

Core Focus

- Multiplication: Introducing the comparison model, making comparisons between multiplication and addition, and between division and subtraction
- Length: Introducing millimeters and kilometers
- Mass and Capacity: Reviewing kilograms and grams, and liters and milliliters

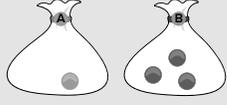
Multiplication

- In Grades 2 and 3, students understood multiplication as equal groups or equal rows. In comparison model multiplication, there are two different-sized groups, and one group involves multiple copies of the other.

5.1 Multiplication: Introducing the comparison model

Step In Compare the number of counters in these two bags. What do you notice?

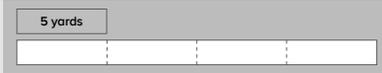
There are three **times as many** counters in Bag B as Bag A.



Draw more counters to show 5 times as many counters in Bag B.

How could you compare the length of these two strips?

5 yards



How long is the longer strip?
How do you know?

I will call the short strip **S**. I can figure out the length of the long strip by calculating $4 \times S$.

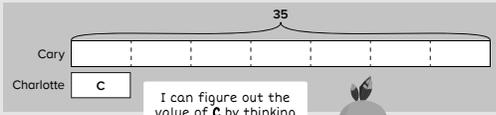
In this lesson, students are introduced to tape diagrams to make multiplicative comparisons between two numbers.

- Phrases such as *times as many*, *times as long as*, and *times as heavy as* signal multiplicative comparison. If multiplicative comparison problems have a known total, they may be solved by dividing.

5.3 Multiplication: Exploring the relationship between multiplication and division (tape diagram)

Step In Cary has 35 pencils. He has seven times as many pencils as his sister Charlotte.

How many pencils does Charlotte have?
How does this diagram match the word problem?



I can figure out the value of **C** by thinking
 $7 \times C = 35$
or
 $35 \div 7 = C$

Complete these two equations to show the answer.

$7 \times \square = 35$ $35 \div 7 = \square$

In this lesson, students use division to solve a multiplicative comparison problem.

- *Jake has four times as many apples* demonstrates multiplicative comparison. Sarah has 3 apples. Jake has 4 times as many as Sarah, so $3 \times 4 = 12$. Jake has 12 apples in total.
- Subtractive comparison is often confused with multiplicative comparison: *Sarah has 3 apples and Jake has 4 apples; how many more does Jake have?*

Ideas for Home

- When doubling or tripling a recipe, use multiplicative comparison language: "We need two times as much rice as the recipe calls for, so how much rice is that?"

Helpful videos

View these short one-minute videos to see these ideas in action.

www.bit.ly/OI_21

Length

- In Grade 4, students explore relationships among various measurements of length in the metric system. In earlier grades, students learned that a centimeter (cm) is about the width of a finger, and a meter (m) is a little longer than a yard, and that $100 \text{ cm} = 1 \text{ m}$.
- The decimeter (dm) and the kilometer (km) are introduced in this module. The decimeter is not frequently used, though it is actually a convenient length — 10 cm. The prefix *kilo* means one thousand. A kilometer is 1,000 meters (a little more than half a mile). Internationally, kilometers measure long distances.

5.9 Length: Introducing kilometers

Step In Where have you heard of kilometers before?

Rapid City
11 miles
18 km

I have seen kilometers as **km** on some road signs.

Some people participate in a 5-kilometer fun run every year.

5-km FUN RUN

In the word **kilometer**, **kilo** means one thousand. A related word is **kilogram**, which is equal to 1,000 grams. A short way to write kilometer is **km**.

A **dekameter** is equal to 10 meters. A short way to write dekameter is **dam**. A **hectometer** is equal to 100 meters. A short way to write hectometer is **hm**.

What do you remember about the decimeter?
Some other metric units of length are not used often but help show the relationship between metric units of length.

Kilometers are used to measure long distances. How is "kilo" different from "milli"?
Look at a meter stick.
How many meter sticks would you need to make one kilometer?

- If students can name and picture these metric measurements, then they are not likely to get confused when working with them. If they can picture how the measurements relate to one another (all the relationships are 10s, 100s, or 1,000s), the arithmetic is easy.

Mass and Capacity

- Students review grams and kilograms in this module: 1 kilogram = 1,000 g. Students also review metric measures of liquid volume (liters and milliliters). Just as with kilograms and grams, 1L is the same as 1,000 mL.

Ideas for Home

- Take turns estimating small lengths or short distances, and then use a metric ruler or metric tape measure to check your estimates.
- Notice together how $\times 10$ and $\div 10$ work in the metric system. Think of a measure in one metric unit (3 m 23 cm) and practice figuring out what that measure would be in other units ($3 \text{ m} + 23 \text{ cm} = 323 \text{ cm} = 3,230 \text{ mm}$); $6 \text{ km} + 8 \text{ m} = 6,008 \text{ m} = 600,800 \text{ cm}$.
- If you are not familiar with the metric system, we encourage you to learn about it along with your child by practicing conversions between kilograms and grams, liters and milliliters, and meters and millimeters. Check conversions using an online conversion calculator.