

For **AQA**

# Mathematics

## Paper 3 (Calculator)

### Foundation Tier

#### Churchill Paper 3B – Marking Guide

Method marks (M) are awarded for a correct method which could lead to a correct answer

Accuracy marks (A) are awarded for a correct answer, having used a correct method, although this can be implied

(B) marks are awarded independent of method



Written by Shaun Armstrong

Only to be copied for use in a single school or college having purchased a licence

### Churchill Paper 3B Marking Guide – AQA Foundation Tier

1    -13.2    -6.8    6.8    13.2    B1    Total 1

---

2       A       B    C       D       B1    Total 1

---

3    (a)   0    4w    7w    10w    B1

      (b)    $2p^3$      $p^5$      $p^6$      $p^9$     B1    Total 2

---

4     $4 \times 2 = 8$  litres  
 $8 \times 1000 = 8000$  ml    She has 8000 ml of lemonade    B1  
 $30 \times 240 = 7200$  ml    She uses 7200 ml of lemonade    M1  
Amount left over =  $8000 - 7200 = 800$  ml    A1    Total 3

---

5    (a)    =  $7 + 6 + 5 = 18$     B1

      (b)    =  $10 - 5 = 5$     B1

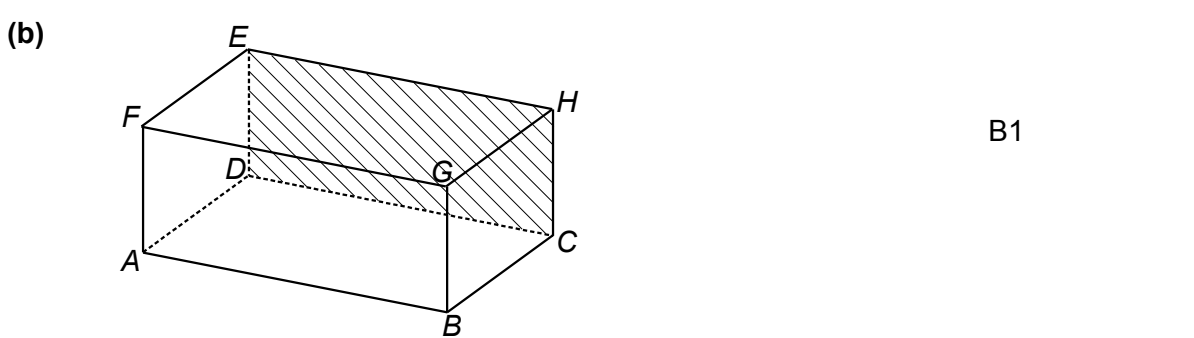
      (c)    Median =  $\frac{1}{2}(35 + 1)$ th = 18<sup>th</sup> value  
Adding frequencies:  $2 + 9 = 11$ ,  $11 + 6 = 17$ ,  $17 + 7 = 24$   
So median is 8    M1  
Total no. payments =  $2 \times 5 + 9 \times 6 + 6 \times 7 + 7 \times 8 + 6 \times 9 + 5 \times 10$   
                                  =  $10 + 54 + 42 + 56 + 54 + 50$   
                                  = 266  
Mean =  $266 \div 35 = 7.6$     M1  
Hence the mean is not higher than the median    A1    Total 5

---

6     $40 \div 5 = 8$  so there are 8 red counters    M1  
There are 2 portions of red counters  
1 portion =  $8 \div 2 = 4$   
There are 5 portions of green counters  
 $5 \times 4 = 20$  so there are 20 green counters    M1  
Number of yellow counters =  $40 - 8 - 20 = 12$     A1    Total 3

---

7    (a)    6    B1



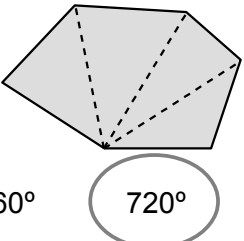
(c)    *BG* and *DE*    B1    Total 3

---

<b>8</b>	<p>10% of £12 = £1.20  £12 – £1.20 = £10.80  So any 10-packs should be bought in A</p> <p>To buy 20 bulbs, 2 of the 10-packs cost £21.60 in A</p> <p><math>3 \times £4.99 = £15 - 3p = £14.97</math>  <math>2 \times £6 = £12</math>  So best value is to get 3 of the 4-packs for £12 in B, otherwise use A</p> <p>To buy 20 bulbs, 3 from B and 2 from A costs <math>£12 + 2 \times £4.99</math>  <math>= £12 + £9.98</math>  <math>= £21.98</math></p> <p>Mixing, can buy one 10-pack from A and 3 of the 4-packs from B  Cost of 22 bulbs = £10.80 + £12 = £22.80</p> <p>Cheapest way is to buy 2 of the 10-packs from shop A for £21.60</p> <p><i>[Can miss out mixing, must at least imply consideration of 2 of 10-pack from each shop and finding cheapest way to buy 5 of 4-pack]</i></p>	<p>M1</p> <p>M1</p> <p>M1</p> <p>M1</p> <p>A1</p> <p>A1</p>	
			Total 6

<b>9</b>	<p>e.g. The width of the square is <math>(x + 8)</math> cm  The height of the square is <math>3x</math> cm  The sides of a square are all the same length  So <math>3x = x + 8</math>  <math>2x = 8</math>  <math>x = 4</math>  Side length of square = <math>3 \times 4 = 12</math>  Area of square = <math>12^2 = 144 \text{ cm}^2</math></p>	<p>M1</p> <p>M1</p> <p>A1</p>	Total 3
----------	---	-------------------------------	---------

<b>10</b>	<p><b>(a)</b> e.g. We only have information about how Omar and Phil's scores compare with how they did on the first test. This doesn't give us any information about their actual scores.</p> <p><b>(b)</b> Nancy: <math>44 - 40 = 4</math>  <math>\frac{4}{40} = \frac{1}{10} = 10\%</math>  Phil: <math>\frac{1}{8} = \frac{1}{8} \times 100\%</math>  <math>= 12.5\%</math>  Nancy's score increased by 10%  Omar's score increased by 11%  Phil's score increased by 12.5%  Phil had the biggest % increase</p>	<p>B1</p> <p>M1</p> <p>M1</p> <p>A1</p>	Total 4
-----------	---	---	---------

<b>11</b>	 <p>Can divide hexagon into 4 triangles  Sum of angles in triangle = <math>180^\circ</math>  <math>4 \times 180^\circ = 720^\circ</math></p>	<p>360°</p> <p>900°</p> <p>1440°</p>	<p>B1</p>	Total 1
-----------	---	--------------------------------------	-----------	---------

<b>12 (a)</b>	e.g.	$  \begin{array}{c}  70 \\  / \quad \backslash \\  7 \quad 10 \\  \quad / \quad \backslash \\  \quad 2 \quad 5  \end{array}  $	M1	
		$70 = 2 \times 5 \times 7$	A1	
<b>(b)</b>	e.g.	$  \begin{array}{c}  84 \\  / \quad \backslash \\  4 \quad 21 \\  / \quad \backslash \quad / \quad \backslash \\  2 \quad 2 \quad 3 \quad 7  \end{array}  $		
		$84 = 2^2 \times 3 \times 7$	M1	
		Common prime factors are 2 and 7		
		Common factors can have neither, one or both of these	M1	
		Common factors are 1, 2, 7, 14		
		So there are exactly 4 common factors	A1	Total 5

---

<b>13</b>	Adira:	Plumber cost = $30 \times 22.50 = \text{£}675$		
		Assistant cost = $40 \times 15.50 = \text{£}620$		M1
		Materials cost = $0.9 \times 860 = \text{£}774$		M1
		Total cost = $675 + 620 + 774 = \text{£}2069$		A1
	Ben:	Minimum cost = $60 \times 20 + 500 = \text{£}1700$		
		Maximum cost = $90 \times 20 + 700 = \text{£}2500$		B1
	e.g.	Pete should use Adira as her fixed price is less than the mid-point of the range of prices offered by Ben		B1
		<i>[There are other valid answers but they must be supported by calculations.]</i>		Total 5

---

<b>14</b>	$P = \frac{1}{6} \times \frac{1}{6} = \frac{1}{36}$			
	$\frac{1}{36}$ $\frac{1}{6}$ $\frac{1}{18}$ $\frac{1}{12}$		B1	Total 1

---

<b>15 (a)</b>	e.g.	You can cover most of the distance on main roads and motorways and drive faster on them		B1
<b>(b)</b>	10 mile journey will be at 30 mph	Speed = $\frac{\text{distance}}{\text{time}}$ so time = $\frac{\text{distance}}{\text{speed}}$		
		Time for 10 miles = $\frac{10}{30} = \frac{1}{3}$ hour = 20 minutes		M1
		20 mile journey will be at 40 mph		
		Time for 20 miles = $\frac{20}{40} = \frac{1}{2}$ hour = 30 minutes		
		It will take 10 minutes longer	A1	Total 3

---

<b>16</b>	<b>(a)</b> 5.5 m	B1	
	<b>(b)</b> $12.35 \leq A < 12.45$	B1	Total 2

---

<b>17</b>	<b>(a)</b> 3	B1	
	<b>(b)</b> $y = 3x + 5$	B1	
	<b>(c)</b> On the x-axis, $y = 0$ So $0 = 3x - 2$ $2 = 3x$ $\frac{2}{3} = x$ It crosses at $(\frac{2}{3}, 0)$	M1 A1	Total 4

---

<b>18</b>	Total weight of cake before = $750 + 600 = 1350$ g Total weight eaten = $1350 \div 2 = 675$ g Weight of chocolate cake eaten = $0.54 \times 750 = 405$ g Weight of carrot cake eaten = $675 - 405 = 270$ g % of carrot cake eaten = $\frac{270}{600} \times 100\% = 45\%$	M1 M1 A1	Total 3
-----------	---	----------------	---------

---

<b>19</b>	$7(p - 2) < 3p + 8$ $7p - 14 < 3p + 8$ $7p < 3p + 22$ $4p < 22$ $p < 5.5$	M1 M1 A1	Total 3
-----------	---	----------------	---------

---

<b>20</b>	Half of $1.8 \times 10^5 = 0.9 \times 10^5 = 9 \times 10^4$ $0.9 \times 10^5$ $9 \times 10^5$ $9 \times 10^6$ $9 \times 10^4$	B1	Total 1
-----------	--	----	---------

---

<b>21</b>	<b>(a)</b> e.g. He has not done enough trials to get a reliable indication of whether or not it is biased. His statement assigns exact probabilities based on his trials which is not possible.	B1 B1	
	<b>(b)</b> e.g. With 100 trials she has got significantly more heads than tails so her coin is very likely to be biased.	B1	Total 3

---

<b>22</b>	$v = u + at$ $v - u = at$ $\frac{v - u}{a} = t$ $t = \frac{v - u}{a}$	B1	Total 1
-----------	--	----	---------

---

23	(a)	e.g. Each term is 3 more than previous term 20 <sup>th</sup> term will be $19 \times 3 = 57$ more than 1 <sup>st</sup> term 20 <sup>th</sup> term = $10 + 57 = 67$	M1 A1	
	(b)	e.g. 7 <sup>th</sup> term = $19 + 31 = 50$ 8 <sup>th</sup> term = $31 + 50 = 81$	M1 A1	Total 4
<hr/>				
24	(a)	41° All the angles are the same in similar shapes.	B1	
	(b)	$\frac{DE}{AB} = \frac{9}{5} = 1.8$ So $\frac{DF}{AC} = 1.8$ $\frac{DF}{11} = 1.8$ $DF = 1.8 \times 11$ $DF = 19.8 \text{ cm}$	M1    A1	Total 3
<hr/>				
25	(a)	e.g. 10% of £400 = £40 30% of £400 = $3 \times £40 = £120$ $£400 - £120 = £280$	M1 A1	
	(b)	e.g. You start with 100% of your number If you want to decrease it by 30% that leaves 70% 70% means 70 out of 100 which is 0.7 So multiplying by 0.7 decreases the number by 30%	B1	
	(c)	After 2 years = $0.7 \times £280 = £196$ After 3 years = $0.7 \times £196 = £137.20$ £137.20 is £137 to the nearest pound	M1 A1	Total 5
<hr/>				
26	(a)	$= \frac{4}{3} \times \pi \times 4.6^3$ $= 407.72... = 408 \text{ cm}^3$ (3sf)	M1 A1	
	(b)	Volume of cube = $407.72... \text{ cm}^3$ Side length = $\sqrt[3]{407.72...}$ $= 7.4151...$ Area of one face = $(7.4151...)^2$ $= 54.984...$ Surface area = $6 \times 54.984...$ $= 329.90... = 330 \text{ cm}^2$ (3sf)	M1    M1 A1	Total 5

**TOTAL FOR PAPER: 80 MARKS**