# Lesson 15.4:

# Compound Events

## Essential Question

How can you find the number of possible outcomes of one or more events?

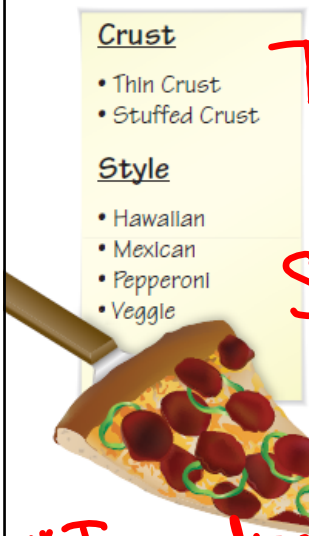
A *tree diagram* can be used to list possible outcomes in an organized way.

1) List the possible outcomes of the first event.

2) Draw a branch for each possible outcome of the second event off of each possible outcome of the first event. (Continue for as many events as you have.)

3) List the possible outcomes of the compound event.

**You randomly choose a crust and style of pizza. Find the sample space. How many different pizzas are possible?**




Thin
- Hawaiian
- Mexican
- Pepperoni
- Veggie

Stuffed
- Hawaiian
- Mexican
- Pepperoni
- Veggie

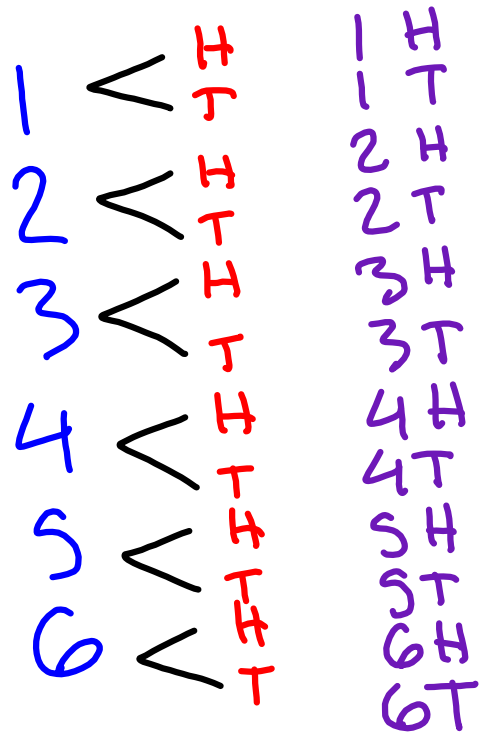
1. Thin Hawaiian
2. Thin Mexican
3. Thin Pepperoni
4. Thin Veggie
5. Stuffed Hawaiian
6. Stuffed Mexican
7. Stuffed Pepperoni
8. Stuffed Veggie

**What is the probability of selecting a stuffed crust Hawaiian pizza?**

$\frac{1}{8} \approx 0.13$

* Tree diagram
* Sample space

**Find the sample space of all of the possible outcomes of rolling a number cube and flipping a coin.**



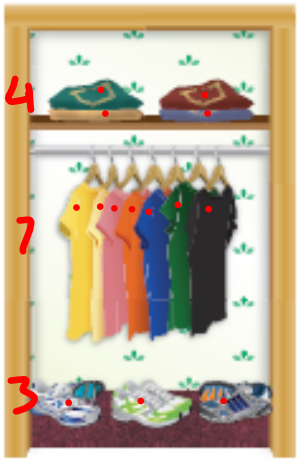

## Key Idea

**Fundamental Counting Principle**

An event $M$ has $m$ possible outcomes. An event $N$ has $n$ possible outcomes. The total number of outcomes of event $M$ followed by event $N$ is $m \times n$.

Alternate definition: When you have a compound event, you multiply the **# of possible outcomes for event 1** by the **# of possible outcomes for event 2**.

**How many different outfits can you make from the T-shirts, jeans, and shoes in the closet?**




$4 \times 7 \times 3$

$12 \times 7$

84 outfits

**2.** Find the total number of possible outcomes of spinning the spinner and choosing a number from 1 to 5.

$4 \cdot 5 = 20$

**3.** How many different outfits can you make from 4 T-shirts, 5 pairs of jeans, and 5 pairs of shoes?

$4 \cdot 5 \cdot 5 = 100$

**What is the probability of rolling a number greater than 4 and flipping tails?**

$P(>4) \cdot P(\text{tails})$

$\frac{2}{6} \cdot \frac{1}{2} = \frac{1}{6} \approx 0.17$

| | | |
|---|---|---|
| 1 < | H | 1H |
| | T | 1T |
| 2 < | H | 2H |
| | T | 2T |
| 3 < | H | 3H |
| | T | 3T |
| 4 < | H | 4H |
| | T | 4T |
| 5 < | H | 5H |
| | T | 5T |
| 6 < | H | 6H |
| | T | 6T |

$\frac{2}{12} = \frac{1}{6}$ ✓

**You flip three nickels. What is the probability of flipping two heads and one tails?**

| | | | |
|---|---|---|---|
| H < | H < | H | HHH |
| | | T | HHT |
| | T < | H | HTH |
| | | T | HTT |
| T < | H < | H | THH |
| | | T | THT |
| | T < | H | TTH |
| | | T | TTT |

$\frac{3}{8} \approx 0.38$

**4.** What is the probability of rolling at most 4 and flipping heads?

$\frac{4}{36} \cdot \frac{1}{2} = \frac{1}{3}$ or $0.\overline{3}$

**5.** What is the probability of flipping at least two tails (with 3 nickels)?

TTH HTT
THT TTT

$\frac{4}{8} = \frac{1}{2}$ or $0.5$

**6.** You roll two number cubes. What is the probability of rolling double threes?

$\frac{1}{6} \cdot \frac{1}{6} = \frac{1}{36}$ or $\approx 0.3$