straight line **or** (Straight) line (adds to) 180°		1	
(b)	110°		2	**M1** for 180 – (2 x 35) o.e.
14	320		3	**M1** for 12x10 or 25x8 or 18x12 or 13x8 seen **Or** **W1** for one correct area 120, 200, 104 or 216 **And** **M1** for attempt at addition of *their* two areas
	cm²		1	
15	17(m) with at least one correct trial.		3	**W1** for 17 on answer line and table blank. **Or** **W1** for one correct substitution, L must be 4 greater than width. **And** **W1** for an improved substitution. **Or** **SC2** for 17 21 357 <u>no tick</u> as the only entry in table and answer line blank or 21 or 357

Section B Total: 25

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June 2007

SECTION A

1	(a)	2	**2**	**M1**	correct algebraic step eg 6*x* = 12 / 15–3 *or* clear flowchart eg 15–3÷6
	(b)	3·5, 3½, 7/2	**2**	**M1**	correct algebraic step eg 2*x* = 7 / 6+1 *or* clear flowchart eg 1+6÷2
2	(a)	7000, 6700, 6500, 6600	**2**	**M1**	100 × 70 / 67 / 65 / 66 / 60 *or* 6680 *or* 6000
	(b)	7 to 8	**1**		inclusive
	(c)i	18	**2**	**M1**	0·4(0) × 45 oe *or* 4·5 or 4½ seen
	(ii)	56	**2**	**M1**	28 ÷ 50 oe *or* 28 × 2 *or* 3 correct % of 50 found
	(d)	600 000	**3**	**M1** **& M1** *or* **W2**	75% soi (eg ¾, 0·75, 270°) 0·75 / ¾ × 800 000 soi *or* figs 200 0(00) & no contradictory evidence figs 600 0(00) as final answer
3		Nelson with 2 conversions Polly	**3**	**W2** *or* **W1**	both correct & 1 correct conversion *or* 2 correct conversions both correct, no conversion *or* 1 correct conversion
4	(a)	3/8 oe fraction	**2**	**M1**	¾ × ½ seen *or* $\frac{1·5}{4}$, $\frac{1½}{4}$, 0·375, 37·5(%)
	(b)	5/16 oe fraction	**2**	**M1**	any correct equivalent fraction seen of 1/8 or 3/16
5	(a)	39	**1**		
	(b)	– 1	**1**		accept equivalents
	(c)	399	**2**	 **M1**	correct or ft their (b) using 400 100 × 4 soi

Section A Total: 25

SECTION B

6	(a)	49	1		
	(b)	1000	1	**sc1**	if 0 scored in (a),(b): 7×7 <u>and</u> 10×10×10 both seen
	(c)	5	1		condone 5³ and 5×5×5
7	(a)	kite	1		only
	(b)	correct statement about properties	2	**W1**	T for R, F for P, not already stated eg • (2) (lines of) reflection symmetry • diagonals (cross) at right angles • all sides same length / equal T for R, T for P, not already stated eg • diagonals bisect • rotation symmetry (order 2) • (2 pairs) opposite angles equal •
8	(a)	clockwise two thirds, 240	1 1		
	(b)	correct diagram	1		intention
	(c)	translation **and** 2 down	2	**W1**	either, without any other transformation
9	(a)	5*h*	1		
	(b)	4*a*	1		
	(c)	3*x* 7*y*	2	**W1**	each
10	(a)	24	2	**M1**	6×2×2 soi
	(b)i	2	1		
	ii		3	**W3** *or* **W2** *or* **W1**	both correct & accurate both correct & inaccurate *or* both correct + wrong consistent scale *or* both correct & reversed *or* front correct & plan rectangle correct *or* plan correct in/accurate 2 by 6 rectangle seen

11	(a)	listing all 6 outcomes	2	W1	only penalise incorrect extras & repeats once any 3 of their own correct
	(b)	$\frac{1}{6}$ oe	2	M1	16·6%, 16·7%, 17%, 0·166, 0·167, 0·17 or any correct equivalent fraction **ft only** *their* list (at least 2 further rows) for 2 or 1, condone repeating <u>given</u> row correct denominator in their fraction *or* wrong form

Section B Total: 25

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SECTION A

1	(a) Base labelled B	1	
	(b) p=10 q = 3 r=16 s=10	1	
	(c) 476	3	**W2** 238 Or **M2** (3x16 (+) 3x10 (+) 10x16) x2 Or **M1** area of 1 face calculated without further working leading to volume.
2	(a) 40	1	

	(b) 9 7
	  10 2 8
	  11 0 5
	  12 1 4 4 8 8 9 9 9
	  13 0 2 5 5 6 6 7
		2	For 2 marks condone 1 error in order or 1 omission
			
			M1 for mis-order of 20 results with one error or omission
			Or
			M1 for 3 errors or omissions in ordered diagram

	(c) Two distinct comments
	   eg
	   aerobics group higher pulse rates
	   spread of pulse rates the same
		
		1
		1
			
			ft from (a) and (b)
			ft from (a) and (b)

3	(a) 30	2	**M1** 3 x 2 x 5
	48	1	or ft 18 + their (a)
4	(a) 75	1	
	(b) -11	2	**M1** 9 seen from -3 x -3 **or** -29 as answer
5	(a) 3a +5	1	or 5 +3a
	(b) $x^2 + 4x$	1	
6	96	3	**W2** 288 / 3 **Or** **M1** $\frac{2}{3}$ x 24 x6 **and** **M1** 144 or 16 (48/3) or 4 (12/3) www
7	(a) 1 (5) 9 13	1	

	(b) Points plotted
	   Ruled line (by eye) thru'
	        (0,1) (3,13)
		1
		1
			ft their (a)
			ft - one straight line through their 4 points

	(c) 1.5 or 1½ or 6/4	1	or ft their line for non-integral x value Condone coordinate answers (1.5, 7)

Section A Total: 25

SECTION B

8	(a) 6.69	**1**	
	(b) 0.4 or equivalent	**1**	
9	(a) 45 and 0.2	**2**	**W1** 45 or 0.2
	(b) 25 km/hr	**3**	**Accept** 24.6 to 25.2 www **M2** 15 ÷ 0.6 **or** **M1** 15 ÷ by their time or 0.6 seen
10	(a) Sum of 5 (equal) angles at centre is 360	**1**	
	(b) Correct octagon	**2**	6 of the angles to measure between 42º and 48º. **M1** 45º seen, **or** 'web with 8 spokes (6 of the angles to measure between 42º and 48º) **or** attempt at regular octagon evidenced by 4 angles between 42º and 48º.

11	Bonus by £4 www	**5**	**Or W4** for 182.5 – 178.5
			M1 Ace £182.5(0)
			and
			M2 £178.5(0) or 170 x 1.05 etc
			    Or M1 £8.5(0)
			and
			M1 their Ace total – their Bonus total
			      (or vv) not 175 – 170

12	7	**3**	**M1** $10x + 5$ (=75) **and** **M1** $10x = 70$ or ft their first step **A1** 7 or ft their penultimate step
13	(a) Line drawn	**1**	Must be between (50,160) and (50,170) to between (80,183) and (80,193)
	(b) Reading from their line	**1**	Read to lower/upper integer
14	B at (-5,2), (-4,5) (-3,5) (-3,2)	**3**	**W2** 3 points correct **or** **M2** 90 clockwise rotation, centre (0,0) or **M1** 3 points 'correct' from clockwise rotation, centre (0,0) **or** **M1** 90 clockwise/anticlockwise any centre
15	452 (. .....)	**2**	**M1** 3(.) x12 x12 or π x 12 x 12

Section B Total: 25

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SECTION A

1	(a) Positive	1	condone equivalent statements
1	(b)(i) ruled line of best fit between (2, 31) and (2, 40) inclusive and between (6, 55) and (6, 62) inclusive	1	
1	(b)(ii) ft their ruled line of best fit	1	tolerance 1 full square
2	(a)(i) $\dfrac{19}{20}$	2	**M1** for correct use of common denominator eg $\dfrac{1}{5} = \dfrac{4}{20}$ or $\dfrac{3}{4} = \dfrac{15}{20}$ or $\dfrac{95}{100}$ seen or implied
2	(a)(ii) $\dfrac{8}{9}$	2	**M1** for $\dfrac{8}{15} \times \dfrac{5}{3}$ or $\dfrac{40}{45}$ or $\dfrac{8}{15} \div \dfrac{9}{15}$ o.e.
2	(b) 320 or 300	2	**M1** for two of 20, 8 and 0·5 seen or implied or for answer with figs 32(0) or 30(0)
3	(a) 49	2	**W1** for $5b^2 = 45$ seen or implied
3	(b) $y = -2x + 5$ o.e.	2	**W1** if '$y =$' omitted or for $y = -2x$ [+ c] or for $y = mx + 5$
4	bisector of angle B constructed	**M2**	tolerance 2°; **M1** for angle bisector arcs but no line drawn or **W1** for angle bisector with no constructing arcs seen
	arc(s) radius 5 cm (± 2 mm) centre D	**M1**	or T at 5 cm from D
	correct position of T clearly indicated	**W1**	(also implies previous **M1**)
5	(a) 0·25 or $\dfrac{1}{4}$ isw cao	3	**M2** for $4x = 1$ or **M1** for $4x = k$ or $kx = 1$ or $4x - 2 = -1$ or $5x = x + 1$ or $5x - 1 = x$ and **M1** for answer ft their $ax = b$, $a \neq 1$ if **M0** allow **SC1** for ¼ oe seen embedded
5	(b) 7 cao	3	**M1** for $3x + 15$ seen and **M1** for $2x = 14$ or ft their expansion if **M0** allow **SC1** for 7 seen embedded in original equation: $5 \times 7 + 1 = 3(7 + 5)$
5	(c) [n] > 3 cao	2	**M1** for $4n > 12$ or $4n \geq 12$ or for $n = 3$ or for 3 found with other wrong inequality

Section A Total: 25

SECTION B

6	(a) 10 and 1	**2**	**1** each
6	(b) points plotted	**W1**	tolerance 2 mm; correct or ft from table; allow one error or omission
	smooth curve through all their plotted points	**W1**	tolerance 2 mm; allow only for curve with just one turning point; allow if only 6 points plotted
7	14·75(…) or 14·8	**3**	**M2** for $\sqrt{11\cdot2^2 + 9\cdot6^2}$ (could be in two steps) or **M1** for $11\cdot2^2 \pm 9\cdot6^2$ or 217·6 or 33·28
8	6·64	**2**	**M1** for 6·6(39…) or digits 664 or **W1** for 5·49 or 7·81 as answer or **SC1** for both 11·22 <u>and</u> 1·69 seen
9	164 isw	**4**	**M1** for at least 3 midpoints 130, 150, 170 etc seen or implied <u>and</u> **M1** for (freq. × their midpts) seen or implied (390, 3900, 3230, 1900, 420 or total 9840) <u>and</u> **M1** for their total ÷ 60 (= 9840 ÷ 60) **SC3** for answers 154 or 174
10	p = 10·8	**2**	if p wrong, then **M1** for $\frac{12}{5} \times 4\cdot5$ o.e. eg 2·4 × 4·5, 0·95 × 12, 4·5 ÷ 0·4166 etc
	q = 5·75 or 5·7 or 5·8	**2**	if q wrong, then **M1** for $\frac{5}{12} \times 13\cdot8$ o.e. eg 13·8 ÷ 2·4, 13·8 × 0·42, 1·15 × 5 , $\frac{4\cdot5}{\text{their }10\cdot8} \times 13\cdot8$ etc if **0** gained in question on above scheme, allow **SC1** for any of these seen: 12 ÷ 5 or 2·4 or 4·5 ÷ 5 or 0·95 or 5 ÷ 12 or 0·416 to 0·417 or 0·41 or 0·42 or 0·4 or 25 minutes or 13·8 ÷ 12 or 1·15

11	(a) 18	2	**M1** for 360 ÷ 20
	(b) 140 angle between tangent and radius = 90° (or a right-angle) isosceles [triangle] mentioned	1 1 1	 allow for two of tangent, radius and 90
12	6480	3	**M2** for 2400 × 2·7 or 12 × 25 × 8 × 2·7 or figs 648 **M1** for 12 × 25 × 8 or 2400

Section B Total: 25

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SECTION A

1	(a) 3^9 (WWW)	2	**M1** $3^{12} \div 3^3$ or $3^2 \times 3^7$ or $3^5 \times 3^4$
	(b)(i) $3\sqrt{2}$	1	
	(b)(ii) 6	1	
2	(a) 78·5 79·5	1 1	Accept $79·4\dot{9}$, 79·499 or better

	(b) $1·6 \times 10^6$	2	**M1** 2 100 000 − 500 000 or
			     21×10^5 or $0·5 \times 10^6$
			     or figs 16

3	$50\pi − 18\pi$ (WWW)	3	**M2** Evidence of $\dfrac{\pi \times 10^2}{2} − \dfrac{\pi \times 6^2}{2}$ or better **M1** Sight of $\dfrac{\pi \times 10^2}{2}$ or $\dfrac{\pi \times 6^2}{2}$ or $\pi 10^2 − \pi 6^2$
4	$(r =) \sqrt[3]{\dfrac{3V}{4\pi}}$ WWW	3	**W1** operation of × 3 correct **and** **W1** ft operation of ÷ 4π correct **and** **W1** ft operation of cube root correct
5	(a) ✗ ✓ ✗ ✓ ✗	2	**M1** any 3 correct including a ✓
	(b) $\dfrac{2}{11}$	1	

6	$x = 1\frac{1}{2}$ and $y = 1$
	 following algebra and **WWW**
		3	**M1** Mult by 2: $4x + 10y = 16$
			     Condone one error
			
			 M1 (Subtract to) eliminate x (ft 1st step)
			     $13y = 13$
			     Condone one error
			
			 If **M0**, **W1** for correct x,y .
			 3 marks only for completely correct
			 algebraic method

7	(a) $^-8$ and 27	1	
	(b) Graph	2	**P1** 5 Points or ft (a) ± 1 square **C1** Within 1 square of correct middle five points
8	$y \le x − 2$ o.e. $y \ge 2$ o.e.	1 1	**SC1** for $y =/\ge x − 2$ **and** $y =/\le 2$ Condone use of < and >.

Section A Total : 25

SECTION B

9	(a) $x^2 + 11x + 24$	**2**	**M1** any 3 out of 4 expanded terms correct
	(b)(i) $2x(a - 3b)$	**2**	**M1** $2(ax - 3bx)$ or $x(2a - 6b)$
	(b)(ii) $(x - 10)(x + 2)$	**2**	**M1** $(x \pm 10)(x \pm 2)$
10	_Rotation_ Rotation or Turn 180° (Centre) (0,0) or origin or O _Enlargement_ Enlargement, any sf **or** any centre Correct sf ($^-$1) Correct centre (0,0) or origin or O	**1** **1** **1** **M1** **A1** **A1**	**NB** ½ turn scores 2 If **W0**, allow **W1** for image drawn. **NB** Any description involving two or more transformations scores 0.
11	(a) 29 – 31 WWW	**2**	**M1** 27 - 29 **and** 57 - 59 written or clearly marked on horizontal axis. If no labels and more than 2 marks take outer 2 values. **SC1** Correct IQR for Saturday (74).
	(b) Any two of these three comments (no more than one of each) Comment on average/median but not mean or mode. Comment on spread. Comment on an interval.	**1** **1**	Examples More money is spent on Saturday. Greater range of amounts are spent on Saturday. More people spent between £40 and £60 on a Tuesday.
12	(a) Both points 16·7, 16·8 plotted. Allow ± 2mm (1 square) _Using template accept within circle._	**3**	**W2** One point plotted or two points at correct heights. (If more than two points then mark the worst two for W2). **W1** Correct calculation seen for a moving average or any 2 points at correct height.
	(b) 4·8(…) or 4·9	**3**	**M2** $\dfrac{1 \cdot 3}{26 \cdot 8}$ or 1·048… or 104·8… **or** **M1** figs 13 or $\dfrac{28 \cdot 1}{26 \cdot 8}$

13	(a) 7·17(…) or 7·18 or 7·2 WWW	3	**M2** (BN =) $\sqrt{7\cdot6^2 - 2\cdot5^2}$ or $\sqrt{57\cdot76 - 6\cdot25}$ or $\sqrt{51\cdot51}$ **M1** (BN² =) $7\cdot6^2 - 2\cdot5^2$ or $\sqrt{7\cdot6^2 + 2\cdot5^2}$ or $\sqrt{64\cdot01}$
	(b) 70·6 to 71 incl WWW	3	**M2** $\cos^{-1}\left(\dfrac{2\cdot5}{7\cdot6}\right)$ or $90 - \sin^{-1}\left(\dfrac{2\cdot5}{7\cdot6}\right)$ or $\tan^{-1}\left(\dfrac{(a)}{2\cdot5}\right)$ **or** **M1** $\cos = \left(\dfrac{2\cdot5}{7\cdot6}\right)$ or $\sin = \left(\dfrac{(a)}{7\cdot6}\right)$ or $\tan = \left(\dfrac{(a)}{2\cdot5}\right)$ or $\sin B = \left(\dfrac{2\cdot5}{7\cdot6}\right)$

Section B Total: 25

Mark Scheme 2339
June 2007

SECTION A

1(a)	0.6, 0.3 and 0.7 in correct places in tree diagram	2	1 for 1st branch **or** both of second branches correct
(b)	0.42 o.e.	2ft	ft their '0.6 × 0.7' evaluated provided both less than 1 or M1 for their '0.6 × 0.7'
2(a)	$\frac{1}{9}$ or 0.11...	1	after 1/9 ignore wrong attempts at decimals
(b)	2	1	
3	3.999.. to 4	2	M1 for 6.499.. to 6.5 **or** 2.5 seen
4	80° **angle** at the **centre** = 2 × angle at **circumference**	1 R1	Indep Accept ' **angle** at **centre**' (is twice ….) after answer 80
	40° **alternate segment**	1 R1	Indep. or other **complete** reasons, must mention angle between. **radius** (or diameter) and **tangent** and **isosceles triangle**
5(a)	3b(a + 5b) final answer	2	M1 for 3(ab+5b^2) or b (3a+15b) or 3b (… + …)
(b)	x − 7 www final answer	3	M2 for (x − 7)(x + 1)seen **or** M1 for (x ± 7)(x ±1) After M0, SC1 for ((x − 6)(x + 1) as numerator **leading to final answer of x − 6**
6	3 × 10^2 **or** 10 × 10$^{−3}$ or 9 × 10$^{−3}$ or 0.009 seen or 300 from 3.2 × 10^2 or 0.01 from 9.5 × 10$^{−3}$ or 30 from 3.2 × 9.5	M1	
	[27, 28.5, 30 or 32] ×$10^{−1}$ o.e. (implies previous M1)	A1	Accept 2.7, 2.85 or 3.2 (×10º) 2.7, 2.85 or 3.2 imply previous M1 but not 3 alone
	Michael	A1	Dep on at least M1 **without any errors seen** After 0 scored, SC1 for 320 **and** 0.0095 seen

7(a)	$y = 36/x^2$ o.e.	2	M1 for (k =) 36 or 9 = k/2² or better or $y = \dfrac{k}{x^2}$ seen
(b)	0.36 o.e.	1ft	ft (their 36) ÷ 10²
(c)	3 **and** -3	2ft	ft $\sqrt{(their36/4)}$ both solutions W1 for 3 or –3 provided k = 36 shown in question **or** M1 for 4 = their 36/x^2 or better

Section A Total: 25

SECTION B

8(a)	$(y =)\dfrac{3x + 2}{16}$ o.e. final ans	3	M2 for $3x + 2 = y + 15y$ or better or $(y =)\dfrac{3x - 2}{16}$ **or** M1 for $3x - 15y = y - 2$
(b)	$x^2 + 3x - 10$ final answer	2	M1 for 2 correct terms (from 3) in final answer **or** 3 out of x^2, $5x$, $-2x$, -10 **or** correct expression given then spoilt
9	Triangle with coordinates $(-2,-2)$ $(-6, -2)$ $(-6, -4)$	2	M1 for two correct vertices or correct method shown but slightly inaccurate **or** SF2 centre the origin or SF –2 any centre After M0, SC1 for correct SF -1 enlargement (vertices at (-1, -1), (-3, -1), (-3, -2))
10(a)	60	1	
(b)	31.57 to 31.6 or 32 www	2	M1 for $5\times4 + 6\times10 + 10\times8+15\times2$ condone an error in 1 product **or** 190 seen **or** $24/76 \times 100$
11(a)	2143.5 to 2145	2	M1 for $4\div3\times\pi\times8^3$ SC1 for 17157 to 17160
(b)	20 to 20.2 www	2	M1 for $\sqrt[3]{2}$ or $4/3\times\pi r^3 = 2\times$(a) seen or implied by ($r^3 =$)1024 or better After MO, SC1 for answer 10 to 10.1(finds the radius) www
12(a)	circle drawn with compasses, centre (0,0) radius 5 cm	2	1 for freehand circle cutting axes in correct place
(b)	line through (0,1) with gradient 1	1 1	Long enough for 1 intersection with their circle or part of circle. If line not ruled then penalty 1 mark if 1 or 2 marks earned
	x = 2.8 to 3.2 , y = 3.8 to 4.2 x = -3.8 to -4.2, y = -2.8 to -3.2	1ft 1ft	Correct or ft from their **diagonal line** and their **circle** or their part circle (1 small square acc) Either order

13	$10^2 + 10^2$	M1	or $5^2 + 5^2$ or sin 45 = x/10 or cos 45 = x/10
	7.07… or 7.1 or 14.1 or 14.14 or $\sqrt{200}$ or $\sqrt{50}$ or better.	A1	ww2
	tanθ = 12/their AM o.e.	M1	Provided AM is not 5, 10, 6 or 12
	inv tan used	M1	Dep on previous M1 Check on calculator if not written
	59.38 to 59.5	A1	www5 ww answer 59 scores SC3

Section B Total: 25

Mark Scheme 2340
June 2007

SECTION A

1	(a) 8	2	**W1** for √64 or 4√2 or 2√16 or 2 × 2 × 2 or 2 × 4 seen
1	(b) 3√7	2	**W1** for √28 = 2√7 or √4√7
2	(a) 10, 17, 33, 35	2	**W1** for two correct
2	(b) bulbs per hour or frequency per hour	1	Accept bulbs ÷ hours, frequency ÷ hours

2	(c) Either A or B chosen and justified appropriately and numerically using end classes.
	
	 or
	 Either A or B chosen but justification not numerical.
	 or
	 Neither chosen but acceptable numerical reason stated.
		2
		
		 W1
		
		 W1
			Eg B: fewer bulbs last less than 50 hours (or less than 100 hours)
			     B: more bulbs last longer than 200 hours.
			     A: more bulbs last over 500 hours.
			
			 Eg B: fewer bulbs last a short time.
			     A: more bulbs last a long time.
			
			 Eg More A bulbs last over 500 hours.

3	$x^2 + (x − 9)^2 = 41$ or $(y + 9)^2 + y^2 = 41$ $(x − 9)^2 = x^2 − 18x + 81$ oe or $(y + 9)^2 = y^2 + 18y + 81$ oe $2x^2 − 18x + 40 = 0$ or $x^2 − 9x + 20 = 0$ $(x − 4)(x − 5)$ oe or ft $x = 4$ or 5 cao $y = −5$ or − 4 cao	M1 M1 M1 M1 W1 W1	for attempt to substitute one variable in circle eqn for expansion; condone one error **M1** for equation with like terms collected attempt to factorise, or complete square, or subst in quad. formula or **W1** for (4, −5) and **W1** for (5, −4), marking to benefit of candidate
4	A (0, 3) B(135, 0)	1 2	**−1** once only for reversed coords **W1** for 270 or 135 seen
5	(a) $(x + 4)^2$ −22 cao	1 2	or $a = 4$ **M1** for (their4)^2 + b = −6 or for −6 −4^2 used
5	(b) (−4, −22)	2	**1** for each coord., ft their (a) for (−a, b)
5	(c) −4 ± √22 f.t. i.s.w. or $\dfrac{-8 \pm \sqrt{88}}{2}$ i.s.w.	2	**M1** for $x + 4 = (\pm)\sqrt{22}$ f.t. or $\dfrac{-8 \pm \sqrt{8^2 - 4 \times 1 \times -6}}{2 \times 1}$ or $\sqrt{88}$ seen

Section A Total: 25

SECTION B

6	$L = 51°$ $(LA =) \dfrac{870}{\sin(their\,51)} \times \sin 73$ 1070 to 1071	**W1** **M2** **A1**	Could be on the diagram. **M1** for $\dfrac{LA}{\sin 73} = \dfrac{870}{\sin(their\,51)}$ oe After **M0**, **SC1** for answer 928 – 928.5
7	(a) $(3x - 1)(x + 3)$	**2**	**W1** for other versions of $(3x \pm 1)(x \pm 3)$
7	(b) Final answer $\dfrac{4x}{4x^2 - 9}$ or $\dfrac{4x}{(2x-3)(2x+3)}$	**3**	**SC2** if the correct answer reached but then cancelled **M1** for $\dfrac{2x-3+2x+3}{(2x+3)(2x-3)}$ and **A1** for **final answer** with a numerator of 4x **or** a denominator of $4x^2 - 9$ or $(2x+3)(2x-3)$
8	(a)(i) $\mathbf{p} + \mathbf{r}$ or $\mathbf{r} + \mathbf{p}$	**1**	condone lack of vector notation
8	(a)(ii) ½ their (i)	**1**	ft if (a)(i) is a proper vector
8	(b) $\overrightarrow{DE} = \overrightarrow{DA} + \overrightarrow{AE}$ or $\overrightarrow{DE} = -r + \overrightarrow{AE}$ or $\overrightarrow{DE} = \overrightarrow{DC} + \overrightarrow{CE}$ Completion with at least one interim step	**M1** **M1**	or M1 for $\overrightarrow{DE} = \frac{1}{2}\overrightarrow{DB}$ + diagonals of a parallelogram bisect each other and M1 for completion
9	25 or 26	**2**	**M1** for $\dfrac{1852}{14312} \times 200$ oe
10	(a) 92	**1**	

10	(b) trial with positive $m \leq 20$ and correct outcome rot to 0 dp or better	W1		1	87.31231	11	54.65615	
				2	82.93854	12	52.46927	
				3	78.85767	13	50.42883	
		W1		4	75.05008	14	48.52504	
	Two trials - one each of 13 and 14 or between 13 and 14 (outcomes one above 50, one below)			5	71.49747	15	46.74874	
				6	68.18278	16	45.09139	
				7	65.09005	17	43.54503	
		W1		8	62.20444	18	42.10222	
				9	59.51207	19	40.75604	
	13			10	57	20	39.5	
						13.5	49.46044	Accept

1 or 0.1 etc for trials.
Please check other non-integer values in the appropriate range.

11	(a) $\dfrac{7.2}{4.8}$ or $\dfrac{4.8}{7.5}$ soi	M1	or $\dfrac{AD}{2.4} = \dfrac{CD}{4.8}$ etc or trig argument
	Convincing completion	A1	**NB** ans given

11	(b) $\frac{1}{3}\pi \times 7.2^2 \times (19.2 + 9.6)$	M1	$(1563 \cdot 457 \ldots)$
	$\frac{1}{3}\pi \times 4.8^2 \times 19.2$	M1	$(463 \cdot 246 \ldots)$
	vol large cone − vol small cone	M1	ft their clear attempts
	1085 to 1101	A1	or **W4** for correct answer www

Section B Total: 25

**Mark Scheme 2341
June 2007**

SECTION A

1	(a)	20	**1**		
	(b)	½ , half	**2**	**M1**	*or* **ft** 10/*their* (a), fully cancelled any equivalent inc 50% and 0·5 *or* **ft** 10/*their* (a) ISW cancelling for the M1
2	(a)i	228	**2**	**M1**	attempt to subtract soi
	(ii)	108	**2**	**M1**	attempt to multiply soi implied by figs 80 *or* 28 *or* 54
	(b)i	49	**1**		
	(ii)	0·5	**1**		
	(iii)	70	**1**		
	(iv)	1, 5, 7, 35	**1**		all, only
3	(a)	grams, g centimetres, cm metres, m	**3**	**W1**	each
	(b)	correct diagram	**3**	**W1** & *W1*& **W1** *or* **W2** *or* **W1**	ruled by eye, within 1mm by eye: all 3 long horizontal lines correct vertical line (ft their horizontals) short horizontal line(<7·5mm) and no extra lines or shading pattern not ruled/>1mm out/wide tramlines, all correct length & position not ruled/>1mm out/tramlines, no more than one other error
4	(a)	George Lerner	**3**	**W1**	each, only, clearly identified
		Etch-A-Sketch			
		Meccano, Lego			(both) any order
	(b)	Canada Trivial Board 1979 Pursuits	**1**		all
	(c)i	10·5	**2**	**M1**	figs 105 (00…) *or* subtraction <u>begun</u> correctly
	(ii)	400 000	**1**		

5	(a)	2085	**2**	**M1** *or*	correct addition of at least two amounts
				W1	*or* at least 2 of the digits correct figs 2085
	(b)	1 ¾	**1**		only
	(c)	4:30	**3**	M2 *or* **M1**	acc equivalents 2·5 *or* 2½ *or* 2:30 *or* 2h30 or equivalent *or* 4·5 *or* 4:50 *or* 4h50 150 ÷ 60 soi *or* timespan totalling exactly 2½ hrs clearly shown
	(d)	800	**2**	**M1**	1400 ÷ 7 *or* 200 *or* 5600 ÷ 7
	(e)	140	**2**	**M1**	10% found correctly (may be implied by 280) *or* clear complete attempt to find 5%
6	(a)	arrow within 2mm of point	**1**		
	(b)	arrow within 2mm of point	**1**		
7	(a)	1014·8(0) with working seen	**3**	**W2** *or* **M1** & **W1** *or* **W1**	figs 10148(0) with working seen complete method any of figs 708, 944, 258, 129, 86, 989, 1032 seen *or* any 4 rectangles correct 1014·8(0) without working
	(b)	20 / 21 / 22 × 40 20 × 43 800 / 840 / 880 860	**M1** **A1**		acc parallel reverse equivalents: 700 ÷ 40 700 ÷ 20 740 ÷ 20 740 ÷ 40 17·5 35 37 18·5
8	(a)	correct rotation	**3**	**W2** **W1**	intention, may be freehand correct, either left or base vertex wrong *or* clockwise rotation 90 about origin correct orientation & size
	(b)	reflection y = -1 *or* y + 1 = 0	**1** **1**		for first mark also accept: reflect reflected reflecting mirror image mirror line line of symmetry
9	(a)i	25	**1**		
	(ii)	4	**2**	**M1**	condone x4 and 4x 5x = 21 – 1 (20) or better *or* correct flowchart method
	(b)	correct equation	**1**	**W0**	must include x, one operation, one = sign x = 4

Section A Total: 50

SECTION B

10	(a)	80	**2**	W1	each
		× 2			acc equivalents; direction **and** quantity
	(b)	62	**3**	**W1**	each
		32			**ft** _their_ 62 – 30 correctly found
		– 6			acc equivalents; direction **and** quantity
11	(a)	40	**1**		
	(b)	47	**1**		
12	(a)i	28·5	**1**		
	(ii)	9	**1**		
	(b)	– 14 ÷3	**2**	**W1**	either order, oe
					either correct
					_or_ 14, 3 both correct but no operations
13	(a)	7	**2**	**M1**	figs 2625(0) ÷ figs 375(0) soi
					_or_ repeated subtraction/addition
	(b)i	True Love Waits	**1**		clear intention
	(ii)	I Break	**1**		clear intention
	(c)	255 (·00) www	**4**	**W3** _or_ **M1** **M1** M1 _or_ **sc1**	figs 255 (00)
					12 × 500 _or_ £60 _or_ (£) 6000p
					14 × 5 _or_ £70 _or_ (£) 7000p
					12·5 × 10 _or_ £125 _or_ (£)12500p
					if 0 scored in total: 6000 _or_ 7000 _or_ 125000 correctly placed
14	(a)	46 to 50	**1**		
	(b)	73	**2**		**M1** 180 soi
	(c)	opposite (angles) _or_ X angles	**1**		
	(d)i	6_x_ = 180	**2**	**M1**	accept equivalents of 6_x_
					4_x_ + _x_ + _x_ (= …) _or_ equivalents
	(ii)	30	**1**		
15	(a)	all correct	**2**	**W1**	no more than 4 errors

	(b)i	$\dfrac{1}{16}$ isw *or* 0·0625 *or* 6·25%	**1**		*throughout (b):* **ft** from their table
	(ii)	0 *or* $\dfrac{0}{n}$ *or* impossible	**1**		wrong denominator or wrong form: penalise 1 mark once only
	(iii)	$\dfrac{6}{16}$ or equivalent isw *or* 0·375 *or* 37·5%	**2**	W1	correct numerator seen *or* denominator of 16
				sc2 *or* **sc1** *or* **sc1**	2/24, 4/24, 6/24 misread of table numerators to ft from the entire table denominator of 24 used throughout if 0 scored in (b) denominator of 16 used throughout (b)
16	(a)	2 × 480 seen 8·5 × 54 seen 960 + 459 + 430 seen	**3**	M1 & **M1**	both substitutions & addition shown 2×480 *or* 960 *or* 8·5×54 *or* 459 seen *their* 960 + *their* 459 + 430 seen
	(b)	3·24	**3**	M2 *or* **M1** M1 & **W1**	figs 323(…) *or* 324(…) implied by 21·72 *or* 21·73 0·175 × 18·49 alternative marking: complete method leading to 17·5% of 18·49 if no arithmetic errors a correct % of 18·49 seen (be convinced) (except 0%, 100%)
	(c)i	20 – 30	**1**		
	(ii)	correct diagram	**3**	W1	for **each** of the following, **max**imum **W2** • axes correctly scaled • five of heights correct • horizontal spacing/joining correct

17	(a)i	triangular prism	1		only clearly identified
	(ii)	pentagon	1		condone mis-spelling
	(b)i	15	2	**M1** *or* **sc1**	2160 ÷ 12² oe 180 seen
	(ii)	65, 65·4 to 65·5	4	**M1** & **A1** & **M1**	π × 5² oe implied by 78·5 to 78·6 78·5 to 78·6 144 – *their* **[**78·5 to 78·6, from using π**]**

Section B Total: 50

Mark Scheme 2342
June 2007

SECTION A

1	(a)	£1014.8(0) **with working**	3	**W3**	W2 for figs 10148(0) **with working** or M1 for any complete method which would lead to the correct answer allowing arithmetic errors **AND** W1 for figs 708 or 944 or 258 or 129 or 86 or 989 or 1032 seen Using grid method accept 4 rectangles correct Answer only (with **no** working) W1 for £1014.8(0)
	(b)	20×40 800 or 840 or 860 or 880	2	M1 A1	Accept 21 × 40 or 20×43 or 22×40 f.t only
2	(a)	Final answer $2a + 5b$	2	**W2**	W1 for each
	(b)	Final answer $8y + 12$	1	**W1**	
	(c)	Final answer $5(a - 2)$	1	**W1**	
3		$\dfrac{5}{8} \times 400$ $\dfrac{20}{100} \times 400$ 400 – their (250 + 80) 70	4	M1 M1 M1 A1	Implied by 250 seen www Implied by 80 seen www Answer only W4
4	(a)	Positive	1	**W1**	Accept written description
	(b)i	Ruled line of best fit	1	**W1**	From (5, 15-20) & (45, 40-45)
	(ii)	23 to 28	1	**W1**	
5	(a)	Correct rotation	3	**W3**	W2 for an error in one point but still with the right-angle **or** W2 for correct but clockwise rotation **or** W1 for correct orientation
	(b)	Reflection or mirror image and no other transformation line $y = -1$ or $y + 1 = 0$	2	**W1** **W1**	
6	(a)	1, 5, 9	2	**W2**	W1 for 2 correct SC1 for –3, 1, 5
	(b)	$5n - 1$ o.e.	2	**W2**	W1 for $5n$ or equivalent seen
	(c)	$T + 5 = 6n$ or $\dfrac{T}{6} = n - \dfrac{5}{6}$	2	M1	

		$\dfrac{T+5}{6}(=n)$ or $\dfrac{T}{6}+\dfrac{5}{6}(=n)$ or $(T+5)\div 6(=n)$		**A1**	W1 for $\dfrac{\pm T \pm 5}{\pm 6}(=n)$ or $T+5\div 6(=n)$ or $T+5/6(=n)$ or $\dfrac{T+5=n}{6}$ Answer only W2
7	(a)	$5x = 21-1$ or better 4	2	**M1** **A1**	 Condone ×4 and 4× Answer only W2
	(b)	$2x=9$ or $-2x=-9$ $4\dfrac{1}{2}$ or 4.5 or $\dfrac{9}{2}$ isw	3	**M2** **A1**	M1 for $4x-2x=8+1$ or $2x-1=8$ or $4x-2x=9$ or $2x=k$ or $kx=9$ Answer only W3
8	(a)	$360 \div 45$ 8	2	**M1** **A1**	 Answer only W2
	(b)i	$\dfrac{180-108}{2}$ 36 (Base angles of) isosceles triangle (equal)	3	**M1** **A1** **W1**	 Answer only W2 Accept, dep on M1, angles in a triangle (=180)
	(ii)	216 Angle at the centre is twice angle at circumference	2	**W1** **W1**	 Accept "Angle at centre" if 216 given
9	(a)	All heights correct Points plotted at mid points and joined with ruled straight lines	2	**W1** **W1**	Allow $\pm$ 2mm in plotting $\pm$ 2mm
	(b)i	168	1	**W1**	
	(ii)	30	1	**W1**	After W0 in part(b) allow SC1 for **both** 164 **and** 15 or 25 or 35
	(c)	Men – lower **interquartile** range	1	**W1**	Accept smaller box or box(es) shorter
10	(a)i	165000	1	**W1**	
	(ii)	1.4×10^{7}	2	**W2**	W1 for answer figs 14 or $a \times 10^{7}$ with $1 \le a < 10$
	(b)	$\dfrac{16}{5} \times \dfrac{25}{6}$ o.e with improper fractions $13\dfrac{1}{3}$	3	**M1** **A2**	Condone one error in the improper fractions A1 for $\dfrac{40}{3}$ **www** o.e. seen Answer only

					W3 for $13\frac{1}{3}$ **www** or
					W2 for $\frac{40}{3}$ o.e. **www**

Section A Total: 50

SECTION B

11	(a)	5 and – 1	1	W1	
	(b)	Correct ruled line	2	W2	W1 for 6 points plotted (f.t.).
	(c)	$2\frac{1}{2}$ or 2.5 or $\frac{5}{2}$	1	W1	
12	(a)	All 12 values correct	2	W2	W1 for further 8 correct
	(b)	All marks in part (b) are f.t. from table.			In part (b) answers of $\frac{2}{24}$, $\frac{4}{24}$, $\frac{6}{24}$ can score a maximum of 2
	(i)	$\frac{1}{16}$ isw or 0.0625 or 6.25%	1	W1	
	(ii)	0 or $\frac{0}{n}$ or impossible	1	W1	
	(iii)	$\frac{6}{16}$ or equivalent isw or 0.375 or 37.5%	2	W2	W1 for 6 seen in numerator or After no marks in part(b) allow W1 for a denominator of 16 throughout Consistent wrong denominator in (i) and (iii) – 1 once. Wrong form – 1 once
13	(a)	Angle BTJ = 68 to 72° JT = 9.3 to 9.7 cm	2	W1 W1	
	(b)	288° to 292°	1	W1	
	(c)	**If 2 marks are awarded in part (a)** 4.45 to 4.8 **If 2 marks are not awarded in part (a)** Measure JB Figs 0.5 × examiner's measured JB Correct conversion	3	 W3 W1 W1 W1	W2 for figs 445 to 48 **or** W1 for JB = 8.9 to 9.6 cm and M1 for Their JB × $\frac{50000}{100 \times 1000}$ Allow ±2mm Allow ±2mm f.t. f.t.
14	(a)	$\frac{65.7}{45}(\times 85)$ €124.1(0)	2	M1 A1	Implied by figs 146 seen SC1 for figs 1241 Answer only W2
	(b)	$\frac{45}{65.7}(\times 90.52)$ or 90.52 ÷ their 1.46 or 90.52 × 0.68(49…)	3	M2	M1 for $90.52 \div \frac{65.7}{45}$

		£62(.00)		A1	Answer only W3
15	(a)i	2.81	2	W2	W1 for figs 281 to 282 seen **or** W1 for 7.45 or 2.65 seen **or** W1 for final answer 2.75
	(ii)	3	1	W1	
	(b)	0.2 or $\dfrac{1}{5}$	1	W1	
16	(a)	$2160 \div 12^2$	2	M1	After M0 give SC1 for 180 seen
		15		A1	Answer only W2
	(b)	$\pi \times 5^2$	4	M1	
		78.5 to 78.6		A1	W2 for 78.5 to 78.6 seen
		144 – their (78.5 to 78.6)		M1	
		65.4 to 65.5		A1	Answer only W4
17	(a)	$\dfrac{840}{7+5}(\times 7)$	2	M1	Implied by 350 or 70 seen
		490		A1	Answer only W2
	(b)	$\dfrac{840-777}{840}(\times 100)$ or $\dfrac{63}{840}(\times 100)$	3	M2	M1 for $\dfrac{777}{840}(\times 100)$ or figs 925 seen
		$(\pm)7.5$		A1	After M0 allow SC1 for 63 seen Answer only W3 for 7.5 W2 for figs 75
18	(a)	$x \times x \times (x+2)$ or $x^2(x+2)$ seen	2	M1	SC1 if brackets are omitted
		Correctly derives given equation		A1	
	(b)	One value 1 < n < 2 substituted	3	W1	Results must be seen.
		One value 1.5 ≤ n < 2 substituted		W1	Results must be seen In each case accept results to 1 sig fig or better. (Corrected or truncated)
		1.8		W1	
		Use of (2x)² instead of 2x² Two values between 1 and 2 substituted		W1	Results must be seen
		1.5		A1	
19	(a)	$(x-5)(x-3)$ isw	2	W2	W1 for $(x \pm 5)(x \pm 3)$ isw
	(b)	Multiplication of equation (1) by 3 or	3	M1	Accept 2 terms correct
		Multiplication of equation (1) by 5 and			Or equivalent to equate x or y terms, accept 2 terms correct in each equation

		Multiplication of equation (2) by 3			
		Subtracting equations		**M1**	Dep. On first M1 At least 2 terms correct ft
		$x = 2, \ y = -3$		**A1**	Dep on M2
					Answer only W1
20		$255 \times \sin 36.5$	**4**	**M2**	M1 for $\sin 36.5 = \dfrac{BC}{255}$
		150 or 152 www		**A2**	A1 for 151 to 151.99
					After the use of trigonometry a final answer corrected to 2 or 3 sig figs [but not to 1 sig fig] can score SC1
					Answer only
					W4 for 150 or 152 W3 for 151 to 151.99

Section B Total: 50

Mark Scheme 2343
June 2007

SECTION A

1	(a) Rotation 180º (Centre) (0,1)	**1** **1**	
	(b) Triangle (2,1) (4,1) (4,2)	**2**	**M1** y = x drawn **SC1** correct reflection in *y = -x* (-2,-1) (-4,-1) (-4,-2)
2	6 3/20 or $\underline{123}$ or 6.15 20	**3**	**M2** $\underline{23}$ 20 **Or M1** $\underline{15}$ or $\underline{8}$ or $\underline{75}$ or $\underline{48}$ seen 20 20 20 20 **Or M1** 3.75 **and** 2.4
3	(a) All heights correct (4, 36, 42, 29, 7, 2) Points plotted at midpoints and joined with ruled straight lines	**1** **1**	Allow ± 2mm (1 square) *Using template accept within circle*
	(b) (i) 168	**1**	
	(ii) 30	**1**	
	(c) Men – lower IQR	**1**	
4	(a) 2 2	**1**	
	(b) Graph	**2**	Points **1** or FT(a) within 1 square Curve **1** Within 1 square of correct middle four points
	(c) 2.3 to 2.5 -0.3 to -0.5	**1** **1**	or FT their curve within 1 square
5	(a) $\underline{v^2 - u^2}$ or $\underline{u^2 - v^2}$ 2a -2a	**2**	**M1** 2as = v² - u² or $\underline{v^2} = \underline{u^2} + \underline{(2a)s}$ 2a 2a (2a)
	(b) -2 www	**4**	**M1** 5(2x+1) = 3(x- 3) **M1** 10x +5 and 3x -9 (correct expansion of brackets by 3, 5 or 15). If given as equation may imply first M1. **M1** 7x = -14 (7x + 14 = 0 does not score). FT their 2ⁿᵈ step. **A1** x = -2 FT their 3ʳᵈ step. Third M1 must have been scored. If answer integer fractions not accepted (eg -14/7 does not score.) However accept either improper fractions or mixed numbers following incorrect working.

6	(a) 8	**2**	**M1** 360/45
	(b)(i) 220 because x is double angle at circumference	**1** **1**	
	(ii) 60 www	**3**	**M1** for <QRO = 50 **M1** for 360 – (110 + their 50 + their 140) **A1** 60 or FT their 220 (dep.on M1 M1)
7	Multiply by 2 and 3 or 5 and 2	**M2**	**M1** 4x + 6y = 14 condone 1 error **M1** 15x – 6y = 81 condone 1 error
	19x = 95 or 19y = -19	**M1**	Adding to eliminate y –condone 1 error
	x = 5 y = -1	**A1**	Or **W1** from M0
8	(a) Not enough info – cheapest anywhere in interval	**1**	
	(b) True – 50 + 60 + 40 + 30 + 20	**1**	
	(c) True – 10 squares out of 40	**1**	Or 50 out of 200 houses FT their 50 and their 200
	(d) False – 100th (or 100.5th) house in interval 200000 to 300000	**1**	FT their 200
9	(4x – 1)(2x +3) ¼ -1.5 or $\frac{-3}{2}$	**M2** **W1** **W1**	**M1** (4x ±1)(2x ± 3) or (4x ± 3)(2x ± 1) **SC1** 2 solutions correct following through from their factorisation (must have given 8x² and ±3)
10	(a) $\frac{12}{90}$ or equivalent isw	**2**	**M1** $\frac{4}{10}$ or $\frac{3}{9}$ or equivalent isw
	(b) $\frac{20}{90}$ (www) or equivalent isw	**3**	**M2** $\frac{12}{90}$ (+) $\frac{2}{90}$ (+) $\frac{6}{90}$ or **M1** 2/90 or 6/90 or RR and BB and GG (identified with or without calculations)
11	Sketch graph	**3**	**M1** amplitude 2 or curve from (0,2) and **M1** One period of 120 or 3 complete cycles

Section A Total: 50

SECTION B

12	(a) £490	2	**M1** 840 / (7 + 5)
	(b) (±) 7.5%	3	**W2** for 92.5 (%) **M2** $\dfrac{840 - 777}{840}$ **Or M1** $\dfrac{777}{840}$ IF M0 allow **SC1** for 63 seen
13	(a) $x \times x \times (x+2)$ or $x^2(x + 2)$ seen Correctly derives given equation	**M1** **A1**	condone omission of brackets For A1 must equate to 13 and brackets must have been used or clear 'splitting of diagram' or $x \times x \times x + x \times x \times 2$
	(b) One value between 1 and 2 substituted. One value between 1.5 and 2 substituted. 1.8	**M1** **M1** **A1**	Results must be seen. Accept results to 1 sig fig or better. (Corrected or truncated) If M0, max **W1** for 1.8 www. If candidate evaluates $(2x)^2$ then **M1** for two values between 1 and 2 substituted. **A1** for 1.5 (NB not W1)
14	2,3,4,5,6,7	3	**M2** $1 < n \leq 7$ **Or M1** (n) ≤ 7 or n > 1 or 1 < n **Or** **W2** 4 correct integers and no extras or 6 correct integers and 1 extra **Or W1** 4 correct integers and 1/2 extras
15	False and false Eg ⅓ is bigger than ¼ Eg 3 × 5 = 15	1 1 1	 dependent on false dependent on false
16	(a) 411.(6..) to 411.7 or 412 isw	3	**M2** 494/1.2 **Or M1** 1.2
	(b) 251.(..) isw	3	**M2** $\pi \times 8 \times 10$ or **M1** $\pi \times 8$

17	150 or 152 (www, scale drawing is not allowed)	4	**W3** for 150.4 to 151.99 **M2** 255 × sin 36.5 or 255 cos 53.5 **Or M1** sin 36.5 = $\underline{BC}$ 255 From M0, M1 or M2 allow **W1** for answer from trig. involving 255 and 36.5/53.5 to 2 or 3 significant figures. If cos **and** Pythagoras used: **M1** for 255 × cos 36.5 **M1** (their adjacent)²+BC²=255²
18	(a) 5.19×10^7	1	
	(b) 359.2…or 359.3 **and** 396 www	4	**W2** 49500000, 48500000,135000 and 125000 seen **Or W1** any 2 of these values seen **Or W1** digits 495, 485, 135, 125 **And** **M1** their 495.. divided by their 125.. Or their 485.. divided by their 135.. **A1** 359.2…or 359.3 or 359 or 360 **and** 396 or 395.9..
	(c) (i) 15.9 million isw	1	
	(ii) 107 – 108 million	3	**M1** t = 16 **and M1** 15.9 × 1.127$^{their\ t}$ from t = 6,15,16,17,160
19	(a) <DCF = < EBF because isosceles triangle	1	
	CF = BF	1	Or CD = BE
	CD = BE and SAS stated	1	then CF = BF with SAS stated
	(b) 9.35 to 9.4(…) www	3	**M2** 88.4..… **Or M1** PQ² = 8² + 14² - 2×8×14 cos40

20	(a) 2x - 1 = 6x² - 2x - 5 6x² - 4x – 4 = 0	**M1** **A1**	
	(b) (-0.55, -2.1) and (1.2, 1.4) www	**4**	**W1** $\dfrac{2\pm\sqrt{(-2)^2 - 4\times3\times-2}}{2\times3}$ **W2** $\dfrac{(2 + \sqrt{28})}{6}$ or $\dfrac{(2 - \sqrt{28})}{6}$ **W3** 1.2 and – 0.55 Or (1.2, 1.4) or (-0.55,-2.1)
21	(a) Height multiplied by cube root of 2	**1**	If height doubled, volume X 8
	(b) 25.3 to 25.6	**2**	**M1** $\sqrt[3]{2}$ or 1.25 to 1.26 seen

Section B Total: 50

**Mark Scheme 2345
June 2007**

<u>**MARKING GUIDE**</u>   <u>**Winning Lines**</u>

This guide gives **some** of the examples of evidence that candidates **may** produce. The examples are not exhaustive neither are they minimum requirements.

In the examples stated W = number of win lines, and h = the height (and width) of a square grid.

MARK FOR EACH STRAND	Strategy	Communication	Reasoning
1	• **Candidates try different approaches and find ways of overcoming difficulties that arise when they are solving problems. They are beginning to organise their work and check results.** Correctly counts the number of horizontal win lines *of a single length* in one diagram	• **Candidates discuss their mathematical work and are beginning to explain their thinking. They use and interpret mathematical symbols and diagrams.** One diagram to show some (horizontal) winning lines.	• **Candidates show that they understand a general statement by finding particular examples that match it.** Draws any **new** winning line OR finds the correct number of horizontal, vertical or total winning lines.
2	• **Candidates are developing their own strategies for solving problems and are using these strategies both in working within mathematics and applying mathematics to practical contexts.** *Finds* all the correct winning lines *of a single length* in any diagram.	• **Candidates present information and results in a clear way, explaining the reasons for their presentation.** A series of diagrams showing winning lines and totals.	• **Candidates search for a pattern by trying out ideas of their own.** Any set of three related results, eg *all* horizontals in three different diagrams.
3	• **In order to carry through tasks and solve mathematical problems, candidates identify and obtain necessary information; they check their results, considering whether these are sensible.** All the correct winning lines *of a single length* in three different diagrams.	• **Candidates show understanding of situations by describing them mathematically using symbols, words and diagrams.** Diagrams and totals, probably tabulated and with notes in the form "I have found…", "I drew …", that explain the work.	• **Candidates make general statements of their own, based on evidence they have produced, and give an explanation of their reasoning.** Makes a (simple) generalisation that is correct for their results Eg one of ➢ The number of horizontal = the number of verticals. ➢ The number of horizontals in a row = length – win + 1 ➢ $W = 2h+2$ etc

4	• **Candidates carry through substantial tasks and solve quite complex problems by breaking them down into smaller, more manageable tasks.** Systematic production of related results leading to a correct algebraic generalisation for one situation. Eg $W = 2h + 2$ This could also be for the total of horizontal and/or vertical lines of length s on any square grid.	• **Candidates interpret, discuss and synthesise information presented in a variety of mathematical forms. Their writing explains and informs their use of diagrams.** Candidate links the methods of presentation (diagrams and tables) through using a commentary that tells the story of the work that has been done and unites the forms of presentation and recording.	• **Candidates are beginning to give a mathematical justification for their generalisations; they test them by checking particular cases.** Candidate tests the generalisation in R3 with new data. Eg If a formula for the total number of win lines of a single length in any grid has been obtained, then the results for a previously unused grid are calculated and then checked from first principles.
5	• **Starting from problems or contexts that have been presented to them, candidates introduce questions of their own, which generate fuller solutions.** The candidate changes a variable and generates sufficient evidence so that a further generalisation may be made eg ➢ Changes grid dimension(s). ➢ Changes the *length of the* win line The candidate's intention must be clear. This could also be for a COMPLETE solution for all lines of length s on any square grid	• **Candidates examine critically and justify their choice of mathematical presentation, considering alternative approaches and explaining improvements they have made.** Shows C4 and then uses algebra to represent a generalisation, which must then show substitution eg ➢ C4 and $T_h = 2h + 2$ and substitutes h = 13 to find T_{13} **OR** Decides to improve presentation in a way which is followed through to improve understanding eg ➢ plots results on a graph **and** uses this to find gradient 2 hence 2h.	• **Candidates justify their generalisations or solutions, showing some insight into the mathematical structure of the situation being investigated. They appreciate the difference between mathematical explanation and experimental evidence.** **Clearly explains** (F/I) that the number of horizontals = height of the grid (and why) and the same for the verticals and that there are only two diagonals. Hence, 2h+2. OR (I/H) why there can only be h – 3 + 1 win lines in a row of length h and win line 3.

6	• **Candidates develop and follow alternative approaches. They reflect on their own lines of enquiry when exploring mathematical tasks; in doing so they introduce and use a range of mathematical techniques.** Uses algebraic techniques (represents line length by a variable and deduces the number of win lines in a LINE and, hence, in a SET OF LINES) and achieves a formula <u>for their chosen development</u>. **Demonstrates understanding of the methods used.** **GOES BEYOND COUNTING.** OR applies difference method to achieve a formula for the sum of the diagonals leading to a quadratic.	• **Candidates convey mathematical meaning through consistent use of symbols.** Candidate uses algebra with **two, clearly defined variables**, and manipulation of these, to find an answer. Eg. ➢ **Derives** result for any rectangular grid in which the length of the win line = one dimension of the rectangle. OR ➢ **Derives** a formula for the number of diagonals in a square grid such that the length is one variable and the win line is the second. (Links to S6)	• **Candidates examine generalisations or solutions reached in an activity, commenting constructively on the reasoning and logic employed, and make further progress in the activity as a result.** ➢ Derives 2h(h-2), with reasoning, for square grid. OR candidate considers a series of formulae and, as a result, makes further progress. Some examples are; ➢ Rectangular grids of different heights (win length = height), deducing overall formula for horizontals in any grid. ➢ Win lines of different lengths on a fixed square grid, deducing a formula for the horizontals, OR verticals OR diagonals for each. Reasoning must be shown in making the deduction from the results.
7	• **Candidates analyse alternative approaches to problems involving a number of features or variables. They give detailed reasons for following or rejecting particular lines of enquiry.** **Uses appropriate** algebraic methods to find a formula for **a three variable** situation. Eg; ➢ Win line, length of grid, height of grid. *Or derives suitably complex quadratic Eg.* ➢ Square grid, length of win line. ➢ Cube, in which the lines are viewed in 3D and win line = edge of cube. (NOT simply surface lines)	• **Candidates use mathematical language and symbols accurately in presenting a convincing reasoned argument.** Presents clear working, with annotation, to support their development that goes **beyond S5**. (**This is most likely to be linked to S7** but may be awarded to a good case of S6.) All variables must be defined and an argument must be presented through the use of algebra.	• **Candidates' reports include mathematical justifications, explaining their solutions to problems involving a number of features or variables.** **S7 or better achieved.** Presents a clear argument for WHY the formula achieved in S7 applies. This might involve a clear explanation of how the sum of diagonals was achieved, showing that the diagonals resolve into the sum of two triangular numbers and a rectangular number in the case where the win length is less than the side of the grid.

8	• **Candidates consider and evaluate a number of approaches to a substantial task. They explore extensively a context or area of mathematics with which they are unfamiliar. They apply independently a range of appropriate mathematical techniques.**	• **Candidates use mathematical language and symbols efficiently in presenting a concise reasoned argument.**	• **Candidates provide a mathematically rigorous justification or proof of their solution to a complex problem, considering the conditions under which it remains valid.**
	Win line, length of grid, height of grid, solution completely correct Or uses algebraic techniques to **extend S7 formula by a further variable** eg ➢ Cube with lines in 3D and win line not equal to side length. ➢ Cuboid with lines viewed in 3D	Presents a clear, elegant construction of the formula, properly annotated, to **support the S8 development, or very good S7. Concise algebra, without significant error.**	**S7 or better achieved**. This draws upon the same evidence as S8 and C8. If C8 is awarded then this mark will probably be awarded as well. Look for understanding of proof offered within the work.

SPECIFY and PLAN [S]   OCR Set Task 2007 Marking Guide "Food for Thought!"

This guide contains examples of some evidence candidates might produce in response to the task

Notes: 1. In these criteria there is an intended approximate link between 7 marks and grade A, 5 marks and grade C and 3 marks and grade F.

      2. Candidates must provide evidence of their plan being implemented.

      3. If secondary data is provided it must be in sufficient quantity to allow sampling to take place.

			Minimum requirements	Notes
1	Simple task, no plan	Candidates choose a simple well-defined problem. Their aims have some clarity. The appropriate data to collect are reasonably obvious. An overall plan is discernible and some attention is given to whether the plan will meet the aims. The structure of the report as a whole is loosely related to the aims.	• Candidates show they understand a simple task. • There is an implicit plan.	❖ Records relevant fat data in a list and may draw a block graph.
2				❖ S1 and shows organisation in the work
3	One dimensional, simple plan and aims.	Candidates choose a problem involving routine use of simple statistical techniques and set out reasonably clear aims. Consideration is given to the collection of data. Candidates describe an overall plan largely designed to meet the aims and structures the project report so that results relating to some of the aims are brought out. Where appropriate, they use a sample of adequate size.	• Candidates set out reasonably clear aims (or the purpose). • Their planning is largely designed to meet the aims/purpose. • They use data appropriate to the problem.	❖ Writes one relevant aim and produces a minimal plan to meet the aim. Eg To collate the data on fat content for cheeses, find the mean and compare this to another food.
4				❖ Writes one or more aims and produces a clear plan that will allow one aim to be met. Eg. Detailed plan for S3 with reasons for the food to be chosen to compare to cheese.

5	Two (+) areas, planning, aims, justified sample	Candidates consider a more complex problem. They choose appropriate data to collect and state their aims in statistical terms with the selection of an appropriate plan. Their plan is designed to meet the aims and is well-described. Candidates consider the practical problems of carrying out the survey or experiment. Where appropriate, they give reasons for choosing a particular sampling method. The project report is well structured so that the project can be seen as a whole.	• Candidates consider a **substantial** problem stating their initial aims clearly at the beginning of the report. • Their plan is explicitly stated to meet those aims. • They choose an appropriate sample.	❖ Writes two or more aims in general terms. A written plan that allows at least two aims to be tested. Relevant data is used. Eg. To compare cheese fat content to other foods and another "nutrient" such as water content, or tests to see whether high calorie foods contain high fat content.
6				❖ Writes two or more aims in statistical terms and constructs an efficient plan to test the aims. Data is carefully selected. Eg. As S5 but aims in the form"… showing positive correlation between fat content and calorific value" with a clear structure drawing all components of the task together.
7	Sophisticated specification and aims	Candidates work on a problem requiring creative thinking and careful specification. They state their aims clearly in statistical terms and select and develop an appropriate plan to meet these aims giving reasons for their choice. They foresee and plan for practical problems in carrying out the survey or experiment.	• Candidates work on a **demanding** problem. • They state their aims clearly in statistical terms and give valid reasons for their choice of planning. • They explain and act upon limitations of their chosen sample (eg bias), where appropriate.	❖ An overall structure justifying the subdivision into individual tasks. Each task stated in statistical terms, carefully specified and related to the main task. Eg. Intends to show that fresh food is better for you than processed food. Explains how the data selected will be used, defining "better" and how this will be measured.
8		Where appropriate, they consider the nature and size of sample to be used and take steps to avoid bias. Where appropriate, they use techniques such as control groups, or pre-tests or questionnaires or data sheets, and refine these to enhance the project. The project report is well structured and the conclusions are related to the initial aims.		❖ S7 is expanded to involve justification for choice of data, possibly whole populations. Specific aims and components stated in correct statistical language. Clear justification, in statistical terms, for how each aim will be met. Methods justified and related to the tasks.

COLLECT, PROCESS and REPRESENT   [C]

Notes: 1. In these criteria there is an intended approximate link between 7 marks and grade A, 5 marks and grade C and 3 marks and grade F.

          2. The mark awarded to a particular technique should reflect the quality of use and understanding as well as its position within the Level Indicators.

          3. The inclusion of statistical techniques outside the National Curriculum does not necessarily justify the award of higher marks.

          4. 'Diagrams' include tables, charts and graphs. At 5-6 marks the diagrams used should be appropriate. At 7-8 marks the range of diagrams should be appropriate to the problem chosen and the statistical strategy chosen.

          5. 'Redundancy' implies unnecessary and/or inappropriate diagrams or calculations. This includes techniques that are not used for any conclusion.

		Minimum requirements	Notes
1	Candidates collect data with limited relevance to the problem and plan. The data are collected or recorded with little thought given to	• Candidates collect or use data and record it.	❖ Evidence haphazardly recorded from S1.
2	processing. Candidates use calculations of the simplest kind. The results are frequently correct. Candidates present information and results in a clear and organised way. The data presentation is sometimes related to their overall plan.		❖ One technique, (grade G) used. Eg bar chart, tally chart… ❖ Some organisation shown in the work
3	Candidates collect data with some relevance to the problem and plan. The data are collected or recorded with some consideration given to efficient processing. Candidates use straightforward and largely relevant calculations involving techniques meeting the level detailed in the handling data paragraph of the grade description for grade F. The results are generally correct. Candidates show understanding of	• Candidates collect or use data with some relevance to the problem. • They utilise statistical techniques/diagrams (see note 1 above) to process and represent the data. • Their results are generally correct.	❖ Two techniques (one grade F) used. Eg Tabulated results, mean fat content ❖ Results contain few obvious errors.
4	situations by describing them using statistical concepts, words and diagrams. They synthesise information presented in a variety of forms. Their writing explains and informs their use of diagrams, which are usually related to their overall plan. They present their diagrams correctly, with suitable scales and titles.		❖ The results of C3, and a further grade E technique, are linked with a commentary (which tells the story).

5	Candidates collect largely relevant and mainly reliable data. The data are collected in a form designed to ensure that they can be used. Candidates use a range of more demanding, largely relevant calculations that include techniques meeting the level detailed in the handling data paragraph of the grade description for grade C. The results are generally correct and no obviously relevant calculation is omitted. There is little redundancy in calculation or presentation. Candidates convey statistical meaning through precise and consistent use of statistical concepts that is sustained throughout the work. They use appropriate diagrams for representing data and give a reason for their choice of presentation, explaining features they have selected.	• Candidates collect/sample largely relevant data. • They utilise appropriate calculations/techniques/ diagrams (see note 1 above) within the problem. • Their results are generally correct.	❖ Uses grade C techniques. Eg Makes own hypothesis and plans to test this; discusses correlation from scatter graph to link fat content to sugar content, ❖ Results contain few obvious errors
6			❖ C5 with little redundancy. ❖ Use of additional, appropriate, grade C or better (Box and whisker, quartiles, etc) techniques. ❖ Statistical language used consistently.
7	Candidates collect reliable data relevant to the problem under consideration. They deal with practical problems such as non-response, missing data or ensuring secondary data are appropriate. Candidates use a range of relevant calculations that include techniques meeting the level detailed in the handling data paragraph of the grade description for grade A. These calculations are correct and no obviously relevant calculation is omitted. Numerical results are rounded appropriately. There is no redundancy in calculation or presentation.	• Candidates collect/sample largely relevant data. • They utilise appropriate and necessary calculations/techniques/ diagrams (see note 1 above) consistently within the problem. • Their results are correct. [*Some minor errors may be condoned provided they do not detract from the quality of the argument.*]	❖ At least S6 awarded. ❖ Statistical language used accurately and consistently. ❖ Three techniques (one grade A) used. Eg Compares fat content two + foods with cf curve, histogram and comments,
8	Candidates use language and statistical concepts effectively in presenting a convincing reasoned argument. They use an appropriate range of diagrams to summarise the data and show how variables are related.		❖ Presents multifaceted argument using data, grade A and B techniques and statistical language efficiently and effectively.

INTERPRET and DISCUSS [I]

Notes:
1. **In these criteria there is an intended approximate link between 7 marks and grade A, 5 marks and grade C and 3 marks and grade F.**
2. **The number of marks awarded at this strand is unlikely to exceed the mark at Strand 1 by more than 1.**
3. **The use of ICT is to be encouraged to allow candidates more time to analyse and interpret the data. (There is no requirement for the diagrams to be drawn by hand).**

		Minimum requirements	Notes
1	Candidates comment on patterns in the data. They summarise the results they have obtained but make little attempt to relate the results to the initial problem.	• Candidates comment on their data.	❖ Makes a comment based on the data. Eg. "Goats cheese has no fat"
2			❖ Any summary or comparative comment, based on the data. Eg "None of the cheeses contain fibre"
3	Candidates comment on patterns in the data and any exceptions. They summarise and give a reasonably correct interpretation of their graphs and calculations. They attempt to relate the summarised data to the initial problem, though some conclusions may be incorrect or irrelevant.	• Candidates summarise some of their data. • They make a statement based on their diagrams or calculations, which is relevant to the problem.	❖ Evidence of processing data. ❖ Relevant comment made based on the processed data. Eg "The mean fat content for the cheeses is 21.5g per 100g."
4	They make some attempt to evaluate their strategy.		❖ I3 AND S3 ❖ Summarises their working and diagrams and relates the comments back to their original aim.

5	Candidates comment on patterns in the data and suggest reasons for exceptions. They summarise and correctly interpret their graphs and calculations, relate the summarised data to the initial problem and draw appropriate inferences. Candidates use summary statistics to make relevant comparisons and show an informal appreciation that results may not be statistically significant.	• Candidates summarise **and** correctly interpret their diagrams or calculations. • They relate these interpretations back to the original problem. • They evaluate their strategy.	❖ Using their results makes **two** comparisons, within the context of their task. Eg Fat content of cheese and meat AND water content of cheese and meat. ❖ Some evaluation of strategy Eg "I should have taken data from more foods", OR "The scale on my graphs was too small to see the patterns clearly", OR "I didn't need to calculate all three averages".
6	Where relevant, they allow for the nature of the sampling method in making inferences about the population. They evaluate the effectiveness of the overall strategy and make a simple assessment of limitations.		❖ I5 and … ❖ Evaluation is more sophisticated and includes comments on the limitations of their data and the implications of their findings. (Some reasons) Eg Assesses how "current" the data is and discusses whether the results will be true for ALL cheeses or foods, types of processing etc
7	Candidates comment on patterns and give plausible reasons for exceptions. They correctly summarise and interpret graphs and calculations. They make correct and detailed inferences from the data concerning the original problem using the vocabulary of probability. Candidates appreciate the significance of results they obtain.	• Candidates summarise and correctly interpret their results. • They show an appreciation of the significance of these results. • They recognise possible limitations in their strategy and suggest improvements (where appropriate)	❖ S6 awarded (no lower than S5) ❖ Clear understanding of findings. ❖ A correct and detailed evaluation, in statistical terms, of their strategy and use of techniques is made. ❖ Valid improvements are suggested with reasons.
8	Where relevant, they allow for the nature and size of the sample and any possible bias in making inferences about the population. They evaluate the effectiveness of the overall strategy and recognise limitations of the work done, making suggestions for improvement. They comment constructively on the practical consequences of the work.		❖ I7 and… ❖ Justifies improvements that may have been suggested and/or offers clear commentary showing an understanding of how the conclusions could be used (for example) by dieticians, doctors etc

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Unit Threshold Marks

Unit		Maximum Mark	a*	a	b	c	d	e	f	g	p	u
2331	Raw	50								27	14	0
	UMS	35								24	12	0
2332	Raw	50							36	19	12	0
	UMS	42							36	24	(18)	0
2333	Raw	50							32	16		0
	UMS	47							36	24		0
2334	Raw	50						37	19	12		0
	UMS	54						48	36	(30)		0
2335	Raw	50						25	12			0
	UMS	59						48	36			0
2336	Raw	50					28	14				0
	UMS	71					60	48				0
2337	Raw	50				27	12					0
	UMS	83				72	60					0
2338	Raw	50			29	14						0
	UMS	95			84	72						0
2339	Raw	50		32	15							0
	UMS	107		96	84							0
2340	Raw	50	30	13								0
	UMS	120	108	96								0

Notes

The above table shows the raw marks and the corresponding key uniform scores for each unit (module test) available in the June 2007 session.

Raw marks falling between two raw marks in the appropriate row above are converted, by a linear map, to a uniform score between the uniform scores that correspond to the two raw marks.

The grade shown in the above 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 on 2331 (M1) and 2332 (M2). It is not a valid grade within GCSE Mathematics and will not be awarded to candidates when they aggregate for the full GCSE (1966).
For a description of how UMS marks are calculated see;
http://www.ocr.org.uk/exam_system/understand_ums.html

Statistics are correct at the time of publication.

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Unit Threshold Marks

	Unit	**Maximum Mark**	**a***	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**u**
2341	Raw	100					64	51	39	27	0
	UMS	239					200	160	120	80	0
2342	Raw	100			70	49	38	27			0
	UMS	319			280	240	200	160			0
2343	Raw	100	71	54	37	20					0
	UMS	400	360	320	280	240					0
2344	Raw	48	43	37	31	26	22	18	14	10	0
	UMS	160	144	128	112	96	80	64	48	32	0
2345	Raw	48	43	37	31	26	22	18	14	10	0
	UMS	160	144	128	112	96	80	64	48	32	0

Specification Aggregation Results
Foundation Tier

	A*	A	B	C	D	E	F	G
Overall Threshold Marks					388	308	228	148
Percentage in Grade					9.2	33.3	32.6	17.3
Cumulative Percentage in Grade					9.2	42.5	75.1	92.4

The total entry for the examination was 23411

Intermediate Tier

	A*	A	B	C	D	E	F	G
Overall Threshold Marks			548	468	388	308		
Percentage in Grade			16.2	41.5	26.1	11.3		
Cumulative Percentage in Grade			16.2	57.7	83.8	95.1		

The total entry for the examination was 34784

Higher Tier

	A*	A	B	C	D	E	F	G
Overall Threshold Marks	708	628	548	468				
Percentage in Grade	16.6	33.9	37.6	10.8				
Cumulative Percentage in Grade	16.6	50.5	88.1	98.9				

The total entry for the examination was 17068

Overall

	A*	A	B	C	D	E	F	G
Percentage in Grade	3.7	7.7	16.0	21.6	14.9	15.6	10.2	5.4
Cumulative Percentage in Grade	3.7	11.4	27.4	49.0	63.9	79.5	89.7	95.1

75263 candidates were entered for aggregation this series

For a description of how UMS marks are calculated see;
http://www.ocr.org.uk/exam_system/understand_ums.html

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