## Lesson 7-5
## Determine Outcomes of Compound Events

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**I can...**
find all possible outcomes of a compound event.

### Solve & Discuss It!

Cameron packed two pairs of shorts and three T-shirts for a weekend trip. What are some combinations of shirts and shorts that Cameron can wear while on his trip? How many days will he have a different outfit to wear?

**Make Sense and Persevere** How might an organized list help you solve the problem?

### Focus on math practices

**Reasoning** How would the number of different outfits change if Cameron packed a pair of khaki shorts? Explain.

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**Essential Question** How can all the possible outcomes, or sample space, of a compound event be represented?

### EXAMPLE 1 Find All Possible Outcomes

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Hailey has two sisters and no brothers. Josh has two brothers and no sisters. They wonder what the chances are, in a family with three children, that the children will be all boys or all girls. How can they determine all possible combinations of boys and girls in a family with three children?

**STEP 1** List the different events.

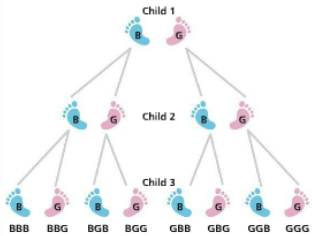
Child 1 is either a boy or a girl.


Child 2 is either a boy or a girl.


Child 3 is either a boy or a girl.


This is a *compound event*. A **compound event** consists of two or more events. This compound event consists of three events.

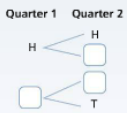
**STEP 2** Make a tree diagram to represent the sample space. A tree diagram shows all the possible outcomes.




Hailey and Josh can make a tree diagram to show the sample space of boys and girls in a family with three children.

### Try It!

Jorge will flip two quarters at the same time. Complete the tree diagram, and then list the sample space of this compound event. Use H for heads and T for tails.




The sample space is: _____

**Convince Me!** How does the sample space change when the number of quarters that Jorge flips is increased by 1?

## EXAMPLE 2 Use a Table to Represent Sample Spaces

**A game is played by spinning the two spinners shown. Players match the results of the spinners to combinations on their game cards. How many different combinations are possible?**

Use a table to represent the sample space.

Remember: The sample space shows all the possible outcomes.


| | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| A | A-1 | A-2 | A-3 | A-4 | A-5 | A-6 |
| B | B-1 | B-2 | B-3 | B-4 | B-5 | B-6 |
| C | C-1 | C-2 | C-3 | C-4 | C-5 | C-6 |
| D | D-1 | D-2 | D-3 | D-4 | D-5 | D-6 |
| E | E-1 | E-2 | E-3 | E-4 | E-5 | E-6 |
| F | F-1 | F-2 | F-3 | F-4 | F-5 | F-6 |

The table is 6 × 6. There are 6 letters and 6 numbers.

There are 36 different letter-number combinations.

The sample space consists of 36 possible outcomes.

## EXAMPLE 3 Use an Organized List to Represent Sample Spaces

**Stan will roll a number cube labeled 1 to 6 and flip a coin.**

**What are all the possible outcomes?**

Use an organized list to represent the sample space.

{(1, H), (1, T),
(2, H), (2, T),
(3, H), (3, T),
(4, H), (4, T),
(5, H), (5, T),
(6, H), (6, T)}

For each of the 6 possible outcomes of the number cube, there are 2 possible outcomes for the coin.

There are 12 different combinations.

The sample space consists of 12 possible outcomes.

### Try It!

The bag contains tiles labeled with the letters A, B, and C. The box contains tiles labeled with the numbers 1, 2, and 3. June draws one letter tile and one number tile. Represent the sample space using either a table or an organized list.



## KEY CONCEPT

A compound event is a combination of two or more events.

An organized list, table, or tree diagram can be used to represent the sample space of a compound event. The sample space for flipping two coins consists of 4 outcomes.

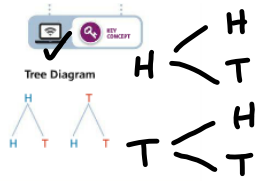
**Organized List** ✓

{(H, H), (H, T), (T, H), (T, T)}

**Table** ✓

| | H | T |
|---|---|---|
| H | H, H | H, T |
| T | T, H | T, T |

**Tree Diagram** ✓




## Do You Understand?

1. **Essential Question** How can all the possible outcomes, or sample space, of a compound event be represented?

2. **Generalize** Will a list, a table, and a tree diagram always give you the same number of outcomes for the same compound event? Explain.

3. **Use Structure** Shari is drawing a tree diagram to represent the sample space of rolling a 12-sided game piece and spinning the pointer of a 4-section spinner. Does it matter if Shari starts the tree diagram with the game piece outcomes or the spinner outcomes? Explain.

## Do You Know How?

4. Both Spinner A and Spinner B have equal-sized sections, as shown at the right. Make a table to represent the sample space when both spinners are spun.


{(R,1),(R,2),(R,3),
(G,1),(G,2),(G,3),
(B,1),(B,1),(B,1)}

| | 1 ✓ | 2 ✓ | 3 ✓ |
|---|---|---|---|
| Red ✓ | R1 | R2 | R3 |
| Green ✓ | G1 | G2 | G3 |
| Blue ✓ | B1 | B2 | B3 |

There are 9 total combinations

5. Tiles labeled with the letters X, Y, and Z are in a bag. Tiles labeled with the numbers 1 and 2 are in a box.

Make a tree diagram to represent the sample space of the compound event of selecting one tile from each container.

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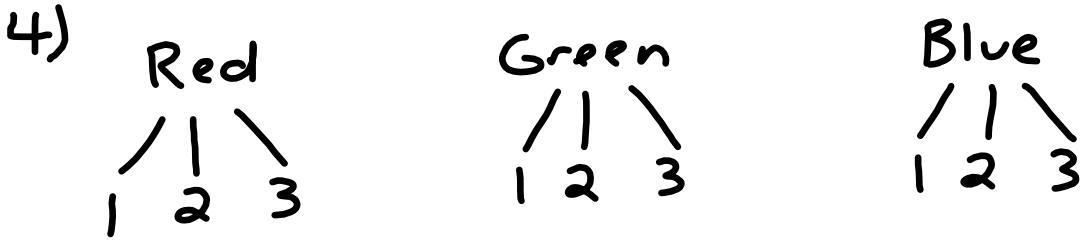


Name: _____

## Practice & Problem Solving

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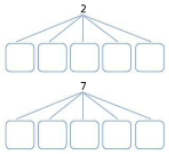
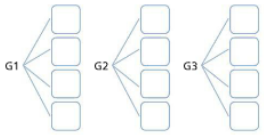
**Leveled Practice** **In 6 and 7, find the number of outcomes for each event.**

**6.** Oliver is playing a game in which he has to choose one of two numbers (2 or 7) and then one of five vowels (a, e, i, o, or u). How many possible outcomes are there?




There are ☐ possible outcomes.

**7.** There are four stores that sell school supplies (S1, S2, S3, and S4) and three stores that sell sporting goods (G1, G2, and G3) nearby. How many possible combinations of stores could you visit to buy a tennis racquet and then a backpack?




There are ☐ possible combinations.

**8.** A bakery sells wheat, multigrain, rye, and oat bread. Each type of bread is available as a loaf or as dinner rolls.

**a.** Complete the table to show all the possible outcomes for the types and styles of bread sold by the bakery.

**b.** Find the number of possible outcomes.

| | Loaf | Rolls |
|---|---|---|
| Wheat | | |
| Multi-grain | | |
| Rye | | |
| Oat | | |

**9. Generalize** How does the number of possible outcomes of a single event help you determine the total number of possible outcomes of a compound event?

**10.** A new car can be purchased with a choice of four exterior colors (A, B, C, and D) and three interior colors (1, 2, and 3). Make an organized list of all the possible color combinations for the car.

**11.** Two friends each plan to order a fruit drink at the diner. The available flavors are kiwi (K), lemon (L), and watermelon (W). Make a list to represent all the possible outcomes of the friends' fruit drink order. Write each outcome in the format (Friend 1, Friend 2).

**12.** Plastic souvenir cups come in three different sizes: small (S), medium (M), and large (L). The available colors are red (R), white (W), and blue (B). Make a list to represent all the possible combinations of the different cups based on size and color. Write each outcome in the format (Size, Color).

**13. Higher Order Thinking** Heidi's older sister needs to take either Chemistry (C), Geometry (G), or Physics (P) this year. She can take the class during any one of six periods (1 through 6). Is there more than one way to draw a tree diagram to model this situation? Explain.

## Assessment Practice

**14.** Complete the table to show the sample space of two-digit numbers using the digits 8, 4, 3, and 2.

| | 8 | 4 | 3 | 2 |
|---|---|---|---|---|
| 8 | | | | |
| 4 | | | | |
| 3 | | | | |
| 2 | | | | |

How many possible outcomes are there?

**15.** Complete the table to show the sample space of number-letter combinations using the numbers 7, 8, and 9 and the letters R, S, T, U, V, and W.

| | R | S | T | U | V | W | |
|---|---|---|---|---|---|---|---|
| 7 | 7R | 7S | 7T | 7U | 7V | 7W | 6 |
| 8 | 8R | 8S | 8T | 8U | 8V | 8W | 6 |
| 9 | 9R | 9S | 9T | 9U | 9V | 9W | 6 |
| | | | | | | | + 18 |

3 6

Fundamental counting Principle

$6 \times 3$

18 total combinations

How many possible outcomes are there?

There are 18 total possible outcomes.



13)




13 cont'd)