GCSE MATHEMATICS 8300/3F

Foundation Tier Paper 3 Calculator

Mark scheme

November 2024

Version: 1.0 Final

24BG8300/3F/MS

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. 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)	195	B1	

Q	Answer	Mark	Comments
1(b)	361	B1	

Q	Answer	Mark	Comments
2	$3y$	B1	
	Additional Guidance		
	$3 \times y$ or $y \times 3$		B0
	$y3$		B0

Q	Answer	Mark	Comments
3(a)	12 ÷ 3 or 4 or 96 ÷ 3 or 32 or 96 × 12 or 1152 or 96 × 12 ÷ 3 or 384	M1	oe accept working in pounds or pence
	3.84	A1	
	Additional Guidance		
	Condone £3.84p		

Q	Answer	Mark	Comments
3(b)	40 ÷ 4 or 20 ÷ 2 or 10 or $\frac{21.5(0)}{40+20}$ or 215	M1	oe accept working in pounds or pence
	2.15	A1	
	Additional Guidance		
	Condone £2.15p		
	Do not ignore further working eg 2.15 followed by 2.15 × 4 + 2.15 × 2 = 12.90		M1A0
	10 can be implied by $\frac{21.5}{40} \times 4$ or $\frac{21.5}{20} \times 2$		M1

Q	Answer	Mark	Comments
4(a)	–1, 0, 1.8, 2	B2	B1 answer begins –1 or ends 2 SC1 2, 1.8, 0, –1
	Additional Guidance		
	Do not allow misreads for B2		
	Accept extra zeros and 1.8 written as a fraction eg –1, 0, $\frac{9}{5}$, 2.0		B2

Q	Answer	Mark	Comments
4(b)	$\frac{1}{4}$, $\frac{1}{2}$, $\frac{7}{8}$, $3\frac{1}{10}$	B2	B1 answer begins $\frac{1}{4}$ or ends $3\frac{1}{10}$ SC1 $3\frac{1}{10}$, $\frac{7}{8}$, $\frac{1}{2}$, $\frac{1}{4}$
	Additional Guidance		
	Do not allow misreads for B2		
	Accept correct conversions to equivalent fractions or decimals eg 0.25, $\frac{4}{8}$, $\frac{7}{8}$, $3\frac{1}{10}$		B2
	Do not accept any incorrect working or incorrect conversions for B2 eg1 $\frac{1}{4}$, $\frac{1}{2}$, $\frac{7}{8}$, $3\frac{1}{10}$ with 3.01 seen in working eg2 $\frac{1}{4}$, $\frac{1}{2}$, $\frac{7}{8}$, 3.01		B1 B1
	Condone any incorrect working or incorrect conversions for B1 eg $\frac{1}{4}$, 0.3, $\frac{1}{2}$, $\frac{7}{8}$		B1
	Condone correct percentage value without percentage sign for B2 eg $\frac{1}{2}$ = 50 is condoned as not incorrect working		

Q	Answer	Mark	Comments
5(a)	4	B1	

Q	Answer	Mark	Comments
5(b)	February	B1	
	Additional Guidance		
	Accept any indication of February eg Feb		B1

Q	Answer	Mark	Comments
5(c)	All five of the following criteria • horizontal bar split at 5 • correct width of bar • overall height of bar is 20 • correct gap from April bar • correct shading or labelling	B2	B1 horizontal bar split at 5 or (Cycle =) 5 or the following four criteria • correct width of bar • overall height of bar is 20 • correct gap from April bar • correct shading or labelling
	Additional Guidance		
	Mark intention		
	Accept Walk bar unshaded		
	Either shading or labelling correct means shading or labelling criteria is met		
	For B2, correct shading or labelling must be Cycle at the bottom of the bar and Walk at the top of the bar		
	For B1, correct shading or labelling must be Cycle at the bottom of the bar and Walk at the top of the bar but not necessarily in a 5 / 15 split		
	Horizontal bar split at 5 can be indicated by correct shading of bar up to 5		
	Cycle = 5 may be implied by a bar drawn to 5 or a line at 5		

Q	Answer	Mark	Comments
6	No and a valid reason	B1	eg No and he will arrive at 7.35 am
	Additional Guidance		
	No can be implied eg 5 minutes late	B1	
	No and 7.35	B1	
	No and 15 + 20 = 35	B1	
	No and 7.15 + 20 = 35	B1	
	No and leave by 7.10	B1	
	No and leave 5 minutes earlier	B1	
	No and he's only got 15 minutes	B1	
	No and 35 past	B1	
	Yes and 5 minutes late	B0	
	No and 5 minutes earlier	B0	
	No and 15 minutes	B0	
	No and 35	B0	
	No and will not arrive by 7.30 (no reason given)	B0	

Q	Answer	Mark	Comments
7	20 ÷ 1.3(0) or [15.3, 15.4] or 19.5(0)	M1	oe
	15 with no incorrect working	A1	
	Additional Guidance		
	15 × 1.30 = 19.05 with answer 15 (incorrect working)		M1A0
	15 × 1.30 without answer 15		M1A0
	For build up method allow one error but must get above £18.70 eg1 13 14.30 15.60 17 18.30 19.60 and answer of 15 eg2 13 15.30 16.60 17.90 19.20 For build down method allow one error but must get below £1.30 eg3 20 18.70 17.40 16.10 14.60 … 5.50 4.20 2.90 1.60 0.30		M1A0 M1A0 M1A0

Q	Answer	Mark	Comments
8(a)	23	B1	
	Additional Guidance		
	If answer line is blank, check the output oval for a value		

Q	Answer	Mark	Comments
8(b)	7	B1	
	Additional Guidance		
	If answer line is blank, check the input oval for a value		

Q	Answer	Mark	Comments
9	14 × 12 or 168 or 2 × 15 or 30 or 12 ÷ 10 or 1.2 or 15 ÷ 10 or 1.5	M1	oe
	14 × 12 + 2 × 15 or 168 + 30 or 198 or 14 × 12 ÷ 10 or 16.8 or 2 × 15 ÷ 10 or 3	M1dep	oe
	19.8	A1	SC2 17.4
	Additional Guidance		
	SC2 17.4 is from thinking 14 slices includes the 2 crusts		
	Condone answer 20 with 19.8 seen		M1M1A1
	Answer 19 with 19.8 seen		M1M1A0

Q	Answer	Mark	Comments
10(a)	45	B1	

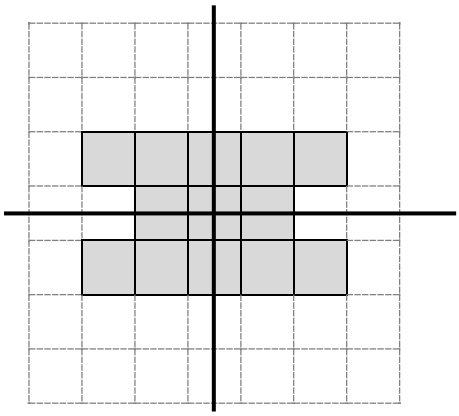
Q	Answer	Mark	Comments
10(b)	**Alternative method 1: Expands bracket first**		
	$8d - 20$	M1	oe expression eg $8 \times d - 20$
	their $8d$ = 28 + their 20 or $8d$ = 48	M1	their 20 cannot be zero
	6	A1ft	ft M0M1 or M1M0
	Alternative method 2: Divides by 4 first		
	$2d - 5 = \frac{28}{4}$ or $2d - 5 = 7$	M1	
	$2d$ = their 7 + 5 or $2d$ = 12	M1	their 7 cannot be 28
	6	A1ft	ft M0M1 or M1M0
	Additional Guidance		
	Alt 1 $6d - 5 = 28$ $6d = 33$ $d = \frac{33}{6}$		M0 M1 A1ft
	Alt 2 $2d - 5 = 24$ $2d = 29$ $d = 14.5$		M0 M1 A1ft
	Answer 6 from trial		M1M1A1
	Embedded answer $4(2 \times 6 - 5) = 28$		M1M1A0
	ft answers correct to 1 dp or better		

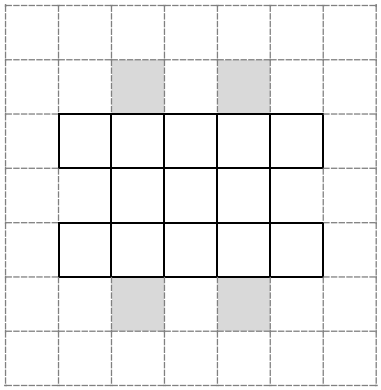
Q	Answer	Mark	Comments
11(a)	21.5 in second circle and 29.5 in third circle	B1	oe

Q	Answer	Mark	Comments
11(b)	14 in circle	B1	
	+ 9 in box	B1ft	ft their 14
	Additional Guidance		
	Accept other operators eg 14 in circle with $\times \frac{14}{5}$ (oe)		B1B1
	36 in circle + 31 in box		B0B1ft
	36 in circle + 9 in box		B0B1

Q	Answer	Mark	Comments
11(c)	$a + 3a = 28$ or $4a = 28$ or $28 + 2a = b$ or $6a = b$ or $28 \div 4$	M1	oe
	7	A1	may be seen on diagram
	42	B1ft	ft $28 + 2 \times$ their 7 or $6 \times$ their 7
	Additional Guidance		
	Answer 42		M1A1B1
	$4a = 28$ followed by $a = 24$ and $b = 76$ or $b = 144$		M1A0B1ft
	$a = 24$ (no working) and $b = 76$ or $b = 144$		M0A0B1ft
	Do not accept $a + 3a = 28 + 2a = b$ for $a + 3a = 28$ or $28 + 2a = b$		M0

Q	Answer	Mark	Comments
12	2 6 7 7 8 10 11 12 18 or 18 12 11 10 8 7 7 6 2 or 2 6 7 7 8 or 18 12 11 10 8	M1	allow one miscopy, extra or omission in a full ordered list
	8	A1	
	Additional Guidance		
	8 from an incorrect list eg 2 6 7 7 8 10 11 12 16 Answer 8	M1A0	
	List correctly ordered but clearly used for mode or mean or range eg1 2 6 7 7 8 10 11 12 18 Answer 7 (mode) eg2 2 + 6 + 7 + 7 + 8 + 10 + 11 + 12 + 18 = 81 Answer 9 (mean) eg3 2 6 7 7 8 10 11 12 18 = 81 Answer 9 (mean) eg4 2 6 7 7 8 10 11 12 18 Answer 16 (range)	M1A0 M1A0 M1A0 M1A0	

Q	Answer	Mark	Comments
13(a)	2 correct lines of symmetry and no incorrect lines 	B2	B1 for 2 correct lines of symmetry with 1 or 2 incorrect lines or for 1 correct line of symmetry with no more than 1 incorrect line
	Additional Guidance		
	Mark intention		

Q	Answer	Mark	Comments
13(b)		B1	
	Additional Guidance		
	Accept any indication		
	Ignore any lines of symmetry drawn		

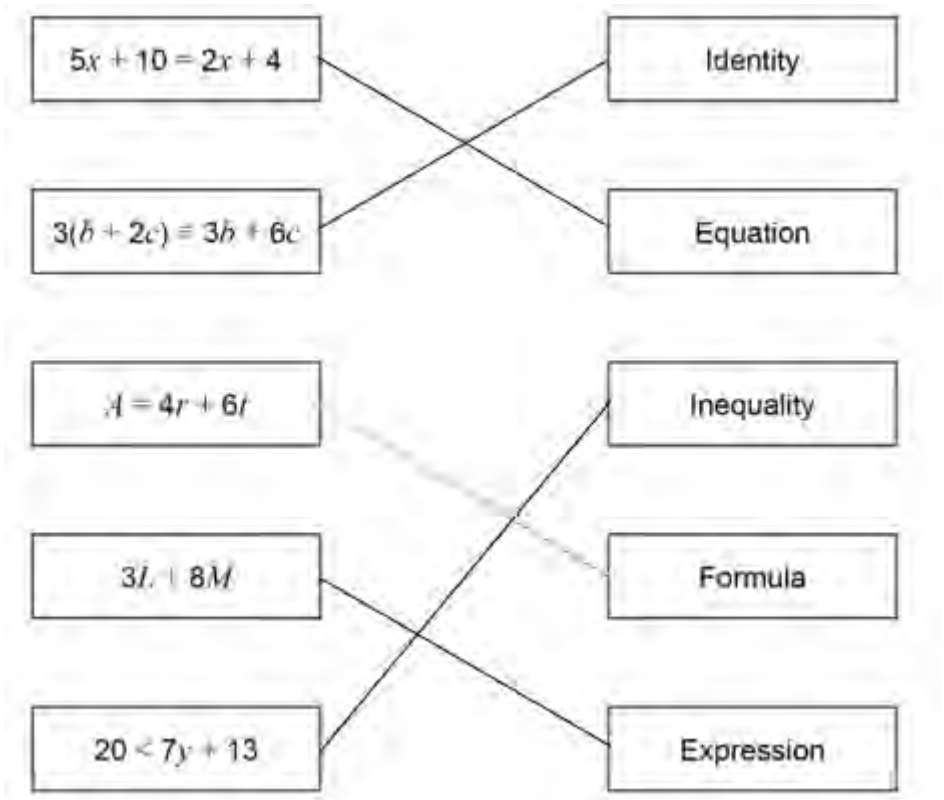
Q	Answer	Mark	Comments
14(a)	3	B1	

Q	Answer	Mark	Comments
14(b)	12	B1	

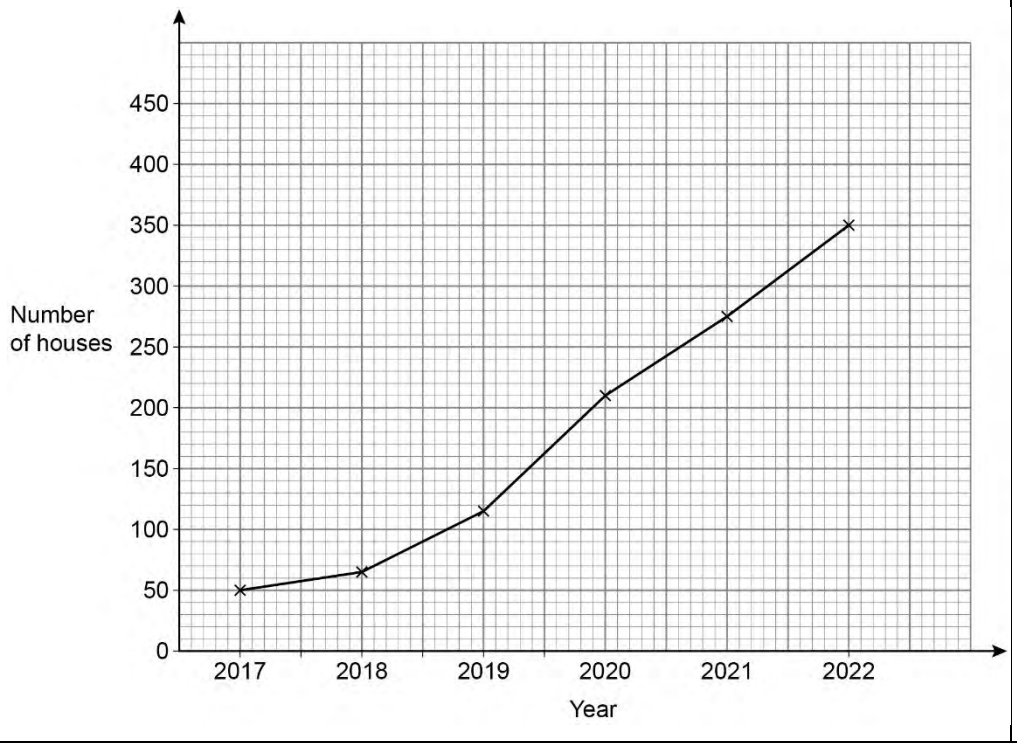
Q	Answer	Mark	Comments
14(c)	17 + 3 or 20 or 17 + 3 + 12 + 5 or 37	M1	oe
	$\frac{20}{37}$	A1	oe fraction
	Additional Guidance		
	Check diagram for working		
	Ignore simplification attempts after a correct fraction is seen		
	Do not ignore any attempts to convert to a decimal or percentage eg answer $\frac{20}{37} = 0.54$		M1A0

Q	Answer	Mark	Comments
15	$\frac{3}{8} \times 120$ or 45	M1	oe may be implied or embedded eg $\left(1 - \frac{3}{8}\right) \times 120$ or $\frac{5}{8} \times 120$ or 75
	(120 – their 45) ÷ (2 + 1) or 75 ÷ 3 or 25	M1dep	oe may be implied or embedded eg $75 \times \frac{2}{3}$ or $\frac{5}{8} \times 120 \times \frac{2}{3}$
	50	A1	
	Additional Guidance		
	M1 may be awarded for correct work with no answer or incorrect answer, even if this is seen amongst multiple attempts		
	25 : 50 on answer line		M1M1A0

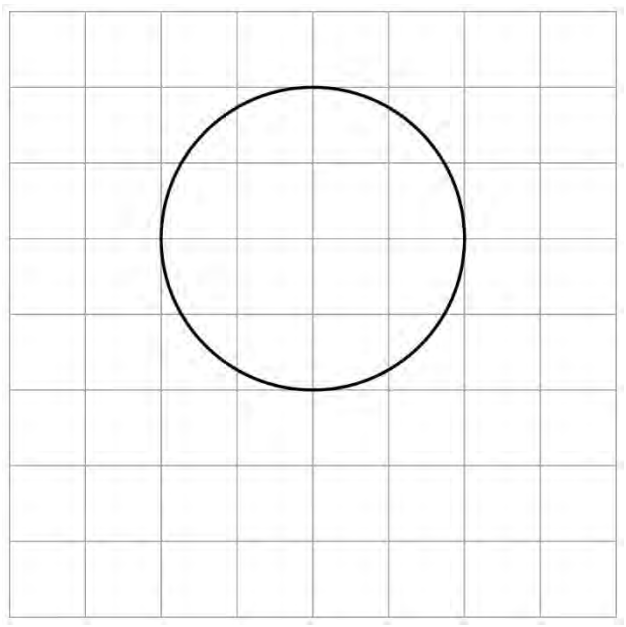
Q	Answer	Mark	Comments
16	8600 × 0.15 or 1290 or 8600 × 0.85 or 7310 or 0.85 × 0.9 or 0.765 or 8600 × 0.1 or 860 or 8600 × 0.9 or 7740	M1	oe
	(8600 – their 1290) × 0.9 or their 7310 × 0.9 or 0.85 × 0.9 × 8600 or (8600 – their 860) × 0.85 or their 7740 × 0.85	M1dep	oe
	6579	A1	SC1 10879
	Additional Guidance		
	SC1 10879 is for correctly calculating a repeated increase		
	Accept 6600 with M2 awarded eg 8600 × 0.85 × 0.9 = 6600		M2A1

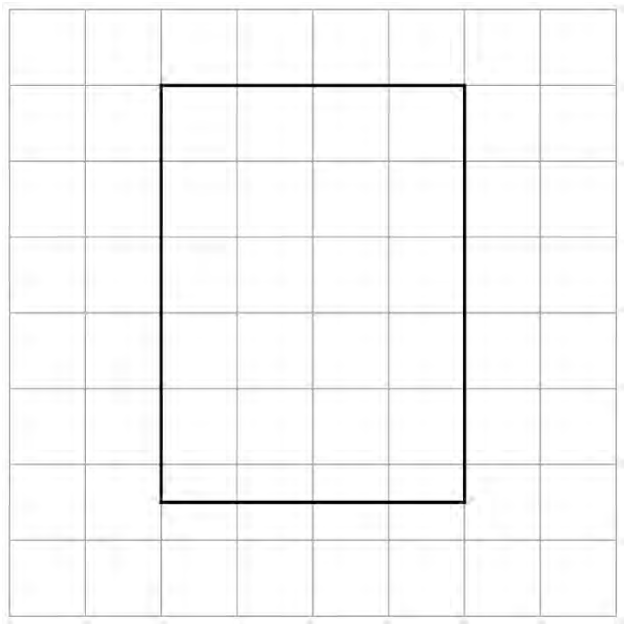
Q	Answer	Mark	Comments
17	All correct	B3	B2 for 2 or 3 correct B1 for 1 correct
	Additional Guidance		
			
	Two or more lines from one box on the left is choice so incorrect for that box		
	Accept any unambiguous indication		

Q	Answer	Mark	Comments	
18	**Alternative method 1: Starts with the cost of five games**			
	$5 \times 3.4(0)$ or 17	M1	oe implied by 8 or 0.32	
	$\frac{\text{their } 17}{25}$ or 0.68	M1dep	oe implied by 32(%) $\frac{5 \times 3.4(0)}{25}$ scores M2	
	68	A1		
	Alternative method 2: Starts with a calculation for the percentage for one game			
	$\frac{3.4(0)}{25}$ or 0.136	M1	oe	
	their 0.136×5 or 0.68 or $\frac{3.4(0)}{25} \times 100$ or 13.6(%)	M1dep	oe $\frac{3.4(0)}{25} \times 5$ scores M2	
	68	A1		
	Additional Guidance			
	M1 may be awarded for correct work with no answer or incorrect answer, even if this is seen amongst multiple attempts			
	Build up methods must be fully correct			
	$\frac{17}{0.25}$ or 17×4			M1M1

Q	Answer	Mark	Comments
19(a)	Plots at least 2 points correctly	M1	$\pm\frac{1}{2}$ square
	Fully correct with all points joined by single straight lines	A1	$\pm\frac{1}{2}$ square
	Additional Guidance		
	Mark intention		
	Ignore other points plotted and any lines of best fit		
	Points may be implied by the position of the line		
			M1A1

Q	Answer	Mark	Comments
19(b)	[360, 500]	B1	
	Additional Guidance		
	An interval given entirely in range eg 425 – 440		B1
	An interval given not entirely in range eg 340 – 430		B0

<table>
<tr><th>Q</th><th>Answer</th><th>Mark</th><th>Comments</th></tr>
<tr><td rowspan="6">20(a)</td><td>Circle with diameter 4 cm</td><td>B2</td><td>diameter ± 5 mm
B1 for any circle
or 40 ÷ 10 or 4
or (radius =) 2</td></tr>
<tr><td colspan="3">Additional Guidance</td></tr>
<tr><td colspan="2"> 
Can be anywhere on the grid</td><td>B2</td></tr>
<tr><td colspan="2">Mark intention</td><td></td></tr>
<tr><td colspan="2">Check stem and part (b) for evidence of 4 or 2</td><td></td></tr>
<tr><td colspan="2">4 or 2 cannot be implied from a diagram for B1</td><td></td></tr>
</table>

<table>
<tr><th>Q</th><th>Answer</th><th>Mark</th><th>Comments</th></tr>
<tr><td rowspan="8">20(b)</td><td>Rectangle with horizontal sides 4 cm and vertical sides 5.5 cm</td><td>B2</td><td>± 2 mm
B1 for any rectangle
or
40 ÷ 10 or 4 and 55 ÷ 10 or 5.5
SC2 for correct answers in (a) and (b) reversed (award 0 in (a) and 2 in (b))</td></tr>
<tr><td colspan="3">Additional Guidance</td></tr>
<tr><td colspan="2"> 
Can be anywhere on the grid</td><td>B2</td></tr>
<tr><td colspan="2">Mark intention</td><td></td></tr>
<tr><td colspan="2">Do not accept curved corners on any rectangle</td><td></td></tr>
<tr><td colspan="2">Check stem and part (a) for evidence of 4 and 5.5</td><td></td></tr>
<tr><td colspan="2">4 and 5.5 cannot be implied from a diagram for B1</td><td></td></tr>
</table>

Q	Answer	Mark	Comments
21	5 × 8 or 40	M1	oe
	their 40 ÷ 10 or 4	M1dep	oe
	8 + 8 + 5 + 5 or 26 and 10 + 10 + 4 + 4 or 28 **or** 8 + 5 or 13 and 10 + 4 or 14	M1dep	oe
	26 : 28	A1	oe ratio eg 13 : 14
	Additional Guidance		
	Ignore attempts at simplification after correct answer seen		
	Ignore units		
	Check diagram for working		

Q	Answer	Mark	Comments
22	**Alternative method 1: Compares lower bound with cost of 6 drinks**		
	12 – 0.5(0) or 11.5(0)	M1	oe eg 1200 – 50 allow mixed units eg 12 – 50
	1.89 × 6 or 11.34	M1	oe eg 189 × 6
	11.5(0) and 11.34	A1	oe eg 1150 and 1134 units must be consistent
	Alternative method 2: Compares rounded cost of drinks with 12		
	1.89 × 6 or 11.34	M1	oe eg 189 × 6
	11.34 rounds to 11	M1dep	oe eg 11.34 → 11
	11.34 rounds to 11 and 11 is less than 12	A1	oe units must be consistent
	Alternative method 3: Uses lower bound to work out cost or number of drinks		
	12 – 0.5(0) or 11.5(0)	M1	oe eg 1200 – 50 allow mixed units eg 12 – 50
	their 11.5(0) ÷ 6 or [1.91, 1.92] or their 11.5(0) ÷ 1.89 or [6.08, 6.1]	M1	oe eg 1150 ÷ 6 or [191, 192] their 11.5(0) must be [11, 11.99]
	11.5(0) ÷ 6 and [1.91, 1.92] or 11.5(0) ÷ 1.89 and [6.08, 6.1]	A1	oe eg 1150 ÷ 6 and [191, 192] units must be consistent
	Additional Guidance		
	Ignore any use of upper bound		
	Condone inconsistent notation eg 11.50 and £11.34p		M1M1A1
	11.34 rounds to 11 not 12 so she will have enough		M1M1A1
	11.34 rounds to 11 so she will have enough		M1M1A0

.Q	Answer	Mark	Comments
23	$2m + 4$ or $2 \times m + 4$	B2	oe B1 $2m$ or $m2$ or $200m + 400$ or $km + 4$ with k an integer, $k \neq 0$ or 2
	Additional Guidance		
	Ignore any attempt to substitute a value for m after $2m$ seen for B1		
	Condone $m2 + 4$ (not testing simplification)		B2
	Accept use of another letter for m other than c eg1 $2x + 4$ eg2 $2c + 4$		B2 B0
	Condone inclusion of £ sign for B1 eg1 £$2m + 4$ eg2 £$2m$		B1 B1

Q	Answer	Mark	Comments
24(a)	912 ÷ 15.2 or 60	M1	oe implied by 62
	912 ÷ (their 60 + 2) or 912 ÷ 62 or [14.7, 14.71]	M1dep	oe
	[14.7, 14.71] : 1 or 15 : 1 with M2 awarded	A1	oe eg $\frac{456}{31}$: 1
	Additional Guidance		
	M1 may be awarded for correct work, with no answer or incorrect answer, even if this is seen amongst multiple attempts		
	Do not allow misreads for 15.2		

Q	Answer	Mark	Comments
24(b)	Valid explanation	B1	eg she needs to round up
	Additional Guidance		
	She rounded down		B1
	Needs 8 (teachers)		B1
	Need (one) more		B1
	Only 70 students could go		B1
	2 students do not have a teacher		B1
	There are students without a teacher		B1
	Have groups of 8 with 9 teachers		B0
	8		B0
	Cannot have 0.2 of a teacher		B0

Q	Answer	Mark	Comments
25	(–2, –2) and (–2, 4) and (4, 4)	B4	B3 for 2 correct coordinates or the 3 correct lines drawn B2 for 1 correct coordinate or 2 correct lines drawn B1 for 1 correct line drawn
	Additional Guidance		
	Mark coordinates first		
	Ignore incorrect lines		

Q	Answer	Mark	Comments
26	Any two of the following statements • not using π in the calculation • not cubing 7.5 • no units	B2	oe B1 for one correct statement
	Additional Guidance		
	Ignore irrelevant statements for B1 or B2		
	Ignore incorrect statements or incorrect values with correct reasons, unless contradictory, for B1		
	Need to do $\pi \times 7.5^3$ (calculation shows 2 mistakes)		B2
	The answer should be 281.25π (doesn't show mistakes but a correct answer in terms of π)		B1
	Need to do $\pi \times 7.5^3$ to get 883.6 (883.6 is not an answer in terms of π)		B1
	The answer should be [883.5, 884]		B0
	15 is wrong		B0
	Statements about not using π in the calculation She hasn't multiplied by π / pi Used 3 for π Hasn't used 3.14 The answer is not in terms of π It is not in terms of π		 B1 B1 B0 B0 B0
	Statements about not cubing 7.5 She should have done 7.5^3 She hasn't cubed the radius She multiplied it by 3 Hasn't cubed a number		 B1 B1 B1 B0
	Statements about no units She hasn't given any units She should have written cm^3		 B1 B1