LESSON 1

Solve Problems Involving Scale

Dear Family,

This week your student is learning about scale drawings. In a **scale drawing**, the size of an original figure changes, but its shape does not change.

Here are some examples of scale drawings that you may be familiar with.

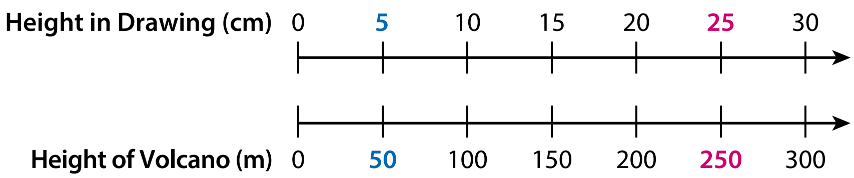
- A floor plan is a scale drawing of the actual layout of space in a building.
- A state road map is a scale drawing of the actual roads in the state.

Scale drawings are typically used when objects are either too small or too large to be shown at their actual sizes. Floor plans and maps are drawn smaller than actual size. Suppose a floor plan is drawn so that 1 inch on the floor plan represents an actual distance of 3 feet. For that floor plan, the **scale** is 1 in. to 3 ft.

Your student will be solving scale drawing problems like the one below.

> The scale from an actual volcano to a drawing of the volcano is 50 m to 5 cm. The height of the drawing of the volcano is 25 cm. How tall is the actual volcano?

➤ **ONE WAY** to find the height is to use a double number line.



➤ **ANOTHER WAY** is to use a **scale factor**.

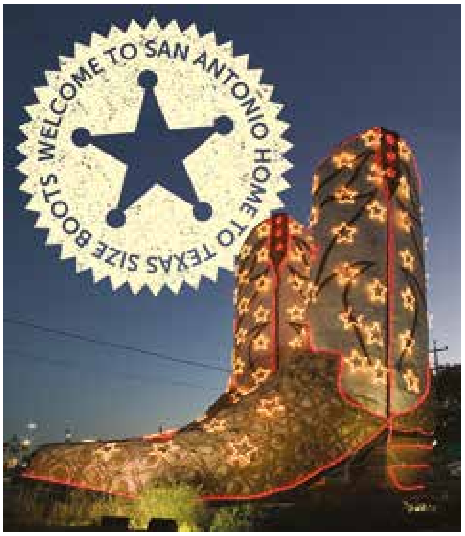
The scale from the drawing to the actual volcano is 5 cm for every 50 m, so the scale factor from the drawing to the volcano is $\frac{50}{5}$, or 10.

Multiply the height of the model by the scale factor: $25 \times 10 = 250$.

Using either method, the height of the actual volcano is 250 m.

Use the next page to start a conversation about scale.

Activity Thinking About Scale Around You



Do this activity together to investigate scale in the real world.

Have you ever taken a long road trip and come across some large roadside attractions?

The world's largest cowboy boots are a sculpture in Texas. They are over 35 feet tall! A cowboy boot is normally just 12 inches, or 1 foot, tall.

Gift shops often have models of buildings that fit in the palm of your hand. In Washington, D.C., you can get a Lincoln Memorial model that is 6.5 inches tall. The actual memorial is 80 feet tall! These giant and tiny models are scale copies of real-life objects.

Where do you see scale drawings and scale copies in the world around you?

Dear Family,

This week your student is exploring proportional relationships.

Here are some examples of **proportional relationships** that you may be familiar with.

- Ingredients of a recipe are proportional to one another: *you use the same proportions when making smaller or larger batches.*
- The earnings of hourly employees are proportional to the number of hours worked: *a person who works 3 hours will earn 3 times the hourly wage.*

Suppose Ichiro's hourly wage is $15. When he works 4 hours, he earns $60. His hourly wage of $15 does not change. In Ichiro's case, the **constant of proportionality** between amount earned and hours worked is 15. When a relationship is proportional, *constant of proportionality* is another term for *unit rate*.

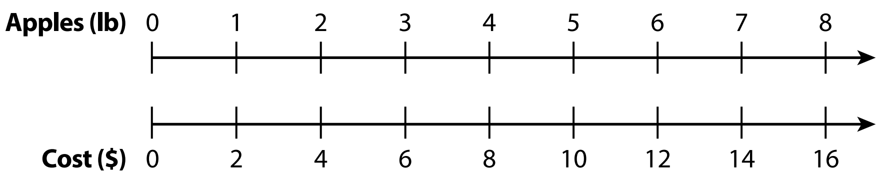
Your student will be modeling proportional relationships like the one below.

Jennifer goes apple picking with her family at a nearby farm. Each pound of apples they pick costs $2. The total cost depends on the number of pounds of apples they pick.

ONE WAY to represent a proportional relationship is with a table.

Apples (lb)	0	1	2	3	4	5	6	7	8
Cost ($)	0	2	4	6	8	10	12	14	16

ANOTHER WAY is to use a double number line.



Both representations show that the cost is always twice the number of pounds of apples. That means the constant of proportionality in this situation is 2.

Use the next page to start a conversation about proportional relationships.

Activity Thinking About Proportional Relationships Around You

➤ **Do this activity together to investigate proportional relationships in the real world.**

Have you ever played a video game and found that a day in the game was shorter than a day in real life? The game designers might have decided that 20 minutes pass in game time for each minute that passes in real time. That would mean that the relationship between real time and game time is a proportional relationship!

Game Time	Real Time
20 minutes pass	1 minute passes

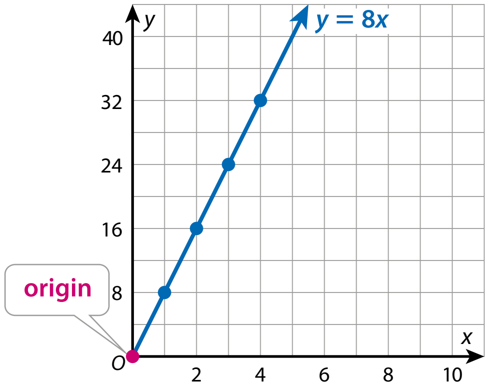
Where else do you see proportional relationships in the world around you?

Dear Family,

This week your student is learning about graphs and equations that can represent proportional relationships.

One way to represent a proportional relationship is with a graph. The graph will be a straight line that goes through the **origin**, or the point (0, 0).

Another way is with an equation that tells you how many x you have for every one y. The equation for the proportional relationship at the right is $y = 8x$.



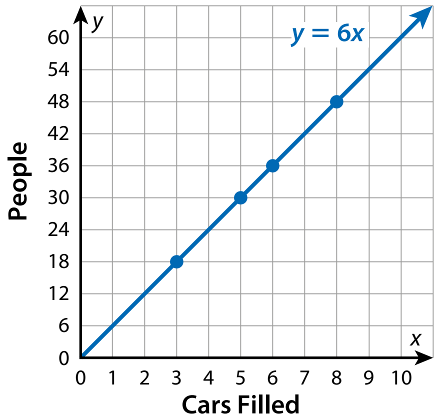
Your student will solve problems like the one below.

The table compares the number of people who ride a rollercoaster to the number of rollercoaster cars they fill. Is this a proportional relationship?

Cars Filled (x)	3	5	6	8
People (y)	18	30	36	48

➤ **ONE WAY** to recognize a proportional relationship is with a graph.

Plot the pairs of values as ordered pairs and connect the points. The graph is a straight line that passes through (0, 0), so the relationship is proportional.



➤ **ANOTHER WAY** to recognize a proportional relationship is to check if the ratios are equivalent.

The ratios 3 : 18, 5 : 30, 6 : 36, and 8 : 48 are all equivalent. In each case, you can multiply the first quantity by 6 to get the second quantity.

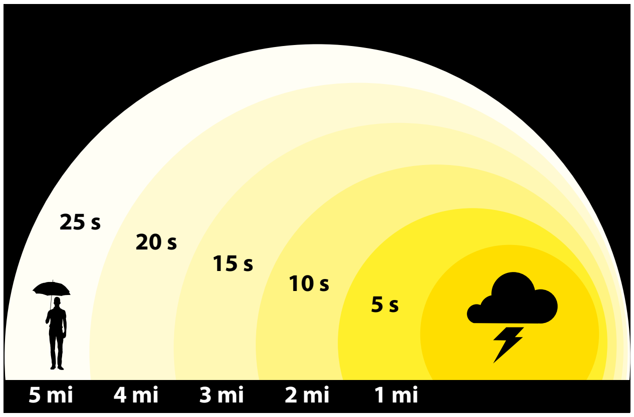
Both ways show that the relationship is proportional.

Use the next page to start a conversation about proportional relationships.

Activity Thinking About Proportional Relationships Around You

➤ **Do this activity together to investigate proportional relationships in the real world.**

Have you ever heard or seen a thunderstorm approaching and wondered how far away it was? You can figure this out!



After you see a flash of lightning, count the number of seconds until you hear the next rumble of thunder. For every 5 seconds you count, the storm is 1 mile away.

You can multiply the number of seconds by $\frac{1}{5}$ to find how many miles away the storm is. That means the constant of proportionality for the relationship between time and distance is $\frac{1}{5}$.

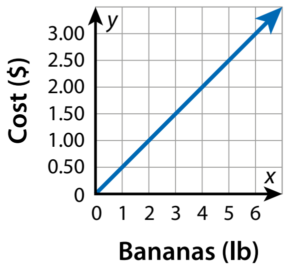
? What are other situations around you where one quantity is always a multiple of another quantity?

LESSON 5

Solve Proportional Relationship Problems

Dear Family,

This week your student is learning how to solve problems that involve proportional relationships. Your student has already learned about different ways to represent a proportional relationship. A proportional relationship can be represented with a verbal description, a graph, an equation, or a diagram (such as a double number line).

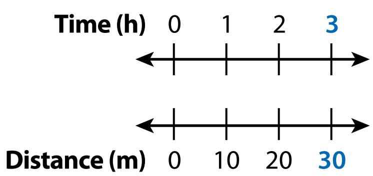
Verbal Description	Graph	Equation
Each pound of bananas costs \$0.50.		$c = 0.5p$ c = total cost (\$) p = pounds

Your student will be solving problems like the one below.

Charlotte and Sofia are 66 miles apart. They ride their bikes toward each other. They meet after 3 hours of riding. Each girl rides at a constant rate. Charlotte rides at 10 miles per hour. How far does Sofia ride?

Together Sofia and Charlotte ride 66 miles. First find out how far Charlotte rides.

➤ **ONE WAY** is to use a double number line to find how far Charlotte rides.



➤ **ANOTHER WAY** is to use an equation to find how far Charlotte rides.

Let m = miles and h = hours.

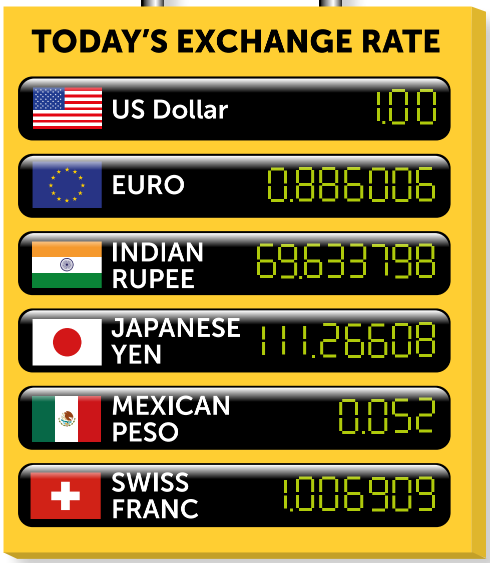
$$m = 10h$$
$$= 10(3)$$
$$= 30$$

Charlotte rides 30 miles, so Sofia rides 66 miles − 30 miles = 36 miles.

Both ways show that Sofia rides her bike 36 miles.

Use the next page to start a conversation about proportional relationships.

Activity Thinking About Proportional Relationships Around You



➤ **Do this activity together to investigate proportional relationships in the real world.**

Have you ever paid for something using money other than dollars and cents? Different countries use different currencies. Mexico uses the peso and Japan uses the yen.

You exchange dollars for another currency according to the exchange rate. This tells you how many units of the other currency you get for 1 dollar.

? What are other situations where you use proportional relationships?

LESSON 20

Solve Problems Involving Percents

Dear Family,

This week your student is learning about solving problems with percents.

A percent is a rate per 100, and it can be expressed with the percent symbol (%), as a fraction, or as a decimal.

$$25\% = \frac{25}{100} = 0.25$$

Here are some common situations involving percents that you may recognize.

- A store advertises a 25%-off sale, or **markdown**, of the regular prices.
- A business owner sells an item for a **markup** of 10% more than she bought it for.
- There is a 5% sales **tax** on an appliance purchase.
- A server receives a 15% tip, or **gratuity**, on the amount of a restaurant bill.
- A salesperson earns a 14% **commission** on car sales.
- A bank offers a savings account that pays a **simple interest** rate of 2% on the principal, or amount deposited.

Your student will be solving problems like the one below.

Rani buys a $35 desk with a 15%-off coupon. How much does Rani pay for the desk?

ONE WAY to find a discounted price is to find the amount of the discount and subtract it from the original price.

$$15\% \text{ of } 35 = (0.15)(35)$$
$$= 5.25$$
$$35 - 5.25 = 29.75$$

ANOTHER WAY is to find the percent of the original price that Rani pays.

Receiving a 15% discount is the same as paying 85% of the original price.

$$85\% \text{ of } 35 = (0.85)(35)$$
$$= 29.75$$

Both ways show that Rani pays $29.75.

Use the next page to start a conversation about percents.

Activity Thinking About Percents Around You

➤ **Do this activity together to investigate percents in the real world.**

Do you have a pet that always seems to be sleeping? Different types of animals sleep for different amounts of time.

A brown bat sleeps for an average of 82.9% of a 24-hour day in order to conserve energy when it is cold or when food is limited. That is almost 20 hours of sleep!

Giraffes sleep standing up so they can more easily defend themselves from predators. A giraffe only sleeps for an average of 7.9% of the day, or less than 2 hours!

? Where else do you see percents in the world around you?