



General Certificate of Secondary Education

Mathematics 4307

Specification B

Module 3 Tier H 43053H

Final

Mark Scheme

2010 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.

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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.
E	Marks awarded for an explanation.
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.

MODULE 3 HIGHER TIER

43053H

1(a)	948 ÷ 6	M1	
	158	A1	158 : 948 M1 A0
1(b)	1 : 12	B2	B1 their $\frac{158}{2} : 948$ B1 1 : 12 not in simplest form eg $\frac{1}{2} : 6$

2	$\frac{100}{7}$	M1	oe
	14.2 to 14.3 inclusive	A1	$14\frac{2}{7}$
	their 14.2.../0.44	M1 dep	
	32 to 33 inclusive and yes	A1 ft	oe to saying 'yes'
	Alternative method 1		
	30×0.44	M1	
	13.2	A1	
	$\frac{100}{7}$	M1	oe
	14 to 14.3 inclusive and yes	A1 ft	oe to saying 'yes'
	Alternative method 2		
	30×0.44	M1	
	13.2	A1	
	their 13.2×7	M1 dep	
	92.4 and yes	A1 ft	oe to saying 'yes'

3	50 (×) 2 or 25 (×) 2 (×) 2 or 10 (×) 5 (×) 2 or 5 (×) 5 (×) 4 or 5 (×) 20	M1	Allow on factor trees or repeated division Condone use of × 1
	2 (×) 2 (×) 5 (×) 5	A1	
	$2^2 \times 5^2$	A1 ft	Allow dots for × but no other alternatives ft only with prime factors and after M1 awarded

4(a)	$0.17 \times 800 (= 136)$	M1	oe
	$800 - \text{their } 136$	M1 dep	M2 0.83×800 or 83×8
	664	A1	
4(b)(i)	265	B1	
4(b)(ii)	274	B1	SC1 numbers wrong way around in parts (b)(i) and (b)(ii)

5(a)	-11 (is wrong and) should be 30	B1	oe Accept should be 30
	$11(x)$ (is wrong and) should be $-11(x)$	B1	
5(b)	5 and 6 have no common factors and x and y have no common factors	B1	Must reference numbers and letters oe

6(a)	4.35×10^8	B1	
6(b)(i)	757.69848...	B1	757.69849
6(b)(ii)	760	B1 ft	ft figure having at least 3 sf Correct or ft

7(a)(i)	Greater than 5	B1	oe Accept (they are) increasing
7(a)(ii)	Less than -7	B1	oe
7(b)	Smooth curve through points	B1	
7(c)	Attempts to subtract or difference the two quadratics	M1	$(y =) \pm x \pm 2$
	Draws the line $y = x + 2$ to at least the two crossing points	A1	
	Reads off their two answers ($\pm \frac{1}{2}$ small square)	A1 ft	ft if M1 awarded but must have two answers

8	$T = \frac{200}{N}$ or $k = 200$ and $T = \frac{k}{N}$ (oe) seen	B3	oe B2 for $T \propto \frac{200}{N}$ or $k = 200$ but $T = \frac{k}{N}$ (oe) not seen or $k = 25 \times 8$ or $\frac{k}{8} = 25$ oe B1 for $T \propto \frac{1}{N}$ or $T = \frac{k}{N}$ oe or 25×8 or 200 or $k \propto 200$
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9	$28400 \div 0.48$ (= 59 166 to 59 167 inclusive)	M1	0.48×0.97 (= 0.4656) oe
	their 59 166.666... $\div 0.97$	M1 dep	$28\,400 \div$ their 0.4656 oe
	[60 995, 60 997]	A1	At least 5 sf shown and correct
	61 000 or 60 000	B1 ft	Accept rounding to 1 sf, 2 sf or 3 sf from previously shown value to at least one more sf

10(a)	4	B1	
10(b) (i)	-487	B1	
10(b) (ii)	-24 350	B2	B1 a negative number with the digits 2435 in right order B1 24350

11	At least two of 4, 2 and 0.5	M1	
	5^3	A1	
	125	A1 ft	ft any value over 5 correctly cubed if M1 awarded SC1 27 no working

12(a)	$3h - 12$	B1	
12(b)	$x^3 + 3x^2$	M1	
	$-x^3 + 3x$	M1	Allow one sign error or $-(x^3 - 3x)$
	$3x^2 + 3x$ and factorised	A1	or simplify LHS to $3x^2 + 3x$ and multiply out RHS convincingly to same
12(c)	$m(m - 1)$	B1	

13(a)	Appropriate common denominator with at least one correct numerator	M1	$\frac{6}{15}$ (-) $\frac{5}{15}$ oe
	$\frac{1}{15}$	A1	oe
13(b)	$\frac{7}{4} \times \frac{7}{5}$ or $1\frac{3}{4} \times \frac{7}{5}$	M1	oe
	$\frac{49}{20}$	A1	oe eg $2\frac{9}{20}$

14	$450 - 400 (= 50)$	M1	$\frac{450}{400} - 1 (= 0.125)$ or $\frac{450}{400} \times 100 (= 112.5)$
	$\frac{\text{their } 50}{400} \times 100$	M1 dep	oe eg $\frac{50}{4}$ their 0.125×100 or their $112.5 - 100$
	12.5	A1	SC1 sight of or answer of $\frac{1}{8}$

15(a)	1	B1	
15(b)	2	B1 ft	$2 \times$ their (a) or correct
15(c)	2	B1	

16(a)	$\frac{10}{3} \times \frac{10}{3}$	B1	Allow $\left(\frac{10}{3}\right)^2$ or $\frac{10^2}{3^2}$
	$\frac{100}{9}$	B1 ft	ft their improper fractions correctly squared
	$11\frac{1}{9}$	B1 ft	ft their improper fraction if either B1 awarded and correct mixed number obtained ($11\frac{1}{9}$ implies B3, $\frac{100}{9}$ implies B2)
16(b)	Successfully combines any 2 square roots	M1	eg $\sqrt{3}\sqrt{2} = \sqrt{3 \times 2}$ or $\sqrt{6}$ Ignore further work in deciding this mark M1 $k = \frac{n^2}{2}$
	Any two correct answers and no incorrect answer	A2	$\frac{1}{2}$, 2, $\frac{9}{2}$, 8, $\frac{25}{2}$ 18, $\frac{49}{2}$ 32, ... M1 A1 any one correct answer

17(a)	Numerator = 12 (and/or -12)	M1	
	$\sqrt[3]{27^2}$ or $(\sqrt[3]{27})^2$ or 3^2 or 9	M1	
	$\frac{12}{9}$ or $1\frac{3}{9}$ or $1\frac{1}{3}$ or $\frac{4}{3}$	A1	
	$1.\dot{3}$ or 1.3...	B1 ft	SC2 1.3, 1.33 etc no working
17(b)	$3.\dot{5}\dot{3} \times \frac{1}{10}$ (= $0.3\dot{5}\dot{3}$)	M1	oe
	Let $x = 0.\dot{3}\dot{5}$ $100x = 35.\dot{3}\dot{5}$ and attempt to subtract	M1 dep	
	$\frac{35}{99}$	A1	oe
	Alternative method		
	Let $x = 3.\dot{5}\dot{3}$ $100x = 353.\dot{5}\dot{3}$ and attempt to subtract	M1	oe
	($99x = 350$) $x = \frac{350}{99}$ ($\div 10$)	M1 dep	oe
	$\frac{350}{990}$	A1	oe