

Q	Answer	Mark	Comments
1(a)	35	B1	
	Additional Guidance		
	Mark the answer line. If this is blank, the answer may be seen on the diagram		

Q	Answer	Mark	Comments
1(b)	-2	B1	
	Additional Guidance		
	Mark the answer line. If this is blank, the answer may be seen on the diagram		

Q	Answer	Mark	Comments
	All 4 correct	B4	B1 for each box correctly matched
Additional Guidance			
2			
<p>Connections do not have to be straight lines</p>			
<p>The line from the second box on the left was given so do not count it</p>			
<p>Two or more lines from one box on the left is choice so incorrect for that box</p>			

Q	Answer	Mark	Comments
	A and (A =) 14 and (B =) 12	B2	B1 (A =) 14 or (B =) 12 14 and/or 12 may be on the diagram accept 140 and 120
Additional Guidance			
3(a)	Ignore reference to areas of any shapes and perimeters of the other shapes		
	Ignore units, including for 140 and 120		
	If answer line blank, accept A clearly indicated in working		
	Accept 14 on the answer line in place of A with 12 seen for B		
			B2

Q	Answer	Mark	Comments
3(b)	D	B1	

Q	Answer	Mark	Comments
3(c)	C and E	B1	either order

Q	Answer	Mark	Comments
	Any correct reflection of shape with corresponding mirror line shown	B2	B1 any correct reflection of shape with no or incorrect mirror line
Additional Guidance			
3(d)	Mark intention for mirror line and shape		
	Ignore internal lines		
	For B2, if there is more than one shape and/or more than one mirror line, apply the rules of choice		
	For B1, any one correct reflection of the shape (even with other incorrect shapes) will score B1		

Q	Answer	Mark	Comments
4(a)	(4, 3)	B1	accept $(4, 3)$
	Additional Guidance		
	Mark the answer line. If this is blank, the answer may be seen on the diagram but must be the coordinates for P		
	Do not allow x and y within the coordinates eg $(4x, 3y)$		B0

Q	Answer	Mark	Comments
4(b)	$(x, -3)$ where $x \neq 4$	B1	accept eg $(5, -3)$
	Additional Guidance		
	Do not allow x and y within the coordinates eg $(5x, -3y)$		B0

Q	Answer	Mark	Comments	
5(a)	$5 \div 0.75$ or $500 \div 75$ or $6.6(\dots)$ or 6.7 or 75×6 or 450 or 0.75×6 or 4.5 or 75×7 or 525 or 0.75×7 or 5.25	M1	oe eg build up or build down	
	6		A1	
	Additional Guidance			
	Incorrect work seen is A0 eg $75 \times 6 = 450$ and $75 \times 7 = 575$ Answer 6		M1A0	
	Do not allow $5 \div 75$ or $500 \div 0.75$ unless recovered			
	Build up must be fully correct method, no errors, 75, 150, 225, 300, 375, 450, (525)			
	Build down must be fully correct method, no errors, 425, 350, 275, 200, 125, 50			

Q	Answer	Mark	Comments
5(b)	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 – their 0.25) × 6 or $2.5 \times$ their 0.9 × 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 – their 0.25) ÷ 4 or $2.5 \times$ their 0.9 ÷ 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 ÷ 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 – their 0.25) × 3 or $2.5 \times$ their 0.9 × 3 or 2.25×3	M1dep	oe eg $7.5 \times$ their 0.9 or $7.5 - 0.75$ shop X
	X with 6.75 (and 7) seen	A2	A1 6.75 oe

Question 5(b) continues on the next page

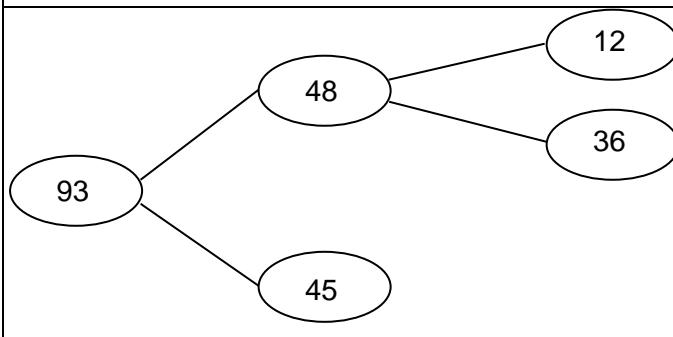
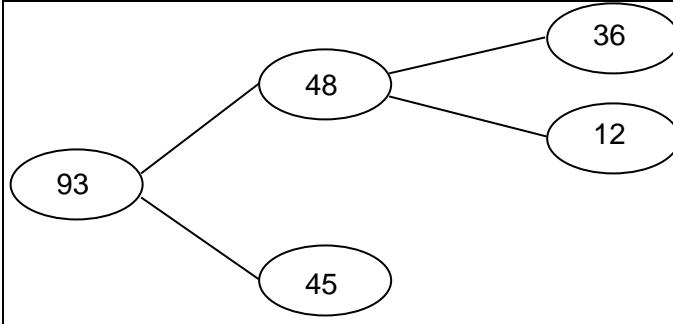
Additional Guidance																
5(b) cont	Up to 3 marks may be awarded for correct work with no answer or incorrect answer, even if this is seen amongst multiple attempts															
	Use the scheme that favours the student eg 0.56 and 0.58 followed by 13.44 and 13.92 and X (mark by Alt 2) M3A1															
	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 $10\% \text{ of } 2.5$ unless recovered															
	Allow variations eg Shop X £15, Shop Z £14, M1 Shop X is £1 more but the discount is £1.50 M1M1 Shop X cheaper 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 border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Shop</th><th style="text-align: center;">Cost of 2</th><th style="text-align: center;">Cost of 3</th><th style="text-align: center;">Cost of 4</th><th style="text-align: center;">Cost of 6</th></tr> </thead> <tbody> <tr> <td style="text-align: center;">X</td><td style="text-align: center;">1.12(5) or 1.13</td><td style="text-align: center;">1.68(75) or 1.69</td><td style="text-align: center;">2.25</td><td style="text-align: center;">3.37(5) or 3.38</td></tr> <tr> <td style="text-align: center;">Z</td><td style="text-align: center;">1.16(6...) or 1.17</td><td style="text-align: center;">1.75</td><td style="text-align: center;">2.33(3...)</td><td style="text-align: center;">3.5</td></tr> </tbody> </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...)	3.5
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												

Q	Answer	Mark	Comments
6	All five extra sets ie AC or CA but not both and AD or DA but not both and BC or CB but not both and BD or DB but not both and CD or DC but not both	B2	list in any order B1 any three or four of the five correct
Additional Guidance			
	Mark the grid unless blank		
	Ignore extras, repeats and reversals for B1 but not for B2		

Q	Answer	Mark	Comments
	<p>Two even and two odd numbers and the numbers all different and the sum of the four numbers is 46</p>	B2	<p>any order B1 two even and two odd numbers and the sum of the four numbers is 46 or the numbers all different and the sum of the four numbers is 46 or two even and two odd numbers and the numbers all different and the sum of the four numbers is [36, 56]</p>
Additional Guidance			
7(a)	<input type="text" value="11"/> + <input type="text" value="8"/> + <input type="text" value="6"/> + <input type="text" value="21"/>	B2	
	<input type="text" value="30"/> + <input type="text" value="10"/> + <input type="text" value="3"/> + <input type="text" value="3"/> (not all different)	B1	
	<input type="text" value="8"/> + <input type="text" value="12"/> + <input type="text" value="10"/> + <input type="text" value="16"/> (no odds)	B1	
	<input type="text" value="10"/> + <input type="text" value="16"/> + <input type="text" value="1"/> + <input type="text" value="11"/> (not 46 but in range)	B1	
	<input type="text" value="15"/> + <input type="text" value="10"/> + <input type="text" value="15"/> + <input type="text" value="10"/> (not all different and not 46)	B0	
	<input type="text" value="3"/> + <input type="text" value="5"/> + <input type="text" value="7"/> + <input type="text" value="29"/> (no evens and not 46)	B0	
	<p>Negatives are acceptable for B1 or B2</p>		
	<p>0 is an even number for B1 or B2, but a blank box does not imply 0</p>		
	<p>Fractions and/or decimals are acceptable for four different numbers that sum to 46 for B1</p>		
	<p>Mark the boxes</p>		

Q	Answer	Mark	Comments
7(b)	<div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">3</div> × <div style="border: 1px solid black; padding: 2px; margin-left: 10px;">10</div> </div> <p style="text-align: center;">or</p> <div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">6</div> × <div style="border: 1px solid black; padding: 2px; margin-left: 10px;">5</div> </div>	B2	<p>either order</p> <p>B1 uses a factor of 12 and the product of the two numbers is [24, 36]</p> <p>or</p> <p>uses a factor of 40 and the product of the two numbers is [24, 36]</p> <p>or</p> <p>the product of the two numbers is 30</p>
	Additional Guidance		
	<div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">3</div> × <div style="border: 1px solid black; padding: 2px; margin-left: 10px;">9</div> </div>	B1	
	<div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">7</div> × <div style="border: 1px solid black; padding: 2px; margin-left: 10px;">5</div> </div>	B1	
	<div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">30</div> × <div style="border: 1px solid black; padding: 2px; margin-left: 10px;">1</div> </div>	B1	
	<div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">15</div> × <div style="border: 1px solid black; padding: 2px; margin-left: 10px;">2</div> </div>	B1	
	<p>Fractions and/or decimals are acceptable for non-factors for B1</p>		
<p>Mark the boxes</p>			

Q	Answer	Mark	Comments
7(c)	<input type="text" value="36"/> ÷ <input type="text" value="2"/>	B2	B1 any square number > 1 or any prime number
	Additional Guidance		
	Allow squares to be written in index form for B2 or B1 eg <input type="text" value="6<sup>2</sup>"/> ÷ <input type="text" value="2"/>	B2	
	<input type="text" value="2"/> ÷ <input type="text" value="36"/>	B1	
	<input type="text" value=""/> ÷ <input type="text" value="9"/>	B1	
	<input type="text" value="72"/> ÷ <input type="text" value="4"/>	B1	
	Mark the boxes		

Q	Answer	Mark	Comments
	45 in No (Played)	B1	
	36 in No (More than one game played?)	B1	
	12 in Yes (More than one game played?)	B1ft	ft 48 – their 36 their 36 must be a positive integer less than 48
Additional Guidance			
Mark the frequency tree			
8(a)	 <pre> graph LR 93((93)) --> 45((45)) 93 --> 48((48)) 48 --> 12((12)) 48 --> 36((36)) </pre>		B1B1B1
	 <pre> graph LR 93((93)) --> 45((45)) 93 --> 48((48)) 48 --> 36((36)) 48 --> 12((12)) </pre>		B1B0B1ft

Q	Answer	Mark	Comments
8(b)	Alternative method 1		
	0.68 × 93 or 63.2(4)	M1	oe
	64	A1	
	Alternative method 2		
	$\frac{63}{93} = 0.67(\dots)$ or $\frac{64}{93} = [0.68, 0.69]$	M1	other trials can be ignored
	64	A1	
	Additional Guidance		
	Answer only 64		
	0.69 × 93 or 64.1(7) or 64.2 with answer 64 (without seeing 0.68 × 93 or 63.2(4))		
	For 0.68 × 93, accept 68% × 93 but do not accept 68% of 93 unless recovered		

Q	Answer	Mark	Comments
9(a)	6 × 4 or 24 or $11 \times (12 - 4)$ or 11×8 or 88	M1	oe
	112	A1	
	Additional Guidance		
	112.00(p)		
	112.0		

Q	Answer	Mark	Comments
9(b)	Alternative method 1 Works in min or hrs for 9 episodes and 1 episode		
	9 × 50 or 450 or $9 \times \frac{50}{60}$ or $\frac{450}{60}$	M1	oe eg $9 \times \frac{5}{6}$ or $\frac{45}{6}$ or $\frac{15}{2}$ or 7.5
	60 + 42 or 102 or $\frac{102}{60}$ oe fraction or 1.7	M1	552 or 9.2 implies M1M1
	9 hours 12 minutes	A1	SC2 9h 32 min or 6h 32 min or 9h 20 min
	Alternative method 2 Works in min or hrs for 9 episodes and converts to hrs and min		
	9 × 50 or 450 or $9 \times \frac{50}{60}$ or $\frac{450}{60}$	M1	oe eg $9 \times \frac{5}{6}$ or $\frac{45}{6}$ or $\frac{15}{2}$ or 7.5 implied by 7h 30 min
	7h 30 min	M1	ft conversion of their 450 to hours and minutes if their 450 > 60 or their $\frac{450}{60}$ to hours and minutes if their $\frac{450}{60} > 1$
	9 hours 12 minutes	A1	SC2 9h 32 min or 6h 32 min or 9h 20 min
	Additional Guidance		
	7h 50 min + 1h 42 min = 9h 32 min	SC2	
	4h 50 min + 1h 42 min = 6h 32 min	SC2	
	9.2h = 9h 20 min	SC2	

Q	Answer	Mark	Comments
	$1020 \div 5 (\times 2)$ or $204 (\times 2)$	M1	oe
	408	A1	SC1 612
Additional Guidance			
10(a)	$\frac{408}{1020}$ on answer line		M1A0
	Condone 408 out of 1020		M1A1
	For 0.4×1020 , accept $40\% \times 1020$ but do not accept $40\% \text{ of } 1020$ unless recovered		

Q	Answer	Mark	Comments	
	$\frac{4}{7}$	B1	oe fraction	
Additional Guidance				
10(b)	Conversion to decimal or percentage			B0

Q	Answer	Mark	Comments
	$220 \div 250 (\times 100)$ or 0.88	M1	oe
	88	A1	SC1 12
Additional Guidance			
10(c)	Build-up methods must be correct or show correct method for each step		

Q	Answer	Mark	Comments
11(a)	8 in W only	B1	
	21 in $(H \cup W)'$	B1ft	ft 29 – their 8 their 8 must be < 29
	Additional Guidance		
	15 in W only 21 in $(H \cup W)'$		B0 B1
	15 in W only 14 in $(H \cup W)'$		B0 B1ft

Q	Answer	Mark	Comments
11(b)	$\frac{7}{60}$ or [0.116, 0.117] or [11.6, 11.7]%	B1	oe fraction
	Additional Guidance		
	Ignore conversion attempt to decimal, fraction or percentage (but not ratio) after correct probability seen		
	Do not allow eg 7 in 60 or 7 out of 60 unless the correct probability seen		
	Do not allow ratio		
	Ignore words if correct probability seen		

Q	Answer	Mark	Comments
11(c)	Valid explanation	B1	eg needs brackets around $35 - 19$
	Additional Guidance		
	Any calculations shown must be correct		
	Ignore irrelevant, non-contradictory statements		
	It gives 25.5 and it should be 8	B1	
	(It gives the wrong answer,) it should be 8	B1	
	He shouldn't divide (by 2) first	B1	
	He needs brackets around the takeaway	B1	
	He needs to subtract first	B1	
	He should do $35 - 19$ and then divide by 2	B1	
	(mathematical calculation) (may correct the given calculation by adding brackets)	B1	
	$\frac{35 - 19}{2}$ (implies the brackets)	B1	
	This gives 25.5 (or 51) when he needs 8 or 16	B1	
	$35 - 19 = 16$ $16 \div 2 = 8$ (needs to say that this is what he should do)	B0	
	This gives 25.5 (or 51) which is too much (needs to compare with 8 or 16)	B0	
	He hasn't used BIDMAS	B0	
	It gives the wrong answer	B0	
	$35 - 19 \div 2 = 8$	B0	
	$35 - 19 \div 2 = 25.50$	B0	
	He needs brackets	B0	

Q	Answer	Mark	Comments
	<p>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</p>	B2	<p>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</p>
Additional Guidance			
12	<p>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)</p>		B2
	<p>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</p>		
	<p>Condone eg $3 : 2 \times 3 = 9 : 6$ to imply both values are multiplied by 3</p>		
	<p>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</p>		
	<p>3 is a factor of 9 and 2 is a factor of 6 (with no reference to $\times 3$)</p>	B0	
	<p>$9 : 6 = 3 : 2$ or $\frac{9}{6} = \frac{3}{2}$ (not evaluated to 1.5 or shown $\div 3$)</p>	B0	
	<p>9 : 6 simplifies to 3 : 2 and 1.5 : 1 (with no reference to $\div 3$ or $\div 6$)</p>	B0	
	<p>3 : 2 and 1.5 : 1 are both equivalent to 9 : 6 (with no reference to $\times 3$ or $\times 6$)</p>	B0	

Q	Answer	Mark	Comments
	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			
13	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		

Q	Answer	Mark	Comments
14	$3(4a + 5b)$	B1	
	Additional Guidance		
	Condone missing final bracket ie $3(4a + 5b)$		B1
	Allow multiplying back out to check their answer		
	Further incorrect work after a correct response is B0 eg $3(4a + 5b) = 27ab$		B0
	$3(a4 + b5)$		B0
	$3 \times (4a + 5b)$		B0

Q	Answer	Mark	Comments
15	$-3, -2, -1, 0, 1$	B2	any order B1 four correct and none incorrect or five correct and one incorrect
	Additional Guidance		
	$-2, -1, 0, 1$		B1
	$-3, -2, -1, 0, 1, 2$		B1
	$-3, -2, -1, 1$		B1
	$-2, -1, 0, 1, 2$		B0

Q	Answer	Mark	Comments
16	$3n + 4$ or $4 + 3n$	B2	oe eg $7 + (3n - 3)$ B1 $3n (+ \dots)$ or $3n (- \dots)$
	Additional Guidance		
	Ignore LHS of formula given eg $T_n = 3n + 4$		
	Condone $n = 3n + 4$ or n th term = $3n + 4$		
	Allow a multiplication sign eg $3 \times n + 4$ or $n \times 3 + 4$		
	Allow other variables eg $3x + 4$		
	$3x$		
	$n3 \dots$		
	$n3 + 4$		
	$3n$ th + 4		
$3n$ th			B0
$3n + 4n$			B0

Q	Answer	Mark	Comments												
	45×8 or 360	M1	oe number of 2p coins may be embedded												
	$45 \times 8 \times 2$ or 360×2 or 720 or $7.2(0)$	M1dep	oe value of 2p coins implied by 1170 or $11.7(0)$												
	$17.7(0) - \text{their } 7.2(0) - 45 \times 0.1(0)$ or $1770 - \text{their } 720 - 45 \times 10$ or $6(0.00)$ or 600	M1dep	oe value of 5p coins implied by $7.2 : 6$ oe ratio not in simplest form or $6 : 7.2$ oe ratio												
	$6 : 5$	A1	accept $1.2 : 1$ or $\frac{6}{5} : 1$ or $1\frac{1}{5} : 1$ or $1 : 0.83(\dots)$ or $1 : \frac{5}{6}$												
17	Additional Guidance														
	Up to M3 may be awarded for correct work with no answer or incorrect answer, even if this is seen amongst multiple attempts														
	Allow working in pence or pounds throughout														
	Must work consistently in pence or pounds for the third mark (or recover)														
	Ignore units in the ratio eg $6p : 5p$ or $\text{£}1.20 : \text{£}1$		M3A1												
	720 may be seen in a ratio with the value of the 10p coins eg $720 : 450$ or $7.2 : 4.5$		M2												
	600 may be seen in a ratio with the value of the 10p coins eg $600 : 450$ or $6 : 4.5$		M3												
	For information:	<table border="1" style="display: inline-table; vertical-align: middle;"> <thead> <tr> <th>Coin</th> <th>10p</th> <th>2p</th> <th>5p</th> </tr> </thead> <tbody> <tr> <td>Number</td> <td>45</td> <td>360</td> <td>120</td> </tr> <tr> <td>Value</td> <td>£4.50</td> <td>£7.20</td> <td>£6.00</td> </tr> </tbody> </table>	Coin	10p	2p	5p	Number	45	360	120	Value	£4.50	£7.20	£6.00	
Coin	10p	2p	5p												
Number	45	360	120												
Value	£4.50	£7.20	£6.00												

Q	Answer	Mark	Comments																													
18(a)	All values correct	B2	B1 1 or 2 rows correct																													
	Additional Guidance																															
	18(a)	<table border="1" style="width: 100%; text-align: center;"> <tr> <td></td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr> <tr> <td>$2x$</td><td>2</td><td>4</td><td>6</td><td>8</td><td>10</td><td>12</td></tr> <tr> <td>$3x$</td><td>3</td><td>6</td><td>9</td><td>12</td><td>15</td><td>18</td></tr> <tr> <td>x^2</td><td>1</td><td>4</td><td>9</td><td>16</td><td>25</td><td>36</td></tr> </table>		1	2	3	4	5	6	$2x$	2	4	6	8	10	12	$3x$	3	6	9	12	15	18	x^2	1	4	9	16	25	36	B2	
		1	2	3	4	5	6																									
$2x$	2	4	6	8	10	12																										
$3x$	3	6	9	12	15	18																										
x^2	1	4	9	16	25	36																										

Q	Answer	Mark	Comments
18(b)	$\frac{8}{18}$ or $\frac{4}{9}$ or 0.44(4...) or 44(.4...)%	B1ft	oe fraction, decimal or percentage ft their table with ≥ 12 values must be using 18 for the total number of possible scores
	Additional Guidance		
18(b)	Ignore simplification or conversion attempt (not ratio) after correct probability seen		
	Ratio answer eg 8 : 18, even alongside a correct probability is B0		
	ft decimals or percentages must be correct to the same accuracy as in the scheme eg 10 winning values in their table $\frac{10}{18}$ or 0.55(5...) or 0.56 or 0.556 or 55(.5...)% or 56% or 55.6%	B1ft	

Q	Answer	Mark	Comments
18(c)	$711 \times \text{their } \frac{8}{18}$	M1	oe ft their probability from (b) or if no probability in (b), ft their table with ≥ 12 values where $0 < \text{their probability} < 1$ probabilities, if rounded in (c), must be truncated or rounded to at least 2 sf
	316	A1	SC2 395
	Additional Guidance		
	Answer 316		M1A1
	$\frac{316}{711}$ on answer line		M1A0
	Condone 316 out of 711		M1A1
	Do not treat estimating by rounding as a misread eg1 700 used instead of 711 eg2 (b) 0.44 (c) 0.4×711 (rounded to 1sf in (c) for the probability) eg3 (b) 0.4 (c) 0.4×711 (follows through their (b))		M0A0 M0A0 M1A0
	Do not allow ft for a ratio from (b) but may ft their (a) instead		
	For 0.44×711 , accept $44\% \times 711$ but do not accept $44\% \text{ of } 711$ unless recovered		
	The method mark may be implied by a ft answer (decimal or truncated to the nearest integer or rounded up to the nearest integer) eg1 (b) $\frac{7}{18}$ (c) 276.5 or 276 or 277 (correct ft method implied using (b)) eg2 (a) completed table has 7 winning values (b) no probability shown (c) 276.5 or 276 or 277 (correct ft method implied using (a))		M1A0 M1A0

Q	Answer	Mark	Comments
19(a)	360 ÷ 8 or 135 seen	M1	oe eg $45 \times 8 = 360$ or $180 - \frac{(8-2) \times 180}{8}$ may be on diagram
	45	A1	
Additional Guidance			
M1 may be awarded for correct work with no answer or incorrect answer, even if this is seen amongst multiple attempts			
45 seen but not chosen as answer, even if linked to the wrong angle		M1A0	

Q	Answer	Mark	Comments
19(b)	It is less than the answer to part (a)	B1	

Q	Answer	Mark	Comments
20	$\begin{pmatrix} 4 \\ -3 \end{pmatrix}$	B2	B1 $\begin{pmatrix} 4 \\ \dots \end{pmatrix}$ or $\begin{pmatrix} \dots \\ -3 \end{pmatrix}$ SC1 $\begin{pmatrix} -4 \\ 3 \end{pmatrix}$
	Additional Guidance		
	$(4, -3)$ or $\begin{pmatrix} -3 \\ 4 \end{pmatrix}$		
	Ignore words if a vector is also seen		
	eg1 Reflection $\begin{pmatrix} 4 \\ -3 \end{pmatrix}$		
	eg2 4 right 3 up and $\begin{pmatrix} 4 \\ 3 \end{pmatrix}$		
	eg3 4 right 3 down		
	eg4 Rotate 4 left and 3 up and $\begin{pmatrix} -4 \\ 3 \end{pmatrix}$		
	Condone any type of brackets		
Condone missing brackets for B2 or B1 or SC1 but must have two numbers in a column			
Condone ‘fraction line’ for B2 or B1 or SC1 but must have two numbers in a column			
$\begin{pmatrix} 4x \\ -3y \end{pmatrix}$ or $\begin{pmatrix} x4 \\ -y3 \end{pmatrix}$ or $\begin{pmatrix} x+4 \\ y-3 \end{pmatrix}$ or $\begin{pmatrix} 4 \text{ right} \\ 3 \text{ down} \end{pmatrix}$ or $\begin{pmatrix} 4 \text{ r} \\ 3 \text{ d} \end{pmatrix}$ or $\begin{pmatrix} 4 \rightarrow \\ 3 \downarrow \end{pmatrix}$			B0

Q	Answer	Mark	Comments
21	Alternative method 1 Compares 70% of volume of hemisphere with volume of water $\frac{4}{3} \times \pi \times 12^3$ or 2304π or [7216, 7239.2] or $\frac{2}{3} \times \pi \times 12^3$ or 1152π or [3581, 3638]	M1	oe eg $\frac{4}{3} \pi \times 1728$ allow without any multiplication signs eg $\frac{4}{3} \pi 12^3$
	$0.7 \times$ their 1152π or 806.4π or [2506, 2547]	M1dep	oe $0.7 \times$ their [3581, 3638] or $\frac{4032}{5}\pi$ must be using volume of hemisphere
	325×8 or 2600		oe
	[2506, 2547] and 2600 and Yes	A1	oe
	Alternative method 2 Works out volume of water as proportion of volume of hemisphere		
	$\frac{4}{3} \times \pi \times 12^3$ or 2304π or [7216, 7239.2] or $\frac{2}{3} \times \pi \times 12^3$ or 1152π or [3581, 3638]	M1	oe eg $\frac{4}{3} \pi \times 1728$ allow without any multiplication signs eg $\frac{4}{3} \pi 12^3$
	325×8 or 2600		oe
	$\text{their } 2600 \div \text{their } 1152\pi$ or [0.71, 0.73]	M1dep	oe eg $2600 \div 1152\pi$ or 72% dep on M2 must be using volume of hemisphere
	[71, 73](%) and Yes		oe eg 0.72 and 0.7 and Yes

Question 21 continues on the next page

	Alternative method 3 Works out time to fill 70% of volume of hemisphere		
	$\frac{4}{3} \times \pi \times 12^3$ or 2304π or [7216, 7239.2] or $\frac{2}{3} \times \pi \times 12^3$ or 1152π or [3581, 3638]	M1	oe eg $\frac{4}{3}\pi \times 1728$ allow without any multiplication signs eg $\frac{4}{3}\pi 12^3$
21 cont	0.7 \times their 1152π or 806.4π or [2506, 2547] or their $1152\pi \div 325$ or [11, 11.2]	M1dep	oe 0.7 \times their [3581, 3638] or $\frac{4032}{5}\pi$ or their [3581, 3638] $\div 325$ must be using volume of hemisphere
	0.7 \times their $1152\pi \div 325$ or $0.7 \times$ their [3581, 3638] $\div 325$ or [7.7, 7.84]	M1dep	oe their [2506, 2547] $\div 325$ or $0.7 \times$ their [11, 11.2]
	[7.7, 7.84] and Yes	A1	oe

Question 21 continues on the next page

Additional Guidance	
21 cont	Up to M3 may be awarded for correct work with no answer or incorrect answer, even if this is seen amongst multiple attempts
	Allow 1.33(...) for $\frac{4}{3}$
	Allow 0.66(...) or 0.67 for $\frac{2}{3}$
	π may be seen as [3.14, 3.142] eg Alt 1 $\frac{2}{3} \times 3.14 \times 12^3$ M1
	If a number (or calculation) in terms of π is seen but π is subsequently omitted, treat as a miscopy for M marks eg Alt 1 1152 π M1 0.7 \times 1152 = 806.4 M1dep 325 \times 8 = 2600 Yes M1A0
	Yes cannot be implied by inequalities
	Alts 1 and 2 325 cm ³ \times 8 seen is M1 even if evaluated incorrectly 325 ³ \times 8 seen is M0 unless recovered to 2600
	Do not allow misreads of the given formula unless recovered eg1 using 12 ² instead of 12 ³ eg2 using $\frac{3}{4}$ instead of $\frac{4}{3}$
	For 0.7 \times their 1152 π , do not accept 70% \times their 1152 π unless recovered

Q	Answer	Mark	Comments
	$8 \div 5$ or $19.2 \div 12$ or $\frac{8}{5}$ or $\frac{19.2}{12}$ or 1.6 or $12 \div 5$ or $19.2 \div 8$ or $\frac{12}{5}$ or $\frac{19.2}{8}$ or 2.4	M1	oe use of a valid pair of sides to make an appropriate calculation or value eg $5 \div 8$ or 0.625 or $5 \div 12$ or [0.416, 0.417]
22	$8 \div 5 = 19.2 \div 12$ or $\frac{8}{5} = \frac{19.2}{12}$ or $12 \div 5 = 19.2 \div 8$ or $\frac{12}{5} = \frac{19.2}{8}$	A1	oe showing sides are in proportion eg $5 \div 8 = 12 \div 19.2$ or $\frac{5}{12} = \frac{8}{19.2}$
Additional Guidance			
22	For A1 equating may be implied by two calculations or two fractions with correct evaluation eg $8 \div 5 = 19.2 \div 12$ is implied by $8 = 5 \times 1.6$ and $19.2 = 12 \times 1.6$		
	M1A1		
	For A1 equating may be implied by calculations eg1 $8 \div 5 = 19.2 \div 12$ is implied by $8 \div 5 = 1.6$ and $12 \times 1.6 = 19.2$ eg2 $8 \div 5 = 19.2 \div 12$ is implied by $\frac{8}{5} \times 12 = 19.2$		
	M1A1		
	$5 \times 19.2 = 8 \times 12$		
	M1A1		
	$5 \times 19.2 = 96$ and $8 \times 12 = 96$		
	M1A1		
	Non-contradictory working can be ignored eg correct response along with area calculations		
M1A1			
	Ignore words eg references to scale factors, enlargement, angles		
	M1A1		
	Working on diagrams may be seen eg1 Arrows or lines from 5 to 8 and 12 to 19.2 with $\times 1.6$ on them eg2 Arrows or lines from 5 to 8 and 12 to 19.2 with 1.6 on them Arrows or lines must unambiguously link relevant numbers	M1A0	
	For $8 \div 5$ or $\frac{8}{5}$ allow $8 : 5$ etc		

Q	Answer	Mark	Comments			
	$80 \times x$ or $80x$ or $x \times 80$ or $x80$ or $x \div 60$ or $\frac{x}{60}$ or $\frac{1}{60}x$ or $x\frac{1}{60}$ or $80 \div 60$ or $\frac{80}{60}$	M1	teabags per hour boxes per minute			
23	$\frac{80x}{60} \left(= \frac{4x}{3} \right)$ or $80 \div 60 \times x \left(= \frac{4x}{3} \right)$	A1	oe showing 80 and 60 and x eg $\frac{80 \times x}{60} \left(= \frac{4x}{3} \right)$ or $x \frac{80}{60} \left(= \frac{4x}{3} \right)$ or $\frac{80}{60} \times x \left(= \frac{4x}{3} \right)$ or $80x \div 60 \left(= \frac{4x}{3} \right)$			
	Additional Guidance					
	M1 may be awarded for correct work with no answer or incorrect answer, even if this is seen amongst multiple attempts					
	Do not allow M1 if only seen embedded in an incorrect expression or calculation eg $80x \times 4 = 320x$					
	$60 \times \frac{4x}{3} = 80x$ (M1 allowed as $80x$ is not embedded in an incorrect expression or calculation, A0 because using the given answer)					
	Condone $x = 80 \div 60$					
	$\frac{80x}{60} \left(= \frac{4x}{3} \right)$					
	$\frac{80}{60} = \frac{4}{3}$ and $\frac{4}{3} \times x \left(= \frac{4x}{3} \right)$					
	$\frac{80}{60} = \frac{4}{3}$ and $\frac{4x}{3}$					
	No equivalents allowed for M1					
Ignore units						
Condone 1.33(...) for $\frac{4}{3}$						
Ignore non-contradictory working after M1A1 seen						