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ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Mathematics 4301

Specification A

Paper 1 Higher

Mark Scheme

2008 examination - June series

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

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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(a)	7.482	B1	
1(b)	1.29	B1	
1(c)	1	B1	
2	C, A, B	B2	One or two correct B1
3(a)	802.5 m	B1	
3(b)	(4.9 ×) 1 000 000	M1	oe eg, 1000×1000 or 10^6
	4 900 000	A1	oe eg, 4.9 million or 4.9×10^6
4(a)	128	B1	
	Corresponding angle	B1	Allow complete and correct alternative reasons
4(b)	180 – 85	M1	360 – (128 + 52 + 85)
	95	A1	
5	$\frac{84}{120} \times 100$	M1	or 0.7 or $\frac{7}{10}$ or $\frac{14}{20}$ or $\frac{420}{600}$
	70	A1	
6	Triangle in correct position (0, 0) (4, 4) (6, – 2) (±2 mm)	B2	B1 For correct size and orientation but in wrong position B1 For triangle with two correct vertices B1 Three correct vertices
7(a)	$x + 3x + 64 + 132 = 360$	B1	oe
7(b)	$x + 3x = 360 – 64 – 132$	M1	Rearranging linear equation: x terms on one side of equation Allow one error in numerical terms (**not** 360)
	$4x = 360 – 196$ or $4x = 164$	M1	or $(x =)$(their 164) ÷ 4 only if (their) 164 > 0
	41	A1	

Q	Answer	Mark	Comments
8(a)	$\frac{4}{5} \times \frac{7}{6}$	M1	$\frac{28}{35} \div \frac{30}{35}$
	$\frac{28}{30}$ or $28 \div 35$	A1	$\frac{2}{5} \times \frac{7}{3}$
	$\frac{14}{15}$	A1	
8(b)	$\frac{15}{4}$ or $\frac{7}{5}$	M1	or $(2+)\ \frac{(15)}{20} - \frac{(8)}{20}$ oe
	(Their) $\frac{75}{20}$ – (their) $\frac{28}{20}$ Allow one error in numerators	M1	or $(2+)\ \frac{15}{20} - \frac{8}{20}$ Allow one error in numerators
	$\frac{47}{20}$ or $2\frac{7}{20}$	A1	oe
			Decimal version 3.75 (M1) – 1.4 (M1) = 2.35 (A1) can score M0M1A0
8(c)	$\frac{1}{0.5}$ seen	M1	oe
	2	A1	Allow $\frac{2}{1}$
9	Correct key	B1	
	Correct and ordered 6 | 5 7 7 | 0 0 2 6 8 | 0 0 4 5 7 9 | 1	B2	One or two errors or omissions B1 or Correct but not ordered B1
10(a)	– 3 and 7	B2	B1 For each
10(b)	Correct graph between –2 and 4 with 'good' curve through correct points ± 2 mm	B1	Allow (4, 6) or (4, 8) or (4, 9) ft From (their)table B1 5, 6 or 7 of (their) points correctly plotted
10(c)	Where the graph crosses the *x*-axis	B1	

Q	Answer	Mark	Comments
11(a)	70	B1	
11(b)	$6y - 2 = 13$ or $3y - 1 = 6.5$	M1	
	$6y = 13 + 2$ or $3y = 6.5 + 1$	M1	
	2.5 or $\frac{15}{6}$	A1	oe $y = \frac{14}{6}$ SC2 (from $6y - 1 = 13$)
11(c)	$16 - z = 4 \times 7$	M1	or $4 - \frac{z}{4} = 7$
	16 – (their) 28 = z	M1	or $4 - 7 = \frac{z}{4}$ or $-z$ = (their) 28 – 16 or $-\frac{z}{4} = 7 - 4$
	– 12	A1	
11(d)	$\frac{(x+1)}{5}$	B2	B1 For $\frac{2(x+1)}{10}$ or $\frac{2x+2}{10}$ or $\frac{(x+1)^2}{5(x+1)}$ or $\frac{(x^2+2x+1}{5x+5)}$

12(a)	90	B1	
12(b)	$\frac{190}{100} \times 80\,000$	M1	ft Their 90 or $(\frac{190}{100} \times 80\,000 + 80\,000)\ldots$ oe
	152 000	A1 ft	

13(a)	0.7×10^4	M1	7000
	7×10^3	A1	
13(b)	25×10^{-6}	M1	or 0.000025 or 0.005 seen
	2.5×10^{-5}	A1	SC1 5×10^{-6}

Q	Answer	Mark	Comments
14(a)	$\pi \times 8^2$	M1	
	$5 \times \pi \times$ (their) 8^2	M1	Must be dimensionally correct, eg, $\pi \times 16^2$ (**not** $5 \times 2 \times \pi \times 8$)
	320 (×) π or π (×) 320	A1	SC2 1280π or 960 to 1006
	cm^3	B1	
14(b)	(Their)$320\pi = \pi \times r^2 \times 20$	M1	or (Their) $320\pi \div$ (20 or 20π) Proceed with ft **only** if 2nd M1 scored in part (a) and the answer to part (b) involves π or is 960
	r^2 = (their)16 or √(their) 16	M1	ft (Their) 320π
	4	A1 ft	ft (Their) 320π SC2 Can be awarded if the working in part (b) is unconvincing
15(a)	4×28.50 or 114	M1	
	36.10	A1	**Not** 36.1
15(b)	Greater and reason	B1	eg, 34.70 is replaced by 37.60
16	$3a - 3b = 2b + 7$	M1	$a - b = \frac{(2b+7)}{3}$
	$3a = 5b + 7$	M1	
	$\frac{(5b+7)}{3}$	A1	oe eg, $\frac{(2b+7)}{3} + b$
17	$21 \div 6$ or 3.5 or $6 \div 21$ or 6 : 21	M1	$\frac{PQ}{21} = \frac{5}{6}$ oe eg, $\frac{21}{6} = \frac{PQ}{5}$
	$5 \times$ (their) 3.5 or $5 \div$ their $6 \div 21$)	M1 dep	$21 \times \frac{5}{6}$
	17.5	A1	

Q	Answer	Mark	Comments
18(a)	75	B1	
	Opposite angles (add up to 180)	B1	Must see evidence (stated or in working) that opposite angles add up to 180°
18(b)	Angle BAP = 180 – 63 – (their) 75	M1	$\angle DBA = 63$
	Angle ADB = 42	A1	$\angle ADB = 42$
19(a)	$\sqrt{28} = 2\sqrt{7}$ or $\sqrt{63} = 3\sqrt{7}$	M1	
	$5\sqrt{7}$	A1	
19(b)	$\frac{30}{\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}}$	M1	or $\frac{30 \times \sqrt{5}}{5}$
	$6\sqrt{5}$	A1	
20(a)	$h \propto \frac{1}{r^2}$ or $h = \frac{k}{r^2}$	M1	or $\left(\frac{1}{3}\right) \times \pi r^2 h = k$
	$k = 72$	A1	k = 24π or 72π from above start
	$h = \frac{(their)\ 4.5 \times 4^2}{r^2}$	B1	This must be stated for final B1
20(b)	$8 = \frac{72}{r^2}$ or $r^2 = \frac{72}{8}$	M1	ft Their k if M1 awarded in part (a)
	3	A1 ft	ft Their k Answer must be in simplest form possible

Q	Answer	Mark	Comments
21	0.7×0.6 or 0.42	M1	0.7×0.4 or 0.28
	0.3×0.4 or 0.12	M1	0.3×0.6 or 0.18
	(Their)(0.7×0.6) + (their)(0.3×0.4)	M1 dep	$1 -$ (their)$(0.7 \times 0.4) -$ (their)(0.3×0.6)
	0.54	A1	
22(a)	$\sqrt{9}$ or 3	B1	or 9^3 or 729
	3^3 $(=27)$	B1	or $\sqrt{729}$ $(=27)$
22(b)	$9^x = (9^{\frac{3}{2}})^4$ $(x =) \frac{3}{2} \times 4$	M1	or $(3^2)^x = (3^3)^4$ (for equating powers) $2x = 3 \times 4$
	6 or $\frac{12}{2}$	A1	Accept 9^6 or $9^{\frac{12}{2}}$
23	$\overrightarrow{BC} = 5\mathbf{a} + 2\mathbf{b} + \mathbf{a} + 7\mathbf{b}$	M1	or $\overrightarrow{CB} = -\mathbf{a} - 7\mathbf{b} - 5\mathbf{a} - 2\mathbf{b}$
	$\overrightarrow{BC} = 6\mathbf{a} + 9\mathbf{b}$	A1	or $\overrightarrow{CB} = -6\mathbf{a} - 9\mathbf{b}$
	Attempt to compare $\overrightarrow{BC}$ and $\overrightarrow{AD}$	M1	ie, One vector is a multiple of the other $\frac{4}{6} \times 9$ oe eg, $6\mathbf{a} + 9\mathbf{b}$ is a multiple of $4\mathbf{a} + k\mathbf{b}$
	6	A1	
24(a)	Sketch showing translation of $\binom{7}{0}$	B1	Parabola touching x-axis to right of $y = x^2$
24(b)	Sketch showing one-way stretch (// to y-axis) SF = 3	B1	Parabola touching at origin and '**inside**' $y = x^2$

Q	Answer	Mark	Comments
25(a)	$(x^2 +) x^2 + 4x + 4x + 16$ (= 26)	M1	For expansion (4 terms with 3 terms correct)
	x^2 + (their) $(x + 4)^2 = 26$	M1	For substitution (independent of expansion mark)
	Simplifying to $2x^2 + 8x - 10 = 0$	A1	Clearly shown
25(b)	A = (1, 5) B = (–5, –1)	B2	Condone A and B interchanged B1 A = (1, 5) or B = (–5, –1) B1 For $x = 1$ and $x = -5$ (from factors of quadratic) but no corresponding y values found