Revision – Waves 1

1.

The diagram represents the electromagnetic spectrum.

Gamma-rays	X-rays	Ultraviolet	Visible	Infra-red	Microwaves	Radio waves

(a) Which of X-rays and radio waves has the longer wavelength?

....
                                                                                                                                (1)

(b) Which of X-rays and radio waves has the higher frequency?

....
                                                                                                                                (1)

(c) State one use of X-rays.

....
                                                                                                                                (1)

(d) State one property that all electromagnetic waves have in common.

....
                                                                                                                                (1)

(e) State the law of reflection.

....

....
                                                                                                                                (1)

(f) A teacher wants to demonstrate the law of reflection to his class.
    Suggest two reasons why he should use visible light rather than X-rays.

    1 ....

    2 ....
                                                                                                                                (2)

2.

(a) Are sound waves in air transverse or longitudinal?

....

(1)

(b) A sound wave has a frequency of 384 Hz and a wavelength of 0.86 m.
Calculate its speed in m/s.

....

....

Speed = ... m/s

(2)

(c) Another sound wave has a frequency of 38 400 Hz.

(i) Would you be able to hear this sound wave?

....

(1)

(ii) Explain your answer.

....

(1)

3.

(a) A student sings into a microphone.

Complete the sentence.

The useful energy transfer made by the microphone is from sound energy to

.... energy.

(1)

(b) The amplitude, the frequency and the wavelength of a sound wave can be changed.

(i) What change could be made to make the sound lower in pitch?

....

(1)

(ii) What change could be made to make the sound louder?

....

(1)

(c) A sound wave, wavelength λ, approaches a gap in a wall.

(i) Name the effect which occurs as the sound wave passes through the gap.

....

(1)

(ii) Complete the sentence.

The greatest effect occurs when .... is equal to λ.

(1)

(d) Describe how you could measure the speed of sound in air by a simple direct method. You may draw a diagram to illustrate your answer.

(4)

4.

The table shows the main sections of the electromagnetic spectrum.

Gamma rays	X-rays	Ultraviolet	Visible	Infrared	Microwaves	Radio

$\longrightarrow$

(a) (i) State two sections of the spectrum that are used for communications.

(2)

1 ....

2 ....

(ii) State two sections of the spectrum that are used for cooking.

(2)

1 ....

2 ....

(b) The arrow below the table shows the direction of

(1)

☒ **A** increasing wave amplitude

☒ **B** increasing wave frequency

☒ **C** increasing wave speed

☒ **D** increasing wavelength

(c) A radio station broadcasts at a frequency of 200 kHz.

The wavelength of the radio waves is 1500 m.

(i) State the equation linking wave speed, frequency and wavelength.

(1)

(ii) Calculate the speed of these radio waves and give the unit.

(3)

speed = ... unit ....

5.

The Astra satellite is in an orbit around the Earth.

(a) The satellite uses microwave signals for communication.

Microwaves are part of the electromagnetic spectrum.

(i) Which part of the electromagnetic spectrum has longer wavelengths than microwaves?

(1)

☒ **A** gamma rays

☒ **B** radio waves

☒ **C** ultraviolet light

☒ **D** visible light

(ii) Which of these statements is correct?

(1)

☒ **A** Microwaves always travel faster than radio waves.

☒ **B** Microwaves always travel slower than radio waves.

☒ **C** Microwaves and radio waves travel at the same speed in a vacuum.

☒ **D** Microwaves and radio waves travel at the same speed in all materials.

(iii) State one property of electromagnetic waves that makes microwaves suitable for communications with a satellite in space.

(1)

....

....

(b) The Astra satellite takes 24 hours to orbit the Earth once.

It travels at a speed of 3.1 km/s.

Calculate the orbital radius of the satellite and give the unit.

(4)

orbital radius = ... unit ....

(c) The Astra satellite orbits above the equator and travels in the same direction as the rotation of the Earth.

Suggest why this type of 24-hour orbit is an advantage for communications.

(1)

....

....

....