



## **General Certificate of Secondary Education**

# **Mathematics 4307**

## *Specification B*

**Module 3 Tier H 43053H**

# **Mark Scheme**

*2009 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.

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**The following abbreviations are used on the mark scheme:**

<b>M</b>	Method marks awarded for a correct method.
<b>A</b>	Accuracy marks awarded when following on from a correct method. It is not necessary always to see the method. This can be implied.
<b>B</b>	Marks awarded independent of method.
<b>M dep</b>	A method mark which is dependent on a previous method mark being awarded.
<b>ft</b>	Follow through marks. Marks awarded for correct working following a mistake in an earlier step.
<b>SC</b>	Special Case. Marks awarded for a common misinterpretation which has some mathematical worth.
<b>oe</b>	Or equivalent.
<b>eeoo</b>	Each error or omission.

**MODULE 3 HIGHER TIER**

**43053H**

1(a)	$5a + 10$	B1	
1(b)	$50(2x - 3)$	B1	
1(c)	$28(3b - 8)$	B1	

2(a)	$35 \div 7$	M1	
	5	A1	5:35 is M1A0
2(b)	$2000 - 800 (= 1200)$	M1	$\frac{2000}{800} (= 2.5)$ Accept 250 for M1
	$\frac{\text{their } 1200}{800} \times 100$	M1 dep	their 2.5 $\times 100 - 100$ or their 250 - 100 (their 2.5 - 1) $\times 100$
	150	A1	

3	$75 - 13.5(0) (= 61.5(0))$	M1	
	their $61.5(0) \div 10.5(0)$ ( $= 5.8\dots$ or 5.9)	M1 dep	or their $61.5(0) \div 6 (= 10.25)$
	No (£1.50 short)	A1	No with no arithmetical errors seen
	<b>Alternate method</b>		
	$13.5(0) + 6 \times 10.5(0)$ or $13.5(0) + 5 \times 10.5(0)$	M1	( $= 76.5(0)$ or 66)
	76.5(0)	A1	
	No	A1 ft	ft only from $6 \times 10.5(0)$

4	$0.4 \times 1.8(0)$ or $0.2 \times 1.4(0)$	M1	oe (0.72 or 0.28) Allow use of pence
	their 0.72 + their 0.28	M1 dep	£1 or 100p
	$2.00 - (\text{their } 0.72 + \text{their } 0.28)$	M1 dep	
	500	A1	

5(a)	667	B1	
5(b)(i)	1	B1	
5(b)(ii)	2	B1	

6(a)	$(x + a)(x + b)$ where $ab = \pm 20$	M1	
	$(x + 4)(x + 5)$	A1	Either order
6(b)	$\frac{3-x}{x+5}$	B1 ft	

7	9 000 000	M1	oe eg $0.9 \times 10^7$ , 9 million
	$9 \times 10^6$	A1	

8(a)	$T = \frac{k}{N}$ or $T \propto \frac{1}{N}$	M1	oe
	$k = 80 \times 4 (= 320)$	M1 dep	
	$T = \frac{320}{N}$	A1	Accept $k = 320$ after $T = \frac{k}{N}$ seen oe
8(b)	$N = \frac{320}{16}$	M1	Watch out for incorrect methods
	20	A1 ft	ft part (a)

9(a)	Sight of 102 or 1.02	B1	oe
	$\frac{54000000}{1.02}$	M1	oe $\frac{54000000}{102} \times 100$
	52 941 176.(...)	A1	To 2 significant figures or better but if no method shown then to 4 significant figures or better
9(b)	$48\,000\,000 \times 1.047$ (= 50 256 000)	M1	oe
	their $50\,256\,000 \times 1.047$ (= 52 618 032)	M1 dep	$48\,000\,000 \times 1.047^2$ is M2
	$\frac{\text{their } 9(a)}{1.02}$ (= 51 903 114)	M1	Allow their rounded or full answer from part (a) $\frac{54000000}{(1.02)^2}$
	Both answers correct and Lucy correct (oe)	A1	At least 3 significant figures

10	$36\,000 - 3600$	M1	oe $\frac{90}{100} \times 36\,000$
	32 400	A1	
	44 000	B1	
	their 44 000 + their 32 400	M1 dep	dep on either M1 or B1 awarded
	76 400 and yes	A1 ft	75 000 implied but if seen must be correct

11(a)	286 900	B1	
11(b)	30.2	B1	
11(c)	28 690	B1	

12(a)	$\frac{1}{8}$	B1	
12(b)	$\frac{3}{7} \times \frac{1}{8}$	M1	
	$\frac{3}{56}$	A1	
12(c)	Either $\frac{7}{2}$ or $\frac{13}{7}$ seen	M1	$(2)\frac{7}{14}$ $(-)\frac{12}{14}$
	their $\frac{49}{14}$ $(-)\frac{26}{14}$	M1	Common denominator with at least one numerator correct $2 - \frac{5}{14}$ or $1\frac{21}{14}$ $(-)\frac{12}{14}$
	$\frac{23}{14}$	A1	$1\frac{9}{14}$ oe No decimals

13(a) (i)	$t(t-1)$	B1	
13(a) (ii)	Takes out common factor of $(x+2)$	M1	Put $t = x + 2$ Allow other errors
	$(x+2)(x+2-1)$	A1	
	$= (x+2)(x+1)$	A1	
	<b>Alternate method</b>		
	$x^2 + 2x + 2x + 4 - (x+2)$	M1	Allow one error
	$x^2 + 3x + 2$	A1	
	$= (x+2)(x+1)$	A1	
13(b) (i)	$(-3, -2)$ identified	B1	Could be on table
13(b) (ii)	$(-3, 2)$ plotted	B1	$\pm \frac{1}{2}$ square

14(a)	Sixteen million	B1	
14(b)	$7.53 \times 10^{-3}$	B1	

15(a)	8.535	B1	Accept 853.5 cm
15(b)	Sight of 8.365 or 836.5	B1	or use of 499...
	Their min for Carl – their max for Mike	M1	Max must be more than 8.36 (oe) Min must be less than 8.54 (oe)
	0.17 or 17 or 0.16 $\dot{9}$ or 16. $\dot{9}$	A1	Ignore units this time

16(a)	0.08 and/or -0.08	B2	oe eg $\frac{2}{25}$ B1 sight of 0.01 (oe) 8 or -8
16(b) (i)	$x^{\frac{2}{3}}$	B1	Condone $(x^2)^{\frac{1}{3}}$ or $(x^{\frac{1}{3}})^2$ or $x^{2 \times \frac{1}{3}}$ or $x^{2 \cdot \frac{1}{3}}$ or $x^{\frac{1}{3} \times 2}$ or $x^{\frac{1}{3} \cdot 2}$
16(b) (ii)	4	B1	

17(a)	$\frac{\sqrt{20}\sqrt{45}(-)\sqrt{20}\sqrt{5}}{\sqrt{45}\sqrt{5}}$	M1	ie common denominator (allow one numerator error)
	$\frac{\sqrt{20 \times 45}(-)\sqrt{20 \times 5}}{\sqrt{45 \times 5}}$	M1 dep	Allow one arithmetical error
	$\frac{20}{15} \left( = \frac{4}{3} \right)$	A1	
	<b>Alternate method</b>		
	$\sqrt{20} = 2\sqrt{5}$ or $\sqrt{45} = 3\sqrt{5}$	M1	Allow other errors
	$\frac{2\sqrt{5}}{\sqrt{5}} - \frac{2\sqrt{5}}{3\sqrt{5}}$	M1 dep	
	$2 - \frac{2}{3} \left( = \frac{4}{3} \right)$	A1	
17(b)	$\frac{\sqrt{4}}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$	M1	$\sqrt{\frac{12}{9}}$
	$\frac{2\sqrt{3}}{3}$	A1	Accept $\frac{\sqrt{12}}{3}$