

4.6 Counting Techniques and Probability Strategies—Permutations

1. Evaluate each of the following.

(a) $7!$ (b) ${}_8P_2$ (c) $4! \times 3!$ (d) $P(14, 5)$ (e) $\frac{12!}{3!6!5!}$

2. Simplify: (a) $\frac{r!}{(r-1)!}$ (b) $\frac{(n-r)!}{(n-r+1)!}$

3. Solve for n , if $P(n, r) = 5 \times P(n-1, r-1)$.

4. How many distinct arrangements of the letters in PERMUTATIONS can you make?

- (a) taking all the letters at a time
~~(b) taking seven letters at a time~~
~~(c) taking three letters at a time~~

5. How many distinct four-digit odd numbers can be formed from the digits in the number 6 738 195?

6. Manpreet has 6 romance novels, 4 fiction novels, and 9 war novels on a shelf. In how many ways can she arrange her novels on the shelf if novels of the same genre are to be kept together?

7. Ten beads of different colours are strung on a string to make a necklace. How many different arrangements are there?

8. A safe opens when the right combination of three numbers from 00 to 99 are entered. The same number may be used more than once.

- (a) What is the probability of getting the correct combination by chance?
 (b) What is the probability of getting the right combination if you already know the first number?
 (c) What is the probability of getting the right combination if you already know the first two numbers?

9. A drawer contains five blue, seven pink and three orange scarves. Three scarves are drawn from the drawer, one at a time, without replacement. Determine the probability that the order in which they are selected is:

- (a) blue, pink, orange (b) pink, blue, orange (c) orange, blue, pink

Answers

1. (a) 5040 (b) 56 (c) 144 (d) 240 240 (e) 924 2. (a) r (b) $\frac{1}{(n-r+1)}$ 3. $n=5$
 4. (a) $\frac{12!}{2!} = 239\,500\,800$ (b) $\frac{P(12,7)}{12!} = 1,995,840$ (c) $\frac{P(12,3)}{2!} = 660$ 5. $5P(6,3) = 600$
 6. $6! \times 4! \times 9! \times 3 \times 2$ 7. $\frac{10!}{2} = 1\,814\,400$ 8. (a) $\frac{1}{100^3}$ (b) $\frac{1}{100^2}$ (c) $\frac{1}{100}$ 9. (a), (b), (c) $\frac{5 \times 7 \times 3}{P(15,3)} = \frac{1}{26}$