

Multiple Choice Answers

Q38: A

Q39: A

Q40: B

6(a)(i)	numbers of protons and electrons both = 1
	number of neutrons = 2
6(a)(ii)	diagram shows 2 neutrons and 1 proton labelled and forming a nucleus
	diagram shows 1 electron labelled and separated from the nucleus (not touching the proton and neutrons)
6(b)(i)	helium nucleus: top line = 3 and bottom line = 2
	beta particle: top line = 0 and bottom line = -1
6(b)(ii)	(electron) antineutrino
6(c)	proton: up up down or neutron: up down down
	(tritium:) 4 up, 5 down

Multiple Choice Answers

Q40: A

Multiple Choice Answers

Q40: D

8(a)	flavour	charge / e
	up / u	$-\frac{2}{3}$
	down / d	$(+)\frac{1}{3}$
	down / d	$(+)\frac{1}{3}$
	3 correct quark flavours	
	Charge on anti-up quark $-\frac{2}{3}(e)$	
	Charge on anti-down quark $(+)\frac{1}{3}(e)$	
8(b)	particle: (electron) neutrino	
	antiparticle: positron	

8(a)	wavelength associated with a moving particle
8(b)	$\lambda = h / p$
	$= (6.63 \times 10^{-34}) / (9.11 \times 10^{-31} \times 4.9 \times 10^7)$
	$= 1.5 \times 10^{-11} \text{ m}$
8(c)	similarity: <i>any one point from:</i> - same mass - same <u>magnitude</u> of charge - both leptons
	difference: <i>any one point from:</i> - electron has negative charge, positron has positive charge - positron is anti-particle of electron - electron is a particle, positron is an anti-particle
8(d)(i)	(pair) annihilation
8(d)(ii)	their mass gets converted into energy
	(their mass-energy) becomes the energy of the gamma photons
8(d)(iii)	they travel in opposite directions to conserve momentum
8(d)(iv)	kinetic energy = $\frac{1}{2} \times 9.11 \times 10^{-31} \times (4.9 \times 10^7)^2 = 1.1 \times 10^{-15} \text{ J}$
8(d)(v)	$E = mc^2$
	$E = hc / \lambda$ or $E = hf$ and $c = f\lambda$
	$(1.1 \times 10^{-15}) + (9.11 \times 10^{-31} \times (3.00 \times 10^8)^2) = (6.63 \times 10^{-34} \times 3.00 \times 10^8) / \lambda$
	$\lambda = 2.39 \times 10^{-12} \text{ m}$