

COMBINATIONS

1. In how many ways can a committee of 4 be selected from a group of seven?

$$\frac{7 \cdot 6 \cdot 5 \cdot 4}{4!} = \frac{7 \cdot 6 \cdot 5 \cdot 4}{4 \cdot 3 \cdot 2 \cdot 1} = 35$$

2. In how many ways can six books be selected from ten texts?

$$\frac{10 \cdot 9 \cdot 8 \cdot 7 \cdot 6 \cdot 5}{6!} = \frac{10 \cdot 9 \cdot 8 \cdot 7 \cdot 6 \cdot 5}{6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} = 210$$

3. How many straight lines can be determined by 10 points, no three of which lie in a straight line? $\frac{10 \cdot 9}{2!} = \frac{10 \cdot 9}{2 \cdot 1} = 45$

4. How many chords (line segment joining two points located on the circumference of a circle) can be formed by joining 8 points that lie on the circumference of a circle?

$$\frac{8 \cdot 7}{2!} = \frac{8 \cdot 7}{2 \cdot 1} = 28$$

5. How many triangles can be formed from eight points, no three of which lie in a straight line?

$$\frac{8 \cdot 7 \cdot 6}{3!} = \frac{8 \cdot 7 \cdot 6}{3 \cdot 2 \cdot 1} = 56$$

6. How many five sided figures can be formed from twenty points, no three of which lie on a straight line?

$$\frac{20 \cdot 19 \cdot 18 \cdot 17 \cdot 16}{5!} = \frac{20 \cdot 19 \cdot 18 \cdot 17 \cdot 16}{5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} = 15504$$

7. In how many ways can a student select five questions out of ten on an algebra exam?

$$\frac{10 \cdot 9 \cdot 8 \cdot 7 \cdot 6}{5!} = \frac{10 \cdot 9 \cdot 8 \cdot 7 \cdot 6}{5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} = 252$$

8. In how many ways can a student select 4 classes out of 10?

$$\frac{10 \cdot 9 \cdot 8 \cdot 7}{4!} = \frac{10 \cdot 9 \cdot 8 \cdot 7}{4 \cdot 3 \cdot 2 \cdot 1} = 210$$

9. In how many ways can 6 cards be drawn from a deck of playing cards?

$$\frac{52 \cdot 51 \cdot 50 \cdot 49 \cdot 48 \cdot 47}{6!} = \frac{52 \cdot 51 \cdot 50 \cdot 49 \cdot 48 \cdot 47}{6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} = 20,358,520$$

10. In how many ways can 10 cards be drawn from a deck of playing cards?

$$\frac{52 \cdot 51 \cdot 50 \cdot 49 \cdot 48 \cdot 47 \cdot 46 \cdot 45 \cdot 44 \cdot 43}{10!} = \frac{52 \cdot 51 \cdot 50 \cdot 49 \cdot 48 \cdot 47 \cdot 46 \cdot 45 \cdot 44 \cdot 43}{10 \cdot 9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} = 15,820,024,220$$

11. In how many ways can a bridge hand be dealt from a deck of playing cards?

$$\frac{52 \cdot 51 \cdot 50 \cdot 49 \cdot 48 \cdot 47 \cdot 46 \cdot 45 \cdot 44 \cdot 43 \cdot 42 \cdot 41 \cdot 40}{13!} =$$
$$\frac{52 \cdot 51 \cdot 50 \cdot 49 \cdot 48 \cdot 47 \cdot 46 \cdot 45 \cdot 44 \cdot 43 \cdot 42 \cdot 41 \cdot 40}{13 \cdot 12 \cdot 11 \cdot 10 \cdot 9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} = 653,013,559,600$$

12. In how many ways can a person go from point A to point B if 7 different paths lead from A to B?

$$\frac{7}{1!} = 7$$

13. How many combinations are possible using all the letters from the word "problem"?

$$\frac{7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{7!} = \frac{7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} = 1$$

14. How many combinations are possible using all the letters from the word "point"?

$$\frac{5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{5!} = \frac{5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} = 1$$

15. How many combinations of three letters can be formed from the letters in the word "uncle"?

$$\frac{5 \cdot 4 \cdot 3}{3!} = \frac{5 \cdot 4 \cdot 3}{3 \cdot 2 \cdot 1} = 10$$

16. How many combinations of six letters can be formed from the letters in the word "section"?

$$\frac{7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2}{6!} = \frac{7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2}{6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} = 7$$

17. In how many ways can a researcher select 5 tests plots from twenty for research purposes?

$$\frac{20 \cdot 19 \cdot 18 \cdot 17 \cdot 16}{5!} = \frac{20 \cdot 19 \cdot 18 \cdot 17 \cdot 16}{5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} = 15,504$$

18. In how many ways can a researcher select a sample of 10 individuals from a population of 200 people?

$$\frac{200 \cdot 199 \cdot 198 \cdot 197 \cdot 196 \cdot 195 \cdot 194 \cdot 193 \cdot 192 \cdot 191}{10!} =$$
$$\frac{200 \cdot 199 \cdot 198 \cdot 197 \cdot 196 \cdot 195 \cdot 194 \cdot 193 \cdot 192 \cdot 191}{10 \cdot 9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} = 22,451,004,309,013,280$$

19. In how many ways can a student select two science projects from a list of 30?

$$\frac{30 \cdot 29}{2!} = \frac{30 \cdot 29}{2 \cdot 1} = 435$$

20. How many groups of 4 digits can be selected from the digits 0, 1, 2, 3, ... 9?

$$\frac{10 \cdot 9 \cdot 8 \cdot 7}{4!} = \frac{10 \cdot 9 \cdot 8 \cdot 7}{4 \cdot 3 \cdot 2 \cdot 1} = 210$$