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ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Mathematics 3302

Specification B

Module 3 Tier H 33003H THREE TIER

Mark Scheme

2007 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.

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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	75 – 63 (= 12)	M1	$\frac{63}{75} \times 100$ (= 84) 1 – $\frac{63}{75}$ (= 0.16)
	$\frac{\text{their } 12}{75} \times 100$	M1 dep	100 – their 84 their 0.16 × 100
	16	A1	

2(a)	24 ÷ (3 + 5)	M1	Condone 1 ÷ (3 + 5) 3 unsupported is M0
	9	A1	Do not allow $\frac{3}{8}$ (of a day) SC1 Answer 15 or 9 and 15
2(b)	(their 9 + 1) : 24 – (their 9 + 1)	M1	10 and 14 seen
	10:14	A1 ft	Must be integers
	5:7	A1	**Must have seen previous ratio**

3(a)	All points plotted within $\pm\frac{1}{2}$ square	B1	
	Smooth curve through their points ($\pm\frac{1}{2}$ sq)	B1 ft	Curve must be quadratic
3(b)(i)	Draws $y = 10$	B1	
3(b)(ii)	ft their curve x value at $y = 10$	B1 ft	
3(c)	Need to extend the curve (or graphs) to the left	B1	Allow "for more –ve x values" instead of "to the left"
	Need to have another point of intersection (for the graphs)	B1	If only refers to extending curve allow "find x when y is 10"

4(a)(i)	10.5735(…)	B1	
4(a)(ii)	10.6	B1 ft	ft from value > 3 sf seen
4(b)	1.5	B1	oe eg $\frac{3}{2}$
4(c)	49	B1	

5(a)	9.8×10^7	B1	
5(b)	$8.6(4) \times 10^{-8}$	B2	B1 for $8.6(4)^{-8}$ or correct answer not in standard form

6(a)	$A = kB^2$	M1	$A \propto B^2$
	$50 = k \times 10^2$	M1	This as first line implies M2
	$k = \frac{1}{2}$ $(A = \frac{1}{2}B^2)$	A1	Equation is needed only if $A = kB^2$ was not seen for M1
6(b)	$(B^2 =)$ 72 ÷ their k	M1	144 if correct
	$(\pm)12$	A1	

7	$(x =$ 0.47171…) $1000x = 471.7171…$ $10x =$ 4.7171… **and subtracts**	M1	$(x =$ 0.47171…) $100x = 47.17171…$ **and subtracts** x
	$990x = 467$	A1	$99x = 46.7$
	$\frac{467}{990}$	A1	Do not accept $\frac{46.7}{99}$

Alt 7	(0.4 + 0.07171…) $(n =$ 0.07171…) $1000n = 71.7171…$ $10n =$ 0.7171… **and subtracts**	M1	$(n =$ 0.07171…) $100n = 7.1717…$ **and subtracts** n
	$990n = 71$	A1	$99n = 7.1$
	$\frac{467}{990}$	A1	Do not accept $\frac{46.7}{99}$

Alt 7	$(m =$ 0.7171…) $100m = 71.71…$ **and subtracts** m	M1	
	$99m = 71$ **and** obtains $\frac{71}{990}$	A1	
	$\frac{467}{990}$	A1	

8	1.6(0) seen	M1	
	$1 - \frac{1.5}{1.6}$	M1 dep	0.0625
	6.25	A1	SC2 6.2 or 6.3 with no working

Alt 8	Starts with value eg 1000 1000×1.6 or 1000×1.5	M1	Allow for sight of 1600 or 1500
	$\frac{\text{their } 1600 - \text{their } 1500}{\text{their } 1600}$	M1 dep	0.0625 $1 - \frac{\text{their } 1500}{\text{their } 1600}$
	6.25	A1	SC2 6.2 or 6.3 with no working

9(a)	2 (×) 50 or 5 (×) 20	M1	2 (×) 2 (×) 25 or 2 (×) 5 (×) 10 or 5 (×) 5 (×) 4
	2 (×) 2 (×) 5 (×) 5	A1	Condone use of 1
	$2^2 \times 5^2$	A1	Do not allow use of 1
9(b)(i)	4 or 2^2	B1 ft	ft from their (a) allow index form
9(b)(ii)	$2^3 \times 5^2 \times 7$	M1	ft from their (a) Lists multiples of 56 up to 1400
	1400	A1	No ft SC1 2800

10	Estimates $\sqrt{37}$ as 6 or $\sqrt[3]{8.1}$ as 2	M1	
	3	A1	

11(a)	50% of 96 25% of 96 $12\frac{1}{2}$% of 96 **and** attempt at sum	M1	Must find 3 values ft and allow 1 error in the 3 values
	84	A1	84 with no working is M0
11(b)	($6\frac{1}{4}$ is) half of $12\frac{1}{2}$	B1	$6\frac{1}{4}$% = 15 (need to see both)
	Add this extra amount on	B1 dep	SC1 Obtains the value 225

12	95 ÷ 5 (= 19)	M1	
	(19) × 6	M1 dep	
	114	A1	SC1 $\frac{5}{6}$ (of normal price) = 95 with no further progress made

13(a)	1	B1	
13(b)	$\frac{1}{1000}$ or $\frac{1}{10^3}$	M1	
	0.001	A1	
13(c)	$5^{11}(\div 5^3)$	B1	$5^6 \times 5^2$ or $5^9 \times 5^{-1}$ or $5^9 \div 5^{(1)}$
	5^8	B1 ft	Only ft if numerator seen (as a power of 5) Note: $\frac{25^{11}}{5^3} = 5^8$ is B0B0
13(d)	$\left(2^4\right)^{-\frac{3}{4}}$ or $\frac{1}{16^{\frac{3}{4}}}$	M1	2^{-3} or $(\frac{1}{2})^3$
	$\frac{1}{8}$	A1	
13(e)	2.5×10^{-4}	B1	

14	0.75	B1	
	0.145	B1	
	their min cover × 2 or their min page × 100	M1	1.5 or 14.5 if correct **Must** have attempted **one** minimum
	their min cover × 2 + their min page × 100	M1 dep	**Must** have attempted **two** minimums
	16	A1	

15(a)	$\sqrt{16} - \sqrt{4}$ (= 4 – 2) or $\sqrt{16} - \sqrt{2}\ \sqrt{2}$ or $\sqrt{8}\ \sqrt{2} - \sqrt{4}$	M1	$\sqrt{2}(2\sqrt{2} - \sqrt{2})$ $= \sqrt{2}(\sqrt{2})$ **both** steps needed or $\sqrt{2}\,(2\sqrt{2} - \sqrt{2}\,)$ $= 2\sqrt{2}\ \sqrt{2} - \sqrt{2}\ \sqrt{2}$ Both steps needed
	2	A1	
15(b)	$\frac{(\sqrt{5})}{\sqrt{20}}$	B1	$\frac{(\sqrt{5})}{\sqrt{4}\sqrt{5}}$ or $\frac{(\sqrt{5})}{2\sqrt{5}}$ or $\sqrt{\frac{5}{20}}$ or $\frac{\sqrt{1}}{\sqrt{2}\sqrt{2}}$ Do **not** allow for $\frac{(\sqrt{5})}{\sqrt{2}\sqrt{10}}$ $\frac{\sqrt{5}}{\sqrt{2}\sqrt{10}} \times \frac{\sqrt{2}\sqrt{10}}{\sqrt{2}\sqrt{10}} = \frac{(\sqrt{5}\sqrt{2}\sqrt{10})}{20}$
	$\frac{1}{2}$	B1	oe