



GCSE Mathematics

Grades 2-3 Resource Non-Calc Test 2

Mark scheme

8300 Grades 2-3 Resource Non-Calc Test 2

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		
	$3x = 19 + 8$ or $3x = 27$ or $(19 + 8) \div 3$ or $\frac{27}{3}$	M1	accept in 'flow chart' eg $(x \rightarrow) \times 3 \rightarrow -8 \rightarrow 19$ and $\leftarrow \div 3 \leftarrow +8 \leftarrow 19$ enough for M1
	9	A1	
	Alternative method 2		
	$x - \frac{8}{3} = \frac{19}{3}$	M1	
	9	A1	
	Additional Guidance		
	$3 \times 9 - 8 (= 19)$		M1A0
2(a)	$46 \div 2$ or 23 or $4x = 46$	M1	oe
	their $23 \div 2$ or $46 \div 2 \div 2$ or $46 \div 4$	M1dep	oe may be seen as a fraction eg $\frac{23}{2}$ or $11\frac{1}{2}$ or $\frac{46}{4}$ or $11\frac{2}{4}$
	11.5	A1	SC2 5.75 or 11 remainder 1
	Additional Guidance		
	$46 \div 2 = 25, (25 \div 2 =) 12.5$		M1M1A0
	$46 \div 2 = 24$, followed by 11		M1M0A0
	11.5 in working, different answer on answer line (do not ignore further work)		M1M1A0

Question	Answer	Mark	Comments
2(b)	Alternative method 1		
	$34 - k$ or $34 - 10$ or 24	M1	oe implied by $34 - 2k$ or $34 - 3k$
	$3k = 34 - 10$ or $3k = \text{their } 24$ or $\frac{34 - 10}{3}$ or $\frac{\text{their } 24}{3}$	M1dep	oe
	8	A1	SC2 -8 or all terms seen $34, 26, 18, 10$ SC1 6
	Alternative method 2		
	$10 + k$ or $34 - 10$ or 24	M1	oe implied by $10 + 2k$ or $10 + 3k$
	$10 + 3k = 34$ or $3k = \text{their } 24$ or $\frac{34 - 10}{3}$ or $\frac{\text{their } 24}{3}$	M1dep	oe
	8	A1	SC2 -8 or all terms seen $34, 26, 18, 10$ SC1 6
	Alternative method 3		
	One correct trial	M1	a correct trial is either a subtraction of the same value, exactly three times, from 34 and evaluated correctly or addition of the same value, exactly three times, from 10 and evaluated correctly
	Two or more correct trials	M1dep	
	8	A1	SC2 -8 or all terms seen $34, 26, 18, 10$ SC1 6
	Additional Guidance		
	Accept any letter in place of k		

Question	Answer	Mark	Comments
3	$14\,000 \times 0.2$ or $14\,000 \div 10 \times 2$ or (10% =) 1400 or (1% =) 140	M1	oe eg $14\,000 \div 5$ $\frac{20}{100} \times 14\,000$
	2800	A1	oe eg 2800.00
	Additional Guidance		
	2800 followed by 14 000 – 2800 (implied by 11 200)		M1A0
	$14\,000 \div 10 = 4000$ followed by $4000 \times 2 = 6000$ (fully correct method)		M1A0
	$14\,000 \div 10 = 4000$ followed by 20% = 8000 (method not shown for 20% but it is correct for 2 × their 10%)		M1A0
	$14\,000 \div 10 = 4000$ followed by 20% = 6000 (method not shown for 20%)		M0A0
	10% = 140, $140 \times 2 = 280$ (method not shown for 10%)		M0A0
	$14 \div 5$ or 2.8 (without place value adjustment)		M0A0
4	7 cm by 3 cm rectangle drawn	B1	
	Additional Guidance		
	Mark intention		
	Allow a 7 cm by 3 cm rectangle drawn that does not use the given side		

Question	Answer	Mark	Comments
5	$180 \div (1 + 9)$ or 18 or 162	M1	
	18 and 162	A1	
	Additional Guidance		
	162 and 18		M1A0
	Build-up method will score 2 or 0 eg 1 : 9 2 : 18 does not score M1 for 18		
6	20	B1	allow $P = 20$

Question	Answer	Mark	Comments
7	Any correct conversion using values given $800 \div 1000$ or 0.8 or 2.1×1000 or 2100 or 1.9×1000 or 1900 or $2.7 (\times 1000)$ or 2700 or 0.2×1000 or 200	M1	oe eg 0.800 may be seen in 2nd M1 2.7 or 4.8 or 2.9 implies 0.8 4800 implies 2100 and 1900 2900 implies 2100
	1.9 + their 0.8 – 2.1 or their 1900 + 800 – their 2100 or their 0.8 – (2.1 – 1.9) or $800 - (\text{their } 2100 - \text{their } 1900)$ or 600	M1	oe allow their conversions allow mixed units eg $1.9 + 800 - 2.1$
	0.6	A1	
	Additional Guidance		
	Check diagram		
	600 (implies 2100 and 1900)		M1M1
	Accept additional zeroes in the answer eg 0.600 or 00.6		M1M1A1
	No correct unit changes or no changes attempted can score M0M1A0 but calculation must be seen eg $190 + 800 - 210 = 780$		M0M1A0
	Up to M2 may be awarded for correct work, with no or incorrect answer, even if seen amongst multiple attempts		

Question	Answer	Mark	Comments
8(a)	$\frac{17}{5}$	B1	oe improper fraction
	Additional Guidance		
	Ignore attempts to simplify after correct answer seen		
8(b)	$\frac{19}{100}$	B1	oe fraction
	Additional Guidance		
	Ignore attempts to simplify after correct answer seen		
9	$24 \times \frac{3}{4}$ or $24 \div 4 (\times 3)$ or $6 (\times 3)$ or 18 or $18 : 6$	M1	oe
	$30 : 6$	A1	
	$5 : 1$	B1ft	ft their ratio written in simplest form
	Additional Guidance		
	$15 : 3$ or $10 : 2$		M1A1B0
	answer $1 : 5$ answer $6 : 30$		M1A0B1ft M1A0B0ft
	$18 : 24$ then $3 : 4$		M1A0B1ft

Question	Answer	Mark	Comments
10	$80 \times \frac{1}{10} (\times 9) \text{ or } 8 \text{ or } 72$	M1	oe
	their $72 \times \frac{1}{3} (\times 2) \text{ or } 24 \text{ or } 48$	M1dep	oe
	$80 - \text{their } 48 \text{ or their } 24 + \text{their } 8$ or 32 or $\frac{32}{80}$	M1dep	oe dep on M2
	$\frac{2}{5}$	A1	SC3 $\frac{3}{10}$
	Additional Guidance		
	SC3 is for omitting the initial $\frac{1}{10}$		
11	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
12(a)	450 in Drink coffee Yes	B1	
	50 in Drink coffee No	B1ft	ft 500 – their 450
	90 in At least three cups Yes	B1ft	ft their 450 ÷ 5
	360 in At least three cups No	B1ft	ft their 450 – their 90
	Additional Guidance		
	for 90 ft , their 450 ÷ 5 must be truncated or rounded up to the nearest whole number		
	for 360 ft, their 450 – their 90 must give a positive integer		
	Accept unambiguous values elsewhere but diagram values take precedence		
	Correct relative frequencies seen, withhold first B1 that would have been awarded. eg $\frac{400}{500}, \frac{100}{500}, \frac{80}{400}, \frac{320}{400}$ eg $\frac{400}{500}, \frac{100}{500}, \frac{80}{500}, \frac{320}{500}$		B0 B0ft B1ft B1ft B0 B0ft B0ft B0ft
	Do not accept probabilities eg $\frac{9}{10}, \frac{1}{10}, \frac{4}{5}, \frac{1}{5}$ eg 0.9, 0.1, 0.8, 0.2		B0 B0

Question	Answer	Mark	Comments
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12(b)	Alternative method 1		
	$\frac{\text{their } 90}{500}$ (or partially simplified)	B1ft	oe eg decimal ft or correct
	$\frac{9}{50}$	B1ft	ft their unsimplified fraction fully simplified $\frac{9}{50}$ scores B1B1
	Alternative method 2		
	$\frac{9}{10} \times \frac{1}{5}$	M1	oe eg 0.9×0.2 or 0.18
	$\frac{9}{50}$	A1	
	Additional Guidance		
	$\frac{90}{500} = \frac{18}{100}$		B1B0
	$\frac{80}{500} = \frac{4}{25}$ (with 80 in part(a) then ft)		B1ftB1ft
	$\frac{80}{500} = \frac{4}{25}$ (with 80 not in part (a) so not ft but then simplest form correct)		B0B1ft
	$\frac{80}{500} = \frac{8}{50}$ (with 80 not in part (a) so not ft and simplest form not correct)		B0B0
	$\frac{45}{250}$		B1B0
	80 in (a), $\frac{8}{50}$ here		B1B0
	$\frac{90}{400} = \frac{9}{40}$		B0B1ft
	$\frac{500}{90} = \frac{50}{9}$		B0B1ft
	Do not accept 18% for first mark		

Question	Answer	Mark	Comments
13	$ADC = 110$ or $BAD = 180 - 110$ or $BAD = 70$ or $BCD = 180 - 110$ or $BCD = 70$ or any indication that angle $EAD = \text{angle } EDA$ or any indication that angle $BCD = \text{angle } ADE$	M1	may be seen on diagram eg both written as x or both having the same value
	$EDA = 180 - 110$ or $EDA = 70$ or $EAD = 180 - 110$ or $EAD = 70$	M1dep	may be seen on diagram
	40	A1	
	Additional Guidance		
	Angle values must be identified with the correct angle, either by notation or use of the diagram Notation such as $D = 110$ or $C = 70$ is not acceptable (although marks may still be awarded for correct position of angles on diagram)		
	Work on the diagram can score up to M2		
	Subject to the previous comment, award the higher mark for work seen on diagram and work seen in working space		
	Ignore incorrect angles when awarding up to M2, but any incorrect work cannot score M2A1		
	40 marked as angle AED on diagram but :- 180 on answer line or no sign of 40 as final answer in working		M2A0

Question	Answer	Mark	Comments																									
14	n = an odd number and p = a prime number such that $n + p$ is a square number	B1	eg $n = 1$ and $p = 3$ $n = 9$ and $p = 7$																									
	Additional Guidance																											
	Some of the early correct pairs are :- <table><tr><th>n</th><th>p</th></tr><tr><td>1</td><td>3</td></tr><tr><td>3</td><td>13</td></tr><tr><td>5</td><td>11</td></tr><tr><td>7</td><td>2 or 29</td></tr><tr><td>9</td><td>7</td></tr><tr><td>11</td><td>5</td></tr><tr><td>13</td><td>3 or 23</td></tr><tr><td>17</td><td>19</td></tr><tr><td>19</td><td>17</td></tr><tr><td>23</td><td>2</td></tr><tr><td>25</td><td>11</td></tr><tr><td>31</td><td>5</td></tr></table>		n	p	1	3	3	13	5	11	7	2 or 29	9	7	11	5	13	3 or 23	17	19	19	17	23	2	25	11	31	5
n	p																											
1	3																											
3	13																											
5	11																											
7	2 or 29																											
9	7																											
11	5																											
13	3 or 23																											
17	19																											
19	17																											
23	2																											
25	11																											
31	5																											

Question	Answer	Mark	Comments
15	$\frac{7}{3}$	M1	oe improper fraction
	$\times \frac{5}{4}$ or $\times 1.25$ or 7×5 and 3×4 or $\frac{7 \times 5}{3 \times 5} \div \frac{4 \times 3}{3 \times 5}$ or $\frac{35}{15} \div \frac{12}{15}$	M1	oe if seen in a grid, must be selected
	$\frac{35}{12}$	A1	oe improper fraction
	$2\frac{11}{12}$	A1ft	oe mixed number ft their improper fraction correctly converted to a mixed number if at least M1 awarded
	Additional Guidance		
	Ignore attempts to simplify after mixed number seen		
	$\frac{8}{3} \times \frac{5}{4} = \frac{40}{12}$, answer $3\frac{4}{12}$		M0M1A0A1ft

Question	Answer	Mark	Comments
16	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