



AQA Qualifications

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# GCSE

# Mathematics

Unit 1: Higher 43601H

Mark scheme

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43601H  
June 2016

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Version: 1.0 Final

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Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts: alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Assessment Writer.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' 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 from [aqa.org.uk](http://aqa.org.uk)

## Glossary for Mark Schemes

GCSE examinations are marked in such a way as to award positive achievement wherever possible. Thus, for GCSE Mathematics papers, marks are awarded under various categories.

If a student uses a method which is not explicitly covered by the mark scheme the same principles of marking should be applied. Credit should be given to any valid methods. Examiners should seek advice from their senior examiner if in any doubt.

- M** Method marks are awarded for a correct method which could lead to a correct answer.
- M dep** A method mark dependent on a previous method mark being awarded.
- A** Accuracy marks are awarded when following on from a correct method. It is not necessary to always see the method. This can be implied.
- B** Marks awarded independent of method.
- B dep** A mark that can only be awarded if a previous independent mark has been awarded.
- ft** Follow through marks. Marks awarded following a mistake in an earlier step.
- SC** Special case. Marks awarded within the scheme for a common misinterpretation which has some mathematical worth.
- oe** Or equivalent. Accept answers that are equivalent.  
eg, accept 0.5 as well as  $\frac{1}{2}$
- [a, b]** Accept values between  $a$  and  $b$  inclusive.
- [a, b)** Accept values  $a \leq \text{value} < b$
- 3.14...** Accept answers which begin 3.14 eg 3.14, 3.142, 3.1416

Examiners should consistently apply the following principles

**Diagrams**

Diagrams that have working on them should be treated like normal responses. If a diagram has been written on but the correct response is within the answer space, the work within the answer space should be marked. Working on diagrams that contradicts work within the answer space is not to be considered as choice but as working, and is not, therefore, penalised.

**Responses which appear to come from incorrect methods**

Whenever there is doubt as to whether a candidate has used an incorrect method to obtain an answer, as a general principle, the benefit of doubt must be given to the candidate. In cases where there is no doubt that the answer has come from incorrect working then the candidate should be penalised.

**Questions which ask candidates to show working**

Instructions on marking will be given but usually marks are not awarded to candidates who show no working.

**Questions which do not ask candidates to show working**

As a general principle, a correct response is awarded full marks.

**Misread or miscopy**

Candidates often copy values from a question incorrectly. If the examiner thinks that the candidate has made a genuine misread, then only the accuracy marks (A or B marks), up to a maximum of 2 marks are penalised. The method marks can still be awarded.

**Further work**

Once the correct answer has been seen, further working may be ignored unless it goes on to contradict the correct answer.

**Choice**

When a choice of answers and/or methods is given, mark each attempt. If both methods are valid then M marks can be awarded but any incorrect answer or method would result in marks being lost.

**Work not replaced**

Erased or crossed out work that is still legible should be marked.

**Work replaced**

Erased or crossed out work that has been replaced is not awarded marks.

**Premature approximation**

Rounding off too early can lead to inaccuracy in the final answer. This should be penalised by 1 mark unless instructed otherwise.

**Continental notation**

Accept a comma used instead of a decimal point (for example, in measurements or currency), provided that it is clear to the examiner that the candidate intended it to be a decimal point.

| Q    | Answer  | Mark | Comments   |
|------|---|------|--|
| 1(a) | Any two of the three valid criticisms<br>ie the overlap<br>the options not being exhaustive<br>the lack of a time frame       | B2   | B1 Any one valid criticism<br>eg<br>If you had stayed in 3 which box would you tick?<br>Some people might have stayed in more than 14<br>Should say 'How many hotels have you stayed at in the last week/year' |
|      | <b>Additional Guidance</b>  |      |  |
|      | Do not accept the same criticism repeated eg<br>1 There is no box for 15<br>2 There is no box for 16                          |      | B1<br>B0   |
|      | Ignore irrelevant statements  |      |  |
|      | Ignore criticisms of the question (other than lack of time frame)   |      |  |
|      | The numbers collide 0 – 3, 3 – 6  |      | B1   |
|      | No box for Other  |      | B1   |
|      | No box for Don't know   |      | B1   |
|      | There is a gap  |      | B1   |
|      | They assume everyone has stayed in a hotel and it doesn't have an option for over 14 (ignore any non-contradictory statement) |      | B1   |
|      | There are not enough boxes  |      | B0   |
|      | The boxes are wrong   |      | B0   |

| Q           | Answer   | Mark     | Comments |
|-------------|--|----------|----------|
| <b>1(b)</b> | Suitable response section covering 0 to 7, exhaustive, no overlaps, with at least 3 separate numerical choices | B1       |          |
|             | <b>Additional Guidance</b>   |          |          |
|             | Interpret box labelled eg 5+ in favour of the student  |          |          |
|             | Ignore boxes that extend beyond 7 and do not count them eg<br>0 – 2, 3 – 5, 6 – 8<br>0 – 5, 6 – 10, 11 – 15    | B1<br>B0 |          |
|             | Ignore boxes labelled Other and Not sure etc   |          |          |
|             | A box including 0 with another box labelled None (oe) is an overlap  | B0       |          |
|             | If inequalities are used they must be correct  |          |          |
|             | Allow tally table even if filled in  |          |          |
|             | Boxes (oe) for<br>0 oe, 1, 2, 3, 4, 5, 6, 7  | B1       |          |
|             | Boxes (oe) for<br>Mon, Tues, Wed, Thurs, Fri, Sat, Sun   | B0       |          |

| Q        | Answer  | Mark | Comments  |
|----------|---|------|---|
| 2        | <b>Alternative method 1</b>   |      |   |
|          | 36(%) or 0.36<br>or 64 : 36 or 32 : 18                                | M1   | oe  |
|          | 16 : 9  | A1   | Accept 1 : 0.5625 or 1 : $\frac{9}{16}$<br>or 1.7 : 1 or $\frac{16}{9} : 1$<br>SC1 correctly simplifying any given ratio<br>SC1 for simplified ratio in reverse eg 9 : 16 |
|          | <b>Alternative method 2</b>   |      |   |
|          | $\frac{16}{25}$ or $\frac{9}{25}$ or $\frac{16}{9}$ or $\frac{9}{16}$ | M1   | Must be simplified fraction   |
|          | 16 : 9  | A1   | Accept 1 : 0.5625 or 1 : $\frac{9}{16}$<br>or 1.7 : 1 or $\frac{16}{9} : 1$<br>SC1 correctly simplifying any given ratio<br>SC1 for simplified ratio in reverse eg 9 : 16 |
|          | <b>Additional Guidance</b>  |      |   |
|          | 16 : 9 seen then answer 4 : 3   |      | M1A0  |
| 16% : 9% |   | M1A0 |   |

| Q        | Answer  | Mark  | Comments   |
|----------|---|-------|--|
| <b>3</b> | <b>Alternative method 1</b>   |       |  |
|          | 360 – 165 – 60 or 135   | M1    | Angle for cows<br>May be on diagram                                  |
|          | their 135 ÷ 360 (× 100) or 0.375  | M1dep | oe<br>Proportion of cows   |
|          | 37.5  | A1    | Accept 38 with method  |
|          | <b>Alternative method 2</b>   |       |  |
|          | 60 ÷ 360 (× 100)<br>or 0.166(6..) or 16.6(6..) (%)<br><b>and</b><br>165 ÷ 360 (× 100)<br>or 0.458(3..) or 45.8(3..) (%)<br><br>or (60 + 165) ÷ 360 or 0.625 | M1    | Proportions of chickens and sheep<br>oe<br>May be on diagram         |
|          | (1 – their 0.1666... – their 0.4583...)<br>(× 100)<br>or<br>their 16.66... + their 45.83...<br>or<br>(60 + 165) ÷ 360 × 100<br>or<br>62.5 (%)               | M1dep | Proportion of cows<br><br>oe<br><br>Percentage of chickens and sheep |
|          | 37.5  | A1    | Accept 38 with method  |
|          | <b>Additional Guidance</b>  |       |  |
|          | 0.625   | M1    |  |
|          | 62.5 or 0.375   | M1M1  |  |
|          | Accuracy lost through truncation or rounding is only penalised in the final mark  |       |  |



| Q    | Answer   | Mark | Comments                                  |
|------|----------|------|---|
| 4(a) | Positive | B1   | Ignore any indication of strength eg weak |
| 4(b) | 7        | B1   | Accept any answer in range [6.8, 7.2]     |

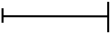
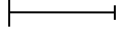
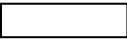
|  |   |      |   |
|--|---|------|---|
| 5(a)   | Appropriate key   | B1   |   |
|  | Stem 2, 3, 4, 5   | B1   | or 5, 4, 3, 2   |
|  | Leaves correct and ordered<br>1 4 9<br>2 5 6 8 8 9<br>0 3 7 8<br>2 6  | B1   | Must match the order of their stem if present eg if 5, 4, 3, 2 leaves should be<br>6 2<br>8 7 3 0<br>9 8 8 6 5 2<br>9 4 1 |
|  | Appropriate alignment of leaves   | Q1ft | ft their single digit leaves<br>Strand (ii)<br>Logical organised working so row lengths show the distribution             |
|  | <b>Additional Guidance</b>  |      |   |
|  | For the Q mark:   |      |   |
|  | <ul style="list-style-type: none"> <li>Leaves may be unordered and/or incorrect (but need at least 13)</li> <li>Leaves must be single digit</li> <li>Lengths of rows need to correspond to <i>their</i> number of leaves ie row with most leaves should be longest etc</li> </ul> |      |   |
|  | The Q mark is independent so B0B0B0Q1ft is possible   |      |   |
| Ignore eg lines between numbers which may be working for 5b and commas |   |      |   |
| If not crossed out and replaced, mark the stem-and-leaf on the grid    |   |      |   |

| Q    | Answer  | Mark  | Comments                                      |
|------|---|-------|---|
| 5(b) | <b>Alternative method 1</b>   |       |   |
|      | 11 × 10 or 110<br>or<br>2 × 20 or 40  | M1    | oe<br>Implied by 4.40 or 440 or 1.60 or 160   |
|      | (their 110 + their 40) × 0.04<br>or<br>(their 110 + their 40) × 4 or 600    | M1dep | oe  |
|      | 6   | A1    |   |
|      | <b>Alternative method 2</b>   |       |   |
|      | 10 × 0.04 or 0.4 or 10 × 4 or 40<br>or<br>20 × 0.04 or 0.8 or 20 × 4 or 80  | M1    | oe<br>Allow 30 × 4 or 1.20 or 120 for M1 only |
|      | their 0.4 × 11 + their 0.8 × 2<br>or<br>their 40 × 11 + their 80 × 2 or 600 | M1dep | oe  |
|      | 6   | A1    |   |
|      | <b>Additional Guidance</b>  |       |   |
|      | (Total points =) 150 scores the first mark                                  |       | M1  |
|      | 13 × 10 + 2 × 20 = 170<br>170 × 4 = 680<br>£6.80                            |       | M1<br>M1dep<br>A0                             |

| Q | Answer   | Mark | Comments  |
|---|--|------|---|
| 6 | 4 or 5 correct plots   | M1   | (25, 5), (35, 13), (45, 9), (55, 6), (65, 2)<br>$\pm \frac{1}{2}$ small square<br>Accept 5 points plotted at the correct heights consistently on the lower bound or upper bound for M1 only |
|   | 5 correct plots joined with straight lines to form a frequency polygon                                     | A1   | $\pm \frac{1}{2}$ small square  |
|   | <b>Additional Guidance</b>   |      |   |
|   | Accept unruled lines if intention for straight lines is clear  |      | M1A1  |
|   | Bar chart and frequency polygon drawn – mark frequency polygon   |      |   |
|   | Bar chart only   |      | M0  |
|   | Ignore other points or lines before first plot and after final plot and a line joining first and last plot |      |   |

|   |  |    |                                     |
|---|--|----|-------------------------------------|
| 7 | $\frac{3}{25} \times 100$ or 12            | M1 | oe<br>Allow $\frac{12}{100}$ or 12% |
|   | $\frac{1}{10} \times (100 - 20)$ or 8      | M1 | oe<br>Allow $\frac{8}{80}$          |
|   | 4  | A1 |                                     |
|   | <b>Additional Guidance</b>                 |    |                                     |
|   | $(\frac{3}{25} - \frac{1}{10}) \times 100$ |    | M1 M0 A0                            |
|   | $(\frac{3}{25} - \frac{1}{10}) \times 80$  |    | M0 M1 A0                            |

| Q    | Answer   | Mark  | Comments |        |
|------|--|-------|----------|--------|
| 8(a) | 24   | B1    |          |        |
| 8(b) | F(45) = [71, 73] or F(44) = [70, 72]<br>or<br>F(37) = [57, 59] or F(36) = [55, 57]<br>or<br>F(>45) = [7, 9] or F(>44) = [8, 10]<br>or<br>F(>37) = [21, 23] or F(>36) = [23, 25]          | M1    |          |        |
|      | F(45) = [71, 73] or F(44) = [70, 72]<br>and<br>F(37) = [57, 59] or F(36) = [55, 57]<br><b>or</b><br>F(>45) = [7, 9] or F(>44) = [8, 10]<br>and<br>F(>37) = [21, 23] or F(>36) = [23, 25] | M1dep |          |        |
|      | [12, 17]   | A1    |          |        |
|      | <b>Additional Guidance</b>   |       |          |        |
|      | Answer only in range   |       |          | M1M1A1 |
|      | Answer in range from wrong working   |       |          | M2 max |

| Q        | Answer   | Mark | Comments   |                   |
|----------|--|------|--|-------------------|
| <b>9</b> | Upper quartile drawn at 41   | B1   | $(\pm \frac{1}{2}$ square)   |                   |
|          | Upper quartile and lower quartile drawn with interquartile range of 20   | B1ft | $(\pm \frac{1}{2}$ square)<br>ft their upper quartile – 20                         |                   |
|          | $44 \times \frac{3}{4}$  | M1   | oe<br>eg 44 : 33 seen in working   |                   |
|          | Median at 33   | A1   | $(\pm \frac{1}{2}$ square)<br>NB Must have a fully correct diagram for all 4 marks |                   |
|          | <b>Additional Guidance</b>   |      |  |                   |
|          | Line drawn at 33 (not LQ or UQ)  |      |  | M1A1              |
|          | Box with two medians can still score LQ and UQ   |      |  | B1B1M0A0 possible |
|          | <p>Instructions for incomplete diagrams:</p> <ul style="list-style-type: none"> <li>• If a line at 33 is shown can imply this is their median</li> <li>• If three lines are drawn assume LQ, median, UQ, even without box</li> <li>• For the following:</li> </ul> <div style="margin-left: 20px;">  implies LQ<br/>  implies UQ<br/>  implies LQ and UQ </div> |      |  |                   |

| Q            | Answer   | Mark | Comments   |
|--------------|--|------|--|
| <b>10(a)</b> | Selects $4.2 \times 10^{-4}$ and 0.005   | B1   | oe $0.00042$ $5 \times 10^{-3}$<br>May be implied by 0.0027(1) oe  |
|              | Finds the midpoint of any two of the numbers<br>eg $(4.2 \times 10^{-4} + 0.005) \div 2$<br>or 0.0027(1) | M1   | Allow an incorrect number of leading zeros if numbers converted incorrectly<br>0.000245 or 0.002535<br>or 0.003235 or 0.00341<br>or 0.0057 all imply B0M1<br>oe  |
|              | $2.7(1) \times 10^{-3}$  | Q1ft | Strand (i)<br>ft B0M1 for correct midpoint of two of the numbers, given in standard form<br>SC2 $2.45 \times 10^{-4}$ or $2.535 \times 10^{-3}$ or<br>$3.235 \times 10^{-3}$ or $3.41 \times 10^{-3}$ or<br>$5.7 \times 10^{-3}$ |
|              | <b>Additional Guidance</b>   |      |  |
| <b>10(b)</b> | stays the same   | B1   |  |

| Q  | Answer   | Mark | Comments   |
|----|--|------|--|
| 11 | Selects at least two (and no others) from<br>Centre (and miss) or miss and centre or outer and outer | B1   | Seen or implied<br>eg At least two pairs selected from 0.2 (and 0.3) 0.3 and 0.2 0.5 and 0.5 (and no others)<br>Allow outer-outer repeated as a fourth pair  |
|    | 0.2 × 0.3 (× 2) or 0.06 or 0.12<br>or<br>0.5 × 0.5 or 0.25   | M1   | oe<br>Allow other combinations seen  |
|    | 0.2 × 0.3 (× 2) or 0.06 or 0.12<br>and<br>0.5 × 0.5 or 0.25  | M1   | oe<br>No other combinations used   |
|    | 0.37   | A1   | oe fraction, decimal or percentage<br>SC3 for 0.31 (ignoring reverse)<br>SC3 for 0.51 (assumes one dart allowed)<br>SC2 for 0.61 (for total of 50+)<br>SC2 for 0.62 (outer-outer twice)<br>SC1 for 0.45 (50+ with order ignored) |
|    | <b>Additional Guidance</b>   |      |  |

| Q   | Answer  | Mark | Comments |      |     |     |                                   |    |   |      |     |      |                           |                           |     |
|---|---|------|----------|------|-----|-----|-----------------------------------|----|---|------|-----|------|---------------------------|---------------------------|-----|
| 12  | <table border="1"> <tr> <td>2550</td> <td>850</td> <td>1400</td> </tr> <tr> <td>383</td> <td>127</td> <td>210</td> </tr> </table> | 2550 | 850      | 1400 | 383 | 127 | 210                               | B2 | <p>B1 for any one correct entry</p> <table border="1"> <tr> <td>2550</td> <td>850</td> <td>1400</td> </tr> <tr> <td>382<br/>or 382.5<br/>or 383</td> <td>128<br/>or 127.5<br/>or 127</td> <td>210</td> </tr> </table> | 2550 | 850 | 1400 | 382<br>or 382.5<br>or 383 | 128<br>or 127.5<br>or 127 | 210 |
|   | 2550  | 850  | 1400     |      |     |     |                                   |    |   |      |     |      |                           |                           |     |
|   | 383   | 127  | 210      |      |     |     |                                   |    |   |      |     |      |                           |                           |     |
|   | 2550  | 850  | 1400     |      |     |     |                                   |    |   |      |     |      |                           |                           |     |
| 382<br>or 382.5<br>or 383   | 128<br>or 127.5<br>or 127   | 210  |          |      |     |     |                                   |    |   |      |     |      |                           |                           |     |
| <p>or</p> <table border="1"> <tr> <td>2550</td> <td>850</td> <td>1400</td> </tr> <tr> <td>382</td> <td>128</td> <td>210</td> </tr> </table> | 2550  | 850  | 1400     | 382  | 128 | 210 | <p><b>Additional Guidance</b></p> |    |   |      |     |      |                           |                           |     |
| 2550  | 850   | 1400 |          |      |     |     |                                   |    |   |      |     |      |                           |                           |     |
| 382   | 128   | 210  |          |      |     |     |                                   |    |   |      |     |      |                           |                           |     |
|   |   |      |          |      |     |     |                                   |    |   |      |     |      |                           |                           |     |
|   |   |      |          |      |     |     |                                   |    |   |      |     |      |                           |                           |     |



| Q     | Answer  | Mark  | Comments  |
|-------|---|-------|---|
| 13(a) | <b>Alternative method 1</b>   |       |   |
|       | Attempt at frequency density<br>300 ÷ 30 or 10 or<br>200 ÷ 10 or 20 or<br>260 ÷ 20 or 13 or<br>80 ÷ 40 or 2             | M1    | One frequency ÷ one class width   |
|       | 4 correct frequency densities   | A1    | 10, 20, 13, 2   |
|       | Widths correct and bars in correct positions  | A1    | Must have correct frequency density for at least two bars                       |
|       | Bars to correct heights and vertical scale or key   | A1 ft | ft their frequency densities with M1 awarded<br>$\pm \frac{1}{2}$ small square  |
|       | <b>Alternative method 2</b>   |       |   |
|       | Attempt at standard frequencies<br>eg 300 ÷ 3, 200 ÷ 1, 260 ÷ 2, 80 ÷ 4   | M1    | Any two attempted   |
|       | 4 correct standard frequencies  | A1    | eg 100, 200, 130, 20  |
|       | Widths correct and bars in correct positions  | A1    | Must have correct standard frequency for at least two bars                      |
|       | Bars to correct heights and key   | A1 ft | ft their standard frequencies with M1 awarded<br>$\pm \frac{1}{2}$ small square |
|       | <b>Additional Guidance</b>  |       |   |
|       | Accept any scale that fits<br>eg 1 cm $\equiv$ 2.5, 1 cm $\equiv$ 3, 1 cm $\equiv$ 4, 1 cm $\equiv$ 5, 1 cm $\equiv$ 10 |       |   |

| Q     | Answer   | Mark | Comments |  |
|-------|--|------|----------|--|
| 13(b) | $\frac{3}{4} \times 840$ or 630<br>or<br>$\frac{1}{4} \times 840$ or 210 | M1   | oe       |  |
|       | 110  | A1   |          |  |
|       | <b>Additional Guidance</b>   |      |          |  |
|       |  |      |          |  |

| Q  | Answer   | Mark  | Comments   |
|----|--|-------|--|
| 14 | <b>Alternative method 1</b>  |       |  |
|    | $\frac{9}{15} \times \frac{x}{14}$ or $\frac{3}{15} \times \frac{x}{14}$   | M1    | oe   |
|    | $\frac{9}{15} \times \frac{6}{14}$ or $\frac{54}{210}$ or $\frac{9}{35}$<br>or $\frac{9}{15} \times \frac{3}{14}$ or $\frac{27}{210}$ or $\frac{9}{70}$<br>or $\frac{3}{15} \times \frac{12}{14}$ or $\frac{36}{210}$ or $\frac{6}{35}$<br>or $\frac{3}{15} \times \frac{9}{14}$ or $\frac{27}{210}$ or $\frac{9}{70}$<br>or $\frac{3}{15} \times \frac{3}{14}$ or $\frac{9}{210}$ or $\frac{3}{70}$ | M1dep | P(R, R')<br>P(R, Y) or P(R, G)<br>P(Y, Y') or P(G, G')<br>P(Y, R) or P(G, R)<br>P(Y, G) or P(G, Y)<br>oe<br>0.257(142) or 0.128(571) or 0.171(428) or 0.042(857) |
|    | $\frac{9}{15} \times \frac{6}{14} + \frac{3}{15} \times \frac{12}{14} + \frac{3}{15} \times \frac{12}{14}$<br>or<br>$\frac{9}{15} \times \frac{3}{14} \times 2 + (\frac{3}{15} \times \frac{9}{14} + \frac{3}{15} \times \frac{3}{14}) \times 2$   | M1dep | oe $\frac{54}{210} + \frac{36}{210} + \frac{36}{210}$<br>or<br>$\frac{27}{210} \times 2 + (\frac{27}{210} + \frac{9}{210}) \times 2$                             |
|    | $\frac{126}{210}$ or $\frac{3}{5}$ or 0.6  | A1    | oe<br>SC2 for $\frac{126}{225}$ or $\frac{14}{25}$ oe  |

| Q                    | Answer   | Mark  | Comments   |
|----------------------|--|-------|--|
| <b>14<br/>cont.</b>  | <b>Alternative method 2</b>  |       |  |
|                      | $\frac{9}{15} \times \frac{x}{14}$ or $\frac{3}{15} \times \frac{x}{14}$   | M1    | oe   |
|                      | $\frac{9}{15} \times \frac{8}{14}$ or $\frac{72}{210}$ or $\frac{12}{35}$<br>or<br>$\frac{3}{15} \times \frac{2}{14}$ or $\frac{6}{210}$ or $\frac{1}{35}$ | M1dep | P(R, R)<br>P(Y, Y) or P(G, G)<br>oe<br>0.342(857) or 0.028(571)        |
|                      | $1 - \left( \frac{9}{15} \times \frac{8}{14} + \frac{3}{15} \times \frac{2}{14} + \frac{3}{15} \times \frac{2}{14} \right)$                                | M1dep | oe $1 - \left( \frac{72}{210} + \frac{6}{210} + \frac{6}{210} \right)$ |
|                      | $\frac{126}{210}$ or $\frac{3}{5}$ or 0.6  | A1    | oe<br>SC2 $\frac{141}{225}$ or $\frac{47}{75}$ oe                      |
|                      | <b>Additional Guidance</b>   |       |  |
|                      | Probabilities combined on a tree diagram   |       | M1M1   |
| Note that P(R) = 0.6 |  |       |  |

| Q  | Answer   | Mark | Comments   |
|----|--|------|--|
| 15 | <b>Alternative method 1</b>  |      |  |
|    | 455 or 465 or<br>505 or 515 seen   | B1   | May be implied by 960 or 980                                 |
|    | their 455 + their 505<br>or<br>960   | M1   | their 455 must be [450, 460)<br>their 505 must be [500, 510) |
|    | 26 000 ÷ (455 + 505)<br>or<br>26 000 ÷ 960 or 27.0833...   | M1   | Allow 26 005   |
|    | 27   | A1   | Must be using 26 000 and 960<br>SC2 26 from 26 000 ÷ 980     |
|    | <b>Alternative method 2</b>  |      |  |
|    | 455 or 465 or<br>505 or 515 seen   | B1   | May be implied by 960 or 980                                 |
|    | their 455 + their 505<br>or<br>960   | M1   | their 455 must be [450, 460)<br>their 505 must be [500, 510) |
|    | (455 + 505) × 27 = 25 920<br>and<br>(455 + 505) × 28 = 26 880<br>or<br>960 × 27 = 25 920<br>and<br>960 × 28 = 26 880 | M1   |  |
|    | 27   | A1   | Must be using (26 000 and) 960<br>SC2 26 from 26 000 ÷ 980   |
|    | <b>Additional Guidance</b>   |      |  |
|    |  |      |  |