AQA

ASSESSMENT and
QUALIFICATIONS
ALLIANCE

General Certificate of Secondary Education

Mathematics 3301
Specification A

Paper 2 Intermediate Tier

Mark Scheme

2006 examination – November 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.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

The following abbreviations are used on the mark scheme:

M   Method marks awarded for a correct method.

A   Accuracy marks awarded when following on from a correct method.
               It is not necessary always to see the method. This can be implied.

B   Marks awarded independent of method.

M dep   A method mark which is dependent on a previous method mark being
awarded.

ft   Follow through marks. Marks awarded for correct working following a mistake in an
               earlier step.

SC   Special Case. Marks awarded for a common misinterpretation which has some
               mathematical worth.

oe   Or equivalent.

eeoo   Each error or omission.

Paper 2I

1(a)	125	B1	125.0
1(b)(i)	0.7407407…….	B1	$\frac{20}{27}$ is B1 7.4… $^{-01}$ is B0
1(b)(ii)	1	B1ft	1.0 is B0

2(a)	8×4.55	M1	
	36.4	A1	36.40
2(b)	$40 \div 4.55$	M1	
	8.79(12….)	A1	8.79, 8.8, 8.7 is A0 $9 \times 4.55 = 40.95$ T & I M0 A0

3(a)	8 and 12	B2	Either order B1 for one correct
3(b)	Rectangle at $(-2, 2)\ (-5, 2)\ (-5, 4)\ (-2, 4)$	B3	B2 Rectangle at $(2, -2)\ (5, -2)\ (5, -4)\ (2, -4)$ B1 Any rotation centre $(0, 0)$

4	£60	B1	6000 6000 mins is B0
	$150 - 30$	M1	$150 \times 0.1 - 30$ is M0
	Their 120×0.1	A1ft	1200
	26 and Contract	A1	2600 or cheaper by £34

5(a)	$21 - 10$	M1	$21 + -10$
	11	A1	
5(b)	4×9	M1	4×3^2 only is M0
	31	A1	

6	Graph through (0, 5)	B1	1 correct point plotted or worked eg, (0, 5), (1, 7), (2, 9), (3, 11), (4, 13), (5, 15)
	Line gradient 2	B1	B1 for further 2 points plotted or worked
	Drawn line from (0, 5) to (5, 15) to $\frac{1}{2}$ sq accuracy	B1	

7	A = 19, B = 4	B2	B1 for each
	C = 7 – Their B	B1ft	3
	D = 15 + Their C	B1ft	18

| 8 | Fully correct triangle to 2 mm accuracy | B3 | B2 for 2 sides correct to 2 mm B1 for 1 side correct to 2 mm |

9	20 × 20 × 15 (6000)	M1	$\frac{1000}{(20 \times 20)}$ or $\frac{15}{6}$
	Their 6000 + 1000	A1ft	2.5
	Their 7000 ÷ (20 × 20)	M1dep	15 + Their 2.5
	17.5	A1	T & I can get all 4 marks

Only penalise once for notation error eg, 13 out of 28   **Ratio never allowed**

10(a)(i)	$\frac{13}{28}$	B1	oe 0.46(4) $\frac{6.5}{14}$ is B0 notation error
10(a)(ii)	$\frac{7}{28}$	B1	oe $\frac{1}{4}$
10(a)(iii)	$\frac{16}{28}$	B1	oe 0.57(1)
10(b)	Double count blue eyed girls or Should be $\frac{20}{28}$ or 8 other children with brown or green eyes or There are 8 people left not 1 or Not taken off the girls who have blue eyes	B1	B0 The 12 children may not all be girls Not all the girls have blue eyes He has added girls and blue eyed children Statement must have no incorrect part

11	Correct shading	B2	B1 for just 3 corners or just 3 mid-points

Allow embedded answers unless contradicted when M marks only

12(a)	$4x = 21 - 7$	M1	$x = \frac{21}{4} - \frac{7}{4}$
	$\frac{14}{4}$, 3.5	A1	$3\frac{1}{2}$, $3\frac{2}{4}$ oe
12(b)	$7 = 14y - 6y$ or $-7 = 6y - 14y$	M1	$\frac{7}{6} = \frac{14}{6}y - y$, $\frac{7}{14} = y - \frac{6}{14}y$, $-8y = 7$, $8y = -7$
	$\frac{7}{8}$	A1	0.875 oe

13	S, A, N	B3	-1eeoo

14	Digits 52 or $5 \div (360$ to $363)$	M1	13774 to 14444
	14000	A1	Accept 14300, 14400

15	$\sum$fx (187)	M1	At least 3 additions $0 + 16 + 70 + 45 + 56$
	Their $187 \div 90$	M1	
	2.1, 2.08, 2.07…	A1	Accept 2 with workings Beware $\frac{10}{5} = 2$

16	$30 \div 20$	M1	oe
	Their $(\frac{30}{20}) \times 2.78$	M1dep	$2.78 \div 0.667$ M2 but M0 if time $= \frac{20}{30}$
	4.17	A1	4.2

17	Evidence of adding at least two frequencies	M1	18, 52, 92, 100
	$40 < m \leq 80$	A1	Answer only with no working or no contradictory working M1, A1 Answer from incorrect working eg, mean $= 75.2$, $\frac{160}{2} = 80$ M0, A0

18(a)	$3x - 6 \leq 9$	M1	$x - 2 \leq 3$ is M1
			$3x - 6 = 9$ or $x - 2 = 3$ is M0 unless inequality recovered
			Allow 1 error in 1st or 2nd line
	$3x \leq 6 + 9 (= 15)$	M1	$x \leq 3 + 2 (= 5)$
	$x \leq 5$	A1	$x = 5$, $x \geq 5$, $x > 5$ or $3(5 - 2) \leq 9$ SC1
			$x = <5 \, x$, ≤ 5, $x < 5$ M2, A0
18(b)	**Left Boundary** $-3 \leq$ open circle < -2 or $-3 <$ closed circle ≤ -2 **Right Boundary** closed circle on 3 or line beyond 3 with termination (arrow, circle, nothing)	B1	Boundaries must be joined by a line, ignore any markings on intermediate points

19(a)	$\frac{26}{100} \times 150$	M1	39
	150 + Their 39	M1dep	M2 for 1.26×150
	189	A1	190 is A0
19(b)	40	B1	$150 - 110$
	$40 \div 110 \times 100$	M1	$150 \div 100 (\times 100) = 1.3636\ldots (136.36)$ is M0 unless 1 or 100% subtracted, then it is M2
	36.4, 36.36…	A1	36 if M1 awarded 36 from T & I is M0
19(c)	120% = 110	M1	$110 \div 1.2$ is M2
	1% = 0.9166…	A1	
	100% = 92, 91.7, 91.6	A1	T & I must get 91.6 to 91.7 Beware $20 \times \frac{100}{110} = 18.18$, $110 - 18.18 = 92$ M0

20(a)	$(x^2 =)\ 45^2 + 40^2$	M1	
	$\sqrt{3625}$	M1dep	Mark is for squaring, adding and square rooting, $\sqrt{(45^2 + 40^2)}$ is M2 oe eg, $\frac{45}{\sin 48.366}$
	60.2…	A1	60 with working
	60	B1ft	For rounding Their answer to an integer
20(b)	$\text{Tan} y = \dfrac{45}{40}$ $\text{Sin} y = \dfrac{45}{\text{Their(a)}}$ $\text{Cos} y = \dfrac{40}{\text{Their(a)}}$	M2	M1 for fraction wrong way M1 for other angle using correct trig. then M1 for subtract from 90º Cannot be scored in (a)
	48.1º to 48.6º	A1	48º, 49º with working Grads = 53.74, Rads = 0.844 M2, A0

21	$\pi r^2 = 8$	M1	
	Radius of circle $\sqrt{(8 \div \pi)}$	M1	$\sqrt{2.546}$
	$r = 1.59…$	A1	1.6
	Side square = 3 so No	A1	oe $d = 3.19$, 3.2 so No

22(a)	Lowest 'whisker' 8 Lower quartile 18 Median 25 Upper quartile 32 Highest 'whisker' 57	B3	−1eeoo plotted to half square Failure to draw box is 1 error Failure to draw 'whisker' is 1 error
22(b)	25%	B1	

23(a)	$4p + 4r = 7r + 11$	M1	$p + r = \dfrac{(7r + 11)}{4}$ Allow one error eg, $4p + r = 7r + 11$
	$4p = 3r + 11$	A1	
	$p = \dfrac{3r + 11}{4}$ or $\dfrac{1}{4}(3r + 11)$	A1ft	Dividing by 4 must be done correctly eg, $3r + 11 \div 4$ is A0 but eg, $(3r + 11) \div 4$ is A1 ft if M1 awarded eg, $p = \dfrac{(6r + 11)}{4}$ $\dfrac{(7r + 11)}{4 - r}$ A2
23(b)	$(x - 9)(x + 9)$	B1	
23(c)	$3x + 5y = 4 \qquad 6x + 10y = 8$ $30x + 5y = 130 \quad 6x + y = 26$	M1	oe Allow error in 1 term Sub one equation into other
	$27x = 126 \qquad 9y = -18$	M1dep	oe Elimination from Their equation, at least one term correct eg, $27x = -126$, $9y = 18$
	$x = 4\frac{2}{3} \qquad$ and $\qquad y = -2$	A1	oe (4.66, –2), (4.67, –2) SC1 for correct answer with no working or using trial and improvement.

24(a)	4.33×10^{14}	B2	$4.328\ldots \times 10^{14}$ B1 for 4.33^{14} or 4.3×10^{14} Only penalise once for calc. notation or 2 significant figures 4.3^{14} is B0
24(b)	2.78×10^{16}	B2	$2.783\ldots \times 10^{16}$ B1 for 2.78^{16} or 2.8×10^{16}

25	$20 = \dfrac{15}{v}$	M1	
	$v = 0.75$	A1	$\dfrac{15}{20}$
	Their $0.75 = 0.6 \times$ length	M1	Their 0.75 must be calculated value eg, $20 \div 6$ is M0, $300 \div 0.6$ is M1
	1.25	A1	