

Question number	Answer	Notes	Marks
2 (a)	work (done) = force \times distance (moved);	allow rearrangements and standard symbols e.g. $W = F \times d$	1
(b)	dimensionally correct substitution; correct evaluation; unit; e.g. (W =) $275\,000 \times (0.163 - 0.008)$ (W =) 42 600 joules / J	allow force multiplied by any distance unit conversion error or POT error loses the evaluation mark e.g. 4 262 500, 4262.5 mark independently allow 275×15.5 allow 43 000, 42 630, 42 625 allow kJ 42.6(25) kJ scores 3 marks	3

Total for Question 2 = 4 marks

Question number	Answer	Notes	Marks
5 (a) (i)	amplitude decreases (with distance); wavelength is constant; speed is constant;		3
(ii)	A (there was a time delay for signals travelling to the probe from Earth); B is incorrect because although the statement is correct it does not explain why the probe is difficult to steer C is incorrect because although the statement is correct it does not explain why the probe is difficult to steer D is incorrect because it contains incorrect Physics		1
(iii)	C; A is incorrect because all radio signals travel at the same speed B is incorrect because all radio signals travel at the same speed D is incorrect because it is easier to remove noise from a digital signal		1
(iv)	B; A is incorrect because the signal shows varying amplitude with more than two values C is incorrect because the signal shows varying amplitude with more than two values D is incorrect because the signal shows varying amplitude with more than two values		1
(b)	substitution; evaluation; e.g. (power =) 36.4×0.275 (power =) 10.0 (kW)	allow 10.01, 10	2

Question number	Answer	Notes	Marks
(c)	<p>dimensionally correct substitution;</p> <p>rearrangement;</p> <p>evaluation;</p> <p>e.g. $0.091 = \frac{\text{change in momentum}}{25 \times 60}$ (change in momentum =) $0.091 \times 60 \times 25$ (change in momentum =) 140 (kg m/s)</p>	<p>no marks for equation as given in paper</p> <p>substitution and rearrangement in either order</p> <p>allow 136.5, 137</p> <p>unit conversion error or POT error loses the evaluation mark e.g. 2275, 2.275, 136 500, 1.365×10^{11} scores 2 marks</p>	3

Total for Question 5 = 11 marks