

Q1. (2018)

0 5

A car aerial receives radio waves from a radio transmitter.

Radio waves are transverse waves.

Sound waves are longitudinal waves.

0 5 . 3

Describe how the radio waves reaching the car aerial produce signals in the electrical circuit of the car radio.

[3 marks]

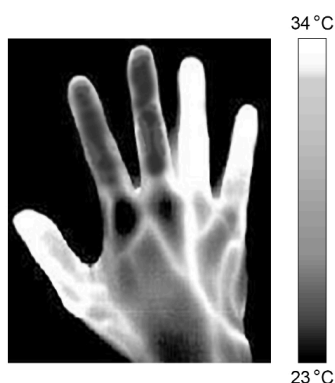
Q2. (2021)

0 5

Different parts of the electromagnetic spectrum are used in medical imaging.

Figure 8 shows an image of a person's hand taken with an infrared camera.

Figure 8



0 5 . 1

Explain why the infrared camera is able to show that parts of the hand are at different temperatures.

[2 marks]

Q3. (2021)

X-rays are produced by colliding high-energy electrons into a metal target.

The electrons have high energy because they are accelerated to high speeds.

Only a small proportion of the kinetic energy of an electron is converted into an X-ray when it collides with the metal target.

0 5 . 5

The metal target is made from tungsten.

Tungsten has the highest melting point of any metal.

Explain why using tungsten as the metal target enables the X-ray machine to be more powerful.

[3 marks]

Q4. (2022)

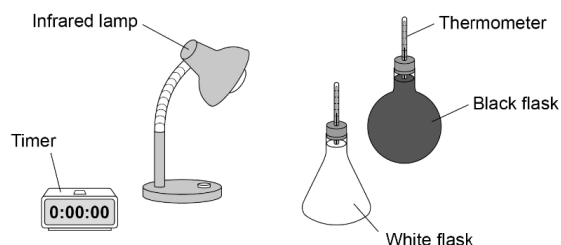
0 5

A student investigated how the colour of a surface affects the amount of infrared radiation the surface absorbs.

Figure 7 shows the equipment used.

The two flasks are painted different colours.

Figure 7



This is the method used.

1. Pour water at 20 °C into each flask.
2. Place a bung and thermometer into each flask.
3. Place each flask in front of the infrared lamp.
4. Measure the temperature of the water every 30 seconds for 10 minutes.

a)

0 5 . 1

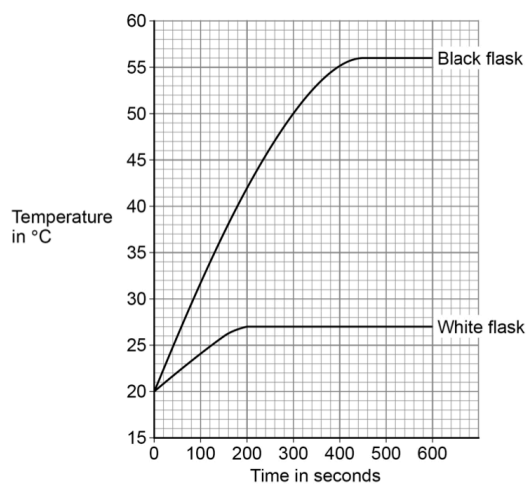
Explain **two** improvements to the method the student used.

[4 marks]

b)

Figure 8 shows the results for each flask.

Figure 8



0 5 . 2

Complete the sentences.

[2 marks]

After 100 seconds the temperature difference between the black flask and the white flask was _____ °C

The temperature of the white flask stopped increasing. The temperature inside the black flask continued to increase for a further _____ seconds.

c)

- 0 5 . 3 The initial rate of absorption of infrared radiation by the black flask was greater than the initial rate of absorption by the white flask.

How does **Figure 8** show this?

[1 mark]

d)

- 0 5 . 4 Explain why the temperature of the water in the flasks increased and then became constant.

[4 marks]

Q5. (2024)

Figure 5 shows a person using a mobile phone to allow a laptop to access the Internet.

Figure 5



The electromagnetic waves emitted by the mobile phone send information to the laptop.

a)

- 0 3 . 6 The electromagnetic waves emitted by the mobile phone have a period of 4.0×10^{-10} s.

Calculate the frequency of the waves.

Use the Physics Equations Sheet.

Give your answer in standard form.

[3 marks]

b)

- 0 3 . 7 The electromagnetic waves are produced by oscillations in the transmitter of the mobile phone.

Explain how oscillations in the transmitter enable information to be transferred to the detector in the laptop.

[4 marks]