General Certificate of Secondary Education

Mathematics 4307
Specification B

Module 3 Tier H   43053H

Mark Scheme

2010 examination - March 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.

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

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.

E   Marks awarded for an explanation.

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)	$165 \div 55$	M1	oe
	3	A1	
1(b)	$0.4(0) \times 55 \ (= 22)$	M1	oe $1 - 0.4 \ (= 0.6)$ oe
	$55 -$ their 22	M1 dep	their 0.6×55
	33	A1	

2	Selects correct two only $2x(x + 2)$ and $x(2x + 4)$	B2	B1 for one correct with no more than one incorrect selected

3	$6.5(0) \times 3 \ (= 19.5(0))$	M1		
	$7.5(0) \times \dfrac{2}{3} \ (= 5)$	M1	$7.5(0) - \dfrac{1}{3} \times 7.5(0) \ (= 5)$	$7.5(0) \times 4 \ (= 30)$ and $\dfrac{2}{3} \times$ their 30 M2
	their 5×4	M1 dep	dep on 2nd M1	
	$19.5(0)$ and 20 seen	A1		
	Alternative method			
	$6.5 (0) \times 3 \ (= 19.5(0))$	M1		
	their $19.5(0) \div 4 \ (= 4.875)$	M1 dep	4.87 or 4.88	
	$7.5(0) \times \dfrac{2}{3}$	M1		
	4.875 or 4.87 or 4.88 and 5 seen	A1		

4(a)	1.59392…	B1	
4(b)	1.6	B1 ft	ft value seen > 2 significant figures

5(a)	12	B2	B1 for any other multiple of 12 B1 for 12 unsimplified eg 2×6
5(b)	28	B1	
5(c)	$2 \ (\times) \ 46$ or $4 \ (\times) \ 23$ or $2 \ (\times) \ 2 \ (\times) \ 23$	M1	Allow $1 \ (\times) \ 2 \ (\times) \ 46$ or $1 \ (\times) \ 4 \ (\times) \ 23$
	$2 \times 2 \times 23$	A1	$2^2 \times 23$

6	120(%) or 1.2(0) linked to 500	M1	
	$500 \div 120 \times 100$	M1 dep	oe $500 \div 120 \times 20$ oe
	416.6… or 416.7	A1	83.3…
	Comments that this number is not possible	A1 ft	ft if M2 awarded and their answer is not an integer

7	$3.9(38) \times 10^{-3}$ or 3.94×10^{-3}	B3	B2 for correct answer not in st form B2 for $-3.9(38) \times 10^{-3}$ or -3.94×10^{-3} B2 for $(-)3.15 \times 10^{-3}$ or $(-)3.2 \times 10^{-3}$ B2 for $(-)7.88 \times 10^{-4}$ or $(-)7.9 \times 10^{-4}$ B1 for either of the above not in st form B1 for $(-)3.1 \times 10^{-3}$ or $(-)7.8 \times 10^{-4}$ SC1 uses 6.2×10^{-5} and 4×10^{-3}

8(a)	$y = kx^2$	M1	oe
	$40 = k (\times) 2^2$	M1 dep	M2 if this is first line
	$k = 10$	A1	$y = 10x^2$ needed if $y = kx^2$ not explicitly seen earlier SC2 $10x^2$
8(b)	2.5	B1 ft	ft their k if $(y =) kx^2$ in (a) and $k \neq 1$

9(a)	$\dfrac{2}{9}$	B1	oe fraction
9(b)	$\dfrac{32}{990}$	B1	$\dfrac{32}{99} \times \dfrac{1}{10}$ or $\dfrac{32}{99} \div 10$

10	Two of 445 14.5 74.5 435 15.5 75.5	B1	$445 \leftrightarrow 444.99\,(9\ldots) \leftrightarrow 444.\dot{9}$ $15.5 \leftrightarrow 15.499\,(9\ldots) \leftrightarrow 15.4\dot{9}$ $75.5 \leftrightarrow 75.499(9\ldots) \leftrightarrow 75.4\dot{9}$
	$\dfrac{(2\times)\,445}{a+b}$	M1	$\dfrac{(2\times)\,445}{14.5+74.5}$
	$\dfrac{(2\times)\,c}{14.5+74.5}$	M1	scores M2
	10 or 9.999(…)	A1	

11	$200 \times 3 \ (= 600)$	M1	M2 for $200 \times 4 \ (= 800)$ **and** their $800 - (200 + 350)$
	their $600 - 350$	M1 dep	
	250	A1	

12	Valid product with at least one number rounded to 1 sf	M1	eg 52×300 or 38×60 or 40×61
	Two valid products each with at least one number rounded to 1 sf and intention to add	M1 dep	eg $50 \times 300 \ + \ 38 \times 60$ or $52 \times 300 \ + \ 40 \times 61.75$
	17400 or 17880 or 18000 or 17280	A1	SC1 Answer $17000 \rightarrow 18000$ inclusive if M0

13(a)	Valid common denominator with at least one numerator correct	M1	eg $\dfrac{(10)}{12} \ (+) \ \dfrac{(3)}{12}$
	$\dfrac{13}{12}$ or $1\dfrac{1}{12}$	A1	oe fraction
13(b)	$\dfrac{1}{2}$	B1	
13(c)	$1 - \dfrac{1}{8} \ (= \dfrac{7}{8})$	M1	
	their $\dfrac{7}{8} \ \times \ \dfrac{1}{3}$	M1 dep	
	$\dfrac{7}{24}$	A1	oe fraction SC1 $\dfrac{1}{24}$

14(a) (i)	$(2, 6)$ plotted $\pm \frac{1}{2}$ sq	B1	
14(a) (ii)	Smooth curve passing through the 8 points given $\pm \frac{1}{2}$ sq	B1	
14(b)	$x^2 + 2x - 2 - (x^2 + x - 1)$ attempted with x^2 eliminated	M1	or $\pm x \pm 1$
	$y = x - 1$ drawn	A1	
	0.6 and -1.6	B1 ft	ft from their line drawn if gradient $\neq 0$

15	$210 - 150 \ (= 60)$	M1	$\frac{210}{150} \times 100 \ (= 140)$	$\frac{210}{150} - 1 \ (= 0.4)$
	$\dfrac{\text{their } 60}{150} \times 100$	M1 dep	their $140 - 100$	their 0.4×100
	40	A1		

16(a)	3^{10}	B2	B1 $3^{11} \div 3$ or $(3^{15} \div)3^5$
16(b)	$\dfrac{1}{36}$	B1	Do not allow $\dfrac{1}{6^2}$
16(c)	$(-)10$	B1	
16(d)	25	B2	B1 for 5^2 or $125^{\frac{1}{3}} = 5$ or $\sqrt[3]{125} = 5$ or $\dfrac{1}{25}$

17(a)	$(m + 1)(m + 6)$	B2	B1 for $(m \pm a)(m \pm b)$ where $ab = \pm 6$
17(b)	$(983 + 17)(983 - 83)$	M1	1000 and 900 seen
	$900\,000$	A1	

18(a)	1.5×10^7	B2	B1 for correct answer not in standard form seen eg 15×10^6 or 15 000 000
18(b)	$\dfrac{20+3\sqrt{2}}{\sqrt{2}}$ or $\dfrac{20}{\sqrt{2}} + 3$	M1	$(20 + 3\sqrt{2}) \div \sqrt{2}$
	$20\dfrac{\sqrt{2}}{2}$ or $10\sqrt{2}$	A1	
	$10\sqrt{2} + 3$	A1	$a = 10$ (and) $b = 3$