Paper: 1MA1/2H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
20 **Q1**	160 (supported)	B1	stating bound of 10.85 or 10.95	Accept 10.949 or 10.9499... for 10.95
		M1	using both UB **and** LB to work out value of d eg [UB of c]^3 ÷ 8 **and** [LB of c]^3 ÷ 8 **or** gives a bound of 159.66... from correct working **or** gives a bound of 164.11... from correct working	$10.9 < UB \leq 10.98$ $10.85 \leq LB < 10.9$
		A1	for 159.66... **and** 164.11... from correct working	Accept bounds rounded or truncated to at least 4 sig fig
		C1	for 160 from 159.66... and 164.11... with a supporting reason eg "since both UB and LB round to 160"	

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Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
16 **Q2**	17.4	B1	for stating any correct bound, eg. 6.75 or 6.85 or 0.045 or 0.055	Accept 6.84$\dot{9}$ or 6.8499... for 6.85 and 0.054$\dot{9}$ or 0.05499.. for 0.055
		M1	using both UB of e and LB of f to work out value of $2e \div f$, eg 2[UB of e] ÷ [LB of f] or $\frac{2\times 6.85}{0.045}$	$6.8 < \text{UB}(e) \leq 6.85$ $0.045 \leq \text{LB}(f) < 0.05$
		A1	for answer in the range 17.4 to 17.5 from correct working	If an answer is given in the range in working and then rounded incorrectly award full marks. Award 0 marks for a correct answer with no (or incorrect) supportive working

Paper: 1MA1/3H				
Question	**Working**	**Answer**	**Mark**	**Notes**
16 **Q3**		Yes and correct working	B1 P1 A1	for 147.5 or 148.5 or 148.4999... or 11.75 or 11.85 or 11.84999... substitutes $11.8 < UB \leq 11.85$ and $147.5 \leq LB < 148$ in the formula to work out petrol consumption for 'Yes' and 8.03(3898305...) from correct working

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Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
21 **Q4**	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 × 15.95 × 21.65 (=454(0.925125)) **or** 13.25 × 16.05 × 21.75 (=462(5.409375))	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] ÷ "462(5.409375)" (=0.425(367755)) where 1965 ≤ mass LB < 1970 **or** [mass UB] ÷ "454(0.925125)" (=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

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Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
19 (a)	81.0662	M1	for one of 26.15 or 26.25 or 4.25 or 4.35	Accept $26.24\dot{9}$ for 26.25 and $4.34\dot{9}$ for 4.35
		M1	for a correct process to find the upper bound for D [UB of u]^2 ÷ [2 × LB of a] eg $\frac{26.25^2}{2\times 4.25}$ where 26.2 < UB of $u \leq 26.25$ and $4.25 \leq$ LB of $a < 4.3$	Award for $\frac{26.25^2}{4.25}$
Q5		A1	for answer given in the range 81.0661 to 81.0662 from correct working	
(b)	80	B1	for 80 ft answer to (a) with 78.6003	
	explanation	C1	for explanation relating to the upper bound found in (a) **Acceptable examples** bounds agree when rounded to 80 bounds agree to nearest 10 **Not acceptable examples** 80 79.83325 rounded to nearest tenth	

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Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
21 **Q6**	984.(3677853) and 969.(0181643)	B1	stating bound of 51.95 or 52.05 or 1.445 or 1.455	Accept $52.04\dot{9}$ or 52.0499… for 52.05 Accept $1.45\dot{4}9$ or 1.4549… for 1.455
		P1	for process to rearrange formula to give g as the subject, eg $g=\frac{4\pi^2 l}{T^2}$ oe	Rearrangement may occur after substitution, in this case correct bounds are not needed for this mark
		P1	for process to use LB of l **and** UB of T in formula for g or T **or** process to use UB of l **and** LB of T in formula for g or T eg $\frac{4\pi^2[\text{LB of } l]}{[\text{UB of } T]^2}$ or $\frac{4\pi^2[\text{UB of } l]}{[\text{LB of } T]^2}$	51.95 ≤ [LB of l] < 52.0 1.45 < [UB of T] ≤ 1.455 52.0 < [UB of l] ≤ 52.05 1.445 ≤ [LB of T] < 1.45 Rearrangement may not be correct
		A1	for upper bound = 984.(3677853) or 984.(1125639..) **and** lower bound = 969.(0181643) or 968.(7669227..)	NB: correct answer without supportive working gets 0 marks Accept answers rounded or truncated to 3sf or better

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Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
18 **Q7**	2.7 with statement	B1 B1 P1 A1 C1	for 179.5 or 180.5 or 180.4999... for 486.5 or 487.5 or 487.4999... for a correct process to find a bound for average speed, eg [upper bound of distance] ÷ [lower bound of time] where 487 < [UB of distance] ≤ 487.5 and 179.5 ≤ [LB of time] < 180 **or** for [lower bound of distance] ÷ [upper bound of time] where 486.5 ≤ [LB of distance] < 487 and 180 < [UB of time] ≤ 180.5 (dep on all previous marks) for 2.695(2…) **and** 2.715(8 …) with both values clearly coming from working with correct values for 2.7 from 2.695… and 2.715… **and** statement that both LB and UB round to 2.7	 Accept bounds truncated or rounded to at least 4 sig fig

Paper: 1MA1/2H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
23 **Q8**	20	B1	stating bound, eg 10.65 **or** 10.55 **or** 31 min 48.5sec **or** 31 min 47.5sec **or** 1908.5sec **or** 1907.5sec	
		P1	(dep on B1) for a correct bound for time in hours, eg 0.5301(38…) **or** 0.5298(61…) **Or** a correct process to find one bound for speed in km per minute eg [UB of S] = [UB of D]÷[LB of T] or [LB of S] = [LB of D]÷[UB of T] **or** a correct process to find one bound for speed in km per second eg [UB of S] = [UB of D]÷[LB of T] or [LB of S] = [LB of D]÷[UB of T]	Bound rounded or truncated to 4 dp Where $10.6 < [\text{UB of D}] \leq 10.65$ **and** $31 \text{ min } 47.5 \text{ sec} \leq [\text{LB of T}] < 31 \text{ min } 48 \text{ sec}$ **Or** $10.55 \leq [\text{LB of D}] < 10.6$ **and** $31 \text{ min } 48 \text{ sec} < [\text{UB of T}] \leq 31 \text{ min } 48.5 \text{ sec}$ Where $10.6 < [\text{UB of D}] \leq 10.65$ **and** $1907.5 \text{ sec} \leq [\text{LB of T}] < 1908 \text{ sec}$ **Or** $10.55 \leq [\text{LB of D}] < 10.6$ **and** $1908 \text{ sec} < [\text{UB of T}] \leq 1908.5 \text{ sec}$
		P1	(dep on P1) for correct process to find one bound for speed in km per hour, eg [UB of S] = [UB of D]÷ 0.5298(61…) **or** [LB of S] = [LB of D]÷ 0.5301(38…) **OR** Correct process to convert a bound for speed in km per minute to km per hour eg [UB of S] = [UB of D]÷[LB of T] × 60 **or** [LB of S] = [LB of D]÷[UB of T] × 60 **OR** Correct process to convert a bound for speed in km per second to km per hour eg [UB of S] = [UB of D]÷[LB of T] × 60 × 60 **or** [LB of S] = [LB of D]÷[UB of T] × 60 × 60	Time used in hours Where $10.6 < [\text{UB of D}] \leq 10.65$ **and** $31 \text{ min } 47.5 \text{ sec} \leq [\text{LB of T}] < 31 \text{ min } 48 \text{ sec}$ **Or** $10.55 \leq [\text{LB of D}] < 10.6$ **and** $31 \text{ min } 48 \text{ sec} < [\text{UB of T}] \leq 31 \text{ min } 48.5 \text{ sec}$ Where $10.6 < [\text{UB of D}] \leq 10.65$ **and** $1907.5 \text{ sec} \leq [\text{LB of T}] < 1908 \text{ sec}$ **Or** $10.55 \leq [\text{LB of D}] < 10.6$ **and** $1908 \text{ sec} < [\text{UB of T}] \leq 1908.5 \text{ sec}$
		A1	for both correct bounds from correct working, 20.099… **and** 19.900…	Figures rounded or truncated to 3 sf or better
		C1	for 20 correct to 2 significant figures as both bounds agree.	

Paper: 1MA1/3H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
18 **Q9**	6.495190528	B1 M1 M1 A1	for 11.25 or 11.35 use $a^2 + a^2 + a^2$ oe for the square of the length of a diagonal for writing an equation to find the length of a side, eg $a^2 + a^2 + a^2 = [LB]^2$ where $11.25 \leq LB < 11.3$ oe for an answer in the range 6.49 to 6.50	If the answer is given in the range 6.49 to 6.5 without supportive evidence award 0 marks.