The Electromagnetic Spectrum (F)

1 (a). A student looks at two identical metal spoons, **A** and **B**.

Spoon **A** was placed in hot water at 70 °C.

Spoon **B** is at 20 °C.

Which spoon emits the most radiation?

Tick (✓) **one** box.

Spoon **A** ☐

Spoon **B** ☐

Explain your answer.

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[1]

(b). Explain why both spoons look identical to the student, even though they are at different temperatures.

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[1]

2. What type of wave is light?

A A longitudinal electromagnetic wave
B A longitudinal P wave
C A transverse S wave
D A transverse electromagnetic wave

Your answer ☐ **[1]**

3. Which row in the table is correct?

	Electromagnetic wave	Use
A	Radio	Killing bacteria
B	Microwaves	Mobile phones
C	X-rays	Optical fibres
D	Gamma rays	Tanning beds

Your answer ☐ **[1]**

4. An electromagnetic wave transfers energy.

Which row in the table is correct?

	Electromagnetic wave	Energy transfer
A	Infra-red	From a heating element of a toaster to the bread inside
B	Radio	From a radio to a transmitter
C	Gamma rays	From a high voltage supply to heating water in food
D	X-rays	From bones in the body to an X-ray machine

Your answer ☐ **[1]**

5. Which row **A**, **B**, **C** or **D**, is true for electromagnetic waves?

	Transmission	Type	Movement in space
A	Transmit energy from absorber to source	Longitudinal	Travel through space at different velocities
B	Transmit energy from absorber to source	Transverse	Travel through space at different velocities
C	Transmit energy from source to absorber	Longitudinal	Travel through space where all have the same velocity
D	Transmit energy from source to absorber	Transverse	Travel through space where all have the same velocity

Your answer ☐ **[1]**

6. A radio wave has a wavelength of 100 m. It has a speed of 3×10^8 m/s.

Use the equation: Wave speed = Frequency × Wavelength

Calculate the frequency of the wave.

A 3 MHz
B 30 MHz
C 300 MHz
D 3000 MHz

Your answer ☐ **[1]**

7. Some electromagnetic waves are used to scan a person in hospital.

Which statement is true about a scan that uses **electromagnetic** waves?

A Micro-waves are used to scan skin.
B Ultrasound waves are used to scan an unborn baby.
C Ultra-violet is used to scan for cancer.
D X-rays are used to scan for broken bones.

Your answer ☐ **[1]**

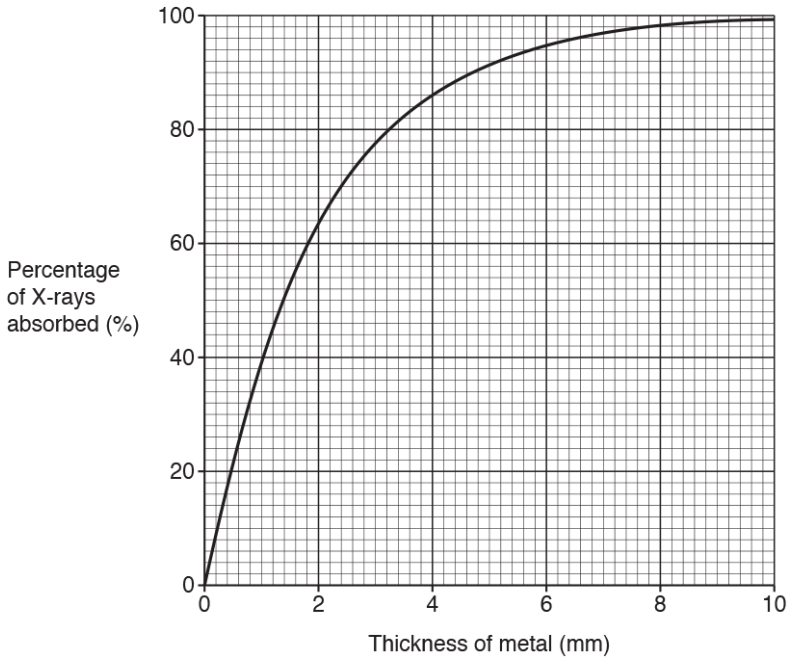
8. Which statement is **true** for electromagnetic waves?

A High frequency electromagnetic waves have a long wavelength.
B High frequency electromagnetic waves have no wavelength.
C Low frequency electromagnetic waves have a long wavelength.
D Low frequency electromagnetic waves have a short wavelength.

Your answer ☐ **[1]**

9 (a). This question is about X-rays and visible light.

This graph shows how the absorption of X-rays changes with the thickness of metal.



i. What percentage of X-rays is absorbed by 4 mm of metal?

Percentage of X-rays absorbed = ... % **[1]**

ii. Calculate the percentage of X-rays passing **through** 4 mm of metal.

Use your answer to **(i)** to help you.

Percentage of X-rays = ... % **[2]**

(b). State one **similarity** and one **difference** between X-rays and visible light.

Similarity

Difference

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[2]

10. Look at the diagram of the electromagnetic spectrum.

Radio	Microwave	Infra-red	Visible light	Ultra-violet	X-rays	Gamma-rays

i. Name a wave that has a longer wavelength than red light.

_____ **[1]**

ii. Name a wave that has a higher frequency than violet light.

_____ **[1]**

iii. State two **uses** of gamma-rays.

1. _____

2. _____

[2]

END OF QUESTION PAPER