OCR
RECOGNISING ACHIEVEMENT

GCSE

Mathematics A

Mark Schemes for the Components

January 2010

CONTENTS

General Certificate of Secondary Education

Mathematics A (J512)

MARK SCHEMES FOR THE COMPONENTS

J512/01 Paper 1 (Foundation Tier)

1	(a)	345	1	
	(b)	115	1	
	(c)	84	1	
	(d)	18	1	
2	(a)	(i) Tonnes	1	
		(ii) Metres	1	
		(iii) Litres	1	Allow kilograms
	(b)	Square metres is area oe	1	or 'Sq m is not a length' or 'should be metres/kilometres' etc
3	(a)	(1, 5)	1	
	(b)	58 ± 2	2	**1** for figs 56 to 60 seen
	(c)	(4.5, 2.5) marked	1	
	(d)	Parallel line drawn through A	1	Any length
	(e)	(4, 0)	1	Allow (8, 0) or (-2, 10)
4	(a)	(i) 27	1	
		(ii) 4, 9, 11, 6	2	**1** for 2 or 3 correct frequencies
	(b)	(i) 10 – 19	1	
		(ii) Do not know actual values oe	1	
5	(a)	0.5	1	
	(b)	0.75	1	
	(c)	¼ or equivalent fraction	1	
	(d)	30	1	

6	(a)	102	4	**B1** for Sam = 36 (/min) **B1** for Lizzie = 30 (/min) **M1** for Total = *their* 36 × 2 + *their* 30 Or **SC2** for 1020 Or **SC1** for 170
	(b)	(i) SK, KS, KK, US, UK and no incorrect entries	2	Ignore repeats Allow **1** if 3 correct
		(ii) 2/6 oe	2	ft *their* 6 Allow **1** if SS and KK identified or for 2/*n* with *n* > 2 (need not follow from their total) Deduct 1 mark for poor notation (2 in 6, 2 to 6, 2:6, 2 out of 6 etc) once only in paper
7	(a)	7.8	1	
	(b)	6 < *x* < 7	1	
	(c)	38 www	3	**B1** for quotient 3 **B1** for rem 14 If division done in 2 steps, e.g. 684/2 = 342 then 342/9 = 38 then mark the /9 division as above with quotient 3 and remainder 7 <u>If 'chunking' used allow:</u> **B2** for (18 ×) 35 = 630, or (9 ×) 35 = 315 or better Or **B1** for (18 ×) 30 = 540 or (18 ×) 40 = 720 or (9 ×) 30 = 270 or (9 ×) 40 = 360
8	(a)	(i) 20	1	
		(ii) Correct line drawn	1	
	(b)	(i) Two numbers with a product of 24 (*p* × *q*)	1	
		(ii) *Their* 2*p* + 2*q*	1	**Must** ft from *their* (b)(i)
	(c)	4	2	Allow **M1** if area and perimeter calculated for any value Or allow **SC1** if a rectangle found (e.g. 6 × 3)
9	(a)	(i) 4*r*	1	
		(ii) 10*v* + 6*w*	2	**1** for one term correct seen
	(b)	(i) 5	1	
		(ii) *y* = 8.5 oe	2	**M1** for 10 + 7 or 17 seen

10	(a)	180 < *answer* < 360	1	Award 0 for a diagram
	(b)	167° ± 2	1	
	(c)	45°	1	
		"line" **with** ("angles" or "180")	1	'180' can be implied by correct answer/working Where totals are given with reasons they must be correct
11	(a)	1/15	1	Or 0.066(66..), 0.067 Deduct 1 mark for poor notation (1 in 15, 1 to 15, 1:15, 1 out of 15 etc) once only in paper
	(b)	2/5 cao	2	**B1** for 6/15 oe seen
12	(a)	Circle radius 3 anywhere on page	1	2.5cm ≤ *r* ≤ 3.5cm
	(b)	Correct construction ± 2mm with arcs visible, lines ruled	3	**B1** for any line correct length ± 2mm **M1** for construction arcs seen Or **SC2** for correct triangle no arcs
13	(a)	-1, 1, ,7	2	Allow 1 for 2 correct
	(b)	Correct ruled line within tolerance from *x* = -2 to *x* = 6	2	**B1** for any three of *their* points correctly plotted
14	(a)	Correct diagram, condone freehand	2	Allow 1 for any cuboid correctly drawn -1 if cuboid is 'transparent' **and** -1 if one extra incorrect line added on the cuboid
	(b)	48 cm^3	2 1	**M1** for 2 × 3 × 8 soi If a different cuboid is drawn ft provided method is clear and correct
15	(a)	8	2	**M1** for 6 × 4 or better seen or $\dfrac{6}{3}$
	(b)	1.5 oe	3	**B1** for 10*x* + 5 or $\dfrac{20}{5}$ **M1** for 10*x* = 20 − *their* 5 or better or for *their* 10*x* = 20 − 5 or better or 2*x* = *their* $\dfrac{20}{5}$ − 1 or better

16	(a)	$\dfrac{13}{50} \times \dfrac{2}{2}$ soi by 26/100	1	Or $\dfrac{13}{50} \times 100$ or $\dfrac{1}{50} = 2\%$ (× 13)
	(b)	35% 30% $\dfrac{13}{50} \quad \dfrac{90}{300} \quad \dfrac{7}{20}$ or 26%, 30%, 35% oe	1 1 1	From 7/20 From 90/300
17	(a)	5 points correctly plotted	2	**M1** for 3 points correct
	(b)	Negative	1	
18	(a)	6 pack 23p each 10 pack 22p each 10 pack identified (as better value)	1 1 1	Or 60 cost £13.80 oe and £13.20 Dependent on two correct linked steps
	(b)	(i) No. Could be 6 and 4 etc	1	oe Must be 'numerical' NOT 'There could be more bags' NOT 'We do not know how many bags'
		(ii) Bacon: 96 Cheese and onion: 64	3	**M1** for 160 ÷ 5 soi by 32 **A1** for one correct value seen
19	(a)	20, 30	1,1	**SC1** for reversed answers
	(b)	Complete correct curve from $x = 0$ to $x = 4$ and above 30	2	±½ small sq for points and curve Daylight above 30 **B1** for 4 of *their*/correct points correctly plotted
	(c)	(i) 30.5 to 32.5	1	
		(ii) 0.5 to 0.9 or *their* time (at 15) ± 0.1	1	ft is dependent on graph with one solution only between 0 and 4
20	(a)	4 sectors of 96, 60, 120, 84 4 labels indicating apple varieties	3 1	Allow **1** for each correct sector ± 2° to a maximum of 3 marks If **0** scored allow **1** for 96, 60, 120, 84 seen
	(b)	(i) 5 correct heights plotted At midpoints and joined	1 1	±½ small sq Ruled lines. Ignore lines from either end.
		(ii) For example: treated trees give more weight	1	Or treated have fewer trees with low weights etc

J512/02 Paper 2 (Foundation Tier)

1	(a)	30	1	
	(b)	4	1	
	(c)	25	1	
	(d)	16	1	
	(e)	4 and 25	2	**M1** for 100 seen
	(f)	5	1	
2	(a)	0.124 0.2 0.201 0.32	2	**B1** for 1 error
	(b)	4	2	**B1** for 4.(…) or 4 and remainder Or **M1** for sight of £2.40 or £2.50 or £9.68
3	(a)	(Triangular) Prism Cube	2	**B1** for each
	(b)	Square based pyramid drawn	2	**B1** for any pyramid (including a cone) or a net with a square and 4 triangles of some sort or a plan (square with 4 triangles)
	(c)	Prism with a circular cross-section oe	2	**B1** for prism or circular cross-section oe or whose net is a rectangle and 2 circles
4	(a)	(i) Correct pattern	1	
		(ii) 9 11	1	
	(b)	(i) 18	1	
		(ii) By adding on three	1	Multiples of 3 or in the 3 times table acceptable
	(c)	(i) 9 4.5 (4½)	2	**B1** for 9 or correct ft from *their* 9
		(ii) Halving or dividing by 2	1	
5	(a)	100 50	2	**B1** for each
	(b)	3¼ squares drawn in Friday 5 squares drawn in Saturday	2	**B1** for each
	(c)	Bars drawn correct or from *their* 100, 50	2	**B1** for each
6	(a)	4 000 000	1	
	(b)	(i) 3540	1	
		(ii) 3500	1	
	(c)	2.77	2	**M1** for 5 – (1.15 + 1.08) oe or sight of figs 223

7	(a)	1.2 oe	1	
	(b)	68	2	**M1** for 0.17 × 400 oe or 1% is 4 so 17% is 17 × 4 oe
	(c)	2.272 isw	2	**M1** for 0.71 × 3.2 oe or 2.27
8	(a)	(i) 8	1	
		(ii) 31	1	
	(b)	22.2 www	3	**M2** for attempt to find the sum of the scores ÷ 10 Or **M1** for attempt to find the sum of the scores
9	(a)	(i) Odd	1	

		(ii) Multiples of 6
		      or an even number
		      or a multiple of 3
			1	

	(b)	2.6	2	**M1** for 3 × 4.2 + 2 × −5 or sight of 12.6 or −10
10	(a)	3 correct points (10, 14) (20, 28) (40, 56)	2	**B1** for 1 or 2 correct
		Correct ruled straight line through (10, 14) and (40, 56)	1	Ruled straight line going through *their* 3 points acceptable
	(b)	Answer from *their* ruled straight line at *x* = 32	1	
	(c)	Answer from *their* ruled straight line at *y* = 20	1	After 0 in (b) and (c), **SC1** for answers of (b) 44 to 45 and (c) 14 to 15
11	(a)	(i) 38	2	**M1** for 180 – 2 × 71 oe or sight of 142

		(ii) Angles in a **triangle** add up to
		      180 or **base/two angles** in an
		      isosceles (triangle) are **equal**
			1	

	(b)	(i) 141	2	**M1** for 180 – (180 – (90 + 51)) oe or 39 seen
		(ii) Correct explanation for working out angle *y*	2	**B2** for an **external angle** of a **triangle** is the **sum** of the **opposite two angles** Or **B1** for angles in a **triangle** add up to **180** And **B1** for angles on a straight **line** add up to **180**

12	(a)	(i) $\dfrac{11}{19}$ isw or 0.57(…) or 0.58	2	**B1** for 11/n or n/19 or 11 and 19 seen in an answer but not in a ratio
		(ii) $\dfrac{8}{19}$ isw except do not accept ½ or 0.42(…)	1	ft *their* 19 provided answer as fraction
		(iii) $\dfrac{0}{(19)}$	1	ft *their* 19 provided answer as fraction
	(b)	Correct explanation as to why the dice is biased	1	There are a lot more fours oe or there should be roughly the same of each number oe
13	(a)	0.58(…) or 47/81	2	**M1** for 4.7/8.1
	(b)	2.14(…)	2	**M1** for ($\sqrt{}$)4.59(36) or $\dfrac{3\sqrt{319}}{25}$
14	(a)	Correct enlargement	2	**B1** for 1 correct side in an enlarged triangle
	(b)	2.16 4.14	1 1	
	(c)	25	2	**M1** for attempting to find 100/4 or 10/2 × 10/2 or sight of 5 × 5 oe
15	(a)	3.75 or 3 ¾ or 15/4	2	**M1** for ¾ × (10/2)
	(b)	13 www	3	**M2** for 13.3… or 1500/112.5 and 1000/70 Or **M1** for (flour) (figs 1500)/(figs 225) or 6.6(…) or 6.7 or (figs 1500)/(figs 112.5) or (salt) (figs 1000)/(figs 140) or 7.1(...) or (figs 1000)/(figs 70)
16		(6 × 7 =) 42 or 2 tins left each week or 44/7 = 6.2857… or 44/6 = 7 1/3	**M1**	
		44 – 42 = 2 and 2 × 21 = 42 or 21 × 44 or 21 × 42 or 0.2857…× 21 = 6 or 1/3 × 21 = 7	**M1**	
		After 21 weeks enough (42) left for 22nd week or enough for next 7 days	**A1**	

17	(a)	Fully correct two-way table with labels cars with numbers at least 1 – 3 and people with numbers at least 1 – 5	3	**B2** for two-way table with at most one error in missing label or incomplete row of numbers or use of axes Or **B1** for two-way table with at most two errors in missing labels or incomplete row of numbers or use of axes
	(b)	14 in correct position on table	1	
18	(a)	46 Interior or co-interior or allied or full clear description of interior angles, not just supplementary	1 1	Allow **fully** correct alternative with **all** reasons correct e.g. Opposite angles of parallelogram are equal **and** angles in quadrilateral/parallelogram add to 360 e.g. Angles on a straight line add to 180 **and** corresponding angles are equal
	(b)	35 www	4	**M3** for $5y =$ *their* 175 or *their* 175 ÷ 5 Or **M2** for $5y +$ *their* 185 = 360 or 5y and *their* 175 seen Or **M1** for $y + 4y + 118 + 67$ (= 360) or 360 – (118 + 67)
19	(a)	d^{11}	1	
	(b)	d^{6}	1	
20		240 www	4	**B3** for 240.1 – 240.3 Or **M2** for $2 × \pi × 4.2 × 9.1$ Or **M1** for $2 × \pi × 4.2$ or $\pi × 8.4$ If **M0** or **M1** or **M2** award also **B1** for *their* answer rounded to 2 sig figs If curved surface area calculated plus either one or two circles giving answer in range 295 – 296 or 350 – 351 then **SC2** plus, if appropriate, **B1** for rounding to 2 sig figs, 300 or 350 If $\pi × 4.2 × 9.1$ and final answer in range 120 – 120.09 then **SC1** plus, if appropriate, **B1** for rounding to 120

J512/03 Paper 3 (Higher Tier)

1	(a)	0.45 oe	2	**M1** for 1 − (0.05 + 0.15 + 0.35)
	(b)	0.4(0) oe	2	**M1** for 0.05 + 0.35 or 0.4(0) ÷ 1
2	(a)	-2	2	**M1** for $3x + 2$ or $x + 7$ or $2x − 2$ or $−x + 5$ seen
	(b)	8	2	**M1** for 6 × 4 or better seen or $\dfrac{6}{3}$
	(c)	1.5 oe	3	**B1** for $10x + 5$ Or $\dfrac{20}{5}$ **M1** for $10x = 20 −$ *their* 5 or better or for *their* $10x = 20 − 5$ or better or $2x = $ *their* $\dfrac{20}{5} − 1$ or better
3	(a)	$\dfrac{13}{50} \times \dfrac{2}{2}$ soi by 26/100	1	Or $\dfrac{13}{50} \times 100$ or $\dfrac{1}{50} = 2\%$ (× 13)
	(b)	35% 30% $\dfrac{13}{50}$ $\dfrac{90}{300}$ $\dfrac{7}{20}$ or 26%, 30%, 35% oe	1 1 1	From 7/20 From 90/300
4	(a)	4cm ± 2mm line in *their* kite <u>Both</u> 4.5cm ± 2mm lines in *their* kite <u>Both</u> 6cm ± 2mm lines in *their* kite	1 1 1	After 0 scored, **SC1** for any one correct length ± 2mm
	(b)	90 – 105cm	2	**B1** for length 9 to 10.5 cm seen
5	(a)	5 points correctly plotted	2	**M1** for 3 points correct
	(b)	Negative	1	
	(c)	Line between (4, 21) and (4, 23) and between (10, 13) and (11, 14)	1	
	(d)	17 to 19	1	
6	(a)	6 pack 23p each 10 pack 22p each 10 pack identified (as better value)	1 1 1	Or 60 cost £13.80 oe and £13.20 Dependent on two correct linked steps
	(b)	(i) No. Could be 6 and 4 etc	1	oe Must be 'numerical' NOT 'There could be more bags' NOT 'We do not know how many bags'
		(ii) Bacon: 96 Cheese and onion: 64	3	**M1** for 160 ÷ 5 soi by 32 **A1** for one correct value seen

7		4.5 www	3	**B1** for 30 **M1** for 135 ÷ *their* 30
		g/cm³ or g per cm³ oe	1	
8	(a)	5 correct heights plotted At midpoints and joined	1 1	±½ small sq Ruled lines. Ignore lines from either end.
	(b)	(i) For example: treated trees give more weight	1	Or treated have fewer trees with low weights etc
		(ii) No (soi). Insufficient information	1	Or 'Only total weight recorded' Or 'Do not know how many apples'
9	(a)	48, 50, 56, 60 or 64 www	2	**M1** for <u>two</u> of 4, 8, 0.5
	(b)	(i) 5	1	
		(ii) 1/8 or 0.125	1	
		(iii) 1	1	
10	(a)	20, 30	1,1	**SC1** for reversed answers
	(b)	Complete correct curve from $x = 0$ to $x = 4$ and above 30	2	±½ small sq for points and curve Daylight above 30 **B1** for 4 of *their*/correct points correctly plotted
	(c)	(i) 30.5 to 32.5	1	
		(ii) 0.5 to 0.9 or *their* time at 15 ± 0.1	1	ft is dependent on graph with one solution only between 0 and 4
11	(a)	25.5 (× 10) oe	1	Or 25 × 10 + 0.5 × 10 Condone 25.499(9..)
	(b)	252.5	2	**B1** for 245 or 7.5 seen
12	(a)	$(x =) \dfrac{y+2}{3}$ oe	2	**M1** for $3x = y + 2$ or $\dfrac{y}{3} = x - \dfrac{2}{3}$ or complete reverse flow diagram
	(b)	(i) $\dfrac{1}{2}$ oe	2	**M1** for drawing a triangle on the line or (correct diff in *y*)/(correct diff in *x*)
		(ii) $y = their \dfrac{1}{2} x + 1$ oe	FT2	**M1** for $y = \dfrac{1}{2} x + c$ or $their \dfrac{1}{2} x + 1$
	(c)	(1/2, 4) oe	1,1	After **B0**, **M1** for $\left(\dfrac{-3+4}{2}, \dfrac{3+5}{2} \right)$
13		400 www	3	**M2** for 320 ÷ 0.8 Or **M1** for $0.8x = 320$ oe or 320 ÷ 80

14		$\pi \times 60^2$ or $\pi \times 8^2$ soi 3600π or 64π $(\pi \times) 60^2 - (\pi \times) 8^2$ oe 3536π	**M1** **A1** **M1** **A1**	 After 0 scored, **SC1** for any <u>use</u> of $\pi \times r^2$
15	(a)	Complete correct diagram	**2**	**B1** for 0.8 correct once
	(b)	0.64 oe	**2**	**M1** for *their* 0.8 × *their* 0.8
16	(a)	-5 and (+)1	**1**	
	(b)	$10y^2 + 11y - 6$	**3**	**M2** for 3 of $10y^2$, $-4y$, $(+)15y$, -6 seen Or **M1** for 2 of these seen
17		For example: AB = CD AD = BC Opposite sides of a para. are equal BD is common oe (Congruent) SSS	 **1** **1** **1** **1** **1**	 Or SAS or ASA only Any correct reason (dependent on a correct pair identified with letters) dep 3rd fact to complete SSS, SAS or ASA Dependent on 3 scored (not reason)
18	(a)	$y = \dfrac{36}{x^2}$ oe	**2**	**M1** for $y = \dfrac{k}{x^2}$ oe and attempt to subst.
	(b)	0.36 oe	**1**	
	(c)	3, -3	**1,1**	After 0 scored, **SC1** for $x^2 = 9$
19	(a)	Area bigger oe	**1**	Eg 'same height, twice/different width' or 'twice the size' 'twice as many students' Soi by 8 and 16
	(b)	62	**3**	**B2** for two of 9, 39 and 14 www Or **B1** for one of 9, 39 and 14 www Or **SC2** for figs 62 seen Or **SC1** for answer of 31
20	(a)	150	**1**	
	(b)	210 and 330	**1,1**	
21		$x^2 + (x - 3)^2 = 17$ $x^2 - 3x - 3x + 9$ or better $x^2 + x^2 - 3x - 3x + 9 - 17 = 0$ or better $(2x - 8)(x + 1)$ oe $x = 4$ and -1 $y = 1$ and -4	**M1** **B1** **M1** **A1** **A1** **A1**	Or equivalent working in y Collecting *their* two x^2 expressions = 0 $(x - 4)(2x + 2)$ or $(x - 4)(x + 1)$ or $\dfrac{6 \pm 10}{4}$ oe After **A0A0**, **SC1** for one x and its y seen

J512/04 Paper 4 (Higher Tier)

1	(a)	0.58(…) or 47/81	2	**M1** for 4.7/8.1
	(b)	2.14(…)	2	**M1** for (√)4.59(36) or $\dfrac{3\sqrt{319}}{25}$
2	(a)	3.75 or 3 ¾ or 15/4	2	**M1** for ¾ × (10/2)
	(b)	13 www	3	**M2** for 13.3… or 1500/112.5 and 1000/70 Or **M1** for (flour) (figs 1500)/(figs 225) or 6.6(…) or 6.7 or (figs 1500)/(figs 112.5) or (salt) (figs 1000)/(figs 140) or 7.1(...) or (figs 1000)/(figs 70)
3	(a)	(i) Fully correct two-way table with labels cars with numbers at least 1 – 3 and people with numbers at least 1 – 5	3	**B2** for two-way table with at most one error in missing label or incomplete row of numbers or use of axes Or **B1** for two-way table with at most two errors in missing labels or incomplete row of numbers or use of axes
		(ii) 14 in correct position on table	1	
	(b)	No box for 3 or rewrite more than 3 as 3 or more	1	
4	(a)	46 Interior or co-interior or allied or full clear description of interior angles, not just supplementary	1 1	Allow **fully** correct alternative with **all** reasons correct e.g. Opposite angles of parallelogram are equal **and** angles in quadrilateral/parallelogram add to 360 e.g. Angles on a straight line add to 180 **and** corresponding angles are equal
	(b)	35 www	4	**M3** for 5*y* = *their* 175 or *their* 175 ÷ 5 Or **M2** for 5*y* + *their* 185 = 360 or 5y and *their* 175 seen Or **M1** for *y* + 4*y* + 118 + 67 (= 360) or 360 – (118 + 67)
5		(6 × 7 =) 42 or 2 tins left each week or 44/7 = 6.2857… or 44/6 = 7 1/3	M1	
		44 – 42 = 2 **and** 2 × 21 = 42 or 21 × 44 or 21 × 42 or 0.2857… × 21 = 6 or 1/3 × 21 = 7	M1	
		After 21 weeks enough (42) left for 22nd week or enough for next 7 days	A1	

6	(a)	-1 2 7	2	**B1** for 2 consecutive correct
	(b)	-2 2 6 in any order	2	**B1** for numbers that differ by 4 and at least one positive and one negative
7	(a)	Rotation Centre (0, 0) or origin Angle 90° (anti-clockwise) or 270° clockwise or -270°	1 1 1	Not turn If combination of two transformations, then **SC1** for fully correct descriptions using correct mathematical terminology
	(b)	Fully correct reflection	2	**B1** for image with 2 correct vertices If **B0**, then **SC1** for reflection shape A in *y*-axis or shape B in *x*-axis or *y*-axis
8	(a)	3.42	3	**M2** for *their* 342 ÷ 100 Or **M1** for 342 or Σ at least 4 correct products
	(b)	No, all frequencies close to 100/6 or frequencies nearly all same	1	
9	(a)	d^{11}	1	
	(b)	d^{6}	1	
10		240 www	4	**B3** for 240.1 – 240.3 Or **M2** for $2 \times \pi \times 4.2 \times 9.1$ Or **M1** for $2 \times \pi \times 4.2$ or $\pi \times 8.4$ If **M0** or **M1** or **M2** award also **B1** for *their* answer rounded to 2 sig figs If curved surface area calculated plus either one or two circles giving answer in range 295 – 296 or 350 – 351 then **SC2** plus, if appropriate, **B1** for rounding to 2 sig figs, 300 or 350 If $\pi \times 4.2 \times 9.1$ and final answer in range 120 – 120.09 then **SC1** plus, if appropriate, **B1** for rounding to 120

11	(a)	2 3 4 5	3	**M2** for $7/4 < n ≤ 5$ or $2 ≤ n ≤ 5$ or 3 correct values given with no incorrect values Or **M1** for either $7/4$ or 5 in working or one correct value if only one value stated If **M0** then **SC2** for 2, 3, 4, 5 seen and followed by 8, 12, 16, 20 Or **SC1** for 8, 12, 16, 20 only
	(b)	Fully correct	3	**B2** for all lines correct and no/incorrect shading Or **B1** for two lines correct and no/incorrect shading If **B0** then **SC1** for lines $x + y = 7$ and $x = 3$ and $y = 2$
12		$5.7^2 + 12.9^2$ or 198.9 or 199	**M1**	For full alternative explanations **M2** for finding both smaller angles or one smaller angle using two or more trig ratios
		$14.4^2 = 207.36$ or $\sqrt{198.9} = 14.1(…)$	**M1**	Or **M1** followed by **M1** for method to find largest angle e.g. cosine rule
		No, answers not equal or $14.1 ≠ 14.4$	**A1**	
13		$y = 86$ Angle at centre double angle at circumference $z = 137$ Sum opposite angles cyclic quadrilateral 180	1 1 1 1	
14		$3(x)$ and $5(x)$ seen/used $8x × 5x (= 810)$ *their* $40x^2 = 810$ $x^2 = 810/their (8 × 5)$ or $x^2 = their 20.25$ 4.5 www	**M1** **M1** **M1** **M1** **A1**	 3rd **M1** dep on 1st **M1** 4th **M1** dep on 3rd **M1** If no working, then **SC4** for 4.5
15	(a)	Points plotted correctly ± ½ small square and joined to form line/curve	3	If **0** then **B1** for ≥ 7 plots (excluding (0, 0)) at upper bound and **B1** for ≥ 7 plots (excluding (0, 0)) at correct height
	(b)	German and 5.5 - 8 marks	2	**B1** for difference medians 5.5 - 8
16	(a)	(i) $x(x – 8)$	1	
		(ii) $2x(3x^2 + 5y^3)$	2	**M1** for $2(3x^3 + 5xy^3)$ or $x(6x^2 + 10y^3)$
		(iii) $(2x – y)(2x + y)$	2	**M1** for $(2x – y)$ or $(2x + y)$ as part of product
	(b)	$\dfrac{x+3}{3x}$ or $\dfrac{1}{3} + \dfrac{1}{x}$	2	**M1** for $x(x + 3)/3x^2$

17	(a)	9.1×10^7	**1**	
	(b)	1000 or 10^3	**2**	**M1** for $10^{-9} \div 10^{-12}$
18	(a)	13.3 – 13.4 www	**3**	**M2** for (QT =) 16.7 × sin 53 oe Or **M1** for sin 53 = QT/16.7 oe
	(b)	36.9(…) www	**3**	**M2** for cos RST = 0.799 - 0.8 Or **M1** for (cos RST =) $$\dfrac{27.4^2 + 19.1^2 - 16.7^2}{2 \times 27.4 \times 19.1}$$
19	(a)	Exams twice per year	**1**	
	(b)	3800 - 4000 4900 - 5300	**1** **2**	Predicted next moving average stated **M1** for ½ (2700 + x) = *their* reading oe
20		Trial ≥ 1.5 and < 2 and outcome	**M1**	
		Improved trial and outcome	**M1**	Improved trial means a further trial which would give an answer closer to 27
		Two correct trials between 1.685 and 1.695 inclusive that give answers below 27 and above 27 Or 1.69 and 1.7(0) with an explanation i.e. working that 1.69 gives a closer answer than 1.7(0)	**A1**	
		1.69	**A1**	Dependent on both **M** marks only
21	(a)	3√5	**1**	
	(b)	3√6/2	**2**	**M1** for 9√6/√6√6 or 9√6/6
22	(a)	(i) **a**	**1**	
		(ii) **a** + **b**	**1**	
	(b)	⅓ (**b** – 2**a**) or **b**/3 – 2**a**/3	**3**	**B2** for correct unsimplified expression Or **M1** for ⅓ *their* DB or ⅔ *their* DB seen
23	(a)	Square numbers always positive When $x = y$, $(x – y)^2 = 0$	**1** **1**	
	(b)	$x^2 - 2xy + y^2 \geq 0$ and $x^2 + y^2 \geq 2xy$	**1**	

Grade Thresholds

General Certificate of Secondary Education
Mathematics A (J512)
January 2010 Examination Series

Component Threshold Marks

Component	Max Mark	A	B	C	D	E	F	G
1	100			66	55	44	33	22
2	100			67	56	46	36	26
3	100	66	49	32	18			
4	100	56	39	23	14			

Specification Options

Foundation Tier

	Max Mark	A*	A	B	C	D	E	F	G
Overall Threshold Marks	200				133	111	90	69	48
Percentage in Grade					40.9	21.6	13.7	10.2	7.3
Cumulative Percentage in Grade					40.9	62.5	76.2	86.4	93.7

The total entry for the examination was 16286.

Higher Tier

	Max Mark	A*	A	B	C	D	E	F	G
Overall Threshold Marks	200	156	122	88	55	32	20		
Percentage in Grade			8.3	15.4	25.3	30.2	15.0	4.1	
Cumulative Percentage in Grade			8.3	23.7	49.0	79.2	94.2	98.3	

The total entry for the examination was 3462.

Overall

	A*	A	B	C	D	E	F	G
Percentage in Grade	1.5	2.7	4.4	39.1	20.4	12.0	8.4	6.0
Cumulative Percentage in Grade	1.5	4.2	8.6	47.7	68.1	80.1	88.5	94.5

The total entry for the examination was 19748.

Statistics are correct at the time of publication.

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