Question number			Answer	Notes	Marks
1	(a)		C (the walls)		1
	(b)		D (40%)		1
	(c)	(i)	Any **two** of – • Fibres are good insulators / bad conductors; • Air is a bad conductor / good insulator; • Because air particles are widely spaced; • conduction requires solids/does not occur in gases;	no marks for • ‘air is trapped’ as is given in stem • conduction/convection mechanism described e.**g. air can’t convect up through layers**	2
		(ii)	stopping /reducing (formation of) convection <u>currents</u>; air in the insulation can’t move/eq;	allow air is trapped fibres prevent movement of air	2

Total 6 marks

Question number			Answer	Notes	Marks
5	(a)	(i)	starting height (of the toy car);		1
		(ii)	a positive correlation between the 2 key variables, eg The higher the (starting) height, the faster the (final) speed / speed at bottom;	NB response needs to mention both key variables	1
	(b)		use a ruler or a set square ; further detail; e.g. held vertically check for zero error thickness of board taken into account avoid parallax errors	Allow suitably labelled diagram drawn in the space below perpendicular to bench	2

Question number			Answer	Notes	Marks
10	(a)	(i)	B radio waves		1
		(ii)	C Microwaves and radio waves travel at the same speed in a vacuum.		1
		(iii)	any one sensible property; e.g. travels (very) fast travel at speed of light can be coded can travel in vacuum	Allow can penetrate the ionosphere, can carry more information (than radio) higher frequency /shorter wavelength (than radio) minimal diffraction	1
	(b)		Quantities substituted in the correct equation; Rearrangement; Calculation; Conversion from hours/days to s at any point (implicit if correct ans in km); e.g. $3.1 = \frac{2 \times \pi \times r}{(24 \times 3600)}$ $r = \frac{3.1 \times 24 \times 3600}{2\pi}$ r = 42 600 km	No credit for quoting the equation as $v = 2\pi r/T$ is given on page 2. sub and rearrange in either order allow 3600 or 86 400 seen Allow 42630, 42628 Allow 42622 (from $\pi = 3.142$)	4

Question number			Answer	Notes	Marks
11	(a)		Electrical; Chemical / potential;		2
	(b)	(i)	Charge = current x time;	Accept rearrangements and standard symbols e.g. current = $\frac{\text{charge}}{\text{time}}$ Q = I x t I=Q/t ignore units	1
		(ii)	Substitution; Calculation; Matching correct unit i.e. coulomb/C; e.g. Q = $\frac{400 \times 3.5 \times 3600}{1000}$ 5000 C	 Allow mC Allow 5040 **MAX 2 if** time not converted into s (1.4, 1400, 60, 60 000,seen) POT error seen	3
	(c)		Longer (charging) time needed; Any **one** of P=IV; Lower current OR charge (supplied at a) lower rate; rate of charging lower/ less energy available;		2

Total 8 marks