Fundamental Counting Principle

Lesson 9.5
**Vocabulary:**

**Fundamental Counting Principle** -

Uses multiplication of the number of ways each event in an experiment can occur to find the number of possible outcomes in a sample space.

If event $M$ has $m$ possible outcomes and event $N$ has $n$ possible outcomes, then event $M$ followed by event $N$ has $m \times n$ possible outcomes.
1. Find the total number of outcomes when a coin is tossed and a number cube is rolled.

A coin has 2 possible outcomes. A number cube has 6 possible outcomes. Multiply the possible outcomes of each event.

\[
\begin{align*}
\text{coin} & \quad \text{number cube} & \quad \text{total} \\
2 & \quad \cdot & \quad 6 & \quad = & \quad 12
\end{align*}
\]

There are 12 different outcomes.
Find the total number of outcomes when choosing from bike helmets that come in three colors and two styles.

\[ 3 \cdot 2 = 6 \]
How many outcomes are possible when rolling a number cube and picking a cube from 4 different colored cubes? (Example 1)
Use the Fundamental Counting Principle to find the number of outcomes from tossing a **quarter**, **a dime**, and **a nickel**. (Example 1)

\[ 2 \cdot 2 \cdot 2 = 8 \]
2. Find the total number of outcomes from rolling a number cube with sides labeled 1–6 and choosing a letter from the word NUMBERS. Then find the probability of rolling a 6 and choosing an M.

**Step 1:** Find the number of outcomes

\[
\text{number cube} \cdot \text{letters} = 42
\]

There are 42 different outcomes.

**Step 2:** Find the Probability

There is only one favorable outcome.

\[
\frac{1}{42} \text{ or about 2%}
\]
Find the number of different jeans available at The Jeans Shop. Then find the probability of randomly selecting a size 32 x 34 slim fit. Is it likely or unlikely that the jeans would be chosen?

**Step 1:**
Find the number of outcomes

<table>
<thead>
<tr>
<th>size</th>
<th>length</th>
<th>style</th>
<th>total</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>3</td>
<td>3</td>
<td>45</td>
</tr>
</tbody>
</table>

There are 45 different types of jeans to choose.

**Step 2:**
Find the Probability

\[
\frac{1}{45} \text{ or about 2%}
\]

Very unlikely
4. A box of toy cars contains blue, orange, yellow, red, and black cars. A separate box contains a male and a female action figure. What is the probability of randomly choosing an orange car and a female action figure? Is it likely or unlikely that this combination is chosen?

**Step 1:** Find the number of outcomes

There are 5 choices for the car and 2 choices for the action figure.

\[ 5 \cdot 2 = 10 \]

**Step 2:** Find the Probability

There is only one favorable outcome.

\[ P(\text{orange car, female action figure}) = \frac{1}{10} \text{ or } 10\% \]

Very unlikely
Two number cubes are rolled. What is the probability that the sum of the numbers on the cubes is 12? How likely is it that the sum would be 12?

\[ 6 \times 6 = 36 \]

\[ \frac{1}{36} \text{ or about } 3\% \]

very unlikely
Find the number of different outfits that can be made from 3 sweaters, 4 blouses, and 6 skirts. Then find the probability of randomly selecting a particular sweater-blouse-skirt outfit. Is the probability of this event likely or unlikely? (Examples 2–4)

$$3 \cdot 4 \cdot 6 = 72$$

$$\frac{1}{72} \text{ or about } 1.4\%$$

unlikely
Homework:

Pg. 761 - 764

# 1 - 12 (all)

# 24 - 27 (all)