

Mathematics A

General Certificate of Secondary Education 1962

Mark Scheme for the Components

June 2007

1962/MS/R/07

OCR (Oxford, Cambridge and RSA Examinations) is a unitary awarding body, established by the University of Cambridge Local Examinations Syndicate and the RSA Examinations Board in January 1998. OCR provides a full range of GCSE, A level, GNVQ, Key Skills and other qualifications for schools and colleges in the United Kingdom, including those previously provided by MEG and OCEAC. It is also responsible for developing new syllabuses to meet national requirements and the needs of students and teachers.

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

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

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

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

© OCR 2007

Any enquiries about publications should be addressed to:

OCR Publications
PO Box 5050
Annersley
NOTTINGHAM
NG15 0DL

Telephone: 0870 870 6622
Facsimile: 0870 870 6621
E-mail: publications@ocr.org.uk

CONTENTS

General Certificate of Secondary Education

Mathematics A (1962)

MARK SCHEMES FOR THE COMPONENTS

Component	Content	Page
1962/01	Paper 1 (Foundation Tier)	1
1962/02	Paper 2 (Foundation Tier)	11
1962/03	Paper 3 (Intermediate Tier)	17
1962/04	Paper 4 (Intermediate Tier)	21
1962/05	Paper 5 (Higher Tier)	27
1962/06	Paper 6 (Higher Tier)	33
1962/08	Coursework (OCR Marked)	39

Mark Scheme 1962/01
June 2007

	Final mark scheme details 1962/01	Mark	June 2007
1	(a) 170 (b) 1212.6 (c) 130 (d) 2.5(0) or 2½ (e) 2.1527	1 1 1 1 1	
2	(a) Three thousand seven hundred and six (b) 40700 (c) (i) 6440 Condone in words (ii) 6400 Condone in words (d) 500 or 5 hundred(s) or hundred(s) (e) 1, 3, 5, 15 or 3, 5 alone	1 1 1 1 1 2	B1 for any two (each wrong -1)
3	(a) $A = (0 , 2)$ $B = (4 , 1)$ (b) Plots at $(3 , - 4)$ and $(-2 , -3)$ (c) 11.5 or 11½ (d) Correct reflection. Condone freehand	1+1 1+1 2 2	M1 for attempt to count squares or other correct method M1 for 3 points correct or for a reflection in any other line (no errors)
4	(a) 13 (b) 473 (c) 450 (d) 18	1 1 2 2	B1 for sight of 550 or M1 for attempt to add 4 numbers and then subtract from 1000. B1 for sight of 198 or M1 for attempt to add and then subtract 180 from answer
5	(a) (i) Any acute angle (ii) Middle top (iii) Top right (b) Top left and bottom middle. (c) Bottom right and bottom left	1 1 1 1 1	Accept B anywhere in the triangle Accept C anywhere in the triangle or right angle symbol

6	(a) fourth (b) third (c) first	1 1 1	ie C -- B A
7	(a)(i) 13 Condone extra consecutive terms (ii) You keep on adding 2 It's the odd numbers or wtte You miss a number every time oe b)(i) 21 Condone extra consecutive terms (ii) 37 (c) 7^2 17 15	1 1 1 1 2	B1 for 7^2 or for 17 and 15
8	(a) 3 (b) 4 (c) 7	1 2 1	M1 for attempting to arrange in order
9	7	3	M2 for $7+7+4+4 - (6+5+4)$ or better or B1 for sight of 22 or 1
10	(a)(i) 75 (ii) 60 (b) 12 bars with 20p change	2 2 3	M1 for $300 \div 4$ oe or halving and halving or B1 for sight of 75 M1 for $300 \div 5$ oe or B1 for sight of 60 B2 for sight of 12 or $4(.)80$ Or M1 for $5(00) \div 40$ Or M1 for adding up 40's SC1 for sight of 4.8
11	(a) 2 points correctly plotted and joined with a ruled straight line (b)(i) 6.2 to 6.8 (or their reading.) $\pm \frac{1}{2}$ small sq (ii) 6.7 to 6.9 (or their reading.) $\pm \frac{1}{2}$ small sq (c) 77	1 1 1 1 2	Correct line scores 2 Dep on a ruled straight line Dep on a ruled straight line M1 for correct method

12	(a)(i) 33 (ii) 10 000 2x + 6y final answer (c)(i) added (instead of multiplying) (ii) t^6 cao	2 1 2 1 1	B1 for 25 or 8 seen B1 for (+)2x or (+)6y seen 'Multiplied 6 by t' oe or there are 6 t's NOTHING WRONG Condone T^6
13	(a) 42, 10 (b) Correct ruled line from x = 0 to x = 5 (c) 19 to 20	1+1 L2 L1 P1 1	Correct ruled line from x = 0 to x = 4 Or their 6 points plotted $\pm 1/2$ small sq
14	(a) (Vertically) opposite (angles) (b) 74, <u>line</u> with angles or 180 (c) 56, or 180-(50+(b)), <u>triangle</u> with angles or 180	1 1+1 1+1	Nothing incorrect in all 3 parts indep Or exterior angles of a triangle
15	(a) 50 (b) 150 (c) 3	1 2 2	M1 for $1 \times 7 + 2 \times 15 + \dots$ soi M1 for $their(b) \div their(a)$
16	(a) 9 cm 4cm at 90° 7cm at 90° Complete diagram (b) 61 to 65 Or their $x \pm 2^\circ$ (c) 32 cm ²	1 1 1 1 1 2 U1	Ruled lengths ± 0.2 cm, angles $\pm 2^\circ$ Dep on 1st 3 marks From their quadrilateral M1 for $\frac{1}{2} (9 + 7) 4$ or $7 \times 4 + \frac{1}{2} \times 2 \times 4$ or $9 \times 4 - \frac{1}{2} \times 2 \times 4$
17	152	3	B1 for sight of 200 B1 for sight of 48

18	(a) 0.4 oe	2	M1 for 1- (0.3 + 0.1 + 0.2) OR B1 for 0.6 seen
	(b) 0.3 oe	1	NOT 0.3/1 etc
19	(a) 4/7	2	M1 for 120/210 seen oe
	(b) 120	2	M1 for 100 ÷ 5 soi by 20

Mark Scheme 1962/02
June 2007

Mark numerical answers at most accurate point unless question indicates otherwise.

	Final mark scheme details 1962/02	Mark	June 2007
1	(a)(i) $\frac{1}{2}$ isw (ii) 25 (b)(i) 0.4(0) (ii) 0.4375, 0.438, 0.44 (iii) 40%, $\frac{7}{16}$, 0.45 (c)(i) 37 (ii) 36 (iii) 28 (iv) 20	2 1 1 1 1 1 1 1	B1 for $\frac{4}{8}$ or better
2	(a) Circle drawn with compasses (b) C and P labelled (c) radius and chord drawn	1 1+1 1+1	tol \pm 2mm If labels used, must be correct
3	(a) 280 (b) 810 (c) 16 (d)(i) kilometres (ii) metres (iii) litres, millilitres (iv) grams	2 2 3 1 1 1 1	M1 4×40 seen <i>without</i> 4×120 , or $160+120$, or $160+240$ M1 120×5 or 30×7 soi B1 for 47 seen B1 for 63 seen Accept km, ignore figs throughout Accept m Accept l, ml Accept g
4	Correct labels	1 1 1 1	Accept eg (a) to (d)

5	(a) Sunday (b) Friday (c) 10 (d) -6 (e) 40	1 1 1 1 2	SC1 for 8 and -4 Allow -10 M1 for $2 \times 5 + 30$ or $10 + 30$
6	(a)(i) Strings (ii) 17 (iii) $\frac{6}{81}$ (isw), $\frac{2}{27}$, 0.07(4..), 7(.4...)% (iv) eg no st in band or more ww or brass in band (b)(i) $\frac{23}{120}$ isw (ii) 64 (iii) 18 (iv) 99% (or 1%) not whole no. oe	1 1 1 1 1 2 2 1	Correct notation only Penalise notation only once on paper. M1 for $8 \times 120 \div 15$ oe M1 for any complete method
7	(a) One correct square (b) One correct square	1 1	(4 possibilities)
8	81	3	B2 for 80.75 or 80.7 or 80.8 or M1 for 9.5×8.5
9	(a) 30 (b)(i) 60 ± 2 (ii) 20	1 1 2	can ft from (i), M1 for $(i) \div 3$ or $\frac{60}{360} \times 120$ or $\frac{60}{90} \times (a)$

10	(a) 3.9 (b) 62.6 (c) 31.36 (d) 729	1 1 1 1	
11	(a) 150 (g) (b) 48	2 2	M1 for $\frac{24}{12} \times 75$ oe M1 for $\frac{500}{125} \times 12$ oe
12	(a) 52 (seconds) (b) 36 (seconds) (c) $\frac{3}{17}$, 18%, 17.6...%, 0.18, 0.176...	1 1 1	Correct notation (only penalise once)
13	(a)(i) 8 (ii) 6 (iii) $\frac{7}{5}$ isw, $1\frac{2}{5}$ or 1.4 (iv) 30 (b)(i) 64 (ii) -24 (iii) (No) $4n$ can be divided by 4 or 2 or even \times odd is even oe	1 1 2 1 1 1 2	M1 for $5x = 4 + 3$ Accept (Yes)(eg) n could be $\frac{3}{4}$ so $4n = 3$ B1 for less specific argument.
14	Correct enlargement	2	B1 for at least two correct lengths SC1 for similar figure with SF2 or SF4
15	USA by £6.60 to £6.70 (\$12.2 to \$12.3 or €9.40/€9.41) Correct units stated on answer line	4 U1	B3 for 56.7 to 56.8 <u>and</u> 63.3 to 63.4 or B2 for either seen or M1 for $\frac{105}{1.85}$ or $\frac{90}{1.42}$ (Ignore p if ans eg £6.60p)

16	(a) 76 (°) Isosceles or angles of a triangle (=180) (b)(i) 62 (°) Alternate or Z angles oe (ii) 41 (°)	2 R1 1 R1 1	M1 for $\frac{180 - 28}{2}$
17	(a)(i) Final answer $7(x + 2)$ (ii) Final answer $x(x - 5)$ (b) Final answer $10x - 15$ (c) 3.5, $3\frac{1}{2}$, $\frac{7}{2}$	1 1 1 3	Condone missing final bracket Condone missing final bracket M2 for $2x = 7$ B1 for $2x$ or 7 soi
18	Rectangle 10 by 2 Central rectangle 6 by 8	R1 H1	No extra lines No extra lines or curves SC1 correct outline only or correct plan
19	(a) 5 correct plots (acc. 1 mm) (b) Ruled line of best fit (c) Strict follow through from their line	2 1 1	B1 for at least 3 correct Between lines joining (13.0) to (32,33) and (13,10) to (32,43) at least from $x = 14$ to $x = 31$ Accept integer above or below their decimal

Mark Scheme 1962/03
June 2007

	Final mark scheme details 1962/03	Mark	June 2007
1	(a)(i) 33 (ii) 10 000 (b) $2x + 6y$ final answer (c)(i) adding (instead of multiplying) oe (ii) t^6 cao	2 1 2 1 1	B1 for 25 or 8 seen B1 for (+)2x or (+)6y seen Or 'multiplied 6 by t' ; 'there are 6 ts' oe Nothing incorrect Condone T^6
2	(a) 2, 1 (b) halve oe	1 1	Nothing incorrect Accept -16, -8, -4, -2,
3	(a) 42, 10 (b) correct ruled line from $x=0$ to $x=5$ (c)(i) 19 to 20 (ii) 1.15 to 1.3	1,1 L2 1 1	L1 for correct ruled line from $x=0$ to $x=4$ Or P1 for their 6 points plotted; $\pm\frac{1}{2}$ small square
4	(a) 15, 6 either order (b) 10, 90 either order (c) 9 cao	1,1 3 2	M1 for 5×2 soi by 10 or <i>their</i> $15 \times \textit{their}6$ and A1 for one correct answer M1 for <i>their</i> $90 \div \textit{their}10$ or 3^2 seen
5	0.40×80 oe = 32 $\frac{3}{4} \times 60$ oe = 45 77 men or 14 more men	M1 A1 M1 A1 A1	Or $10\% = 8$ and 4×8 Any complete correct method Nothing incorrect
6	(a) (vertically) opposite (angles) (b) 74 line and either angles or 180 (c) 56 or $180 - (50 + \textit{their} (b))$ triangle and either angles or 180	1 1 R1 / 1 R1	Nothing incorrect Nothing incorrect Nothing incorrect Or exterior angle of a triangle

7	(a) 50 (b) 150 (c) 3 cao	1 2 2	M1 for $1 \times 7 + 2 \times 15 + \dots$ soi M1 for <i>their</i> (b) \div <i>their</i> (a)
8	(a) 9cm 4cm at 90° 7cm at 90° complete 'correct' diagram (b) 61 to 65 or <i>their</i> $x \pm 2^\circ$ (c) 32 cm ²	1 1 1 1 / 1 2 U1	Ruled lengths $\pm 0.2\text{cm}$, angles $\pm 2^\circ$ Dep. on 1 st three marks scored For their quadrilateral M1 for $\frac{1}{2}(9+7)4$ or $7 \times 4 + \frac{1}{2} \times 2 \times 4$ or $9 \times 4 - \frac{1}{2} \times 2 \times 4$ oe On answer line or last line of work
9	(a) 50 cao (b) 200 cao	2 2	M1 for two of 40, 100, 80 seen M1 for 100 and 0.5(0) seen
10	(a) 0.4 oe (b) 0.3 oe	2 1	M1 for $1 - (0.3 + 0.1 + 0.2)$ Or B1 for 0.6 seen NOT 0.3/1 etc
11	<u>Allow embedded answers if not contradicted</u> (a) -1 (b) 2 (c) 44	3 3 2	M2 for $x+5=8 \div 2$ or better Or M1 for $2x+10=8$ And M1 for $2x= 8 - \textit{their} 10$ or better (indep) M1 for $8x-3x$ or better in an equation And M1 for $21-11$ or better in an equn. M1 for $\frac{x}{4} = 8+3$ or better or $x-12=32$ 4

12	<p>(a) $\frac{4}{7}$</p> <p>(b) 120</p> <p>(c) $r = 175, l = 75$</p> <p>(d) 5%</p> <p>(e) 160</p>	<p>2</p> <p>2</p> <p>3</p> <p>3</p> <p>2</p>	<p>M1 for $\frac{120}{210}$ seen oe</p> <p>M1 for $100 \div 5$ soi by 20</p> <p>M1 for $250 \div 10$ soi by 25 And A1 for one correct value seen</p> <p>M2 for $\frac{210-200}{200} (x 100)$ or $10\%=20$ or $1\%=2$ or M1 for $\frac{210}{200}$ seen</p> <p>M1 for $200 \div 5$ soi by 40 Or $0.8(0) \times 200$ oe or $10\%=20$</p>
13	<p>(a) reflection cao $y = x$ oe</p> <p>(b) correct translation</p>	<p>1</p> <p>1</p> <p>2</p>	<p>Nothing incorrect Indep</p> <p>B1 for either x or y move correct</p>
14	<p>(a) $10x + 1$ final answer</p> <p>(b) $x^2 + (1)x - 20$ final answer</p>	<p>2</p> <p>2</p>	<p>M1 for $4x+4$ or $6x-3$ seen</p> <p>B1 for three of $x^2, (+)5x, -4x, -20$ seen</p>
15	<p>(a) $(\pm)6$</p> <p>(b) $12 + 7\sqrt{2}$ final answer</p>	<p>2</p> <p>2</p>	<p>B1 for $\sqrt{36}$ or $2\sqrt{3}$ or $3\sqrt{4}$ seen</p> <p>B1 for $7\sqrt{2}$ seen</p>
16	<p>(a) 73 angle at centre</p> <p>(b) 107 or $180 - \text{their(a)}$ opposite angles of a cyclic quad. Or a quad. in a circle</p>	<p>1</p> <p>R1</p> <p>/ 1</p> <p>R1</p>	<p>Nothing incorrect. NOT O, origin, middle, etc</p> <p>Or, if 214 seen, angle at centre Nothing incorrect. If y comes from 180-146, correct reason scores 0</p>
17	<p>(a) Correct ruled or good freehand line drawn $x = 2.9$ to $3.1, y = 1.9$ to 2.1</p> <p>(b) $\frac{y+4}{2}$ oe final answer</p>	<p>L1</p> <p>dep1,1</p> <p>2</p>	<p>After L0 allow SC1 for $x=3, y=2$</p> <p>M1 for $y+4=2x$ oe Or SC1 for $y+4 \div 2$ or $4+y \div 2$</p>

18	<p>(a) (20), 37, 42, 46, (48), 50</p> <p><u>P marks dep on 'correct' cf attempt</u></p> <p>(b) <i>their</i> 6 points plotted</p> <p><u>J and (c) / marks dep on increasing graph</u></p> <p>Join <i>their</i> 6 points. Line or curve</p> <p>(c)(i) 13 or <i>their</i> rainfall using cf=25</p> <p>(ii) 6 or 50 – <i>their</i> cf using r=35</p>	<p>1</p> <p>/ P2</p> <p>/ J1</p> <p>/ 1</p> <p>/ 2</p>	<p>/ P1 for 3 points correct, $\pm\frac{1}{2}$ small sq. Or SC1 for / hts, consistent wrong posn.</p> <p>$\pm\frac{1}{2}$ small sq. Ignore to left of 10.</p> <p>$\pm\frac{1}{2}$ small sq.</p> <p>M1 for <i>their</i> cf using r=35 ; $\pm\frac{1}{2}$ small sq.</p>
----	--	--	--


Mark Scheme 1962/04
June 2007

Mark numerical answers at most accurate point unless question indicates otherwise.

	Final mark scheme details 1962/04	Mark	June 2007
1	(a) 3.29 (b) 9 (c) 80	1 1 2	SC1 for figs 8
2	(a) 150 (g) (b) 48	2 2	M1 for $\frac{24}{12} \times 75$ oe M1 for $\frac{500}{125} \times 12$ oe
3	(a) 52 (seconds) (b)(i) 36 (seconds) (ii) 37 (seconds) (Halfway) between 36 and 38 oe	1 1 1 1	
4	(a) Completed cuboid (b) 94 (cm ²)	1 3	Hidden detail not essential, allow good freehand Acc 2 mm SC2 for answer 47 or M2 for 2 (5 x 4 + 5 x 3 + 4 x 3) or B1 for area of one face soi (not by volume or perimeter)
5	<i>Allow embedded answers in parts (a) and (b) if not contradicted on answer line</i> (a)(i) $\frac{7}{5}$ isw , $1\frac{2}{5}$ or 1.4 (ii) 30 (b) $\frac{5}{4}$ isw, $1\frac{1}{4}$, 1.25 (c)(i) 64 (ii) - 24 (iii) (No) , 4n can be divided by 4 or 2 or even x odd is even oe	2 1 3 1 1 2	M1 for $5x = 4 + 3$ M1 for $19 = 4x + 14$ M1 (ind) for $4x = 19 -$ their 14 Accept (Yes) , n could be (eg) $\frac{3}{4}$ so $4n = 3$ B1 for less specific argument

6	3 www	4	B3 for 35 and 39 seen or M2 for figs(1.25 x 28 + 0.6 x 65) or B1 for either 35 or 39 seen
7	Correct enlargement	2	Acc 2 mm, accept good freehand B1 for at least two correct lengths or SC1 for similar figure with SF2 or SF4
8	Final answer $7x + 3y + 8z$	3	B2 for at least two correct terms seen or B1 for one correct term seen
9	USA by 6.60 to 6.70 oe www (\$12.25 or €9.40/€9.41) Correct units stated on answer line	4 U1	B3 for 56.7 to 56.8 <u>and</u> 63.3 to 63.4 seen or B2 for either seen or M1 for $\frac{105}{1.85}$ or $\frac{90}{1.42}$ (Ignore p if answer e.g £6.60p)
10	(a) 76 (°) Isosceles or angles of a triangle(=180) (b)(i) 62 (°) Alternate or Z angles oe (ii) 41 (°)	2 R1 1 R1 1	M1 for $\frac{180 - 28}{2}$
11	(a)(i) Final answer $7(x + 2)$ (ii) Final answer $x(x - 5)$ (b) Final answer t^3 (c)(i) $3x + 75 = 249$ or $3x = 249 - 75$ (ii) 58 (pence)	1 1 1 3 1	Condone missing final bracket Condone missing final bracket M2 for $3x + \text{figs } 75 = \text{figs } 249$ oe or B1 for $3x$ soi by figs $\frac{249 - 75}{3}$
12	(a) (i) 10 cm square Central circle, $r = 3 (\pm 0.2 \text{ cm})$ (ii) Rectangle 10 by 2 Central rectangle 6 by 8 (b) 226 to 226.5 (cm ³)	 B1 C1 R1 H1 3	<i>-1 for reversed answers unless clearly indicated</i> No extra lines Accept good freehand No extra lines No extra lines or curves (SC1 for correct outline only) M2 for $\pi \times 3^2 \times 8$ soi by figs 22 or M1 for $\pi r^2 h$ used

13	Correct trial and outcome $3 \leq x \leq 4$ Correct trial and outcome $3 < x < 4$ Correct trial and outcome $3.25 \leq x < 3.3$ Answer 3.3	1 1 1 1	Allow trials for both 3.2 and 3.3 if 3.3 selected
14	(a) 5 correct plots (acc. ± 1 mm) (b) (Strong) positive (c) Ruled line of best fit (d) Strict follow-through from their line	2 1 1 1	B1 for at least 3 correct Between lines joining (13,0) to (32,33) and (13,10) to (32,43), stretching from $x=14$ to $x = 31$ without crossing the parallels Accept integer above or below their decimal
15	(a) 11.2 (b)(i) 2.65×10^6 (ii) 1.92×10^5 (c) Final answer £5746.88	2 1 2 4	SC1 for 5.66 or 39.9 or B1 for figs 11... seen SC1 for $1.72(.) \times 10^5$ or B1 for figs 19.. B3 for 5740 to 5750 or M2 for 5000×1.0475^3 or SC2 for answer 746 to 747 or B1 for 237.5 or 5237.5 seen or SC1 for 16045.23
16	(a) 362 or 363 (b) 0.1,0.9,0.1,0.9,0.1 correctly placed (c) 0.81	2 2 2	M1 for $\frac{21}{25} \times 432$ soi by 362.8. or 357 B1 for 0.1 correctly placed once ft from their 0.9×0.9 M1 for $0.9 \times$ their 0.9 seen
17	(£) 180 000	3	M2 for $\frac{243000}{135} \times (100)$ or M1 for $135 \% = 243000$ soi
18	(a) 42.5 to 43 www (b) 25 www (c)(i) 18.75 to 18.8 or $0.75 \times$ their 25 (ii) 38°	3 3 2 1	M2 for $\sqrt{28^2 + 32^2}$ or M1 for $(AC^2 =) 28^2 + 32^2$ or SC1 for $\sqrt{32^2 - 28^2}$ soi by answer 15 to 16 M2 for $32 \tan 38^\circ$ or M1 for $\tan = \frac{BD}{32}$ or $\frac{32}{BD}$ M1 for $\frac{24}{32} \times$ their 25 or $24 \tan 38$

19	(a) 1.5, 0.5 (b) 5 or 6  plots (acc. ± 1 mm) Decreasing curve through their plots (c) 1.1 to 1.3	1 P1 C1 1	(4 plots minimum) Ignore $y = 2.5$ stated
----	--	----------------------------	--

Mark Scheme 1962/05
June 2007

	Final mark scheme details 1962/05	Mark	June 2007
1	(a) $r = 175$, $l = 75$ (b) 5% (c) 160	3 3 2	M1 for $250 \div 10$ soi by 25 And A1 for one correct value seen M2 for $\frac{210 - 200}{200} (\times 100)$ or $10\% = 20$ or $1\% = 2$ or M1 for $\frac{210}{200}$ seen M1 for $200 \div 5$ soi by 40 or $0.8(0) \times 200$ oe or $10\% = 20$
2	(a) reflection cao (in line) $y = x$ oe (b) correct translation (7, 1), (8, 1), (7, 3) (c) correct rotation (1, 4), (1, 5), (-1, 4)	1 1 2 2	Not mirror indep B1 for either x or y move correct B1 for clockwise rotation, 90° about (1, 3) OR anticlockwise rotation, 90° about other centre
3	(a) 120 cm^3 (b) 6 (cm)	3 U1 $2\sqrt{\quad}$	M2 for $\frac{1}{2} \times 4 \times 6 \times 10$ OR M1 for $\frac{1}{2} \times 4 \times 6$ indep ft their (a) $\div 20$ M1 $20x = \text{their (a)}$ or better
4	(a) -25 (b) 10 (c) $x \geq -4$ or $-4 \leq x$ final ans	2 3 3	B1 for $x/5 = 7 - 12$ or $x + 60 = 35$ B1 for $3x - 9 + 2x + 2 = 43$ + M1 $\sqrt{\quad}$ for $5x - 7 = 43$ or better (collecting terms) B1 for $5x + 6 \geq 2x - 6$ + M1 $\sqrt{\quad}$ for $5x - 2x \geq -6 - 6$ oe or better or SC1 for ans $(x) = , < , > , \leq -4$
5	(a)(i) (8, 8, 0) (ii) (4, 4, 0) (iii) (4, 4, 7) (b) 9	1 1 1 $2\sqrt{\quad}$	If 0 scored give SC1 for (8, 0, 8), (4, 0, 4) and (4, 7, 4) ft their $\sqrt{(4^2 + 4^2 + 7^2)}$ [bracket evaluated] M1 $\sqrt{\quad}$ for $\sqrt{(4^2 + 4^2 + 7^2)}$ oe (eg 2 stages)

6	<p>(a) Spin spinner a large number of times Use relative frequencies as probabilities</p> <p>(b) 0.16 oe proper fraction, decimal, %</p>	<p>1 1 3</p>	<p>If number stated it must be at least 50 Indep. Accept a good description of relative frequency</p> <p>ISW attempt to cancel, convert to acceptable form but not to ratio B1 for 0.4 seen M1 $(0 < P < 1)^2$</p>
7	<p>(a) $(\pm) 6$</p> <p>(b) $12 + 7\sqrt{2}$ final answer</p>	<p>2 2</p>	<p>B1 for $\sqrt{36}$ or $2\sqrt{3}$ or $3\sqrt{4}$ seen</p> <p>B1 for $7\sqrt{2}$ seen</p>
8	<p>(a) 73 angle at centre</p> <p>(b) $180 -$ their (a) or 107 opposite angles of a cyclic quad. Or..... quad in a circle</p>	<p>1 1 1√ 1</p>	<p>Nothing incorrect, NOT origin/O/middle etc</p> <p>Or, if 214 seen, angle at centre Nothing incorrect. Correct reason scores 0 if $y = 180 - 146$</p>
9	<p>(a) Correct line drawn $x = 2.9$ to 3.1, $y = 1.9$ to 2.1 dep</p> <p>(b) $x = \frac{y+4}{2}$ oe final answer</p>	<p>L1 1,1 2</p>	<p>Ruled or good freehand After L0, allow SC1 for $x = 3, y = 2$</p> <p>M1 for $y + 4 = 2x$ oe eg $y/2 = x - 2$ Or SC1 for $x = y + 4 \div 2$ or $4 + y \div 2$</p>
10	<p>(a) (20), 37, 42, 46, (48), 50</p> <p><u>P marks dep on 'correct' cf attempt</u> (b) Diagram – their 6 points</p> <p><u>J mark and (c) √ marks dep on increasing graph</u> - join their 6 plotted points</p> <p>(c)(i) 13 or their rainfall using cf = 25</p> <p>(ii) 6 or 50 – their cf using r = 35</p>	<p>1 P2√ J1√ 1√ 2√</p>	<p>P1√ for 3 points correct $\pm \frac{1}{2}$ small sq. or SC1 for √ hts, consistent wrong pos'n.</p> <p>$\pm \frac{1}{2}$ small sq, ignore to left of $r = 10$</p> <p>ft value $\pm \frac{1}{2}$ small sq</p> <p>M1 for their cf using $r = 35$; ft value $\pm \frac{1}{2}$ small sq</p>

11	<p>(a) $\frac{17}{33}$</p> <p>(b)(i) $\frac{1}{4}$ or 0.25</p> <p>(ii) 125</p> <p>(iii) $(\pm) \frac{1}{5}$ or 0.2</p>	<p>3</p> <p>1</p> <p>2</p> <p>1</p>	<p>B2 for 51/99 OR M1 for = 51.515151..... or 51.51</p> <p>B1 for 5 or $\sqrt{25}$ or 25^3, 15625 seen.</p> <p>Not - $\frac{1}{5}$</p>
12	<p>(a) 1.5, 3</p> <p>(b) Plotting 7 points Joining with smooth curve</p> <p>(c) minimum y value read off</p>	<p>1</p> <p>P1√</p> <p>C1√</p> <p>1√</p>	<p>Must be stated not read from graph</p> <p>$\pm \frac{1}{2}$ small square</p> <p>$\pm \frac{1}{2}$ small square horiz/vert. Must go below 1 must be increasing curve between $x = 3$ and 7 must not be ruled, excessively 'thick' or 'hairy'</p> <p>strict ft $\pm \frac{1}{2}$ small square, must be read off between 2 and 3 and be below 1</p>
13	<p>(a) $(x/360) \times \pi \times 10^2$ oe</p> <p>(b) their (a) = $k \times \pi \times 5^2$ $(x/360) \times \pi \times 10^2 = (1/3) \times \pi \times 5^2$ oe 30°</p>	<p>2</p> <p>M1</p> <p>M1</p> <p>A1</p>	<p>Condone eg $100 \pi /360/x$, B1 for $x/360$ or $360/x$ seen</p> <p>Their (a) must be $f(x)$</p> <p>For 'oe' $\div (360/x)$ must be resolved</p> <p>SC2 for 30 following fully correct ratio method</p>
14	<p>(a) $2n$ is even so $2n + 1$ is odd odd \times odd = odd</p> <p>(b)(i) 3 - 4</p> <p>(ii) $-\frac{1}{2}, 2$</p>	<p>1</p> <p>1</p> <p>1</p> <p>2</p> <p>3</p>	<p>Or after $4n^2 + 4n + 1$, anything $\times 4$ is even so $4n^2 + 4n + 1$ is odd SC1 for $2n^2 + 4n + 1$ with full explanation Anything incorrect scores 0</p> <p>M1 for $2n + 1 = \pm 7$ or $2n + 1 = -7$ Or if 0 scored, M1 for $4n^2 + 4n + 1 = 49$ or better</p> <p>M2 for $(2n + 1)[(2n + 1) - 5] (= 0)$ OR M1 for $4n^2 + 4n + 1 - 10n - 5 (= 0)$ with at most 1 error (except omission of term) + A1 for $4n^2 - 6n - 4 (= 0)$ OR B1 indep for 1 correct solution</p>

15	<p>(a) $16x^6y^2$</p> <p>(b) 1 and 11 fully supported by correct algebra</p>	2 6	<p>B1 for kx^6y^2 or $16x^ky^2$ or $16x^6y^k$ any $k \neq 0$</p> <p><u>Method 1</u> M2 attempt at $3(x + 1) + 8(x - 2) = (x - 2)(x + 1)$ A1 for $11x - 13$</p> <p><u>Method 2</u> M1 for <u>attempt at $3(x + 1) + 8(x - 2)$</u> $(x - 2)(x + 1)$ A1 for $\frac{11x - 13}{(x - 2)(x + 1)}$ M1 for their $11x - 13 = (x - 2)(x + 1)$</p> <p><u>Both methods</u> + A1 for $x^2 - 12x + 11 (= 0)$ oe or $x^2 - 12x = -11$ oe WWW + M1 for attempt to factorise their 3 term quadratic (x^2 and number term correct) or correct subst of their 3 term quadratic in formula or attempt to complete square to $(x + a)^2$ correct a^2</p> <p>B1 (indep) for 1 and 11 (Added to any marks scored)</p>
16	<p>(a) Correct graph (1, 2), (0, 1), (-1, 2)</p> <p>(b) Correct graph (-2, 1), (-1, 0), (0, 1)</p> <p>(c) Correct graph (-½, 1), (0, 0), (½, 1)</p>	1 1 1	<p>Ignore anything outside given range of points</p> <p>If 0 scored in (a) and (b), give SC1 for translations up 0.5 and left 0.5</p>
17	<p>(a) Independence</p> <p>(b) may not be independent due to eg heredity/genetics/family</p>	1 1	<p>Mark best Accept good description of independence Eg the first member of the family does not affect the second NOT anything about numbers in family, replacement, ambidextrous etc</p> <p>Mark whole of (a) and (b) Accept clear equivalents</p>
18	<p>(a)(i) $a + b + c$ oe</p> <p>(ii) $-a + b - c$ oe</p> <p>(iii) $a + b + \frac{1}{2}c$ oe</p> <p>(b) (i) N marked at midpoint of FG</p> <p>(ii) P marked at midpoint of FC</p>	1 1 1 1 1	<p>Mark on intention of being in the right place</p>

Mark Scheme 1962/06
June 2007

Unless stated otherwise:
for calculations, mark at the most accurate stage, unless method is destroyed,
for algebraic answers mark final answer for possible full marks.

	Final mark scheme details 1962/06	Mark	June 2007
1	Correct trial and outcome $3 \leq x \leq 4$ Correct trial and outcome $3 < x < 4$ Correct trial and outcome $3.25 \leq x < 3.3$ Answer 3.3	1 1 1 1	Allow trials for both 3.2 and 3.3 if 3.3 selected Not embedded answer
2	(a) 11.2 (b) 1.92×10^5 (c) £5746.88	2 2 4	SC1 for 5.66 or 39.9 or B1 for figs 11... seen SC1 for 1.72×10^5 or B1 for figs 19... seen B3 for 5740 to 5750 can be earned if go on for extra year or M2 for 5000×1.0475^3 or SC2 for answer 746 to 747 or B1 for 237.5 or 5237.5 seen or SC1 for 16045.23
3	(a)(i) p^7 (ii) p^3 (b)(i) $12x - 7$ (ii) $x^3 - 2x^2$ (iii) $x^2 - 2x - 3$ (c) $4n - 2$ oe	1 1 2 2 2 2	 B1 for $6x + 8$ or $6x - 15$ seen B1 for x^3 or $-2x^2$ seen. Accept $-x^2 \times 2$ or $-x^2 (2)$ B1 for $x^2 - 3$ or $+x - 3x$ seen B1 for $4n$ seen Condone other variable
4	(a) Construction arcs Angle bisector ruled (b) Arc centre C, radius 7 cm Perpendicular bisector of AC Accurate perpendicular bisector. Correct region	M1 A1 B1 M1 A1 A1	<i>Accuracy $\pm 2\text{mm}$ and $\pm 2^\circ$ throughout</i> Final arcs curve correct way relative to A SC1 for accurate bisector with no or wrong arcs. Arcs not necessary Dep on B1 earned Ignore shading outside angle BAC Allow if angle bisector not constructed

5	(£) 180 000	3	M2 for $\frac{243000}{135} \times (100)$ or M1 for 135% = 243000 soi by 63000
6	(a) $x+2+x+1+x+x+7-x+2x-3 = 23$ oe $4x + 7 = 23$ oe $x = 4$ (b) Equating coeffs. of x or y or correct substitution $10x = -5$ or $5y = 15$ oe $x = -\frac{1}{2}, y = 3$ oe	M1 A1 A1 M1 A1 A1	ww SC1 for $(x =) 4$ Two terms correct ww SC1 for both correct
7	(a) 42.5 to 43 www (b) 25 www (c)(i) 18.75 to 18.8 or $0.75 \times$ their 25 evaluated to 3 sf (ii) 38 ($^{\circ}$)	3 3 2 $\sqrt{}$ 1	M2 for $\sqrt{28^2 + 32^2}$ or M1 for $(AC^2) = 28^2 + 32^2$ or SC1 for $\sqrt{32^2 - 28^2}$ soi by answer 15 to 16 M2 for $32 \tan 38$ or $\frac{32 \sin 38}{\sin 52}$ or M1 for $\tan = \frac{BD}{32}$ or $\frac{32}{BD}$ or $\frac{BD}{\sin 38} = \frac{32}{\sin 52}$ oe M1 for $\frac{24}{32} \times$ their 25 or $24 \tan 38$
8	(a) 4 correct plots 3 ruled joins (b) 1 st block W = 2 cm, H = 9 cm 2 nd block W = 4 cm, H = 4.5 cm 3 rd block W = 2 cm, H = 6.5 cm 4 th block W = 1 cm, H = 3 cm (c) 47 or 48	P1 J1 B1 B1 B1 B1 1	Odd values between horiz lines, even values on horiz lines. Ignore left and right of points Condone freehand blocks SC2 for all four blocks of correct width and heights in correct ratio. Condone 2.2 or 2.3 for 2.25 etc or SC1 for first and last blocks of correct width and heights in ratio 3:1 or f ds of 1.8, 0.9, 1.3 and 0.6 stated. Gaps ≤ 2 mm loses mark for first 'correct' block

9	<p>(a) $y = 5x - 2$ oe isw</p> <p>(b) $y = -\frac{1}{5}x$ oe isw</p>	<p>3</p> <p>2√</p>	<p>Condone $y = 5x + -2$ M2 for $5x - 2$ or $y = 5x + c$, $c \neq 0$ or M1 for (grad =) 10/2 soi by $5x$ or B1 for $y = mx - 2$ condone $y = mx + -2$, $m \neq 0$</p> <p>√ from gradient in (a) M1 for grad = $\frac{-1}{their5}$ soi by -0.2 seen</p>
10	<p>(a) Greatest = 14.5 or 14.49^r, Least = 13.5</p> <p>(b) 114.75 final answer</p>	<p>2</p> <p>2</p>	<p>B1 for either. Condone reversed.</p> <p>M1 for 13.5×8.5 soi by 115 or better</p>
11	<p>$y = 2$ ruled $x = 1$ ruled $x + y = 9$ ruled</p> <p>Their triangular region indicated</p>	<p>1</p> <p>1</p> <p>1</p> <p>1√</p>	<p>Accuracy within 2mm of (0,9) and (9,0)</p> <p>√ for one horiz. line, one vert. line and one line with - ve gradient which give a triangle.</p>
12	<p>(a) 6</p> <p>(b)(i) 45 (.0...) www</p> <p>(ii) 18.3 to 18.4 www</p>	<p>1</p> <p>2</p> <p>3</p>	<p>M1 for $\frac{1}{2} \times 8 \times 13 \sin 120$</p> <p>M2 for $\sqrt{337}$ or $\sqrt{297}...$ or $\sqrt{63}...$ or M1 for $8^2 + 13^2 - 2.8.13\cos 120$ soi by $25\cos 120$</p>
13	<p>(a) $(x + 3)(x - 5) = 60$ $x^2 - 2x - 75 = 0$</p> <p>(b)(i) 9.7 and - 7.7</p> <p>(ii) 12.7 and 4.7 or better</p>	<p>M1</p> <p>E1</p> <p>3</p> <p>1√</p>	<p>Brackets must be correct or implied by further work</p> <p>Correctly <u>established</u> with no errors. There must be at least one middle step.</p> <p>B1 for $\frac{2 \pm \sqrt{\quad}}{2}$ or $(x - 1)^2$ and B1 for $\sqrt{(-2)^2 - 4.1. - 75}$ or $\sqrt{304}$ or $\sqrt{76}$</p> <p>Both B marks are implied by both answers rot</p> <p>ww SC1 for one correct value</p> <p>√ from their +ve value > 5</p>

14	(a) $4\sqrt{3}$ isw (b) $7 - 4\sqrt{3}$ isw	2 2	M1 for $\frac{12}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$ soi by $\frac{12\sqrt{3}}{3}$ or $\sqrt{\frac{144}{3}}$ B1 for $4 + 3$ or $-2\sqrt{3} - 2\sqrt{3}$ oe
15	17 or 16.6 to 16.7 www	3	M2 for $\tan^{-1} \frac{30}{\sqrt{60^2 + 80^2}}$ or M1 for $\tan = \frac{30}{\sqrt{60^2 + 80^2}}$
16	(a) $\frac{12}{110}$ oe www (b) $\frac{56}{110}$ oe www	3 4	<i>isw incorrect cancelling throughout question or conversion to decimals.</i> M2 for $\frac{4}{11} \times \frac{3}{10}$ or M1 for reduction by 1 anywhere (may be in tree diagram) M3 for $\frac{7}{11} \times \frac{4}{10} + \frac{4}{11} \times \frac{7}{10}$ or $2(\frac{7}{11} \times \frac{4}{10})$ unless spoiled by further wrong method. or $1 - (\text{their } a + \frac{7}{11} \times \frac{6}{10})$ or M2 for either $\frac{7}{11} \times \frac{4}{10}$ or $\frac{4}{11} \times \frac{7}{10}$ soi by $\frac{28}{110}$ or $1 - \text{their } a$ or $1 - \frac{7}{11} \times \frac{6}{10}$ or M1 for $\frac{4}{10}$ or $\frac{7}{10}$ seen (may be in diagram)
17	(a) $\pi y \cdot 2x + \pi y^2$ Their cone area = $4\pi y^2$ $2\pi yx = 3\pi y^2$ $x = \frac{3y}{2}$ (b) 980... www	B1 M1 M1 E1 4	Cone area must include $\pi y \cdot 2x$ For subtracting πy^2 Established with no errors SC1 for correct numerical verification with no errors M3 for $\frac{1}{3}\pi 9^2 \cdot 12 - \frac{1}{3}\pi 3^2 \cdot 4$ or M2 for $\frac{1}{3}\pi 9^2 \cdot 12$ soi by 1017... or $\frac{1}{3}\pi 3^2 \cdot 4$ soi by 37.6... or B1 for height removed = 4

Mark Scheme 1962/08
June 2007

MARKING GUIDE Winning Lines

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	<ul style="list-style-type: none"> 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. <p>Correctly counts the number of horizontal win lines of a single length in one diagram</p>	<ul style="list-style-type: none"> Candidates discuss their mathematical work and are beginning to explain their thinking. They use and interpret mathematical symbols and diagrams. <p>One diagram to show some (horizontal) winning lines.</p>	<ul style="list-style-type: none"> Candidates show that they understand a general statement by finding particular examples that match it. <p>Draws any new winning line OR finds the correct number of horizontal, vertical or total winning lines.</p>
2	<ul style="list-style-type: none"> 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. <p><i>Finds all the correct winning lines of a single length in any diagram.</i></p>	<ul style="list-style-type: none"> Candidates present information and results in a clear way, explaining the reasons for their presentation. <p>A series of diagrams showing winning lines and totals.</p>	<ul style="list-style-type: none"> Candidates search for a pattern by trying out ideas of their own. <p>Any set of three related results, eg <i>all</i> horizontals in three different diagrams.</p>
3	<ul style="list-style-type: none"> 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. <p>All the correct winning lines of a single length in three different diagrams.</p>	<ul style="list-style-type: none"> Candidates show understanding of situations by describing them mathematically using symbols, words and diagrams. <p>Diagrams and totals, probably tabulated and with notes in the form "I have found...", "I drew ...", that explain the work.</p>	<ul style="list-style-type: none"> Candidates make general statements of their own, based on evidence they have produced, and give an explanation of their reasoning. <p>Makes a (simple) generalisation that is correct for their results Eg one of</p> <ul style="list-style-type: none"> The number of horizontal = the number of verticals. The number of horizontals in a row = length – win + 1 $W = 2h+2$ etc
4	<ul style="list-style-type: none"> Candidates carry through substantial tasks and solve quite complex problems by breaking them down into smaller, more manageable tasks. <p>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.</p>	<ul style="list-style-type: none"> Candidates interpret, discuss and synthesise information presented in a variety of mathematical forms. Their writing explains and informs their use of diagrams. <p>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.</p>	<ul style="list-style-type: none"> Candidates are beginning to give a mathematical justification for their generalisations; they test them by checking particular cases. <p>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.</p>

5	<ul style="list-style-type: none"> Starting from problems or contexts that have been presented to them, candidates introduce questions of their own, which generate fuller solutions. <p>The candidate changes a variable and generates sufficient evidence so that a further generalisation may be made eg</p> <ul style="list-style-type: none"> Changes grid dimension(s). Changes the <i>length of the</i> win line <p>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</p>	<ul style="list-style-type: none"> Candidates examine critically and justify their choice of mathematical presentation, considering alternative approaches and explaining improvements they have made. <p>Shows C4 and then uses algebra to represent a generalisation, which must then show substitution eg</p> <ul style="list-style-type: none"> C_4 and $T_h = 2h + 2$ and substitutes $h = 13$ to find T_{13} <p>OR Decides to improve presentation in a way which is followed through to improve understanding eg</p> <ul style="list-style-type: none"> plots results on a graph and uses this to find gradient 2 hence $2h$. 	<ul style="list-style-type: none"> 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. <p>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.</p>
6	<ul style="list-style-type: none"> 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. <p>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.</p>	<ul style="list-style-type: none"> Candidates convey mathematical meaning through consistent use of symbols. <p>Candidate uses algebra with two, clearly defined variables, and manipulation of these, to find an answer. Eg.</p> <ul style="list-style-type: none"> 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) 	<ul style="list-style-type: none"> 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. <ul style="list-style-type: none"> Derives $2h(h-2)$, with reasoning, for square grid. <p>OR candidate considers a series of formulae and, as a result, makes further progress. Some examples are;</p> <ul style="list-style-type: none"> 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. <p>Reasoning must be shown in making the deduction from the results.</p>
7	<ul style="list-style-type: none"> 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. <p>Uses appropriate algebraic methods to find a formula for a three variable situation. Eg;</p> <ul style="list-style-type: none"> Win line, length of grid, height of grid. <p>Or derives suitably complex quadratic Eg.</p> <ul style="list-style-type: none"> 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) 	<ul style="list-style-type: none"> Candidates use mathematical language and symbols accurately in presenting a convincing reasoned argument. <p>Presents clear working, with annotation, to support their development that goes beyond S5.</p> <p>(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.</p>	<ul style="list-style-type: none"> Candidates' reports include mathematical justifications, explaining their solutions to problems involving a number of features or variables. <p>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.</p>
8	<ul style="list-style-type: none"> 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. <p>Win line, length of grid, height of grid, solution completely correct Or uses algebraic techniques to extend S7 formula by a further variable eg</p> <ul style="list-style-type: none"> Cube with lines in 3D and win line not equal to side length. Cuboid with lines viewed in 3D 	<ul style="list-style-type: none"> Candidates use mathematical language and symbols efficiently in presenting a concise reasoned argument. <p>Presents a clear, elegant construction of the formula, properly annotated, to support the S8 development, or very good S7. Concise algebra, without significant error.</p>	<ul style="list-style-type: none"> Candidates provide a mathematically rigorous justification or proof of their solution to a complex problem, considering the conditions under which it remains valid. <p>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.</p>

1962/08

Mark Scheme

June 2007

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.	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • 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.

1962/08

Mark Scheme

June 2007

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	<ul style="list-style-type: none"> Candidates collect or use data and record it. 	<ul style="list-style-type: none"> 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.		<ul style="list-style-type: none"> 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 situations by describing them	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> Two techniques (one grade F) used. Eg Tabulated results, mean fat content Results contain few obvious errors.
4	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.		<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Candidates collect/sample largely relevant data. They utilise appropriate calculations/techniques/ diagrams (see note 1 above) within the problem. Their results are generally correct. 	<ul style="list-style-type: none"> 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	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.		<ul style="list-style-type: none"> 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 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.	<ul style="list-style-type: none"> 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. <p>[Some minor errors may be condoned provided they do not detract from the quality of the argument.]</p>	<ul style="list-style-type: none"> 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			<ul style="list-style-type: none"> Presents multifaceted argument using data, grade A and B techniques and statistical language efficiently and effectively.

1962/08

Mark Scheme

June 2007

INTERPRET and DISCUSS [!]

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.	<ul style="list-style-type: none"> Candidates comment on their data. 	<ul style="list-style-type: none"> Makes a comment based on the data. Eg. "Goats cheese has no fat"
2			<ul style="list-style-type: none"> 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. They make some attempt to evaluate their strategy.	<ul style="list-style-type: none"> Candidates summarise some of their data. They make a statement based on their diagrams or calculations, which is relevant to the problem. 	<ul style="list-style-type: none"> 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			<ul style="list-style-type: none"> 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. 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.	<ul style="list-style-type: none"> Candidates summarise and correctly interpret their diagrams or calculations. They relate these interpretations back to the original problem. They evaluate their strategy. 	<ul style="list-style-type: none"> 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			<ul style="list-style-type: none"> 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. 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.	<ul style="list-style-type: none"> 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) 	<ul style="list-style-type: none"> 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			<ul style="list-style-type: none"> 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

**General Certificate of Secondary Education (Mathematics) (1962)
June 2007 Assessment Session**

Component Threshold Marks

Component	Max Mark	A*	A	B	C	D	E	F	G
1	100					66	50	35	20
2	100					60	45	31	17
3	100			77	54	42	30		
4	100			73	48	37	26		
5	100	73	57	41	25				
6	100	82	63	44	25				
7	48	43	37	31	26	22	18	14	10
8	48	43	37	31	26	22	18	14	10

Specification Options

Foundation Tier

FA

	Max Mark	A*	A	B	C	D	E	F	G
Overall Threshold Marks	338					250	200	150	100
Percentage in Grade						9.8	29.9	31.0	17.0
Cumulative Percentage in Grade						9.8	39.7	70.7	87.7

The total entry for the option was 5999.

FB

	Max Mark	A*	A	B	C	D	E	F	G
Overall Threshold Marks	338					250	200	150	100
Percentage in Grade						12.4	36.1	29.5	13.4
Cumulative Percentage in Grade						12.4	48.5	78.0	91.4

The total entry for the option was 4920.

FC

	Max Mark	A*	A	B	C	D	E	F	G
Overall Threshold Marks	338					250	200	150	100
Percentage in Grade						5.0	27.6	31.2	23.1
Cumulative Percentage in Grade						5.0	32.6	63.8	86.9

The total entry for the option was 202.

Intermediate Tier

IA

	Max Mark	A*	A	B	C	D	E	F	G
Overall Threshold Marks	418			350	300	250	200		
Percentage in Grade				14.6	43.7	24.6	11.2		
Cumulative Percentage in Grade				14.6	58.3	82.9	94.1		

The total entry for the option was 11254.

IB

	Max Mark	A*	A	B	C	D	E	F	G
Overall Threshold Marks	418			350	300	250	200		
Percentage in Grade				19.2	47.0	19.6	8.7		
Cumulative Percentage in Grade				19.2	66.2	85.8	94.5		

The total entry for the option was 11590.

IC

	Max Mark	A*	A	B	C	D	E	F	G
Overall Threshold Marks	418			350	300	250	200		
Percentage in Grade				1.6	24.3	35.2	20.8		
Cumulative Percentage in Grade				1.6	25.9	61.1	81.9		

The total entry for the option was 863.

Higher Tier

HA

	Max Mark	A*	A	B	C	D	E	F	G
Overall Threshold Marks	500	450	400	350	300				
Percentage in Grade		21.4	35.9	30.2	10.8				
Cumulative Percentage in Grade		21.4	57.3	87.5	98.3				

The total entry for the option was 4897.

HB

	Max Mark	A*	A	B	C	D	E	F	G
Overall Threshold Marks	500	450	400	350	300				
Percentage in Grade		21.2	37.0	29.9	9.9				
Cumulative Percentage in Grade		21.2	58.2	88.1	98.0				

The total entry for the option was 7532.

HC

	Max Mark	A*	A	B	C	D	E	F	G
Overall Threshold Marks	500	450	400	350	300				
Percentage in Grade		10.3	30.9	45.4	10.3				
Cumulative Percentage in Grade		10.3	41.2	86.6	96.9				

The total entry for the option was 97.

Overall

	A*	A	B	C	D	E	F	G
Percentage in Grade	5.6	9.7	16.2	25.1	13.8	12.8	7.1	3.6
Cumulative Percentage in Grade	5.6	15.3	31.5	56.6	70.4	83.2	90.3	93.9

The total entry for the examination was 47354.

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

OCR Customer Contact Centre

(General Qualifications)

Telephone: 01223 553998

Facsimile: 01223 552627

Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

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

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



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

© OCR 2007