

Question	Answer	Mark	Comments
1	8	B1	
	$\frac{1}{0.4}$ or $\frac{10}{4}$ or 2.5 or $\frac{1}{\frac{2}{5}}$ or $\frac{5}{2}$ or $2\frac{1}{2}$	M1	8×0.4 or 3.2 implies B1M1 $16 : 5$ or equivalent ratio implies B1M1
	$3.2 : 1$ or $\frac{16}{5} : 1$ or $3\frac{1}{5} : 1$	A1ft	ft B0M1
	Additional Guidance		
	$8^3 = 512$ or $8 \times 8 \times 8 = 512$ alone is not sufficient for B1		
	ft answers must have n exact or correctly rounded to at least 2 sf eg $\sqrt{512} = 22.62$ (incorrect and truncated) 2.5 $9.05 : 1$		B0 M1 A1ft
	ft answer exact surd value eg $\sqrt{512} = 16\sqrt{2}$ 2.5 $9.05 : 1$ or $\frac{32}{5}\sqrt{2} : 1$		B0 M1 A1ft

Question	Answer	Mark	Comments
2	$62 \div 2$ or 62×0.5 or 31	M1	oe eg $62 \div 60 \times 30$
	their $31 - 25$ or 6	M1	their 31 must be > 25
	their 6×3 or 18 or their 6×4 or 24	M1dep	dep on 2nd M1
	49	A1	
	Additional Guidance		
	49 from correct working, but a different answer given		M3A0

Question	Answer	Mark	Comments
3	Alternative method 1: substitutes $2f$ for d		
	$\frac{e-f}{2f-e} = \frac{1}{4}$ or $2f-e = 4(e-f)$	M1	oe equation in e and f
	$6f = 5e$ or $\frac{e}{f} = \frac{6}{5}$	M1dep	oe with variables collected eg $1.5f = 1.25e$ oe with single fractions eg $\frac{f}{5} = \frac{e}{6}$
	6 : 5	A1	oe ratio
	Alternative method 2: substitutes $\frac{d}{2}$ for f		
	$d-e = 4(e - \frac{d}{2})$ or $3d = 5e$	M1	oe equation in d and e
	$6f = 5e$ or $\frac{e}{f} = \frac{6}{5}$	M1dep	oe with variables collected eg $1.5f = 1.25e$ oe with single fractions eg $\frac{f}{5} = \frac{e}{6}$
	6 : 5	A1	oe ratio
	Alternative method 3: substitutes $2f$ for d and forms simultaneous equations		
	$e-f = 1$ and $2f-e = 4$	M1	oe with rhs in the ratio 1 : 4 eg $e-f = 2$ and $2f-e = 8$
	$f = 5$ or $e = 6$	M1dep	correct solution for one unknown from their correct simultaneous equations eg $f = 10$ or $e = 12$ from above equations
	6 : 5	A1	oe ratio
	Additional Guidance		
	5 : 6 with no method marks awarded		M0M0A0

Q	Answer	Mark	Comments
4	1 : 2	B1	

Q	Answer	Mark	Comments
5	$270 \div (2.6 + 1)$ or $270 \div 3.6$ or 75 or $\frac{2.6}{(2.6+1)}$ or $\frac{2.6}{3.6}$ or $0.72(\dots)$ or $2.6 - 1$ or 1.6	M1	oe
	their 75×2.6 or $270 - \text{their } 75$ or 195 or $270 \times \text{their } 0.72(\dots)$ or their $75 \times (2.6 - 1)$ or their $75 \times \text{their } 1.6$ or $\frac{\text{their } 1.6}{(2.6+1)}$ or $0.44(\dots)$	M1dep	oe
	120	A1	
	Additional Guidance		
	195 and 75		M1M1
	$270 \div 2.6$		M0

Q	Answer	Mark	Comments
6	$(x =) 4 \times 2$ or $(x =) 8$ or area of top right rectangle is 12×2 or $12 \div 4 \times \text{their } 8$ or 24 or area of bottom left rectangle is $56 \div 2$ or $4 \times 56 \div \text{their } 8$ or 28	M1	may be on diagram implied by length of bottom left or bottom right vertical section is 7
	Area of top right rectangle is 12×2 or $12 \div 4 \times \text{their } 8$ or 24 and area of bottom left rectangle is $56 \div 2$ or $4 \times 56 \div \text{their } 8$ or 28 or Total area is $(4 + \text{their } 8) \times (12 \div 4 + 56 \div \text{their } 8)$ or 12×10 or 120	M1dep	may be on diagram
	(Total shaded area is) 52	A1	implied by $52 : 68$
	$13 : 17$ or $1 : \frac{17}{13}$ or $\frac{13}{17} : 1$	B1ft	ft simplification of their ratio or conversion into the form $1 : n$ or $n : 1$ with M2A0 or M1M0A0 scored
	Additional Guidance		
	If their ratio cannot be simplified by dividing by a common factor they can only score B1ft by converting into the form $1 : n$ or $n : 1$		
	$\frac{52}{120} : \frac{68}{120}$		M1M1A1B0
	$68 : 52$ simplified to $17 : 13$		M1M1A0B1ft
	$13 \text{ cm}^2 : 17 \text{ cm}^2$		M1M1A1B0
	For B1, accept values as decimals rounded or truncated to 2 dp or better eg $1 : 1.31$ or $0.76 : 1$		B1

Q	Answer	Mark	Comments
7	Alternative method 1		
	$4.5 \div 2$ or 2.25	M1	
	$\sqrt{\text{their } 2.25}$ or 1.5	M1dep	
	$1 : 1.5$ or $1 : 1\frac{1}{2}$ or $1 : \frac{3}{2}$	A1	
	Alternative method 2		
	$\sqrt{2} : \sqrt{4.5}$	M1	
	$1 : \frac{\sqrt{\text{their } 4.5}}{\sqrt{\text{their } 2}}$	M1dep	
	$1 : 1.5$ or $1 : 1\frac{1}{2}$ or $1 : \frac{3}{2}$	A1	
	Alternative method 3		
	$\sqrt{4} : \sqrt{9}$	M1	
	$2 : 3$	M1dep	
	$1 : 1.5$ or $1 : 1\frac{1}{2}$ or $1 : \frac{3}{2}$	A1	
	Alternative method 4		
	$2 \div 4.5$ or $\frac{4}{9}$ or $0.\dot{4}$	M1	accept 0.44 or better
	$\sqrt{\text{their } \frac{4}{9}}$ or $\frac{2}{3}$ or $0.\dot{6}$ and $\frac{2}{3} : 1$	M1dep	accept 0.66 or better
	$1 : 1.5$ or $1 : 1\frac{1}{2}$ or $1 : \frac{3}{2}$	A1	
	Additional Guidance		
	1 : 1.5 on answer line with no evidence of incorrect method		M1M1A1

Q	Answer	Mark	Comments
8	Alternative method 1: using different time periods		
	450 ÷ 30 or 15 or 250 ÷ 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

8 cont	Additional Guidance	
	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

Q	Answer	Mark	Comments
9(a)	Alternative method 1		
	$3000 \div (9 + 4 + 7)$ or $3000 \div 20$ or 150	M1	oe implied by 1350 or 600 or 1050 or 358.5(0) or 283.5(0)
	9×2.39 or 21.51 or 4×1.89 or 7.56 or 29.07	M1	oe may be embedded or implied eg $9 \times 2.39 \times \text{their } 150$ or $4 \times 1.89 \times \text{their } 150$ their 150 can be any number 3226.5(0) or 1134 or 4360.5(0) score M1M1
	$(6660 - 9 \times 2.39 \times \text{their } 150 - 4 \times 1.89 \times \text{their } 150) \div (7 \times \text{their } 150)$ or $(6660 - 3226.5(0) - 1134) \div 1050$ or $(6660 - 4360.5(0)) \div 1050$ or $2299.5(0) \div 1050$	M1dep	oe eg $(6660 - 9 \times 2.39 \times \text{their } 150 - 4 \times 1.89 \times \text{their } 150) \div (3000 - 9 \times \text{their } 150 - 4 \times \text{their } 150)$ or $\frac{219}{100}$ dep on M1M1 their 150 must be from 1st M1
	2.19	A1	

9(b) cont	Alternative method 2		
	3000 ÷ (9 + 4 + 7) or 3000 ÷ 20 or 150	M1	oe implied by 1350 or 600 or 1050 or 358.5(0) or 283.5(0)
	9 × 2.39 or 21.51 or 4 × 1.89 or 7.56 or 29.07	M1	oe may be embedded or implied eg 9 × 2.39 × their 150 or 4 × 1.89 × their 150 their 150 can be any number 3226.5(0) or 1134 or 4360.5(0) score M1M1
	$\left(\frac{6660}{\text{their 150}} - 9 \times 2.39 - 4 \times 1.89 \right) \div 7$ or $(44.4(0) - 21.51 - 7.56) \div 7$ or $15.33 \div 7$	M1dep	oe eg $(44.4(0) - 29.07) \div 7$ or $\frac{219}{100}$ dep on M1M1 their 150 must be from 1st M1
	2.19	A1	
	Additional Guidance		
	Up to M1M1 may be awarded for correct work with no, or incorrect answer, even if this is seen amongst multiple attempts		

Q	Answer	Mark	Comments
10	$18.9 \div 0.45$ or 42	M1	oe
	their $42 \div 7 \times 8$ or 48	M1dep	oe eg $\frac{8}{7} \times$ their 42 or $[1.14, 1.143] \times$ their 42
	$0.45 \div 9 \times 5$ or 0.25	M1	oe eg $\frac{5}{9} \times 0.45$ or $[0.55, 0.56] \times 0.45$ $\frac{8}{7} \times \frac{5}{9} \times 18.9$ oe scores M3
	12	A1	
	Additional Guidance		
	Up to M3 may be awarded for correct work with no, or incorrect answer, even if this is seen amongst multiple attempts		
	Any single calculation or set of calculations that are a correct method and lead to 12		M3
	Note that the single calculation $\frac{8}{7} \times \frac{5}{9} \times 18.9$ does not use 0.45		M3
	An oe for $\frac{8}{7} \times \frac{5}{9} \times 18.9$ is $\frac{8}{7} \times \frac{18.9}{0.45} \times \frac{5}{9} \times 0.45$		M3
	Values may be seen in ratios eg 42 : 48		M1M1

Q	Answer	Mark	Comments
11	$330 \div (3 + 2)$ or $330 \div 5$ or 66	M1	oe eg $\frac{330}{5}$
	their 66×2 or 132	M1dep	oe $\frac{2}{5} \times 330$ scores M2
	$294 \div 7$ or 42 or $294 \div 7 \times 3$ or 126	M1	oe eg $\frac{294}{7}$ or $\frac{3}{7} \times 294$
	132 and 126 and A	A1	
	Additional Guidance		
	132 and 88.2 and A		M1M1M0A0

Q	Answer	Mark	Comments
12	Alternative method 1 – using angles around O and angles inside arrowhead		
	$ACO = 90 - 83$ or $ACO = 7$	M1	may be seen on diagram
	Acute $BOC = 2 \times 28$ or acute $BOC = 56$	M1	may be seen on diagram
	Reflex $BOC = 360 - \text{their } 56$ or reflex $BOC = 304$	M1dep	may be seen on diagram dep on 2nd M1
	$ABO = 360 - \text{their } 304 - \text{their } 7 - 28$ or $ABO = 21$	M1dep	may be seen on diagram dep on M3
	$ABO = 21$ and $ACO = 7$ and $21 : 7 = 3 : 1$	A1	all angle values must be seen
	Alternative method 2 – with line OA added		
	$ACO = 90 - 83$ or $ACO = 7$	M1	may be seen on diagram
	$OAC = 7$ or $ABO + ACO = 28$	M1dep	may be seen on diagram
	$OAB = 28 - 7$ or $OAB = 21$ or $ABO = 28 - 7$	M1dep	may be seen on diagram dep on M2
	$ABO = 21$	M1dep	may be seen on diagram dep on M3
	$ABO = 21$ and $ACO = 7$ and $21 : 7 = 3 : 1$	A1	all angle values must be seen

Q	Answer	Mark	Comments
12 cont	Alternative method 3 – using alternate segment theorem		
	$ACO = 90 - 83$ or $ACO = 7$	M1	may be seen on diagram
	Acute $BOC = 2 \times 28$ or acute $BOC = 56$	M1	may be seen on diagram
	$ABC = 83$	M1	may be seen on diagram
	$OBC = \frac{180 - \text{their } 56}{2}$ or $OBC = 62$ and $ABO = 83 - \text{their } 62$ or $ABO = 21$	M1dep	may be seen on diagram, dep on 2nd and 3rd M1
	$ABO = 21$ and $ACO = 7$ and $21 : 7 = 3 : 1$	A1	all angle values must be seen

Q	Answer	Mark	Comments
12 cont	Alternative method 4 – using triangles OBC and ABC		
	$ACO = 90 - 83$ or $ACO = 7$	M1	may be seen on diagram
	Acute $BOC = 2 \times 28$ or acute $BOC = 56$	M1	may be seen on diagram
	$OBC = \frac{180 - \text{their } 56}{2}$ or $OBC = 62$	M1dep	may be seen on diagram or angle OCB dep on 2nd M1
	$ABO = 180 - 28 - 62 - 62 - 7$ or $ABO = 21$	M1dep	oe may be seen on diagram dep on M3
	$ABO = 21$ and $ACO = 7$ and $21 : 7 = 3 : 1$	A1	all angle values must be seen
	Additional Guidance		
	If angles are not correctly positioned on the diagram they must be correctly identified in the working, eg $BOC = 56$ is M0 if not correctly positioned on the diagram and not identified as acute		
	$ACO = 7$ and $ABO : ACO = 21 : 7$ with no other correct working		M1M0M0M0A0

Q	Answer	Mark	Comments
13	$\frac{5}{6} \times 96$ or 80	M1	oe eg $96 \div 6 \times 5$ implied by 176
	$\frac{1}{4} \times$ their 80 or 20	M1dep	oe eg $80 \div 4$
	$\frac{2}{3} \times 96$ or 64	M1	oe eg $96 \div 3 \times 2$ accept 0.66 or better for $\frac{2}{3}$
	84(.00)	A1	SC2 100.8(0) or [77.32, 77.34] condone incorrect money notation eg 84.0 or 84.00p
	Additional Guidance		
	SC2 for 100.8(0) is from misreading as Andrew gets £96		
	SC2 for [77.32, 77.34] is from $\frac{2}{3}$ of 80 plus $\frac{1}{4}$ of 96		
	Do not accept ' $\frac{5}{6}$ of 96' or ' $\frac{1}{4}$ of 80' or ' $\frac{2}{3}$ of 96' for M marks unless accompanied by a correct method or value		

Q	Answer	Mark	Comments
14	$\frac{30}{12}$ or 2.5	B1	oe fraction, mixed number or decimal eg $\frac{5}{2}$ or $2\frac{1}{2}$
	Additional Guidance		
	Ignore simplification or conversion attempt after correct answer seen eg $\frac{30}{12}$ in working with 2.6 on answer line		B1
	30 $\div$ 12 with no further correct work		B0

Q	Answer	Mark	Comments											
15	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(.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(...) or $1 : \frac{5}{6}$											
	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 £1.20 : £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"> <tr> <td>Coin</td><td>10p</td><td>2p</td><td>5p</td></tr> <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> </table>			Coin	10p	2p	5p	Number	45	360	120	Value	£4.50	£7.20
Coin	10p	2p	5p											
Number	45	360	120											
Value	£4.50	£7.20	£6.00											

Q	Answer	Mark	Comments
16	Alternative method 1		
	2450 ÷ (2 + 5) or 2450 ÷ 7 or 350	M1	oe
	their 350 × 5 or 1750 or their 350 × 2 or 700 or their 350 ÷ 4 or 87.5(0)	M1dep	oe $2450 \times \frac{5}{7}$ is M2 $2450 \times \frac{2}{7}$ is M2 2450 ÷ 28 is M2
	their 1750 ÷ 4 or (2450 – their 700) ÷ 4 or their 87.5(0) × 5 or 437.5(0)	M1dep	oe dep on M2 $350 \times \frac{5}{4}$ is M3
	437.5(0) and Yes	A1	accept 437.5(0) > 430
	Alternative method 2		
	2450 ÷ 4 or 612.5(0)	M1	oe
	their 612.5(0) ÷ (2 + 5) or their 612.5(0) ÷ 7 or 87.5(0)	M1dep	oe 2450 ÷ 28 is M2
	their 87.5(0) × 5 or their 612.5(0) – their 87.5(0) × 2 or 437.5(0)	M1dep	oe dep on M2 $612.5(0) \times \frac{5}{7}$ is M3
	437.5(0) and Yes	A1	accept 437.5(0) > 430

16 cont	Alternative method 3		
	430×4 or 1720	M1	
	$2450 \div (2 + 5)$ or $2450 \div 7$ or 350	M1	oe
	their 350×5 or 1750 or their 350×2 or 700	M1dep	oe dep on 2nd M $2450 \times \frac{5}{7}$ is M2 $2450 \times \frac{2}{7}$ is M2
	1720 and 1750 and Yes	A1	$2450 - 1720 = 730$ and 700 and Yes
	Alternative method 4		
	430×4 or 1720	M1	
	their $1720 \div 5$ or 344 or their 1720×2 or 3440	M1dep	oe
	their 344×2 or their $3440 \div 5$ or 688	M1dep	oe dep on M2 $1720 \times \frac{2}{5}$ is M3
	2408 and Yes	A1	
	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		
	$2450 \div 7 \times 1.25$ or 350×1.25		M1M1M1
	Yes may be implied eg They receive 7.50 more than 430		M3A1
	Condone £437.50p and Yes		M3A1

Q	Answer	Mark	Comments
17	Alternative method 1 – using Pythagoras' theorem or 3, 4, 5 triangle		
	16 ÷ 4 × 5 or 20 (cm) or identifies triangle as 3, 4, 5	M1	oe length of c may be on diagram
	$\sqrt{(\text{their } 20)^2 - 16^2}$ or $\sqrt{400 - 256}$ or $\sqrt{144}$ or 4×3	M1dep	
	12 (cm)	A1	length of b may be on diagram
	96	A1ft	ft $\frac{1}{2} \times 16 \times \text{their } 12$ with M2 awarded
	Alternative method 2 – using trigonometry and $\frac{1}{2}ab \sin C$ formula		
	16 ÷ 4 × 5 or 20 (cm)	M1	oe length of c may be on diagram
	$\cos^{-1}\left(\frac{16}{20}\right)$ or 36.8(...) or 36.9	M1dep	angle between sides a and c
	$\frac{1}{2} \times 16 \times 20 \times \sin(\text{their } 36.8(\dots))$	M1dep	dep on M2
	96	A1	
	Additional Guidance		
	$\frac{1}{2} \times 16 \times 12 \times \sin 90$		M1M1M1

Q	Answer	Mark	Comments
18(a)	Alternative method 1		
	$G \propto \sqrt{H}$ or $G = k\sqrt{H}$ or $16 \div 2 \times 3 = k\sqrt{16}$ or $24 = k\sqrt{16}$	M1	oe equation k may be any letter
	$k = \frac{\text{their } 24}{\sqrt{16}}$ or $k = 6$ or $G = \text{their } 6\sqrt{H}$	M1dep	their 24 must be the result of $16 \div 2 \times 3$
	their $6 \times \text{their } \sqrt{100}$ or 60	M1dep	dep on M2
	60 : 100 or 3 : 5	A1	oe ratio
	Alternative method 2		
	100 ÷ 16 or 6.25	M1	
	$\sqrt{\text{their } 6.25}$ or 2.5	M1dep	
	2 × their 2.5 or 5 or 24 × their 2.5 or 60	M1dep	dep on M2
	60 : 100 or 3 : 5	A1	oe ratio
	Additional Guidance		
	Ignore an incorrect attempt to simplify a correct ratio eg 60 : 100 followed by 3 : 4		M1M1M1A1
	$k = 6$ implies M2 unless from incorrect working		
	$G \propto k\sqrt{H}$ is M0 unless recovered		
	$G = k\sqrt{H}$ $\sqrt{16} = 4$ $G : H = 6 : 4$ $6 = k \times 4$ $k = \frac{6}{4}$ followed by $G = 1.5 \times 10$ 150 : 100		M1M0M0A0
	$G = 24$ with no correct further work		M0

Q	Answer	Mark	Comments
19	$3 + 7$ 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	

Q	Answer	Mark	Comments
20	$3^{11} (: 3^7)$ or $3^6 : 3^2$ or $3^5 : 3^{(1)}$ or $\frac{a}{3^7}$ or 177 147 : 2187	M1	oe eg 729 : 9 or 243 : 3 3^n may be implied by a multiplication string of n 3s a can be any value other than 3^7
	$\frac{3^{11}}{3^7} (: 1)$ or $\frac{3^6}{3^2} (: 1)$ or $3^6 \times 3^{-2} (: 1)$ or $\frac{3^5}{3^{(1)}} (: 1)$ or $3^{-1} \times 3^5 (: 1)$ or $3^4 (: 1)$ or $\frac{177\ 147}{2187} (: 1)$	M1dep	oe left-hand side with one or two components eg $\frac{729}{9} : 1$ or $243 \times \frac{1}{3} : 1$ allow $(: 1)$ to be $(: 3^0)$ 3^n may be implied by a multiplication string of n 3s
	81 : 1	A1	
	Additional Guidance		
	$\frac{3^6 \times 3^5}{3^7} (: 1)$ with no further work		M1M0A0
	81 : 1 or $3^4 (: 1)$ could be seen from incorrect working eg $\frac{9^{11}}{3^7} = 3^4$ Answer 81 : 1		M1M0A0

Q	Answer	Mark	Comments
21	11 : 10	B1	

Q	Answer	Mark	Comment
22	Alternative method 1 – combining the ratios		
	$21 : 35$ and $35 : 20$ or $(3 : 5 \text{ and }) 5 : \frac{20}{7}$ or $\frac{21}{5} : 7$ (and $7 : 4$)	M1	oe making the E term common allow as fractions with a common denominator eg $\frac{21}{35}$ and $\frac{20}{35}$
	$21 : 35 : 20$ or $3 : 5 : \frac{20}{7}$ or $\frac{21}{5} : 7 : 4$ or $\frac{21/5}{76/5}$ or $\frac{3}{76/7}$	M1dep	oe allow as integers 21 and 35 and 20 or as fractions with a common denominator eg $\frac{21}{35}$ and $\frac{35}{35}$ and $\frac{20}{35}$
	$\frac{21}{76}$	A1	
	Alternative method 2 – based on D		
	$\frac{5(D)}{3}$ and $\frac{20(D)}{21}$	M1	oe
	$\frac{21(D)}{21} + \frac{35(D)}{21} + \frac{20(D)}{21}$ or $\frac{76(D)}{21}$	M1dep	oe with common denominator
	$\frac{21}{76}$	A1	

22 (cont)	Alternative method 3 – based on E		
	$\frac{3(E)}{5}$ and $\frac{4(E)}{7}$	M1	oe
	$\frac{21(E)}{35} + \frac{35(E)}{35} + \frac{20(E)}{35}$ or $\frac{76(E)}{35}$	M1dep	oe with common denominator
	$\frac{21}{76}$	A1	
	Alternative method 4 – based on F		
	$\frac{21(F)}{20}$ and $\frac{7(F)}{4}$	M1	oe
	$\frac{21(F)}{20} + \frac{35(F)}{20} + \frac{20(F)}{20}$ or $\frac{76(F)}{20}$	M1dep	oe with common denominator
	$\frac{21}{76}$	A1	
	Additional Guidance		
	Allow unrounded decimal values throughout		

Q	Answer	Mark	Comments
23	Alternative method 1		
	$72 \div 6 \times 5$ or 60	M1	oe $72 \div 6 \times 11$ or 132 implies M1
	72×1.5 or 108	M1	oe eg $72 \times 3 \div 2$ 14×12 implies M2
	60 and 108 and 240 or $250 - 60 - 108 = 82$	A1	oe eg1 168 and 240 eg2 60 and 108 and 10 eg3 168 and $(250 - 72 =) 178$
	Alternative method 2		
	6×1.5 or 9	M1	oe eg1 $6 \times 3 \div 2$ eg2 $6 : 5 : 9$
	$72 \div 6 \times (6 + 5 + \text{their } 9)$ or $72 \div 6 \times 5$ and $72 \div 6 \times \text{their } 9$	M1dep	oe eg 12×20 14×12 implies M2
	9 and 240 or 60 and 108 and 240 or $250 - 60 - 108 = 82$	A1	oe eg1 168 and 240 eg2 60 and 108 and 10 eg3 168 and $(250 - 72 =) 178$
	Additional Guidance		
	Up to M2 may be awarded for correct work, with no or incorrect answer, even if this is seen amongst multiple attempts		
	In Alt 1 the 2nd mark is not dependent In Alt 2 the 2nd mark is dependent		
	240 alone or 240 with no correct method		M0
	$72 \div 6 \times 11 = 132$ and $132 + 108 = 240$		M1M1A1
	$1\frac{1}{2} \times 72 = 36$ and $72 + 36 = 108$ and $72 + 60 + 108 = 240$		M1M1A1
	$1\frac{1}{2} \times 72 = 36$		M1
	$1\frac{1}{2}$ of 72 = 36		M0
	$72 \div 11$		M0

Q	Answer	Mark	Comments
24	Alternative method 1		
	$0.49 \times (250 + 50)$ or 0.49×300 or 147	M1	oe
	their $147 - 128$ or 19	M1dep	
	19 : 31	A1	SC2 answer 31 : 19
	Alternative method 2		
	$(1 - 0.49) \times (250 + 50)$ or 0.51×300 or 153	M1	oe
	their $153 - 122$ or 31	M1dep	
	19 : 31	A1	SC2 answer 31 : 19
	Additional Guidance		
	Up to M2 may be awarded for correct work, with no or incorrect answer, even if this is seen amongst multiple attempts		
	147 : 153 or 153 : 147		M1M0A0
	0.49 : 0.51		M0M0A0
	Beware of 147 and 153 from incorrect working $122 + 25 = 147$ $128 + 25 = 153$		M0 M0

Q	Answer	Mark	Comments
25	$\frac{1}{4}x + 15 + \frac{2}{3}x - 44 = 180$	M1	oe equation
	$\frac{1}{4}x + \frac{2}{3}x = 180 - 15 + 44$ or $3x + 180 + 8x - 528 = 2160$	M1dep	oe equation with terms collected eg $\frac{11}{12}x = 209$ or oe equation with fractions eliminated eg $11x = 2508$
	$(x =) 209 \div \frac{11}{12}$ or $(x =) 228$	M1dep	oe calculation that leads to $(x =) 228$ eg $(x =) 2508 \div 11$ implied by 72 and 108
	72 : 108	A1	oe ratio eg 2 : 3 or 1 : 1.5 or $\frac{2}{3} : 1$
	Additional Guidance		
	Ignore simplification attempt after correct ratio seen eg 72 : 108 in working with answer 36 : 52		M3A1
	Accept [0.66, 0.67] for $\frac{2}{3}$		
	Accept [0.91, 0.92] for $\frac{11}{12}$		
	Accept [1.09, 1.1] for $\frac{12}{11}$		

Q	Answer	Mark	Comments
26	Alternative method 1: works out a scale factor		
	$\frac{1}{2} \times 3(L) \times 4(L) \times 12(L)$ or $72(L^3)$ where L is any variable or any positive value	M1	oe volume eg ($L = 2$) $\frac{1}{2} \times 6 \times 8 \times 24$ or 576
	$1125 \div \text{their } 72$ or $\frac{125}{8}$ or 15.625	M1dep	oe eg $1125 \times 2 \div (3 \times 4 \times 12)$ eg ($L = 2$) $1125 \div \text{their } 576$ or $\frac{125}{64}$
	$\sqrt[3]{\text{their } \frac{125}{8}}$ or $\frac{5}{2}$ or 2.5	M1dep	oe eg ($L = 2$) $\sqrt[3]{\text{their } \frac{125}{64}}$ or $\frac{5}{4}$ or 1.25
	$2 \times 3 \times \text{their } 2.5 + 2 \times 4 \times \text{their } 2.5$ $+ 2 \times 5 \times \text{their } 2.5$ $+ 3 \times 12 \times \text{their } 2.5$	M1dep	oe eg ($L = 2$) $2 \times 6 \times \text{their } 1.25 + 2 \times 8 \times \text{their } 1.25$ $+ 2 \times 10 \times \text{their } 1.25$ $+ 3 \times 24 \times \text{their } 1.25$
	150	A1	SC4 [119, 119.1]

26 cont	Alternative method 2: works out a value of a, b, c or d		
	Correct expression for volume in terms of a or b eg $\frac{1}{2} \times a \times \frac{4a}{3} \times \frac{12a}{3}$ or $\frac{8a^3}{3}$ or $\frac{1}{2} \times \frac{3b}{4} \times b \times \frac{12b}{4}$ or $\frac{9b^3}{8}$	M1	oe in terms of c or d eg $\frac{1}{2} \times \frac{3c}{5} \times \frac{4c}{5} \times \frac{12c}{5}$ or $\frac{72c^3}{125}$ or $\frac{1}{2} \times \frac{3d}{12} \times \frac{4d}{12} \times d$ or $\frac{d^3}{24}$ may be implied by an equation eg $a \times \frac{4a}{3} \times \frac{12a}{3} = 1125 \times 2$
	$a^3 = 1125 \div \text{their } \frac{8}{3}$ or $a^3 = \frac{3375}{8}$ or $b^3 = 1125 \div \text{their } \frac{9}{8}$ or $b^3 = 1000$	M1dep	oe eg $c^3 = 1125 \div \text{their } \frac{72}{125}$ or $c^3 = \frac{15\,625}{8}$ or $d^3 = 1125 \div \text{their } \frac{1}{24}$ or $d^3 = 27\,000$
	$a = \sqrt[3]{\text{their } \frac{3375}{8}}$ or $a = 7.5$ or $b = \sqrt[3]{1000}$ or $b = 10$	M1dep	oe eg $c = \sqrt[3]{\text{their } \frac{15\,625}{8}}$ or $c = 12.5$ or $d = \sqrt[3]{27\,000}$ or $d = 30$
	$2 \times \text{their } a + 2 \times \frac{4}{3} \times \text{their } a$ $+ 2 \times \frac{5}{3} \times \text{their } a + 3 \times \frac{12}{3} \times \text{their } a$ or $2 \times \frac{3}{4} \times \text{their } b + 2 \times \text{their } b$ $+ 2 \times \frac{5}{4} \times \text{their } b + 3 \times 3 \times \text{their } b$	M1dep	oe correct method using their c or their d
	150	A1	SC4 [119, 119.1]
	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		