1. Recently scientists have aimed infrared lasers at the Moon.

Explain why infrared radiation **cannot** be seen in the sky.

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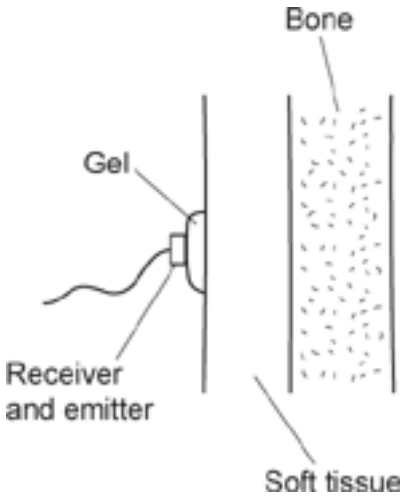
[1]

2. The diagram shows a patient having an ultrasound scan.



The speed of ultrasound in soft tissue is 1500 m / s.

The echo from the boundary between the soft tissue and the bone is received 2.0×10^{-5} s after the ultrasound is emitted.

What is the thickness of the soft tissue?

Ignore the thickness of the gel.

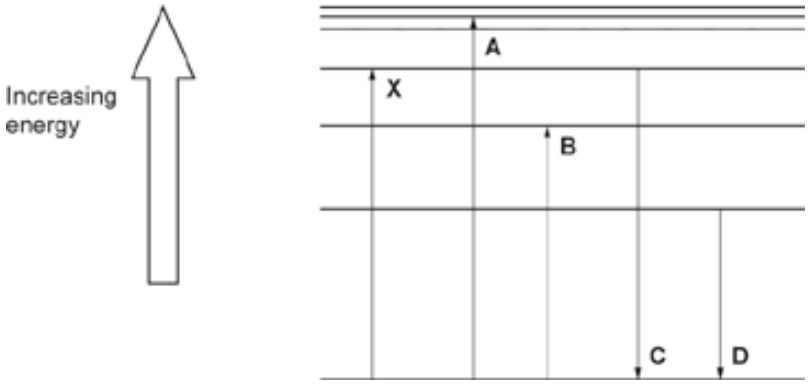
Use the equation: distance travelled = speed × time

A 0.015 m
B 0.030 m
C 0.060 m
D 0.075 m

Your answer ☐ **[1]**

3. The diagram shows energy levels in an atom.

Arrow **X** shows the movement of an electron that has absorbed infrared radiation.



Which arrow shows the movement of the same electron if it had absorbed radiation with more energy?

Your answer ☐ **[1]**

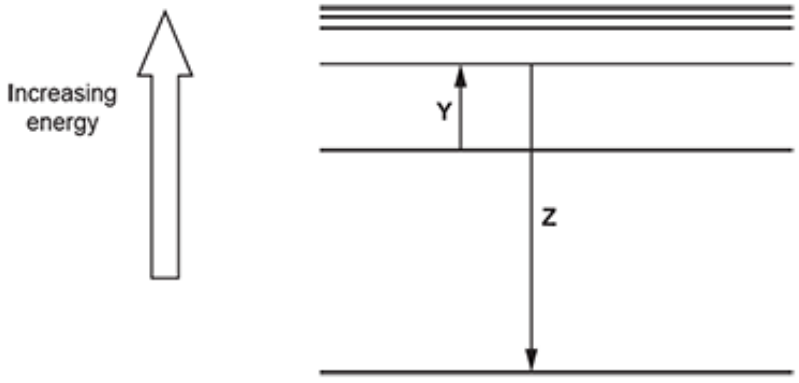
4. Which electromagnetic waves can cause cancer **and** help treat cancer?

A Gamma rays and X-rays
B Infrared and X-rays
C Microwaves and infrared
D Radio waves and gamma rays

Your answer ☐ **[1]**

5. Atoms can emit or absorb electromagnetic radiation when electrons move between energy levels.

The diagram shows electron transitions **Y** and **Z** between energy levels in an atom.



i. Draw an arrow on the diagram showing the transition of an electron in the **lowest** energy level when it is lost from the atom.

[2]

ii. Complete each sentence about the electron transitions in the diagram.

Use the words in the list.

absorbed	**emitted**	**excited**	**ionised**
higher than	**lower than**	**the same as**	

When an electron is ....., as shown by arrow **Y**, electromagnetic radiation is ..... by the atom.
The frequency of electromagnetic radiation involved in transition **Z** is ..... the frequency of the electromagnetic radiation involved in transition **Y**.

[2]

6. Ultrasound scans are used to take pictures of unborn babies.

Before the ultrasound scan, gel is placed on the skin.

Which sentence explains why the scan **only** works when the gel is used?

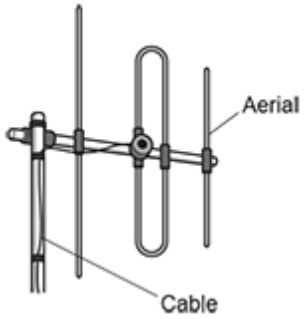
A The gel amplifies the ultrasound waves.
B The gel lubricates the skin.
C The gel reflects the ultrasound waves.
D The gel transmits the ultrasound waves.

Your answer ☐

[1]

7. A radio aerial receives radio signals.

The aerial is connected to a radio receiver using a cable.

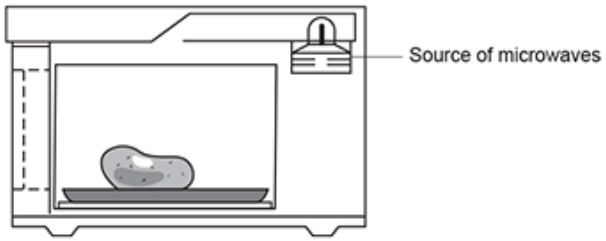


How does the radio signal travel through the cable?

A As a light wave
B As a radio wave
C As a sound oscillation
D As an electrical oscillation

Your answer ☐ **[1]**

8. The diagram shows food being heated in a microwave oven.



Read these statements about the microwave oven:
1. The microwaves ..... energy.
2. The food's temperature increases because it ..... the microwaves.

	Statement 1	Statement 2
A	refract	reflects
B	transfer	reflects
C	refract	absorbs
D	transfer	absorbs

Which row gives the correct words to complete the statements?

Your answer ☐ **[1]**

END OF QUESTION PAPER