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# GCSE Mathematics

Paper 1 Foundation Tier

Mark scheme

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8300  
November 2017

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Version: 1.0 Final

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.

Further copies of this mark scheme are available from [aqa.org.uk](http://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.

<b>M</b>	Method marks are awarded for a correct method which could lead to a correct answer.
<b>A</b>	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>B</b>	Marks awarded independent of method.
<b>ft</b>	Follow through marks. Marks awarded for correct working following a mistake in an earlier step.
<b>SC</b>	Special case. Marks awarded for a common misinterpretation which has some mathematical worth.
<b>M dep</b>	A method mark dependent on a previous method mark being awarded.
<b>B dep</b>	A mark that can only be awarded if a previous independent mark has been awarded.
<b>oe</b>	Or equivalent. Accept answers that are equivalent. eg accept 0.5 as well as $\frac{1}{2}$
<b>[a, b]</b>	Accept values between a and b inclusive.
<b>[a, b)</b>	Accept values $a \leq \text{value} < b$
<b>3.14 ...</b>	Accept answers which begin 3.14 eg 3.14, 3.142, 3.1416
<b>Use of brackets</b>	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	0.6	B1	
	<b>Additional Guidance</b>		
2	75	B1	
	<b>Additional Guidance</b>		
3	Rhombus	B1	
	<b>Additional Guidance</b>		
4	-19	B1	
	<b>Additional Guidance</b>		
5a	17	B1	
	<b>Additional Guidance</b>		
5b	9	B1	
	<b>Additional Guidance</b>		

Question	Answer	Mark	Comments
5c	-2	B1	
	<b>Additional Guidance</b>		
6a	Division set up, with 8 and a remainder 3 seen in correct position or $830 \leq \text{answer} < 840$ but not 834	M1	$\begin{array}{r} 8 \\ 8 \overline{)91374} \end{array} \quad \text{or} \quad \begin{array}{r} 8 \\ 9 \ 1 \ 7 \ 4 \\ \underline{8 \ 8} \\ 3 \end{array}$
	834	A1	
	<b>Additional Guidance</b>		
	Build up method or chunking method must lead to $830 \leq \text{answer} < 840$ to score M1 or better		

Question	Answer	Mark	Comments
<b>6b</b>	$\frac{35}{42} (+) \frac{18}{42}$	M1	oe fractions with a correct common denominator and at least one correct numerator
	$\frac{53}{42}$	A1	oe improper fraction
	$1 \frac{11}{42}$	B1ft	oe mixed number ft for correct conversion of an improper fraction to a mixed number
	<b>Additional Guidance</b>		
	For B1ft the mixed number must not be an integer		
	Beware $5 + 3 = 53$		M0
	When attempts are made to cancel the fraction, full marks cannot be scored $\frac{53}{42} = \frac{9}{4} = 2 \frac{1}{4}$ (attempt to cancel occurs before conversion to mixed number) $\frac{53}{42} = 1 \frac{11}{42} = 1 \frac{1}{3}$ (attempt to cancel occurs after completely correct answer seen)		M1A1B0  M1A1B0
<b>7a</b>	4	B1	
	<b>Additional Guidance</b>		

Question	Answer	Mark	Comments	
7b	$3 + 6 + 6 + 9 + 4$ or 28	M1	at least four correct and intention to add	
	their $28 \div 4$	M1dep	oe	
	7	A1		
	<b>Additional Guidance</b>			
	Totals other than 28 must be evidenced for M1 or M2			
	$3 + 6 + 6 + 9 + 4 = 29$ , $29 \div 4$ , answer = 7			M1M1A0

8	17 (days)	B1	may be implied
	their $17 \times 8$ or 136 or their $17 \times 0.08$	M1	oe eg build up – must be fully correct method repeated addition can imply their number of days
	1.36	A1ft	ft their 17 accept 136p if £ sign deleted
	<b>Additional Guidance</b>		
	16 (days) and £1.28 18 (days) and £1.44		B0M1A1ft B0M1A1ft
	Answer only £1.28 Answer only £1.44		B0M0A0 B0M0A0
	Beware digits arising from incorrect work eg $18 \times 0.8 = 14.4(0)$		B0M0A0
	Condone £1.36p		B1M1A1



Question	Answer	Mark	Comments
9a	$\frac{3}{25}$ or 0.12 or 12%	B1	oe fraction, decimal or percentage
	<b>Additional Guidance</b>		
	Do not accept ratios		
	Ignore use of words eg 3 out of 25 = $\frac{3}{25}$ eg 3 in 25 (only)		B1  B0
	12		B0
	Ignore attempts to simplify $\frac{3}{25}$ eg $\frac{3}{25} = \frac{1}{8}$ (attempt to simplify) $\frac{3}{25} = 0.03$ (attempt to convert to a decimal) $\frac{3}{25} = 3 : 25$ (choice)		B1  B1  B0

Question	Answer	Mark	Comments
9b	E1, E3 and E3, E4 and C2, D2	B2	B1 for 1 pair correct and 0 incorrect or 2 pairs correct and 0 incorrect or 2 pairs correct and 1 incorrect or 3 pairs correct and 1 incorrect or E1, E3, (E3), E4, C2 and D2 listed, but not clearly in pairs and with no additional squares other than E2 listed
	<b>Additional Guidance</b>		
	Accept 1E for E1 etc		
	Ignore listing of E2 if included		
	Ignore any annotations on diagram		
If pairings seen in working, allow list without pairings on answer line			

Question	Answer	Mark	Comments										
10	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th data-bbox="347 365 491 443">Fraction</th> <th data-bbox="491 365 683 443">Percentage</th> </tr> </thead> <tbody> <tr> <td data-bbox="347 443 491 521"></td> <td data-bbox="491 443 683 521"></td> </tr> <tr> <td data-bbox="347 521 491 633"></td> <td data-bbox="491 521 683 633">30(%)</td> </tr> <tr> <td data-bbox="347 633 491 745"><math>\frac{43}{100}</math></td> <td data-bbox="491 633 683 745"></td> </tr> <tr> <td data-bbox="347 745 491 857"></td> <td data-bbox="491 745 683 857">250(%)</td> </tr> </tbody> </table>	Fraction	Percentage				30(%)	$\frac{43}{100}$			250(%)	B3	B1 for each correct answer
	Fraction	Percentage											
		30(%)											
$\frac{43}{100}$													
	250(%)												
<b>Additional Guidance</b>													
Do not accept fractions with non-integer numerator or denominator eg $\frac{4.3}{10}$ (unless it is an attempt to cancel after correct answer seen)			B0										
Ignore attempts to cancel $\frac{43}{100}$ once correct fraction seen													
11a	$\frac{2}{5}$	B1											
	<b>Additional Guidance</b>												
11b	$\frac{5}{9} \times 72$ or $8 \times 5$ or $360 \div 9$	M1	oe eg multiples of 8 listed and 5 <sup>th</sup> one chosen with maximum one error										
	40	A1	SC1 32										
	<b>Additional Guidance</b>												
	$\frac{40}{72}$			M1A0									
	40 out of 72			M1A1									

Question	Answer	Mark	Comments
12a	8	B1	
	<b>Additional Guidance</b>		
12b	2	B1	
	<b>Additional Guidance</b>		
13	$1 - 0.1 - 0.6$ or $1 - (0.1 + 0.6)$ or $1 - 0.7$	M1	oe
	0.3	A1	oe eg 30% or $\frac{3}{10}$
	<b>Additional Guidance</b>		
	$1 - 0.1 + 0.6 = 0.3$ (recovered)		M1A1
	$1 - 0.1 + 0.6 = 1.5$ (not recovered)		M0A0
	$0.6 \div 2 = 0.3$ (incorrect method)		M0A0
Embedded, correct answer, eg $0.3 + 0.1 + 0.6 = 1$			M1A0
$\frac{0.3}{1}$ unless 0.3 already seen			M1A0

Question	Answer	Mark	Comments																
14	Identifies or plots any two correct points	M1	points with integer values are <table border="1" style="margin-left: 20px;"> <tr> <td>x</td><td>-3</td><td>-2</td><td>-1</td><td>0</td><td>1</td><td>2</td><td>3</td></tr> <tr> <td>y</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td><td>-1</td></tr> </table> may be in a list ignore incorrect plots	x	-3	-2	-1	0	1	2	3	y	5	4	3	2	1	0	-1
	x	-3	-2	-1	0	1	2	3											
	y	5	4	3	2	1	0	-1											
	Correct straight ruled line from $(-3, 5)$ to $(3, -1)$	A1	ignore incorrect plots if correct line drawn																
	<b>Additional Guidance</b>																		
Correct line, but not extending from $(-3, 5)$ to $(3, -1)$		M1A0																	
Two lines, one correct and one incorrect		M1A0																	

15	<b>Alternative method 1</b>		
	Method for finding a percentage beyond 5% or 1%	M1	eg $6.2 \div 2$ or 3.1 (0.5%) $31 + 6.2$ or 37.2 (6%) $31 \times 2$ or 62 (10%) $6.2 + 6.2$ or 12.4 (2%) $31 \times 3$ or 93 (15%) $6.2 \times 3$ or 18.6 (3%)
	Fully correct method that would lead to the correct answer	M1dep	eg their 93 – their 12.4 $(\text{their } 3.1 + \text{their } 37.2) \times 2$ their 62 + their 18.6
	80.6	A1	

**Alternative method 2 is on the next page**

Question	Answer	Mark	Comments
<b>15 cont</b>	<b>Alternative method 2</b>		
	6.2 × 13 or 62 × 13	M1	may be implied
	10 × 6.2 + 3 × 6.2 or 62 + 18.6 or 6 × 13 + 0.2 × 13 or 78 + 2.6 or digits 806 other than 80.6	M1dep	<u>From traditional method</u> their 186 + their 620 or their 26 + their 780 at least one correct and placeholder of zero correct or implied <u>From grid method</u> their 600 + their 20 + their 180 + their 6 at least three correct <u>From Chinese / Napier's bones method</u> at least three values correct from (0)/6, (0)/2, (0)/6 and 1/8 and then appropriate diagonal adding
	80.6	A1	
	<b>Additional Guidance</b>		
	In all cases, accept repeated addition for multiplication eg accept 31 + 31 for 2 × 31		
	Ignore a % sign after 80.6		

Question	Answer	Mark	Comments																				
16	$\frac{1}{5}$ in top centre cell 1 in centre cell $\frac{1}{10}$ in bottom right cell	B3	oe decimals B2 any two correct or the product of the centre column and the diagonal from top left to bottom right are both 1 B1 any one correct or the product of the centre column or the diagonal from top left to bottom right is 1																				
	<b>Additional Guidance</b>																						
	A response can be awarded B2 if it meets both ways of scoring B1 Eg one correct value <b>and</b> the product of the centre column is 1 (see example below right)																						
	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td>10</td><td><math>\frac{1}{15}</math></td><td><math>\frac{1}{2}</math></td></tr> <tr><td><math>\frac{1}{20}</math></td><td>3</td><td>20</td></tr> <tr><td>2</td><td>5</td><td><math>\frac{1}{30}</math></td></tr> </table>	10	$\frac{1}{15}$	$\frac{1}{2}$	$\frac{1}{20}$	3	20	2	5	$\frac{1}{30}$	or Diagonal and centre column each have product 1	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td>10</td><td><math>\frac{1}{50}</math></td><td><math>\frac{1}{2}</math></td></tr> <tr><td><math>\frac{1}{20}</math></td><td>10</td><td>20</td></tr> <tr><td>2</td><td>5</td><td><math>\frac{1}{10}</math></td></tr> </table>	10	$\frac{1}{50}$	$\frac{1}{2}$	$\frac{1}{20}$	10	20	2	5	$\frac{1}{10}$	Bottom right cell correct and centre column = 1	B2
	10	$\frac{1}{15}$	$\frac{1}{2}$																				
$\frac{1}{20}$	3	20																					
2	5	$\frac{1}{30}$																					
10	$\frac{1}{50}$	$\frac{1}{2}$																					
$\frac{1}{20}$	10	20																					
2	5	$\frac{1}{10}$																					
Centre column has product 1 <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td>10</td><td><math>\frac{1}{50}</math></td><td><math>\frac{1}{2}</math></td></tr> <tr><td><math>\frac{1}{20}</math></td><td>10</td><td>20</td></tr> <tr><td>2</td><td>5</td><td><math>\frac{2}{10}</math></td></tr> </table>	10	$\frac{1}{50}$	$\frac{1}{2}$	$\frac{1}{20}$	10	20	2	5	$\frac{2}{10}$	or Diagonal has product 1 <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td>10</td><td><math>\frac{1}{20}</math></td><td><math>\frac{1}{2}</math></td></tr> <tr><td><math>\frac{1}{20}</math></td><td>8</td><td>20</td></tr> <tr><td>2</td><td>5</td><td><math>\frac{1}{80}</math></td></tr> </table>	10	$\frac{1}{20}$	$\frac{1}{2}$	$\frac{1}{20}$	8	20	2	5	$\frac{1}{80}$	B1			
10	$\frac{1}{50}$	$\frac{1}{2}$																					
$\frac{1}{20}$	10	20																					
2	5	$\frac{2}{10}$																					
10	$\frac{1}{20}$	$\frac{1}{2}$																					
$\frac{1}{20}$	8	20																					
2	5	$\frac{1}{80}$																					

Question	Answer	Mark	Comments	
17a	3 or 35 or 291 seen or $8 \times \text{their } 3 + 11$	M1		
	35 chosen	A1		
	<b>Additional Guidance</b>			
17b	Subtract 11 and divide by 8	B1	accept – or $\div$ for words subtract and divide but not / for divide	
	<b>Additional Guidance</b>			
	Do not accept use of algebra eg $(x - 11)/8$	B0		



Question	Answer	Mark	Comments
18	<b>Alternative method 1</b>		
	Angle $DAB = 70$	B1	may be on diagram
	Angle $ABC = 360 - \text{their } 70 - 90 - 120$ or Angle $ABC = 80$	M1	may be on diagram
	Valid reason	A1	eg $180 - 80 = 100$ $80 + 100 = 180$ angles on a straight line add to 180 $(360 - 80 - 80)/2 = 100$
	<b>Alternative method 2</b> working backwards from $x = 100$		
	Angle $ABC = 180 - 100$ or Angle $ABC = 80$	M1	may be on diagram
	Angle $DAB = 360 - \text{their } 80 - 90 - 120$ or Angle $DAB = 70$	M1dep	may be on diagram
	Valid reason	A1	eg opposite angles are equal vertically opposite angles (are equal) $180 - 70 = 110$ and $180 - 110 = 70$
	<b>Additional Guidance</b>		
Incorrect angles seen anywhere around A or B cannot score the A1			

Question	Answer	Mark	Comments	
19	Method for equating gallons to litres beyond 2 gallons = 9 litres	M1	eg $9 \div 2$ or 4.5 $17 \times 9$ or 153 $9 \times 2$ or 18 $9 \times 8$ or 72 $17 \div 2$ or 8.5	
	Fully correct method that would lead to the correct answer	M1dep	eg $9 \div 2 \times 17$ their $4.5 \times 17$ their $153 \div 2$ their $18 \times 4 +$ their 4.5 their $72 +$ their 4.5 their $8.5 \times 9$	
	76.5	A1		
	<b>Additional Guidance</b>			
	2 gallons = 9 litres 4 gallons = 18 litres 6 gallons = 36 litres (error with working not shown) 8 gallons = 45 litres $45 + 45 + 4.5 = 94.5$	M1M0A0		
2 gallons = 9 litres $9 + 9 = 18$ so 4 gallons = 18 litres $18 + 9 = 36$ so 6 gallons = 36 litres (method correct) so 8 gallons = 45 litres $45 + 45 + 4.5 = 94.5$	M1M1A0			

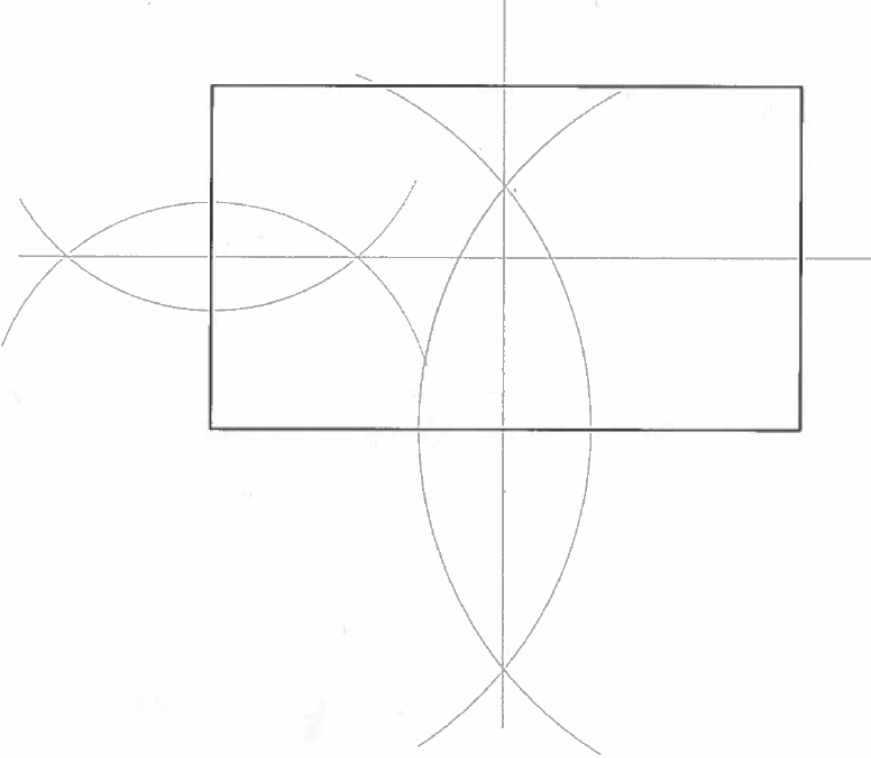
Question	Answer	Mark	Comments
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<b>20a</b>	$n =$ an odd number and $p =$ a prime number such that $n + p$ is a square number	B1	eg $n = 1$ and $p = 3$ $n = 9$ and $p = 7$																										
	<b>Additional Guidance</b>																												
	Some of the early correct pairs are :-		B1																										
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;"><math>n</math></th> <th style="text-align: left;"><math>p</math></th> </tr> </thead> <tbody> <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> </tbody> </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																												
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7	2 or 29																												
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13	3 or 23																												
17	19																												
19	17																												
23	2																												
25	11																												
31	5																												

<b>20b</b>	$n =$ an odd number and $p =$ a prime number such that $np$ is a square number	B1	eg $n = 3$ and $p = 3$ $n = 27$ and $p = 3$																		
	<b>Additional Guidance</b>																				
	Some of the early correct pairs are :-		B1																		
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;"><math>n</math></th> <th style="text-align: left;"><math>p</math></th> </tr> </thead> <tbody> <tr><td>3</td><td>3</td></tr> <tr><td>5</td><td>5</td></tr> <tr><td>7</td><td>7</td></tr> <tr><td>11</td><td>11</td></tr> <tr><td>13</td><td>13</td></tr> <tr><td>17</td><td>17</td></tr> <tr><td>23</td><td>23</td></tr> <tr><td>27</td><td>3</td></tr> </tbody> </table>	$n$	$p$	3	3	5	5	7	7	11	11	13	13	17	17	23	23	27	3		
$n$	$p$																				
3	3																				
5	5																				
7	7																				
11	11																				
13	13																				
17	17																				
23	23																				
27	3																				

Question	Answer	Mark	Comments
<b>21a</b>	The arcs should be drawn from C or from points the same distance from C or The lines are different lengths, so you can't go from the ends	B1	oe
	<b>Additional Guidance</b>		
	CB $\neq$ CD	B1	
	Not drawn an arc from C	B1	
	He put compass in wrong place. He should have started at C but he started at B and D	B1	
	Should be an arc on each line CB and CD	B0	
	Arcs in wrong place	B0	
	Arcs aren't equal	B0	
	His line isn't in the centre of B and D	B0	
	D has a longer line than B	B0	
	Arcs aren't the same radius	B0	
	Should be an arc from B to D	B0	
	Should be an arc from B to the line CD	B0	
Should be an intersection on CB and CD	B0		

Question	Answer	Mark	Comments
<b>21b</b>	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
	<b>Additional Guidance</b>		
	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
	One pair of equal, intersecting arcs from the vertices of one side of the rectangle	M1	tolerance $\pm 1$ mm
	Fully correct construction of line of symmetry with either two pairs of equal, intersecting arcs from the vertices of the same side of the rectangle or one pair of equal, intersecting arcs from the vertices of one side of the rectangle and the diagonals drawn	A1	tolerance $\pm 1$ mm  line of symmetry may be solid or dashed but must touch opposite sides of rectangle
<b>Additional Guidance</b>			
	Correct line with no appropriately constructed arcs		M0A0
21c			

Question	Answer	Mark	Comments	
22	<b>Alternative method 1</b>			
	$88 \div (7 + 4)$ or $88 \div 11$ or 8	M1	oe $11 \times 8 = 88$	
	their $8 \times 7$ and their $8 \times 4$ or their $8 \times 7$ and $88 -$ their value or their $8 \times 4$ and $88 -$ their value or 56 and 32 or their $8 \times (7 - 4)$ or their $8 \times 3$	M1dep	oe eg $8 \times 7 = 63$ and $88 - 63$ eg $8 \times 4 = 30$ and $88 - 30$	
	24	A1		
	<b>Alternative method 2</b>			
	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		
	<b>Alternative method 3</b> 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		

Alternative method 4 is on the next page

Question	Answer	Mark	Comments	
<b>22 cont</b>	<b>Alternative method 4</b> using $x : y = 4 : 7$ (incorrect)			
	$7x = 4y$ and $4x + 4y = 352$	$7x = 4y$ and $7x + 7y = 616$	M1	oe forming equation from ratio and equating coefficients
	$11x = 352$ or $x = 32$	$11y = 616$ or $y = 56$	M1dep	oe equation in one variable
	their answer		A0	
	<b>Alternative method 5</b> using $x : y = 7 : 4$ (correct)			
	$x = \frac{7}{4}y$ or $y = \frac{4}{7}x$ or $x = 88 - y$ or $y = 88 - x$		M1	oe making one variable the subject
	$\frac{7y}{4} + y = 88$ or $\frac{11}{4}y = 88$ or $x + \frac{4}{7}x = 88$ or $\frac{11}{7}x = 88$		M1dep	oe equation in one variable
	24		A1	
	<b>Alternative method 6</b> using $x : y = 4 : 7$ (incorrect)			
	$y = \frac{7}{4}x$ or $x = \frac{4}{7}y$ or $x = 88 - y$ or $y = 88 - x$		M1	oe making one variable the subject
	$\frac{7}{4}x + x = 88$ or $\frac{11}{4}x = 88$ or $y + \frac{4}{7}y = 88$ or $\frac{11}{7}y = 88$		M1dep	oe equation in one variable
	their answer		A0	
	<b>Additional Guidance</b>			
	–24, with no incorrect working, implies 56 and 32		M1M1A0	
$x = 32$ and $y = 56$		M1M1A0		



Question	Answer	Mark	Comments	
23	Valid criticism referring to the line from (0, 0) to (10, 1)	B1	eg there shouldn't be a curve need to be specific about the line shape, it is not sufficient to simply say it is wrong	
	Valid criticism referring to the line from (15, 1)	B1	oe eg he never goes 2 km from home	
	<b>Additional Guidance</b>			
	Criticisms can be in either order			
	A correct diagram takes precedence over statements, otherwise ignore diagram			
	<b>For first B1:</b>			
	The first part is curved			B1
	The curve should be a straight line			B1
	He has drawn a curve for constant speed			B1
	The line is curved which shows his speed was not consistent/constant			B1
	He's not going at a constant speed to the shop (correct referral to graph)			B1
	All lines should be straight			B1
	Constant speed should be a diagonal/straight line			B1
	The line shouldn't curve			B1
	The constant speed should be 			B1
	The curved line shows he decreased speed			B1
	It should be a straight line from 0 to 10			B1
It should be a straight line at the start			B1	
A distance-time graph shouldn't have curves			B0	

Continued on next page

<b>23 cont</b>	It should be a straight line ( 'It' seems to be referring to the whole graph)	B0
	The curved line shows he increased and decreased speed	B0
	He was walking at a range of speeds, so not consistent (referral to whole graph)	B0
	The constant speed is drawn incorrectly (how?)	B0
	The lines should be curved or straight, not both	B0
	The curve should be a line of best fit	B0
	It should be a straight line from 0 to 15 (it should be to 10)	B0
	The curve is wrong (how?)	B0
	<b>For 2nd B1:</b>	
	The line should go down at the end	B1
	He isn't walking home, he's walking further away	B1
	He has walked away from home when he hasn't	B1
	The line should go back to the bottom of the graph	B1
	The graph should return to zero	B1
	The last part should be decreasing (instead of increasing)	B1
	The line for him walking home should have negative gradient	B1
	The graph shows he didn't walk home	B1
	The line for him walking home should have negative correlation	B0
	The line for the journey home goes the wrong way	B0
	The graph does not show his journey home	B0
	His house is 2 km away from the shop	B0
	The line should be decreasing instead of increasing (which line?)	B0
	His home is 1 km from the shop not 2 km	B0

Question	Answer	Mark	Comments
24	<b>Alternative method 1</b>		
	Three whole numbers that each are less than 80 and have units digit 4 or States that each number must have units digit 4	M1	
	82	A1	
	<b>Alternative method 2</b>		
	Correctly evaluated trial for three whole numbers, none of which are a multiple of 10, and that, when rounded, total 70	M1	eg $33 + 33 + 13 = 79$
	82	A1	
	<b>Additional Guidance</b>		
	$39 + 33 + 13 = 85$ $(40 + 30 + 10 = 80)$		M0
	Beware 82 from incorrect values, eg $39 + 24 + 19 = 82$		M0A0
Ignore incorrectly evaluated trials that do not solely lead to the answer			
25	$n - 1$	B1	
	<b>Additional Guidance</b>		

Question	Answer	Mark	Comments
26(a)	$\frac{1}{2}(b + 2b)h$ or $3 \times \frac{1}{2}bh$	M1	oe
	$1.5bh$ or $\frac{3}{2}bh$ or $\frac{3bh}{2}$ or $1\frac{1}{2}bh$	A1	accept $hb$ for $bh$
	<b>Additional Guidance</b>		
	Correct expression with $\times$ , $\div$ or brackets		M1A0
	Condone units within expressions for M1 only		
	Condone the expression given within a formula eg $A = 1.5hb$		M1A1
	Condone correct expression stated and then equated to a value or with values substituted		M1A1
26(b)	$3b + 2s$ or $3b = 2s$ or $4s$	M1	oe
	$6b$	A1	oe eg $b + b + b + b + b + b$
	<b>Additional Guidance</b>		
	Condone the expression given within a formula eg $P = 6b$		M1A1

Question	Answer	Mark	Comments	
27	$\pi \times 6 \times 6$ or $36\pi$ or [113, 113.112] or $9 \times [3.14, 3.142]$ or [28.26, 28.3]	M1	oe accept [3.14, 3.142] for $\pi$	
	$9\pi$ or $9 \times \pi$ or $\pi 9$ or $\pi \times 9$	A1		
	<b>Additional Guidance</b>			
	36 $\pi$ followed by an incorrect method eg $36\pi \div 2 = 18\pi$ with answer 18 $\pi$			M1A0
	Answer of $9\pi$ from $\pi \times 3^2$			M0A0
	$9\pi$ and [28.26, 28.3] given on answer line			M1A0
	$\pi r^2$ stated but followed by 36 or 9			M0A0
28a	$1.25 \times 10^4$	B1	accept $10^4 \times 1.25$	
	<b>Additional Guidance</b>			
	$1.2 \times 10^4$ or $1.3 \times 10^4$		B0	
28b	0.034	B1	accept $\frac{34}{1000}$ (oe fraction)	
	<b>Additional Guidance</b>			
	If fraction given, ignore attempts to cancel			

Question	Answer	Mark	Comments	
29	$((\sqrt{3})^2 =) 3$ and $((\sqrt{2})^2 =) 2$ or $(\sqrt{6})^2$ or $\sqrt{6^2}$ or $\sqrt{36}$ or $\sqrt{9} \times \sqrt{4}$ or $\sqrt{9 \times 4}$	M1		
	6	A1		
	<b>Additional Guidance</b>			
	$3 \times 2 = 6$ with answer eg $\sqrt{6}$ or $6^4$			M0A0
	Condone $\sqrt{3} = 1.7$ , $1.7^2 = 3$ and $\sqrt{2} = 1.4$ , $1.4^2 = 2$ , otherwise $\sqrt{3}$ or $\sqrt{2}$ or $3^2$ or $2^2$ incorrectly evaluated does not score even if answer is 6 eg $\sqrt{3} = 1.5$ , $1.5^2 = 3$ , answer 6 $\sqrt{2} = 1$ , $1^2 = 2$ $3^2 = 6$ , $\sqrt{6} = 3$ $(\sqrt{6})^4$ $\sqrt{2} = 1$			M0A0 M0A0 M0 M0A0 M0

Question	Answer	Mark	Comments
<b>30</b>	<b>Alternative method 1</b>		
	$x + 2x + 2x + 10$ or $5x + 10$ or $x + 2x + 2x + 10 + 90$ or $5x + 100$	M1	oe
	$x + 2x + 2x + 10 = 360 - 90$ or $5x + 10 = 270$ or $x + 2x + 2x + 10 + 90 = 360$ or $5x + 100 = 360$ or $5x = 260$	M1dep	oe
	$(x =) 52$ or $2x = 104$ or $2x + 10 = 114$	A1	may be on diagram
	$\frac{114}{360}$ or $\frac{57}{180}$ or $\frac{38}{120}$ or $\frac{19}{60}$ or 0.31(6..) or 0.317 or 0.32 or 31(.6...) % or 31.7% or 32%	B1ft	ft $\frac{2 \times \text{their } 52 + 10}{360}$ or $\frac{\text{their angle for C}}{360}$

**Alternative method 2 is on the next page**

Question	Answer	Mark	Comments
<b>30 cont</b>	<b>Alternative method 2</b>		
	$\frac{90}{360} + \frac{x}{360} + \frac{2x}{360} + P(C) = 1$ or $\frac{90}{360} + \frac{x}{360} + \frac{2x}{360} + \frac{2x+10}{360}$ or $\frac{2x+10}{5x+100}$	M1	oe
	$\frac{90}{360} + \frac{x}{360} + \frac{2x}{360} + \frac{2x+10}{360} = 1$	M1dep	oe
	(x =) 52 or 2x = 104 or 2x + 10 = 114	A1	may be on diagram
	$\frac{114}{360}$ or $\frac{57}{180}$ or $\frac{38}{120}$ or $\frac{19}{60}$ or 0.31(6..) or 0.317 or 0.32 or 31(.6...) % or 31.7% or 32%	B1ft	ft $\frac{2 \times \text{their } 52 + 10}{360}$ or $\frac{\text{their angle for C}}{360}$
	<b>Additional Guidance</b>		
	Ignore incorrect simplification or conversion after $\frac{114}{360}$ oe	M1M1A1B1	
	$\frac{360 - 10 - 90}{5}$ oe	M1M1	
	$x + 2x + 2x + 10$ followed by $6x + 10 = 270$	M1M0	
	Do not accept decimal within fraction for final answer if correct fraction not seen		
The follow through is not available if A1 awarded			



Question	Answer	Mark	Comments
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<b>31(a)</b>	$(x - 10)(x + 10)$	B1	either order ignore fw
	<b>Additional Guidance</b>		
	$(x + 10)(x + -10)$		B1
	Condone missing bracket at end only $(x - 10)(x + 10)$ $(x - 10(x + 10))$		B1 B0
	$(x - 10)(x + 10)$ followed by attempt to solve, eg answer $x = 10, x = -10$		B1
	answer only $x = 10, x = -10$		B0

<b>31(b)</b>	$7x - 2x > 1 - 6$ or $5x > -5$ or $6 - 1 > 2x - 7x$ or $5 > -5x$ or $1 > -x$	M1	oe collecting terms
	$x > -1$ or $-1 < x$	A1	SC1 incorrect sign eg $x \geq -1$ or $x = -1$ or answer of $-1$
	<b>Additional Guidance</b>		
	Answer $x > \frac{-5}{5}$		M1A0
	Answer only $\frac{-5}{5}$		SC0
	$x > -1$ with $-1$ or $0, 1, 2, \dots$ as the answer		M1A0