

# Electromagnetic Waves Uses and Dangers 4 MS

## QUESTION 1

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)	any two from: <ul style="list-style-type: none"> <li>•travel (at same speed) through a vacuum / space</li> <li>transverse</li> <li>•transfer energy</li> <li>•can be reflected</li> <li>•can be refracted</li> <li>•can be diffracted</li> <li>•can be absorbed</li> <li>• travel in straight lines</li> </ul>	do not accept air for vacuum	2
b)	can pass through the ionosphere	accept atmosphere for ionosphere do not accept air for ionosphere accept travel in straight lines accept not refracted / reflected / absorbed by the ionosphere	1
c)	diffraction (of waves around hills) wavelength needs to be similar size to the obstacle / gap radio has a long enough wavelength or TV doesn't have a long enough wavelength	an answer TV (waves / signals) have short wavelengths so do not diffract (around the hill) scores 2 marks	1 1 1
d)	$1.2 \times 10^6 / 1200000$  hertz / Hz	$v = f \times \lambda$ allow 1 mark for correct substitution ie $3.0 \times 10^8 = f \times 2.5 \times 10^2$ do not accept hz or HZ accept kHz or MHz answers 1.2 MHz or 1200 kHz gain all 3 marks for full credit the unit and numerical value must be consistent	3
Total marks			9

## QUESTION 2

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)i)	UVC it is absorbed / stopped by the ozone layer	reason only scores if UVC is chosen accept atmosphere / air for ozone layer accept does not reach the Earth	1 1
a)ii)	increases the risk  due to higher levels of UV (radiation) or less UV (radiation) absorbed	accept more likely to get (skin) cancer / sun burn accept more people likely to be harmed (by UV radiation)  specific reference to UVA / all three increasing negates this mark	1  1
b)i)	type of) surface	accept snow and sand accept place / location do not accept position (of dummy head)	1
b)ii)	repeat measurements / investigation and take average(s) / mean	both parts required repeat measurements / experiment  is insufficient	1
b)iii)	snow the intensity (facing the Sun) is higher, (so more must be reflected) or intensity hardly reduces when facing away from the Sun (so most UV entering sensor must be reflected)	mark is for reason, only scores if snow chosen  accept results are higher (for snow than sand) accept white surfaces are good reflectors accept it's white	1
c)	No for all wavelengths shown some UV is reaching the sensor	this mark point can score even if yes is chosen accept some UV is passing through (the goggles) accept the reading should be zero (but it isn't)	1 1
Total marks			9

### QUESTION 3

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)	decreases increases	correct order only	1 1
b)	absorbed	makes the glass warmer is insufficient (energy) is wasted is insufficient	1
c)i)	intensity (of transmitted light ) depends on thickness  or  to enable a valid comparison or it is a control variable	accept absorption depends on thickness it would affect the results is insufficient   fair test is insufficient	1
c)ii)	transmits the least light  or  absorbs the most light	accept very little light is transmitted do not accept transmits none of the light  do not accept absorbs all of the light any reference to heat negates this mark	1
Total marks			5

### QUESTION 4

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)	infrared / IR	correct answer only	1
b)	any two from: <ul style="list-style-type: none"> <li>• increase the power / watts</li> <li>• decrease the speed</li> <li>• put biscuits through again</li> </ul>	allow increase the temperature of the oven or make the oven hotter allow leave the biscuits in for longer increase radiation is insufficient ignore changes to the design of the oven	2
c)	(inside) surface is a (good) reflector or poor absorber (of IR)	Ignore bounce for reflect surface is a (good) reflector of  light does not score surface is a (good) reflector of light and infrared / heat does score	1

	(and) outside surface is poor emitter (of IR) (so) increases the energy reaching the biscuits	allow reduces energy loss or makes oven more efficient do not accept no energy losses keeps oven hotter is insufficient	1 1
Total marks			6

### QUESTION 5

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)	Doppler (effect)		1
b)	(reflected microwaves) wavelength decreased (reflected microwaves) frequency increased (reflected microwaves) have same speed		1 1 1
Total marks			4