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ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Mathematics 4301

Specification A

Paper 1 Higher

Mark Scheme

2008 examination - November series

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Glossary for Mark Schemes

GCSE examinations are marked in such a way as to award positive achievement wherever possible. Thus, for GCSE Mathematics papers, marks are awarded under various categories.

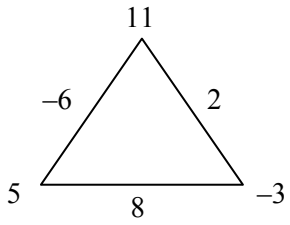
M	Method marks are awarded for a correct method which could lead to a correct answer.
A	Accuracy marks are awarded when following on from a correct method. It is not necessary to always see the method. This can be implied.
B	Marks awarded independent of method.
M dep	A method mark dependent on a previous method mark being awarded.
B dep	A mark that can only be awarded if a previous independent mark has been awarded.
ft	Follow through marks. Marks awarded following a mistake in an earlier step.
SC	Special case. Marks awarded within the scheme for a common misinterpretation which has some mathematical worth.
oe	Or equivalent. Accept answers that are equivalent. eg, accept 0.5 as well as $\frac{1}{2}$

Paper 1H

Q	Answer	Mark	Comments
1	90 or 30 or 120	M1	
	5 and 8 or 40	M1	Accept 5 and 10 or 50
	3	A1	SC2 For $\frac{88+31}{40} = \frac{119}{40} = 3\ldots$ (complete solution)
2(a)	2	B1	
2(b)	$\frac{(n+11)}{4}$	B2	oe B1 For sight of $n + 11$ or [their $(n + 11)$] ÷ 4
3	$\frac{10}{100} \times 24\,000$ (= 2400)	M1	24 000 ÷ 12 (= 2000)
	(Their 2400) + 24 000 (= 26 400)	M1dep	$\frac{10}{100}$ × (their 2000) (= 200)
	(Their 26 400) ÷ 12	M1dep	(Their 200) + (their 2000)
	2 200	A1	
4(a)	Row/column for Boys	B1	Must have a two-way table for all 3 marks
	Row/column for Girls	B1	
	Columns/rows 4 to 7	B1	
4(b)	Data for ≥ 20 pupils	B1dep	Accept totals or tally marks, dep on full marks for (a)
5(a)	40	B1	
5(b)	180 – (their) 40 – 75	M1	
	65	A1	
6(a)	$x + 4x + 80 = 180$	M1	Attempt to use angle sum = 180
	$(x =)$ 20	A1	
6(b)	There are two angles of 80°	M1	All of the angles are of different size
	Isosceles	A1	Accept scalene for those who get $x \neq 20$

Q	Answer	Mark	Comments
7(a)	230	B1	Accept 228 to 232
7(b)	Bearing of 110	M1	Accept 108 to 112
	Bearing of 080	M1	Accept 078 to 082
	C accurately marked	A1	ft If both M's earned
8	$4n + 2$	B2	B1 For $4n$… allow $4 \times n$ and $n \times 4$ but not $n4$
9(a)	6	B1	
9(b)	$5x + 20 = 10$ or $x + 4 = 2$	M1	
	$5x = 10 - 20$ or $x = 2 - 4$	M1	Correct isolation of x term from their first line
	–2	A1ft	ft If at least M1 awarded SC1 For $\frac{6}{5}$ or $1\frac{1}{5}$ or 1.2 but no equation seen
9(c)	$\frac{y}{3} = 15 - 11$ or $\frac{y}{3} = 4$	M1	$33 + y = 45$ or $45 - 33 = y$
	12	A1	
10(a)	$40 < x \leq 60$	B1	
10(b)	5 points at correct heights	B1	Anywhere within class boundaries
	5 points at mid-intervals and diagram correct	B1	(10, 4) (30, 12) (50, 16) (70, 6) (90, 2)
11(a)	$\frac{1}{2} \times 10 \times 15$	B1	oe
11(b)	$\frac{1}{2} \times 6 \times 9$ or 27	M1	
	75 – (their 27)	M1	150 – 75 – (their 27) or 150 – (75 + their 27) 'Their 27' must come from an area calculation
	48	A1	
	cm^2	B1	Units mark

Q	Answer	Mark	Comments
12(a)	Correct factors of 8 **and** 12	M1	Correct… lists of factors (no need for 1×8 and 1×12) or factor trees or prime factors
	4	A1	
12(b)	Attempting to find multiples of 8 **and** 12	M1	At least two multiples of each
	24	A1	
13(a)	–2	B1	
13(b)	10	B1	
13(c)	$3x^2 - 2 = 73$	M1	oe
	5	A1	± 5 scores A2
	–5	A1	
14(a)	210 000 or 70 000 or 280 000	M1	$(2.1 \times 10^5 +)\ 0.7 \times 10^5$ scores M1
	2.8×10^5	A1	
14(b)	$14.7 \times 10^5 \times 10^4$ or 14.7×10^9	M1	Sight of digits 147 or 10^9 earns this mark
	1.47×10^{10}	A1	
15(a)	90°	B1	
15(b)(i)	27°	B1	
15(b)(ii)	63°	B1	
15(c)	52°	B1	

Q	Answer	Mark	Comments
16(a)	$x + 1 + 2y + 11 = 11 + 2x + 2y + y$	M1	oe
	Either cancelling of $2y$ and 11 shown or $1 = 2x - x + y$	A1	oe
16(b)	$x + 1 + 2y + 11 = x + 1 + 2x + y$	M1	oe
	Either cancelling of x and 1 shown or $11 = 2x + y - 2y$	A1	oe
16(c)	$x = 4$	B1	
	$y = -3$	B1	
16(d)		B1	
17	$8^{\frac{1}{3}} = 2$	B1	
	$2^{-5} = \frac{1}{32}$ 1 or $\frac{1}{2^5}$	B1	$2 \times 2^{-5} = 2^{-4}$ earns this B1
	Product = $\frac{1}{16}$ **and** $4^{-2} = \frac{1}{4^2} = \frac{1}{16}$	B1	$2^{-4} = 2^{-2} \times 2^{-2} = 4^{-2}$ earns this B1 oe… Must be clearly shown since answer given
18(a)	$(2n + a)(n + b)$ where $ab = 9$	M1	+9 and +1 or +1 and +9
	$(2n + 3)(n + 3)$	A1	
18(b)	23 (×) 13	B1	

Q	Answer	Mark	Comments
19(a)(i)	0.2 and 0.5	B1	
19(a)(ii)	0.2×0.5	M1	ft Their (a)(i) probabilities
	0.1	A1	
19(b)	0.9	B1	1 – (their 0.1)
19(c)	(Their 0.9) × (their 0.1)	M1	Their probabilities **must** total 1
	(Their 0.9) × (their 0.1) + (their 0.1) × (their 0.9)	M1dep	For addition of their products or for 2 × (their 0.9) × (their 0.1)
	0.18	A1	
20(a)	$(10 - x)(8 - x) = 48$ or $8x + (10 - x)x = 32$ or $10x + (8 - x)x = 32$	M1	Look for 'area of grass' or 'area of path'
	$80 - 8x - 10x + x^2 =$ (their 48) or $8x + 10x - x^2 =$ (their 32)	M1	For correct expansion
	$x^2 - 18x + 32 = 0$ clearly shown	A1	Must be clearly shown since answer given
20(b)	$(x - 16)(x - 2)$ (= 0)	M1	Allow $(10 - x)(8 - x) = 48$ only if re-stated in part (b)
	2	A1	Solutions of 2 **and** 16 scores A0 Look out for $x = 2$ coming from incorrect algebra Allow **complete** solution done in part (a)
21	$\pi \times 12 \times 12$	M1	
	(Their 144π) × $\frac{60}{360}$	M1	or (their 144π) × 20 'Their 144π' must be an area
	(Their 24π) × 20	M1dep	or (their 2880π) × $\frac{60}{360}$ dependent on 2nd M1
	480π	A1	Using π = 3.(14…) can score M3 A0 SC2 For 480 (π missing)

Q	Answer	Mark	Comments
22	Correct 1st step using surds	M1	Examples are… $\sqrt{50} / \sqrt{5} = \sqrt{10}$ $\sqrt{x} \times \sqrt{50} = \sqrt{(50x)}$ $\sqrt{50} = 5\sqrt{2}$ LHS = $\sqrt{(50x/5)}$ RHS = $4\sqrt{5} = \sqrt{(16 \times 5)} = \sqrt{80}$ RHS = $4 \times \sqrt{5} \times \sqrt{5} = 20$ (after multiplying by $\sqrt{5}$) Squaring LHS correctly Squaring RHS correctly (When pursuing a solution by squaring both sides)
	Correct 2nd step using surds	M1	See above
	Simplifying to $10x = 80$… oe	M1	Examples are… $\sqrt{(10x)} = \sqrt{80}$ $50x = 400$ $\sqrt{(50x)} = \sqrt{400}$ $\sqrt{x} = \sqrt{8}$ $\sqrt{2}\sqrt{x} = 4$ $2x = 16$
	8	A1	Look for equivalent solutions that fit in with these basic principles
23(a)	Correct sketch graph	B1	Key points (0, 1) (90, 0) (180, – 1) (270, 0) (360, 1)
23(b)	Correct sketch graph	B1	Key points (0, 0) (90, $\frac{1}{2}$) (180, 0) (270, $-\frac{1}{2}$) (360, 0)
23(c)	Correct sketch graph	B1	Key points (0, 0) (180, 1) (360, 0)

Q	Answer	Mark	Comments
24(a)	$-2\mathbf{a} + 2\mathbf{b}$	B1	
24(b)	$(\overrightarrow{PQ} = \overrightarrow{PA} + \overrightarrow{AQ} =)$ $\mathbf{a} + \frac{1}{4}$ their$(-2\mathbf{a} + 2\mathbf{b})$	M1	Expression in terms of **a** and **b** required
	$\frac{1}{2}\mathbf{a} + \frac{1}{2}\mathbf{b}$ clearly shown	A1	Must be clearly shown since answer given
24(c)	$2\mathbf{a} + \frac{1}{2}$ their $(-2\mathbf{a} + 2\mathbf{b})$	M1	or $2\mathbf{b} + \frac{1}{2}$ their$(2\mathbf{a} - 2\mathbf{b})$ or $2\mathbf{b} - \frac{1}{2}$ their$(-2\mathbf{a} + 2\mathbf{b})$
	$\mathbf{a} + \mathbf{b}$	A1	
24(d)	$\overrightarrow{OM} = 2\overrightarrow{PQ}$	B1	$OM = 2PQ$ **and** OM is parallel to PQ