GCSE
MATHEMATICS
8300/3F

Paper 3 Calculator

Foundation tier

Shadow paper based on June 2024 question paper

Mark scheme

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 Examiner.

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.

No student should be disadvantaged on the basis of their gender identity and/or how they refer to the gender identity of others in their exam responses.

A consistent use of 'they/them' as a singular and pronouns beyond 'she/her' or 'he/him' will be credited in exam responses in line with existing mark scheme criteria.

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.
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.
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. 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 $\leqslant$ value < b
3.14 …	Accept answers which begin 3.14 e.g. 3.14, 3.142, 3.1416
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 student has used an incorrect method to obtain an answer, as a general principle, the benefit of doubt must be given to the student. In cases where there is no doubt that the answer has come from incorrect working then the student should be penalised.

Questions which ask students to show working

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

Questions which do not ask students to show working

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

Misread or miscopy

Students often copy values from a question incorrectly. If the examiner thinks that the student 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 student intended it to be a decimal point.

Q	Answer	Mark	Comments
1(a)	Correct bar in correct position	B1	
	Additional Guidance		
	Mark intention		
	Shading not required		

Q	Answer	Mark	Comments
1(b)	1	B1	

Q	Answer	Mark	Comments
2	−10 −8 −5 2	B2	B1 answer begins –10 or ends 2 SC1 reverse order

Q	Answer	Mark	Comments
3(a)	26	B1	ignore further terms

Q	Answer	Mark	Comments
3(b)	add 8	B1ft	accept + 8 ft their 26 or correct answer
	Additional Guidance		
	20 in part (a) answer + 2 36 in part (a) answer × 2		B1ft B1ft

Q	Answer	Mark	Comments
4	50p 20p 10p 5p 2p	B2	any order units required for each coin B1 50 20 10 5 2 in any order without all units or set of valid coins that make 87p (with correct units or without units) e.g. 20 20 20 20 5 2
	Additional Guidance		
	Units may be seen in the working but missing on the answer line for B2		
	50p 20p 10p 5p 2p in working with answer 0.50p 0.20p 0.10p 0.05p 0.02p		B1
	Accept £0.50, condone £0.50p		
	Units of the form 0.50p are incorrect		
	If all five coins are in a consistent form to show 50 20 10 5 2 e.g. 0.50p 0.20p 0.10p 0.05p 0.02p condone for B1		

Q	Answer	Mark	Comments
5	$>$	B1	
	$<$	B1	
	=	B1	
	Additional Guidance		
	Must use the correct symbol, not word equivalents		

Q	Answer	Mark	Comments
6(a)	8	B1	

Q	Answer	Mark	Comments
6(b)	5	B1	

Q	Answer	Mark	Comments
6(c)	1	B1	

Q	Answer	Mark	Comments
7(a)	56 in correct position in number machine	B1	

Q	Answer	Mark	Comments
7(b)	+ 3 in correct position in number machine	B1	oe operation to reach 12

Q	Answer	Mark	Comments
7(c)	7 and 4 in correct positions in number machine	B2	B1 correct operations for input 5, output 31 or correct operations for input 10, output 66
	Additional Guidance		
	B1 may be awarded for correct work, with no or incorrect answer, even if this is seen amongst multiple attempts		
	Examples of correct operations for input 5, output 31 include $\times 8$ and -9 **or** $\times 9$ and -14 **or** $\times 10$ and -19		B1
	Examples of correct operations for input 10, output 66 include $\times 6.6$ and -0 **or** $\times 8$ and -14 **or** $\times 9$ and -24		B1

Q	Answer	Mark	Comments
8	0.6 or 1.2 or 250 or 780	M1	oe
	3 x 0.6 + 2 × 2.5 + 7.8 or 14.6 or 1460	M1	oe allow mixed units 14.6 or 1460 implies M2
	$\frac{7.8}{14.6}$ or $\frac{78}{146}$ or $\frac{39}{73}$	A1	oe fraction SC2 0.53424 ….
	Additional Guidance		
	Ignore simplification attempts after a correct fraction is seen		
	$\frac{78}{146}$ in working with 0.53424 … on answer line		M1M1A0
	Condone e.g. 1.20p for first M1		
	Do not allow e.g. £120 for first M1		

Q	Answer	Mark	Comments
9	243	B2	B1 27 or 216

Q	Answer	Mark	Comments
10	1900 in Away	B1	
	4560 in Home Yes	B1	
	3040 in Home No	B1ft	ft 9500 – their 4560 their 1370 must be less than 9500
	1244 in Away Yes	B1ft	ft 5804 – their 4560 their 4560 must be less than 5804
	656 in Away No	B1ft	ft their 1900 – their 1244
	Additional Guidance		
	If Away oval is blank, then condone an indication of 1550 as Away		
	If Home Yes oval is blank, then condone an indication of 1370 as Home Yes		
	ft values must be from ovals		

Q	Answer	Mark	Comments
11(a)	(2, 4)	B1	
	Additional Guidance		
	Check the diagram if answer line is blank		

Q	Answer	Mark	Comments
11(b)	(-2, 4)	B1	SC1 (–2, 4) in (a) and (2, 4) in (b)
	Additional Guidance		
	Check the diagram if answer line is blank		

Q	Answer	Mark	Comments
12(a)	Shots on Target	B1	
	(50, 16) and (60, 15) plotted	B1	$\pm\frac{1}{2}$ square
	Additional Guidance		
	Ignore any lines		
	Ignore other plots		

Q	Answer	Mark	Comments
12(b)	Negative	B1	oe
	Strong	B1	oe e.g. fairly strong SC1 answers in reverse order

Q	Answer	Mark	Comments
13	**Alternative method 1: working separately**		
	180 – 65 or 115	M1	implied by 57.5
	360 – 90 – 212 or 58	M1	Oe Implied by 116
	Yes and 58 and 57.5 or Yes and 115 and 116	A1	
	Alternative method 2: starting with x		
	180 – 65 or 115	M1	implied by 57.5
	360 – 90 – 0.5 × their 115 or 212.5 or 360 – 212 – 0.5 × their 115 or 90.5 or 0.5 × their 115 + 90 + 212 or 359.5	M1dep	oe
	Yes and 212.5 or Yes and 90.5 or Yes and 359.5	A1	
	Alternative method 3: starting with y		
	360 – 90 – 212 or 58	M1	oe implied by 116
	180 – their 58 x 2 or 64 or 65 + their 58 x 2 or 181	M1dep	oe
	Yes and 64 or Yes and 181	A1	

Q	Answer	Mark	Comments
14	$15x + 10$	B2	B1 $15x$ or (+) 10
	Additional Guidance		
	$10 + 15x$		B2
	Ignore any attempt to solve $15x + 10 = 0$		
	$15x + 10$ in working with answer $25x$		B1
	$15x + 7$ in working with answer $22x$		B1

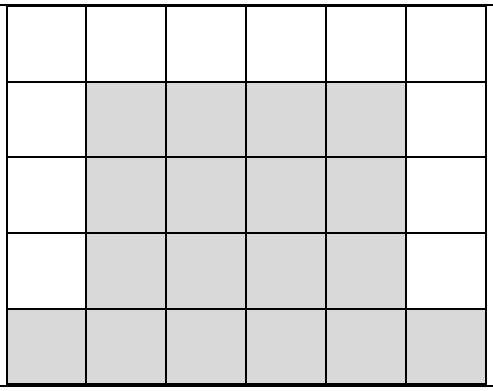
Q	Answer	Mark	Comments
15	$3x$	B1	oe
	y^2	B1	oe
	$13t$	B1	oe

Q	Answer	Mark	Comments
16	16 × 0.83 or 13.28	M1	oe e.g.1 $20 \times 0.83 \times \frac{4}{5}$ e.g. 2 20 × 0.83 – (20 ÷ 5) × 0.83
	2.3 × 0.9 or 2.07 or 2.3 × 6 or 13.8	M1	oe e.g. 2.3 – 0.1 × 2.3
	2.3 × 0.9 × 6 or 12.42	M1dep	oe e.g. 13.8 – 0.1 × 2.3 dep on 2nd M1
	their 12.42 + 2 × 0.75 or 13.92	M1	oe their 9.18 must be 6 times their pack price
	Shop A Cheaper by £0.64	A1	oe e.g. Shop A Cheaper by 64p
	Additional Guidance		
	Accept working in pounds or pence		
	Mixed units in the 4th M1 mark must be recovered with a correct value for their calculation 1242 and 12.42 + 2 × 75 1242 and 12.42 + 2 × 75 and 13.92		 M1M1M1M0 M1M1M1M1

Q	Answer	Mark	Comments
17(a)	16 : 12	B1	oe e.g. 8 : 6 may be implied by correct answer
	4 : 3 or 1 : 3/4or 1 : $\frac{3}{4}$ or $\frac{4}{3}$: 1	B1ft	ft their ratio
	Additional Guidance		
	Accept [1.33, 1.333333….] for $\frac{4}{3}$ 0.75 for 3/4		
	4 : 3		B1B1
	Answer 1 : $\frac{6}{8}$		B1B0
	16 : 28 followed by 4 : 7		B0B1ft

Q	Answer	Mark	Comments
17(b)	$\frac{7}{12}$	B1	oe fraction

Q	Answer	Mark	Comments
17(c)	2.6 or $2\frac{3}{5}$ or $\frac{13}{5}$	B1	oe
	Additional Guidance		
	Condone e.g. 1 : 2.6		B1

Q	Answer	Mark	Comments
18(a)		B1	
	Additional Guidance		
	Mark intention, condone missing interior lines		
	Shading not required		

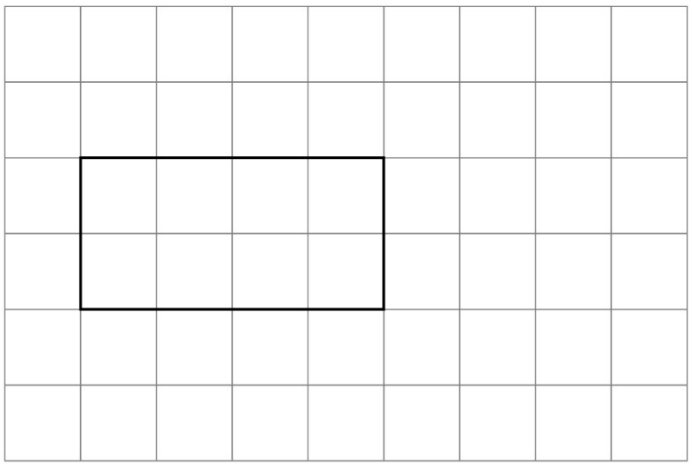
Q	Answer	Mark	Comments
18(b)	25	B1	

Q	Answer	Mark	Comments
19	13^2 or 169 **and** 25^2 or 625 or 794	M1	ignore units
	$\sqrt{13^2+25^2}$ or $\sqrt{169+625}$ or $\sqrt{794}$	M1dep	
	28.17(…)	A1	accept 28 with 794 seen or M2 awarded
	Additional Guidance		
	M1 may be awarded for correct work, with no or incorrect answer, even if this is seen amongst multiple attempts		
	$25^2 - 13^2$		M1M0A0
	$\sqrt{456}$ without seeing 24^2 or 576 **and** 31^2 or 961		M0M0A0
	Answer only 28.2		M2A1
	Answer only 28		M0
	[28.17, 28.2] … from only accurate drawing		M0M0A0
	[28.17, 28.2] … from only trigonometry		M0M0A0
	[28.17 , 28.2] … from only cosine rule		M1M0A0

Q	Answer	Mark	Comments
20	This is not representative of all people or He didn't take into account other days	B1	oe
	Additional Guidance		
	Ignore incorrect or irrelevant statements or incorrect values alongside a correct reason, unless contradictory		
	Data is biased		B1
	Missing days or missing Wednesday/Thursday/Friday/Saturday/Sunday/weekends.		B1
	There could be different results on the other days.		B1
	Must have a sample from each day		B1
	Only doing 2 out of the 7 days		B1
	Not asked anyone on Wednesday/Thursday/Friday/Saturday/Sunday/weekends.		B1
	Missing most of the other days (ignore 'most of' as irrelevant)		B1
	Sample all days, sample size too small (ignore incorrect statement)		B1
	Needs to sample them all.		B0
	Sample too small		B0
	Some days might be different to others		B0

Q	Answer	Mark	Comments
21	It is true for **one** value of x	B1	

Q	Answer	Mark	Comments
22	4 × 36.7 or 146.8	M1	oe
	36.7 × 0.3 or 11.01	M1	oe
	36.7 – their 11.01 or 25.69	M1dep	oe dep on 2nd M1 36.7 × 0.7 oe is 2nd M1 and 3rd M1
	(429.39 – their 146.8) ÷ their 25.69 or 282.59 ÷ their 25.69	M1dep	oe dep on 3rd M1 e.g.1 11 × 25.69 = 282.59 e.g.2 146.8 + (11 x 25.69) = 429.39
	15 with 25.69 seen or 15 with 146.8, 172.49, 198.18, 223.87, 249.56, 275.25. 300.94, 326.63, 352.32, 378.01, 403.7, 429.39	A1	
	Additional Guidance		
	Up to M3 may be awarded for correct work, with no or incorrect answer, even if this is seen amongst multiple attempts		
	Build up attempts must be fully correct or show method		
	146.8 + 25.69		M1M1M1
	146.8, 172.49, 198.18, 223.87, 249.56, 275.25. 300.94, 326.63, 352.32, 378.01, 403.7, 429.39 without 15		M1M0M0M0

<table>
<tr><th>Q</th><th>Answer</th><th>Mark</th><th>Comments</th></tr>
<tr><td rowspan="8">23</td><td>24 ÷ (2 × 3) or 4
or
rectangle with height 2 cm</td><td>M1</td><td>oe
implied by rectangle with one side 4 cm</td></tr>
<tr><td>Rectangle with height 2 cm and width 4 cm</td><td>A1</td><td>any position on the grid</td></tr>
<tr><td colspan="3">Additional Guidance</td></tr>
<tr><td colspan="2">Mark intention, condone interior lines</td><td></td></tr>
<tr><td colspan="2">Accept unruled lines</td><td></td></tr>
<tr><td colspan="2">Side elevation
  </td><td>M1A1</td></tr>
<tr><td colspan="2">Cuboid with rectangle height 2 cm and/or width 4 cm</td><td>M1A0</td></tr>
</table>

Q	Answer	Mark	Comments
24(a)	**Alternative method 1: working in metres per second or kilometres per second**		
	5250 (metres) or 0.2 (km)	B1	implied by 26.25 or 1312.5
	their 5250 ÷ 200 × 50 or 5.25 ÷ their 0.2 × 50 or 1312.5	M2	oe M1 their 5250 ÷ 200 or 26.25 oe or 200 ÷ 50 or 4 oe or 5.25 ÷ their 0.2 oe
	their 1312.5 ÷ 60	M1dep	oe dep on M2
	21.875 minutes	A1ft	ft their 5250 or their 0.2 Accept 22 minutes with 21.875 seen
	Alternative method 2: working in metres per minute or kilometres per minute		
	5250 (metres) or 0.2 (km)	B1	implied by 0.24
	50 ÷ 60 or $\frac{5}{6}$	M1	oe accept [0.83333 …., 0.84]
	200 ÷ (50 ÷ 60) or 600 or $\frac{their\,0.2}{(50 \div 60)}$ or 0.24 or their 5250 × (50 ÷ 60)	M1dep	oe calculation
	their 5250 ÷ their 600 or 5.25 ÷ their 0.24 or their 5250 × (50 ÷ 60) ÷ 200	M1dep	oe
	21.875	A1ft	ft their 5250 or their 0.2 Accept 22 minutes with 21.875

Additional Guidance is on the next page

24(a) cont.	**Additional Guidance**	
	$5250 \div \frac{5}{6}$	B1M2
	$5.25 \div 200 \times 50$	B0M2
	$5.25 \div 0.2 \times 50$	B0M2

Q	Answer	Mark	Comments
24(b)	It is less than the answer to part (a)	B1	

Q	Answer	Mark	Comments
25	$(7 + 5 + 7 + 6 + 6 + 8) \div 6$ or $39 \div 6$ or 6.5	M1	Oe Implied by 26
	$54 \div 360 \times 100$ or 15	M1	oe
	$4 \times$ their 6.5 + their 15 or 26 + 15	M1dep	oe dep on M2
	41	A1	SC2 21.5 or 80
	Additional Guidance		
	Check table and pie chart for working		
	26 + 15%		M1M1M1

Q	Answer	Mark	Comments
26	$1+\frac{6.2}{100}$ or 1.062 or 106.2%	M1	oe e.g. $\frac{100+6.2}{100}$ may be implied by a correct value after one year of their chosen house value
	1.062^{20} **and** [3, 3.330..]	A1	may be implied by a correct value after 20 years of their chosen house value
	Additional Guidance		
	(house value =) 100 000 and (value after 1 year =) 106 200		M1
	(house value =) 100 000 and (value after 20 years =) [333 000, 333 036]		M1A1
	$\left(1+\frac{6.2}{100}\right)^{20} = 3.33...$		M1A1
	Do not allow a misread of 6.2% e.g.1 1.06 or 1.62		M0

Q	Answer	Mark	Comments
27	**Alternative method 1: population density of Town A**		
	95000 ÷ (9 × 2.6) or [4059, 4060]	M2	oe M1 95 000 ÷ 9 or 10 555.555 … oe or 9 × 2.6 or 23.4 oe
	Town B and [4059, 4060]	A1	
	Alternative method 2: comparing one square mile of population		
	95 000 ÷ 9 or [10555 , 10556]	M1	oe
	4750 × 2.6 or 12 350	M1	oe
	Town B and 10 555 and 12 350	A1	
	Alternative method 3: comparing nine square miles of population		
	4750 × 2.6 × 9 or 111 150	M2	oe M1 4750 × 2.6 or 12 350 oe or 9 × 2.6 or 23.4 oe
	Town B and 111 150	A1	
	Alternative method 4: comparing areas with equal populations		
	9 × 2.6 or 23.4	M1	oe
	95 000 ÷ 4750 or 20	M1	oe
	Town B **and** 20 **and** 23	A1	