

Additional examination-style questions

- 1 (a) State and explain **two** physical properties of the light produced by a laser which makes it different from the light produced by a filament lamp. (3 marks)
- (b) An endoscope may use light from a filament lamp and light from a laser. State
- (i) the use of the light from a filament lamp,
- (ii) a use of the light from a laser. (2 marks)
- (c) **Figure 1** shows a cross-section through an optical fibre used in an endoscope. The core is made from glass of refractive index 1.5.

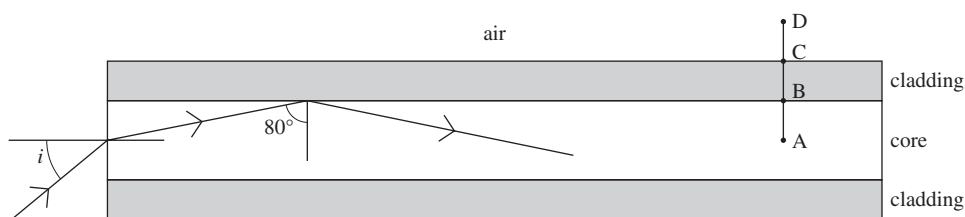
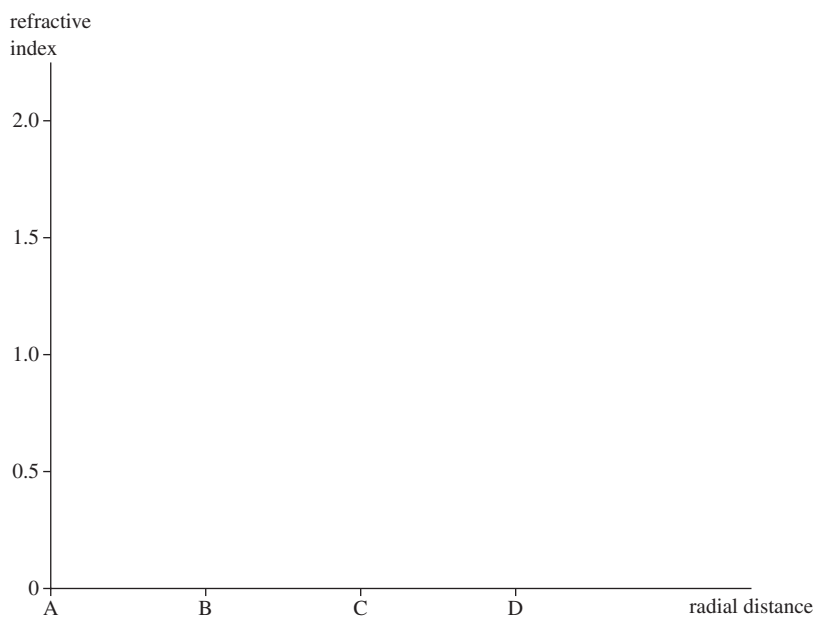


Figure 1

- (i) Complete the graph below to show how the refractive index changes with radial distance along the line ABCD in Figure 1.



- (ii) Calculate the value of the angle of incidence, i , shown in Figure 1. (4 marks)
- AQA 2006

Additional examination-style questions

- 2 (a) The diverging lens in **Figure 2** forms an image of the object. Complete **Figure 2** by drawing a ray diagram to show the formation of the image. Label the image.

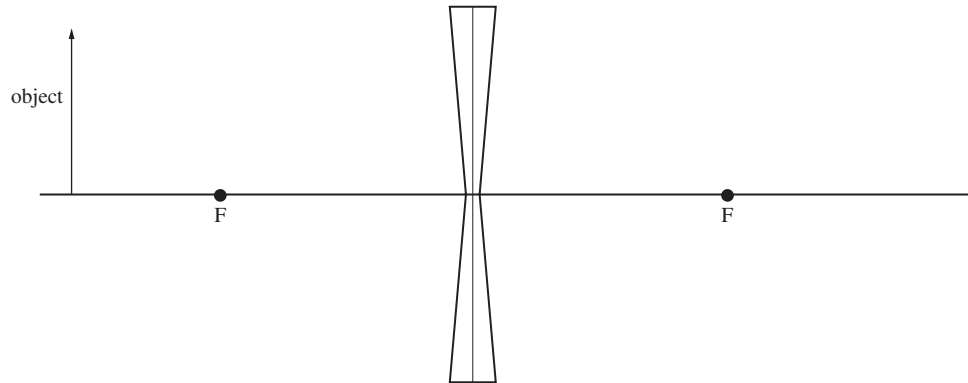


Figure 2

(2 marks)

- (b) A diverging spectacle lens of power 3.0 D is used to correct a defect of vision. When used to view a real object, the image is formed 0.21 m from the lens.

- (i) State the defect of vision.
 (ii) Calculate the distance of the object from the lens.

(2 marks)

AQA 2006

- 3 (a) State the **two** physical properties of a material which determine its acoustic impedance.

- (b) Under what condition is ultrasound strongly reflected at a boundary between two types of material?

- (c) State where a coupling medium or gel is used in an ultrasound scan and explain why it is necessary.

(6 marks)

AQA 2006

Additional examination-style questions

- 4 (a) **Figure 3** shows the ECG waveform produced when electrodes are attached to the chest of a healthy person. Label the axes with suitable scales and units.

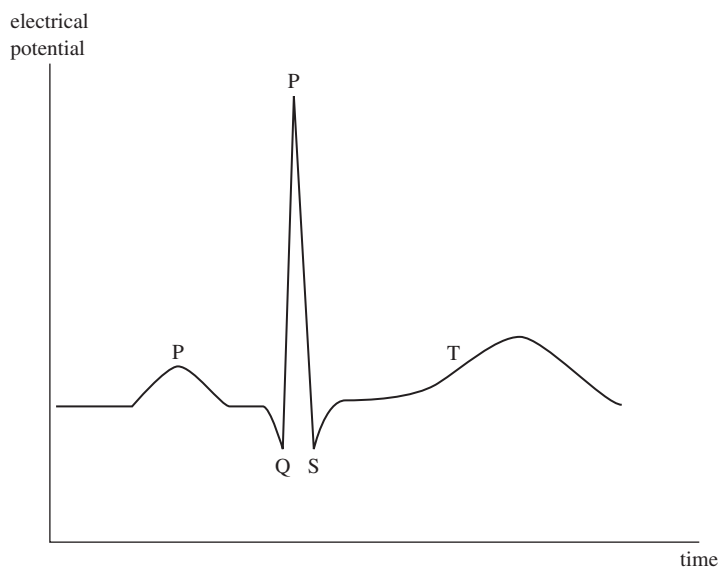


Figure 3

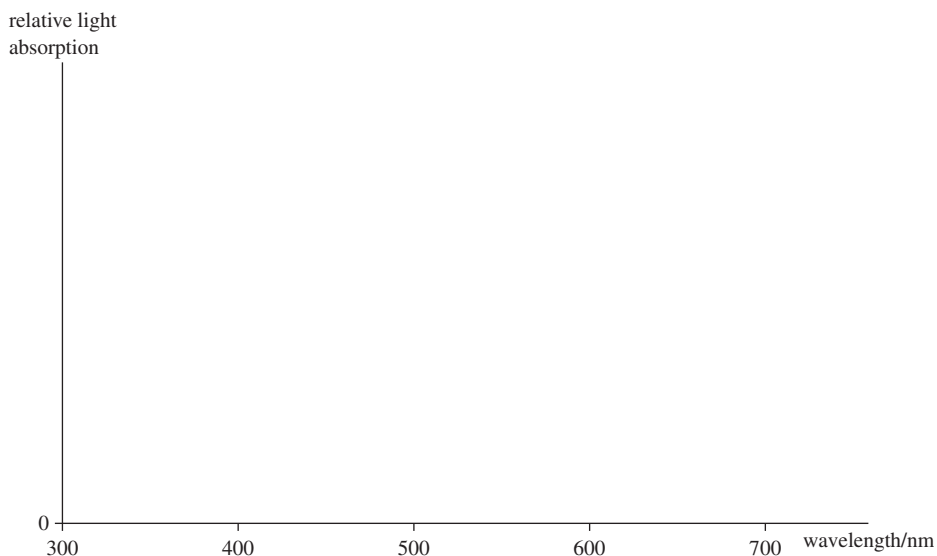
(2 marks)

- (b) State what is meant by *depolarisation* and *repolarisation* and, in terms of ion movement, explain how each effect is caused. (3 marks)
- (c) State how the action of the atria and ventricles correspond to the waveform PQRST shown in **Figure 3**. (3 marks)
AQA 2007
- 5 Modern diagnostic X-ray tubes are used to produce sharp images of parts of the human skeleton.
- (a) Explain how the design of the anode allows a sharp image to be produced. (2 marks)
- (b) State and explain **three** methods used to minimise the patient dose during diagnostic radiography. (3 marks)
- (c) A beam of 50 keV X-ray photons is incident on and travels through a piece of bone of thickness 1.2 cm. Calculate the ratio of the transmitted intensity to incident intensity of the X-ray beam.
half-value thickness of bone for 50 keV X-ray photons = 1.5 cm (3 marks)
AQA 2007

Additional examination-style questions

6 The fovea in the human eye consists only of cones which have an average diameter of $1.5 \mu\text{m}$.

(a) On the axes sketch and clearly label **three** curves to show how the response of each of the three types of cone in the fovea varies with the wavelength of light.



(3 marks)

(b) An eye looks directly at two point sources of light which are 8 mm apart and 40 m distant from the eye. The fovea is 19 mm behind the eye lens at the centre of the retina.

(i) Calculate the separation of the two images at the fovea.

(ii) State, with a reason, whether the eye would be able to resolve the two images formed at the fovea.

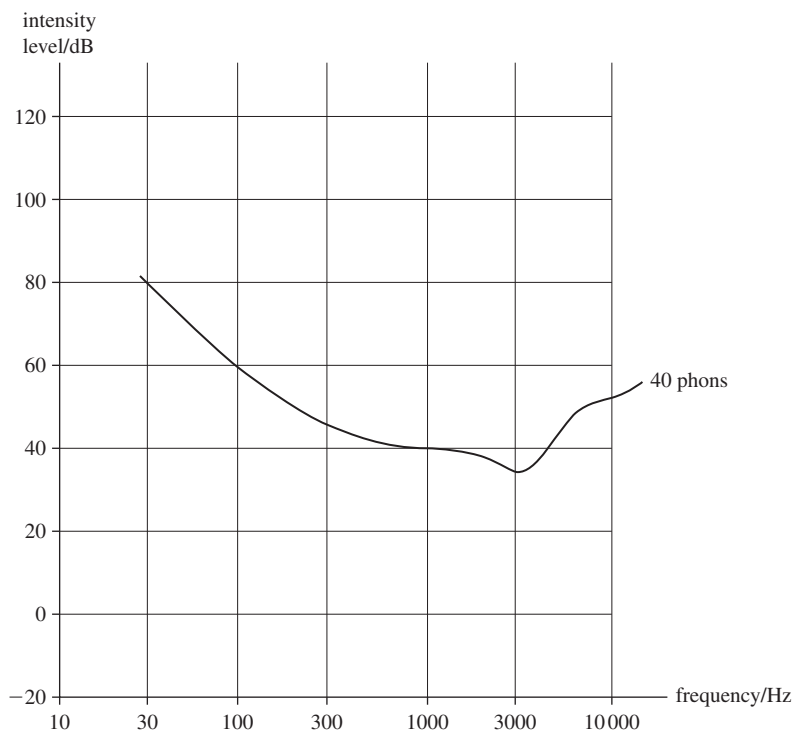
(4 marks)

AQA 2008

Additional examination-style questions

7 (a) The *threshold of hearing* is $1.0 \times 10^{-12} \text{ W m}^{-2}$. Explain what is meant by the threshold of hearing. (2 marks)

(b) The graph shows an equal loudness curve for a person with good hearing.



- (i) Explain how such a curve might be obtained.
You may be awarded additional marks to those shown in brackets for the quality of written communication in your answer.
- (ii) The ear drum of the person being tested has a cross-sectional area of 12 mm^2 . Calculate the power incident on the eardrum at a frequency of 100 Hz for the equal loudness curve shown. (6 marks)

AQA 2008

Additional examination-style questions

8 (a) Figure 4 shows a cross-section through an ultrasound generator.

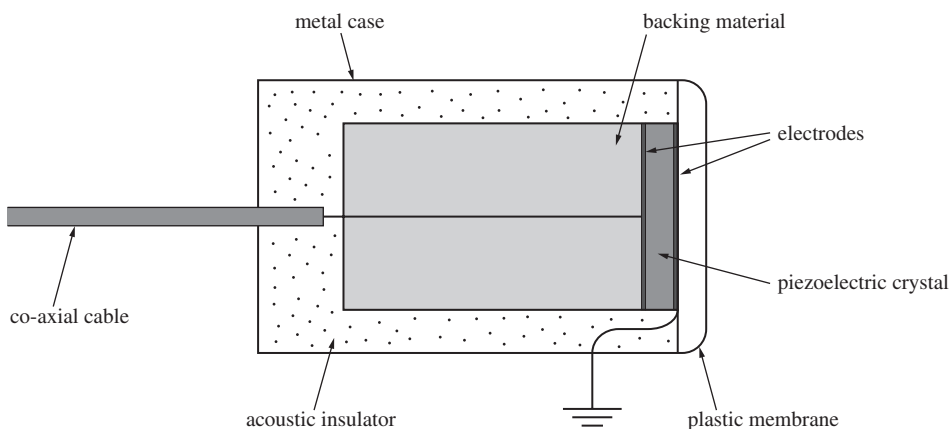
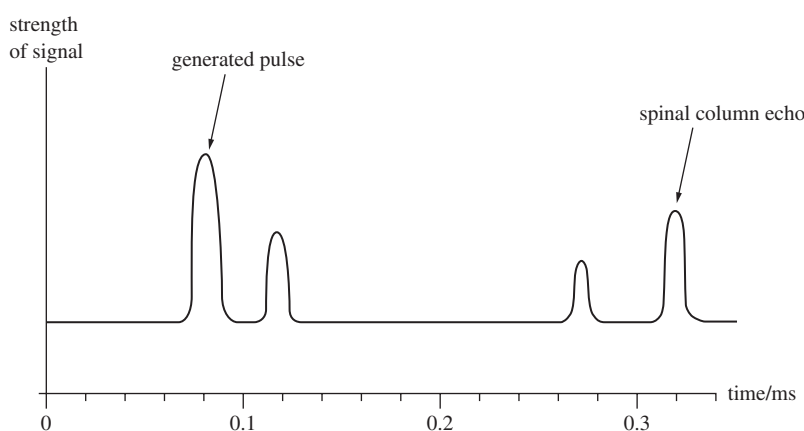


Figure 4

- (a) Explain the purpose of the backing material. (2 marks)
- (b) State the main difference between the probe used in an A-scan and that used in a B-scan. (1 mark)
- (c) Figure 5 shows the display on an oscilloscope screen of an A-scan to find the size of an organ.



Speed of sound in the organ = 1200 ms^{-1}

Figure 5

- (i) Calculate the diameter of the organ.
- (ii) State *two* processes which reduce the strength of the reflected signal received by the probe. (4 marks)

AQA 2008

9 (a) A rotating anode X-ray tube is operated at a peak voltage of 90 kV and an electron beam current of 48 mA.

- (i) Calculate the number of electrons reaching the anode each second.
- (ii) Calculate the maximum photon energy, in J, of the X-rays produced. (2 marks)

AQA 2008