

## I. State whether the events are independent or dependent.

Given Situation	Independent OR Dependent
1.) finishing in first, second, or third place in a 10-person race	D
2.) seventy-five raffle tickets are placed in a jar where three tickets are then selected, one after the other, without replacing a ticket after it's chosen	D
3.) choosing an ice cream flavor and choosing a topping	I
4.) the letters A through Z are written on pieces of paper and placed in a jar where four of them are selected one after the other but were replaced into the jar after each selection	I
5.) Jillian is selecting two or more courses for her block schedule next semester where she must select one of three morning history classes and one of two afternoon math classes	I
6.) determining a 4-digit code where the digits can't be repeated	D

## II. Solve each problem using the Fundamental Counting Principle. Show work!

- 7.) A surveying firm plans to buy a color printer for printing maps. It has narrowed its choice to one of three models. Each of the models is available with 2 gigabytes of RAM, 3 gigabytes of RAM, or 4 gigabytes of RAM. How many possible models and RAM does the firm have to choose?  $3 \times 3 = 9$  models
- 8.) How many arrangements of three letters can be formed from the letter of the word MATH if any letter will be used more than once?  $4 \times 3 \times 2 \times 1 \times 4 = 96$  arrangements
- 9.) Allan is playing the role of Oliver in the school's play. The wardrobe crew has presented Allan with 5 pairs of pants and 4 shirts that he can wear. How many possible costumes consisting of a pair of pants and a shirt does Allan have to choose from?  $5 \times 4 = 20$  costumes
- 10.) The 10-member steering committee that is preparing a study of the public transportation needs of its town will select a chairperson, vice-chairperson, and secretary from the committee. No person can serve in more than one position. In how many ways can the three positions be filled?  $10 \times 9 \times 8 = 720$  ways
- 11.) Jeanine has decided to buy a pick-up truck. Her choices include a V-6 engine or a V-8 engine, a standard cab or an extended cab, and 2-wheel drive or 4-wheel drive. How many possible models are there to choose from?  $2 \times 2 \times 2 = 8$  models
- 12.) A mail-order company that sells gardening tools offers takes in two different lengths. Customers can also choose either a wooden, plastic, or fiberglass handle for the rake. How many different kinds of rakes are there?  $2 \times 3 = 6$  rakes
- 13.) A Mexican restaurant offers chicken, beef, or vegetarian fajitas wrapped with either corn or flour tortillas, and topped with either mild, medium, or hot salsa. How many different choices of fajitas does a customer have?  $3 \times 2 \times 3 = 18$  choices
- 14.) A briefcase lock has 3 rotating cylinders, each containing 10 digits. How many numerical codes are possible?  $10 \times 10 \times 10 = 1000$  codes
- 15.) A golf club manufacturer makes irons with 7 different shaft lengths, 3 different grips, 5 different lies, and 2 different club head materials. How many different combinations are offered?  $7 \times 3 \times 5 \times 2 = 210$  combinations
- 16.) In how many ways can the four call letters of a radio station be arranged if the first letter must be W or K and no letters repeat?  $2 \times 25 \times 24 \times 23 = 27600$  ways
- 17.) How many 6-character passwords can be formed if the first character is a digit and the remaining 5 characters are letters that can be repeated?  $10 \times 26 \times 26 \times 26 \times 26 \times 26 = 118813760$  passwords
- 18.) How many 6-character passwords can be formed if the first and last characters are digits and the remaining 4 characters are letters? Assume that any character can be repeated.

$$10 \times 26 \times 26 \times 26 \times 26 \times 10 = 4577600 \text{ passwords}$$

## III. Determine whether each situation involves a permutation or a combination. Then find the number of possibilities.

- 19.) awarding the gold, silver, and bronze medals to 12 Olympic athletes  $12P3 = 1320$
- 20.) checking out 3 literary books from a list of 8 books for a research paper  $8C3 = 56$
- 21.) choosing 2 movies to rent from 5 movies  $5C2 = 10$
- 22.) the first, second, and third-place finishers in a race with 10 contestants  $10P3 = 720$
- 23.) electing 4 candidates to a municipal planning board from a field of 7 candidates  $7C4 = 35$
- 24.) choosing 2 vegetables from a menu that offers 6 vegetable choices  $6C2 = 15$
- 25.) an arrangement of the letters in the word RHOMBUS (no repeats)  $7P7 = 5040$
- 26.) selecting 2 of 8 choices of orange juice at a store  $8C2 = 28$
- 27.) placing a red rose bush, a yellow rose bush, a white rose bush, and a pink rose bush in a row in a planter  $4P4 = 24$
- 28.) selecting 2 of 9 kitten at an animal rescue shelter  $9C2 = 36$
- 29.) an arrangement of the letters in the word ISOSCELES  $9P9 = 362880$
- 30.) selecting a 4-person bobsled team from a group of 9 athletes  $9C4 = 126$
- 31.) an arrangement of the letters in the word CANADA  $P = \frac{6!}{(3!)^2} = 120$
- 32.) arranging 4 charms on a bracelet that has a clasp, a front, and a back  $4P4 = 24$
- 33.) selecting 3 desserts from 10 desserts that are displayed on a dessert cart in a restaurant  $10C3 = 120$
- 34.) an arrangement of the letters in the word ANNUALLY  $P = \frac{8!}{(2!)(2!)(2!)} = 5040$
- 35.) listing models as good, better, or best from a list of 14 lawnmowers  $14P3 = 2184$