



GCSE Mathematics

Grades 2-3 Resource Calc Test 1

Mark scheme

8300 Grades 2-3 Resource Calc Test 1

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.

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 $a \leq \text{value} < b$
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.

Question	Answer	Mark	Comments
1	Alternative method 1		
	$24 \div 4 \times 3$ or 18	M1	oe
	their 18×60 or 1080	M1dep	oe 1080 implies M2
	1080 and $\frac{3}{4}$ (of a day)	A1	
	Alternative method 2		
	24×60 or 1440	M1	oe
	their $1440 \div 4 \times 3$ or 1080	M1dep	oe 1080 implies M2
	1080 and $\frac{3}{4}$ (of a day)	A1	
	Alternative method 3		
	$24 \div 4 \times 3$ or 18	M1	oe may be seen in either order (M marks not dependent) [16 h 36 m, 16 h 42 m] implies division 16 or 17 may be embedded
	$1000 \div 60$ or 16(.6...) or 16.7 or 17	M1	
	16(.6...) or 16.7 or 17 or [16 h 36 m, 16 h 42 m] and 18 and $\frac{3}{4}$ (of a day)	A1	16 or 17 may be embedded

Alternative method and Additional Guidance continued on the next page

Question	Answer	Mark	Comments
1 cont	Alternative method 4		
	24×60 or 1440	M1	oe
	$1000 \div \text{their } 1440 (\times 100)$ or $\frac{25}{36}$ or 0.69... or 69(...)%	M1dep	oe $\frac{25}{36}$ or 0.69... or 69(...) % implies M2
	$\frac{25}{36}$ and $\frac{27}{36}$ and $\frac{3}{4}$ (of a day) or 0.69... and 0.75 and $\frac{3}{4}$ (of a day) or 69(...) % and 75% and $\frac{3}{4}$ (of a day)	A1	
	Additional Guidance		
	Ignore units for the M marks but they must be correct, if given, for the A mark		
	$\frac{3}{4}$ of 24 is insufficient method unless a correct method or 18 is seen		
	Once $1000 \div 60$ or 16 or 16.6... or 16.7 or 17 is seen in Alt method 3, ignore any incorrect conversion to hours and minutes. If the student only shows hours and minutes, they must be in the given range.		
	Do not accept $\frac{3}{4}$ (of a day) in equivalent form eg 1080 or 18		A0

Q	Answer	Mark	Comments
2	Alternative method 1 Comparing the cost of 24 bottles		
	2.5×0.1 or 0.25 or $1 - 0.1$ or 0.9	M1	oe eg $2.5 \div 10$ discount or multiplier for shop X implied by $2.5 \times 6 \times 0.1$ or 1.5 or 2.25
	$(2.5 - \text{their } 0.25) \times 6$ or $2.5 \times \text{their } 0.9 \times 6$ or 2.25×6 or 13.5	M1dep	oe eg 15×0.9 or $15 - 1.5$ shop X
	7×2 or 14	M1	oe shop Z
	X with 13.5 and 14 seen	A1	oe
	Alternative method 2 Comparing the cost of 1 bottle		
	2.5×0.1 or 0.25 or $1 - 0.1$ or 0.9	M1	oe eg $2.5 \div 10$ discount or multiplier for shop X implied by $2.5 \div 4 \times 0.1$ or 0.06(25) or 2.25
	$(2.5 - \text{their } 0.25) \div 4$ or $2.5 \times \text{their } 0.9 \div 4$ or $2.25 \div 4$ or 0.56(25) or 0.563	M1dep	oe eg $0.62(5) \times 0.9$ or $0.62(5) - 0.06(25)$ shop X
	$7 \div 12$ or 0.58(3...)	M1	oe shop Z
	X with 0.56(25) or 0.563 and 0.58(3...) seen	A1	oe
	Alternative method 3 Comparing the cost of 12 bottles		
	2.5×0.1 or 0.25 or $1 - 0.1$ or 0.9	M1	oe eg $2.5 \div 10$ discount or multiplier for shop X implied by $2.5 \times 3 \times 0.1$ or 0.75 or 2.25
	$(2.5 - \text{their } 0.25) \times 3$ or $2.5 \times \text{their } 0.9 \times 3$ or 2.25×3	M1dep	oe eg $7.5 \times \text{their } 0.9$ or $7.5 - 0.75$ shop X
	X with 6.75 (and 7) seen	A2	A1 6.75 oe

Additional Guidance continue on the next page

2 cont	Additional Guidance																		
	Up to 3 marks may be awarded for correct work with no answer or incorrect answer, even if this is seen amongst multiple attempts																		
	Use the scheme that favours the student eg 0.56 and 0.58 followed by 13.44 and 13.92 and X (mark by Alt 2)				M3A1														
	Ignore incorrect money notation eg 13.5 or 14.0																		
	All schemes can be oe in pence and allow work in a mix of pounds or pence for up to 3 marks																		
	Condone eg answer 13.5 with 14 seen				M3A1														
	For 0.1×2.5 , accept $10\% \times 2.5$ but do not accept 10% of 2.5 unless recovered																		
	Allow variations eg Shop X £15, Shop Z £14, Shop X is £1 more but the discount is £1.50 Shop X cheaper				M1 M1M1 A1														
	Where the student compares eg 2, 3, 4, 6, 48 or 96 bottles apply the principles of Alt 2 – some relevant figures given below (after offer)																		
	<table><tr><td>Shop</td><td>Cost of 2</td><td>Cost of 3</td><td>Cost of 4</td><td>Cost of 6</td></tr><tr><td>X</td><td>1.12(5) or 1.13</td><td>1.68(75) or 1.69</td><td>2.25</td><td>3.37(5) or 3.38</td></tr><tr><td>Z</td><td>1.16(6...) or 1.17</td><td>1.75</td><td>2.33(3...)</td><td>3.5</td></tr></table>					Shop	Cost of 2	Cost of 3	Cost of 4	Cost of 6	X	1.12(5) or 1.13	1.68(75) or 1.69	2.25	3.37(5) or 3.38	Z	1.16(6...) or 1.17	1.75	2.33(3...)
Shop	Cost of 2	Cost of 3	Cost of 4	Cost of 6															
X	1.12(5) or 1.13	1.68(75) or 1.69	2.25	3.37(5) or 3.38															
Z	1.16(6...) or 1.17	1.75	2.33(3...)	3.5															

Question	Answer	Mark	Comments
3	$4x = 14 + 3$ or $4x = 17$ or $(14 + 3) \div 4$ or $17 \div 4$ or $x - \frac{3}{4} = \frac{14}{4}$	M1	
	4.25 or $\frac{17}{4}$ or $4\frac{1}{4}$	A1	
	Additional Guidance		
	Embedded answer of 4.25 with 4.25 not selected on answer line eg $4 \times 4.25 - 3 = 14$ with no answer given or answer of 14 or 17		M1A0
	$14 + 3$ and answer 4.25		M1A1
	$14 + 3$ only		M0A0
	Trial and improvement with answer 4.25		M1A1
	Trial and improvement with no answer or answer other than 4.25		M0A0
	4.25 or $\frac{17}{4}$ or $4\frac{1}{4}$ seen and then answer 4 given		M1A1
	Answer of $\times 4.25$		M1A0
	$17 \div 4$ (and no further)		M1A0
4	0.32	B1	
5	22.6 or $\frac{113}{5}$ or $22\frac{3}{5}$	B1	
	Additional Guidance		
	Condone $22\frac{6}{10}$		B1

Question	Answer	Mark	Comments
6	$90 \times \frac{3}{10}$ or 27	M1	oe
	their 27×2	M1dep	oe 27×2 implies M2
	54	A1	SC1 answer 126 or answer 600
	Additional Guidance		
	Answer 54	M1M1A1	
	$\frac{3}{10}$ of 90 is insufficient method unless a correct method or 27 is seen or implied		

Question	Answer	Mark	Comments
7	Correct method or evaluation for the 25% or the 15% or correct multiplier for the increase or the decrease seen	M1	eg 28×0.25 or 7 or 40×0.15 or 6 or 1.25 or 0.85 oe
	Correct method or evaluation for either calculation	M1dep	eg $28 + 28 \times 0.25$ or 35 or 40×0.85 or 34
	Correct method or evaluation for both calculations	M1dep	
	35 with 34 seen	A1	oe eg 28 increased by 25% with 35 and 34 seen
	Additional Guidance		
	28×1.25 or 35		M1M1
	40×0.85 or 34		M1M1
	28×1.25 or 35 and 40×0.85 or 34		M1M1M1
	Build-up methods must be correct or show correct method for each step eg 1 $10\% = 2.8$, $5\% = 1.4$, $25\% = 7$ eg 2 $10\% = 2.8$, $5\% = 2.8 \div 2 = 1.8$, $25\% = 7.4$ (error in build-up but method shown for that step) eg 3 $10\% = 2.8$, $5\% = 1.8$, $25\% = 7.4$ (error in build-up and method not shown for that step)	M1 M1 M0	
	35 and 34 seen and 35 chosen by eg circling		M3A1
	For 28×0.25 , do not accept $28 \times 25\%$ unless recovered		
8	$x^2 - 4x$	B1	

Question	Answer	Mark	Comments
9(a)	$\frac{13}{9}$	B1	oe improper fraction
	Additional Guidance		
	$\frac{13}{9}$ in working with a decimal on answer line		B0
9(b)	2.8	B1	
	Additional Guidance		
	2.80		B0
10	$180 \div 3$ or 60	M1	oe eg $60 + 60 + 60 = 180$
	$(180 - 28) \div 2$ or $152 \div 2$ or 76	M1	oe eg $76 + 76 + 28 = 180$
	$180 - \text{their } 60 - \text{their } 76$	M1dep	oe eg $44 + 60 + 76 = 180$ dep on M1M1
	44	A1	
	Additional Guidance		
	60 or 76 seen in appropriate place on diagram or in working scores one mark for each		
	Answer 44 not from wrong working		M3A1
	$180 - 28 \div 2$ unless recovered		2nd M0

Question	Answer	Mark	Comments
11	80×0.9 or 72 or 25×1.2 or 30 or 80×0.1 and 25×0.2 or 8 and 5 or –8 and 5	M1	oe eg $80 \times (1 - 0.1)$ or $25 + 25 \times 0.2$ or $25 + 5$ implied by 102 or 3 or –3
	No and correct valid amount(s)	A1	eg no and 105 and 102 or no and 3 or no and –3 or no and 8 and 5 or no and –8 and 5
	Additional Guidance		
	If neither box is ticked, No may be implied eg neither box is ticked and Ellie paid 3 less		M1A1
	Working and values may be seen by the table		
	No and 105 with M1 not seen		M0A0
	No and 8 with M1 not seen		M0A0
	No and 5 with M1 not seen		M0A0
	Condone No and 8 and 5 with arithmetic error(s) seen eg 72 so 8 less 30 so 5 more 105 and 103 No (arithmetic error in calculating Ellie's total)		M1A1
	Do not condone No and 8 and 5 with process error(s) seen eg $80 - 8 = 72$ $25 - 5 = 20$ (process error, should be $25 + 5$) 105 and 92 No		M1A0

Question	Answer	Mark	Comments
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12	20 + 3 or 23 or 10.58	M1	may be implied by a journey (lines or curves) ending at 10.58 on the graph
	Straight line from (10.35, 7) to (10.58, 0)	A1	$\pm \frac{1}{2}$ small square ignore any other working lines on the graph
	Additional Guidance		
	Fully correct graph		M1A1
	Accept unruled line if intention clear		

13	$0.5 \times 10 \times 12$ or 60	M1	oe
	$180 \div \text{their } 60$	M1dep	
	3	A1	SC1 1.5 oe

14	$\frac{2}{3} \times 720$ or $\frac{3}{5} \times 700$	M1	oe Accept use of 0.66... or 0.67
	480 or 420	A1	
	900	A1	Ignore fw
	Additional Guidance		
	900 with no working		M1A1A1
	900 out of 1420 or $\frac{900}{1420}$ (ignore fw)		M1A1A1
	$\frac{480}{720}$ (480 boys out of 720) or $\frac{420}{1420}$ (420 girls out of 1420 students)		M1A1A0

Question	Answer	Mark	Comments
15	Alternative method 1		
	$\frac{5}{7} \times 168$ or 120	M1	oe eg $168 \div 7 \times 5$ implied by 48 allow 0.71(4...) or 71(.4...) % for $\frac{5}{7}$
	$\frac{1}{3} \times (168 - \text{their } 120)$ or $\frac{1}{3} \times 48$ or 16 or $\left(1 - \frac{1}{3}\right) \times (168 - \text{their } 120)$ or $\left(1 - \frac{1}{3}\right) \times 48$	M1	oe must subtract their 120 from 168 with $10 < \text{their } 120 < 150$ allow 0.33(3...) or 33(.3...) % for $\frac{1}{3}$ allow 0.66(6...) or 0.67 or 66(.6...) % or 67 % for $\left(1 - \frac{1}{3}\right)$ 16 is M1M1
	32(.00p)	A1	SC2 80 SC1 40
	Alternative method 2		
	$\left(1 - \frac{5}{7}\right) \times 168$ or 48	M1	oe eg $168 \div 7 \times 2$ allow 0.28(6...) or 0.29 or 28(.6...) % or 29 % for $\left(1 - \frac{5}{7}\right)$
	$\frac{1}{3} \times \text{their } 48$ or 16 or $\left(1 - \frac{1}{3}\right) \times \text{their } 48$	M1	oe $18 < \text{their } 48 < 100$ allow 0.33(3...) or 33(.3...) % for $\frac{1}{3}$ allow 0.66(6...) or 0.67 or 66(.6...) % or 67 % for $\left(1 - \frac{1}{3}\right)$ 16 is M1M1
	32(.00p)	A1	SC2 80 SC1 40

Additional Guidance continue on the next page

15 cont	Additional Guidance	
	Up to M2 may be awarded for correct work with no, or incorrect answer, even if this is seen amongst multiple attempts	
	$\frac{5}{7} \times 168 = 120, 120 \div 3 = 40$, Answer 40	M1M0A0 (or SC1)
	$\frac{5}{7} \times 168 = 120, 120 \div 3 = 40$, Answer 80	SC2
	Alt 1 Allow 0.71(4...) or 71(.4...) % for $\frac{5}{7}$ and 0.33(3...) or 33(.3...) % for $\frac{1}{3}$ eg $0.71 \times 168 = 119.28$ $0.33 \times (168 - 119.28) = 16.08$, Answer 32.64	M1 M1A0
	Do not allow $\frac{5}{7} = 0.7$ or $\frac{2}{7} = 0.3$ or $\frac{1}{3} = 0.3$ or $\frac{2}{3} = 0.7$ eg $0.7 \times 168 = 117.6$ $0.3 \times (168 - 117.6) = 15.12$, Answer 35.28	M0 M0A0
	Second mark of Alt 1 is independent eg $0.7 \times 168 = 117.6$ (unacceptable to use 0.7 for $\frac{5}{7}$) $(168 - 117.6) \div 3 = 16.8$	M0 M1A0
	Second mark of Alt 2 is independent eg $0.3 \times 168 = 50.4$ (unacceptable to use 0.3 for $\frac{2}{7}$) $0.33 \times 50.4 = 16.63$	M0 M1A0
	Calculation shown as eg $71\% \times 168$	M1

Question	Answer	Mark	Comments
16	Ticks Both of them and gives valid reason for Kai eg references both values being divided (or multiplied) by 3 and gives valid reason for Jo eg references both values being divided (or multiplied) by 6	B2	oe valid reason eg1 $9 \div 3 \times 2 = 6$ and $9 \div 1.5 \times 1 = 6$ or eg2 $9 \div 6 = 1.5$ and $3 \div 2 = 1.5$ and $1.5 \div 1 = 1.5$ B1 ticks Kai only and gives valid reason for Kai or ticks Jo only and gives valid reason for Jo or ticks Both of them and gives valid reason for Jo or Kai
	Additional Guidance		
	Ticks Both of them and gives correct reason for Kai or Jo and refs both values being divided (or multiplied) by 2 (to link Jo and Kai)	B2	
	Accept a build-up method to imply multiplying by 3 or by 6 eg all three of $3 : 2$ and $6 : 4$ and $9 : 6$ or all six of $1.5 : 1$ and $3 : 2$ and $4.5 : 3$ and $6 : 4$ and $7.5 : 5$ and $9 : 6$		
	Condone eg $3 : 2 \times 3 = 9 : 6$ to imply both values are multiplied by 3		
	If evaluating $6 \div 9 = 0.66$ and $2 \div 3 = 0.66$ and $1 \div 1.5 = 0.66$, accept 0.66(...) or 0.67		
	3 is a factor of 9 and 2 is a factor of 6 (with no reference to $\times 3$)	B0	
	$9 : 6 = 3 : 2$ or $\frac{9}{6} = \frac{3}{2}$ (not evaluated to 1.5 or shown $\div 3$)	B0	
	$9 : 6$ simplifies to $3 : 2$ and $1.5 : 1$ (with no reference to $\div 3$ or $\div 6$)	B0	
	$3 : 2$ and $1.5 : 1$ are both equivalent to $9 : 6$ (with no reference to $\times 3$ or $\times 6$)	B0	

Question	Answer	Mark	Comments
17	Alternative method 1		
	90×5 or 450 or $\frac{72+83+88+97+x}{5}$ or $\frac{340+x}{5}$	M1	oe any letter or symbol
	$90 \times 5 - 72 - 83 - 88 - 97$ or $90 \times 5 - 340$ or $72 + 83 + 88 + 97 + x = 90 \times 5$ or $340 + x = 90 \times 5$	M1dep	oe any letter or symbol equations must have fraction eliminated
	110	A1	
	Alternative method 2		
	Trial of any value with mean correctly evaluated	M1	also allow if given to the next or previous integer eg1 trial of 100 $\frac{72+83+88+97+100}{5} = 88$ eg2 trial of 78 $\frac{340+78}{5} = 83$ (or 84 or 83.6) ignore trials with mean not evaluated or incorrectly evaluated
	Trial of 110 with mean evaluated to 90	M1dep	eg $\frac{72+83+88+97+110}{5} = 90$ this mark implies M1M1
	110	A1	

Mark scheme and Additional Guidance continue on the next page

17 cont	Alternative method 3		
	$\frac{72+83+88+97}{4}$ or $\frac{340}{4}$ or 85	M1	oe
	their 85 + 5 × (90 – their 85) or their 85 + 5 × 5 or their 85 + 25	M1dep	oe 90 + 4 × (90 – their 85)
	110	A1	
	Alternative method 4		
	$\frac{72+83+88+97}{5}$ or $\frac{340}{5}$ or 68	M1	oe
	5 × (90 – their 68) or 5 × 22	M1dep	oe
	110	A1	
	Alternative method 5		
	(90 – 72) + (90 – 83) + (90 – 88) + (90 – 97) or 18 + 7 + 2 – 7 or 20	M1	oe eg (72 – 90) + (83 – 90) + (88 – 90) + (97 – 90) or 90 × 4 – 72 – 83 – 88 – 97 or –18 – 7 – 2 + 7 or –20
	90 + their 20	M1dep	oe eg 90 – their –20
	110	A1	
	Additional Guidance		
	M1 may be awarded for correct work with no, or incorrect answer, even if this is seen amongst multiple attempts		
	Embedded 110 scores M1M1A0 using Alt 2 (even if a different answer is given)		
	Condone eg Alt 3 $72 + 83 + 88 + 97 \div 4$ No further marks unless recovered		M1
	Alt 5 1st M1 Subtractions must be consistent		
	Condone 110% for 110		

Question	Answer	Mark	Comments
18	Alternative method 1		
	10.8×8 or 86.4	M1	
	$50 \times 110 \times 35$ or 192 500	M1	Must use correct volume formula
	their $192\,500 \div 1000$ or 192.5	M1dep	dep on 2nd M1
	their $192.5 - \text{their } 86.4$	M1dep	dep on M1M1M1
	106.1 or 106	A1	
	Alternative method 2		
	$10.8 \times 8 \times 1000$ or 86 400	M1	oe
	$50 \times 110 \times 35$ or 192 500	M1	Must use correct volume formula
	their $192\,500 - \text{their } 86\,400$ or 106 100	M1dep	dep on M1M1
	their $106\,100 \div 1000$	M1dep	dep on M1M1M1
	106.1 or 106	A1	
	Additional Guidance		
	192.5	2ndM1M1dep	
	106 100	M1M1M1dep	
	$50 \times 110 \times 35 = 192\,500 \div 2$	2ndM0	