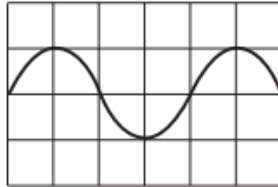


National 5 Waves and Radiation Practice Check Test

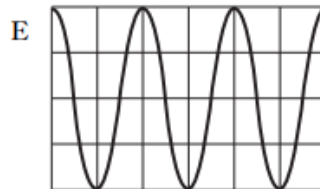
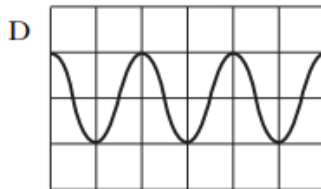
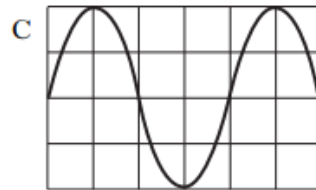
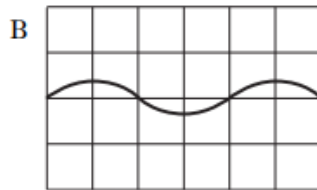
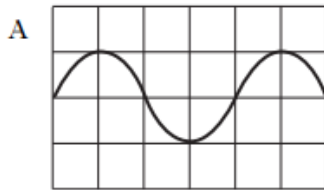
- 1 A student investigates sound waves.

She connects a microphone to an oscilloscope. The microphone detects a sound and the following trace is seen on the oscilloscope screen.



The student then uses the microphone to detect a louder sound of higher frequency. The controls of the oscilloscope are unchanged.

Which of the following shows the trace now seen on the oscilloscope screen?



- 2 A satellite sends radio waves to a ground station on Earth

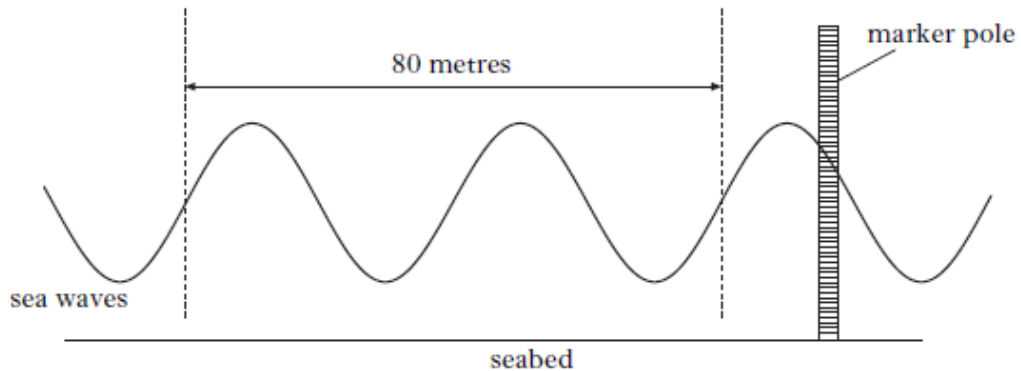


- (a) State the speed of the radio waves in air
- (b) The microwaves have a wavelength of 60mm
- (i) Calculate the frequency of the waves 3
- (ii) Determine the period of the waves 3
- (c) The satellite sends microwaves along with the radio waves to the ground station. Will the radio waves be received by the ground station before, after or at the same time as the radio waves? Explain your answer 2

3 A surfer rides the waves near a beach.

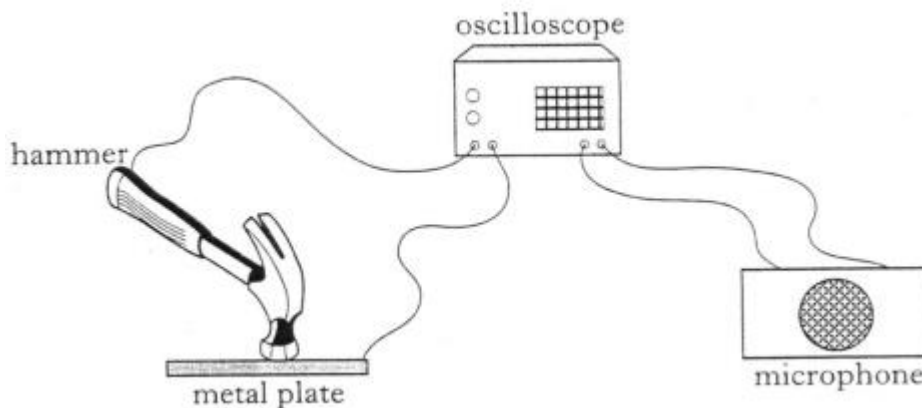


(a) The diagram below shows a wave some distance from the beach.



- (i) Using information from the diagram, calculate the wavelength of the wave. 2
- (ii) The time between one crest and the next crest passing the marker pole is 5 seconds. Calculate the speed of the wave. 3

4 The speed of sound in air is measured using the apparatus shown below



In an experiment, the distance between the metal plate and the microphone is measured as 0.80 metres.

The time taken for the sound to travel from the metal plate to the microphone is measured at 0.0025 seconds.

Using these measurements, calculate the speed of sound in air. 3

5 The boxes below give uses of different types of radiation

A		B		C	
	Inspection of welded joints		Treating vitamin D deficiency		Removing birthmarks
D		E		F	
	Sterilising surgical instruments		Seeing things		Thermograms

(a) From the boxes above, select **one use each** for gamma rays, ultraviolet rays and X-rays and complete the following sentences.

- (i) A use for gamma rays 1
- (ii) A use for ultraviolet rays 1
- (iii) A use for X-rays 1

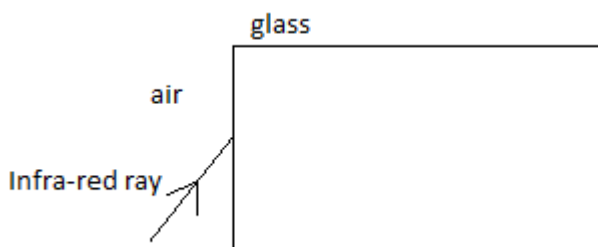
(b) In hospitals, medical staff use tracers that give out gamma rays

State **one** safety precaution that medical staff should take when working with sources of gamma radiation 1

6 Optical fibres are used to carry internet data using infra-red radiation.

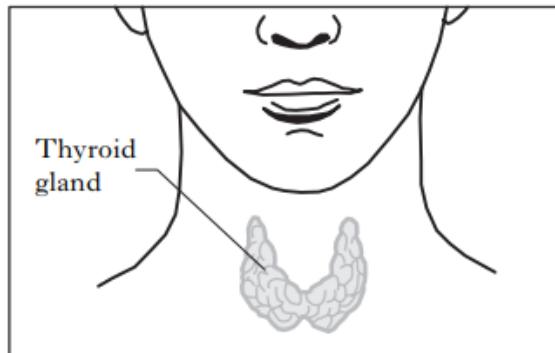
(a) State if the wavelength of infra-red radiation is greater than, the same as, or less than the wavelength of visible light. 1

(b) The diagram shows a view of an infra-red ray entering the end of a fibre.



- (i) Copy and complete the diagram to show the path of the infra-red ray as it enters the glass from air. 1
- (ii) Identify on your diagram the normal, the angle of incidence and the angle of refraction. 3

- 7 The thyroid gland, located in the neck, is essential for maintaining good health.



- (a) (i) A radioactive source, which is a gamma radiation emitter, is used as a radioactive tracer for the diagnosis of thyroid gland disorders.

A small quantity of this tracer, with an activity of 20 MBq, is injected into a patient's body. After 52 hours, the activity of the tracer is measured at 1.25 MBq.

Calculate the half life of the tracer.

3

- (ii) Another radioactive source is used to **treat** cancer of the thyroid gland. This source emits only beta radiation.

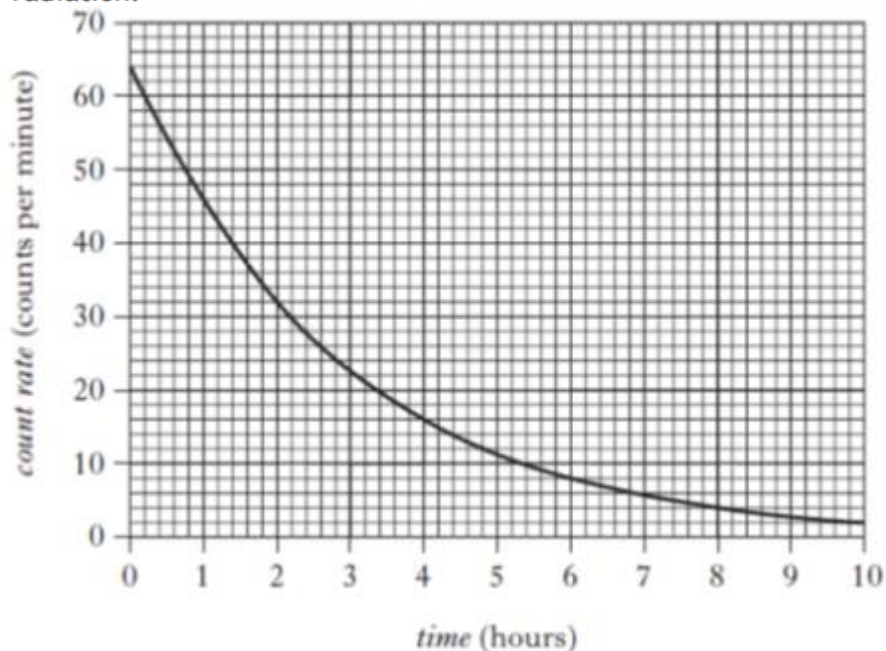
Why is this source unsuitable as a **tracer**?

1

- (b) What are the units of equivalent dose?

1

- 8 A technician checks the count rate of a radioactive source. A graph of count rate against time for the source is shown. The count rate has been corrected for background radiation.

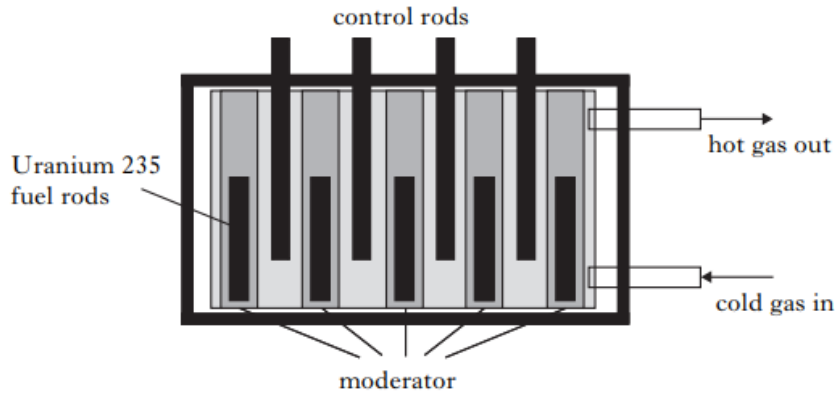


- (a) Use the graph to determine the half-life of the source.

2

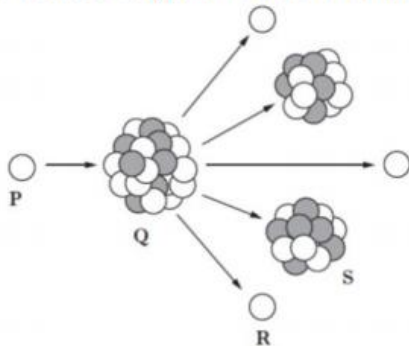
- (b) State two factors which can affect the background radiation level. 2
- (c) The source emits gamma rays. State what is meant by a gamma ray. 1

9 Many countries use nuclear reactors to produce energy. A diagram of the core of a nuclear reactor is shown.



(a) State **one advantage** and **one disadvantage** of using nuclear power for the generation of electricity. 2

(b) A student is researching information on nuclear reactors. The following diagram is found on a website. It illustrates a type of reaction that takes place in a reactor.



- (i) Name the type of nuclear reaction is shown in the diagram. 2
- (ii) The labels have been omitted at positions P, Q, R and S on the diagram. State clearly what each of these labels should be. 2

Total Marks 40