GCSE 2004
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AQA
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ALLIANCE

Mark Scheme

Mathematics B (3302)
Module 3 Tier H

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.

Further copies of this Mark Scheme are available to download from the AQA Website: www.aqa.org.uk

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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   33003H

1	$750 \div (12 + 7 + 6)$ (= 30)	M1	Use of 9:10:11 is M0
	their 30×12 or $\times 7$ or $\times 6$	M1 dep	
	360, 210, 180	A1	All 3 needed in correct order 1 or 2 correct answers with no working implies M2A0

2(a)	2.35621…	B1	
(b)	2.36	B1 ft	ft their (a) if > 3 sf Do not accept 2.360

3(a)	$15\ 000 \times 1.02$	M1	$15\ 000 + 0.02 \times 15\ 000$
	15 300	A1	
(b)	Compound interest mentioned in words or formula $A(1 + \frac{x}{100})^t$	B1 B1	Any two answers, B1 for each
	Connects 3 years to the power of 3		Allow SC1 (£)15 918.12 seen and no other marks awarded
	Adding 2% is (multiplying by) 1.02		

4	$24.60 \div 2$ (= 12.30)	M1	$\frac{2}{3} = 24.60$ or $\frac{1}{3} = 12.30$

	$(12.30) \times 3$	M1	If see both of these steps in this order
			24.60×3 (= 73.80)
			          $(73.80) \div 2$
			                    give M2
			
			$24.60 \div 0.66(66…)$ M2
			$24.60 \div 0.67$ M2
			$24.60 \div \frac{2}{3}$ M2

	36.90	A1	36.9 is A0

5	$5.83 \times 10^7 \div (5.47 \times 10^5)$	M1	Condone invisible brackets Allow if not in standard form and at least one correct or both 2 zeros out $(5.83 \times 7) \div (5.47 \times 5)$ M0 $40.81 \div 27.35$ M0
	106.58…	A1	
	110 or 107	B1 ft	ft to 2 sf or 3 sf Allow 106.6 but no ft to 4 sf

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6	1.37×0.88 (× normal price)	M1	1.37×0.12 (= 0.1644) $1.37 - (0.1644)$
	1.2056 (× normal price)	A1	
	Profit is 20.6%	B1	Accept 21 20.56
			Alternative method if money: £100 × 1.37 × 0.88 M1 = £120.56 A1

7(a)	$P \propto w^2$ or $P = kw^2$	M1	
	$32 = k \times 80^2$ (= 6400k)	M1	
	$k = \dfrac{32}{6400} = \dfrac{1}{200}$ (So $P = \dfrac{w^2}{200}$)	A1	or $P = 0.005w^2$ Only need equation if haven't seen $P = kw^2$ earlier
(b)	50	B1 ft	ft their $P = kw^2$
(c)	$18 = (\dfrac{w^2}{200})$ $w^2 = 18 \times (200)$ or 3600	M1	Puts $P = 18$ in their $P = kw^2$ and isolates w^2 term
	So $w = 60$	A1	
(d)	Graph 1 (only if ft from their (a))	B1 ft	ft from their (a) eg Graph 2 from $P = kw$ in (a)
	(The relationship is) quadratic	B1 ft	or 'the value (18, 60) only fits graph 1' ft from above case would be: '(The relationship is) linear'

8(a)	$\dfrac{\text{their min} \, 12.3}{\text{their max} \, 15.6 - \text{their min} \, 7.20}$ $\dfrac{12.25}{15.65 - 7.195}$ if correct	M1	Their min 12.3 must be > 12.2 Their max 15.6 must be < 15.7 Their min 7.20 must be > 7.19
	Any 1 correct limit	M1	
	1.448846…	A1	1.45 1.449 1.4488 etc
(b)	3 × their max 141 + 7 × their max 150 $3 \times 141.5 + 7 \times 150.5 = 1478$ if correct	M1	Their max 141 must be < 142 Their max 150 must be < 151
	Lower bound lift load = 1475	B1	
	So this load cannot be safely carried	A1	Only award if fully correct: both 1475 and 1478 seen

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9	$120 = 2 \ (\times) \ 60$	M1	or $3 \ (\times) \ 40$ or $5 \ (\times) \ 24$
	$= 2 \times 2 \times 2 \times 3 \times 5$	A1	Condone missing $\times$ signs here
	$2^3 \times 3 \times 5$	A1	Do not accept factor of 1

10(a)	$5750 - 5000$	M1	$\dfrac{5750}{5000} \times 100 \ (= 115)$ or 750 seen
	$\dfrac{5750 - 5000}{5000} \times 100$	M1 dep	$(115) - 100$ Alternative method: $750 \div 50$ M2
	15	A1	
(b)	i) 6250	B1	
	ii) 6349	B1	

11(a)	$\dfrac{1}{3} \times \dfrac{9}{1}$	M1	
	3	A1	Allow $\dfrac{3}{1}$ but not $\dfrac{9}{3}$
(b)	13	B1	

12	$2 \times 1\frac{1}{4} - 1\frac{2}{3}$	M1	Allow $2 \times 1.25 - 1.67$ or $1.66(6\ldots)$
	$(2\frac{1}{2}) - 1\frac{2}{3} = 1 + \frac{1}{2} - \frac{2}{3}$ $= 1 + \frac{3}{6} - \frac{4}{6}$ OR $\quad \frac{5}{2} - \frac{5}{3} = \frac{15}{6} - \frac{10}{6}$	M1 dep	Do not accept decimals Deals with whole numbers and gets common denominator and at least one correct numerator Alternative method: $\frac{1}{3} + \frac{1}{2}$ M1 $= \frac{2}{6} + \frac{3}{6}$ M1
	$\dfrac{5}{6}$	A1	oe SC1 $1\frac{2}{3} - 1\frac{1}{4} = \pm \ \frac{5}{12}$ or $\quad 1\frac{1}{4} - 1\frac{2}{3} = \pm \ \frac{5}{12}$

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13(a)	Points plotted	B1	
	Smooth curve drawn through points	B1 ft	Within $\frac{1}{2}$ square Condone ruler for first two and last two pairs of points
(b)	$-1.3 \le x \le -1.1$ $3.1 \le x \le 3.3$	B1 ft B1 ft	SC1 $(-1.2, 0)$; $(3.2, 0)$ Do not ft if full marks in (a)
(c)	-5	B1	Accept $(1, -5)$
(d)	Subtracts quadratics eg $x^2 - 2x - 4 - (x^2 - x - 5)$	M1	$x^2 - 2x - 4 + x - 1 = 0$
	(So line is $y = 1 - x$) Line drawn	B1 ft	
	$-1.9 \le x \le -1.7$ $2.7 \le x \le 2.9$	A1	Do not accept from a quadratic graph

14(a)	$x = 0.\dot{5}\dot{1}$ $100x = 51.\dot{5}\dot{1}$ $99x = 51$	M1	$\frac{51}{99}$
	$\frac{17}{33}$	A1	
(b)	$0.4\dot{5}\dot{1} = \frac{4}{10} + (\frac{17}{330})$	M1	Uses their (a) or $\quad 10x = 4.\dot{5}\dot{1}$ $\quad 1000x = 451.\dot{5}\dot{1}$ $\quad\quad 990x = 447$ or uses x and $100x$ to get $99x = 44.7$
	$(\frac{132 + 17}{330})$	M1 dep	For common denominator $\frac{(447)}{990}$
	$\frac{149}{330}$	A1	

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15(a)	$27^{-\frac{2}{3}} = \dfrac{1}{27^{\frac{2}{3}}}$ or 3^{-2} or $\dfrac{1}{3^2}$	M1	
	$\dfrac{1}{9}$	A1	
(b)	$\dfrac{10 \times \sqrt{5}}{\sqrt{5} \times \sqrt{5}}$	M1	
	$2\sqrt{5}$	A1	
(c)	$\sqrt{125} = 5\sqrt{5}$ or $\sqrt{45} = 3\sqrt{5}$	B1	$\dfrac{\left(\sqrt{125} - \sqrt{45}\right)\left(\sqrt{125} - \sqrt{45}\right)}{\left(\sqrt{125} + \sqrt{45}\right)\left(\sqrt{125} - \sqrt{45}\right)}$ M1
	$\dfrac{2\sqrt{5}}{8\sqrt{5}}$	B1	$\dfrac{125 - 2\sqrt{125}\sqrt{45} + 45}{125 - 45}$ A1
	$\dfrac{1}{4}$	B1 dep	$\dfrac{1}{4}$ A1