Version : 1.0: 11.10

General Certificate of Secondary Education
November 2010

Mathematics **43053H**

Higher

Module 3

Final

Mark Scheme

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.
M dep	A method mark which is dependent on a previous method mark being awarded.
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.
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.

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1	240 ÷ 100 × 1.3 (= 3.12)	M1	240 × 0.013 or sight of 1.013
	240 + their 3.12	M1 dep	240 × 1.013 gets M2
	243.12	A1	

2a	784 × 0.425	M1	784 × 42.5 (= 33 320)
	333.20	A1	Do not accept 333.2
2b	154 ÷ their time	M1	
	154 ÷ 3.5 or 154 ÷ $3\frac{1}{2}$	M1	oe 154 ÷ 210 × 60
	44	A1	

3	$\frac{3}{4}$ × 140	M1	oe
	0.15 × 8 × 60	M1	oe
	105 or 72	A1	
	33	A1	

4a	$(x^2 +) x^2 + 5x$	M1	
	$2x^2 + 5x$	A1	Condone $x(2x + 5)$
4b	$2a(3a + 5)$	B2	B1 for $2(3a^2 + 5a)$ or $a(6a + 10)$

5	800 ÷ (2 + 7 + 11)	M1	800 ÷ 20 (= 40)
	Any one of 2, 7, 11 × their 40	M1 dep	
	80, 280, 440	A1	SC2 correct answers in wrong order

6	6 × 12 + 5	M1	77
	their 77 × 2.54	M1 dep	
	No and 1.955 or 1.9558 or 1.956 or 1.96 or 195.5 or 195.58 or 195.6 or 196	A1	SC2 No and 198 (.12) Yes and 192.7 or 1.927 Yes and 192.5 or 1.925 SC1 one of these numbers with no decision or incorrect decision
	Alternative method		
	6 × 12 + 5	M1	77
	195 ÷ 2.54	M1	
	No and 77 and 76.7(…) or 76.8	A1	

7	0.51 or 0.03	M1	
	their 0.51 + their 0.03	M1 dep	5.4×10^{-1} 0.54
	27 ÷ any mass	M1	
	50	A1	

8a	$y = kx^3$	M1	oe
	$224 \div 4^3$ (= k)	M1	224 ÷ 64 (= 3.5) If this is first line award M2
	$y = 3.5x^3$	A1	oe Allow k = 3.5 if first M1 awarded
8b	$\sqrt[3]{\frac{1792}{\text{their } 3.5}}$	M1	$\sqrt[3]{512}$ $x^3 = 512$
	8	A1 ft	

9	11.5 or 12.5 or 0.515 or 0.525	B1	Condone $12.4\dot{9}$ or 12.499(…) or $0.524\dot{9}$ or 0.52499(…)
	their min rail ÷ their max dress	M1	their max dress × 22
	11.5 ÷ 0.525 or $11.5 \div 0.524\dot{9}$ or 11.5 ÷ 0.52499(…)	A1	0.525 × 22 or $0.524\dot{9} \times 22$ or 0.52499(…) × 22
	No with 21.9(…) (< 22)	A1	No with 11.55 and 11.5 seen For 11.55 accept in range 11.549 to 11.55

10	Any two of 40, 5 and 20	M1	$\frac{200}{20}$
	10 or 10.2 or 10.25 or 10.3	A1	oe

11	4.6 × 1.7 seen or attempted	M1	46 × 17 seen
	7.82	A1	
	11.02	A1 ft	SC2 13.26 SC1 digits 1326

12a	0	B1	
12b	All their points plotted $\pm\frac{1}{2}$ square	B1 ft	If table blank, mark on 6 given points
	Points plotted within $\frac{1}{2}$ square joined by smooth curve	B1	At least 6 points

13a	7^9	B1	
13b	7^6	B1	

14a	17 and 71 or 37 and 73 or 79 and 97	B1	
14b	7 or 13 is a factor of 91	B1	7 × 13 = 91 Do not accept '91 has other factors'

15	$3\frac{2}{5} \times 2\frac{3}{4}$	M1	
	$\frac{17}{5}$ and $\frac{11}{4}$ attempted with at least 1 correct with both improper	M1	3.4 and 2.75 Conversion to decimals with at least 1 correct
	$\frac{187}{20}$	A1	9.35 oe
	$9\frac{7}{20}$	A1 ft	oe ft mixed number from improper fraction dep on M2

16a	$x^2 - 5x + 3x - 15$	M1	Allow one error Must see x^2 and have four terms
	$x^2 - 2x - 15$	A1	
16b	$(x - 3)(x + 3)$	B1	Either order

17	4 ÷ 11 = 0.3…	M1	
	$0.\dot{3}6$	A1	

18a	2 (×) 210	M1	Product with at least 1 prime
	2 (×) 2 (×) 3 (×) 5 (×) 7	A1	Can be on factor tree
	$2^2 \times 3 \times 5 \times 7$	A1	
18b	20 and 210 or 30 and 140 or 60 and 70	B2	20 and 30 or 20 and 70 or 30 and 70 B1

19a	$\sqrt{60}$	M1	$\sqrt{2}$ (×) $\sqrt{5}$ (×) $\sqrt{2}$ (×) $\sqrt{3}$ or 4 (×) $\sqrt{3}$ (×) $\sqrt{5}$ or $\sqrt{4\times15}$ or 2 (×) $\sqrt{5}$ (×) $\sqrt{3}$ or $\sqrt{4}$ (×) $\sqrt{15}$
	$2\sqrt{15}$	A1	
19b	$\frac{3\sqrt{2}}{2}$	B1	Accept $1.5\sqrt{2}$
19c	$\sqrt{13}$	B1	
	$(7\times2)^{\frac{1}{2}}$ or $14^{\frac{1}{2}}$	M1	Indicates $8^{\frac{1}{3}} = 2$
	$\sqrt{13}$ and $\sqrt{14}$ and B	A1	
19d	2^{-6}	B3	B2 $\left(2^4\right)^{-\frac{3}{2}}$ or $(2^{-2})^3$ or $\left(2^{-12}\right)^{\frac{1}{2}}$ or 2^6 B1 $16 = 2^4$ or $(16)^{-\frac{3}{2}}$ or 4^{-3} or 2^{12} or 2^{-12} or changes denominator to 4^3 or 64 or $\sqrt{4096}$ or $16^{\frac{3}{2}}$