AQA Qualifications

# GCSE

# Mathematics

## Unit 2 43602F

## Mark scheme

43602F
June 2015

Version 1.0 Final Mark Scheme

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

## 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. |
| **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. |
| **Q** | Marks awarded for Quality of Written Communication |
| **ft** | Follow through marks. Marks awarded for correct working following a mistake in an earlier step. |
| **SC** | Special case. Marks awarded within the scheme for a common misinterpretation which has some mathematical worth. |
| **M dep** | A method mark dependent on a previous method mark being awarded. |
| **B dep** | A mark that can only be awarded if a previous independent mark has been awarded. |
| **oe** | Or equivalent. Accept answers that are equivalent.<br>eg, accept 0.5 as well as $\frac{1}{2}$ |
| **[*a*, *b*]** | Accept values between *a* and *b* inclusive. |
| **3.14 …** | Accept answers which begin 3.14 eg 3.14, 3.142, 3.149. |
| **Use of brackets** | It is not necessary to see the bracketed work to award the marks. |

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.

| Q | Answer | Mark | Comments |
|---|---|---|---|
| 1(a) | (7, 5) | B1 | |
| | **Additional Guidance** | | |
| | $(7x, 5y)$ | | B0 |
| 1(b) | (7, 1) | B1 | |
| | **Additional Guidance** | | |
| | $(7x, 1y)$ | | B0 |
| 1(c) | (4, 3) | B1 | |
| | **Additional Guidance** | | |
| | $(4x, 3y)$ | | B0 |
| 2(a) | 42 and 56 | B2 | Either order<br>B1 1 correct or 1 correct and 1 incorrect |
| | **Additional Guidance** | | |
| | 42 alone or 56 alone | | B1 |
| | eg 42 and 49 | | B1 |
| | eg 35 and 49 | | B0 |
| | eg 35, 42, 49, 56 | | B0 |
| 2(b) | 8 | B1 | |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| **3** | 50(p), 5(p), 5(p), 5(p)<br>and<br>20(p), 20(p), 20(p), 5(p) | B3 | Coins in any order<br>Piles in either order<br>B2 1 correct set of coins for their total ÷ 2<br>or 65(p) or (£)0.65<br>B1 130(p) or (£)1.30<br>or two piles with equal amounts using only 50p, 20p and 5p coins |
| | **Additional Guidance** | | |
| | Beware of additional coins | | |
| | 1 × 50 + 3 × 5 and 3 x 20 + 1 × 5 | | B3 |
| | Correct answers listed in working, answer line 65p and 65p | | B3 |
| | Allow description in words<br>eg This pile should have the 50p coin and three 5p coins and this pile should have the remaining 20p coins and 5p | | B3 |
| **4(a)** | $\frac{40}{100}$ or $\frac{20}{50}$ or $\frac{10}{25}$ or $\frac{8}{20}$ or $\frac{4}{10}$ or $\frac{2}{5}$ | B1 | oe fraction |
| | **Additional Guidance** | | |
| | Ignore further working from a correct fraction eg $\frac{40}{100}=\frac{1}{4}$ | | B1 |
| **4(b)** | 0.7 or 0.70 | B1 | Accept .7 or .70 |
| **4(c)** | 25(%) | B1 | |
| **5(a)** | 23 | B1 | |
| **5(b)** | 1.2 | B1 | Accept $\frac{12}{10}$ or $1\frac{2}{10}$ or $1\frac{1}{5}$ |
| | **Additional Guidance** | | |
| | Accept 1.20 | | B1 |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| 6 | ( $x$ =) 7 | B1 | |
| | ( $y$ =) 12 | B1ft | ft 26 – 2 × their 7<br>or their 7 + 5 |
| | ( $z$ =) 15 | B1ft | ft 34 – their 7 – their 12<br>or their 7 + 8 |
| | **Additional Guidance** | | |
| | Allow embedded answers with correct numbers written by letters in grid | | B3 |
| | Answer line 7 (+) 7 (+) 7 (= 21), 7 (+) 7 (+) 12 (= 26), 7 (+) 12 (+) 15 (= 34) | | B3 |
| | Ignore attempt to provide totals after $x$ = 7, $y$ = 12 and $z$ = 15 seen in working with 42, 24, 15 on answer line | | B3 |
| 7(a) | Will | B1 | |
| 7(b) | 16 | B1 | Allow –16 |
| 7(c) | 10 | B1 | Allow –10 |
| 8(a) | expression | B1 | |
| 8(b) | equation | B1 | |
| 9(a) | 0.325, 0.37, 0.4 | B1 | oe |
| | **Additional Guidance** | | |
| | Accept 0.325, 0.370, 0.400 | | B1 |
| | Accept $\frac{325}{1000}$, $\frac{370}{1000}$, $\frac{400}{1000}$ or other equivalent fractions in correct order | | B1 |
| | Accept 32.5%, 37%, 40% in correct order | | B1 |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| **9(b)** | $\frac{3}{5}$ and 60% | B2 | B1 one correct<br>or one correct and one incorrect<br>or two correct and one incorrect |

| | | | |
|---|---|---|---|
| **10** | 64 or $\sqrt{64}$ or 2 or $2^3$ | M1 | |
| | 8 | A1 | |
| | **Additional Guidance** | | |
| | Do not accept answer $8^2$ for final accuracy mark | | |
| | $\sqrt{64} = 8 \times 8$ and answer $8^2$ | | M1A0 |
| | $4 \times 4 \times 4$ | | M0 |
| | Beware of correct answer 8 from incorrect working<br>$4 \times 4 \times 4 = 65$ and $\sqrt{65} = 8$ | | M0A0 |
| | $2 \times 2 \times 2$ | | M1 |

| | | | |
|---|---|---|---|
| **11(a)** | $6a$ | B1 | |
| | **Additional Guidance** | | |
| | $6A$ | | B1 |
| | $6 \times a$ | | B0 |
| | $a6$ | | B0 |

| | | | |
|---|---|---|---|
| **11(b)** | 8.5 or $8\frac{1}{2}$ or $8\frac{5}{10}$ or $\frac{85}{10}$ or $\frac{17}{2}$ | B1 | oe |
| | **Additional Guidance** | | |
| | Ignore further working from a correct fraction | | |

| | | | |
|---|---|---|---|
| **11(c)** | 20 | B1 | |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| 12 | **Alternative method 1** | | |
| | 12 ÷ 2 or 6 or 12 × 5 or 60 | M1 | |
| | their (12 ÷ 2) × 5 or their (12 × 5) ÷ 2<br>or 30<br>or 6 + 6 + 3 | M1 | oe<br>30 seen implies M2 |
| | 15 | A1 | |
| | **Alternative method 2** | | |
| | 40% (=12) | M1 | |
| | 12 ÷ 4 or 3 or 12 × 2.5 or 30 | M1 | 30 seen implies M2 |
| | 15 | A1 | |
| | **Additional Guidance** | | |
| | Accept 6 indicated on a diagram | | |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| 13 | 49 or 0.49 | B1 | |
| | 3.75 or 375 | B1 | |
| | (£)4.24 or 424p | B1ft | ft correct addition of their values with consistent units implied |
| | **Additional Guidance** | | |
| | (£)4.24p | | B3 |
| | 49 (+) 3.75 = 52.75 | | B1B1B0 |
| | 49 (+) 3.25 = 52.25 | | B1B0B0ft |
| | 48 (+) 3.75 = 51.75 | | B0B1B0ft |
| | 0.49 (+) 3.75 = 4.25 | | B1B1B0 |
| | 0.48 (+) 3.75 = 4.23 | | B0B1B1ft |
| | 0.49 (+) 3.25 = 3.74 | | B1B0B1ft |
| | 85 (+) 3.75 = 4.60 | | B0B1B1ft |
| | 85 (+) 3.75 = 4.6 | | B0B1B0ft |
| | 44 (+) 3.50 = 3.94 | | B0B0B1ft |
| 14 | 32 ÷ 2 – 4 or 12 | M1 | |
| | their 12 ÷ 2 – 4 or 2<br>or their 2 ÷ 2 – 4 | M1 | |
| | –3 | A1 | SC2 –5.5 with no working |
| | **Additional Guidance** | | |
| | 12 2 –3 –5.5 | | M1M1A0 |
| | 12 2 –3 1.5 with 1.5 on answer line | | M1M1A0 |
| | Incorrect second or third term followed by correct method or evaluation<br>eg 16 ÷ 2 – 4 or 8 ÷ 2 – 4<br>eg (32,) 16, 8, 0 or (32,) 16, 4, .... | | M0M1A0<br>M0M1A0 |

| Q | Answer | Mark | Comments | |
|---|---|---|---|---|
| 15 | 5 × 70 or 350 or 3 × 60 or 180<br>or<br>5 × 0.7(0) or 3.5(0) or 3 × 0.6(0) or 1.8(0) | M1 | | |
| | their (5 × 70) + their (3 × 60) or 530<br>or<br>their (5 × 0.7(0)) + their (3 × 0.6(0))<br>or 5.3 | M1dep | | |
| | 5.30 | Q1 | Strand (i) correct money notation<br>Do not accept 5.3 or 5.30p<br>SC2 5.10 or 6.50 or 3.90<br>SC1 510 or 650 or 390 | |
| | **Additional Guidance** | | | |
| | 530p | | | M1M1Q0 |
| | 5.30p | | | M1M1Q0 |
| | In second method mark "their (5 × 70)" means 5 × 70 or an evaluation of 5 × 70 | | | |
| | 5 × 70 + 3 × 60 | | | M1M1Q0 |
| | eg 420 + 180 after 5 × 70 (=) 420 and 3 × 60 (=) 180 | | | M1M1Q0 |
| | 5 × 70 + 4 × 60 | | | M1M0Q0 |
| | 140 + 180 after 3 × 70 (=) 140 and 3 × 60 (=) 180 | | | M1M0Q0 |
| | 1.8(0) and 3.5(0) without working or indication of addition with answer 5.40 | | | M1M0Q0 |

| Q | Answer | Mark | Comments | |
|---|---|---|---|---|
| 16 | **Alternative method 1** | | | |
| | 720 ÷ 20 or 7.2(0) ÷ 0.2(0) or 36 | M1 | oe | |
| | their 36 ÷ 4 × 3 or 27 | M1 | oe eg $\frac{3}{4} \times 36$<br>correct method to find $\frac{3}{4}$ of their 36 | |
| | their 27 × 5 or 135 or their 27 × 0.05 | M1dep | dep on 2nd M1<br>oe | |
| | 1.35 | A1 | | |
| | **Alternative method 2** | | | |
| | 7.20 ÷ 4 × 3 or 5.4(0) | M1 | oe eg $\frac{3}{4} \times 7.20$ | |
| | their 5.4(0) ÷ 20 or 27 | M1 | | |
| | their 27 × 5 or 135 or their 27 × 0.05 | M1dep | dep on 2nd M1<br>oe | |
| | 1.35 | A1 | | |
| | **Additional Guidance** | | | |
| | £135 | | | M1M1M1A0 |
| | £ crossed out and 135p | | | M1M1M1A1 |
| | Do not allow further work to add on or subtract from their 27 for third method mark<br>eg 36 ÷ 4 × 3 = 27 followed by 36 + 27 = 63 and 63 × 5 | | | M1M1M0A0 |
| | Allow rounding, truncation or exact decimal for their 27 in third method mark<br>eg 720 ÷ 20 = 35, 35 ÷ 4 × 3 = 26.25, 26 x 5 (= 130) | | | M1M1M1A0 |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| **17** | 800 or 1600 or 200 or 60 or 120 or 100 | M1 | |
| | 800 or 1600<br>and<br>200<br>and<br>60 or 120 or 100 | M1 | |
| | 1920 or 1900 or 2000 | A1 | SC1 1900 without working<br>or 1900 from 1899 |
| **18** | $4 < n \leq 8$<br>or 9, 10, 11, 12, 13, 14, 15, 16<br>or 4.5, 5, 5.5, 6, 6.5, 7, 7.5, 8<br>or 4, 5, 6, 7, 8<br>or 5, 6, 7<br>or 10, 12, 14, 16 | M1 | Accept $4 < n$ and $n \leq 8$<br><br>List of numbers in any order |
| | 5, 6, 7, 8 | A1 | Any order |
| | **Additional Guidance** | | |
| | Embedded answer fully correct $2 \times 5 = 10$, $2 \times 6 = 12$, $2 \times 7 = 14$, $2 \times 8 = 16$ | | M1A0 |
| | Embedded answer fully correct 10, 12, 14, 16 | | M1A0 |
| | 4, 5, 6, 7 | | M0A0 |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| 19 | $x$ = 81 and $y$ = 19 | B2 | B1 100 – (a square number) correctly evaluated<br>or 100 – (a prime number) correctly evaluated<br>or A list of square numbers up to and including 81 with one error or omission and a list of prime numbers up to and including 19 with one error or omission<br>or A correctly evaluated trial of a square number plus a prime number.<br>eg 49 + 53 = 102 |
| | **Additional Guidance** | | |
| | Condone $x$ = 19 and $y$ = 81 | | B2 |
| | $x$ = $9^2$ and $y$ = 19 | | B2 |
| | $x$ = 9 and $y$ = 19 with $9^2 = 81$ or $9^2 + 19$ or 81 + 19 in working | | B2 |
| | $x$ = 9 and $y$ = 19 without working | | B1 |
| | 49 and 51 implies 100 – (a square number) correctly evaluated | | B1 |
| | 91 and 9 implies 100 – (a square number) correctly evaluated | | B1 |

| Q | Answer | Mark | Comments | |
|---|---|---|---|---|
| 20 | **Alternative method 1** | | | |
| | 150 ÷ 3 or 50 | M1 | oe | |
| | their 50 × 4 or 150 + their 50 or 200 | M1dep | oe | |
| | 150 ÷ 100 × 20 or 30<br>or their 50 ÷ 100 × 20 or 10<br>or their 200 ÷ 100 × 20 or 40<br>or 1.2 × 200<br>or 1.2 × 150 or 180<br>or 1.2 × 50 or 60 | M1 | oe | |
| | 240 | A1 | | |
| | **Alternative method 2** | | | |
| | 150 ÷ 100 × 20 or 30<br>or 150 + 30 or 180<br>or 1.2 × 150 | M1 | oe | |
| | their 180 ÷ 3 or 60<br>or 150 ÷ 3 + their 30 ÷ 3<br>or 50 + 10 | M1 | oe | |
| | their 60 × 4<br>or 150 + their 50 + their 30 + their 10 | M1dep | oe<br>dep on 2nd M1 | |
| | 240 | A1 | | |
| | **Additional Guidance** | | | |
| | 150 ÷ 4 = 37.50, 37.50 ÷ 100 × 20 = 7.50 | | | M0M0M1A0 |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| **21(a)** | 2 (×) 100 or 5 (×) 40 | M1 | oe conditional on one prime factor in a correct product equal to 200 or one prime factor shown in a correct section on a factor tree starting from 200<br>Any order<br>allow on prime factor tree or repeated division using 2 or 5 correctly<br>condone 100 (×) 2 (×) 1 etc for this mark |
| | 2 (×) 2 (×) 2 (×) 5 (×) 5 | A1 | Any order<br>allow on prime factor tree or repeated division |
| | $2^3 \times 5^2$ | Q1ft | Strand (i) correct index notation<br>Any order<br>ft correct product of prime numbers in index form from their working |
| | **Additional Guidance** | | |
| | $2^3 + 5^2$ | | M1A1Q0 |
| | (200 =) 2 (×) 2 (×) 5 (×) 5 and $2^2 \times 5^2$ is minimum Q1ft | | |
| | 200 ÷ 2 = 100 | | M1 |
| | 2 (×) 10 (×) 10 as a product or shown on a correct section of factor tree | | M1 |
| | 20 (×) 5 (×) 2 as a product or shown on a correct section of factor tree | | M1 |
| | 20 (×) 5 (×) 4 as a product or shown on a correct section of factor tree | | M0 |

| | | | |
|---|---|---|---|
| **21(b)** | 4 and 60 **and** 12 and 20 | B2 | B1 one correct<br>or one correct and one incorrect<br>or two correct and one incorrect<br>Any indication |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| 22 | **Alternative method 1** | | |
| | 60 × 40 or 2400 | M1 | oe |
| | their 2400 – 2000 or 400<br>or 2000 – their 2400 | M1dep | |
| | $\frac{\text{their } 400}{2000}$ (× 100) or 0.2 | M1dep | oe |
| | 20(%) | A1 | |
| | **Alternative method 2** | | |
| | 60 × 40 or 2400 | M1 | oe |
| | their 2400 – 2000 or 400<br>or 2000 – their 2400 | M1dep | |
| | 10% = 2000 ÷ 10 or 1% = 2000 ÷ 100 **and** correctly finds multiplier using build up or division to find percentage equivalent to total their 400 | M1 | oe<br>Correct build up to find percentage equivalent to total their (their 2400 – 2000) or their (2000 – their 2400) implies M3 |
| | 20(%) | A1 | |

| | | | |
|---|---|---|---|
| **22 (cont)** | **Alternative method 3** | | |
| | 60 × 40 or 2400 | M1 | |
| | $\frac{\text{their } 2400}{2000}$ (×100) or 120(%) or 1.2 | M1dep | |
| | their 120 – 100 or their 1.2(0) – 1(.00)<br>or 100 – their 120<br>or 1(.00) – their 1.2(0) or 0.2 | M1dep | oe |
| | 20(%) | A1 | |
| | **Additional Guidance** | | |
| | 20% on answer line and no working | | M1M1M1A1 |
| | 480 × 5 (= 2400) from 5 years scores minimum M1 | | |
| | 60 x 40 = 1800 and 200 scores minimum M1M1 | | |
| | 60 x 40 = 1800 and 200 and $\frac{200}{2000}$ | | M1M1M1A0 |
| | 60 x 40 = 1800 and $\frac{200}{2000}$ | | M1M1M1A0 |
| | $\frac{2000}{\text{their } 2400}$ (= 1.2) does not score second method mark on ALT3 | | |