1			648	M2	a complete method, eg $12.5 \times 1000 \div 19.3$	
				[M1	for using volume = mass/density, eg $12500 \div 19.3$ (condone inconsistent units or incorrect conversions) may be implied by digits 647... or 648...]	
				A1	for answer in range 647 to 648	

2		No (supported)		P1	For a process to calculate the initial or new pressure, eg $(70 + 10) \div (20 + 10)$ (=2.6 to 2.7) **or** $80 \div 30$ (=2.6 to 2.7) **or** $70 \div 20$ (=3.5)	Accept any value in the range 2.6 to 2.7 if unsupported by working
				P1	For a complete process to make a comparison eg. $0.8 \times$ "3.5" (=2.8) **OR** $\frac{("3.5" - "2.6")}{"3.5"} \times 100$ (=22 to 26) **OR** "3.5" $\times\, 0.2$ (=0.7) **and** $80 \div 30$ (=2.6 to 2.7) **OR** $\frac{"2.6"}{"3.5"}$ ($\times\, 100$) (=0.74 to 0.78 **or** 74 to 78)	
				A1	for a correct conclusion supported by accurate figures eg **2.8 and 2.6(6…)** **OR** decrease is 24% (or 22% to 26%) **OR** 0.7 **and** 2.6 to 2.7 **and** 3.5 **OR** 0.7 **and** 0.9 **OR** 0.76 (or 0.74 to 0.78) **OR** 76% (or 74% to 78%)	Allow truncation or rounding of figures

3		0.43		B1	for one correct bound for mass or length eg 1967.5 **or** 1972.5 **or** 13.15 **or** 15.95 **or** 21.65 **or** 13.25 **or** 16.05 **or** 21.75	Can work in any units
				P1	for a correct process to find a bound for the volume, eg $13.15 \times 15.95 \times 21.65$ (=454(.925125)) or $13.25 \times 16.05 \times 21.75$ (=462(.5409375))	Accept volumes truncated or rounded to at least 3 sig fig
				P1	for a correct process to find a bound for density, eg [mass LB] $\div$ "462(.5409375)" (=0.425(367755)) where $1965 \leq$ mass LB < 1970 or [mass UB] $\div$ "454(.925125)" (=0.434(3828506)) where $1970 <$ mass UB ≤ 1975	Accept densities truncated or rounded to at least 3 sig fig
				A1	for both correct bounds, 0.425(367755) **and** 0.434(3828506)	Accept bounds truncated or rounded to at least 3 sig fig At this point correct units must be used
				C1	(dep on A1) for a correct statement on degree of accuracy e.g. UB and LB both round to 0.43 to 2 decimal places or 2 significant figures	Must be 0.43 not 0.4

4	(a)	16 to 20		P1	for using time $= \frac{\text{distance}}{\text{speed}}$, eg $\frac{1}{200}$ or $\frac{1}{213}$ or for 1 hour $= 60 \times 60$ (= 3600) seconds	
				P1	complete process, eg $\frac{1}{200} \times 60 \times 60$ oe or $\frac{1}{213} \times 60 \times 60$ oe	Calculation could be done in stages.
				A1	for answer in range 16 to 20	
	(b)	decision with reason		C1	(dep on correct use of time $= \frac{\text{distance}}{\text{speed}}$) for reason related to their response to part(a), eg overestimate as speed rounded down	

5	(a)	130		P1	for process to divide eg $(3.9 \times 10^7) \div (3 \times 10^5)$	Condone missing brackets
				A1	cao	Accept 1.3×10^2
	(b)	Explanation		C1	Explanation referring to the time **Acceptable examples** The time will be more It will take longer The answer will be bigger **Not acceptable examples** The answer will be wrong The answer will be different	

6	1.01	P1	for 1.09 × 60 (= 65.4 or $\frac{327}{5}$) or 0.97 × 128 (= 124.16 or $\frac{3104}{25}$)	Note that the volumes may be converted to ml, eg 1.09 × 60000 (= 65400)
		P1	for 1.09 × 60 (= 65.4 or $\frac{327}{5}$) **and** 0.97 × 128 (= 124.16 or $\frac{3104}{25}$) or "65.4" + "124.16" (= 189.56 or $\frac{4739}{25}$)	
		P1	for a complete process to find the density of antifreeze eg ("65.4" + "124.16") ÷ 188 or 189.56 ÷ 188 or $\frac{4739}{25}$ ÷188	Candidates working in ml must use 188,000
		A1	for answer in the range 1.00 to 1.01	If an answer within the range is seen in working but then rounded incorrectly award full marks. Accept 1 for 1.00 Note that the correct value is 1.008.....

7	(i)	Distance in the range 20 to 23	P1	for a process to draw a bearing of 070°, eg. a line drawn 70° from the North line at *P*	Accept a line of any length as long as the intention is clear.
	(ii)	Bearing in the range 317 to 330	P1	for a process to work out the distance *PQ*, eg. 12 × 1.5 (= 18)	
			P1	(dep previous P1) for the process to use the given scale, eg. "18" ÷ 4 (= 4.5 cm)	Award P3 for Q shown in the correct place on the diagram. 4.5 scores 2 marks provided there is a link to 12 × 1.5 (= 18)
			A1	(dep P3) for distance in the range 20 to 23	Award no marks if no supportive processes
			A1	(dep P3) for bearing in the range 317 to 330	Award no marks if no supportive processes Award A0A0 if *Q* is not in the correct place

8	(a)	21.6	M1	for a method using distance = speed × time, eg. 72 × $\frac{18}{60}$ or 7.2 km in 6 minutes, so 7.2 × 3 oe partitioning method	Accept 72 × 18
			A1	for 21.6 oe	
	(b)	No (supported)	M1	for a method to convert 20 m/s to km/h or 72 km/h to m/s, eg. 20 × $\frac{3600}{1000}$ (= 72) or 72 × $\frac{1000}{3600}$ (= 20)	Accept methods to convert **both** speeds to km/s or m/h
			C1	for No since 72 km/h = 20 m/s oe	

9	50	B1	for finding the time difference, eg, 1hr 18 mins or 78 mins oe	Allow 1.18 for this mark 118 scores B0
		P1	for correct process to convert minutes to hours, eg 18 ÷ 60 (=0.3) or 78 ÷ 60 (=1.3) or for a correct process to convert speed in miles per minute to mph eg "0.833.." × 60	For a conversion of time or speed
		P1	for using speed = distance ÷ time eg, 65 ÷ [time] or 65 ÷ 78 (=0.833..)	[time] is what the candidate clearly indicates as time difference
		A1	cao SCB2 for 83(.333…) seen as the answer	

10	739	P1	process to find the volume of C, eg π × 3² × 25 (= 706.8583471 or 225π)	For use of 3.14 Volume of C is 706.5
		P1	process to find the volume of A or the volume of B, eg "706.8…" × $\frac{2}{2+13}$ (= 94.24777961 or 30π) or "706.8…" × $\frac{13}{2+13}$ (= 612.6105675 or 195π) **or** process to work with density and ratio, eg (2 × 1.21 + 13 × 1.02) (= 15.68)	Volume of A is 94.2 Volume of B is 612.3
		P1	process to find the mass of C, eg "30π" × 1.21 (= 114.0398133) + "195π" × 1.02 (= 624.8627788) or "225π" × "15.68" ÷ (2+13)	Mass of A is 113.982 Mass of B is 624.546
		A1	for an answer in the range 738.5 to 739	Do not award accuracy mark if the figure is from obvious incorrect working

11	450	M1	for 18 ÷ 3 (=6)	Ignore units
		M1	for substitution eg. 75 = $\frac{F}{"6"}$ or 75 × "6"	
		A1	cao	

12	196	P1	for vol A = 1400 ÷ 70 (=20) or for mass B = 280 × 30 (=8400)	
		P1	for density C = $\frac{1400 + "8400"}{"20" + 30}$ (= $\frac{9800}{50}$) or answer with digits 196	
		A1	cao	An answer of 350 from 70 + 280 gets no marks

13	1.6	P1	for 1.8 × 80 (= 144) or 1.2 × 40 (= 48) or for 192 or for 80 : 40 = 2 : 1	
		P1	for ("144" + "48") ÷ (80 + 40) or 192 ÷ 120 or for (1.8 × 2 + 1.2) ÷ 3 or 4.8 ÷ 3	
		A1	oe	