Question number	Answer	Notes	Marks
12 (a)	comet drawn in orbit around the Sun; orbital path is elliptical;	 judge by eye allow partially drawn ellipse Sun need not be at a focus of the ellipse, but should not be at the centre of the ellipse	2
(b)	attempted use of orbital speed formula; valid substitution into orbital speed formula; correct evaluation of time period for either planet; attempt to divide T for Saturn by T for Mars; correct final evaluation of ratio; e.g. $v = 2 \times \pi \times r / T$ $24.1 = 2 \times \pi \times 2.28 \times 10^8 / T$ $T_{Mars} = 5.94 \times 10^7$ (s) OR $T_{Saturn} = 9.26 \times 10^8$ (s) $n = T_{Saturn} / T_{Mars}$ 15.6	allow for either planet seen anywhere in working $9.70 = 2 \times \pi \times 1.43 \times 10^9 / T$ 5.944… 9.2628… allow range of 15-16	5

Total for Question 12 = 7 marks