

# X-Rays

## Question Paper

Level	GCSE
Subject	Physics
Exam Board	AQA
Unit	P3
Topic	X-Rays
Difficulty Level	Silver Level
Booklet	Question Paper

**Time Allowed:** 38 minutes

**Score:** /38

**Percentage:** /100

Q1.(a) Complete the following sentences.

Ultrasound waves have a minimum frequency  
of ..... hertz.

The wavelength of an X-ray is about the same as  
the diameter of .....

(2)

(b) In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.

The images show one medical use of ultrasound and one medical use of X-rays.



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Compare the medical uses of ultrasound and X-rays.

Your answer should include the risks, if any, and precautions, if any, associated with the use of ultrasound and X-rays.

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(6)  
(Total 8 marks)

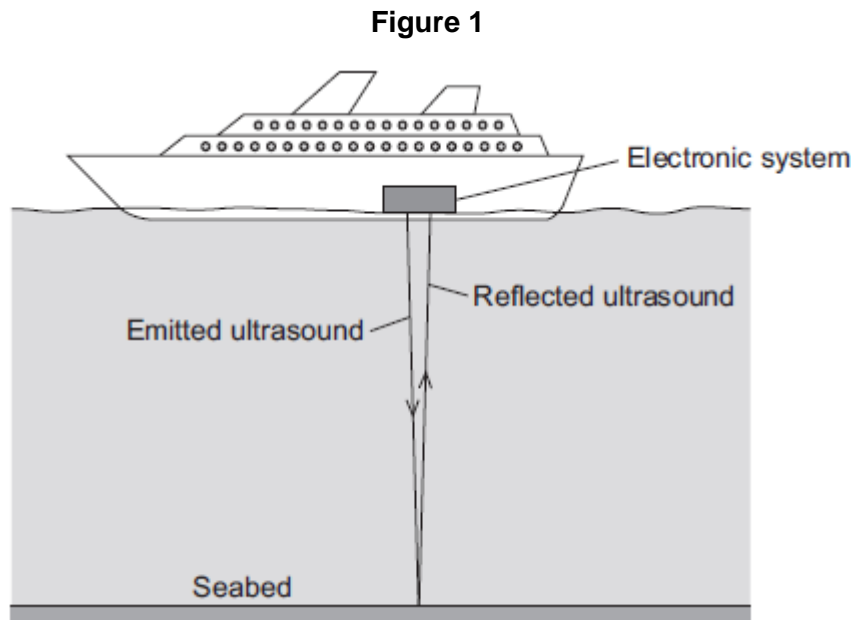
Q2.(a) What is ultrasound?

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(1)

(b) **Figure 1** shows how ultrasound is used to measure the depth of water below a ship.



A pulse of ultrasound is sent out from an electronic system on-board the ship.

It takes 0.80 seconds for the emitted ultrasound to be received back at the ship.

Calculate the depth of the water.

Speed of ultrasound in water = 1600 m / s

Use the correct equation from the Physics Equations Sheet.

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.....

Depth of water = ..... metres

(3)

- (c) Ultrasound can be used in medicine for scanning.

State **one** medical use of ultrasound scanning.

.....

(1)

- (d) Images of the inside of the human body can be made using a Computerised Tomography (CT) scanner. The CT scanner in **Figure 2** uses X-rays to produce these images.

**Figure 2**



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State **one** advantage and **one** disadvantage of using a CT scanner, compared with ultrasound scanning, for forming images of the inside of the human body.

Advantage of CT scanning .....

.....  
.....  
Disadvantage of CT scanning .....

(2)  
(Total 7 marks)

**Q3.** Ultrasound and X-rays are waves used in hospitals to create images of the inside of the human body. To produce the images below, the waves must enter the human body.

**Ultrasound scan of an unborn child  
bone**

**X-ray of a broken  
bone**



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- (a) *In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.*

Describe the features of ultrasound and X-rays, and what happens to each type of wave after it has entered the human body.

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(6)

- (b) It would **not** be safe to use X-rays to produce an image of an unborn child.  
Explain why.

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(2)

- (c) Ultrasound can be used for medical treatments as well as for imaging.  
Give **one** use of ultrasound for medical treatment.

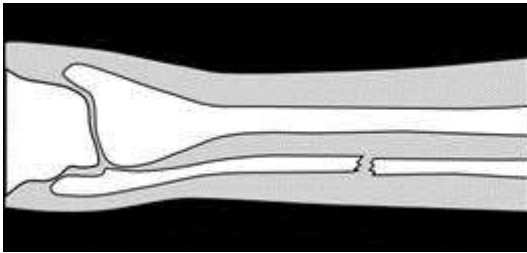
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(1)

(Total 9 marks)

**Q4.** Both X-ray machines and CT scanners are used to produce images of the body.

- (a) The diagram shows an X-ray photograph of a broken leg.



Before switching on the X-ray machine, the radiographer goes behind a screen.

Explain why the radiographer does this.

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(3)

(b) The following is an extract from a newspaper article.

**X-rays cause 700 new cancers each year in the U.K.**  
Each year there are about 125 000 new cancer cases in the UK, of which, about 700 may be due to the use of X-rays to diagnose illness.

The article was reporting on a scientific research project first published in a medical journal.

What evidence would the scientists have collected to come to the conclusion that X-rays can cause cancer?

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(2)

(c) Explain the advantage of a CT scan compared to an X-ray.

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(2)

(Total 7 marks)

**Q5.** After a person is injured a doctor will sometimes ask for a photograph to be taken of the patient's bone structure, e.g. in the case of a suspected broken arm.

(i) Which type of electromagnetic radiation would be used to take the photograph?

.....

(1)

(ii) Describe the properties of this radiation which enable it to be used to photograph bone structure.

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(2)

(Total 3 marks)



**Q6.** Explain fully why pregnant women should not normally have X-rays of the lower body.

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**(Total 4 marks)**