Section 6-8

The Multiplication Principle

Students will be able to use the multiplication principle to find probabilities.


Creating a Tree Diagram

You go to the eye doctor and determine you need new glasses. You can buy the frame material in metal or plastic. The frames can be in the shape of a rectangle, oval, cat's eye, or round. How many different frames could you possibly make?


Sample Space

The set of all possible outcomes for an experiment is called SAMPLE SPACE

A sandwich shop makes egg salad, tuna salad, or tomato salad sandwiches using either wheat or rye bread. Make a tree diagram to count the number of possible sandwich choices.
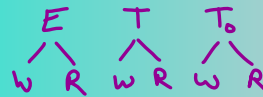
A yogurt shop offers 18 flavors of yogurt as well as 3 types of cones, and 12 different toppings. Assuming a frozen yogurt is a combination of one cone, one yogurt flavor, and one topping, how many choices are possible?
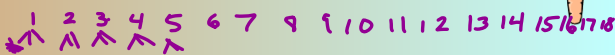
$$18 \cdot 3 \cdot 12 = 648 \text{ ways}$$

The Multiplication Principle

If one event can occur in m ways and for each of these ways a second event can occur in n ways, then the number of ways that the two events can occur together is $m \cdot n$.

$$3 \cdot 2 = 6$$

The multiplication principle can be extended to three or more events.

Papa Murphy's is running a special every Tuesday. You can custom make your own single pizza by choosing the following:

size: medium, large or family

crust: thin or regular

sauce: red, sweet chili, creamy garlic, garlic and olive oil

meat: bacon, Canadian bacon, sausage, Italian sausage, beef, pepperoni, chicken

other toppings: **16** options (olives, artichokes, tomatoes)

How many possible combinations?

$3 \cdot 2 \cdot 4 \cdot 7 \cdot 16 = 2688$ ways

Your locker combination lock has 50 numbers on its dial. To open the lock, you must turn the dial right to the first number, left to the second number, then right to the third number. You randomly choose three numbers on the lock. What is the probability that you choose the correct combination?

$$\frac{favorable}{total\ possible} = \frac{1}{50 \cdot 50 \cdot 50} = \frac{1}{125,000}$$

In the National Basketball Association (NBA), there are 15 teams in the Eastern Conference and 15 teams in the Western Conference. One team from each conference advances to the finals. How many different team matchups could there be in the finals?

$15 \cdot 15 = 225$

Your computer password has 4 capital letters followed by 4 digits. Your friend randomly chooses 4 capital letters and 4 digits. Find the probability that your friend chooses your password.

$$\frac{favorable}{total\ possible} = \frac{1}{456,976,0000}$$

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Homework

Pg. 329-331

#3-6, 8-18 even, 20, 26