

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

2	(a)		Jupiter	B1	for Jupiter (accept $1.898 \times 10^{27}$ )
	(b)		$4.5388 \times 10^{24}$	B1	for $4.5388 \times 10^{24}$ oe (e.g. $45.388 \times 10^{23}$ )
	(c)		Yes (supported)	M1	for $(4.35 \times 10^8) \div (4.14 \times 10^7)$ (= 105(.07..)) or $(4.14 \times 10^7) \times 100$ (= $4.14 \times 10^9$ ) or $(4.35 \times 10^8) \div 100$ (= $4.35 \times 10^7$ )
				A1	for Yes with correct supporting evidence

3			0.0007452	M1	digits 7452 seen
				A1	cao

4	(a)	$4.52 \times 10^3$		M1	for $2.04 \dots \times 10^7$ oe eg $2.04 \dots \times 10^5 \div 10^{-12}$ or $20.4 \dots \times 10^6$ 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 $4.51 \times 10^3$ to $4.52 \times 10^3$  (SC B1 for $6.32 \dots \times 10^{-1}$ )	
	(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 $\sqrt{\frac{5.6 \times 10^{-3} \times 1.1}{(1.4 \times 10^{-4} \times 1.05)^3}}$ (= $4.40 \dots \times 10^3$ ) 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 $T$ <b>OR</b> compares $4.40 \dots \times 10^3$ with their value of $T$ from (a) provided answer to (a) is greater	This mark may only be awarded if supported by numerical evidence

5	(a)	75 to 81		B2	for answer in the range 75 to 81	Can use standard form
				(B1	for 60 or 100 or 6000 or 6400 or $\sqrt{64 \times 100}$ )	
	(b)	0.000148		B1	for 0.000148 oe	
	(c)	$\frac{1}{25}$		B1	for $\frac{1}{25}$ or 0.04	

6	(a)	$5.62 \times 10^{-3}$		B1	cao	
	(b)	1452		B1	cao	

7		$4.56 \times 10^{-2}$		M1	for $0.000000342 \div 0.0000075$ <b>OR</b> for 0.0456 oe eg $0.456 \times 10^{-1}$ or $45.6 \times 10^{-3}$ or $\frac{57}{1250}$ <b>OR</b> for an answer of $4.56 \times 10^0$	
				A1	cao	

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

9	0.000672, $67.2 \times 10^{-4}$ $6.72 \times 10^5$ $672 \times 10^4$	B2	cao	Accept correct numbers in any form
		(B1)	<p>for correct conversions to same format, condoning one error</p> <p>or for 3 numbers in the correct order (ignoring one)</p> <p>or for all 4 numbers listed in reverse order)</p>	

10	(a)	450 000	B1	cao	
	(b)	$7 \times 10^{-3}$	B1	cao	
	(c)	$4.73 \times 10^3$	M1 A1	<p>for 4730 oe or for <math>4.73 \times 10^n</math> where <math>n \neq 3</math></p> <p>cao</p>	