

**Q1.** (a) In an X-ray tube, electrons are accelerated from rest through a pd of 72.4 kV before they hit the target anode.

(i) Calculate the kinetic energy of an electron as it reaches the anode. Give your answer to an appropriate number of significant figures.

answer = ..... J

**(2)**

(ii) Assuming that the electron gives up all this energy to form an X-ray photon, calculate the wavelength of the photon.

answer = ..... m

**(2)**

(b) X-rays are used in a CT scanner. Describe briefly how a CT scanner produces an image.

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(3)  
(Total 7 marks)

**Q2.** (a) Outline the basic principles of a magnetic resonance (MR) scanner used to scan a patient's brain.

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(3)

(b) State and explain **two** advantages of using an **MR** scanner to scan a patient's brain compared with a CT scanner.

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(4)

**(Total 7 marks)**