GCSE
MATHEMATICS
8300/3F

Foundation Tier Paper 3 Calculator

Mark scheme

June 2024

Version: 1.0 Final

2 4 6 G 8 3 0 0 / 3 F / M S

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

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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. eg 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 eg 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)	9	B1	

Q	Answer	Mark	Comments
2	–7 –5 –1 3	B2	B1 answer begins –7 or ends 3 SC1 reverse order

Q	Answer	Mark	Comments
3(a)	23	B1	ignore further terms

Q	Answer	Mark	Comments
3(b)	add 6	B1ft	accept + 6 ft their 23 or correct answer
	Additional Guidance		
	20 in part (a) answer + 3 34 in part (a) answer × 2		B1ft B1ft

Q	Answer	Mark	Comments
4	50p 10p 10p 1p	B2	any order units required for each coin B1 50 10 10 1 in any order without all units or set of valid coins that make 71p (with correct units or without units) eg 10 1 20 20 20 or 50 20 1
	Additional Guidance		
	Units may be seen in the working but missing on the answer line for B2		
	50p 10p 10p 1p in working with answer 0.50p 0.10p 0.10p 0.01p		B1
	Accept £0.50, condone £0.50p		
	Units of the form 0.50p are incorrect		
	If all four coins are in a consistent form to show 50 10 10 1 eg 0.50p 0.10p 0.10p 0.01p 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)	6	B1	

Q	Answer	Mark	Comments
6(b)	8	B1	

Q	Answer	Mark	Comments
6(c)	1	B1	

Q	Answer	Mark	Comments
7(a)	40 in correct position in number machine	B1	

Q	Answer	Mark	Comments
7(b)	$+ 11$ in correct position in number machine	B1	oe operation to reach 18 eg $- -11$ or $\times \frac{18}{7}$

Q	Answer	Mark	Comments
7(c)	3 and 2 in correct positions in number machine	B2	B1 correct operations for input 5, output 13 or correct operations for input 10, output 28
	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 13 include $\times 2.6$ and $- 0$ **or** $\times 4$ and $- 7$ **or** $\times 5$ and $- 12$		B1
	Examples of correct operations for input 10, output 28 include $\times 2.8$ and $- 0$ **or** $\times 4$ and $- 12$ **or** $\times 5$ and $- 22$		B1

Q	Answer	Mark	Comments
8	0.4 or 0.8 or 220 or 700	M1	oe
	$2.2 + 2 \times 0.4 + 7$ or 10 or 1000	M1	oe allow mixed units 10 or 1000 implies M2
	$\frac{7}{10}$ or $\frac{700}{1000}$	A1	oe fraction SC2 0.7(0) or 70%
	Additional Guidance		
	Ignore simplification attempts after a correct fraction is seen		
	$\frac{7}{10}$ in working with 0.7 on answer line		M1M1A0
	Condone eg 0.80p for first M1		
	Do not allow eg £220 for first M1		

Q	Answer	Mark	Comments
9	368	B2	B1 25 or 343

Q	Answer	Mark	Comments
10	1550 in Away	B1	
	1370 in Home Yes	B1	
	5480 in Home No	B1ft	ft 6850 – their 1370 their 1370 must be less than 6850
	949 in Away Yes	B1ft	ft 2319 – their 1370 their 1370 must be less than 2319
	601 in Away No	B1ft	ft their 1550 – their 949 their 1550 must be greater than their 949
	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, –1)	B1	
	Additional Guidance		
	Check the diagram if answer line is blank		

Q	Answer	Mark	Comments
11(b)	(8, –1)	B1	SC1 (–1, –2) in (a) and (–1, 8) in (b)
	Additional Guidance		
	Check the diagram if answer line is blank		

Q	Answer	Mark	Comments
12(a)	Distance (km)	B1	oe must have units
	(8, 38) and (8.5, 42) plotted	B1	$\pm\frac{1}{2}$ square
	Additional Guidance		
	Ignore any lines		
	Ignore other plots		

Q	Answer	Mark	Comments
12(b)	Positive	B1	oe
	Strong	B1	oe eg fairly strong SC1 answers in reverse order

Q	Answer	Mark	Comments
13	**Alternative method 1: working separately**		
	180 – 127 or 53	M1	implied by 106
	360 – 90 – 163 or 107	M1	oe implied by 53.5
	No and 106 and 107 or No and 53 and 53.5 or No and 53 and 107 – 53 = 54	A1	
	Alternative method 2: starting with *y*		
	180 – 127 or 53	M1	implied by 106
	360 – 90 – 2 × their 53 or 164 or 360 – 163 – 2 × their 53 or 91 or 2 × their 53 + 90 + 163 or 359	M1dep	oe
	No and 164 or No and 91 or No and 359	A1	
	Alternative method 3: starting with *x*		
	360 – 90 – 163 or 107	M1	oe implied by 53.5
	180 – their 107 ÷ 2 or 126.5 or 127 + their 107 ÷ 2 or 180.5	M1dep	oe
	No and 126.5 or No and 180.5	A1	

Q	Answer	Mark	Comments
14	$6x + 24$	B2	B1 $6x$ or (+) 24
	Additional Guidance		
	$24 + 6x$		B2
	Ignore any attempt to solve $6x + 24 = 0$		
	$6x + 24$ in working with answer $30x$		B1
	$6x + 25$ in working with answer $31x$		B1

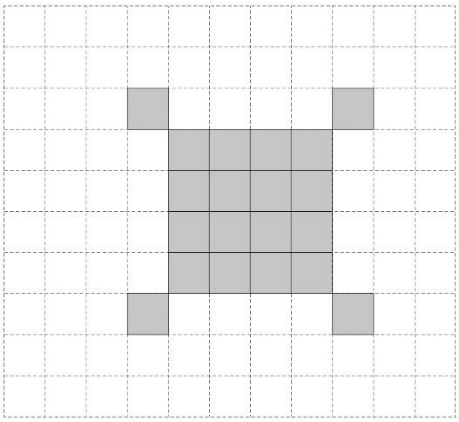
Q	Answer	Mark	Comments
15	$4x$	B1	oe
	y	B1	oe
	$3t$	B1	oe

Q	Answer	Mark	Comments
16	15×0.64 or 9.6	M1	oe eg1 $20 \times 0.64 \times \frac{3}{4}$ eg2 $20 \times 0.64 - (20 \div 4) \times 0.64$
	1.7×0.9 or 1.53 or 1.7×6 or 10.2	M1	oe eg $1.7 - 0.1 \times 1.7$
	$1.7 \times 0.9 \times 6$ or 9.18	M1dep	oe eg $10.2 - 0.1 \times 10.2$ dep on 2nd M1
	their $9.18 + 2 \times 0.62$ or 10.42	M1	oe their 9.18 must be 6 times their pack price
	Shop A Cheaper by £0.82	A1	oe eg Shop A Cheaper by 82p
	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 960 and $9.18 + 2 \times 62$ 960 and $9.18 + 2 \times 62$ and 10.42		 M1M1M1M0 M1M1M1M1
	$10.20 + 2 \times 0.62$ or 11.44 score the 2nd and 4th M1 mark		

Q	Answer	Mark	Comments
17(a)	12 : 18	B1	oe eg 6 : 9 may be implied by correct answer
	2 : 3 or 1 : 1.5 or 1 : $\frac{3}{2}$ or $\frac{2}{3}$: 1	B1ft	ft their ratio
	Additional Guidance		
	Accept [0.66, 0.67] for $\frac{2}{3}$		
	2 : 3		B1B1
	Answer 1 : $\frac{6}{4}$		B1B0
	12 : 30 followed by 2 : 5		B0B1ft

Q	Answer	Mark	Comments
17(b)	$\frac{3}{11}$	B1	oe fraction

Q	Answer	Mark	Comments
17(c)	2.25 or $2\frac{1}{4}$ or $\frac{9}{4}$	B1	oe
	Additional Guidance		
	Condone eg 1 : 2.25		B1

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

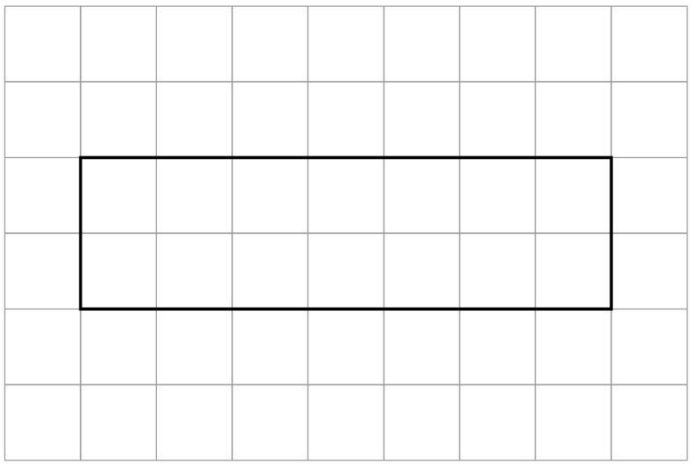
Q	Answer	Mark	Comments
18(b)	23	B1	

Q	Answer	Mark	Comments
19	24^2 or 576 **and** 31^2 or 961 or 1537	M1	ignore units
	$\sqrt{24^2+31^2}$ or $\sqrt{576+961}$ or $\sqrt{1537}$	M1dep	
	39.2(…)	A1	accept 39 with 1537 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		
	$31^2 - 24^2$		M1M0A0
	$\sqrt{385}$ without seeing 24^2 or 576 **and** 31^2 or 961		M0M0A0
	Answer only 39.2		M2A1
	Answer only 39		M0
	39.2 from only accurate drawing		M0M0A0
	39.2 from only trigonometry		M0M0A0
	39.2 from only cosine rule		M1M0A0

Q	Answer	Mark	Comments
20	This is not representative of all flats or He didn't take into account flats on the other floors	B1	oe
	Additional Guidance		
	Ignore incorrect or irrelevant statements or incorrect values alongside a correct reason, unless contradictory		
	Data is biased	B1	
	Missing floor or Misses top 2 floors (ignore incorrect value)	B1	
	There could be different results on the other 4 floors (ignore incorrect value)	B1	
	Must have a flat from each floor, do another 27 (ignore irrelevant statement)	B1	
	Only doing 5 out of the 8 floors	B1	
	Not tested any on floor 7 or 8	B1	
	Missing most of the other floors (ignore 'most of' as irrelevant)	B1	
	Some floors might be different to others	B1	
	Sample all floors, sample size too small (ignore incorrect statement)	B1	
	Needs to sample them all (all may refer to all flats not floors)	B0	
	Sample too small	B0	
	Some flats might be different to others	B0	
	Didn't test a third of the flats	B0	

Q	Answer	Mark	Comments
21	It is true for **all** values of x	B1	

Q	Answer	Mark	Comments
22	5 × 24.5 or 122.5	M1	oe
	24.5 × 0.2 or 4.9	M1	oe
	24.5 – their 4.9 or 19.6	M1dep	oe dep on 2nd M1 24.5 × 0.8 oe is 2nd M1 and 3rd M1
	(259.7 – their 122.5) ÷ their 19.6 or 137.2 ÷ their 19.6	M1dep	oe dep on 3rd M1 eg1 7 × 19.6 = 137.2 eg2 122.5 + 19.6 + 19.6 + 19.6 + 19.6 + 19.6 + 19.6 + 19.6 = 259.7
	12 with 19.6 seen or 12 with 122.5, 142.1, 161.7, 181.3, 200.9, 220.5, 240.1, 259.7	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		
	122.5 + 19.6		M1M1M1
	122.5, 142.1, 161.7, 181.3, 200.9, 220.5, 240.1, 259.7 without 12		M1M0M0M0

<table>
<tr><th>Q</th><th>Answer</th><th>Mark</th><th>Comments</th></tr>
<tr><td rowspan="8">23</td><td>42 ÷ (2 × 3) or 7
or
rectangle with height 2 cm</td><td>M1</td><td>oe
implied by rectangle with one side 7 cm</td></tr>
<tr><td>Rectangle with height 2 cm and width 7 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 7 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**		
	1500 (metres) or 0.05 (km)	B1	implied by 30 or 1200
	their 1500 ÷ 50 × 40 or 1.5 ÷ their 0.05 × 40 or 1200	M2	oe M1 their 1500 ÷ 50 or 30 oe or 50 ÷ 40 or 1.25 oe or 1.5 ÷ their 0.05 oe their 1500 must be using digits 15 (and zeros) their 0.05 must be using single digit 5 (and zeros)
	their 1200 ÷ 60	M1dep	oe dep on M2
	20	A1ft	ft their 1500 or their 0.05
	Alternative method 2: working in metres per minute or kilometres per minute		
	1500 (metres) or 0.05 (km)	B1	implied by 0.075
	40 ÷ 60 or $\frac{2}{3}$	M1	oe accept [0.66, 0.67]
	50 ÷ (40 ÷ 60) or 75 or $\frac{\text{their } 0.05}{(40 \div 60)}$ or 0.075 or their 1500 × (40 ÷ 60)	M1dep	oe calculation their 1500 must be using digits 15 (and zeros) their 0.05 must be using single digit 5 (and zeros)
	their 1500 ÷ their 75 or 1.5 ÷ their 0.075 or their 1500 × (40 ÷ 60) ÷ 50	M1dep	oe
	20	A1ft	ft their 1500 or their 0.05

Additional Guidance is on the next page

24(a) cont	**Additional Guidance**	
	1500 ÷ 1.25	B1M2
	1.5 ÷ 50 × 40 their 1500 must be using digits 15 (and zeros)	B0M2
	1.5 ÷ 0.5 × 40 their 0.05 must be using single digit 5 (and zeros)	B0M2
	150 ÷ 50 their 1500 must be using digits 15 (and zeros)	B0M1
	150 ÷ 1.25 = 120, 120 ÷ 60 = 2	B0M2M1A1ft

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

Q	Answer	Mark	Comments
25	(8 + 9 + 9 + 6 + 9 + 10) ÷ 6 or 51 ÷ 6 or 8.5	M1	oe implied by 34
	162 ÷ 360 × 100 or 45	M1	oe
	4 × their 8.5 + their 45 or 34 + 45	M1dep	oe dep on M2
	79	A1	SC2 53.5 or 57.5
	Additional Guidance		
	Check table and pie chart for working		
	34 + 45%		M1M1M1

Q	Answer	Mark	Comments
26	$1+\frac{5.1}{100}$ or 1.051 or 105.1%	M1	oe eg $\frac{100+5.1}{100}$ may be implied by a correct value after one year of their chosen house value
	1.051^{14} **and** [2, 2.01]	A1	may be implied by a correct value after 14 years of their chosen house value
	Additional Guidance		
	(house value =) 100 000 and (value after 1 year =) 105 100		M1
	(house value =) 100 000 and (value after 14 years =) [200 600, 200 650]		M1A1
	$\left(1+\frac{5.1}{100}\right)^{14} = 2.006$		M1A1
	Do not allow a misread of 5.1% eg1 1.05 eg2 1.052		 M0 M0

Q	Answer	Mark	Comments
27	**Alternative method 1: population density of Town A**		
	84 000 ÷ (7 × 2.6) or [4615, 4616]	M2	oe M1 84 000 ÷ 7 or 12 000 oe or 7 × 2.6 or 18.2 oe
	Town B and [4615, 4616]	A1	
	Alternative method 2: comparing one square mile of population		
	84 000 ÷ 7 or 12 000	M1	oe
	4695 × 2.6 or 12 207	M1	oe
	Town B and 12 000 and 12 207	A1	
	Alternative method 3: comparing seven square miles of population		
	4695 × 2.6 × 7 or 85 449	M2	oe M1 4695 × 2.6 or 12 207 oe or 7 × 2.6 or 18.2 oe
	Town B and 85 449	A1	
	Alternative method 4: comparing areas with equal populations		
	7 × 2.6 or 18.2	M1	oe
	84 000 ÷ 4695 or [17.89, 17.9] or 18	M1	oe
	Town B **and** 18.2 **and** [17.89, 17.9] or 18	A1	