Question number	Answer	Notes	Marks
10 a	any two from: MP1. comets orbit the Sun but moons orbit planets; MP2. moons have (approximately) circular orbits but comets have elliptical orbits; MP3. a comet has variable speed but a moon's speed is (approximately) constant;	 allow 'comet orbits are more elliptical'	2
b (i)	gravitational potential energy = mass x *g* x height;	allow rearrangements and standard symbols e.g. GPE = mgh reject 'gravity' for *g*	1
(ii)	substitution; rearrangement; evaluation to more than 1 significant figure; e.g. 2.2 = 0.75 x 1.6 x height (height =) 2.2 / (0.75 x 1.6) (height =) 1.83333…	 award 2 marks max. if mass not converted to kg giving 0.00183	3
(iii)	2.2 (J);		1
(iv)	any three from: MP1. gravitational field strength is greater on the Earth; MP2. (therefore) hammer has a greater weight on Earth; MP3. (therefore) astronaut has to apply a greater force (to lift the hammer); MP4. hammer gains more GPE on Earth;	 allow use of *g* = 10 in calculation condone 'gravity is more on Earth' ORA allow 'downward force greater' condone 'hammer is heavier' GPE on Earth is 15J gains MP1 and MP4	3
c	substitution; rearrangement; evaluation of time period; evaluation of number of orbits; e.g. $7.66 = \frac{2\pi \times 6780}{T}$ $(T =) \frac{2\pi \times 6780}{7.66}$ (T =) 5560 (s) (number of orbits = (24x60x60) / 5560 =) 15.5	allow method of finding total distance travelled and dividing by distance of one orbit ($2\pi r$) 5561 allow 15, 16	4

Total for question 10 = 14 marks

Question number	Answer	Notes	Marks
11 a	MP1. method **to show shape**; e.g. use compass(es) use of iron filings/powder MP2. use of plotting compass **to show direction**; MP3. a further method detail; e.g. mark card/move compass/multiple compasses idea of another line or lines added sprinkle (iron filings) tap card (to distribute iron filings)	all marks may be given from a clearly labelled diagram	3
b	(lines are) parallel; (lines are) evenly spaced;	ignore references to lines being straight	2
c (i)	idea that wire cuts magnetic field lines; voltage is induced;		2
(ii)	any two from: MP1. move wire faster; MP2. coil wire into loops; MP3. use stronger magnets / magnetic field;	ignore references to using a different wire condone 'more coils / turns' allow move magnets closer together	2

Total for question 11 = 9 marks