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ASSESSMENT and QUALIFICATIONS ALLIANCE

## General Certificate of Secondary Education

# Mathematics 4307

*Specification B*

## Module 1 Tier H 43051H

# 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:**

| | |
|---|---|
| **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. |
| **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. |
| **eeoo** | Each error or omission. |

# MODULE 1 HIGHER TIER 43051H

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

| | | | |
|---|---|---|---|
| 1(a) | Correct basic shape of two way table of size 3 by 4 | M1 | |
| | Correct labelling of colours | A1 | |
| | Correct labelling of numbers | A1 | |
| 1(b) | 5 correct entries | B1 | Must be two way table or a complete list of all 12 possibilities |

| | | | |
|---|---|---|---|
| 2(a) | $0.2 \times 600$ or $600 \div 5$ | M1 | |
| | 120 | A1 | $\frac{120}{600}$ M1A0 |
| 2(b) | $0.1 \times 600 = 60$ white<br>or half of their 120 | M1 | **Alternate method**<br>$1 - (0.2 + 0.1 + 0.095)$ |
| | 600 – (their 60 + 57 + their 120)<br>or 600 – their 237<br>or 363 | M1 dep | $\frac{0.605}{3}$ |
| | their 363 ÷ 3 | M1 dep | $0.201\dot{6} \times 600$ |
| | 121 | A1 | Must be an integer |

| | | | |
|---|---|---|---|
| 3(a) | Correct plotting of median | B1 | (156, 20) |
| | Correct plotting of lower quartile | B1 | (141, 10) |
| | Correct plotting of upper quartile | B1 | (176, 30) |
| | Correct plotting of min and max and 'smooth' curve or straight lines joining all points | B1 | (100, 3) and (214, 40)<br>All $\pm \frac{1}{2}$ sq |
| 3(b) | 35 – their 31 | M1 | or their 9 – 5 |
| | '4' | A1 ft | ft from increasing curve<br>Must be integer |

| | | | |
|---|---|---|---|
| 4 | Correct method seen eg<br>$\frac{27}{200} \times 30$<br>or 1 correct value in answer | M1 | 4.05, 10.5 or 15.45 implies M1 |
| | 4, 11, 15<br>or 4, 10, 16<br>or 5, 10, 15 | A2 | A1 for 3 correct values not totalling 30<br>ie 4, 10, 15 or 4, 11, 16<br>or 5, 11, 15 or 5, 11, 16<br>or 5, 10, 16 |

| | | | |
|---|---|---|---|
| 5 | $\frac{1}{6} \times \frac{1}{5}$ or $\frac{2}{6} \times \frac{1}{5}$<br>or $\frac{1}{6} \times \frac{2}{5}$ | M1 | **Alternate method**<br>$\frac{1}{6} \times \frac{1}{5}$ |
| | $\frac{1}{6} \times \frac{1}{5} \times 2$ **and** $\frac{2}{6} \times \frac{1}{5} \times 2$<br>or $\frac{4}{30}$ **and** $\frac{2}{30}$ seen oe | M1 dep | 6 different arrangements indicated or listed |
| | $\frac{4}{30} + \frac{2}{30}$ | M1 dep | oe $\frac{1}{6} \times \frac{1}{5} \times 6$ or $\frac{1}{30} \times 6$ |
| | $\frac{6}{30}$ or $\frac{1}{5}$ | A1 | |
| | | | SC2 for with replacement, method seen, fully correct answer of $\frac{1}{6}$ |
| | | | Sample space method with all 30 outcomes and correct answer is 4 marks SC4<br>Sample space with 15 outcomes and correct answer is 3 marks SC3 |

| | | | |
|---|---|---|---|
| 6(a) | As the age of the tree increases the height of the tree increases.<br>Or the older the tree the taller the tree.<br>Or positive correlation | B1 | |
| 6(b) | 'Straight' line drawn on or between (1, 0.2) and (1, 1.4) to on or between (8, 6) and (8, 7) | B1 | Length must be at least from 1 to 8 horizontally |
| 6(c) | '2.4' | B1 ft | ft from their line of best fit $\pm \frac{1}{2}$ sq |

| | | | |
|---|---|---|---|
| 7 | $(1 \times 0) + (2 \times 1) + (6 \times 2) + (8 \times 3) + (3 \times 4)$ or $2 + 12 + 24 + 12$ | M1 | Condone omission of $1 \times 0$<br>Attempt at $\sum fx$ |
| | their $50 \div 20$ | M1 dep | |
| | 2.5 | A1 | |

| | | | |
|---|---|---|---|
| 8(a) | Plotted at mid class intervals | B1 | $\pm \frac{1}{2}$ sq |
| | Heights correct and joined with a 'straight' line through their points $\pm \frac{1}{2}$ sq | B1 | Ignore ends. Heights within or on class boundaries |
| 8(b) | B and valid comment about mode including numerical value | B2 | eg 'Company B as the mode is 15000 - 20000 whereas company A is 10000 - 15000'<br>Accept 17500 and 12500 instead of class intervals<br>B1 for partial answer eg B because the mode is higher |

| | | | |
|---|---|---|---|
| 9(a) | At least 3 choices, not overlapping, covering at least 5 days including none | B2 | Only 2 choices loses 1 mark<br>One error B1 eg overlapping or gaps or missed 'none'<br>Ignore errors on more than 5 days |
| 9(b) | Too time consuming/too much data to analyse | B1 | |
| 9(c) | Only year 11 or only female | B1 | Accept biased |

| | | | |
|---|---|---|---|
| 10(a) | Correct probs of 0.8 and 0.2 with labels on first pair of branches | B1 | Accept Yes and No or P, $\overline{P}$ etc<br>oe |
| | Correct labels on second pair of branches | B1 | Accept labels and probs in either order on branches |
| | Correct probs of 0.7 and 0.3 on second pair of branches | B1 | oe Penalise branches drawn from failed theory test if probabilities or labels completed unless the probabilities are both zero |
| 10(b) | $0.8 \times 0.3$ | M1 | oe |
| | 0.24 | A1 | oe Ignore incorrect cancelling if $\frac{24}{100}$ seen |

| | | | |
|---|---|---|---|
| 11(a) | 4.0 to 6.0 block of height 11 | B1 | $\pm \frac{1}{2}$ sq |
| | 6.0 to 10.0 block of height 3 | B1 | $\pm \frac{1}{2}$ sq |
| 11(b) | $(0.5 \times 8) + (0.5 \times 20)$ or 14 | M1 | oe |
| | Yes with 14 and 12 | A1 | eg 14 evening 12 day<br>$14 > 12$ oe |