3.19 The Electromagnetic Spectrum: 10-minute Pack

AQA 8464 · Calculator allowed · about 10 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 State one everyday use of each of the following types of electromagnetic wave.

(i) Microwaves

(ii) Infrared

(iii) Ultraviolet

(iv) Gamma rays

(Total for Question 1 is 4 marks)

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2 Radio waves are used to broadcast television and radio programmes. Describe how radio waves used for broadcasting are generated, and how they are then detected by a receiver aerial.

(Total for Question 2 is 2 marks)

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3 A microwave oven produces microwaves with a wavelength of 12 cm. Use the Physics Equations Sheet: wave speed = frequency * wavelength ($v = f * \lambda$), and the speed of electromagnetic waves in air, $v = 3.0 \times 10^8$ m/s, to calculate the frequency of these microwaves.

(Total for Question 3 is 3 marks)

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Mark scheme · 3.19 The Electromagnetic Spectrum: 10-minute Pack

Question 1

(i) any suitable use, e.g. satellite communications, or cooking food (heating water molecules), oe	**B1**
(ii) any suitable use, e.g. electrical heaters, cooking, infrared cameras/thermal imaging, or remote controls, oe	**B1**
(iii) any suitable use, e.g. sun tanning/sunbeds, fluorescent lamps, or detecting forged bank notes/security marking, oe	**B1**
(iv) any suitable use, e.g. sterilising medical equipment, treating cancer (radiotherapy), or medical tracers, oe	**B1**

Answer: (i) Satellite communications (ii) Electrical heaters/cooking (iii) Sun tanning (iv) Sterilising medical equipment / treating cancer.

Question 2

generated by oscillations in an electrical circuit, oe	**B1**
detected because the radio waves induce oscillations (an alternating current) in the electrical circuit of the receiver aerial, oe	**B1**

Answer: Generated by oscillations in an electrical circuit; detected because they induce oscillations (an alternating current) in the receiver aerial's circuit.

Question 3

converts 12 cm to 0.12 m	**M1**
rearranges and substitutes correctly: $f = v/\lambda = (3.0 \times 10^8)/0.12$	**M1**
$f = 2.5 \times 10^9$ Hz (2.5 GHz), cao	**A1**

Answer: 2.5×10^9 Hz (2.5 GHz)

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