AQA

ASSESSMENT and
QUALIFICATIONS
ALLIANCE

General Certificate of Secondary Education

Mathematics 4307
Specification B

Module 3 Tier H   43053H

Mark Scheme

2009 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.

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.

MODULE 3   HIGHER TIER   43053H

1(a)	30.9469(…)	B1	$\dfrac{46080}{1489}$ or $30\dfrac{1410}{1489}$
1(b)	30.95	B1 ft	ft from any (a) > 2 dp

2	1.36 seen	M1	oe 0.36×125 (= 45) Allow build-up to 36%
	125×1.36	M1 dep	oe 125 + their 45
	170	A1	

3	$90 \div 2$ (= 45)	M1	$(0).9(0) \div 2$ (= (0).45)
	$500 + 0.5 \times 500$ (= 750)	M1	oe
	Uses correct method(s) to scale both to the same number of grams or to the same amount of money	M1 dep	dep on M2 eg 1 $500 \div$ their 45 (= 11.(…)) their $750 \div 90$ (= 8.(…)) eg 2 90(p) → 1000(g) 90(p) → 750(g)
	All numbers calculated correctly	A1	eg 1 11.(…) and 8.(…) eg 2 90, 1000 and 90, 750
	(Offer) A	A1 ft	M3 must have been awarded ft from M3A0

4	2 (×) 20 or 5 (×) 8	M1	2 (×) 2 (×) 10 or 2 (×) 4 (×) 5 Condone 1 (×)
	2 (×) 2 (×) 2 (×) 5	A1	Condone 1 (×)
	$2^3 \times 5^{(1)}$	A1	Allow **.** for ×

5(a)(i)	$12x - 4x + 4$	M1	3 terms with 2 correct (including signs)
	$8x + 4$	A1	
5(a)(ii)	$d^2 + 6d - 2d - 12$	M1	4 terms with 3 correct (including signs) but must have a term in d^2
	$d^2 + 4d - 12$	A1	
5(b)(i)	$2m(m - 2)$ or $-2m(2 - m)$	B2	B1 for $2(m^2 - 2m)$ or $m(2m - 4)$ or $-2(2m - m^2)$ or $-m(4 - 2m)$
5(b)(ii)	$(x + 3y)(x - 3y)$ or $(-x - 3y)(-x + 3y)$ or $-(x + 3y)(3y - x)$	B2	B1 for $(3y + x)(3y - x)$ B1 for $(x + 3)(x - 3)$ B1 for $(x + ay)(x - by)$ with $ab = 9$

6	$(1\% =) 16.5 \div 150 (= 0.11)$ or $1.5x = 16.5$	M1	Attempt at % that can be converted to 100% eg $(10(\%) =) 16.5 \div 15 (= 1.1)$ or $(50(\%) =) 16.5 \div 3 (= 5.5)$ or $(25(\%) =) 16.5 \div 6 (= 2.75)$ or $(300(\%) =) 16.5 \times 2 (= 33)$
	their 0.11×100 (Award M2 if two steps are combined in a single calculation)	M1 dep	Attempts to convert to 100% eg their 1.1×10 or their 5.5×2 or their 2.75×4 or their $33 \div 3$
	11	A1	SC1 Digits 11 (if answer not 11) SC1 6.6

7	$60 \div 5 \times 2 (= 24)$	M1	$60 \div 5 \times 7 (= 84)$
	$132 - 60 -$ their 24	M1 dep	$132 -$ their 84
	48	A1	

8	$y = k\sqrt{x}$	M1	$36 \div 12 = 3$ oe	$y^2 = kx$
	$12 = k\sqrt{100}$ (if this is the first line then award M2)	M1 dep	3^2	$12^2 = 100k$
	$(k =) 1.2$ oe	A1	9	$(k =) 1.44$ oe
	$(36 \div$ their $1.2)^2$	M1 dep	their $3^2 \times 100$	$36^2 \div 1.44$
	900	A1		

9	Any two of 375, 72.5 and 43.5	M1	Allow $72.4\dot{9}$ for 72.5
	$\dfrac{\text{their min}}{\text{their max - their min}}$	M1	$375 \leq$ their min < 380 $72 <$ their max < 73 $43 <$ their min < 44
	12.9(31…) or 13 with no incorrect limits used	A1	Answer only of 13.0 is M0M0A0

10(a)	15 (min) $\rightarrow \dfrac{1}{4}$ (h) $\rightarrow$ (0).25 (h) or $\dfrac{15}{60}$ (h) $\rightarrow$ (0).25 (h)	B1	(0).25 (h) $\times$ 60 = 15 (min) or 25% of 60 = 15 (min)
10(b)	10×2.25	M1	oe eg $2 \times 10 + \dfrac{1}{4} \times 10$
	22.5	A1	oe

11(a)	$9\dfrac{3}{4}$ or $\dfrac{39}{4}$ or 9.75	B1	oe
11(b)	1	B1	

12(a)	$\dfrac{24}{40} \times 100$	M1	oe eg build-up
	60	A1	SC1 40 on answer line
12(b)	24 + 5 (= 29) and 21 + 29 (= 50) or 40 + 10 (= 50)	M1	40 + 10 (= 50) or 21 + 29 (= 50) and $\dfrac{\text{their } 60}{100} \times$ their 50
	$\dfrac{\text{their } 29}{\text{their } 50} \times 100$ (= 58)	M1 dep	oe 24 + 5 (= 29)
	58 and A	A1 ft	ft their (a) 30 and A

13(a)	$\sqrt{81} = 9$ and $\sqrt{100} = 10$ or $9^2 = 81$ and $10^2 = 100$ or $\sqrt{81} < \sqrt{90} < \sqrt{100}$ or $9^2 < 90 < 10^2$ or 90 is between 81 and 100	B2	B1 for one correct
13(b)	Any two of 300 4 0.1	M1	Condone 4.00 and 0.100 Sight of 1200
	All 3 of 300 4 0.1	A1	$\dfrac{1200}{0.1}$ or 3000×4 or 300×40 M1A1
	12 000	A1	

14	$\dfrac{2}{3} \times 7$ or $\dfrac{1}{3} \times 7$	M1	3 days needs 2 litres or 1 bottle
	$\dfrac{14}{3}$ or $4\dfrac{2}{3}$ or $\dfrac{7}{3}$ or $2\dfrac{1}{3}$	A1	6 days needs 4 litres or 2 bottles
	3	A1	SC1 Answer 3 if M0 awarded

15(a)	100 or $(1\times)10^2$	B1	
15(b)	4 000 000 (–) 400 000	M1	40×10^5 (–) 4×10^5 or 4×10^6 (–) 0.4×10^6
	3 600 000	A1	Any correct answer eg 36×10^5
	3.6×10^6	B1 ft	ft from any number seen that is not in standard form unless $\times 10^0$ or $\times 10^1$

16(a)	$(5^2)^4$ or $\left(25^{\frac{1}{2}}\right)^8$	B1	$5^2 = 25$ and $2 \times 4 = 8$
16(b)	$\dfrac{1}{4^{(1)}}$	B1	
16(c)	16	B2	B1 for 2^4 or 8×2 or $8^{(1)} \times 8^{\frac{1}{3}}$ or $\left(8^{\frac{1}{3}}\right)^4$

17	Draws $y = x + 2$	B1	
	−3.4 and 2.4	B2 ft	B1 for each x coordinate of the two points of intersection ft their line Coordinates are penalised 1 mark

18(a)	$3\sqrt{3}$	M1	$\sqrt{9}\ \sqrt{3}$ M0 $\qquad \sqrt{27}$ M0
	$\dfrac{\sqrt{3}}{2}$ or $\dfrac{1\sqrt{3}}{2}$ or $\dfrac{1}{2}\sqrt{3}$ or $0.5\sqrt{3}$	A1	
18(b)	$\dfrac{10}{\sqrt{2}} \times \dfrac{\sqrt{2}}{\sqrt{2}}$	M1	$\dfrac{10}{\sqrt{2}} + \dfrac{\sqrt{8}\sqrt{2}}{\sqrt{2}}$
	$5\sqrt{2}$	A1	$\dfrac{14}{\sqrt{2}}$
	$(\sqrt{8} =)\ 2\sqrt{2}$	M1	$\dfrac{14}{\sqrt{2}} \times \dfrac{\sqrt{2}}{\sqrt{2}}$
	$7\sqrt{2}$ or $k = 7$	A1	