

1.1

Using Multiples

▶ **GOAL**

Identify multiples, common multiples, and least common multiples of whole numbers.

Learn about the Math

Some Grade 7 students are planning a hot-dog sale at a volleyball tournament. Based on the last tournament, they expect to sell about 100 hot dogs. The local grocery store sells wieners in packages of 12 and buns in packages of 8.

? **How many packages of wieners and buns should the students buy if they want to make about 100 hot dogs, with no wieners or buns left over?**

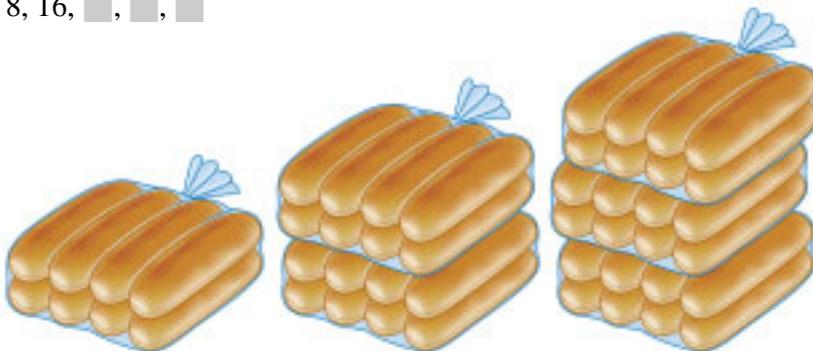
- A. Calculate the number of wieners contained in 1, 2, 3, 4, and 5 packages by listing **multiples** of 12.

12, 24, ■, ■, ■



- B. Calculate the number of buns contained in 1, 2, 3, 4, and 5 packages by listing multiples of 8.

8, 16, ■, ■, ■



- C. Continue your lists from steps A and B for at least 12 multiples of each number. Circle the multiples that are common to both lists.
- D. Write the circled multiple that is the least number. This is the **least common multiple**, or **LCM**.
- E. Explain how your answer in step D will help you solve the problem about how many packages of wieners and buns the students should buy.

least common multiple (LCM)

the least whole number that has two or more given numbers as factors; for example, 12 is the least common multiple of 4 and 6

Reflecting

1. Why might the hot-dog problem be easier to solve if wieners were in packages of 6 and buns were in packages of 12?
2. How does making a list of the multiples of different numbers help you determine which number is the LCM?

Work with the Math

Example 1: Finding the least common multiple

What is the LCM of 5 and 8?

Sandra's Solution

5, 10, 15, 20, 25, 30, 35, (40), 45, ...
 8, 16, 24, 32, (40), ...
 The LCM of 5 and 8 is 40.

I listed multiples of each number. Then I circled the least number common to both lists.



Example 2: Finding the LCM of three numbers

Stephen is training for the three events in a triathlon. He runs every second day, swims every third day, and rides a bicycle every fifth day. How many times during the month of April will he have to practise all three events on the same day?

Ravi's Solution

2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, (30)
 3, 6, 9, 12, 15, 18, 21, 24, 27, (30)
 5, 10, 15, 20, 25, (30)

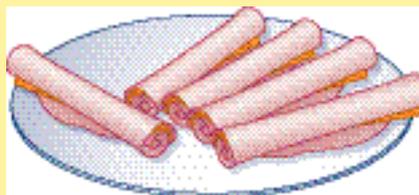
Only one time in April will Stephen have to practise all three events on the same day.

I listed the multiples of 2, 3, and 5 to 30. The LCM is 30. On April 30th, Stephen will have to practise all three events.



Example 3: Using common multiples

Yuki plans to make roll-ups for a party. She rolls a slice of meat with a slice of cheese. Each meat package has 10 slices. Each cheese package has 12 slices. How many packages of each should she buy so that there are no leftovers?



Yuki's Solution

10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, ...
12, 24, 36, 48, 60, 72, 84, 96, 108, 120, ...

$60 \div 10$ slices of meat = 6 packages

$60 \div 12$ slices of cheese = 5 packages

$120 \div 10$ slices of meat = 12 packages

$120 \div 12$ slices of cheese = 10 packages

The least amount I should buy is 6 packages of meat and 5 packages of cheese.

I listed multiples of 10 and 12.

I circled the common multiples. 60 is the LCM.

I could buy 60 slices of meat and 60 slices of cheese to make 60 roll-ups. That's 6 packages of meat and 5 packages of cheese.

Or, I could buy 120 slices of each to make 120 roll-ups. That's 12 packages of meat and 10 packages of cheese.



A Checking

3. List the first five multiples of each number.

- a) 2 b) 5 c) 6

4. Continue the patterns you started in question 3 to determine the LCM of 2, 5, and 6.

5. Make lists of multiples and write three common multiples for each pair of numbers. What is the LCM?

- a) 4 and 8 b) 3 and 5 c) 12 and 18

B Practising

6. Find the LCM of each set of numbers.

- a) 7 and 9
b) 3, 4, and 6
c) 2, 3, 5, and 20

7. Which numbers are multiples of 5? Justify each answer by dividing.

- a) 15 b) 10 000 c) 137 d) 1001

8. Use the information below to solve this problem:

How many packages of hamburger buns and meat patties should you buy to sell at a baseball tournament?

- Buns are sold in packages of 6.
- Meat patties are sold in packages of 8.
- You expect to sell between 80 and 100 hamburgers at the tournament.
- You do not want leftovers.



9. Which numbers are common multiples of 3 and 5? Show the steps you used.

- a) 15 c) 100
b) 135 d) 50

10. The number 7 is a factor of 1001.

- a) Explain how you know that 1001 is a multiple of 7.
b) How does knowing that 7 is a factor of 1001 help you to get another factor of 1001?

11. Which numbers in the box are multiples of each number below?

5	15	180
300	12	
100	60	50

- a) 3 b) 4 c) 25 d) 10 e) 30

12. The number 108 is the LCM of 36 and 54. List the next multiple of 36 and 54. Explain your reasoning.

13. Is a multiple of a number always greater than the number? Use an example to support your answer.

14. Suppose that the Grade 7 students expect to sell between 100 and 150 hot dogs.

- a) How many packages of 12 wieners and 8 buns should the students buy if they don't want any leftovers? Justify your answer.
b) How many packages of each should they buy if they expect to sell more than 300 hot dogs?

15. In the opening hour of a new store, a bell rang every 2 min and lights flashed every 3 min. If the store opened at 10 o'clock, at what times did both events happen at the same time? Explain or sketch a diagram to show the strategy you used.



16. On an automobile assembly line, every third car is green. Every fourth car is a convertible.

- a) How many cars out of the first 100 will be green convertibles?
b) Which number of car is the first green convertible?
c) Show how writing common multiples helped you solve this problem.

C Extending

17. What is the LCM of 1 and any other number greater than 1?

18. The number 12 is a factor of 156. How can you use this information to determine the LCM of 12 and 156?

19. A number is divisible by 6 if it is divisible by both 2 and 3. List the numbers that are divisible by 6 and are between the numbers given below. Show the steps you used.

- a) 40 and 50
b) 120 and 130
c) 6000 and 6020

20. You add three multiples of a number together. Will the sum be a multiple of the number? Explain why or why not. (*Hint*: Make up some examples to help you see how to answer this question.)