AQA

ASSESSMENT and
QUALIFICATIONS
ALLIANCE

General Certificate of Secondary Education

Mathematics 4307
Specification B

Module 3 Tier H   43053H

Mark Scheme

2009 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.

MODULE 3　　HIGHER TIER　　　　　　43053H

1(a)	$2(3x - 4)$	B1	
1(b)	Should be x^2 term or $6x^2$	B1	oe
	Should be $(-)$ 15 (x)	B1	oe

2	Any valid attempt to find new volume, cost or ratio for one size	M1	
	Any valid attempt to compare all 3 sizes	M1	
	All 3 answers correct	A1	
	Medium	B1 ft	ft if M2 awarded and consistent units
	One possible method		
	Attempts to divide medium cost by 3 **or** large cost by 5	M1	
	1.99 or 199 ÷ 3 **and** 3.49 or 349 ÷ 5	M1 dep	
	(0.)66… and (0.)69(8) or (0.)7(0)	A1	
	Medium bottle is best	B1 ft	

3(a)	32.50	B1	
3(b)	37.49	B1	

4	$0.4 \times 800 (= 320)$	B1	oe
	$0.8 \times$ their 320 $(= 256)$	B1	their 320 must be < 800
	$0.32 \times 800 = 256$ or $\frac{544}{800} \times 100 = 68$ or $\frac{256}{800} \times 100 = 32$, $100 - 32 = 68$	B1	oe - ie a sum that gives 68% as the answer or now finds 68% off original and finds this also to be £256
	Alternative method		
	$0.4 \times 0.8 (= 0.32)$	M1	
	$1 -$ their $0.32 (= 0.68)$	M1 dep	
	$0.68 = 68\%$	A1	

5	$4 \div 160$ (= 0.025)	M1	Accept $\frac{1}{40}$
	their $0.025 \times 60 \times 60$	M1 dep	
	90	A1	SC2 1.5 seen

6(a)	4164.22778…	B1	At least 6 sf
6(b)	4.2×10^3	B2 ft	B1 ft for either 2 sf or standard form conversions correct for their (a) or correct eg B1 4200 or 4(.1642278…) $\times 10^3$

7(a)	Any counter example	B1	eg 1 ($\times$) 2 ($\times$) 3 (= 6) 5 ($\times$) 6 ($\times$) 7 (= 210) If evaluated must be correct
7(b)	(At least) one will be even and one will be a multiple of three	B2	B1 (at least) one will be even B1 one will be a multiple of 3 oe

8(a)	$x^2 - 2x + 5x - 10$	M1	x^2 correct and 3 other terms, at least 2 correct. Might be in grid
	$x^2 + 3x - 10$	A1	
8(b)	Factorises difference of two squares into $(x - 7)(x + 7)$	B1	$x^2 - 49 = (x + 7)(x - 7)$
	Explicitly shows the cancelling	B1	Answer given must explain or show by crossing out
	Alternative method		
	$x + 7 = \dfrac{(x+7)(x-7)}{(x-7)} = \dfrac{x^2 - 49}{x - 7}$	B2	or $(x + 7)(x - 7) = x^2 - 49$

9(a)	2500	B1	
9(b)	$3.68 \leq$ answer < 3.69	B1	$\sqrt[3]{50}$ Ignore further working
9(c)	D A B C	B3	B2 2 (or 3) correct B1 any one correct

10	Sight of any correct maximum or minimum bound	B1	7.5, 8.5, 1.075, 1.085, 0.075, 0.085 for up % 1.5, 2.5, 0.985, 0.975, 0.015, 0.025 for down % (or any suitable upper bound value using a recurring decimal)
	$250\,000 \times 1.075$ (= 268 750)	M1	oe
	their $268\,750 \times 0.975$	M1	oe
	262031.25	A1	Accept 262 031 or 262 030 or 262031.30
	260 000 or 262 000	B1 ft	ft any value 4 sf or more rounded to 2 sf or 3 sf

11(a)(i)	32 400	B1	
11(a)(ii)	18 or −18	B1	
11(a)(iii)	1.8 or −1.8	B1	
11(b)	648	B1	
11(c)	324×18 or 3.24×1.8	M1	or $18 \times 18 \times 18$ or $1.8 \times 1.8 \times 1.8$
	Correct method for multiplying numbers	M1 dep	
	5.832	A1	

12	$200 \div 5 \times 2$ or $200 \div 5 \times 3$	M1	
	80 and 120	A1	

13(a)	$\frac{8(+)7}{9(-)4}$ or $\frac{15}{5}$	M1	
	3	A1	SC1 error seen but answer 3
13(b)	$\frac{420}{600} \times 100$	M1	oe eg $420 \div 6$ or full build-up
	70	A1	SC1 answer $\frac{70}{100}$ or answer 30
13(c)	$\frac{16}{18}$ (−) $\frac{3}{18}$	M1	oe At least one numerator correct with an appropriate common denominator. Ignore decimals
	$\frac{13}{18}$	A1	oe fraction Ignore further working

14(a)	63 000 ÷ 21	M1	$\frac{63 \times 10^3}{21}$ 0.3×10^4
	3000	A1	3×10^3
14(b)	480 (–) 0.48	M1	
	479.52	A1	

15(a)	One correct breakdown including a prime factor	M1	2 (×) 40 or 5 (×) 16 or 2 (×) 4 (×) 10 or 2 (×) 2 (×) 20 or 8 (×) 2 (×) 5 or 2 (×) 2 (×) 2 (×) 10 or 2 (×) 2 (×) 4 (×) 5
	2 (×) 2 (×) 2 (×) 2 (×) 5	A1	Allow trees or repeated division for M1A1, condone ×1
	$2^4 \times 5$	A1 ft	ft a string of multiplying primes correctly converted to index form after M1 awarded Only dots or × for final mark
15(b)	$50 = 2 \times 5^2$ or $2 \times 5 \times 5$	M1	or finds first 4 multiples of 80 and first 4 multiples of 50 (allow one error eg 80, 140, 220, 300)
	400	A1	SC1 Answer a different multiple of 400

16	Award these 3 marks in any order but the final mark can only be awarded for all 4 numbers in same form as each other and correct order (in any form)		
	Reduces $3\sqrt{8}$ to $6\sqrt{2}$	B1	or $\sqrt{8} = 2\sqrt{2}$ or $(3\sqrt{8} =) \sqrt{72}$ or 72
	Reduces $2\sqrt{32}$ to $8\sqrt{2}$	B1	or $\sqrt{32} = 4\sqrt{2}$ or $(2\sqrt{32} =) \sqrt{128}$ or 128
	Reduces $\sqrt{50}$ to $5\sqrt{2}$	B1	or $(7\sqrt{2} =) \sqrt{98}$ or 98 $\sqrt{50}$, $3\sqrt{8}$, $7\sqrt{2}$, $2\sqrt{32}$
			SC1 correct answer using original numbers with no working
			SC1 sight of 5√2 or 6√2 or 8√2 with no B marks awarded

17(a)	$-2.2 \leq$ solution < -2	B1	
17(b)	Subtraction of the 2 quadratics	M1	oe may find embedded for M1 $4x - 3$ (or $- 4x + 3$)
	Draws $y = 4x - 3$ correctly to both meeting points with curve	M1	
	$\dfrac{1}{2}$ and 4	A1	Need both $0.4 - 0.6$, $3.8 - 4.2$ Do not accept non-graphical methods

18(a)	Shows a complete correct method	M1	
	$\dfrac{47}{990}$	A1	
18(b)	2	B2	B1 sight of 8 or $\dfrac{1}{8}$ or $\dfrac{1}{2^{-1}}$ or $\dfrac{1}{2}$ or $(2^{-3})^{-\frac{1}{3}}$ Condone 2^1 for B2