

LESSON  
**13.2**

# Tree Diagrams

**BEFORE**

You used outcomes to find a probability.

**Now**

You'll use a tree diagram to find all possible outcomes.

**WHY?**

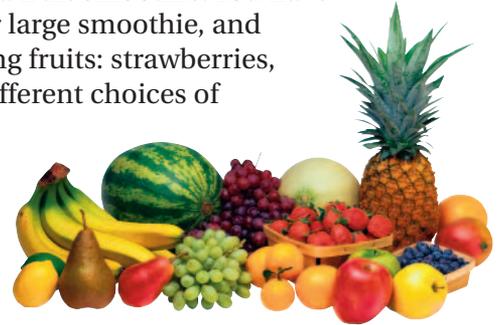
So you can find the number of school lunch combinations, as in Ex. 7.

**Word Watch**

tree diagram, p. 639

**In the Real World**

**Fruit Smoothies** You are ordering a fruit smoothie. You have your choice of a small, medium, or large smoothie, and you can include one of the following fruits: strawberries, bananas, or oranges. How many different choices of smoothies do you have?

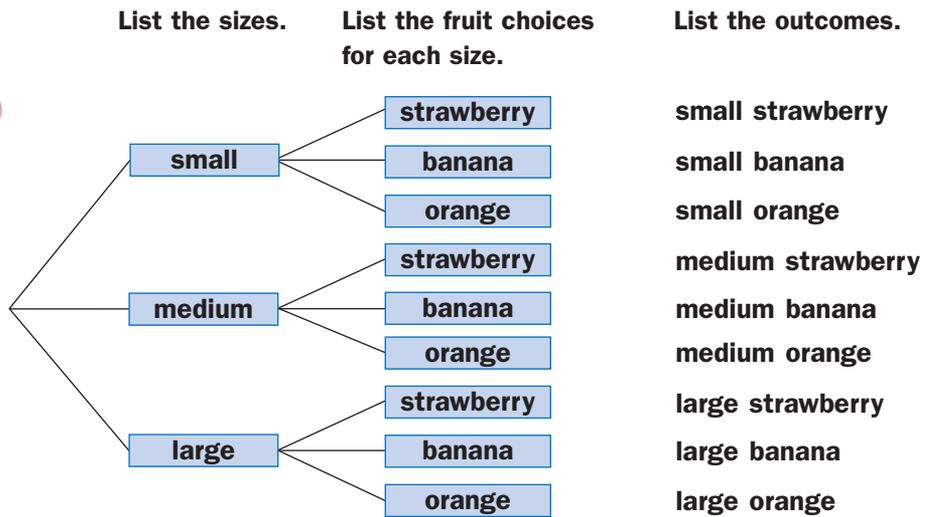


A **tree diagram** can help you find the possible outcomes of an event by using branching (as seen on trees) to list choices.



**EXAMPLE 1 Making a Tree Diagram**

Make a tree diagram to find all of the possible choices for smoothies.



**ANSWER** There are 9 different choices of smoothies.

**Your turn now** Make a tree diagram to solve the problem.

1. You decide to get popcorn at a movie theater. The popcorn comes in regular, large, and jumbo sizes, and you have your choice of plain or buttered popcorn. How many choices of popcorn do you have?

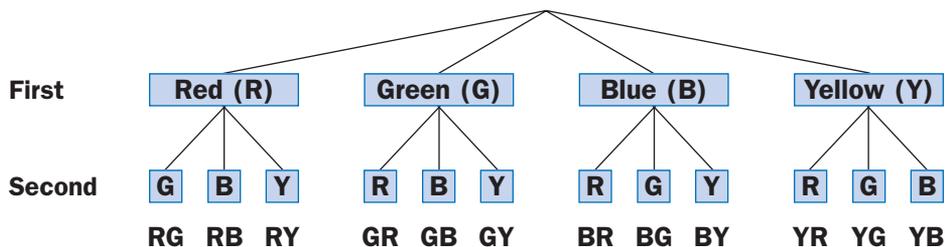


## EXAMPLE 2 Making a Tree Diagram

**Science Camp** You will be attending two sessions at a science camp. At each session, you will be assigned to one of the following groups: red, green, blue, or yellow. If you will not be assigned to the same group for both sessions, how many group assignments are possible?

### Solution

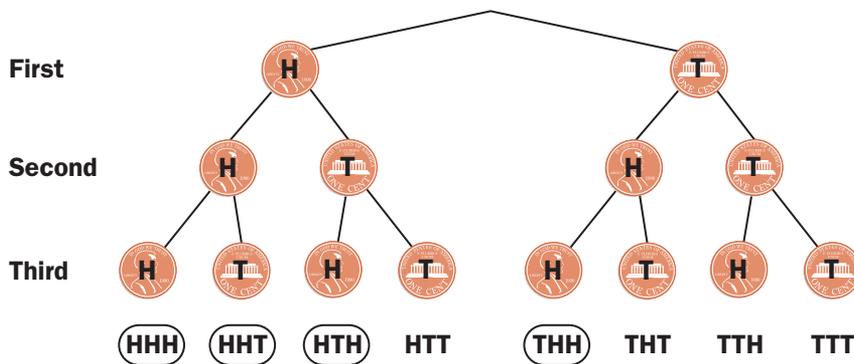
Because you cannot be in the same group for both sessions, do not include the same group in both sessions in the tree diagram.



**ANSWER** There are 12 possible group assignments.

## EXAMPLE 3 Using a Tree Diagram

To find the probability of getting at least 2 heads when tossing a coin 3 times, make a tree diagram to find the outcomes.



**ANSWER** Because 4 of the 8 outcomes have at least 2 heads, the probability is  $\frac{4}{8}$ , or  $\frac{1}{2}$ .

### Your turn now Use a tree diagram to find the probability.

2. You roll a number cube and flip a coin. What is the probability that you get a 3 and tails?



## Getting Ready to Practice

- Vocabulary** Explain how to draw a tree diagram that shows the possible outcomes of rolling a number cube two times.
- Guided Problem Solving** Your wallet contains the following three bills: \$10, \$5, and \$1. Suppose that you randomly choose a bill from your wallet. Then you randomly choose a second bill. What is the probability that the two bills that you take out of your wallet total \$15?
  - Make a tree diagram to find the possible outcomes. The part of your tree diagram that represents the second bill being chosen should show only the two remaining bills.
  - List the possible outcomes. Then circle the outcomes that total \$15.
  - Use the list of outcomes to find the probability that the two bills that you take out of your wallet total \$15.

## Practice and Problem Solving

**HELP**

with Homework

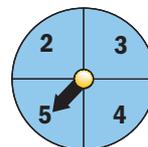
Example	Exercises
1	3-8
2	10-11
3	9, 12-13

Online Resources  
CLASSZONE.COM

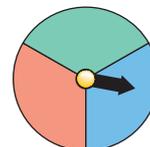
- More Examples
- eTutorial Plus

**Make a tree diagram to find the number of possible outcomes involving the spinner(s). Each spinner is divided into equal parts.**

- Spin spinner A two times.
- Spin spinner A and spinner B.
- Spin spinner B two times.
- Spin spinner B three times.



Spinner A



Spinner B

- School Lunch** Students buying school lunch are offered one of the following entrées: chicken fajita, turkey sandwich, or yogurt with fresh fruit. Students are also offered one of the following side dishes: broccoli, potato wedges, or pretzels. Make a tree diagram to find all of the possible lunch combinations.

**Inflatable Chairs** In Exercises 8 and 9, use the following information.

A store that sells inflatable chairs offers the two following styles: a low-back chair and a high-back chair with arms. The chairs come in the following colors: black, clear, orange, lime, and purple.

- Make a tree diagram to find all the different kinds of inflatable chairs at the store.
- The store receives a shipment of inflatable chairs. Each box contains one of every kind of chair. If you randomly choose a chair from a box, what is the probability that the chair is black?





- 10. Cheerleading** In cheerleading, a flyer is a person who performs a stunt. A cheerleading coach has to select the right outside flyer and the left outside flyer that are needed for a stunt from the five flyers on the squad: Anne, Mandy, Zoe, Laura, and Janie. Make a tree diagram to find the number of ways that the two flyers can be selected.
- 11. Muffins** A bag contains one of each of the following muffins: blueberry, cranberry, bran, corn, carrot, and chocolate chip. A muffin is randomly chosen from the bag, then a second muffin is randomly chosen. Make a tree diagram to find the number of ways two muffins can be chosen.

**In Exercises 12 and 13, suppose that you roll two number cubes. Use a tree diagram to find the probability of the event.**

- 12.** Both numbers are the same.      **13.** You roll a 5 and a 3.
- 14. Explain** Is it more likely for exactly one of the numbers to be 2 or for both of the numbers to be odd when rolling two number cubes? Explain.
- 15. Challenge** A bag contains 2 green marbles, 2 red marbles, and 1 blue marble. What is the probability of randomly choosing a green marble and then a blue marble, without replacing the first marble chosen?

## Mixed Review

**Use a proportion to answer the question.** (*Lesson 9.2*)

- 16.** What percent of 150 is 90?      **17.** 81 is 30% of what number?
- 18.** A jar has 4 red, 2 blue, and 2 white marbles. What is the probability of randomly choosing a white marble from the jar? (*Lesson 13.1*)

**Basic Skills** Write the product as a power.

- 19.**  $10 \cdot 10 \cdot 10 \cdot 10$       **20.**  $6 \cdot 6 \cdot 6 \cdot 6 \cdot 6 \cdot 6$       **21.**  $x \cdot x \cdot x$

## Test-Taking Practice

- 22. Multiple Choice** A store sells general, outdoor, and waterproof disposable cameras. Each type comes with 15 and 27 exposures. How many different disposable cameras does the store sell?
- A.** 2      **B.** 3      **C.** 6      **D.** 8
- 23. Multiple Choice** In Exercise 22, suppose that the store has only one camera for each combination of type and number of exposures. What is the probability of randomly choosing a waterproof camera with 27 exposures?
- F.**  $\frac{1}{8}$       **G.**  $\frac{1}{6}$       **H.**  $\frac{1}{3}$       **I.**  $\frac{2}{3}$