

Q1. (2019)

0 1

Figure 1 shows a runner using a smart watch and a mobile phone to monitor her run.

Figure 1



The smart watch and mobile phone are connected to each other by a system called Bluetooth.

Bluetooth is wireless and uses electromagnetic waves for communication.

a)

0 1 . 3

Suggest why the phone and watch being connected by a wireless system is an advantage when running.

[1 mark]

b)

0 1 . 4

Write down the equation that links frequency, wave speed and wavelength.

[1 mark]

c)

0 1 . 5

The electromagnetic waves have a frequency of 2 400 000 000 Hz

The speed of electromagnetic waves is 300 000 000 m/s

Calculate the wavelength of the electromagnetic waves.

[3 marks]

d)

0 1 . 6

Table 1 shows some information about four types of Bluetooth.

Table 1

Type	Power in milliwatts	Range in metres
1	100	100
2	2.50	10.0
3	1.00	1.00
4	0.50	0.50

Mobile phones use type 2 Bluetooth to communicate with other devices.

Suggest **two** reasons why.

[2 marks]

- 1 _____
- _____
- 2 _____
- _____

Q2. (2020)

0 5

X-rays form part of the electromagnetic spectrum.

Radiographers use X-rays to produce images of bones inside the body.

0 5 . 1

Explain why X-rays can be used to produce images of the bones inside the body.

[2 marks]

Q3. (2020)

0 5 . 2

Table 2 shows the effect of exposure to different doses of radiation.

Table 2

Dose in mSv	Effect on the human body
100	slightly increased risk of cancer
1000	5% increased risk of cancer
5000	high risk of death

During an X-ray a person receives a dose of 0.5 mSv

The radiographer takes many X-ray images each day.

Explain why the radiographer stands behind a protective screen when taking an X-ray image.

[3 marks]

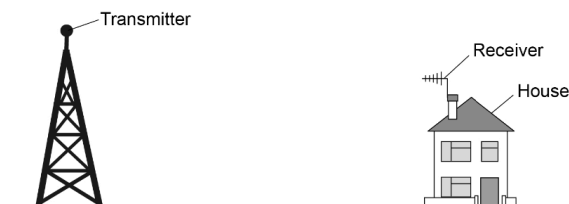
Q4. (2020)

0 5 . 3

Radio waves form part of the electromagnetic spectrum.

Figure 10 shows one use of radio waves.

Figure 10



Explain how electrical signals in the transmitter produce a signal in the receiver.

[3 marks]

Q5. (2021)

0 5 . 2

Infrared has a range of wavelengths from 700 nm to 1 mm.

Which part of the electromagnetic spectrum would have waves with a wavelength of $6.5 \times 10^{-7} \text{ m}$?

[1 mark]

Tick (✓) **one** box.

Infrared

☐

Microwaves

☐

Radio waves

☐

Visible light

☐

Q6. (2023)

0 1

The Sun emits a continuous spectrum of electromagnetic waves.

Figure 1 names some of the groups of waves in the electromagnetic spectrum.**Figure 1**

A	B	Infrared	Visible light	Ultraviolet	C	Gamma rays
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0 1 . 1Name groups **A**, **B** and **C** in **Figure 1**.**[2 marks]****A** _____**B** _____**C** _____**Q7. (2023)****0 1 . 2**Give **one** similarity and **one** difference between the properties of ultraviolet waves and gamma rays.**[2 marks]**

Similarity _____

Difference _____

Q8. (2024)**0 3 . 3**

Which group of electromagnetic waves is used for satellite communications?

[1 mark]**Q9. (2024)****0 3 . 4**

Visible light is the only group of electromagnetic waves that the human eye can detect.

Which colour of visible light has the shortest wavelength?

[1 mark]