Now the amplite for a process is given by

$$A = \langle f | H_s | i \rangle$$

so for process (a) $A_a = \langle \tfrac{3}{2}, +\tfrac{3}{2} | H_s | \tfrac{3}{2}, +\tfrac{3}{2} \rangle$

for process (b) things are a bit more complicated

$$A_b = \left(\sqrt{\tfrac{1}{3}} \langle \tfrac{3}{2}, -\tfrac{1}{2} | - \sqrt{\tfrac{2}{3}} \langle \tfrac{1}{2}, -\tfrac{1}{2} | \right) H_s \left(\sqrt{\tfrac{1}{3}} | \tfrac{3}{2}, -\tfrac{1}{2} \rangle - \sqrt{\tfrac{2}{3}} | \tfrac{1}{2}, -\tfrac{1}{2} \rangle \right)$$

$$= \frac{1}{3} \langle \tfrac{3}{2}, -\tfrac{1}{2} | H_s | \tfrac{3}{2}, -\tfrac{1}{2} \rangle - \frac{\sqrt{2}}{3} \langle \tfrac{3}{2}, -\tfrac{1}{2} | H_s | \tfrac{1}{2}, \tfrac{1}{2} \rangle$$

$$- \frac{\sqrt{2}}{3} \langle \tfrac{1}{2}, -\tfrac{1}{2} | H_s | \tfrac{3}{2}, -\tfrac{1}{2} \rangle + \frac{2}{3} \langle \tfrac{1}{2}, -\tfrac{1}{2} | H_s | \tfrac{1}{2}, -\tfrac{1}{2} \rangle$$

But strong interaction conseres strong isospin thus only terms with the same initial and final isospins survive!

$$\therefore A_b = \frac{1}{3} \langle \tfrac{3}{2}, -\tfrac{1}{2} | H_s | \tfrac{3}{2}, -\tfrac{1}{2} \rangle + \frac{2}{3} \langle \tfrac{1}{2}, -\tfrac{1}{2} | H_s | \tfrac{1}{2}, -\tfrac{1}{2} \rangle$$

Since the energy states of the strong Hamiltonian are only dependent on I_s and not I_{s3} we can write A_b as:

$$A_b = \frac{1}{3} A_a + \frac{2}{3} \langle \tfrac{1}{2}, -\tfrac{1}{2} | H_s | \tfrac{1}{2}, -\tfrac{1}{2} \rangle$$

similarly for process (c)

$$A_c = \left(\sqrt{\tfrac{1}{3}} \langle \tfrac{3}{2}, -\tfrac{1}{2} | - \sqrt{\tfrac{2}{3}} \langle \tfrac{1}{2}, -\tfrac{1}{2} | \right) H_s \left(\sqrt{\tfrac{2}{3}} | \tfrac{3}{2}, -\tfrac{1}{2} \rangle + \sqrt{\tfrac{1}{3}} | \tfrac{1}{2}, -\tfrac{1}{2} \rangle \right)$$

$$= \frac{\sqrt{2}}{3} \langle \tfrac{3}{2}, -\tfrac{1}{2} | H_s | \tfrac{3}{2}, -\tfrac{1}{2} \rangle - \frac{\sqrt{2}}{3} \langle \tfrac{1}{2}, -\tfrac{1}{2} | H_s | \tfrac{1}{2}, -\tfrac{1}{2} \rangle$$

where again since strong interactions conseres isospin only ... initial and final isospins survive