

**Solution**

Use the multiplication rule for dependent events since the coins are chosen without replacement.

The total number of coins in this jar is  $18 + 16 + 18 + 22 = 74$ . Furthermore, there are a total of 16 nickels and 18 dimes.

Let  $E$  be the event “choosing a nickel first,” and let  $F$  be the event “choosing a dime.”

We will then have  $P(E) = \frac{16}{74}$  and  $P(F|E) = \frac{18}{73}$ .

$$\begin{aligned} P(E \text{ and } F) &= P(E) \cdot P(F|E) \\ &= \frac{16}{74} \cdot \frac{18}{73} \\ &= \frac{288}{5402} && \text{Multiply the fractions.} \\ &= \frac{144}{2701} \approx 0.053 && \text{Reduce to lowest terms.} \end{aligned}$$

## 4.R.1 Exercises

### Concept Check

**True/False.** Determine whether each statement is true or false. If a statement is false, explain how it can be changed so the statement will be true. (**Note:** There may be more than one acceptable change.)

- To find  $\frac{1}{2}$  of  $\frac{2}{9}$  requires multiplication.
- $\frac{3}{4} \cdot \frac{9}{10} = \frac{27}{40}$
- The statement  $\frac{1}{3} \cdot \frac{2}{5} = \frac{2}{5} \cdot \frac{1}{3}$  is an example of the associative property of multiplication.
- The number 1 is always a factor of the numerator and the denominator.

## Practice

Multiply and reduce to lowest terms. (**Hint:** Factor before multiplying.)

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5.  $\frac{1}{3} \cdot \frac{3}{4}$

7.  $\frac{5}{16} \cdot \frac{16}{15}$

6.  $\frac{2}{3} \cdot \frac{4}{3}$

8.  $\frac{9}{10} \cdot \frac{35}{40} \cdot \frac{25}{15}$

## Applications

Solve.

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9. **Recipes:** A recipe calls for  $\frac{3}{4}$  cups of flour. How much flour should be used if only half of the recipe is to be made?
10. **Demographics:** A study showed that  $\frac{3}{5}$  of the students in an elementary school were left-handed. If the school had an enrollment of 600 students, how many were left-handed?
11. **Conditional Probability:** There are 15 different colored crayons in a new box. What is the probability that the orange and then the green will be chosen at random, without replacement?
12. **Probability of Independent Events:** On awards day at the end of the year, Jasmine has an 85% chance of winning the top award in English and a 4 out of 5 chance of winning an award for athletics. What's the probability that Jasmine wins both awards?

13. **Medicine:** Insulin pens used to administer a patient's insulin at hospitals have a malfunction rate of 9%. This means that out of a box of 200 pens, 18 are defective in some way and must be thrown away. Find the probability of randomly selecting 3 defective insulin pens in a row from a brand new box of 200 pens, if a defective pen is immediately discarded.

## Writing & Thinking

14. If two fractions are between 0 and 1, can their product be more than 1? Explain.
15. Explain the process of multiplying two fractions. Give an example of a product that cannot be reduced.