**GCSE Mathematics (1MA1)**

**Themed papers – Median and Quartiles**

**Compiled from student-friendly mark schemes**

**Please note that this mark scheme is not the one used by examiners for making scripts. It is intended more as a guide to good practice, indicating where marks are given for correct answers. As such, it doesn’t show follow-through marks (marks that are awarded despite errors being made) or special cases.**

**It should also be noted that for many questions, there may be alternative methods of finding correct solutions that are not shown here – they will be covered in the formal mark scheme.**

**NOTES ON MARKING PRINCIPLES**

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| --- |
| **Guidance on the use of codes within this mark scheme** |
| M1 – method mark. This mark is generally given for an appropriate method in the context of the question. This mark is given for showing your working and may be awarded even if working is incorrect.P1 – process mark. This mark is generally given for setting up an appropriate process to find a solution in the context of the question.A1 – accuracy mark. This mark is generally given for a correct answer following correct working.B1 – working mark. This mark is usually given when working and the answer cannot easily be separated.C1 – communication mark. This mark is given for explaining your answer or giving a conclusion in context supported by your working.Some questions require all working to be shown; in such questions, no marks will be given for an answer with no working (even if it is a correct answer). |

**Question 1 (Total 4 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (a) | 59, 53, 66 | B2 | This mark is given for a correct median, lower quartile and upper quartile(B1 is given for one value correct) |
| (b) | Yes; all the values are lower for Coach A so the people on that coach are younger | C1 | This mark is given for a correct statement with a valid reason |
| (c) | No; there is a greater difference between the greatest and lowest age on Coach B | C1 | This mark is given for a correct statement with a valid reason |

**Question 2 (Total 5 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (a) | 330 – 150 | M1 | This mark is given for evidence of using values for the lower quartile (150) and the upper quartile |
| 180 | A1 | This mark is given for the correct answer only |
| (b) |  | B2 | These marks are given for a fully correct box plot(one mark is for showing a box and at least 3 correctly plotted values) |
| (c) | Yes, because the female students have a greater median than the male students | C1 | This mark is given for a correct comparative statement relevant to the question |

**Question 3 (Total 5 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (a) |  | B3 | These three marks are given for a fully correct box plot |
| (Two marks are given for at least three correctly plotted values, including box and whiskers) |
| (One mark is given for at least two correctly plotted values, including box and whiskers or 5 correct values with no box and whiskers) |
| (b) |  × 80 |  | This mark is given for a method to find an estimate |
| 60 |  | This mark is given for the correct answer only |

**Question 4 (Total 3 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  | (1 × 7.5) + (2 × 12.5) + (7 × 17.5) + (8 × 22.5)= 7.5 + 25 + 122.5 + 180 | M1 | This mark is given for a method to find four products within the intervals |
|  | M1 | This mark is for a method to find ∑*ft* ÷ 18 |
| 18.6 | A1 | This mark is given for a correct answer in the range 18.61 to 18.62 |

**Question 5 (Total 3 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (a) | 40 < *h* ≤ 50 | B1 | This mark is given for the correct answer only |
| (b) |  | B2 | This mark is given for a correct polygon with points plotted at midpoints(B1 is given for one point incorrect) |

**Question 6 (Total 5 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working an or answer examiner might expect to see** | **Mark** | **Notes** |
| (a) | UQ = 168Highest value = 174 | 1 | This mark is given for finding the upper quartile or the highest value |
| Lowest value = 154LQ = 161Median = 165 | 1 | This mark is given for a box plot shown with at least three correctly plotted values from those shown |
|  | 1 | This mark is given for the correct answer only |
| (b) | The median height of Year 7 girls is smaller than that of Year 11 girls | 1 | This mark is given for a statement making a comparison of the medians, in context |
| Year 11 girls have a smaller range of heights than Year 7 girls | 1 | This mark is given for a statement making a comparison of the spreads, in context |

**Question 7 (Total 4 marks)**

| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| --- | --- | --- | --- |
| (a) | 57 | 1 | This mark is given for the correct answer only |
| (b) | Not necessarily, since the maximum weight might be less than 80 and the minimum weight less than 40 | 1 | This mark is given for a correct explanation |
| (c) |  | 1 | This mark is given for reading the graph at weight 65 (=49) and at cumulative frequency 45 (= 63) |
| 25% of 60 would be 15 potatoes, but only 11 have a weight of 65g (so less than 25%) | 1 | This mark is given for a correct explanation |

**Question 8 (Total 3 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (a) | 160 < *h* ≤ 170 | 1 | This mark is given for the correct answer only |
| (b) |  | 2 | These marks are given for a fully correct frequency polygon with line segments joining the points (135, 4), (145, 11), (155, 24), (165, 22) and (175, 19)(1 mark is given if any points are incorrect) |

**Question 9 (Total 6 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (a) |  | C2 | These marks are given for a correct cumulative frequency graph through (40, 5), (60, 25), (80, 35), (100, 38) and (120, 40)(C1 is given for at least 4 points plotted) |
| (b) | Upper quartile = 68Lower quartile = 44 | M1 | This mark s given for an upper or lower quartile identified (±2) |
| 68 – 44 = 24 | A1 | This mark is given for an answer in the range 20 to 28 |
| (c) |  | M1 | This mark is given for a method to find the difference between readings taken from the readings of points from a mark of 50 and a mark of 90 |
|  =  | A1 | This mark is given for a correct answer in the range  to  |

**Question 10 (Total 5 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (a) | 6543216 | B3 | These marks are given for a fully correct histogram(B2 is given for all four blocks correct or all six frequencies)(B1 is given for at least 2 blocks of different widths or at least three correct frequencies) |
| (b) | 50 +  × (80 – 50) = 50 + 18.75 | M1 | This mark is given for a an indication of the median line in the third interval on the histogram or a proportional method to indicate the median distance |
| 68.75 | A1 | This mark is given for a correct answer in the range 65 to 70 |

**Question 11 (Total 6 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (a) | 166 – 158 = 8 | B1 | This mark is given for a correct answer only |
| (b) |  | C1 | This mark is given for at least 2 correctly plotted values, including box or whiskers / tails, or 5 correct values and no whiskers / tails |
|  | C1 | This mark is given for at least 2 correctly plotted values including box and whiskers / tails  |
| Fully correct box plot drawn(minimum = 153, lower quartile = 164, median = 170, upper quartile = 175, maximum = 186) | C1 | This mark is given for a fully correct box plot |
| (c) |  | C1 | This mark is given for a correct comparison of medians  |
|  | C1 | This mark is given for a correct comparison of a measure of spreadFor the award of both marks, at least one of the comparisons must be interpretative |

**Question 12 (Total 2 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working an or answer examiner might expect to see** | **Mark** | **Notes** |
|  | Median plotted incorrectly | B1 | This mark is given for a correct reason |
| Range plotted rather than maximum or maximum nor plotted | B1 | This mark is given for a correct reason |

**Question 13 (Total 6 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (a) | (7 squares – 4 squares) represent 7 fish; so each square represents 2 fish | M1 | This mark is given for working with frequency density |
| 10, 8, 12, 15, 15, 8 | M1 | This mark is given for finding at least 4 of 10, 8, 12, 15, 15, 8 |
| 10 + 8 + 12 + 15 + 15 + 8 = 68 | A1 | This mark is given for the correct answer only |
| (b)(i) |  | M1 | This mark is given for a complete correct method to divide the area of the histogram into two equal parts or for a complete correct method to interpolate for the 34.5th value |
| 412 –­ 417 | A1 | This mark is given for the correct answer only answer within the range 412 – 417 |
| (b)(ii) | Only an estimate because it is dependent on a distribution within the interval | C1 | This mark is given for a correct statement.  |

**Question 14 (Total 6 marks)**

| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| --- | --- | --- | --- |
| (a) |  | B1 | This mark is given for at least 4 points plotted correctly(30, 10), (40, 26), (50, 58), (60, 66), (70, 70) |
| B1 | This mark is given for points joined by a curve (though accept straight lines) |
| (b) | 43 | B1 | This mark is given for an answer in the range 41–45 |
| (c) | 15 people aged less than 35 years7 people aged more than 55 years | M1 | This mark is given for taking readings at 35 and 55 years |
| 63 – 15 = 48 people 60% of 70 people = 42 people | M1 | This mark is given for working out the number of people between 35 and 55 years old |
| Yes, Francesco is correct | C1 | This mark is given for a correct conclusion supported by working |

**Question 15 (Total 4 marks)**

| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| --- | --- | --- | --- |
| (a) (i) | for a fully correct box plot | B1 | This mark is given for a fully correct box plot drawn |
| (ii) | smallest value 20, lower quartile 170 and median 200  | B1 | This mark is given for the correct values shown in the table |
| (b) | 2 statements | C2 | for two comments one about median and one about IQR; one must be in context (i.e. reference to number of lorries) |
| (C1 | For 1 comment about IQR or median |

**Question 16 (Total 4 marks)**

| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| --- | --- | --- | --- |
| (a) | 20 < t ≤ 30 | B1 | This mark is given for a correct answer only |
| (b) | Points plotted at (5,10), (15,26), (25,23), (35,19), (45,14), (55,8) and joined with line segments | B2 | Two marks are given for correct plotting of 6 points and joining with line segments |
| (B1 | 1 mark is given for points plotted at midpoints of intervals or joining points with line segments at the correct heights and consistent within the class interval (including end values) or correct frequency polygon with one point incorrect or correct frequency polygon with first and last points joined) |

**Performance data:**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Q** | **Taken from** | **Total Marks available** | **TOPIC** | **Spec Ref** | **AO** | **% Mean marks** | **Edexcel mean averagesMarks of candidates who achieved grade:** |
| **Q** | **Series** | **Paper** | **ALL** | **9** | **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** | **U** |
| 1a | 11a | June 2019 | 1H | 2 | Statistics | S2 | 1 | 76 | 1.52 | 1.84 | 1.72 | 1.62 | 1.52 | 1.41 | 1.25 | 1.03 | - | - | 0.82 |
| 1b | 11b | June 2019 | 1H | 1 | Statistics | S4 | 2 | 59 | 0.59 | 0.77 | 0.70 | 0.65 | 0.60 | 0.54 | 0.44 | 0.31 | - | - | 0.21 |
| 1c | 11c | June 2019 | 1H | 1 | Statistics | S4 | 2 | 64 | 0.64 | 0.86 | 0.81 | 0.75 | 0.67 | 0.56 | 0.40 | 0.22 | - | - | 0.12 |
| 2a | 9a | June 2017 | 3H | 2 | Statistics | S4 | 2 | 74 | 1.47 | 1.88 | 1.78 | 1.67 | 1.54 | 1.36 | 1.05 | 0.63 | - | - | 0.29 |
| 2b | 9b | June 2017 | 3H | 2 | Statistics | S3 | 2 | 95 | 1.9 | 1.97 | 1.96 | 1.94 | 1.92 | 1.89 | 1.83 | 1.62 | - | - | 1.11 |
| 2c | 9c | June 2017 | 3H | 1 | Statistics | S4 | 2 | 60 | 0.6 | 0.75 | 0.68 | 0.63 | 0.59 | 0.57 | 0.52 | 0.45 | - | - | 0.31 |
| 3a | 10a | June 2018 | 1H | 3 | Statistics | S4 | 2 | 97 | 2.91 | 2.99 | 2.98 | 2.97 | 2.96 | 2.92 | 2.83 | 2.59 | - | - | 1.86 |
| 3b | 10b | June 2018 | 1H | 2 | Statistics | S4 | 2 | 41 | 0.82 | 1.76 | 1.42 | 1.1 | 0.79 | 0.53 | 0.31 | 0.17 | - | - | 0.1 |
| 4i | 4i | Nov 2019 | 2H | 2 | Statistics | S1 | 3 | 83 | 1.66 | 2 | 1.92 | 1.95 | 1.9 | 1.81 | 1.62 | 1.45 | - | - | 1.08 |
| 4ii | 4ii | Nov 2019 | 2H | 1 | Statistics | S1 | 3 | 43 | 0.43 | 0.89 | 0.73 | 0.72 | 0.67 | 0.54 | 0.32 | 0.22 | - | - | 0.18 |
| 5a | 3a | June 2019 | 3H | 1 | Statistics | S2 | 2 | 70 | 0.7 | 0.95 | 0.9 | 0.83 | 0.73 | 0.59 | 0.42 | 0.25 | - | - | 0.17 |
| 5b | 3b | June 2019 | 3H | 2 | Statistics | S2 | 2 | 69 | 1.38 | 1.81 | 1.68 | 1.55 | 1.41 | 1.22 | 0.99 | 0.73 | - | - | 0.46 |
| 6a | 12a | Nov 2017 | 1H | 3 | Algebra | A14 A15 | 2 | 45 | 0.89 | 2 | 1.79 | 1.68 | 1.43 | 1.35 | 0.98 | 0.62 | - | - | 0.4 |
| 6b | 12b | Nov 2017 | 1H | 2 | Algebra | A15 | 2 | 41 | 0.41 | 0.88 | 0.94 | 0.82 | 0.77 | 0.68 | 0.47 | 0.26 | - | - | 0.12 |
| 7a | 11a | Nov 2017 | 3H | 1 | Statistics | S3 S4 | 2 | 39 | 0.39 | 0.88 | 0.71 | 0.69 | 0.64 | 0.56 | 0.42 | 0.32 | - | - | 0.15 |
| 7b | 11b | Nov 2017 | 3H | 1 | Statistics | S3 S4 | 2 | 1 | 0.01 | 0.12 | 0.06 | 0 | 0.01 | 0.01 | 0.01 | 0.01 | - | - | 0.01 |
| 7c | 11c | Nov 2017 | 3H | 2 | Statistics | S3 | 2 | 35 | 0.7 | 1.75 | 1.47 | 1.2 | 1.3 | 0.99 | 0.77 | 0.51 | - | - | 0.27 |
| 8a | 1a | Nov 2017 | 3H | 1 | Statistics | S2 S4 | 2 | 24 | 0.24 | 0.75 | 0.88 | 0.8 | 0.58 | 0.44 | 0.23 | 0.11 | - | - | 0.05 |
| 8b | 1b | Nov 2017 | 3H | 2 | Statistics | S4 | 2 | 47 | 0.94 | 1.25 | 1.21 | 1.14 | 1.28 | 1.03 | 1.02 | 0.9 | - | - | 0.63 |
| 9a | 10a | Nov 2019 | 1H | 2 | Statistics | S3 | 2 | 41 | 0.82 | 1.78 | 1.51 | 1.29 | 1.04 | 0.79 | 0.76 | 0.61 | - | - | 0.53 |
| 9b | 10b | Nov 2019 | 1H | 2 | Statistics | S4 | 2 | 14 | 0.28 | 1.67 | 1.14 | 0.92 | 0.61 | 0.26 | 0.15 | 0.03 | - | - | 0.01 |
| 9c | 10c | Nov 2019 | 1H | 2 | Statistics | S3 P3 | 2 | 12 | 0.24 | 1 | 1.14 | 0.75 | 0.45 | 0.22 | 0.14 | 0.05 | - | - | 0.01 |
| 10a | 17a | Nov 2018 | 3H | 3 | Statistics | S3 | 2 | 22 | 0.66 | 2.6 | 1.74 | 1.72 | 1.61 | 0.93 | 0.42 | 0.1 | - | - | 0.06 |
| 10b | 17b | Nov 2018 | 3H | 2 | Statistics | S3 | 1 | 17 | 0.33 | 1.2 | 1.12 | 0.64 | 0.49 | 0.37 | 0.28 | 0.21 | - | - | 0.14 |
| 11a | 11a | Mock Set 1 | 3H | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 11b | 11b | Mock Set 1 | 3H | 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 11c | 11c | Mock Set 1 | 3H | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 12 | 13 | Mock Set 2 | 2H | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 13a | 18a | Mock Set 2 | 3H | 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 13b | 18b | Mock Set 2 | 3H | 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 14a | 9a | Mock Set 3 | 3H | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 14b | 9b | Mock Set 3 | 3H | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 14c | 9c | Mock Set 3 | 3H | 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 15a | 11a | Mock Set 4 | 2H | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 15b | 11b | Mock Set 4 | 2H | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 16a | 3a | Mock Set 4 | 3H | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 16c | 3b | Mock Set 4 | 3H | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
|  |  |  |  | **70** |  |  |  |  | **20.53** | **34.35** | **30.99** | **28.03** | **25.51** | **21.57** | **17.63** | **13.40** | **-** | **-** | **9.09** |