

Quantities and Relationships

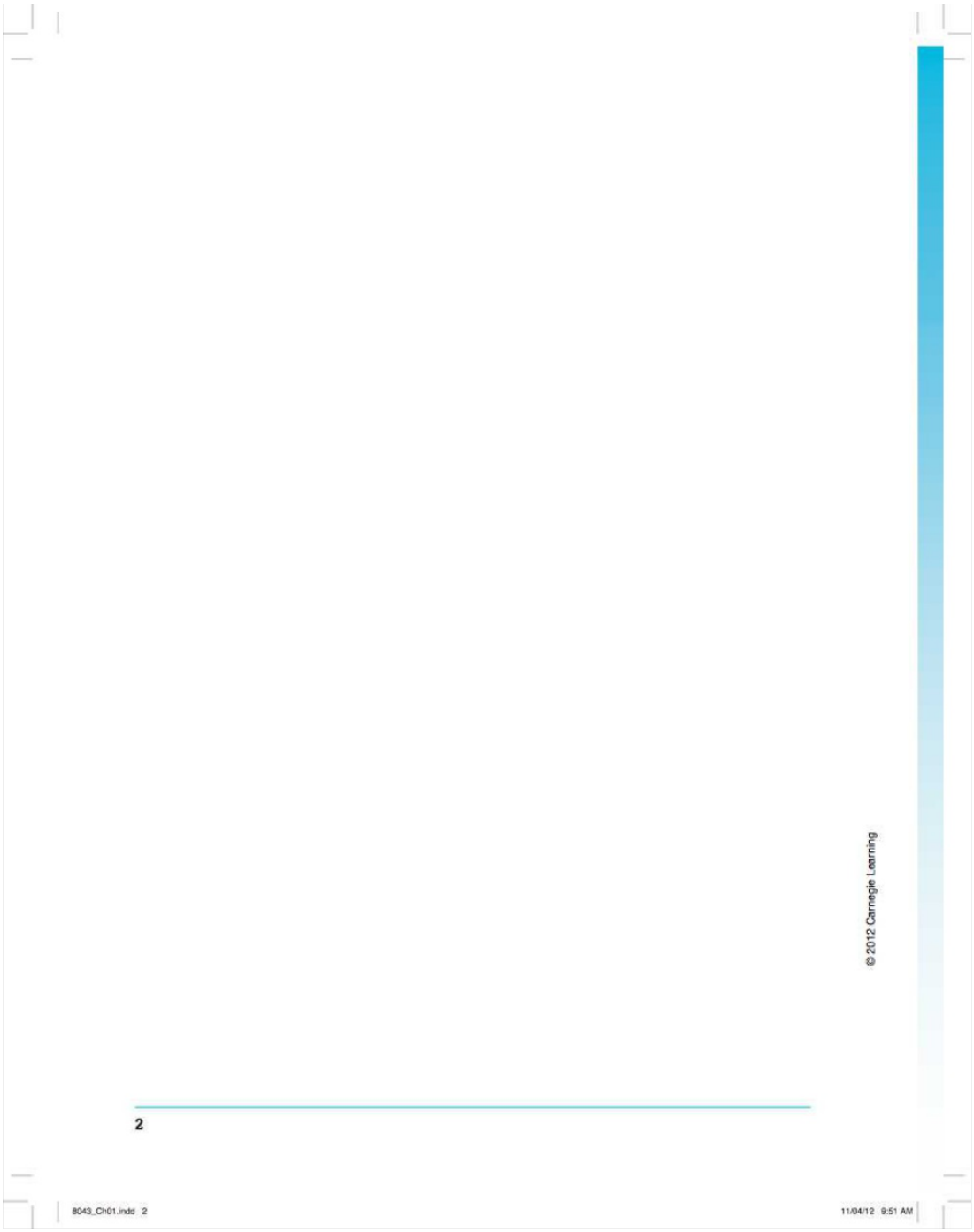
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Skiers seek soft, freshly fallen snow because it gives a smooth “floating” ride. Of course, the ride up the mountain isn’t nearly as much fun—especially if the ski lifts are on the fritz!



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A Picture Is Worth a Thousand Words

Understanding Quantities and Their Relationships

1.1

LEARNING GOALS

In this lesson, you will:

- Understand quantities and their relationships with each other.
- Identify the independent and dependent quantities for a problem situation.
- Match a graph with an appropriate problem situation.
- Label the independent and dependent quantities on a graph.
- Review and analyze graphs.
- Describe similarities and differences among graphs.

KEY TERMS

- dependent quantity
- independent quantity

How interesting would a website be without pictures or illustrations? Does an inviting image on a magazine cover make you more likely to buy it? Pictures and images aren't just for drawing your attention, though. They also bring life to text and stories.

There is an old proverb that states that a picture is worth a thousand words. There is a lot of truth in this saying—and images have been used by humans for a long time to communicate. Just think: would you rather post a story of your adventure on a social media site, or post one picture to tell your thousand-word story in a glance?

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PROBLEM 1 What's the Dependency?

Have you ever planned for a party? You may have purchased ice, gone grocery shopping, selected music, made food, or even cleaned in preparation. Many times, these tasks depend on another task being done first. For instance, you wouldn't make food before grocery shopping, now would you?



Let's consider the relationship between:

- the number of hours worked and the money earned.
- your grade on a test and the number of hours you studied.
- the number of people working on a particular job and the time it takes to complete a job.
- the number of games played and the number of points scored.
- the speed of a car and how far the driver pushes down on the gas pedal.

There are two quantities that are changing in each situation. When one quantity depends on another in a problem situation, it is said to be the **dependent quantity**. The quantity that the dependent quantity depends upon is called the **independent quantity**.



1. Circle the independent quantity and underline the dependent quantity in each statement.



2. Describe how you can determine which quantity is the independent quantity and which quantity is the dependent quantity in any problem situation.

The independent must be done first to create the outcome of the dependent.
The independent doesn't rely on anything.



3. Read each scenario and then determine the independent and dependent quantities. Be sure to include the appropriate units of measure for each quantity.



Something's Fishy

Candice is a building manager for the Crowley Enterprise office building. One of her responsibilities is cleaning the office building's 200-gallon aquarium. For cleaning, she must remove the fish from the aquarium and drain the water. The water drains at a constant rate of 10 gallons per minute.

- independent quantity:

time (minutes)

- dependent quantity:

amount of water drained (gallons)

Smart Phone, but Is It a Smart Deal?

You have had your eye on an upgraded smart phone. However, you currently do not have the money to purchase it. Your cousin will provide the funding, as long as you pay him interest. He tells you that you only need to pay \$1 in interest initially, and then the interest will double each week after that. You consider his offer and wonder: is this *really* a good deal?

- independent quantity:

- dependent quantity: