

Probability  
Permutations and Combinations WS

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Show the calculation performed along with each answer.

1. Bill has 3 sweaters and 4 pairs of slacks. In how many ways can he select an outfit?

$$3 \cdot 4 = 12$$

2. Alisha has 5 blouses, 4 skirts, and 4 sweaters in her wardrobe. In how many ways can she select an outfit, assuming she wears three items at once.

$$5 \cdot 4 \cdot 4 = 80$$

3. Four different books are displayed on a shelf. <sup>How many</sup> ~~Illustrate their~~ possible arrangements <sup>are there</sup> ~~with a tree diagram.~~

$${}_4P_4 =$$

4. Six boys and six girls were nominated for a homecoming celebration at a local school. In how many ways can a king, a queen, and a court of 2 students be selected from those nominated?

$$6 \cdot 6 \cdot {}_{10}C_2 = 6 \cdot 6 \cdot \frac{10!}{8!2!} = 1620$$

5. In how many ways can a 6-member committee be formed from 10 people, if 2 particular people must be on the committee?

$${}_8C_4 = \frac{8!}{4!4!} = 70$$

6. In how many ways can 4 **or more** students be selected from 8 students?

$${}_8C_4 + {}_8C_5 + {}_8C_6 + {}_8C_7 + {}_8C_8 = 163$$

7. How many 2-member committees can be chosen from 7 people?

$${}_7C_2 = \frac{7!}{5!2!} = 21$$

8. How many 3-letter ~~combinations~~ can be formed from the letters of VECTORS? *word arrangements*

$${}_7P_3 = \frac{7!}{4!} = 210$$

9. How many different 20-question examinations can be formed from a test bank containing 30 questions?

$${}_{30}C_{20} = \frac{30!}{20!10!} = 30,045,015$$

10. A football team has 6 basic plays. How many arrangements of three different plays could be called?

$${}_6P_3 = \frac{6!}{3!} = 120$$

11. A map of the four western provinces is to be colored using a different color for each province. How many different ways are possible if there are 9 colors available?

$$\text{arrangements } {}_9P_4 = \frac{9!}{5!} = 3024$$

12. There are seven empty seat on a bus and four people enter. In how many ways can they be seated? *(arranged)?*

$${}_7P_4 = \frac{7!}{3!} = 840$$

13. In the United States, a postal code consists of five digits. In Canada, a postal code consists of a letter, a digit, a letter, a digit, a letter, and a digit. How many different postal codes are possible in each country?

$$\text{US: } 10^5 = 100,000 \quad \text{Canada: } 26 \cdot 10 \cdot 26 \cdot 10 \cdot 26 \cdot 10 = 1,757,600$$

14. There are 7 horses in one race and 6 in another. For a person placing a bet, in how many ways can the winner of the two races be chosen?

$${}_7C_1 \cdot {}_6C_1 = \frac{7!}{6!1!} \cdot \frac{6!}{5!1!} = 42$$

15. There are 8 horses in a race. in how many ways can the win, place, and show horses be selected?

$${}_8P_3 = \frac{8!}{5!} = 336$$