1. **Problem**
   A company needs to select a secretary, a manager, a CFO, and a president. Each position will be held by a different person. The company is considering the same pool of 10 applicants for each position. How many configurations are possible?

2. **Problem**
   A company needs to select 4 members to be on a committee. The company is considering a pool of 12 applicants. How many committees are possible?

3. **Problem**
   A traveller is packing shirts. She has 20 shirts to choose from, but will only bring 4 shirts. How many possibilities exist?

4. **Problem**
   A committee is judging the performances of 24 different acrobats. The committee needs to assign 1st prize, 2nd prize, and 3rd prize. How many ways could the committee assign the prizes?

5. **Problem**
   A team has 13 players. The coach needs to pick 3 starters. How many ways could the coach do this?

6. **Problem**
   A basketball team has 12 players. The coach needs to pick players to fill 3 different positions. How many ways could the coach do this?

7. **Problem**
   A team has 10 players. The coach will give out 2 different prizes. How many ways could the coach do this?

8. **Problem**
   Joe is shopping for shirts. Joe likes 22 of the shirts, but will only buy 4 of them. How many different combinations of shirts are possible?

9. **Problem**
   A landscape architect has 2 spots to plant 2 different trees. The landscape architect has 22 different trees available. How many configurations are possible?

10. **Problem**
    A company needs to select 3 members to be on a committee. The company is considering a pool of 12 applicants. How many committees are possible?

11. **Problem**
    A team has 11 players. The coach will give out 5 different prizes. How many ways could the coach do this?

12. **Problem**
    A designer is choosing a color pallette. There are 12 colors available, but the designer will only choose 5 colors for her pallette. How many pallettes are possible?

1. This scenario describes a permutations problem (order matters). We are considering the nonrepeating sequences of size 4 from a set of size 10.

$$
\begin{aligned}
{}_nP_r &= \frac{n!}{(n-r)!} \\
n &= 10 \\
r &= 4 \\
{}_{10}P_4 &= \frac{10!}{(10-4)!} \\
&= \frac{10!}{6!} \\
&= 10 \cdot 9 \cdot 8 \cdot 7 \\
&= \boxed{5040}
\end{aligned}
$$

2. This scenario describes a combinations problem (order does not matter). We are considering the subsets of size 4 from a set of size 12.

$$
\begin{aligned}
{}_nC_r &= \frac{n!}{(n-r)! \cdot r!} \\
n &= 12 \\
r &= 4 \\
{}_{12}C_4 &= \frac{12!}{(12-4)! \cdot 4!} \\
&= \frac{12!}{8! \cdot 4!} \\
&= \frac{12 \cdot 11 \cdot 10 \cdot 9}{4 \cdot 3 \cdot 2 \cdot 1} \\
&= \boxed{495}
\end{aligned}
$$

3. This scenario describes a combinations problem (order does not matter). We are considering the subsets of size 4 from a set of size 20.

$$
\begin{aligned}
{}_nC_r &= \frac{n!}{(n-r)!\cdot r!} \\
n &= 20 \\
r &= 4 \\
{}_{20}C_4 &= \frac{20!}{(20-4)!\cdot 4!} \\
&= \frac{20!}{16!\cdot 4!} \\
&= \frac{20\cdot 19\cdot 18\cdot 17}{4\cdot 3\cdot 2\cdot 1} \\
&= \boxed{4845}
\end{aligned}
$$

4. This scenario describes a permutations problem (order matters). We are considering the nonrepeating sequences of size 3 from a set of size 24.

$$
\begin{aligned}
{}_nP_r &= \frac{n!}{(n-r)!} \\
n &= 24 \\
r &= 3 \\
{}_{24}P_3 &= \frac{24!}{(24-3)!} \\
&= \frac{24!}{21!} \\
&= 24\cdot 23\cdot 22 \\
&= \boxed{12144}
\end{aligned}
$$

5. This scenario describes a combinations problem (order does not matter). We are considering the subsets of size 3 from a set of size 13.

$$_{n}C_{r} = \frac{n!}{(n-r)! \cdot r!}$$

$$n = 13$$

$$r = 3$$

$$_{13}C_{3} = \frac{13!}{(13-3)! \cdot 3!}$$

$$= \frac{13!}{10! \cdot 3!}$$

$$= \frac{13 \cdot 12 \cdot 11}{3 \cdot 2 \cdot 1}$$

$$= \boxed{286}$$

6. This scenario describes a permutations problem (order matters). We are considering the nonrepeating sequences of size 3 from a set of size 12.

$$_{n}P_{r} = \frac{n!}{(n-r)!}$$

$$n = 12$$

$$r = 3$$

$$_{12}P_{3} = \frac{12!}{(12-3)!}$$

$$= \frac{12!}{9!}$$

$$= 12 \cdot 11 \cdot 10$$

$$= \boxed{1320}$$

7. This scenario describes a permutations problem (order matters). We are considering the nonrepeating sequences of size 2 from a set of size 10.

$$
\begin{aligned}
{}_nP_r &= \frac{n!}{(n-r)!} \\
n &= 10 \\
r &= 2 \\
{}_{10}P_2 &= \frac{10!}{(10-2)!} \\
&= \frac{10!}{8!} \\
&= 10 \cdot 9 \\
&= \boxed{90}
\end{aligned}
$$

8. This scenario describes a combinations problem (order does not matter). We are considering the subsets of size 4 from a set of size 22.

$$
\begin{aligned}
{}_nC_r &= \frac{n!}{(n-r)! \cdot r!} \\
n &= 22 \\
r &= 4 \\
{}_{22}C_4 &= \frac{22!}{(22-4)! \cdot 4!} \\
&= \frac{22!}{18! \cdot 4!} \\
&= \frac{22 \cdot 21 \cdot 20 \cdot 19}{4 \cdot 3 \cdot 2 \cdot 1} \\
&= \boxed{7315}
\end{aligned}
$$

9. This scenario describes a permutations problem (order matters). We are considering the nonrepeating sequences of size 2 from a set of size 22.

$$
\begin{aligned}
{}_nP_r &= \frac{n!}{(n-r)!} \\
n &= 22 \\
r &= 2 \\
{}_{22}P_2 &= \frac{22!}{(22-2)!} \\
&= \frac{22!}{20!} \\
&= 22 \cdot 21 \\
&= \boxed{462}
\end{aligned}
$$

10. This scenario describes a combinations problem (order does not matter). We are considering the subsets of size 3 from a set of size 12.

$$
\begin{aligned}
{}_nC_r &= \frac{n!}{(n-r)! \cdot r!} \\
n &= 12 \\
r &= 3 \\
{}_{12}C_3 &= \frac{12!}{(12-3)! \cdot 3!} \\
&= \frac{12!}{9! \cdot 3!} \\
&= \frac{12 \cdot 11 \cdot 10}{3 \cdot 2 \cdot 1} \\
&= \boxed{220}
\end{aligned}
$$

11. This scenario describes a permutations problem (order matters). We are considering the nonrepeating sequences of size 5 from a set of size 11.

$$_{n}P_{r} = \frac{n!}{(n-r)!}$$

$$n = 11$$

$$r = 5$$

$$_{11}P_{5} = \frac{11!}{(11-5)!}$$

$$= \frac{11!}{6!}$$

$$= 11 \cdot 10 \cdot 9 \cdot 8 \cdot 7$$

$$= \boxed{55440}$$

12. This scenario describes a combinations problem (order does not matter). We are considering the subsets of size 5 from a set of size 12.

$$_{n}C_{r} = \frac{n!}{(n-r)! \cdot r!}$$

$$n = 12$$

$$r = 5$$

$$_{12}C_{5} = \frac{12!}{(12-5)! \cdot 5!}$$

$$= \frac{12!}{7! \cdot 5!}$$

$$= \frac{12 \cdot 11 \cdot 10 \cdot 9 \cdot 8}{5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}$$

$$= \boxed{792}$$