Quark structure of mesons

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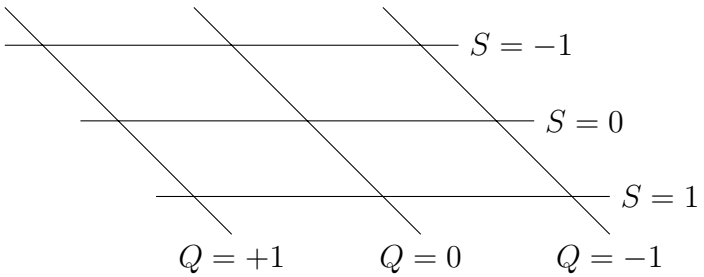
1. (a) A meson is formed from a quark and an antiquark. There are nine possible combinations of the up, down and strange (u, d, and s) which will make mesons. List these nine combinations.

   (b) The table below shows eight mesons. Using your list from (a) identify the quark structure in each of the mesons. Remember that some mesons can be made up of more than one combination.

particle	Charge (Q) / e	Baryon number	Strangeness
π^+	$+1$	0	0
π^-	-1	0	0
π^0	0	0	0
K^+	$+1$	0	1
K^-	-1	0	-1
K^0	0	0	1
$\overline{\mathrm{K}}^0$	0	0	-1
η	0	0	0

2. The diagram below shows the *meson octet*.



   (a) Copy the diagram, and add on the eight particles at the intersections of the lines.

   (b) Which two mesons occupy the same position on the diagram?

   (c) How may they be different to each other?