

M1. (a) (i) $1.60 \times 10^{-19} \times 72.5 \times 10^3 = 1.16 \times 10^{-14}$ (J)

Sig Fig mark for 3sf

2

(ii) $\lambda = (6.63 \times 10^{-34} \times 3.00 \times 10^8) / 1.16 \times 10^{-14}$
 $= 1.71 \times 10^{-11}$ (m)

2

(b) Narrow beam of X-rays

X ray generator rotated (in circular path) around patient

Detectors arranged around outside of the path

Detector opposite generator registers transmitted intensity

Detectors connected to computer which (over time) produces cross sectional image

Any **three** relevant points.

3

[7]

M2. (a) (head) placed in strong/high intensity/super conducting magnets magnetic field **(1)**

supplied radio pulse excite H nuclei **(1)**

when H nuclei de-excite/change spin/change alignment they emit radio signal/em radiation/photons **(1)**

these signals are detected and passed to computer **(1)**

gradient in static field to allow location to be determined/magnetic field aligns H nuclei **(1)**

max 3

(b) example answers:

MR non-ionising radiation – ionising radiation in CT more danger to living cells **(1)**

MR can give multi-plane images from same scan – CT needs new scan for each image **(1)**

MR gives better resolution between tissue types, better resolution picture **(1)**

MR gives real time image CT scan needs to rotate to produce final image **(1)**

4

[7]