

AQA Qualifications

## GCSE

# **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 a	warded for a correct method which could lead
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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.

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.

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  $\frac{1}{2}$ 

[a, b] Accept values between a and b inclusive.

(a, b) Accept values  $a \le \text{value} < b$ 

**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**

Q	Answer	Mark	Comments
1(a)	2678	B1	
1(b)	63	B1	
1(c)	279	B1	
	(Vertical scale) does not start at 0 or incorrect height bars or vertical scale is incorrect	B1	
2	Gaps (between bars not equal)	B1	Any order
	No label(s) (on vertical scale) (frequency)	B1	
3(a)	Less than $\frac{1}{2}$	B1	
3(b)	More than $\frac{1}{2}$	B1	
4(a)	Isosceles	B1	
4(b)	1	B1	
4(c)	Correct sketch	B1	Angles do not need to be labelled
4(d)	Correct sketch	B1	Angles do not need to be labelled  Allow

Q	Answer	Mark	Comments
	7 × 8 seen or 56	M1	
5(a)	5625	A1	SC1 for 5625 without 7 × 8 or 56
	6 × 7 seen	M1	65 <sup>2</sup>
5(b)	65	A1	SC1 for 65 without 6 × 7
24.)	25 × 3451 or 25 × 34.51	M1	Digits 86 275 seen
6(a)	862.75	A1	
	5000 ÷ 415 or 12.04() or 12.05 or 5000 ÷ 4.15	M1	oe
6(b)	1204.8() or 1205	A1	
	1204	Q1ft	Strand (i) Rounding down their answer
7(a)	Northern (Italy)	B1	
	At least two of 9, 8 and 6	M1	
7(b)	9, 8 and 6 and Southern (Italy)	A1	SC1 for 6 and Southern with no other working
7(c)	(10 + 5 + 11 + 7 + 12) ÷ 5 or 45 ÷ 5	M1	Condone missing brackets 5 × 9 = 45 (embedded answer)
. (0)	9	A1	SC1 for 35.4
7(d)	Central (Italy) and valid reason	Q1ft	Strand (ii) e.g. mean between 5 and 13 all temperatures are between 5 and 13 only one that has 9 in it above 5 and below 10

Q	Answer	Mark	Comments
8(a)	-5 -4 -3 -2 -1 O 1 2 3 4 5 x  -1 -1 -2 -3 -3 -4 -3 -2 -5 -4 -3 -5 -5 -5 -5 -5 -5 -5 -5 -5 -5 -5 -5 -5		
	A plotted correctly	B1	Need not be labelled
	B plotted correctly	B1	Need not be labelled
8(b)	5 -5 -4 -5 -4 -5 -4 -1 -1 -2 -3 -4 -4 -4 -5 -4 -5 -4 -5 -4 -5 -4 -5 -5 -4 -5 -5 -6 -7 -7 -7 -7 -7 -7 -7 -7 -7 -7		
	C plotted at (1, 3)	B1	Need not be labelled

Q	Answer						Mark	Comments
8(c)	D(-5, 4)  -5 -5 -4 -3 -2 -1 -1 -2 -3 -4 -4 -4 -5				4 5	x		
	D plo	tted at	(-5, 4)				B2	B1 for one coordinate correct Need not be labelled
9(a)	3						B1	
. ,								
								Accept tallies for inner 6 boxes  B3 for 2 rows with totals
								B3 for 2 columns with totals B3 1 row and 1 column with totals
		Tennis	Basketball	Football	Total			DO FIOW AND I COMMINI WILL LOLAIS
	Boys	3	3	5	11			B2 for 2 rows without totals
9(b)	Girls	5	2	2	9		B4	B2 for 2 columns without totals B2 1 row and 1 column without totals
	Total	8	5	7	20			B2 for all totals
								B1 for 1 row without total B1 for 1 column without total B1 for totals for rows B1 for totals for columns

Q	Answer	Mark	Comments
10(a)	(Match) 4 or 43685	B1	
	128 or 417 seen	M1	Allow – 128 or – 417 seen
10(b)	(Match) 2 or 19872	A1	All working must be correct SC1 for 20417 or (Match) 3
	32473 – 3584	M1	
	28 889	A1	
10(c)	29 000	B1ft	Rounding to nearest thousand SC1 32 000 and 4000 SC1 28 000
	180 – 156	M1	
11(a)	24	A1	
	360 – 90 – 149	M1	
11(b)	121	A1	oe
12(a)	62	B1	
12(b)	8	B1	
12(c)	50	B1	

Q	Answer	Mark	Comments
	15 <b>and</b> 9 seen or implied	B1	Ratio of 5 : 3 seen or implied
13	75 ÷ 15 or 5 or 75 ÷ their 15 or 75 × 9 or 675 or 75 × their 9	M1	for their 15, allow [14, 16] for their 9, allow [8, 10] 75 ÷ 5 or 75 × 3
	75 ÷ 15 × 9 or 5 × 9 or 75 ÷ their 15 × their 9	M1dep	75 ÷ 5 × 3 oe
	45	A1ft	
	4.8 × 1.2 × 2.8	M1	oe
14(a)	16.128 or 16.13 or 16.1 or 16	A1	
	$m^3$	B1	
	their 16.128 × 1000		16 128
	or their 16.128 × 3 or their 16.128 ÷ 4	M1	48.384 4.032
14(b) Alt 1	their 16.128 × 1000 × 3 or their 16.128 × 1000 ÷ 4 or their 16.128 × 3 ÷ 4	M1dep	48 384 4032 12.096
	[12000, 12100]	A1ft	ft from their (a)
440	2.8 ÷ 4 × 3 or 2.1	M1	oe $2.8 - \frac{2.8}{4}$ or 2.1
14(b) Alt 2	4.8 × 1.2 × their 2.1 or their 2.1 × 1000	M1dep	12.096 2100
	[12000, 12100]	A1	

Q	Answer	Mark	Comments
	2120	B1	
	their 2120 ÷ 5	M1	oe
15	424	A1ft	
	2544	B1ft	ft their 2120 + their 424 Correct money notation SC2 for 2162.40 or SC1 for 2162.4
16(a)	5x - 3y	B2	B1 for $5x$ or $-3y$ Do not ignore fw
	3 × 6 – 2 × 4 or 18 – 8 or 10 or 3 × 7 – 2 × 4 or 21 – 8 or 13 or 3 × 6 – 2 × 5 or 18 – 10 or 8 or 3 × 7 – 2 × 5 or 21 – 10 or 11	M1	
	Two correctly evaluated	A1	10 13 8 11
16(b)	(Largest) 13 and (Smallest) 8	Q2	Strand (iii) Fully correct Q1 for their largest and smallest stated with largest 13 or smallest 8 with the four calculations seen  Note 7 and 4 give the answer 13 6 and 5 give the answer 8  SC2 for largest 13 or smallest 8  SC3 for three correct calculations with one incorrect calculation and their largest and smallest correct

Q	Answer	Mark	Comments
17(a)	16.9	B1	
17(b)	their 16.9 × 2  33.8	M1 A1ft	oe [(2.5 + 15) + (1.7 + 15) +] × 2 ÷ 5 SC1 for 3.8
18(a)	-3, -1, 3	B2	B1 for 1 or 2 correct
18(b)	At least 2 of their 5 points plotted correctly  Fully correct straight ruled line from – 2 to 2	± ½ square	
	495 ÷ 55 or 9 or 80 ÷ 55 or 1.45 or 80 × 495 or 39600 495 ÷ 55 × 80	M1	$55 \div 495 \text{ or } \frac{1}{9}$ or $55 \div 80 \text{ or } 0.68 \text{ or } 0.69$
19(a)	or 80 × their 9 or 495 × their 1.45 or 80 × 495 ÷ 55 or 495 + (80 – 55) × their 9	M1dep	$80 \div \text{their } \frac{1}{9}$ or $495 \div \text{their } 0.68$
	720	A1	

Q	Answer	Mark	Comments
	$55 \div 495 \text{ or } \frac{1}{9}$ or $495 \div 55 \text{ or } 9$ or $160 \div 495 \text{ or } 0.32$ or $160 \times 55 \text{ or } 8800$	M1	495 ÷ 160 or 3.09
19(b) Alt 1	$55 \div 495 \times 160$ or $160 \div$ their $9$ or $160 \times$ their $\frac{1}{9}$ or $55 \times$ their $0.32$ or $160 \times 55 \div 495$	M1dep	oe 55 ÷ their 3.09375
	17.7 or 17.8	A1 B1ft	Rounding to nearest whole number
	$80 \div \text{ their } 720 \text{ or } \frac{1}{9}$ or their $720 \div 80 \text{ or } 9$ or $160 \div \text{ their } 720 \text{ or } 0.22$ or $160 \times 80 \text{ or } 8800$	M1	their 720 ÷ 160 or 4.5
19(b) Alt 2	$80 \div \text{ their } 720 \times 160$ or $160 \div \text{ their } 9$ or $160 \times \text{ their } \frac{1}{9}$ or $80 \times \text{ their } 0.22$ or $160 \times 80 \div \text{ their } 720$	M1dep	oe 80 ÷ their 4.5
	17.7 or 17.8	A1	
	18	B1ft	Rounding to nearest whole number

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

Q	Answer	Mark	Comments
	I		
	15.7 × 4 or 62.8	M1	
23	their 62.8 = $\pi$ × diameter	M1dep	oe their $62.8 = 2 \times \pi \times \text{radius}$
23	their 62.8 $\div$ $\pi$		their 62.8 $\div$ 2 $\pi$ radius = [9.95, 10]
	[19.9, 20]	A1	SC2 for [4.9, 5]
	I		B2 Triangle correct but no arcs
	Triangle is correct with two equal arcs	В3	
	seen for angle of 60°		B2 Fully correct constructions (3 <sup>rd</sup> side missing)
24			B1 for either <i>AB</i> = [7.4, 7.6]
			or AC = [6.2, 6.4]
			or 60°