PERMS & COMBS - AUSTRALIA

1. The letters from the word "AUSTRALIA" are placed into a hat and drawn out in random order. What is the probability that the order in which they are drawn out will spell the word "AUSTRALIA"?

2. How many combinations are possible from the letters of the word "AUSTRALIA"
   taken;
   (i) 2 at a time?
   (ii) 3 at a time?
   (iii) 4 at a time?

3. How many arrangements of the letters from the word "AUSTRALIA" are possible if the letters are taken:
   (i) 2 at a time?
   (ii) 3 at a time?
   (iii) 4 at a time?

4. The letters from the word "AUSTRALIA" are placed in a hat and 2 letters are drawn at random. What is the probability of drawing
   (i) 2 As?
   (ii) an A and an I?
   (iii) one vowel only?
   (iv) no vowels?

5. Sal drew 3 letters at random from the word "AUSTRALIA". What is the probability that she drew the three letters of her name
   (i) in correct order?
   (ii) in any order?

6. You are aware that ${}^{n}C_{r} = {}^{n}C_{(n-r)}$. Are the number of combinations of the letters of the word "AUSTRALIA" taken 4 at a time the same as the number of combinations of the letters taken 5 at a time? Justify your answer with relevant calculations.

7. When the letters of the word "AUSTRALIA" are rearranged the first 5 letters can be rearranged to form the word "ALIAS". How many ways can the remaining four letters be arranged?

8. Shakeeba drew a letter at random from the word "AUSTRALIA" and then a letter at random from the word "AUSSIE". What is the probability that
   (i) both are the letter "A"?
   (ii) both are the same?

Answers:

1. $\frac{3}{9} \times \frac{1}{8} \times \frac{1}{7} \times \frac{1}{6} \times \frac{1}{5} \times \frac{2}{4} \times \frac{1}{3} \times \frac{1}{2} \times \frac{1}{1} = \frac{1}{60480}$

2. (i) 22 (ii) 42 (iii) 56

3. (i) 43 (ii) 229 (iii) 1044

4. (i) $\frac{1}{12}$ (ii) $\frac{1}{12}$ (iii) $\frac{5}{9}$ (iv) $\frac{1}{6}$

5. (i) $\frac{1}{216}$ (ii) $\frac{1}{36}$

6. Yes. Both have 56 combinations.

7. 24

8. (i) $\frac{1}{18}$ (ii) $\frac{7}{54}$