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ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Mathematics 3302
Specification B

Module 3 Tier H 33003H

Mark Scheme

2006 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 33003H

1(a)	400 × 1.04 (= 416)	M1	oe 448 as answer can imply this M1
	(416) × 1.04 (= 432.64) and (432.64) × 1.04 = (449.9456)	M1	400×1.04^3 M2 49.945(6) implies M2
	Shows 449.945(6)	A1	Must see at least 3 dp (449.945 or 449.946) Not necessary to state rounding
1(b)	449.95 – 400.00 (= 49.95)	M1	$\frac{449.95}{400} \times 100$ or $\frac{449.95}{400} - 1$
	(their $\frac{49.95}{400}$) × 100	M1 dep	$\frac{449.95}{400} \times 100 - 100$ or $(\frac{449.95}{400} - 1) \times 100$
	12.4875 (or 12.5, 12.48, 12.49, 12.487, 12.488)	A1	

2	Correct method to find value of one or Jack's share eg 440/8	M1	Implied by 55 (× 5) or 165
	275	A1	

3(a)	$(2.2 \times 10^7) \times (8.2 \times 10^4)$	B1	oe do not accept words
	$1.8(04) \times 10^{12}$	B1 ft	1.8^{12} scores B1B0
3(b)	$[(7.7 \times 10^3)/(2.2 \times 10^7)]$ (× 100)	M1	oe Allow words
	0.035	A1	3.5^{-2} implies M1A1
	3.5×10^{-2}	B1 ft	ft answers < 1 SC1 digits 35

4	Sight of 0.9 or 90%	M1	oe eg 90/100 condone 90 = 97.20
	97.20/0.9	M1 dep	oe
	(£)108	A1	

5(a)	Sets up equation of form $B = kN^2$ and sets $180 = 9k$ or $180 = 3^2k$	M1	
	$k = 20$ so $(B = 20\ N^2)$	A1	Must see 180 and 9 to get A1 SC1 checks equations by substitution
5(b)	Missing values 20, 80, 320, 500	B2	B1 for 2 or 3 correct
5(c)	Shows that 800 is possible from 80 + 720 (or 2 and 6)	B1	oe Do not accept 800 is a multiple of 20
	Shows that 820 is possible from 320 + 500 (or 4 and 5)	B1	oe Do not accept 820 is a multiple of 20
	Concludes that 810 cannot be achieved by adding 2 values	B1	eg cannot get £810 from tables cannot get £810 from these values or $810 \div 20 = 40.5$ 810 is not a multiple of 20

6	Multiplies both parts of fraction by $\sqrt{18}$ or $\sqrt{2}$	M1	$\frac{12}{3\sqrt{2}}$
	$\frac{12\sqrt{18}}{18}$ or $\frac{12\sqrt{2}}{6}$	A1	oe eg $\frac{2\sqrt{18}}{3}$ $\frac{4}{\sqrt{2}}$
	Shows that $\sqrt{18} = 3\sqrt{2}$	M1	$\times \frac{\sqrt{2}}{\sqrt{2}}$
	$2\sqrt{2}$	A1	

7	1.995 or 2.005 (litres) or 1995 or 2005 (millilitres) seen	B1	or $2004.\dot{9}$ not eg 2004.99
	207.5 or 212.5 (millilitres) or 0.2075 or 0.2125 (litres) seen	B1	
	Attempts their max/their min	M1	Must be a 'max' and a 'min'
	$\frac{10 \times 2005}{207.5}$	A1	$(= 96.6(265)\ldots)$ $\frac{10 \times 2.005}{0.2075}$
	96	A1	

8(a)(i)	$2^4 \times 3$	B1	Either order
8(a)(ii)	$2^4 \times 3 \times 5$	B1	Any order Both parts correct but not in index form scores B0B1
8(b)	$32 = 2^5$ (any form)	M1	May be seen in (c) or lists sufficient multiples of both numbers correctly (24), 48, 72, 96 and (32), 64, 96
	$2^5 \times 3$ or 96	A1	
8(c)	8	B1	SC1 for 8(b) and 8(c) reversed

9(a)	Attempts to convert to improper fraction with at least one correct	M1	$\frac{9}{4}$ or $\frac{10}{7}$
	$\frac{9}{4}$ (×) $\frac{10}{7}$	A1	
	$\frac{90}{28}$	A1	oe eg $3\frac{3}{14}$ or $\frac{45}{14}$
9(b)	$\frac{5}{2}$	B1	oe

10	$\frac{1}{3}$ and $\frac{5}{7}$	B1 B1	If nothing on answer line accept any indication eg ringed

11(a)	$250 \times (0.8)^2$ or $0.2 \times 250 = (50)$ $250 - (50) = (200)$ $0.2 \times (200) = (40)$ $(200) - (40) = (160)$	M1	oe
	160	A1	
11(b)	$250 \times (0.8)^3$ or $(160) \times (0.8)$ or $0.2 \times (160) = (32)$ $(160) - (32) = (128)$	M1	
	$0.2 \times (128) = (25.6)$ $(128) - (25.6) = (102.4)$	M1	M2 $250 \times (0.8)^4$
	102.4	A1	

12	$(4^0 =)$ 1	B1	
	$(10^{-1} =)$ 0.1	B1	oe
	$(125^{\frac{1}{3}} =)$ 5	B1	
	1.5	B1	oe

13(a)	Shows a complete correct method	M1	eg let $x = \ldots$ then $100x = 84\ldots$ and subtract
	$\frac{84}{99}$	A1	oe eg $\frac{28}{33}$
13(b)	$\frac{14}{165}$	B1	

14(a)	–1.7	B1	+/– 0.05 inclusive Ignore positive solutions
14(b)	Attempts to subtract 2 quadratics either order	M1	
	$2x + 1$ or $-y = -2x - 1$	A1	Correct line on graph implies M1A1
	–1.4 and 1.9	A1	Both within 0.1

15(a)	$pq = \sqrt{36}$ **or** $(pq)^{-1} = 1/pq$	M1	
	$\frac{1}{6}$	A1	Allow +/–
15(b)	$\sqrt{6}\sqrt{6} - \sqrt{3}\sqrt{6} - \sqrt{3}\sqrt{6} + \sqrt{3}\sqrt{3}$	M1	At least 3 terms correct $(6 - 2\sqrt{3}\sqrt{6} + 3)$
	Shows that $(2)\sqrt{3}\sqrt{6} = (2)\sqrt{18}$ or $(2)3\sqrt{2}$	M1	Not dependent upon 1st M1
	Convincingly shows that answer is as required	A1	eg must see 6, 3 and $3\sqrt{2}$