Mark Scheme

Q1.

Question	Answer	Mark	Mark scheme	Additional guidance
(a)	3.0×10^9	P1	for correct process, eg $10^5 \times 365 \times 81$ or for a correct answer not written in standard form, eg 2956500000 or $2.9(565) \times 10^n$ where $n \neq 9$ oe	Values may be rounded. Allow 350, 360, 366, 370, 400 and 80, 100
		A1	for an answer in the range 2.8×10^9 to 4.0×10^9	
(b)	4.5×10^{-11}	P1	for correct process, eg $\frac{90}{2\times10^{12}}$ **or** for correct answer not written in standard form, eg 45×10^{-12} or 0.45×10^{-10} **or** 4.5×10^n where $n \neq -11$	Allow $90 \div 2 \times 10^{12}$
		A1	cao	

(**Q10 1MA1/3H, Nov 2020**)

Q2.

Paper 1MA1: 1H				
Question	Working	Answer	Notes	
(a)		2.5×10^{24}	P1	process to estimate or divide
			P1	a complete process eg. $(1 \times 10^3) \div (4 \times 10^{-22})$
			A1	
(b)		Under-estimate	C1	ft from (a) Eg. under estimate as number rounded up but in denominator of fraction

(**Q11 1MA1/1H/N, Specimen papers**)

Q3.

Question	Working	Answer	Mark	Notes
7		0.000 745 2	M1	digits 7452 seen
			A1	cao

(**Q07 1MA1/3H, Nov 2017**)

Q4.

Question	Working	Answer	Mark	Notes
		1.8×10^{-3}	M2	for $\frac{6\times10^{-2}\times3\times10^{-4}}{1\times10^{-2}}$ or 18×10^{-4} or 0.0018 as the answer
			(M1	for 6×0.0003 **or** 0.06×0.03 **or** 1.8×10^{n} $(n \neq -3)$ **or** $0.000018 \div 0.01$ **or** rewriting one number in standard form)
			A1	cao

(Q21 1MA1/1F, Nov 2017)

Q5.

Question	Working	Answer	Mark	Notes
		0.000 7452	M1	for digits 7452 seen
			A1	cao

(Q25 1MA1/3F, Nov 2017)

Q6.

Question	Working	Answer	Mark	Notes
		8×10^{4}	B1	cao

(Q25 1MA1/1F/M2, Specimen papers)

Q7.

Question	Working	Answer	Mark	Notes
(a)		Shown	M1	for distance ÷ speed to find time, e.g. $(1.496 \times 10^{11}) \div (3 \times 10^{8})$ (= 498.666)
			M1	(dep) for conversion to hours, e.g. "498.666" ÷ (60 × 60)
			A1	0.1385185185…
(b)		Explanation	C1	correct explanation, e.g. they have multiplied the indices rather than adding

(Q28 1MA1/2F/M2, Specimen papers)

Q8.

Question	Working	Answer	Mark	Notes
(a)		Shown	M1	for distance ÷ speed to find time, e.g. $(1.496 \times 10^{11}) \div (3 \times 10^{8})$ (= 498.666)
			M1	(dep) for conversion to hours, e.g. "498.666" ÷ (60 × 60)
			A1	0.1385185185…
(b)		Explanation	C1	correct explanation, e.g. they have multiplied the indices rather than adding

(Q07 1MA1/2H/M2, Specimen papers)

Q9.

Paper 1MA1: 3H			
Question	Working	Answer	Notes
		6.8×10^{-5}	B1

(Q08 1MA1H/3H/N, Specimen papers)

Q10.

Question		Working	Answer	Mark	Notes
	(a)		36000	1	B1 cao
	(b)		5.96×10^{-8}	2	M1 $(2.8 \div 4.7) \times 10^{-2-5}$ or $0.595\ldots \times 10^{-7}$ or $5.95\ldots \times 10^{-8}$ or 0.0000000596 A1 cao

(Q09 1MA1/2H/M1, Specimen papers)

Q11.

Paper 1MA1: 3H			
Question	Working	Answer	Notes
(a)		4.23×10^{-4}	B1
(b)		45000	B1

(Q19 1MA1/3H/S1, Specimen papers)

Q12.

Question	Working	Answer	Mark	Notes
(a)		0.47	B1	
(b)		2.28×10^9	M1	for correct value but not in standard form, eg $22.8 \times 10^{3+5}$, 228×10^7, 2 280 000 000 or for 2.28×10^n, $n \neq 9$
			A1	cao

(**Q15 1MA1/2F, June 2017**)

Q13.

Paper 1MA1: 1H			
Question	**Working**	**Answer**	**Notes**
(a)		5.7×10^{26} to 6×10^{26}	B1 uses estimates eg 1.899 to 1.9 or 2 M1 process of multiplication eg 0.57×10^{27} A1 between 5.7×10^{26} and 6×10^{26}
(b)		explanation	C1 eg underestimate a number is rounded up

(**Q08 1MA1/1H/S1, Specimen papers**)

Q14.

Question	Answer	Mark	Mark scheme	Additional guidance
(a)	0.000675	B1	cao	
(b)	6.592×10^5	M1	for 10.5472×10^3 oe or 1.6×10^8 oe or 2.575×10^{-1} oe or for 6.592×10^n where $n \neq 5$ or for 6.59×10^5 or for 6.6×10^5 or for 659200 oe	If the answer (for 2 marks) is seen in working and then rounded or truncated, award full marks.
		A1	cao	

(**Q29 1MA1/3F, Nov 2022**)

Q15.

Question	Answer	Mark	Mark scheme	Additional guidance
	2.3×10^6	M1	for 2.3×10^n where $n \neq 6$ **or** 23×10^5 or 2300000 **or** 2645000000 and 1150 seen	2300000 could be written as 2.3 million
		A1	cao	

(**Q18 1MA1/3F, June 2018**)

Q16.

Paper 1MA1: 1H			
Question	**Working**	**Answer**	**Notes**
		2.7×10^4	M1 For evidence of a correct method eg. $27 \times 10^{-4+7}$ A1

(Q09 1MA1/1H/N, Specimen papers)

Q17.

Question	Answer	Mark	Mark scheme	Additional guidance
(a)	0.000675	B1	cao	
(b)	6.592×10^5	M1	for 10.5472×10^3 oe or 1.6×10^8 oe or 2.575×10^{-1} oe or for 6.592×10^n where $n \neq 5$ or for 6.59×10^5 or for 6.6×10^5 or for 659200 oe	If the answer (for 2 marks) is seen in working and then rounded or truncated, award full marks.
		A1	cao	

(Q09 1MA1/3H, Nov 2022)

Q18.

Question	Answer	Mark	Mark scheme	Additional guidance
(a)	1 : 50	M1	for an equivalent ratio eg 9 : 450 **or** 9 : 4.5×10^2 **or** 90000 : 4500000 oe **or** for 4500000 ÷ 90000 or $\frac{4500000}{90000}$ (=50)	
		A1	For 1 : 50, accept $n = 50$	
(b)	56250×10^{-3} 0.005625×10^5 5625 5.625×10^4	M1	for writing numbers correctly in a common format eg 56250, 56.25, 562.5 **or** a correct list with one error **or** correct list but in reverse order	Count an omission as one error.
		A1	for correct list	Accept alternative indications of the correct order.

(Q28 1MA1/3F, June 2023)

Q19.

Question	Working	Answer	Notes
		1 : 2.53	P1 for substituting values to find surface gravity of either Earth (= 9.805..) or Jupiter (= 24.796..) P1 for complete process A1 for 1 : 2.528 to 2.53

(**Q10 1MA1/3H/S2, Specimen papers**)

Q20.

Question	Working	Answer	Mark	Notes
(a)		5.49×10^{-3}	B1	cao
(b)		6.4×10^{7}	M1 A1	for method to square each element, e.g. 64 and $10^{3\times2}$ or method to convert to ordinary numbers and square, e.g. 8000×8000 cao
(c)		8.47×10^{5}	M1 A1	for method to convert to ordinary numbers, e.g. 760 000 + 87 000 or $7.6 \times 10^{5} + 0.87 \times 10^{5}$ cao

(**Q07 1MA1/1H/M3, Specimen papers**)

Q21.

Question	Working	Answer	Mark	Notes
(a)		26730	B1	cao
(b)		7.04×10^{-2}	B1	cao
(c)		1.5×10^{8}	M1 A1	for 150 000 000 or 1.5×10^{n} where $n \neq 8$ cao

(**Q26 1MA1/3F/M3, Specimen papers**)

Q22.

Question	Answer	Mark	Mark scheme	Additional guidance
(a)	7.547×10^{-5}	B1	cao	
(b)	34200	B1	cao	
(c)	3.082×10^{15}	M1	for $\frac{23000\times6700}{0.00000005}$ **OR** for one calculation eg 1.541×10^{8} **or** 154 100 000 **or** 4.6×10^{11} **or** 1.34×10^{11}	
		A1	for 3.082×10^{15} oe	Answer could be given as an ordinary number.

(**Q27 1MA1/2F, Nov 2018**)

Q23.

Question	Answer	Mark	Mark scheme	Additional guidance
(a)	5.62×10^{-3}	B1	cao	
(b)	1452	B1	cao	

(**Q27 1MA1/2F, June 2019**)

Q24.

Question	Answer	Mark	Mark scheme	Additional guidance
	4.56×10^{-2}	M1	for $0.000000342 \div 0.0000075$ **OR** for 0.0456 oe eg 0.456×10^{-1} **or** 45.6×10^{-3} **or** $\frac{57}{1250}$ **OR** for an answer of 4.56×10^{n}	
		A1	cao	

(**Q07 1MA1/2H, Nov 2019**)

Q25.

Question	Answer	Mark	Mark scheme	Additional guidance
(a)	3.246×10^7	B1	cao	
(b)	0.00496	B1	cao	
(c)	No with explanation	C1	No and explanation that B is bigger as the power of 10 is bigger. **Acceptable examples** She is incorrect as 10^8 is smaller than 10^9 No, because B has more digits than A No, A is millions but B is billions No, if you subtract A from B the answer is positive (but if you subtract B from A the answer is negative) A= 621200000, B=4730000000, B is bigger No because she did not take into account standard form No as when you find the ordinary number B is greater than A **Not acceptable examples** Yes… A = 5 zeros after the number where as B = 7 zeros after the number No as 4.73×10^9 is one more than 6.212×10^8 6.212 is to the power of 8 and 4.73 is to the power of 9 so there is an extra digit Asma is wrong because she has more numbers behind the decimal point which means that it will be bigger than A No B has more zeros	Decision eg "No" may be seen by the question. "She is incorrect" is equivalent to "no"

(**Q07 1MA1/3H, Nov 2019**)

Q26.

Question	Answer	Mark	Mark scheme	Additional guidance
	0.000 672, 67.2×10^{-4} 6.72×10^5 672×10^4	B2 (B1	cao for correct conversions to same format, condoning one error **or** for 3 numbers in the correct order (ignoring one) **or** for all 4 numbers listed in reverse order)	Accept correct numbers in any form

(**Q09 1MA1/1H, Nov 2020**)

Q27.

Question	Answer	Mark	Mark scheme	Additional guidance
(a)	0.00163	B1	cao	
(b)	4.38×10^{5}	B1	cao	
(c)	2.4×10^{-1}	M1	for $4\times6\times10^{3-5}$ **or** 0.24 oe eg 24×10^{-2} **or** 2.4×10^{n} where $n\neq-1$	
		A1	cao	

(**Q26 1MA1/1F, June 2022**)

Q28.

Question	Answer	Mark	Mark scheme	Additional guidance
(a)	4.68×10^{5}	B1	cao	
(b)	0.000 503 7	B1	cao	

(**Q01 1MA1/3H, Nov 2023**)

Q29.

Question	Answer	Mark	Mark scheme	Additional guidance
(a)(i)	53 000	B1	cao	
(ii)	0.000 074	B1	cao	
(b)	3.42×10^{7}	M1	for 9 700 000 + 24 500 000 (= 34 200 000) **or** 3.42×10^{n} $(n\neq7)$ oe **or** 3.4×10^{7} **or** correct answer in incorrect form eg 34.2×10^{6} **or** both in a form ready for addition, eg $9.7\times10^{6}+24.5\times10^{6}$	
		A1	cao	

(**Q23 1MA1/3F, June 2024**)

Q30.

Question	Answer	Mark	Mark scheme	Additional guidance
	3.125×10^{7}	M1	for $(k=)\ (1.25\times10^{-12})\div(4\times10^{-20})$ **or** for the digits 3125	Can condone missing brackets on division 3.1×10^{7} or 3.12×10^{7} or 3.13×10^{7} will score M1A0
		A1	cao	

(**Q08 1MA1/2H, Nov 2024**)

Q31.

Question	Answer	Mark	Mark scheme	Additional guidance
(a)	340 200	B1	cao	
(b)	8.026×10^{-1}	B1	cao	

(**Q02 1MA1/3H, Nov 2024**)

Q32.

Question	Answer	Mark	Mark scheme	Additional guidance
(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	

(**Q11 1MA1/3H, June 2019**)

Q33.

Question	Working	Answer	Mark	Notes
(a)		6.66×10^7	M1	for $6.5 \times 10^7 \times 1.006^4$
			A1	for 6.66×10^7 or $6.657(\ldots) \times 10^7$
(b)		explanation	C1	for explanation, e.g. growth is compound not simple oe, increase in population changes each year oe
(c)		Correct argument	M1	for method to find the common ratio, e.g. finds population in 3 successive yrs or 1.006
			C1	for convincing conclusion, e.g. terms are generated by multiplying previous term by 1.006 so a geometric progression is formed

(**Q10 1MA1/2H/M3, Specimen papers**)

Q34.

Question	Answer	Mark	Mark scheme	Additional guidance
(a)	8.623×10^{-5}	B1	cao	
(b)	7.44×10^{6}	M1	for $\frac{3200+0.051}{0.00043}$ or $\frac{3200.051}{0.00043}$ **or** performs an operation eg shows 163.2, 7441860.5, 118.6(…) **or** an answer or $7.44(\ldots.) \times 10^{n}$ where $n \neq 6$ or $7441979(\ldots.)$ **or** an answer of 7.4×10^{6}	7441979.0689…
		A1	for $7.44(1979\ldots) \times 10^{6}$	If a correct answer is shown in working and then rounded incorrectly, award full marks. Answer need only be given correctly to 3 sig fig; if following digits are incorrect ignore them.

(Q07 1MA1/2H, Nov 2018)

Q35.

Question	Answer	Mark	Mark scheme	Additional guidance
(a)	450 000	B1	cao	
(b)	7×10^{-3}	B1	cao	
(c)	4.73×10^{3}	M1	for 4730 oe **or** for 4.73×10^{n} where $n \neq 3$	
		A1	cao	

(Q23 1MA1/3F, Nov 2021)

Q36.

Question	Working	Answer	Mark	Notes
(a)		Jupiter	B1	for Jupiter (accept 1.898×10^{27})
(b)		4.5388×10^{24}	B1	for 4.5388×10^{24} oe (e.g. 45.388×10^{23})
(c)		Yes (supported)	M1	for $(4.35 \times 10^{9}) \div (4.14 \times 10^{7})$ (= 105(.07..)) or $(4.14 \times 10^{7}) \times 100$ (= 4.14×10^{9}) or $(4.35 \times 10^{9}) \div 100$ (= 4.35×10^{7})
			A1	for Yes with correct supporting evidence

(Q10 1MA1/2H, June 2017)

Q37.

Question	Working	Answer	Mark	Notes
		4.5×10^{-3}, 0.45×10^{-1},	M1	for conversion to same format or 3 in correct order
		0.045×10^{3}, 450	A1	fully correct answer

(Q10 1MA1/3H/M2, Specimen papers)

Q38.

Question	Answer	Mark	Mark scheme	Additional guidance
(a)	4.52×10^3	M1	for $2.04.... \times 10^7$ oe eg $2.04....\times 10^{-5} \div 10^{-12}$ or $20.4... \times 10^6$ or 204(08163.27) or for correct value of T, 4517.(53....), not written in standard form, eg 4520	May be given correct to 3 sig figs or more
		A1	for answer in the range 4.51×10^3 to 4.52×10^3 (SC B1 for $6.32...\times 10^{-1}$)	
(b)	Explanation	M1	for method to find the scale factor or decreased value in T, eg $\sqrt{\frac{1.1}{1.05^3}}$ (= 0.97.....) oe or $\sqrt{\frac{5.6\times10^{-5}\times1.1}{(1.4\times10^{-4}\times1.05)^3}}$ (= $4.40....\times 10^3$) oe	Award mark for a correct method to calculate the scale factor or the percentage increases in w and d^3 or the decreased value of T
		C1	(dep M1) for explanation eg value of scale factor less than 1, so a decrease in T **OR** compares $4.40...\times 10^3$ with their value of T from (a) provided answer to (a) is greater	This mark may only be awarded if supported by numerical evidence

(Q09 1MA1/3H, June 2018)

Q39.

Question	Working	Answer	Mark	Notes
(a)		0.00000797	B1	cao
(b)		6.3×10^7	M1	for partial calculation involving powers of 10 e.g. $0.63 \times 10^{5--3}$ or 6.3×10^n where $n \neq 7$ or for $n \times 10^8$ or for 63000000
			A1	cao

(Q08 1MA1/1H, June 2017)

Q40.

Question	Working	Answer	Mark	Notes
		4.7805×10^7	B1	cao

(Q11 1MA1/2H/M2, Specimen papers)

Q41.

Question	Working	Answer	Mark	Notes
(a)		3.4×10^8	1	B1
(b)		0.0000183	2	M1 for digits 183... seen or converting one number A1 for answer in range 0.0000183 to 0.000018332

(Q26 1MA1/3F/M1, Specimen papers)