



GCSE Mathematics

Grades 3-4 Resource Non-calc Test 1

Mark scheme

8300 Grades 3-4 Resource Non-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		
	6×8 or 48 or 2^2 or 2×2 or 4	M1	may be on diagram
	$48 \div 4 = 12$ or $48 \div 12 = 4$ or $4 \times 12 = 48$ or $\frac{4}{48} (=) \frac{1}{12}$	A1	oe eg $48 \div 2 = 24$ and $24 \div 2 = 12$
	Alternative method 2		
	$6 \div 2$ or $2 \div 6$ or $8 \div 2$ or $2 \div 8$	M1	
	$3 \times 4 = 12$ or $\frac{1}{3} \times \frac{1}{4} = \frac{1}{12}$ with full working seen	A1	Need to justify where this product comes from with M1 work seen

Question	Answer	Mark	Comments
1 cont	Alternative method 3		
	One row of 4 squares drawn or one column of 3 squares drawn	M1	Mark intention, not accuracy of drawing, 2m labels not required
	Rectangle split into 4 columns and 3 rows	A1	
	Additional Guidance		
	$(2 \times 2 = 4, 6 \times 8 = 48 \text{ and}) 4 \text{ is } \frac{1}{12} \text{ of } 48$		M1A1
	4 12s are 48		M1A1
	$8 \times 6 = 48, 12 \div 48 = 4$ (cannot condone incorrect order as 'show that')		M1A0
	$\frac{4}{48}$ so correct		M1A0
	Beware 4 (or 12) arising from incorrect working eg $2 + 2 = 4, 8 + 6 = 14, 14 - 2 = 12$		M0A0
	$2 \times 2 + 2 \times 2 = 8$ (misconception on area of rug) cannot score for 2×2		M0A0
	$6 \times 8 = 48$ and $48 \times 2 = 96$ (ignore additional 'method' and give M1 for 48) $6 \times 8 = 48$ and $48 \div 2 = 24$ (ignore additional 'method' and give M1 for 48) $6 \times 8 \times 2$ (ignore additional 'method' and give M1 for 6×8)		M1A0
	$6 \times 8 = 48$ and $48 \div 2 \div 2 = 12$ (equivalent to dividing by 4)		M1A1
	Ignore references to perimeter or units if it is clear they are working out area		

Question	Answer	Mark	Comments
2	Alternative method 1		
	8×2 or 16	M1	implied by $8 : 16$
	their $16 + 8$ or 24	M1dep	8×3
	48	A1	
	Alternative method 2		
	$(1 + 2 = 3)$ $3 + 3$ or 6	M1	
	their 6×8	M1dep	their 6 must be from $3 + 3$
	48	A1	
	Additional Guidance		
	Beware 24 coming from incorrect working eg Misread of 8 girls who do not sing in the show, leading to answer of 24		M1M1A0

3	$\frac{5}{9} \times 72$ or 8×5 or $360 \div 9$	M1	oe eg multiples of 8 listed and 5 th one chosen with maximum one error
	40	A1	SC1 32
	Additional Guidance		
	$\frac{40}{72}$		M1A0
	40 out of 72		M1A1

Question	Answer	Mark	Comments
4	$3 + 7$ or 10	M1	implied by 10 symbols or 6.2
	$62 \div \text{their } 10 \times 3$ or 6.2×3 or 18.6 or $62 \div \text{their } 10 \times 7$ or 6.2×7 or 43.4	M1dep	oe full method to work out either number
	18.6 or $\frac{93}{5}$ or $18\frac{3}{5}$ and 43.4 or $\frac{217}{5}$ or $43\frac{2}{5}$	A1	oe decimals, fractions or mixed numbers either order
	Additional Guidance		
	18.6 and 43.4 in working, but truncated or rounded to 18 or 19 and 43 on the answer line	M1M1A1	
	$62 = 10x$	M1	
	$\frac{x}{62} = \frac{3}{10}$ or $\frac{y}{62} = \frac{7}{10}$	M1	

5	$\frac{17}{20}$	B2	B1 for $\frac{85}{100}$ oe fraction eg $\frac{850}{1000}$ B1 for their fraction correctly cancelled to simplest form
	Additional Guidance		
	On answer line $\frac{85}{100}$ and $\frac{17}{20}$ (either order) with or without an '='	B2	
	$\frac{17}{20} = \frac{4}{5}$	B1	
	If you only see $\frac{8.5}{10}$ or $\frac{42.5}{50}$ or $\frac{0.85}{1}$	B0	

Question	Answer	Mark	Comments
6	Alternative method 1		
	3×7 or 21 or $40 \div 2$ or 20	M1	oe
	21 and 20	A1	
	Alternative method 2 – works out and uses correct possible values for a , b , x and y		
	Substitute values into $9a + 3b$ that satisfy $3a + b = 7$ or substitute values into $3x + 4y$ that satisfy $6x + 8y = 40$	M1	eg $a = 2$ and $b = 1$ substituted into $9a + 3b$ or $x = 4$ and $y = 2$ substituted into $3x + 4y$
	21 and 20	A1	Correct evaluation of their expressions with correct values for the letters
	Additional Guidance		
	Beware 21 or 20 coming from wrong working		
	Accept either of 21 or 20 seen if there is also an explanation that the other value is one more or one less (as appropriate) than the calculated one	M1A1	
	Use the scheme that awards the better mark		
	$a = 3$ and $b = -2$ then $9 \times 3 + 3 \times -2$ or $x = 0$ and $y = 5$ then $3 \times 0 + 4 \times 5$	M1	

Question	Answer	Mark	Comments
7(a)	$\begin{pmatrix} 12 \\ 8 \end{pmatrix}$	B1	
	Additional Guidance		
	$4\begin{pmatrix} 3 \\ 2 \end{pmatrix}$ or $\begin{pmatrix} 12 \\ 8 \end{pmatrix}$ in working with answer $\begin{pmatrix} 3 \\ 2 \end{pmatrix}$		B0
	Ignore fraction lines		
7(b)	$\begin{pmatrix} 0 \\ -2 \end{pmatrix}$	B1	
8	Any two of $(-1, -4)$, $(0, -1)$, $(1, 2)$, $(2, 5)$ and $(3, 8)$ or other correct points	M1	may be seen in a table may be implied by points plotted
	At least two correct points plotted correctly or at least two of their points plotted correctly	M1	implied by correct line which does not have to extend from $(-1, -4)$ to $(3, 8)$ $\pm \frac{1}{2}$ small square
	Straight, ruled line from $(-1, -4)$ to $(3, 8)$	A1	$\pm \frac{1}{2}$ small square ignore line beyond $(-1, -4)$ and $(3, 8)$
	Additional Guidance		
	Ignore extra points listed or plotted		
	M marks can be scored even if wrong line drawn		
	M marks are independent, the second mark can be awarded for correct plotting of two of their points		

Question	Answer	Mark	Comments
9	Any correct product of 36 using a prime factor	M1	2 and 18 2 and 2 and 9 3 and 12 3 and 3 and 4 2 and 3 and 6 May be on a factor tree or repeated division
	2 and 2 and 3 and 3	A1	oe May be on a factor tree or repeated division
	$2^2 \times 3^2$ or $3^2 \times 2^2$	A1	
	Additional Guidance		
	Allow any number of 1s included as factors for up to M1A1 only		
	$1 \times 2^2 \times 3^2$		M1A1A0
	$2^2, 3^2$		M1A1A1
	$2 + 2 + 3 + 3$		M1A1A0
	$2^2 + 3^2$		M1A1A0
	$2^2 3^2$ or $2^2, 3^2$		M1A1A0
	$2 \times 2 \times 3 \times 3$ and $2^2 \times 3^2$ on answer line but $2 \times 2 \times 3 \times 3 = 2^2 \times 3^2$ on answer line		M1A1A0 M1A1A1
	$2^2 \times 3^2 = 6^4$		M1A1A0
	6×6 with no prime factorisation		M0A0A0

Question	Answer	Mark	Comments
10	$\pm 6x$ or ± 3 or $8x - 2x = 10 - 7$ or $7 - 10 = 2x - 8x$	M1	oe terms in x or constant terms collected
	$6x = 3$ or $-6x = -3$	A1	oe implied by correct answer
	0.5 or $\frac{1}{2}$	A1ft	oe eg $\frac{3}{6}$ ft any equation of form $6x = a$ or $-6x = a$ or $bx = 3$ or $bx = -3$
	Additional Guidance		
	$\frac{-3}{-6}$		M1A1A0
	Trial and Improvement scores 0 or 3		

Question	Answer	Mark	Comments
11	Alternative method 1		
	$40 \div 4$ or 10 or 30	M1	Accept evidence on diagram
	$32 - \text{their } 10$ or 22	M1dep	Accept evidence on diagram
	$3 \times \text{their } 10 + \text{their } 22$	M1dep	dep on M2
	52	A1	
	Alternative method 2		
	$40 \div 4$ or 10 or 30	M1	Accept evidence on diagram
	$2 \times \text{their } 10$ or 20	M1dep	
	$32 + 40 - \text{their } 20$	M1dep	dep on M2
	52	A1	
	Additional Guidance		
	The two top sides on the triangle given values adding to 22 can be accepted as evidence of 22		
	Beware of appearance of 20 for reasons that are not worth the second mark eg 10, 20, 30, 40		M1 earned at that point
	Beware - wrong working can lead to the appearance of 52 (after rounding)		

Question	Answer	Mark	Comments
12	Alternative method 1		
	$88 \div (7 + 4)$ or $88 \div 11$ or 8	M1	oe $11 \times 8 = 88$
	their 8×7 and their 8×4 or their 8×7 and $88 -$ their value or their 8×4 and $88 -$ their value or 56 and 32 or their $8 \times (7 - 4)$ or their 8×3	M1dep	oe eg $8 \times 7 = 63$ and $88 - 63$ eg $8 \times 4 = 30$ and $88 - 30$
	24	A1	
	Alternative method 2		
	One correctly evaluated trial for two numbers, other than 7 and 4, in the ratio 7 : 4	M1	eg $70 + 40 = 110$
	56 and 32	M1dep	eg $56 + 32 = 88$
	24	A1	
	Alternative method 3 using $x : y = 7 : 4$ (correct)		
	$4x = 7y$ and $4x + 4y = 352$	$4x = 7y$ and $7x + 7y = 616$	M1 oe forming equation from ratio and equating coefficients
	$11y = 352$ or $y = 32$	$11x = 616$ or $x = 56$	M1dep oe equation in one variable
	24	A1	

Question	Answer	Mark	Comments
13	53 – 11 or 42 or 33×3 or 99 or 11×2 or $33 - 11$ or 22	M1	
	their $42 \div 3$ or 14 or their $99 - 53 - \text{their } 22$ or $(\text{their } 22 \times 3) - \text{their } 42$ or 24	M1dep	oe eg build up - allow one error
	$33 - 11 - \text{their } 14$ or their $24 \div 3$	M1dep	dep on M1M1
	8	A1	
	Additional Guidance		
	$3 \times 14 + 11 = 53$		M2

Question	Answer	Mark	Comments
14	It should be a circle, (not a square) or The corners are too far away	B1	oe eg accept circle constructed inside square, touching at midpoints of square to within 2mm
	Additional Guidance		
	A correct diagram takes precedence over statements, otherwise ignore diagram		
	Any distances if quoted, eg to corners, should be accurate to within 2mm		
	Ignore any reference to the top point P		
	The corners are more than 3 (km or cm) away from the point	B1	
	Some points are more than 3 (km or cm) away	B1	
	It isn't 3 (km or cm) to the corners	B1	
	Each corner is [4.1, 4.5] (km or cm) from P (values represent tolerance)	B1	
	Each corner is more than 4 away	B1	
	It should be a circle	B1	
	Each point is 4.2 km from P (not true)	B0	
	The corners of the square are 4 km (out of tolerance)	B0	
	The corners of the square are 4 km while the rest are 3 km	B0	
	Each corner will be more than 1 km away	B0	
	She's measured 3 cm from P without checking the corners	B0	
	It is not supposed to be this shape (but what should it be?)	B0	
	She has measured 4.3 km not 3 (not stated corners)	B0	
	She hasn't shown all the points that represent 3 km	B0	
	She hasn't plotted where all the 3 km points are	B0	
	It shouldn't be a square	B0	

Question	Answer	Mark	Comments
15	$\frac{64}{100} \times (30 + 20)$	M1	oe eg 0.64×50 or $64 \div 2$ build up method must be complete
	32	A1	
	14 (out of 20)	A1ft	ft their 32 – 18 with M1A0 scored their 32 must be greater than 18 SC1 12.8 (or 13 after 12.8 is seen)
	Additional Guidance		
	$\frac{14}{20}$ or 70%		M1A1A0
	14 = 70% on answer line		M1A1A1
	Answer 32 or $\frac{32}{50}$		M1A1A0
	64% $\times$ 50 with no further work		M0
	$\frac{64}{100} \times 50 = 30$ Answer 12		M1A0A1ft
	<u>Example of complete build-up</u> (for 64% of 50) 10% = 5 (no working but correct) 6 $\times$ 5 = 30 (correct with working) 1% = 0.5 (no working but correct) 4 $\times$ 0.5 = 0.20 (incorrect but working shown so still on for M1) = 30.20 (implied correct addition) then 30.20 – 18 = 12.20 Answer 12.20 (condone decimal value for ft)		M1A0A1ft
	<u>Example of incomplete build-up</u> (for 64% of 50) 50% = 25 (no working but correct) 10% = 5 (no working but correct) 2% = 2 (incorrect and no working shown M0) (A0ft cannot award ft when M1 not awarded)		M0A0A0

Question	Answer	Mark	Comments
16	9.7×10^{-4}	B1	
	Additional Guidance		
	Condone $9.7 \cdot 10^{-4}$ or $9.7 \cdot 10^{-4}$		B1
	Ignore zeroes before the '9' eg 00009.7×10^{-4}		B1
	$9.7 \times 10^{4-}$		B0

17	Alternative method 1: using different time periods		
	$450 \div 30$ or 15 or $250 \div 10$ or 25	M1	oe for any section of the basic rate or the overtime rate eg $\frac{450 - 150}{30 - 10}$
	15 and 25	A1	implied by any ratio equivalent to 3 : 5 do not allow as a ratio in the wrong order eg 25 : 15
	3 : 5 or $\frac{3}{5} : 1$ or $1 : \frac{5}{3}$	B1ft	oe fully simplified ft full simplification of their two values
	Alternative method 2: using equal time periods		
	Four correct readings from equal time periods of at least 5 hours from the two sections of the graph	M1	eg at 5 and 10 hours and at 35 and 40 hours if a reading from 30 is used, there may only be 3 readings a reading of 0 from 0 may be implied
	15 and 25 or correct totals for their equal time periods	A1	eg 10 hours = 150 and 10 hours = 250 implied by any ratio equivalent to 3 : 5 must not be seen as a ratio in the wrong order eg 250 : 150
	3 : 5 or $\frac{3}{5} : 1$ or $1 : \frac{5}{3}$	B1ft	oe fully simplified ft full simplification of their two values

Additional Guidance for this question is on the next page

17	Additional Guidance
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cont	In alt 2, only three readings are needed if a reading from 30 hours is included in both time periods or a reading of 0 is used eg readings of 300 from 20, 450 from 30 and 700 from 40	M1
	Readings from 10, 20, 30 and 40 should be 150, 300, 450 and 700 For readings from other numbers of hours not giving a multiple of £10 allow the multiple of 10 above or below the reading or any value between, which can then be used to score all three marks eg allow [220, 230] for a reading at 15 hours eg alt 1 readings of 70 at 5 hours, 380 at 25 hours, 450 at 30 hours and 700 at 40 hours, followed by hourly rates of 15.50 and 25 and an answer of 31 : 50 eg alt 2 readings of 370 at 25 hours, 450 at 30 hours, 580 at 35 hours and 700 at 40 hours, followed by totals of 80 and 120 or hourly rates of 16 and 24 and an answer of 2 : 3	M1A1B1ft M1A1B1ft
	For $1\frac{2}{3}$ allow 1.67 or better with correct rounding	
	450 : 250 = 45 : 25 does not get the mark for 25, but gets the final mark if simplified to 9 : 5	
	Ignore units throughout eg answer £3 : £5	M1A1B1
	15 : 25	M1A1B0
	25 : 15 or 25 : 10 not simplified	M1A0B0
	25 : 15 with answer 5 : 3 or 25 : 10 with answer 5 : 2	M1A0B1ft
	Answer 5 : 3 without working implies	M1A0B1ft
	15 : 17.5	M1A0B0
	15 : 17.5 followed by 6 : 7	M1A0B1ft
	20 : 25	M1A0B0
	20 : 25 followed by 4 : 5	M1A0B1ft
	3 : 5 in working with answer 1.5 : 2.5	M1A1B0
	30 : 10 = 3 : 1	M0A0B1ft

Question	Answer	Mark	Comments
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18	Plots the points (1, 60), (2, 30), (3, 20) and (4, 15)	M1	$\pm \frac{1}{2}$ small square
	Correct smooth curve through correct four points	A1	$\pm \frac{1}{2}$ small square
	Additional Guidance		
	Ignore any calculations and mark the graph only		
	Points cannot be implied by a bar chart or vertical line graph, but condone crosses at the top of a vertical line graph for M1 and the correct curve superimposed for M1A1		
	For M1, ignore the curve outside the domain $1 \leq t \leq 4$ For A1, whether or not the curve extends outside the domain $1 \leq t \leq 4$ it must not have a positive gradient at any point		
	If there is no curve, for M1 there must be no other points with x -coordinate 1, 2, 3 or 4		
	The curve should be a single line with no feathering		
	Unless it affects the shape of the curve (in which case A1 cannot be awarded), ignore incorrect evaluations of $60 \div$ a non-integer value eg $60 \div 1.5 = \dots$		