7) a) Alpha radiation emits a helium nucleus w/ 2 protons & 2 neutrons → $^{4}_{2}He$

b) Beta radiation emits an electron

c) Gamma radiation emits electromagnetic radiation

d) Alpha radiation looses 2 neutrons and 2 protons from the nucleus

e) Beta radiation loses 1 neutron and gain 1 proton in the nucleus as
1 neutron → 1 proton + 1 electron (emitted)

8) $^{14}_{6}C \rightarrow {}^{13}_{7}N + {}^{0}_{-1}e$

$^{226}_{88}Ra \rightarrow {}^{222}_{86}Rn + {}^{4}_{2}He$

$^{225}_{89}Ac \rightarrow {}^{221}_{87}Fr + {}^{4}_{2}He$

$^{210}_{82}Pb \rightarrow {}^{209}_{83}Bi + {}^{0}_{-1}e$

Chapter 8
Review For Final Exam

Formulas

$$t = \frac{t_0}{\sqrt{1-\frac{v^2}{c^2}}} \qquad l = l_0\sqrt{1-\frac{v^2}{c^2}}$$

$E = mc^2$

t_0 = time of moving object
t = time of observer

l_0 = length of object @ rest
l = length of moving object

1) a) 10 km/hr b) 10 km/hr + 5 km/hr = 15 km/hr

2) a) 25 km/hr b) 0 km/hr c) 5 km/hr

3) -20 km/hr 4) -15 km/hr

5) relatively the speed of the earth rotation around it's axis (1670 km/hr)

6) $t_0 = 5.0s$

a) $$\frac{5.0s}{\sqrt{1-\frac{(0.65c)^2}{c^2}}} \rightarrow \frac{5}{\sqrt{1-\frac{0.4225c^2}{c^2}}} \rightarrow \frac{5}{0.75993} = 6.58$$

$\boxed{t = 6.6s}$

b) $$\frac{5}{\sqrt{1-\frac{(0.866c)^2}{c^2}}}$$

↓

10. s

c) $$\frac{5}{\sqrt{1-\frac{(0.995c)^2}{c^2}}}$$

↓

50 s

d) $$\frac{5}{\sqrt{1-\frac{(0.999c)^2}{c^2}}}$$

↓

110 s

3) $l = l_0\sqrt{1-\frac{v^2}{c^2}}$ $\quad l_0 = 100\,m$

a) $l = 100\sqrt{1-\frac{(0.63c)^2}{c^2}} \rightarrow 100\sqrt{1-\frac{0.3969c^2}{c^2}}$

$\rightarrow 100\sqrt{0.6031} \rightarrow 100(0.77659)$

$\rightarrow 77.6595 \rightarrow$ **78 m = l**

b) $l = 100\sqrt{1-\frac{(0.866c)^2}{c^2}}$

↓

50 m = l

c) $100\sqrt{1-\frac{(0.999c)^2}{c^2}}$

↓

14.5 m = l

4) $t = \frac{t_o}{\sqrt{1-\frac{(0.5c)^2}{c^2}}}$ $\quad t = \frac{t_o}{\sqrt{1-0.25}}$

$t = \frac{t_o}{0.866}$ $\quad$ **0.866t = to**

5) a) If 2 frames of reference move with constant velocity relative to each other, then the laws of physics will be the same in both frames of reference.

2) The speed of light in space is the same for any observer no matter what the velocity of the observer's frame of reference is, and no matter what the source of light is.

6) $E = mc^2$ $\quad m = 87g \times \frac{1\,kg}{1000\,g} = 0.087\,kg$

$E = (0.087)(3.00\times10^8\,m/s)$

$E = 2.61\times10^7\,J$

9) 4000 $\xrightarrow{24d}$ 2000 $\xrightarrow{48d}$ 1000 $\xrightarrow{72d}$ 500 $\xrightarrow{96d}$ 250 $\xrightarrow{120\ d}$ 125 $\xrightarrow{144d}$ 62.5 atoms remaining

10)

Type	Abreviation	Fuel	Coolant
Boiling Water	BWR	enriched UO_2	water
Pressurized water	PWR	enriched UO_2	water
Deuterium Uranium	CANDU	natural UO_2	heavy water