OCR
RECOGNISING ACHIEVEMENT

GCSE

Mathematics A

General Certificate of Secondary Education **GCSE 1962**

Mark Schemes for the Components

June 2006

1962/MS/R/06

Oxford Cambridge and RSA Examinations

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General Certificate of Secondary Education

Mathematics A - 1962

MARK SCHEMES FOR THE COMPONENTS

Mark Scheme 1962/01
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	Final mark scheme details 1962/01	Mark	June 2006
1.	(a)(i) 1259	[1]	Condone spacers
	(a)(ii) 9521	[1]	Condone spacers
	(b)(i) ten or tens or 80	[1]	
	(b)(ii) thousand or thousands or 3000	[1]	
2.	(a) 184	[2]	**M1** for correct method, one error. Implied by 194 or 284
	(b) 600 or 612	[2]	**B1** for showing 100 or 6(.0)
	(c) 5 (ignore words)	[2]	**M1** for attempted 15 ÷ 2.95 or using repeated addition. **B1** for sight of 3.
3.	(a) Correct length (6.0 to 6.4)	[1]	
	(b)(i) 8.2 to 8.4 or 82 to 84 **mm**	[1]	
	(b)(ii) Cross correct, 4.0 to 4.3	[1]	
	(b)(iii) Parallel line drawn	[1]	
	(c)(i) Correct circle, compass drawn ± 2mm	[1]	Condone circle drawn from centre of S
	(c)(ii) T correct ± 2mm	[1]	
	(c)(iii) Perpendicular line drawn	[1]	
4.	(a) 80	[1]	
	35	[1]	
	(b) □ □ □ □ □	[1]	
	□ □	[1]	
	(c) Bar chart correct including correct spaces	[2]	**B1** for any two added bars correct.

5.	(a) £2.40(p) £1.25(p) £0.60(p) or 60(p) £0.90(p) or 90(p) 6.40(p) ft (b) £2.60	[1] [1] [1] [1] [1] [2]	Condone omission of units but penalize wrong units £60, 1.25p **M1** for correct method OR **B1** for figs 240 or figs 260 seen.
6.	(a) Acute It is less than 90° oe (b) Reflex It is bigger than180° oe (c) Obtuse It is between 90° and 180° oe	[1] [1] dep [1] [1] dep [1] [1] dep	
7.	(a) 2.6 oe (b) 0.3 oe (c) 1.5 oe (d) Arrow at 1.2 (between 1.15 and 1.25)	[1] [1] [1] [1]	
8.	(a) York (b) Liverpool (c) Norwich (d) Manchester	[1] [1] [1] [1]	
9.	(a) Points plotted Correct, Ruled, Straight line graph drawn. (b)(i) 350 ±10 ft (b)(ii) 180 ± 10 ft (c) 840 ± 20 Double the 300 value oe.	[1]+[1] [1] [1] [1] [1] [1]	 ft must give unique point ft must give unique point ft from their graph with explanation

10.	(a) 7f (b)(i) 5 (b)(ii) 8 (c)(i) 26 (c)(ii) 9	[1] [1] [1] [2] [3]	**B1** for sight of 16 or 10 or 13 **M2** for 30 = 12 + 2W or better OR **M1** for 30 = 2x6 + 2W OR **B1** for sight of 12, 15 or 18
11.	(a) 0.18 oe (b) -10 (c) $\frac{3}{10}$ oe (d) 64 (e) 1000	[1] [1] [1] [1] [1]	
12.	- - 13 - - - - 27 - 5 35 55 - - 63 -	[3]	**B1** for one correct **B2** for 3 correct
13.	(a) -2 (b) 9 cao (c) 2n – 10, nx2 -10, n2 – 10 Final answer	[1] [1] [2]	Ignore any adornments eg n= **B1** for 2n, n2 or nx2 seen or $n^2 – 10$ as final answer
14.	(a) £18.50 (b) 11	[1] [3]	**B1** for sight of 50 – 15 soi **B1** for sight of a value ÷ 3.5 implied by repeated addition **SC2** for an answer of 10
15.	(a) 30 (b) 35	[2] [2]	**M1** for 0.15 x 200 oe or 10%=20 and 5%=10 **M1** for $\frac{70}{200}$ (x 100) oe

16.	310 m^2	[2] [U1]	**M1** for sight of 3.1 x 10 x 10
17.	(a) Two lengths 8 cm ± 2mm 50 ± 2^o Complete, correct triangle (b) 20 or 20.25 or 20.16 WWW	[1] [1] [1] [3]	Look for different orientation **M1** for 8 or 8.1cm and 5cm OR 6.4 and 6.3 seen And **M1** for base x height÷2
18.	(a) Correct translation (b) Correct reflection (c) Rotation 90^o (anticlockwise) or 270^0 clockwise about O	[1] [2] [1] [1] [1]	 **B1** for a correct reflection in a vertical line or in y= -1 Accept 'turn' nb NOT 'Move' Accept 'quarter' anticlockwise or 'three quarters' clockwise Oe eg origin Any incorrect transformation mentioned scores 0
19.	(a) Points plotted (4 or 5 correct) (b) The higher one mark, the higher the other oe. (c) Ruled Line of best fit drawn. (d) Follow through from their ruled straight line only, positive gradient only (e) No - She probably would have scored higher oe	[2] [1] [1] [1] [1]	**B1** 2 or 3 correct Accept positive correlation With at least 2 points on either side and crossing German axis between 0 and 3

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1.	(a) six million (b) 7 043 (c) 10, 25, 15, 7 (d)(i) 5640 (d)(ii) 5600	**1** **1** **1+1+1+1** **1** **1**	
2.	circumference, radius, centre, diameter	**1+1+1+1**	Correctly placed, condone circle, arc
3.	(a) $\frac{7}{15}$ isw (b) Correct shading (c)(i) $\frac{2}{10}, \frac{4}{20}$ (c)(ii) Top-heavy or = 5	**1** **1** **2** **1**	**B1** for 1 correct and 0 wrong, or 2 correct and 1 wrong
4.	(a) 8 daffs, 7 tulips (b) 21 plums, 22 $\surd$ apples	**1+1** **1+1**	
5.	(a)(i) unlikely (a)(ii) likely (a)(iii) impossible (a)(iv) unlikely (b)(i) X at 0.5 (b)(ii) Y at 0	**1** **1** **1** **1** **1** **1**	accept impossible accept impossible tol 2mm, **SC1** correct arrows unlabelled

6.	(a) 10.7	**1**	± 2 mm
	(b)(i) prism	**1**	
	(b)(ii) 10.7	**1**✓	± 2 mm
	(b)(iii) M and/or D	**1**	
7.	(a) 33	**2**	**M1** for complete method combining areas
	(b) Line of symmetry drawn	**1**	2mm tolerance
8.	(a) P (2,4), Q (6,0)	**1+1**	Ignore labels throughout question
	(b) Points plotted	**1+1**	**SC2** all four reversed
9.	52.29 or 5229 pence	**4**	**B3** for 52.3 or **SC3** for 1047.96 or 1051.11 **M1** for J-M soi 756 **M1** for (J±M) × 6.5 soi 4914 or 104481 or J or M × 6.5 soi 54697.5 or 49783.5 **M1** (dep on 2nd M1) for ans + 3.15 or 6.3(oe)
10.	(a)(i) 10.89	**1**	
	(a)(ii) 2.5	**1**	
	(a)(iii) 1.6	**2**	**B1** for 1.5(…)
	(iv) 66	**2**	**B1** for 22 or 462
	(b)(i) 64	**1**	ignore extras
	(b)(ii) × 2 or double	**1**	
	(b)(iii) 20	**1**	ignore extras
11.	(a) 825 www	**3**	**M1** six numbers added ÷ 6 and **B1** 4950
	(b) 2400	**2**	**B1** 800 seen or **M1** 3200 ÷ 4

12.	(a) 5.6 (kg) (b) 4.7 (kg) (c) 3.4 (kg)	**1** **1** **1**	Lost if decimal point missing Not lost if decimal point missing Not lost if decimal point missing
13.	(a) 365 to 385 (m) (b) 124 to 128 (°) (c) Due East (± 2°) AC 3.8 to 4.2 cm	**2** **1** **1** **1**	**B1** for 7.3 to 7.7 seen Allow mark for due East of B
14.	(a) 1.09(2) or 109cm (b) 28	**2** **2**	**M1** for $1.95\times\frac{56}{(100)}$ soi by figs 109(2) **B1** for figs 28 or **SC1** for 196
15.	(a) 3.5, $3\frac{1}{2}, \frac{7}{2}$ (b) Final answer $16x - 5y$ (c) Final answer $5x + 15$	**2** **2** **1**	**M1** for $2x = 12 - 5$, Condone embedded ans **B1** for $16x$ or $-5y$ seen
16.	(a) (£) 47.34 (£) 68.75 55 (m) (b) (£) 8.95	**1** **1**√ **2** **3**	 116.09 – *their* 47.34 **M1** for $\frac{theirfigs68.75}{figs125}$ soi **M2** for $114\times\frac{117.5}{(100)}$ soi by figs 133(95) or **M1** for $114\times\frac{17.5}{(100)}$ soi by figs 1995

17.	(a) 37 (Angles on) straight line (= 180) (b) 71 (c) 38 Alternate or Z (angles)	**1** **R1** **2** **1** **R1 (dep)**	180 seen or used, condone half circle **M1** for $\frac{(180-38)}{2}$
18.	Correctly placed correct triangle	**3**	2 mm accuracy **SC2** correctly placed, SF3 **B2** for 2 correct vertices **B1** correct size wrong position
19.	(a)(i) AB (a)(ii) 3 (b) 1200	**1** **2** **2**	 **M1** 12 ÷ 4 **M1** 3000 ÷ *their* time, eg 2.3, 150, 230 or figs 12
20.	(a)(i) 0.2 (a)(ii) 25 b) 18	**2** **1** **3**	**M1** 1 – (0.4 + 0.25 + 0.15) **B2** 18.(…).more than 2 figs or **M1** 2.9 × 2π **SC1** Calculation involving π(not 3), correctly rounded to 2 sf

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1.	(a) 0.18 oe (b) -10 (c) $\frac{3}{10}$ oe (d) 64 (e) 1000	1 1 1 1 1	
2.	- - 13 - - - - 27 - 5 35 55 - - 63 -	3	**B1** for one correct **B2** for three correct
3.	(a) -2 (b) 9 cao (c) 2n – 10 or n x 2 – 10 or n2 – 10 final answer only	1 1 2	 Not embedded Ignore any adornments eg n= **B1** for 2n , n2 or n x 2 seen or $n^2 - 10$ as final answer
4.	(a) 600 (b) 30	2 2	**M1** for 400 x 1.5 soi **M1** for 60 ÷ 2 soi
5.	Parallelogram Kite	1 1	Allow rectangle, square, rhombus Allow arrow head
6.	(a) 30 (b) 35	2 2	**M1** for 0.15 x 200 oe OR 10%=20 <u>and</u> 5%=10 **M1** for $\frac{70}{200}$ (x 100) oe
7.	*Accept answers embedded if not contradicted* (a) 5 (b) 3	 2 3	 **M1** for 3x = 11+ 4 or better Or for <u>complete</u> flow and reverse **M1** for correctly collecting numbers to one side of an equation **and M1** for correctly collecting x to the other side of an equation

8.	(a) Two lengths 8 cm ± 2mm 50 ± 2º Complete, correct triangle (b) 20, 20.25, 20.16 www	1 1 1 3	 **M1** for 8cm or 8.1cmand 5cm seen or 6.4cm and 6.3 cm seen **And M1** for *their* basexheight÷2
9.	(a) 0.2 oe (b) 0.45 oe	2 2	**M1** for 1 – (0.25+0.1+0.1+0.1+0.25) soi by 0.47oe **M1** for 0.25+0.1+0.1 soi by 0.27 oe
10.	30	2	**M1** for two of 20, 6, 4 soi by 120
11.	(a) Correct translation (b) Correct reflection (c) *Any incorrect transformation mentioned scores 0* Rotation 90º (anticlockwise) or 270 clockwise about O oe	1 2 1 1 1	 **B1** for a correct reflection of A in any vertical line or in y = -1 Accept 'turn' Accept '¼ anticlockwise' or '¾ clockwise'
12.	(a) 8a + 4b cao (b) 4x + 2y + 12z cao	2 3	**M1** for trying to **add** more than 3 sides **B1** for each correct term seen up to a max of B2, these may be unsimplified
13.	(a) Correct heights Correct mid-points and 'straight' line joins *Mark the best part of each statement* (b) Eg. Mr P had shorter journeys oe Mr P had none over 40 oe Mrs S did more miles overall From 0-10 Mr P does 38 and Mrs S does 12 Both have few journeys between 30 and 40 Etc – anything sensible	H1 P1 1 1	May be bar chart heights. ½ small square accuracy NOT just a description of the shape Or reference to total number of journeys

14.	4 www	6	**M1** for 5x4(x2) soi **M1** for 5x3x2 oe soi **M1** for 3x4x2 oe soi **M1** for *their* total ÷ 20 oe soi **A1** for 3.(…) soi by answer 4, MUST be from 74 *4 ww scores 0*
15.	(a) 10x – 6 or 10x + -6 final answer (b) x^2+ 8x + 15 final answer	2 2	**M1** for 6x + 2 or 4x – 8 **M1** for any **three** of x^2, 5x, 3x, 15 seen
16.	(a) x = 2.5 oe cao (b) (y=) -5.2 to -5.3 (c) 0.18 to 0.22, 4.78 to 4.9	1 1 1,1	 Not as a coordinate point **SC1** for both correctly given as coordinates
17.	*Condone consistent use of alternative letter* x + 4 and x – 6 seen 3x – 2 = 40 oe x = 14 R=14, C=18, I=8	 M1 / M1 / A1 B1	 *Their* 3 terms in x = 40 Strict follow through from their equation
18.	(a)(i) 2^7 (ii) 2^6 (b)(i) $2.37(00..) \times 10^7$ (ii) (0).000503 (c) $6\frac{11}{12}$ oe mixed number (d) $11\frac{7}{8}$ or 11.875	1 1 1 1 3 3	 **M1** for $6 + \frac{1}{4} + \frac{2}{3}$ or $\frac{9}{4} + \frac{14}{3}$ with at most one numerical error **and M1** for $6 + \frac{a+b}{12k}$ or $\frac{x+y}{12k}$ oe **OR SC1** for 6.916 to 6.92 or 2 5/12 **M1** for $5 \times 2\frac{3}{8}$ oe soi **and A1** for $10\frac{15}{8}$ or $\frac{95}{8}$ oe
19.	(a) volume (b) length (c) area	1 1 1	Allow V, L, A

20.	$y \geq 2x - 4$ oe $x + y \leq 4$ oe $x \geq 1$ oe	1 1 1	Condone omission of equality throughout
21.	(a) Correct diagram (b) 0.64 oe	2 2	**B1** for 0.8 correct once **M1** for *their* 0.8 x 0.8 with no further work
22.	(a) 55 Tangent (perp to) radius/diameter (b) 35 (Angle in) semi-circle (is 90) OR Angle at centre/angle subtended from diameter Angles, triangle, 180	1 1 1 1 1	 **B2** for Alternate segment or Opposite segment Must mention 2 of the 3 parts, nothing incorrect
23.	*In both parts: If choice, 0 unless one value clearly indicated.* (a) Any negative value) and correctly evaluating 2y) (b) Any value $0 < x \leq 1$ Correctly evaluating x^2	 1 1 1	 dep. on a correct x value

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Unless stated otherwise:

for calculations, mark at the most accurate stage, unless method is destroyed,

for algebraic answers mark final answer

1.	(a) 5.6 (kg) (b) 4.7 (kg) (c) 3.4 (kg)	**1** **1** **1**	Lost if decimal point missing Not lost if decimal point missing Not lost if decimal point missing
2.	(a) 38 Added 3 oe or 3*n* + 5 oe	**1** **1**	
3.	(a) 365 to 385 (m) (b) 124 to 128 (°) (c) Due East (± 2°) AC 3.8 to 4.2 cm	**2** **1** **1** **1**	**B1** for 7.3 to 7.7 seen Allow mark for due East of B
4.	(a) 1.09(2) (b) 28 (c)(i) (10 + 5) × 4 – 2 = 58 (ii) 10 + 5 × (4 – 2) = 20	**2** **2** **1** **1**	**M1** for $1.95 \times \frac{56}{(100)}$ soi by figs 109(2) **B1** for figs 28 or **SC1** for 196
5.	(a)(i) 36 (ii) 3.5, $3\frac{1}{2}, \frac{7}{2}$ (b) Final answer 16*x* – 5*y* (c) Final answer 5*x* + 15	**1** **2** **2** **1**	Condone embedded Condone embedded **M1** for 2*x* = 12 – 5 soi **B1** for 16*x* or – 5*y* seen
6.	(a) (£) 47.34 (£) 68.75 55 (m) (b) (£) 8.95	**1** **1**√ **2** **3**	 116.09 – their 47.34 **M1** for $\frac{\textit{theirfigs}68.75}{\textit{figs}125}$ soi **M2** for $114 \times \frac{117.5}{100}$ soi by figs 133(95) or **M1** for $114 \times \frac{17.5}{100}$ soi by figs 1995

7.	(a)(i) (Jack or both combined) Greater number of spins oe (ii) $\frac{21}{100}$, 0.21, 21% isw (b) 80	**1** **2** **2**	 **SC2** for Liam followed by $\frac{3}{20}$, 0.15, 15% isw or 'Both' followed by $\frac{24}{120}$ oe **B1** for denom 100, 120 or 20 soi or $\frac{21}{their 100}$ **M1** for $\frac{1}{6}$ soi
8.	(a) 71 (b)(i) 38 Alternate or Z (angles) (ii) 85 Corresponding or F (angles)	**2** **1** **R1** **1** **R1**	**M1** for $\frac{(180-38)}{2}$ dep Accept complete alternative reasons dep Accept complete alternative reasons
9.	(a) 17 (condone embedded) (b)(i) Final answer $3(t-4)$ (ii) Final answer $x(x+5)$ (c) $(x=)\ \frac{y+2}{5}$	**3** **1** **1** **2**	**M1** for $2x - 14$ or $x - 7 = 20 \div 2$ seen **M1**(ind) for next ft correct step Accept $(x \pm 0)(x+5)$ **M1** for $5x = y + 2$ soi or **SC1** for $(x=)\ \frac{\pm y \pm 2}{5}$
10.	Correctly placed correct triangle	**3**	2 mm accuracy **SC2** correctly placed triangle SF 3 or **B2** for 2 correct vertices **B1** correct size, wrong position
11.	(a) 3.48 (b) 2.3 (c) $3\frac{1}{5}, \frac{16}{5}$ oe fraction (d) 6.74×10^9	**2** **2** **2** **2**	**B1** for figs 34(.) seen or 3.5 or **SC1** answer 5.44 **B1** for figs 22(.) seen or 2.30.. or **SC1** answer 0.51 **B1** for 3.2 oe seen **B1** for figs 674 seen
12.	(a) 54.5 to 54.6 or 55 www cm^2 (b) $6^2 + 8^2 = 10^2$, 10 = 2 × 5 or diam =10 or angle in semicircle is 90° or angle on a diameter is 90°	**5** **2**	**M1** for $\pi 5^2$ and **A1** for 78.5 to 78.6 **M1** for $\frac{1}{2} \times 8 \times 6$ and **A1** for 24 **U1** **M1** Pythagoras soi or **B1** mention of 90° or right angle

13.	(a)(i) 42	**2**	**M1** for $\frac{72}{5+7}(\times 7)$ soi by 30
	(ii) 18 to 18.1 (%)	**3**	**M2** for $\frac{85-72}{72}(\times 100)$ or **M1** for denominator 72 or % of 72 found for trial & improvement
	(b) (£) 20.5(0)	**3**	**M2** for figs $\left(\frac{615}{3}\right)$ or **M1** for 6.15 is 30% or $k - \frac{70}{100} \times k \approx 6.15$
14.	Correct trial $3 \leq x \leq 4$ Correct trial $3 < x < 4$ Correct trial $3.3 < x \leq 3.35$ Final answer 3.3	**1** **1** **1** **1**	 or both f(3.3) and f(3.4) evaluated
15.	(a) 168.5 (cm)	**4**	**M1** for use of midpoints (± 0.5) **M1** for $\sum hf$, all h values within intervals, max 1 error, soi by 13480 **M1** for $\sum hf \div 80$
	(b) Box from 159 to 168 Median in box at 163 Whiskers to 145 and to 180	**1** **1** **1**	half small square accuracy half small square accuracy After 0, **SC1** for median = 163 stated
16.	(a) 39.8 to 40(°) www	**3**	**M2** for $\tan^{-1}\frac{30}{36}$ or **M1** for tan = $\frac{30}{36}$
	(b) 54 to 54.1 cm www	**3**	**M2** for 620 sin 5° or **M1** for sin (5°) = $\frac{h}{620}$
17.	(a) $x < 2.5$, $x < 2\frac{1}{2}$, $x < \frac{5}{2}$	**2**	**M1** for $2x < 5$ oe Condone ≤
	(b)(i) $(x+1)(x-8)$	**2**	**SC1** for $(x \pm 1)(x \pm 8)$
	(ii) – 1, 8	**1**√	2 separate answers
18.	(a)(i) 2	**2**	**M1** for $\frac{11-3}{4(-0)}$ oe
	(ii) $y = 2x + 3$ oe	**1**√	follow through from their 2
	(b) $y = 2x$ (+ 0) oe	**1**√	follow through from their 2 or their (a)(ii)

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1.	(a) Correct heights Correct mid-points and 'straight' joins (b) Mr P had shorter journeys oe Mr P had none over 40 oe Mrs S did more miles overall From 0 – 10 Mr P does 38 and Mrs S does 12 Both have few journeys between 30 and 40 Etc - anything sensible	**H1** **P1** **1** **1**	May be bar chart heights NOT just a description of the shape Or reference to total number of journeys
2.	(a)(i) $x < 1.5$ or 3/2 (ii) correct line (b) $4x = 12$ oe $x = 3$, $y = -2$	**2** **1√** **M1** **A1**	**B1** for $4x - 2x <$ 3 condone $\leq$ for B1 at least one unit long, accept shading etc. accept $-8y = 16$ oe **SC1** for both answers with no algebra seen
3.	(a) Correct triangle (0, 4) (0, 5) (2, 4) (b)(i) Rotation 90° Clockwise oe about (3, 1) (ii) Reflection in the line $y = -x$ oe	**1** **1** **1** **1** **1** **1**	Accept freehand Accept turn indep accept 270° with no direction indep. 2nd transformation soi scores 0. Condone use of vector as centre do not treat as implying 2nd transformation Accept mirror but not flip 2nd transformation soi scores 0 Allow if full description in wrong space.
4.	(a)(i) 2^7 (ii) 2^6 (b)(i) $2.37(000..) \times 10^7$ (ii) (0).000503 (c) $6\frac{11}{12}$ oe mixed number (d) $11\frac{7}{8}$ or 11.875	**1** **1** **1** **1** **3** **3**	**M1** for $6 + \frac{1}{4} + \frac{2}{3}$ or $\frac{9}{4} + \frac{14}{3}$ with at most 1 numerical error **+ M1** for $6 + \frac{a+b}{12k}$ or $\frac{x+y}{12k}$ **SC1** $2\frac{5}{12}$ for 6.916 to 6.92 **M1** for $5 \times 2\frac{3}{8}$ or $5 \times \frac{19}{8}$ oe soi + **A1** for $10\frac{15}{8}$ or $\frac{95}{8}$ oe

5.	(a) volume (b) length (c) area	**1** **1** **1**	Allow V, L, A
6.	(a) £2.00 or 2 (b) 120 (p) or £1.20 (c) Line from (5, 8) to (10, 12) (d) 129 - 131	**1** **2** **2** **2**	 **M1** for 6/5 or 600/5 soi by figs 12 ± ½ sm sq **B1** for any line from (5, 8) with positive grad't or for £4 seen, or any line with gradient 0.8 If two lines mark worst **M1** for C ÷ 8 where C > 800 (or £8) or **SC1** for 105
7.	(a) $y \geq 2x - 4$ oe $x + y \leq 4$ oe $x \geq 1$ oe (b) –1	**1** **1** **1** **2**	condone omission of equality throughout **M1** for line $x + y = k$ ($k \neq 4$) drawn or point (1, – 2) seen or – 2 and 1 used
8.	(a) correct diagram (b) 0.64 oe	**2** **2**	**B1** for 0.8 correct once **M1** for *their* (0.8 × 0.8) with no further work
9.	(a) 55 Tangent (perp to) to radius\ diameter (b) 35 (Angle in) semicircle (is 90) OR Angle at centre or angle subtended from diameter Angles (sum), triangle, 180	**1** **1** **1** **1** **1**	 **B2** for Alternate (or opposite) segment Must mention 2 of the 3 parts, nothing incorrect
10.	(a)(i) any negative value) And correctly evaluated $2y$) (ii) Any value $0 < x \leq 1$ correctly evaluating x^2 (b)(i) 25 (ii) 9 (iii) –21	**1** **1** **1** **1** **1** **1**	*In both parts: If choice, 0 unless one value clearly indicated.* Dep on correct x value

11.	(a) $\sqrt{3}/2$	**3**	**B2** for $\sqrt{3}$ or **M1** for $2^2 - 1^2$ or **SC1** for $\sqrt{5} / 2$
	(b) $\sqrt{3}/3$	**2**	**M1** for 1/ (their $\sqrt{3}$) condone $\sqrt{1}/\sqrt{3}$
12.	(a) $3(2a + b)(2a – b)$ Or $3(–2a – b)(–2a + b)$ final ans	**3**	**B1** for $3(4a^2 – b^2)$ condone $1b^2$ and $(3 – 0)$ or **B2** for $(6a + 3b)(2a – b)$ or $(2a + b)(6a – 3b)$ or $3(2a + b)(2a – b)$ seen **SC2** for $3(4a + b)(4a – b)$ or **SC1** for $(2a + b)(2a – b)$
	(b) $\frac{cx–b}{a + 1}$ oe	**3**	**M1** for $ay + y = cx – b$ oe + **M1**√ for $y(a + 1) = cx – b$ must be 2 y terms
	(c) (y =) $4x^2 – 20x + 27$	**5**	**M1** for $z = 5 – 2x$ + **M1**√ for y = [their $(5 – 2x)$]^2 + 2 + **M2**√ for $25 + 4x^2 – 10x – 10x$ If less than 3 scored **SC3** for $ax^2 + bx + c$ with 2 of a, b, c correct (non-zero)
13.	(a) widths 0-2, 2-6, 6-10, 10-20, 20-30 correct heights	**W1** **H2**	**H1** for four correct heights (ie heights in right proportion) Or **M1** for attempt to divide frequency by width
	y axis scaled and labelled correctly (FD) or area key given	**S1**	
	(b)(i) 57	**1**	
	(ii) 84	**2**	**B1** for 28 or 56 WWW seen
14.	(a) $\frac{960}{x–1} – \frac{960}{x} = 32$ oe with indication of ÷ 32	**2** **1**	**M1** for $960/x$ seen could include 32 eg $960/32x$ Or $960/(x –1)$ dep on previous 2 marks.
	(b) 6 (km/h) with full correct supporting evidence	**7**	**M2** for $30x – 30(x – 1) = x(x – 1)$ soi or **M1** for common denominator $x(x – 1)$ with attempt at $30x – 30(x – 1)$ as numerator + **B1** for +30 on LHS or $x^2 – x$ on RHS (ind) soi by subsequent working + **A1** for $x^2 – x – 30$ (= 0) or $–x^2 + x + 30$ or $x^2 – x = 30$ 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√ + **A1** for $x = 6$ and $x = –5$ dep on A1 **B1** for 6 only, added to any marks scored.

15.	(a) Basic Sine Wave Shape Range – 3 to 3 Max only at t = 3, Min only at t = 9, Zero only at 0, 6, 12 (b) 2 cao	**1** **1** **1** **1**	Flat at top and bottom, must be at least 1 cycle
16.	$\sqrt{20}$ or $\sqrt{10} = \sqrt{2} \times \sqrt{5}$ $\sqrt{12}$ or $\sqrt{6} = \sqrt{2} \times \sqrt{3}$	**1** **1**	–1 for any subsequent error seen
17.	(a)(i) **c** + 4**a** oe (ii) **c** + **a** oe (iii) $\frac{4}{3}$ (**c** + **a**) oe or $\frac{4}{3}$ (their (ii)) (iv) $\frac{1}{3}$**c** + $\frac{4}{3}$**a** or $\frac{1}{3}$(**c** + 4**a**) (b) $\overrightarrow{OB}$ = k $\overrightarrow{CD}$ soi $\Rightarrow \overrightarrow{OB}$ // $\overrightarrow{CD}$ or trapezium	**1** **1** **1√** **2** **1**	Accept $1\frac{1}{3}$ **B1** for – **c** + their (iii) or **a** + $\frac{1}{4}$ (their (iii)) Column vectors: give 0 for (i) and (ii) but then allow in (iii) and (iv) (iii) and (iv) must be vectorially correct. Dep on (a)(i) and (iv) correct

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For calculations mark at the most accurate unless specific accuracy is required.

For algebraic simplifications and factorizations mark the final answer.

1.	(a) 2.3	**2**	**B1** for figs 22 or 2.30... seen or **SC1** for answer 0.51
	(b) $3\frac{1}{5}, \frac{16}{5}$ oe fraction	**2**	**B1** for 3.2 oe seen
	(c) 6.74×10^9	**2**	**B1** for figs 674 seen
2.	(a) 8	**3**	**M2** for $\frac{(162 - 150)}{150} \times 100$ oe or **M1** for denominator of 150
	(b) 3900	**3**	**M2** for $\frac{6708}{1.72}$ oe or **M1** for 6708 is 172% or k + $\frac{72k}{100} \approx 6708$
3.	(a) $6^2 + 8^2 = 10^2$, diam = 10 or angle in semicircle is 90^o or angle on a diameter is 90	**2**	**M1** Pythagoras soi or **B1** for mention of 90^o or mention of semi-circle
	(b) 15.2 to 15.3 www cm^2	**5** **U1**	**M1** for $\pi 5^2 \div 2$ **and A1** for 39.2 to 39.3 or **SC1** for $\pi 5^2$ soi and **M1** for $\frac{1}{2} \times 8 \times 6$ **and A1** for 24
4.	Correct trial for $3 \le x \le 4$ Correct trial for $3 < x < 4$ Correct trial for $3.3 < x \le 3.35$ Final answer 3.3	**1** **1** **1** **1**	Trials rounded or truncated to whole numbers or better or **both** f(3.3) and f(3.4) evaluated
5.	(a) 168.5 (cm)	**4**	**M1** for **use** of midpoints (± 0.5) **M1** for ∑hf, all h values within intervals, accept lower boundaries as within intervals. Max 1 error soi by 13480 **M1** for ∑hf ÷80
	(b)Box from 159 to 168 Median in box at 163 Whiskers to 145 and to 180	**1** **1** **1**	½ sm.square accuracy ½ sm square accuracy After 0 scored, **SC1** for median = 163 stated
6.	(a) 39.8 to 40(^{o}) www	**3**	**M2** for $\tan^{-1}\frac{30}{36}$ or **M1** for tan = $\frac{30}{36}$
	(b) 54 to 54.1 cm www	**3**	**M2** for $620\sin 5^o$ or **M1** for $\sin(5^o) = \frac{h}{620}$
7.	(a) $x^3 + 3x$	**2**	**B1** for x^3 or $3x$
	(b) $8x + 3$	**2**	**B1** for $2x + 6$ or $6x - 3$
	(c) (x =) 7 www	**3**	**M1** for $\frac{x}{2} - \frac{15}{2} = 3 - x$ or $x - 15 = 2(3 - x)$ and **M1**√ step to collect like terms

8.	(a)(i) 2 (ii) $y = 2x + 3$ oe (b) $y = 2x$ (+0) oe	**2** **1**√ **1**√	**M1** for $\frac{11-3}{4(-0)}$ oe √ from their 2 √ from their 2 or their a(ii) for gradient ≠ 0
9.	(a) −1.8 and 2.8 (b) −2.5 to −2.6 and 1.5 to 1.6	**2** **3**	**B1** for either −1.8 or 2.8 Ignore correct y coordinate **SC1** for (−1.8,k) and (2.8,k) for k ≠ 3 **M2** for ruled line through (0, 2) and (2, −2) 2mm accuracy or **M1** for sloping line through (0 , 2) or line with gradient −2 **B1**√ for their two values from their sloping line
10.	Angle $BCD = 43^o$ Alternate segment oe Angle $BCE = 137^o$ **and** angles on a straight line	**1** **1** **1** **dep**	 Dependent on 1st mark earned
11.	(a) $v = \frac{14\sqrt{d}}{\sqrt{10}}$ oe or $4.4(27\ldots)\sqrt{d}$ or $4.43\sqrt{d}$ or√(19.6d) (b) (d =) 40 or rounds to 40	**3** **2**	**M2** for $k = \frac{14}{\sqrt{10}}$ or 4.4(27…) seen or **M1** for $v = k\sqrt{d}$ oe or v ∝ k√d. Allow k numerical ≠ 1 **M1**√ for correct substitution in their formula involving $\sqrt{d}$ or d^2
12.	30 .47(…) or 30.48 www 30	**5** **R1 ft**	**METHOD A** **M1** for (AD =) 15tan 32 soi by 9.37(3).. **And B1** for XC = 29 **and M2** for (BC=) $\sqrt{"29"^2+(their 9.37(3)...)^2}$ not 44 for 29 Their 9.37… from trig. or **M1** for BC^2 = "29"^{2} + (their 9.37(3)…)^2 not 44 for 29 **METHOD B** **M2** for (*BD =)* $\frac{15}{\cos 32}$ oe soi by 17.6(8…) Or Pythag after AD = 9.37(3….) or **M1** for $\frac{15}{BD}$ = cos 32 oe **and M2** for $\sqrt{44^2+(their BD)^2-2\times 44\times(their BD)\times\cos 32}$ with correct combination. or **M1** for 44^2 + (their *BD*)^2 - 2×44×(their*BD)*×cos32 for rounding their BC to the nearest whole number

13.	(a) Correct proof (b) (x =) $2\frac{1}{2}$ and -6 www	**3** **3**	**M1** for $2x^2 + 4x + 3x + 6$ seen **M1** for $(x + 2)(2x + 3) = 36$ **M2** for $(2x – 5)(x + 6)$ or $\frac{-7 \pm \sqrt{7^2 - 4 \times 2 \times -30}}{2 \times 2}$ or **M1** for $(2x + 5)(x – 6)$ or $\sqrt{7^2 - 4 \times 2 \times -30}$
14.	(arc =) 85 … after trig used or answer rounds to 85	**5**	**M2** for $\tan^{-1}\frac{45}{110}$ soi by 22.2(4…) or **M1** for tan = $\frac{45}{110}$ **and M2** for $\frac{2 \times theirBOA}{360} \times 2\pi \times 110$ or **M1** for $\frac{2 \times theirBOA}{360}$ seen **SC0** for 85 with no working
15.	126 www	**5**	**M3** for 145.5 ÷1.15 **and A1** for 126.5… or 127 or **M2** for their max 145 ÷ 1.15 [max > 145] or **M1** for correct max or correct min value of either seen or their >145 ÷ their < 1.2 **indep R1**$\surd$ for rounding down
16.	$2\sqrt{5}$	**2**	**M1** for multiplying by $\frac{\sqrt{5}}{\sqrt{5}}$ soi by $\frac{\sqrt{50(0)}}{\sqrt{5}}$

17.	(a) $\frac{1}{210}$ oe www	**2**	**M1** for $\frac{1}{7}\times\frac{1}{6}\times\times\frac{1}{5}$ or for attempt to reduce by1 in denominator
	(b) $\frac{2}{7}$ www	**3**	**B2** for $\frac{60}{210}$ oe fraction or **M2** for $\frac{5}{7}\times\frac{4}{6}\times\frac{3}{5}$ or **M1** for subtracting 1 in numerators or denominators
	(c) $\frac{2}{21}$ www	**3**	**B2** for $\frac{20}{210}$ oe fraction or **M2** for $\frac{2}{7}(\times1)\times\frac{2}{6}$ or $\frac{1}{7}(\times1)\times\frac{2}{6}+\frac{1}{7}(\times1)\times\frac{2}{6}$ or $\frac{2}{7}\times\frac{4}{6}\times\frac{2}{5}$ + $\frac{2}{7}\times\frac{2}{6}\times\frac{1}{5}$ or $\frac{1}{7}(\times1)\times\frac{2}{6}$ or **M1** for $\frac{2}{7}\times\frac{4}{6}\times\frac{2}{5}$ **or** $\frac{2}{7}\times\frac{2}{6}\times\frac{1}{5}$ or (7 or 9);(odd or even)'(even) or for all 20 possibilities listed. or **SC1** for 2/7 × (6/6) × 2/5 or 2/7 × (6/6) × 1/5
18.	(a) $\frac{x}{x-3}$ www final answer	**3**	**M1** for numerator = $x(x-3)$ **M1** for denominator = $(x-3)^2$
	(b)(i) $a = 4$, $b = 5$	**3**	**M1** for $8x = 2ax$ oe **M1** for $21 = a^2 + b$ oe Or **B1** for one correct After 0 scored **SC1** for $x^2 + ax + ax + a^2$ oe
	(ii) 5	**1**√	√ for their *b*

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MARKING GUIDE This guide gives some of the many examples of evidence that candidates may produce. It indicates possible lines of development that may allow the award of each mark, depending on the supporting context.

Matchstick Patterns [Ao1]

MARK FOR EACH STRAND		Strategy	Communication	Reasoning
1	Works on single width of rectangle.	• **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.** Counts and records the other matchstick patterns correctly (14, 26)	• **Candidates discuss their mathematical work and are beginning to explain their thinking. They use and interpret mathematical symbols and diagrams.** Counts and records the other matchstick patterns correctly (14, 26)	• **Candidates show that they understand a general statement by finding particular examples that match it.** Correctly constructs a further, correct, matchstick pattern.
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 one more total from a correct matchstick pattern	• **Candidates present information and results in a clear way, explaining the reasons for their presentation.** Records drawings and results in an orderly manner.	• **Candidates search for a pattern by trying out ideas of their own.** Records three related results for one series of matchstick patterns.
3	Works on a series of matchstick patterns → one case solved	• **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.** Systematically finds three or more related matchstick totals, linking these to the width of the pattern.	• **Candidates show understanding of situations by describing them mathematically using symbols, words and diagrams.** Records drawings and results utilising tables and a minimum of text to annotate the work.	• **Candidates make general statements of their own, based on evidence they have produced, and give an explanation of their reasoning.** Makes a general statement about the results obtained. E.g. the number of matchstick in a "two high" series is 4w+2, OR "The number of matches increases by 4 each time".
4		• **Candidates carry through substantial tasks and solve quite complex problems by breaking them down into smaller, more manageable tasks.** Provides an algebraic generalisation for one system of matchstick patterns.	• **Candidates interpret, discuss and synthesise information presented in a variety of mathematical forms. Their writing explains and informs their use of diagrams.** Records drawings and results utilising tables and a clear commentary that links and annotates the work.	• **Candidates are beginning to give a mathematical justification for their generalisations; they test them by checking particular cases.** Tests the generalisation made in R3 on new data, showing the predicted result and the derived result from the associated diagram.

5	Changes a variable/ broadens the task → working with algebra → two variables.	• **Starting from problems or contexts that have been presented to them, candidates introduce questions of their own, which generate fuller solutions.** Generates sufficient data to be able to generalise another pattern. Further patterns may be generalised but, if the same counting and "pattern spotting" techniques are employed the assessment stops here.	• **Candidates examine critically and justify their choice of mathematical presentation, considering alternative approaches and explaining improvements they have made.** C4 AND produces an algebraic formula into which values are substituted and the formula is evaluated.	• **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.** Explains WHY a formula works, relating the solution to the shape of the patterns. E.g. Uses the geometry of the pattern … "Each vertical contains two matches and will always be one more vertical than the width because… " to reason out the formula.
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.** Applies an algebraic method to analyse the relationships within the patterns and, hence, generate further formulae. E.g., sets the height at h matches and the width as w, deriving a formula for the number of matches as 2w + h(w+1). Solves the cube lattice case.	• **Candidates convey mathematical meaning through consistent use of symbols.** Uses algebraic manipulation, with clearly defined variables and logical reasoning, in pursuit of the formula(e) sought in 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.** Considers a series of formulae with varying heights (for example) to determine a formula for patterns of any height and width, oe.
It is regarded as unlikely that candidates at Foundation/Intermediate tier will generate evidence to allow the award of 7 or 8 marks. However, it is the responsibility of the examiner to judge whether the work submitted justifies such an award.				
7	Three or four variables, well explained, [3D], clear methods, variables defined, and symbols used to present their argument.	• **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.** The same techniques as S6 employed to research the number of matchsticks in 3D structures, such as lattices in the form of cuboids, or to explore triangular or tessellating arrays and make significant progress.	• **Candidates use mathematical language and symbols accurately in presenting a convincing reasoned argument.** Construction of formulae to give the total number of matchsticks in cuboid lattices using variables for length (l) width (w) and height (h), showing clear reasoning.	• **Candidates' reports include mathematical justifications, explaining their solutions to problems involving a number of features or variables.** Construction of formulae to give the total number of matchsticks in cuboid lattices using variables for length (l) width (w) and height (h), showing clear reasoning and not mere statement of cases.

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.** The candidate uses algebraic means only to explore their chosen S7 development.	• **Candidates use mathematical language and symbols efficiently in presenting a concise reasoned argument.** Clear concise algebraic reasoning for at least one development into 3D completely solved, or a tessellating lattice.	• **Candidates provide a mathematically rigorous justification or proof of their solution to a complex problem, considering the conditions under which it remains valid.** Algebraic proof for the formula presented for the S8 case.

MARKING GUIDE This guide gives some of the many examples of evidence that candidates may produce. It indicates possible lines of development that may allow the award of each mark, depending on the supporting context.

Spiral Bound [Ao1]

MARK FOR EACH STRAND		Strategy	Communication	Reasoning
1	Works on the given spiral.	• **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.** Finds the length of any spiral, most likely to (-3, 3) [30].	• **Candidates discuss their mathematical work and are beginning to explain their thinking. They use and interpret mathematical symbols and diagrams.** Records the working for the length of one spiral.	• **Candidates show that they understand a general statement by finding particular examples that match it.** Finds the correct length of the spiral to any point.
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 the correct length of a different portion of the spiral.	• **Candidates present information and results in a clear way, explaining the reasons for their presentation.** Sets out the work of S2 neatly with a clear drawing, lengths indicated and totals shown.	• **Candidates search for a pattern by trying out ideas of their own.** Finds three related results for lengths of spirals.
3	Works on a series of related portions of the spiral → one case solved	• **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.** Finds the length of any three related spirals. Eg to consecutive turning points on the spiral.	• **Candidates show understanding of situations by describing them mathematically using symbols, words and diagrams.** Records drawings and results utilising tables and minimum text to annotate the work.	• **Candidates make general statements of their own, based on evidence they have produced, and give an explanation of their reasoning.** Makes a general statement that is correct for the results obtained. Eg The spiral is made up of pairs of consecutive whole numbers, the sum of horizontals are triangular numbers, $\frac{n(n+1)}{2}$ etc
4		• **Candidates carry through substantial tasks and solve quite complex problems by breaking them down into smaller, more manageable tasks.** Makes a correct general statement about the length of any part of the spiral. Eg the sum of n horizontal components are $\frac{n(n+1)}{2}$	• **Candidates interpret, discuss and synthesise information presented in a variety of mathematical forms. Their writing explains and informs their use of diagrams.** Records diagrams of spirals, tables of results and calculations in an orderly way. These are linked with a commentary that clearly explains the work that has been done.	• **Candidates are beginning to give a mathematical justification for their generalisations; they test them by checking particular cases.** Tests the generalisation made in R3 on new data, showing the predicted result and the derived result from the associated diagram.

5	Changes a variable/ broadens the task → working with algebra → two variables.	• **Starting from problems or contexts that have been presented to them, candidates introduce questions of their own, which generate fuller solutions.** Extends spiral systematically and records spiral lengths to related corners, breaking down lengths to component parts. Eg to points on odd numbered corners, y = -x, etc	• **Candidates examine critically and justify their choice of mathematical presentation, considering alternative approaches and explaining improvements they have made.** Following the award of C4, an algebraic formula is stated and a clear substitution into this is shown.	• **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.** Explains WHY a formula works, using the geometry of the pattern. Eg. Shows that the series of lengths may be rearranged to form two series of triangular numbers, because of the geometry of the spiral.
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 method to determine a formula for a further series of lengths to related corners. Eg as a pair of added triangular numbers or by applying difference method.	• **Candidates convey mathematical meaning through consistent use of symbols.** The algebraic method employed in the extension (S6 or better) utilises variables that are clearly defined and some manipulation is employed. This may be part of a "leading diagonal" method to determine a formula.	• **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.** Eg. Examines work on original spiral and extends this to a spiral in which the spaces are twice as large.
7	[Two or] three variables, well explained, [complex relationships], clear methods, variables defined, and symbols used to present their argument.	• **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.** Applies well-explained algebraic methods to explore all spiral lengths within one quadrant. May achieve such formula(e) in terms of coordinates.	• **Candidates use mathematical language and symbols accurately in presenting a convincing reasoned argument.** Algebraic methods used on [at least] the S6 development to convey clear meaning and make progress. The work is annotated and demonstrates clear thinking about the task.	• **Candidates' reports include mathematical justifications, explaining their solutions to problems involving a number of features or variables.** Provides thorough reasoning for why some results are valid for the S7 development, referring to the geometry of the spiral.
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.** Fully generalises given spiral by extending work to all four quadrants OR by constructing rectangular (or triangular) spirals and applies algebraic methods to derive further formulae.	• **Candidates use mathematical language and symbols efficiently in presenting a concise reasoned argument.** Algebraic methods used on [at least] the S7 development. The work is annotated, succinct and conveys clear meaning and understanding of the task.	• **Candidates provide a mathematically rigorous justification or proof of their solution to a complex problem, considering the conditions under which it remains valid.** Clear algebraic reasoning for the complete S7 development and attempts to extend this reasoning to work in other quadrants or to formulae obtained within the new spiral(s) considered.

SPECIFY and PLAN [S] **OCR Set Task 2006 Marking Guide "Rich World, Poor World"**

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	Examples
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.	❖ Attempts the question. Eg Records some data for African/European countries.
2				❖ Identifies some relevant data and makes an extended attempt to answer the question. Eg Records some data for some African/European countries and draws graph(s).
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 … …structure 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 Intent to use data to find mean incomes for chosen countries.
4				❖ Writes one or more aims and produces a clear plan that will allow one aim to be met. Eg. Intends selecting data from some African/European countries, comparing GDPs and drawing comparative graphs.
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. Intends to compare GDP with life expectancy, wealth with birth rate … using appropriate graphs and calculations.
6				❖ Writes one or more aim 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 negative correlation between GDP and death rate" 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. 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.	▪ 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 incorporates individual tasks. Each task stated in statistical terms and carefully specified. The tasks are brought together within the overall hypothesis. Eg. Intends to show that life in Europe is better than in Africa. Explains how the data used will define "life" and "better".
8				❖ 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 relevant 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	Examples
1	Candidates collect data with limited relevance to the problem and plan. The data are collected or recorded with little thought given to processing.	▪ Candidates collect or use data and record it.	❖ Evidence haphazardly recorded from S1.
2	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 of at least 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 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.	▪ 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, comparative bar chart to show incomes, mean incomes… ❖ Results contain few obvious errors.
4			❖ The results of C3 are linked with a commentary. ❖ Grade E and D techniques used appropriately.
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 of at least 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..]	❖ Two techniques (one grade C) used. Makes own hypothesis and plans to test this by Eg Scatter graph to link GDP to life expectancy (D), [type of correlation discussed (C)] ❖ At least 25 data items chosen. ❖ Results contain few obvious errors
6			❖ As C5 but with grade B techniques and little redundancy in their use. ❖ Statistical language used accurately.
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 of at least 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 S5 awarded. ❖ Statistical language used accurately and consistently. ❖ Three techniques (two at least grade B) used. Eg Compares life expectancies of two + countries with cf curve, draws box and whisker plots and comments, scatter graphs interpreted.
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	Examples
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. "I have found some income figures for African/European countries."
2			❖ Any summary or comparative comment, based on their results. Eg "People in Luxembourg are the wealthiest."
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 "Most of the European countries have a higher GDP than the African countries."
4	They make some attempt to evaluate their strategy.		❖ I3 AND S3 ❖ **One** comparison made within the task. ❖ Summary of findings, related back to the 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.	❖ Makes **two** comparisons of results within the context of their task Eg GDP and life expectancy for Europe and Africa AND GDPs of both continents. ❖ Some evaluation of strategy Eg "I should have taken data from more countries", OR "The scale on my graphs was too small to see the patterns clearly."
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. Eg Assesses how "current" the data is and discusses whether the results will be true for ALL inhabitants of the countries. ❖ Reasons are beginning to be given for the evaluative statements. ❖ Techniques are interpreted clearly.
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) ❖ A correct and detailed evaluation, in statistical terms, of their strategy and use of techniques is made. ❖ Valid improvements are suggested (see generic criteria) and some reasons for suggestions will be given. ❖ Most techniques are interpreted correctly using accurate statistical language and some are related to the task.
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… ❖ Fully 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 Aid agencies. ❖ All techniques are interpreted correctly using accurate statistical language and all findings related to the task.

General Certificate of Secondary Education (Mathematics) (1962)
June 2006 Assessment Series

Component Threshold Marks

Component	Max Mark	A*	A	B	C	D	E	F	G
1	100					68	53	39	25
2	100					60	45	30	15
3	100			70	45	36	27		
4	100			66	39	29	19		
5	100	66	50	35	20				
6	100	76	55	37	19				
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						9.2	30.5	30.8	16.6
Cumulative Percentage in Grade						9.2	39.7	70.5	87.2

The total entry for the option was 5800

FB

	Max Mark	A*	A	B	C	D	E	F	G
Overall Threshold Marks	338					250	200	150	100
Percentage in Grade						13.0	35.5	29.0	14.8
Cumulative Percentage in Grade						13.0	48.5	77.5	92.4

The total entry for the option was 5784

FC

	Max Mark	A*	A	B	C	D	E	F	G
Overall Threshold Marks	338					250	200	150	100
Percentage in Grade						7.3	29.3	36.6	24.4
Cumulative Percentage in Grade						7.3	36.6	73.2	97.6

The total entry for the option was 42

Intermediate Tier

IA

	Max Mark	A*	A	B	C	D	E	F	G
Overall Threshold Marks	418			350	300	250	200		
Percentage in Grade				13.8	43.9	24.2	11.7		
Cumulative Percentage in Grade				13.8	57.7	81.9	93.6		

The total entry for the option was 10822

IB

	Max Mark	A*	A	B	C	D	E	F	G
Overall Threshold Marks	418			350	300	250	200		
Percentage in Grade				19.5	45.6	21.9	9.0		
Cumulative Percentage in Grade				19.5	65.1	87.0	96.0		

The total entry for the option was 13198

IC

	Max Mark	A*	A	B	C	D	E	F	G
Overall Threshold Marks	418			350	300	250	200		
Percentage in Grade				0.3	21.9	40.9	21.6		
Cumulative Percentage in Grade				0.3	22.3	63.2	84.8		

The total entry for the option was 638

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	30.8	31.8	14.2				
Cumulative Percentage in Grade		21.4	52.2	84.0	98.2				

The total entry for the option was 5051

HB

	Max Mark	A*	A	B	C	D	E	F	G
Overall Threshold Marks	500	450	400	350	300				
Percentage in Grade		25.4	35.8	27.8	9.9				
Cumulative Percentage in Grade		25.4	61.2	89.0	98.9				

The total entry for the option was 8876

HC

	Max Mark	A*	A	B	C	D	E	F	G
Overall Threshold Marks	500	450	400	350	300				
Percentage in Grade		13.6	15.9	47.7	22.7				
Cumulative Percentage in Grade		13.6	29.6	77.3	100				

The total entry for the option was 44

Overall

	A*	A	B	C	D	E	F	G
Percentage in Grade	6.7	9.5	16.3	25.0	14.1	12.7	6.8	3.6
Cumulative Percentage in Grade	6.7	16.2	32.5	57.5	71.5	84.2	91.1	94.7

The total entry for the examination was 50255

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