AQA Qualifications

# GCSE <br> Mathematics 

## Paper 2 43652F

Mark scheme

43652F
November 2013

Final version 1.0

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.

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
Q
M dep $\quad$ 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.
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. Accept answers that are equivalent.
e.g. accept 0.5 as well as $\frac{1}{2}$
$[\mathbf{a}, \boldsymbol{b}] \quad$ Accept values between $a$ and $b$ inclusive.
$[a, b) \quad$ Accept values $a \leq$ value $<b$
25.3... Allow answers which begin 25.3 e.g. 25.3, 25.31, 25.378.

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.

## Paper 2 Foundation Tier



| $\mathbf{Q}$ | Answer | Mark | Comments |
| :---: | :---: | :---: | :---: |


| $\mathbf{5 ( a )}$ | $7 \times 8$ seen or 56 | M1 |  |
| :--- | :--- | :---: | :--- |
|  | 5625 | A1 | SC1 for 5625 without $7 \times 8$ or 56 |


| 5(b) | $6 \times 7$ seen | M1 | $65^{2}$ |
| :--- | :--- | :--- | :--- |
|  | 65 | A1 | SC1 for 65 without $6 \times 7$ |


| $\mathbf{6 ( a )}$ | $25 \times 3451$ or $25 \times 34.51$ | M1 | Digits 86275 seen |
| :--- | :--- | :---: | :--- |
|  | 862.75 | A1 |  |


| $\mathbf{6 ( b )}$ | $5000 \div 415$ or $12.04(\ldots)$ or 12.05 <br> or $5000 \div 4.15$ | M1 | oe |
| :---: | :--- | :---: | :--- |
|  | $1204.8(\ldots)$ or 1205 | A1 |  |
|  | 1204 | Q1ft | Strand (i) <br> Rounding down their answer |


| 7(a) | Northern (Italy) | B1 |  |
| :--- | :--- | :--- | :--- |


| 7(b) | At least two of 9,8 and 6 | M1 |  |
| :---: | :--- | :---: | :--- |
|  | 9,8 and 6 and Southern (Italy) | A1 | SC1 for 6 and Southern with no other <br> working |


| 7(c) | $(10+5+11+7+12) \div 5$ <br> or $45 \div 5$ | M1 | Condone missing brackets <br> $5 \times 9=45$ (embedded answer) |
| :--- | :--- | :---: | :--- |
|  | 9 | A1 | SC1 for 35.4 |


| 7(d) | Central (Italy) and valid reason | Strand (ii) <br> e.g. mean between 5 and 13 <br> all temperatures are between 5 and 13 <br> only one that has 9 in it <br> above 5 and below 10 |
| :--- | :--- | :--- | :--- |



| $\mathbf{Q}$ | Answer | Mark | Comments |
| :---: | :---: | :---: | :---: |



| $\mathbf{9 ( a )}$ | 3 | B1 |  |
| :--- | :--- | :--- | :--- |



| $\mathbf{Q}$ | Answer | Mark | Comments |
| :--- | :---: | :---: | :---: |


| 10(a) | (Match) 4 or 43685 | B1 |  |
| :---: | :--- | :---: | :--- |
| $\mathbf{1 0 0 ( b )}$ | 128 or 417 seen | M1 | Allow -128 or -417 seen |
|  | (Match) 2 or 19872 | A1 | All working must be correct <br> SC1 for 20417 or (Match) 3 |


| $\mathbf{1 0 ( c )}$ | $32473-3584$ | M1 |  |
| :--- | :--- | :---: | :--- |
|  | 28889 | A1 |  |
|  | 29000 | B1ft | Rounding to nearest thousand <br> SC1 32000 and 4000 <br> SC1 28000 |


| $\mathbf{1 1 ( a )}$ | $180-156$ | M1 |  |
| :--- | :--- | :---: | :--- |
|  | 24 | A1 |  |


| $\mathbf{1 1}(\mathrm{b})$ | $360-90-149$ | M1 | oe |
| :--- | :--- | :---: | :--- |
|  | 121 | A1 |  |


| 12(a) | 62 | B1 |  |
| :--- | :--- | :--- | :--- |


| 12(b) | 8 | B 1 |  |
| :--- | :--- | :--- | :--- |


| 12(c) | 50 | B1 |  |
| :--- | :--- | :--- | :--- |


| $\mathbf{Q}$ | Answer | Mark | Comments |
| :---: | :---: | :---: | :---: |


| 13 | 15 and 9 seen or implied | B1 | Ratio of $5: 3$ seen or implied |
| :---: | :---: | :---: | :---: |
|  | $75 \div 15$ or 5 <br> or $75 \div$ their 15 <br> or $75 \times 9$ or 675 <br> or $75 \times$ their 9 | M1 | for their 15 , allow [14, 16] for their 9 , allow $[8,10]$ $\begin{aligned} & 75 \div 5 \\ & \text { or } 75 \times 3 \end{aligned}$ |
|  | $75 \div 15 \times 9$ <br> or $5 \times 9$ <br> or $75 \div$ their $15 \times$ their 9 | M1dep | $\begin{aligned} & 75 \div 5 \times 3 \\ & \text { oe } \end{aligned}$ |
|  | 45 | A1ft |  |


| $\mathbf{1 4 ( a )}$ | $4.8 \times 1.2 \times 2.8$ | M1 | oe |
| :--- | :--- | :---: | :--- |
|  | 16.128 or 16.13 or 16.1 or 16 | A 1 |  |
|  | $\mathrm{~m}^{3}$ | B 1 |  |


| 14(b) <br> Alt 1 | their $16.128 \times 1000$ <br> or their $16.128 \times 3$ <br> or their $16.128 \div 4$ | M1 | $\begin{array}{\|l\|} 16128 \\ 48.384 \\ 4.032 \end{array}$ |
| :---: | :---: | :---: | :---: |
|  | their $16.128 \times 1000 \times 3$ <br> or their $16.128 \times 1000 \div 4$ <br> or their $16.128 \times 3 \div 4$ | M1dep | $\begin{array}{\|l} 48384 \\ 4032 \\ 12.096 \end{array}$ |
|  | [12000, 12 100] | A1ft | ft from their (a) |


| 14(b) <br> Alt 2 | $2.8 \div 4 \times 3$ or 2.1 | M1 | oe |
| :--- | :--- | :---: | :--- |
|  | $4.8 \times 1.2 \times$ their 2.1 <br> or their $2.1 \times 1000$ | M1dep | 12.096 <br> 2100 |
|  | $[12000,12100]$ | A1 2.1 |  |


| $\mathbf{Q}$ | Answer | Mark | Comments |
| :---: | :---: | :---: | :---: |


| 15 | 2120 | B1 |  |
| :--- | :--- | :---: | :--- |
|  | their $2120 \div 5$ | M1 | oe |
|  | 424 | A1ft |  |
|  | 2544 | B1ft | ft their 2120 + their 424 <br> Correct money notation <br> SC2 for 2162.40 <br> or SC1 for 2162.4 |


| 16(a) | $5 x-3 y$ | B2 | B1 for $5 x$ or $-3 y$ <br> Do not ignore fw |
| :---: | :--- | :---: | :--- |

\(\left.$$
\begin{array}{|l|l|l|l|}\hline & \begin{array}{l}3 \times 6-2 \times 4 \text { or } 18-8 \text { or } 10 \\
\text { or } 3 \times 7-2 \times 4 \text { or } 21-8 \text { or } 13 \\
\text { or } 3 \times 6-2 \times 5 \text { or } 18-10 \text { or } 8 \\
\text { or } 3 \times 7-2 \times 5 \text { or } 21-10 \text { or } 11\end{array} & \text { M1 } & \\
\hline \text { Two correctly evaluated } & \text { A1 } & \begin{array}{llll}10 & 13 & 8 & 11\end{array} \\
\hline & \text { Q2 } & & \begin{array}{l}\text { Strand (iii) } \\
\text { Fully correct } \\
\text { Q1 for their largest and smallest stated with } \\
\text { largest } 13 \text { or smallest } 8 \text { with the four } \\
\text { calculations seen }\end{array} \\
\text { (Largest) } 13 \text { and (Smallest) } 8 & \begin{array}{l}\text { Note } 7 \text { and } 4 \text { give the answer 13 } \\
6 \text { and } 5 \text { give the answer } 8\end{array}
$$ <br>

SC2 for largest 13 or smallest 8\end{array}\right\}\)| SC3 for three correct calculations with one |
| :--- |
| incorrect calculation and their largest and |
| smallest correct |


| $\mathbf{Q}$ | Answer | Mark | Comments |
| :---: | :---: | :---: | :---: |


| 17(a) | 16.9 | B1 |  |
| :---: | :---: | :---: | :---: |
|  |  |  |  |
| 17(b) | their $16.9 \times 2$ | M1 | $\begin{aligned} & \text { oe } \\ & {[(2.5+15)+(1.7+15)+\ldots] \times 2 \div 5} \end{aligned}$ |
|  | 33.8 | A1ft | SC1 for 3.8 |


| 18(a) | $-3,-1,3$ | B2 | B1 for 1 or 2 correct |
| :--- | :--- | :--- | :--- |


| $\mathbf{1 8 ( b )}$ | At least 2 of their 5 points plotted <br> correctly | M1 | May be implied from straight line <br> $\pm 1 / 2$ square |
| :--- | :--- | :---: | :--- |
|  | Fully correct straight ruled line <br> from -2 to 2 | A1 | $\pm 1 / 2$ square |


| $\mathbf{1 9 ( a )}$$495 \div 55$ or 9 <br> or $80 \div 55$ or $1.45 \ldots$ <br> or $80 \times 495$ or 39600 | M1 | $55 \div 495$ or $\frac{1}{9}$ <br> or $55 \div 80$ or $0.68 \ldots$ or 0.69 |
| :--- | :--- | :--- | :--- |
|  | oe |  |
|  | M1dep | $80 \div$ their $\frac{1}{9}$ <br> or $495 \div$ their $0.68 \ldots$ |


| $\mathbf{Q}$ | Answer | Mark | Comments |
| :---: | :---: | :---: | :---: |


|  | $55 \div 495$ or $\frac{1}{9}$ <br> or $495 \div 55$ or 9 <br> or $160 \div 495$ or $0.32 \ldots$ <br> or $160 \times 55$ or 8800 | M1 | $495 \div 160$ or $3.09 \ldots$ |
| :--- | :--- | :--- | :--- |
| 19(b) <br> Alt $\mathbf{1}$ | $55 \div 495 \times 160$ <br> or $160 \div$ their 9 <br> or $160 \times$ their $\frac{1}{9}$ <br> or $55 \times$ their $0.32 \ldots$ <br> or $160 \times 55 \div 495$ | M1dep | oe |
|  | $17.7 \ldots$ or 17.8 | A1 | R1ft |


| $\begin{aligned} & \text { 19(b) } \\ & \text { Alt } 2 \end{aligned}$ | $80 \div$ their 720 or $\frac{1}{9}$ <br> or their $720 \div 80$ or 9 <br> or $160 \div$ their 720 or $0.22 \ldots$ <br> or $160 \times 80$ or 8800 | M1 | their $720 \div 160$ or 4.5 |
| :---: | :---: | :---: | :---: |
|  | $80 \div$ their $720 \times 160$ <br> or $160 \div$ their 9 <br> or $160 \times$ their $\frac{1}{9}$ <br> or $80 \times$ their $0.22 \ldots$ <br> or $160 \times 80 \div$ their 720 | M1dep | oe $80 \div \text { their } 4.5$ |
|  | 17.7... or 17.8 | A1 |  |
|  | 18 | B1ft | Rounding to nearest whole number |


| Q | Answer |  | Mark | Comments |
| :---: | :---: | :---: | :---: | :---: |
| 20(a) | Continuous |  | B1 |  |
| 20(b) | Discrete |  | B1 |  |
| 20(c) | Continuous |  | B1 |  |
| 20(d) | Discrete |  | B1 |  |
| 21 | Height of triangle $=4$ seen or implied |  | B1 | Identifies height of trapezium as 9 |
|  | (Area of rectangle)$234 \text { or } 378$ |  | B1 | (Area of trapezium) $\frac{(13+21) \times 9}{2}$ |
|  | $\frac{\frac{1}{2}}{36} \times 18 \times \text { their } 4 \text { or }$ | $\begin{aligned} & \frac{1}{2} \times 9 \times \text { their } 4 \text { or } \\ & 18 \end{aligned}$ | M1 | $17 \times 9 \text { or } \frac{34 \times 9}{2} \text { or } \frac{306}{2}$ |
|  | $\frac{1}{2} \times 18 \times \text { their } 4 \times$ <br> or 72 | $\frac{1}{2} \times 9 \times \text { their } 4 \times 4$ <br> or 72 | M1dep | 153 |
|  | 306 |  | A1 |  |
| 22(a) | $y-8=3 w$ |  | M1 | $\frac{y}{3}=w+\frac{8}{3}$ |
|  | $\frac{y-8}{3}=w$ <br> or $\frac{y}{3}-\frac{8}{3}=w$ |  | A1 | SC1 $\frac{y-8}{3}$ or $\frac{y}{3}-\frac{8}{3}$ <br> Do not ignore further work |
| 22(b) | $5 x+20$ |  | B1 |  |
|  | $\begin{aligned} & 5 x-3 x=23-20 \\ & \text { or } 2 x=3 \end{aligned}$ |  | M1 | their $5 x-3 x=23-$ their 20 |
|  | 1.5 |  | A1ft | oe |


| Q | Answer | Mark | Comments |
| :---: | :---: | :---: | :---: |
| 23 | $15.7 \times 4$ or 62.8 | M1 |  |
|  | their $62.8=\pi \times$ diameter | M1dep | oe their $62.8=2 \times \pi \times$ radius |
|  | their $62.8 \div \pi$ | M1dep | $\begin{aligned} & \text { their } 62.8 \div 2 \pi \\ & \text { radius }=[9.95,10] \end{aligned}$ |
|  | [19.9, 20] | A1 | SC2 for [4.9, 5] |
| 24 | Triangle is correct with two equal arcs seen for angle of $60^{\circ}$ | B3 | B2 Triangle correct but no arcs <br> B2 Fully correct constructions ( ${ }^{\text {rd }}$ side missing) <br> B 1 for either $A B=[7.4,7.6]$ <br> or $\quad A C=[6.2,6.4]$ <br> or $60^{\circ}$ |

