1 Which statement about infra-red waves is correct?

Infra-red waves in the electromagnetic spectrum

A can be seen by the human eye.

B cannot travel through a vacuum.

C have the same speed as radio waves when in a vacuum.

D travel as longitudinal waves.

[1]

[Total: 1]

2 The diagram shows a mobile (cell) phone.

The screen of the mobile phone emits visible light.

State **one** type of electromagnetic wave with a shorter wavelength than visible light.

..... [1]

[Total: 1]

3 The diagram shows a mobile (cell) phone.

State the type of electromagnetic wave used for the mobile phone signal.

..... [1]

[Total: 1]

4 State which region of the electromagnetic spectrum is used in television remote control.

..... [1]

[Total: 1]

5 State **two** properties that are the same for all waves in the electromagnetic spectrum.

1. .....

2. ..... [2]

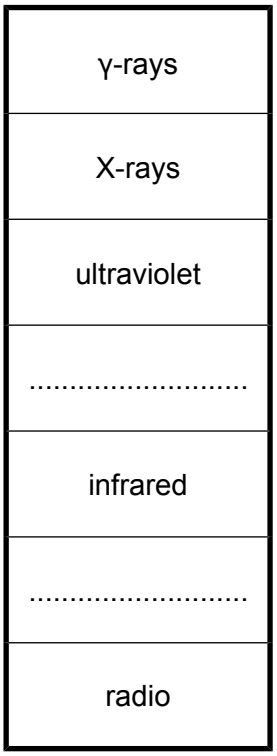
[Total: 2]

6 State which region of the electromagnetic spectrum is used in detecting objects without opening baggage at a security check .

..... [1]

[Total: 1]

7 The diagram shows the main regions of the electromagnetic spectrum. Two labels are missing.



Complete the labels on the diagram.

[2]

[Total: 2]

8 State which region of the electromagnetic spectrum is used in satellite television transmissions.

..... [1]

[Total: 1]

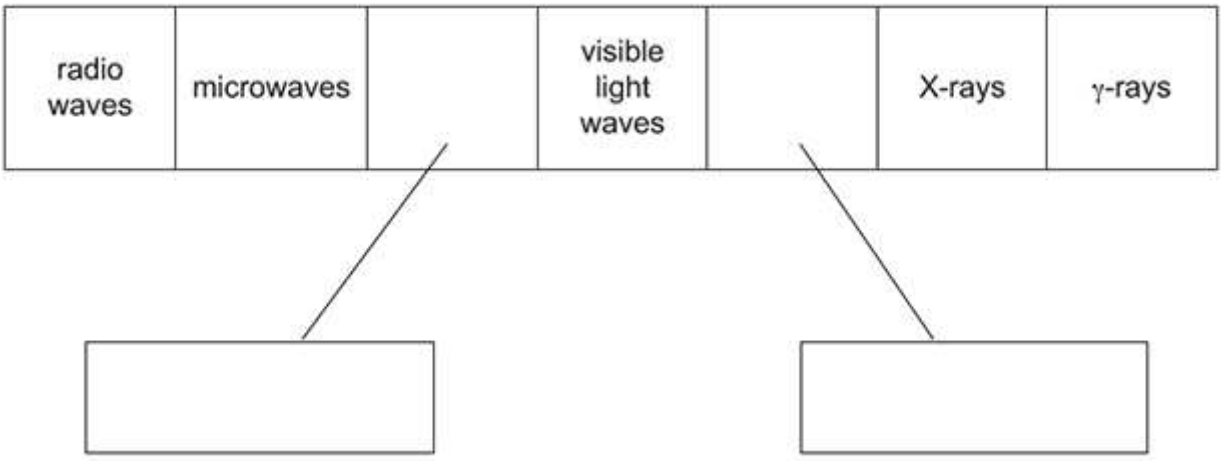
9 Describe one use of γ-rays.

.....

..... [1]

[Total: 1]

10 The diagram shows the main regions of the electromagnetic spectrum.



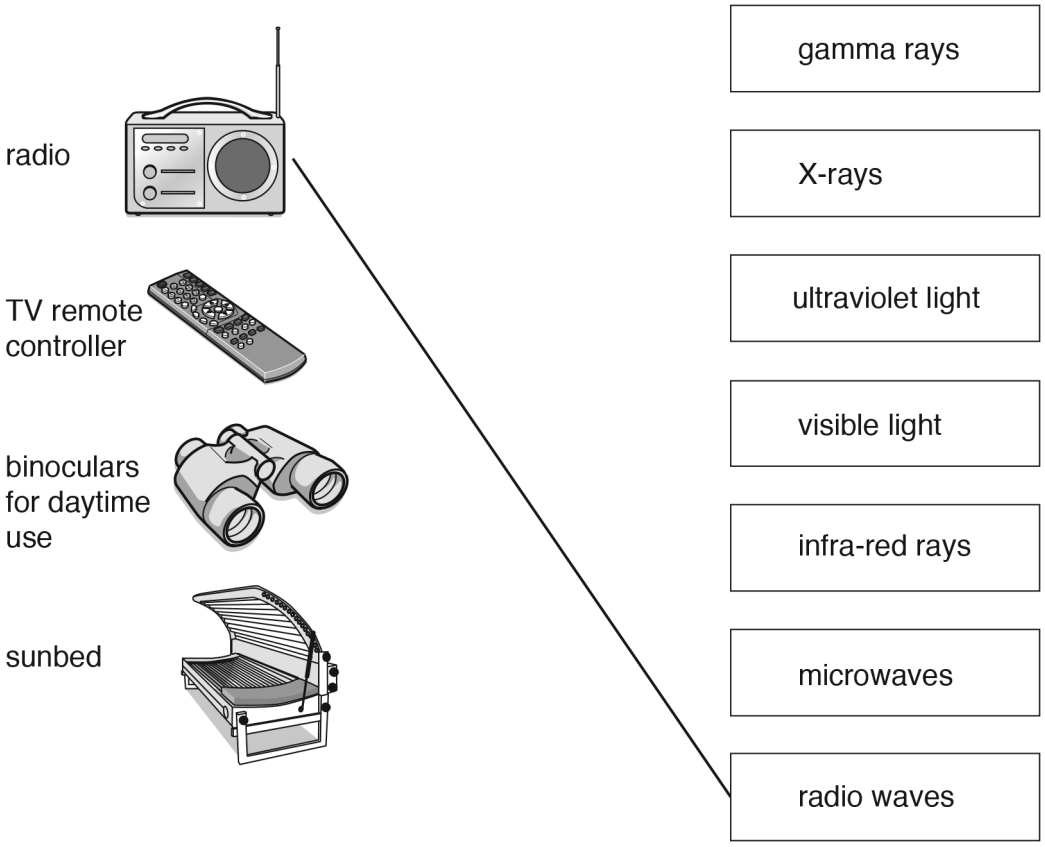
Two of the regions are not labelled.

Add the correct label to each of the unlabelled regions by writing in each box.

[2]

[Total: 2]

11 The diagram shows some devices that each use one type of electromagnetic radiation.



Draw one line from each device to the correct type of electromagnetic radiation. One has been done for you.

[3]

[Total: 3]

12 State the name of one type of radiation that has a longer wavelength than visible light.

..... [1]

[Total: 1]

13 Complete the sentence about electromagnetic radiation. Use a word from the box.

amplitude	frequency	speed	wavelength

All types of electromagnetic radiation travel through a vacuum with the same

..... .

[1]

[Total: 1]

14 The table shows 5 different types of electromagnetic wave.

In the blank column in the table, write the numbers 1 to 5 to show the order of wavelength. Write 1 for the wave with the shortest wavelength and 5 for the wave with the longest wavelength.

type of electromagnetic wave	order of wavelength
gamma rays	
light	
microwaves	
ultraviolet	
X-rays	

[2]

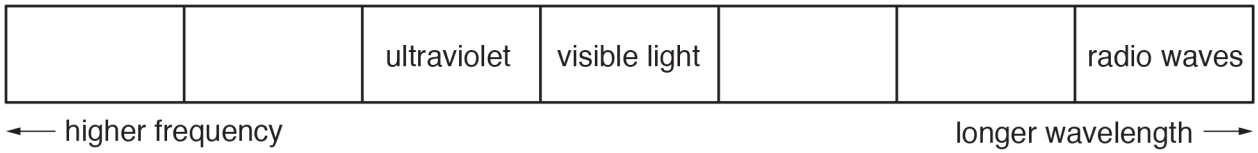
[Total: 2]

15 State **one** use for ultraviolet radiation.

..... [1]

[Total: 1]

16 The diagram shows an incomplete diagram of the electromagnetic spectrum.



Complete the diagram with the names of the missing types of radiation in the correct boxes.

[4]

[Total: 4]

17 Electromagnetic radiation has many uses.

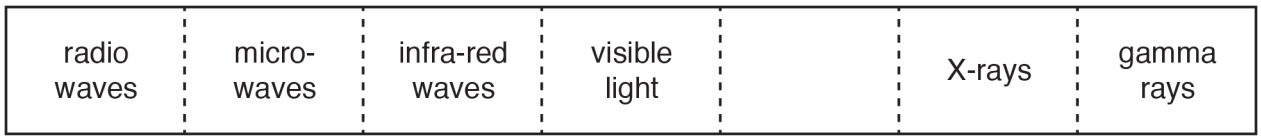
Draw a line from each use to the type of radiation it requires.

use	type of radiation
detecting an intruder at night	radio waves
communicating by satellite for a telephone	microwaves
detecting broken bones in the body	infra-red
	visible light
	ultraviolet
	X-rays
	gamma rays

[3]

[Total: 3]

18 The diagram shows the electromagnetic spectrum. One type of radiation is not labelled.



(a) On the diagram, add the label for the missing type of radiation.

[1]

(b) The arrow in the diagram indicates a property that is increasing.

State the name of the property that is increasing in the direction of the arrow.

..... [1]

(c) Compare the speeds of radio waves and visible light in a vacuum.

..... [1]

[Total: 3]

19 X-rays are one type of radiation in the electromagnetic spectrum.

(a) Describe how X-rays are used for security in airports.

.....

.....

..... [2]

(b) Explain the properties of X-rays that make them useful in airport security.

.....

.....

..... [2]

[Total: 4]

20 Radio waves, visible light and gamma rays are all types of radiation in the electromagnetic spectrum.

Complete the sentence about the electromagnetic spectrum. Choose a word from the box.

amplitude	frequency	velocity

The position of each type of radiation in the electromagnetic spectrum depends on its

..... .

[1]

[Total: 1]

21 Electromagnetic radiation can be used for different purposes.

For each purpose, state one type of electromagnetic radiation that can be used.

remote controllers for televisions .....

killing bacterial cells ..... [2]

[Total: 2]

22 X-rays and γ-rays are used in hospitals.

Describe one medical use for X-rays and one use for γ-rays.

X-rays .....

.....

γ-rays .....

..... [2]

[Total: 2]

23 The speed of visible light waves in a vacuum is 3.0×10^8 m / s.

Suggest a value for the speed of infra-red waves in a vacuum.

speed = ...m / s [1]

[Total: 1]

24 The diagram show a partially-labelled diagram of the electromagnetic spectrum.

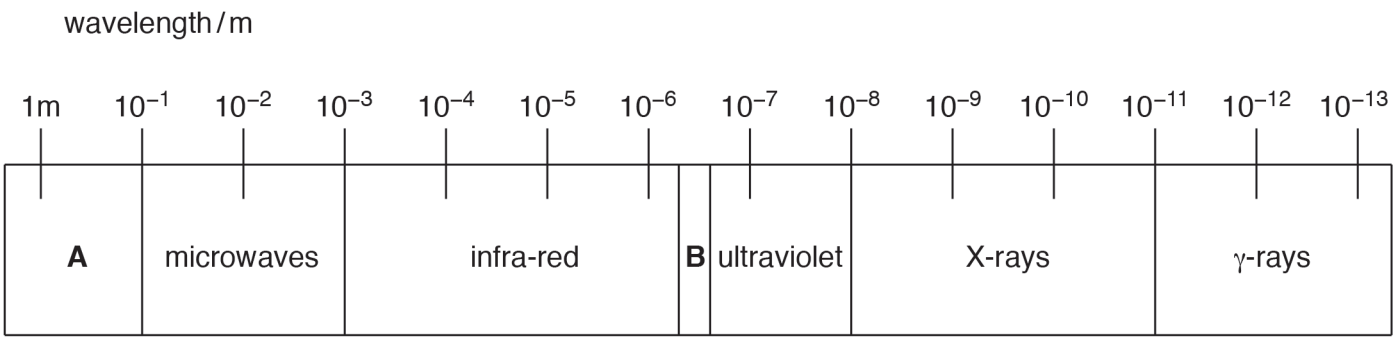
(a) On the diagram, add the names of the missing radiations at **A** and at **B**. [2]

(b) Indicate the radiation that has the lowest frequency. On the diagram, draw a ring around the radiation.

[1]

[Total: 3]

25 The diagram is an incomplete diagram of the electromagnetic spectrum.



(a) In the diagram, section **A** and section **B** of the electromagnetic spectrum are not labelled.

State the names of these parts.

A .....

B ..... [2]

(b) An electromagnetic wave has a wavelength of 1.0×10^{-9} m. Use the diagram to identify the type of electromagnetic wave.

..... [1]

[Total: 3]

26 The diagram shows some parts of the electromagnetic spectrum.

radio waves		infra-red waves	visible light	ultraviolet waves	X-rays	γ-rays

(a) In the diagram, one part of the electromagnetic spectrum is not labelled.

State the name of this part.

..... [1]

(b) Some parts of the electromagnetic spectrum have a wavelength shorter than that of visible light.

State one example.

..... [1]

[Total: 2]

27 State, with a reason, why microwave ovens are designed only to work with the door closed.

.....

.....

..... [2]

[Total: 2]

28 A dentist takes an X-ray photograph of a patient's teeth.

Explain why it is safe for the patient to be close to the source of X-rays, but the dentist must stand away from the source.

.....

.....

.....

..... [2]

[Total: 2]

29 Tick the box for the wave with the lowest speed in air.

- ☐ ultraviolet
- ☐ ultrasound
- ☐ visible light

[1]

[Total: 1]

30 The diagram represents the seven main regions of the electromagnetic spectrum.

radio waves	microwaves	infrared radiation	visible light	ultraviolet		gamma rays

(a) In the diagram, one region is not named.

State the name of the radiation in this region.

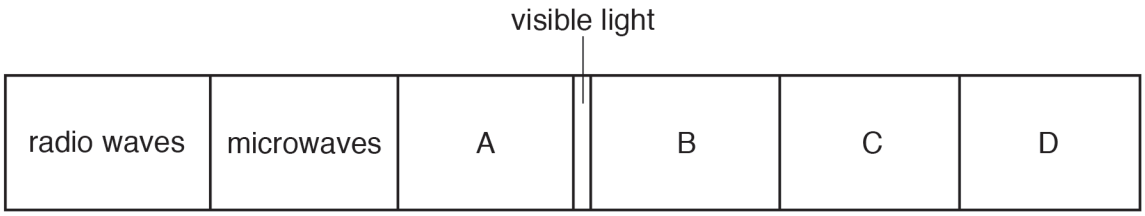
..... [1]

(b) State which region has waves with the longest wavelength.

..... [1]

[Total: 2]

31 The diagram represents the electromagnetic spectrum.



State the radiation in each of the regions represented by A, B, C and D in the diagram.

A .....

B .....

C .....

D .....

[2]

[Total: 2]

32 The Moon is 380 000 km from the Earth. A laser light beam is directed from the Earth to the Moon. The beam is reflected back to the Earth.

How long does it take for the light to travel to the Moon and back to the Earth?

A 1.27 ms **B** 2.53 ms **C** 1.27 s **D** 2.53 s

[1]

[Total: 1]

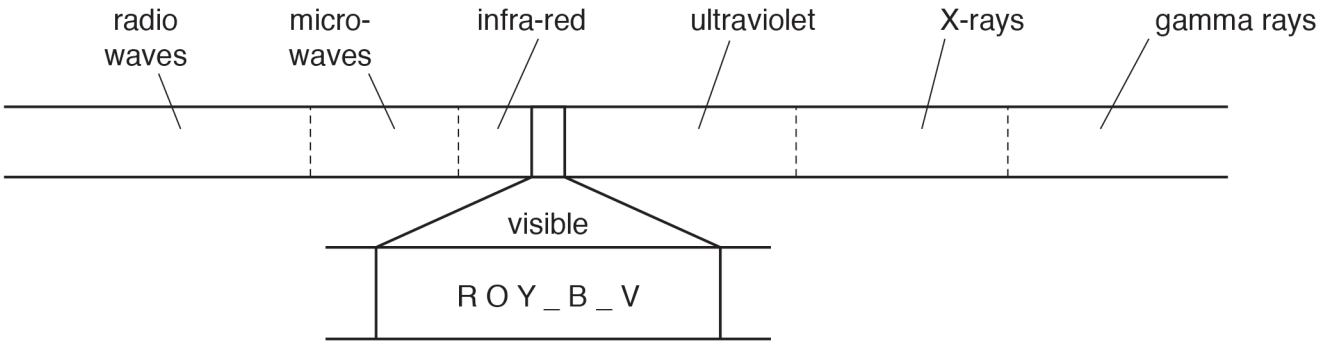
33 Describe how high levels of microwave energy can be dangerous to people.

.....

..... [1]

[Total: 1]

34 The diagram shows the regions of the electromagnetic spectrum.



(a) The diagram shows the first letter of some colours in the visible part of the spectrum.

State which colours are missing.

..... and ..... [1]

(b) State the names of the regions of the electromagnetic spectrum that are used in

(i) communications,

..... and ..... [1]

(ii) remote controls for televisions and DVD players.

..... [1]

[Total: 3]

35 State **two** safety precautions required when using X-rays.

1. .....

2. ..... [2]

[Total: 2]

36 Light travels in a vacuum and then enters a glass block. The speed of the light in the glass block is 2.0×10^8 m / s.

Which statement about the speed of light is correct?

A The speed in a vacuum is 1.5 times the speed in the glass.

B The speed in the glass is the same as the speed in a vacuum.

C The speed in the glass is 1.5 times the speed in a vacuum.

D The speed in the glass is 1.0×10^8 times the speed in a vacuum.

[1]

[Total: 1]

37 State a use of infra-red radiation.

..... [1]

[Total: 1]

38 This question is about the electromagnetic spectrum.

The diagram shows labels for parts of the electromagnetic spectrum, in order.

radio waves	microwaves	infra-red radiation	visible light	.....	.....	gamma rays

Complete the diagram by adding the two missing labels. [2]

[Total: 2]

39 Describe the harmful effect of microwaves on people.

.....

..... [1]

[Total: 1]

40 Sound is not an electromagnetic wave.

Give **one** other way in which sound waves are different from radio waves.

..... [1]

[Total: 1]