



General Certificate of Secondary Education

Mathematics 4307

Specification B

Module 1 Tier H 43051H

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.

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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.
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 1 HIGHER TIER

43051H

Note: Probability - Accept fraction, decimal or percentage. Do not accept ratio.

Q	A	Mark	Comments								
1(a)	Throw the coin a large number (≥ 30) of times (or repeat the experiment) and count the number of heads or see, list, record results	E2	oe E1 throw a coin 10 (or < 30) times or throw a coin a large number of times or throw a coin and count heads or tails								
1(b)	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Heads</td> <td>Tails</td> </tr> <tr> <td> </td> <td> </td> </tr> </table>	Heads	Tails			B1	Ignore superfluous work eg cum freq oe <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Number of Throws</td> <td>Heads</td> </tr> <tr> <td> </td> <td> </td> </tr> </table>	Number of Throws	Heads		
Heads	Tails										
Number of Throws	Heads										
1(c)	If there are a lot more heads than tails [$\text{Pr}(H) > 0.6$ if numbers given] Work out the probability of heads and if $\text{Pr}(H) > 0.6$ or significantly greater than $\frac{1}{2}$	E2	E1 more heads than tails or look at how many heads there are or count up the totals of each								

2(a)	$0 + 1250 + 2 \times 960 + 3 \times 131 \dots$	M1	Summing at least 4 correct products seen
	$\frac{\text{their } 3850}{2800}$	M1 dep	
	1.375	A1	Accept 1.4 or better from 3850 seen. 1.51 \Rightarrow M2 without working Allow 1.38 without working 1.37 \Rightarrow M2A0 oe $\frac{11}{8}$
2(b)	$\frac{63}{2800}$	B1	oe $\frac{9}{400}$ or 0.0225 or 0.023
2(c)	their $\frac{63}{2800} \times 26$ (000 000)	M1	Must be a probability $\times 26$ (m)
	585 000	A1	Must be correct units eg 0.585 m(illions) OK 58500 \Rightarrow M0A0 without working

3(a)	$\frac{4+3}{5+4+3}$	M1	oe attempt at both correct numerator and correct denominator
	$\frac{7}{12}$	A1	0.58 $\dot{3}$ Accept 0.58 or better
3(b)	<p>$25 \times \frac{1}{3}$ ($= 8.\dot{3}$) is not a whole number</p> <p>or cannot work out $\frac{1}{3}$ of 25</p> <p>or 25 does not divide by 3</p> <p>or cannot have 0.$\dot{3}$ of a bead</p> <p>or half bead</p> <p>or fraction of a bead</p>	E1	<p>Not '3 cannot be divided by 25'</p> <p>oe</p> <p>Allow '25 doesn't divide into 3'</p>
3(c)(i)	<p>All 6 probabilities correct</p> <p>$\frac{1}{5}$ and $\frac{4}{5}$ on each pair of branches</p>	B2	Any 3 probabilities correct B1
3(c)(ii)	$\frac{1}{25}$	B1 ft	ft their probabilities seen ($0 < \text{prob} < 1$) oe 0.04

4(a)	$\frac{82+115+174+129}{4}$	M1	or by considering differences/increases
	125	A1	Mark table first
4(b)	<p>Their moving average plotted in correct horizontal and their vertical position $\pm \frac{1}{2}$ sq</p>	B1 ft	ft or correct
4(c)	their $130 \pm \frac{1}{2}$ sq	M1	Correct reading of <u>their</u> trend line, curve etc but must go through or very near the ma points, must write it down
	$\frac{115+174+129+x}{4}$ = their 130	M1 dep	
	Approx £102	A1 ft	ft their correct reading of their trend line

5(a)	8 points correct $\pm \frac{1}{2}$ sq	B2	6 or 7 correct $\pm \frac{1}{2}$ sq B1 Ignore extras
5(b)	Suitable "straight" line with length at least from 4 to 12 on horizontal axis passing through or on (4, 9) and (4, 11) and through or on (10, 3.5) and (12, 3)	B1	
5(c)	Approx 8 hours $\pm \frac{1}{2}$ sq	B1 ft	ft line or curve with negative gradient or zig-zag line
5(d)	As the amount of time spent on homework increases the amount of time spent watching TV decreases	B1	oe eg vice versa

6	$1 - 0.6 (= 0.4)$	M1	$\frac{150}{0.6}$
	0.2 or 20% seen	A1	250 seen
	$\frac{1}{3}$ of 150	M1	$\frac{\text{their } (250 - 150)}{2}$
	50	A1	$\frac{150}{3} = 50$ scores 4 marks but clear incorrect method eg 3 shapes and $\frac{150}{3} = 50$ scores no marks

7(a)	Shortest, tallest and median correct $\pm \frac{1}{2}$ sq	B1	160, 169, 180
	Box $\pm \frac{1}{2}$ sq and shape of diagram correct	B1	Can lose 1st B1 and get 2nd B1
7(b)	The boys' range (or interquartile range) is greater than the girls' or the boys' heights are more spread than the girls'	B1	No contradictions with figures (if figures wrong then lose B1 mark) oe Boys' interquartile range = 8 Girls' interquartile range = 7 etc
	The median of the girls is greater than the median of the boys or (on average) the girls are taller than the boys	B1	oe

8	$\frac{1}{9}$ or $\frac{1}{8}$ seen	M1	or $\frac{2}{9}$ seen
	$\frac{1}{10} \times \frac{1}{9} \times \frac{1}{8}$	M1 dep	or $\frac{3}{10} \times \frac{2}{9}$ seen
	their $\frac{1}{720} \times 6$	M1 dep	oe eg adding 6 triple products probs from tree or $\frac{1}{10} \times \frac{1}{9} \times \frac{1}{8} \times 6$ or $\frac{3}{10} \times \frac{2}{9} \times \frac{1}{8}$
	$\frac{1}{120}$	A1	oe. $\frac{1}{720}$ with no working \Rightarrow SC2

9(a)	cw 15 and 20	B1	Mark table first
	fds 0.5 or 0.2	B1	Mark table first Either correct and in correct place Nothing in table then mark working
9(b)	Boundaries at 0, 16, 65, 80 and 100	B1	$\pm \frac{1}{2}$ sq If no vertical line at 100 lose B1
	their heights $\pm \frac{1}{2}$ sq	B1 ft	Must fit graph
9(c)	$\frac{10}{15} \times 7.5 + 4$	M1	5 + 4 or obtain correct area: pop'n ratio eg $11.5 \text{ cm}^2 = 11.5$ million etc
	9	A1	