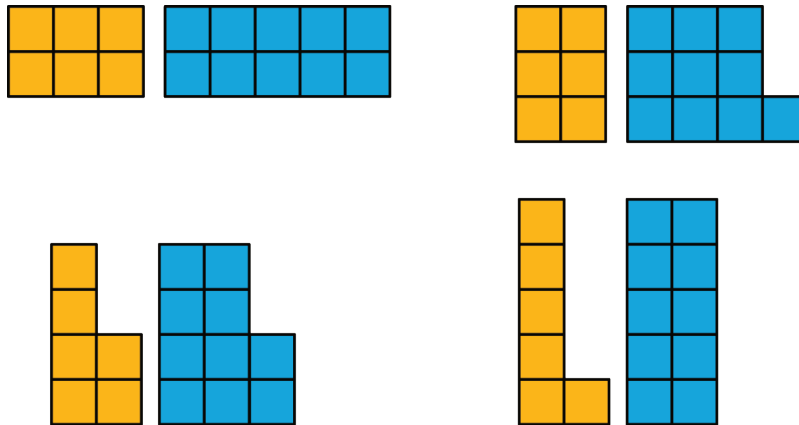# Unit 7, Lesson 16: Common Factors

Let's use factors to solve problems.

16.1: Figures Made of Squares

How are the pairs of figures alike? How are they different?

16.2: Diego's Bake Sale

Diego is preparing brownies and cookies for a bake sale. He would like to make equal-size bags for selling all of the 48 brownies and 64 cookies that he has. Organize your answer to each question so that it can be followed by others.

1. How can Diego package all the 48 brownies so that each bag has the same number of them? How many bags can he make, and how many brownies will be in each bag? Find all the possible ways to package the brownies.

NAME   DATE   PERIOD

2. How can Diego package all the 64 cookies so that each bag has the same number of them? How many bags can he make, and how many cookies will be in each bag? Find all the possible ways to package the cookies.

3. How can Diego package all the 48 brownies and 64 cookies so that each bag has the same combination of items? How many bags can he make, and how many of each will be in each bag? Find all the possible ways to package both items.

4. What is the largest number of combination bags that Diego can make with no left over? Explain to your partner how you know that it is the largest possible number of bags.

NAME   DATE   PERIOD

16.3: Greatest Common Factor

1. The **greatest common factor** of 30 and 18 is 6. What do you think the term "greatest common factor" means?

2. Find all of the **factors** of 21 and 6. Then, identify the greatest common factor of 21 and 6.

3. Find all of the factors of 28 and 12. Then, identify the greatest common factor of 28 and 12.

4. A rectangular bulletin board is 12 inches tall and 27 inches wide. Elena plans to cover it with squares of colored paper that are all the same size. The paper squares come in different sizes; all of them have whole-number inches for their side lengths.

   a. What is the side length of the largest square that Elena could use to cover the bulletin board completely without gaps and overlaps? Explain or show your reasoning.

b. How is the solution to this problem related to greatest common factor?

Are you ready for more?

A school has 1000 lockers, all lined up in a hallway. Each locker is closed. Then...

- One student goes down the hall and opens each locker.

- A second student goes down the hall and closes every second locker: lockers 2, 4, 6, and so on.

- A third student goes down the hall and changes every third locker. If a locker is open, he closes it. If a locker is closed, he opens it.

- A fourth student goes down the hall and changes every fourth locker.

This process continues up to the thousandth student! At the end of the process, which lockers will be open? (Hint: you may want to try this problem with a smaller number of lockers first.)

Lesson 16 Summary

A factor of a whole number n is a whole number that divides n evenly without a remainder. For example, 1, 2, 3, 4, 6, and 12 are all factors of 12 because each of them divides 12 evenly and without a remainder.

A **common factor** of two whole numbers is a factor that they have in common. For example, 1, 3, 5, and 15 are factors of 45; they are also factors of 60. We call 1, 3, 5, and 15 common factors of 45 and 60.

The **greatest common factor** (sometimes written as GCF) of two whole numbers is the greatest of all of the common factors. For example, 15 is the greatest common factor for 45 and 60.

One way to find the greatest common factor of two whole numbers is to list all of the factors for each, and then look for the greatest factor they have in common. Let's try to find the greatest common factor of 18 and 24. First, we list all the factors of each number.

- Factors of 18: **1**, **2**, **3**, **6**, 9,18

- Factors of 24: **1**, **2**, **3**, 4, **6**, 8, 12, 24

The common factors are 1, 2, 3, and 6. Of these, 6 is the greatest one, so 6 is the greatest common factor of 18 and 24.

Lesson 16 Glossary Terms

- common factor

- greatest common factor

Unit 7, Lesson 16: Common Factors

1. A teacher is making gift bags. Each bag is to be filled with pencils and stickers. The teacher has 24 pencils and 36 stickers to use. Each bag will have the same number of each item, with no items left over.

   For example, she could make 2 bags with 12 pencils and 18 stickers each.

   What are the other possibilities? Explain or show your reasoning.

2. a. List all the factors of 42.

    b. What is the greatest common factor of 42 and 15?

    c. What is the greatest common factor of 42 and 50?

3. A school chorus has 90 sixth-grade students and 75 seventh-grade students. The music director wants to make groups of performers, with the same combination of sixth- and seventh-grade students in each group. She wants to form as many groups as possible.

   a. What is the largest number of groups that could be formed? Explain or show your reasoning.

   b. If that many groups are formed, how many students of each grade level would be in each group?

4. Here are some bank transactions from a bank account last week. Which transactions represent negative values?

      Monday: $650 paycheck deposited

      Tuesday: $40 withdrawal from the ATM at the gas pump

      Wednesday: $20 credit for returned merchandise

NAME   DATE   PERIOD

Thursday: $125 deducted for cell phone charges

Friday: $45 check written to pay for book order

Saturday: $80 withdrawal for weekend spending money

Sunday: $10 cash-back reward deposited from a credit card company

(from Unit 7, Lesson 13)

5. Find the quotients.

a. $\frac{1}{7} \div \frac{1}{8}$

b. $\frac{12}{5} \div \frac{6}{5}$

c. $\frac{1}{10} \div 10$

d. $\frac{9}{10} \div \frac{10}{9}$

(from Unit 4, Lesson 11)

6. An elephant can travel at a constant speed of 25 miles per hour, while a giraffe can travel at a constant speed of 16 miles in $\frac{1}{2}$ hour.

a. Which animal runs faster? Explain your reasoning.

b. How far can each animal run in 3 hours?

(from Unit 2, Lesson 9)