10(a)	product of density and speed
	speed of sound in medium (and density of the medium)
10(b)	ultrasound waves cause crystal to vibrate
	vibrations (of crystal) cause induced e.m.f. (across crystal)
10(c)(i)	intensity reflection coefficient= $(40.4 - 1.48)^2 / (40.4 + 1.48)^2$
	$= 0.86$
10(c)(ii)	Z values are very similar
	(almost) all the ultrasound will be transmitted **or** (almost) none of the ultrasound will be reflected

8(a)	(radioactive) substance introduced into the body
	substance absorbed by the tissues being studied
8(b)(i)	$P = 15$ **and** $R = 0$
	$Q = 7$ **and** $S = (+)1$
8(b)(ii)	(electron) neutrino
8(c)(i)	<u>number</u> of nuclear disintegrations per unit time
8(c)(ii)	decay constant $= \ln 2 / (2.04 \times 60)$
	$= 5.66 \times 10^{-3}\ s^{-1}$
8(c)(iii)	$N = (2.85 \times 10^{-6}) / (15 \times 1.66 \times 10^{-27})$
	$A = \lambda N$
	rate $= (5.66 \times 10^{-3}) \times (2.85 \times 10^{-6}) / (15 \times 1.66 \times 10^{-27})$
	$= 6.48 \times 10^{17}\ s^{-1}$
8(d)(i)	gamma photons
8(d)(ii)	positron collides with electron (in body)
	annihilation results in their masses becoming photon energy

6(a)	plate X marked as negative and plate Y marked as positive
6(b)(i)	$E = V / x$
	$= (58 \times 10^3) / 0.041$ $= 1.4 \times 10^6\ N\ C^{-1}$
6(b)(ii)	$ma = eE$
	$a = (1.60 \times 10^{-19} \times 1.41 \times 10^6) / (9.11 \times 10^{-31})$ $= 2.5 \times 10^{17}\ m\ s^{-2}$
6(c)(i)	$eV = hc / \lambda$ **or** $eV = hf$ **and** $f = c / \lambda$
	$(1.60 \times 10^{-19} \times 58 \times 10^3) = (6.63 \times 10^{-34} \times 3.00 \times 10^8) / \lambda$
	clear conversion from m to pm leading to $\lambda = 21$ pm
6(c)(ii)	X-rays
6(c)(iii)	*Any two points from:* • waves are passed into structure and transmitted waves detected • different parts of the structure absorb different fractions of energy • difference in detected / transmitted <u>intensities</u> used (to form image)