

2.Total : $11!$ ways to rearrange the word

a.

Choose 1: Choose 3 spots to place letter in order of 'R','I','M', $C(11, 3)$ ways.

Choice 2: There are 8 letters left : $8!$

The probability to get 'RIM' is $C(11, 3) * 8! / 11! = 1/6$. Thus by subtraction rule,

$$1 - C(11, 3) * 8! / 11! = 5/6$$

b. Set up model set A =can make CARE, B=can make JURY. Thus $|A \cup B|$ = can make either CARE or JURY = $|A| + |B| - |A \cap B|$

Choose CARE : $C(11, 4) * 7! / 11! = \frac{1}{4!}$

Choose JURY : $C(11, 4) * 7! / 11! = \frac{1}{4!}$

Choose CARE,JURY at the same time: $C(11, 7) * 4! / 11! = \frac{1}{7!}$

So $|A \cup B| = \frac{2}{4!} - \frac{1}{7!} = \frac{419}{5040}$. Thus by subtraction rule, you can not make either CARE or JURY is $1 - \frac{419}{5040} = \frac{4621}{5040} = 0.91686507936$

c.Set up model set A =can make CARE, B=can make JURY , C=can make RIM. Thus $|A \cup B \cup C|$ = can make either CARE or JURY or RIM = $|A| + |B| + |C| - |A \cap B| - |B \cap C| - |A \cap C| + |A \cap B \cap C|$

$$|A| + |B| + |C| = \frac{2}{4!} + \frac{1}{3!} = \frac{1}{4}$$

$$|A \cap C| = |B \cap C| = C(11, 6) * 5! / 11! = \frac{1}{6!}$$

$$|A \cap B| = \frac{1}{7!}$$

$$|A \cap B \cap C| = C(11, 9) * 2! / 11! = \frac{1}{9!}$$

So grand total is : $\frac{1}{4} - \frac{2}{6!} - \frac{1}{7!} + \frac{1}{9!} = 0.24702656525$.

Thus by subtraction rule : $1 - 0.24702656525 = 0.75297343474$ is the probability that can't make any of words, CARE , JURY or RIM