

1 | We Are Family!

2 | Warming the Bench

3 | The Forest for the Trees

LESSON 1

We Are Family!

Percent, Fraction, and Decimal Equivalence

Learning Goals

- Model percents as rates per 100 on a hundredths grid.
- Estimate the percent of a quantity shaded in a model.
- Write equivalent fractions, decimals, and percents.
- Explain the similarities and differences among percents, fractions, and decimals.

REVIEW (1–2 minutes)

➤ Rewrite each fraction as an equivalent fraction with a denominator of 100.

1 $\frac{1}{10}$

2 $\frac{2}{5}$

3 $\frac{3}{20}$

4 $\frac{24}{40}$

You have learned that a percent is a part-to-whole ratio where the whole is 100. You also know that you can write fractions as decimals.

How do you write any number as a percent?



Putting It All in Perspective

➤ Describe what you think each famous quotation really means.

1 “Genius is one percent inspiration and ninety-nine percent perspiration.”

-Thomas Edison

2 “Success is 99 percent failure.”

-Soichiro Honda

3 “You miss 100 percent of the shots you never take.”

-Wayne Gretzky

4 “Always give 110%. It’s the extra 10% that everyone remembers.”

-Frank Sonnenberg



Estimating Percents from Pictures

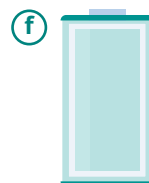
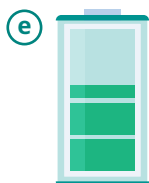
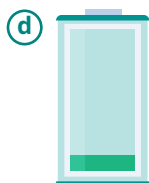
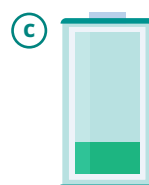
You know that 100% means one, or the whole, and 50% means half. You can estimate a lot of percents when using a visual model.

HABITS OF MIND

- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.

A laptop computer uses a battery icon to show battery life. When you glance at the icon, you can get a good estimate of how much battery life remains before you need to recharge.

- 1 Estimate how much battery power remains by writing the percent under each battery icon.



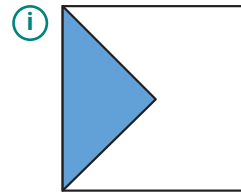
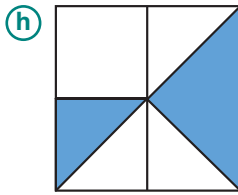
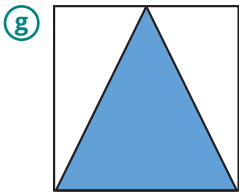
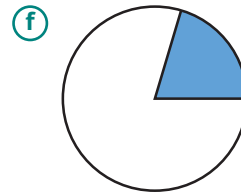
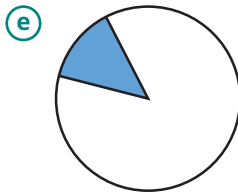
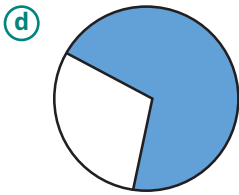
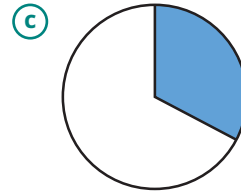
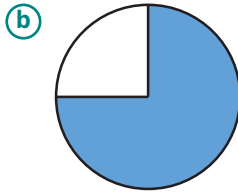
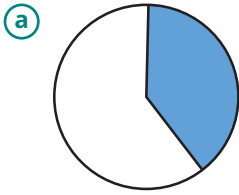
TOPIC 2

ASK YOURSELF . . .

Are your estimates the same as your partner's?



2 Estimate the shaded part of each circle shown and write it as a percent.



3 Describe the strategies that you used to make your estimations.

ASK YOURSELF . . .

Can you determine the percent shown if the shading isn't all together and the parts are not all the same size?



Determining Equivalences

HABIT OF MIND

- Attend to precision.

The sixth-grade class is planning a field trip to Philadelphia. To decide which historical site to visit, the 100 sixth-graders completed a survey. The table on page 260 records the results of the survey.

- Complete the Grid, Fraction, and Decimal columns of the table on page 260.



Which excursion would you like to take while in Philadelphia?				
	Grid	Fraction	Decimal	Percent
35 of the students chose the Liberty Bell.				
22 of the students chose Independence Hall.				
30 of the students chose the National Constitution Center.				
13 of the students chose the Betsy Ross House.				
0 of the students chose Reading Terminal Market.				
Are you planning on going on the trip?				
100 of the students responded Yes.				



Recall that a percent is a special part-to-whole ratio with a whole of 100. You can also think of a percent as a fraction in which the denominator is 100.

You can use percents, fractions, and decimals interchangeably.

WORKED EXAMPLE

You can write 15 out of 100 as the fraction $\frac{15}{100}$.

Because percent means “**out of 100**,” you can also write it as 15%.

TAKE NOTE . . .

The percent symbol “%” means “per 100” or “out of 100.”

1 Express each fraction in the survey as a percent in the last column of the table.

2 Write a summary of the results of the student survey using percents.

3 Compare the percents and decimals you wrote in the table to determine a pattern. Use this pattern to write a rule you can use to write any decimal as a percent and any percent as a decimal.

THINK ABOUT . . .

A percent tells you how many hundredths. $\frac{15}{100}$ is the same as 0.15 and 15%.



4 Write each number as a percent.

(a) 0.32

(b) 0.07

(c) 0.7381

(d) 1.52

(e) 0.4

(f) 4

5 Write each percent as a decimal.

(a) 47%

(b) 3%

(c) 12.5%

(d) 125%

(e) 80%

(f) 0.5%

You can use different methods to write a fraction as a percent.

- When the denominator of a fraction is a factor of 100, scale up the fraction to write it as a percent.
- When the denominator is not a factor of 100, you can divide the numerator by the denominator to write the fraction as a decimal, which you can then write as a percent.

6 Write each fraction as a percent. Round your answer to the nearest tenth of a percent.

(a) $\frac{4}{5}$

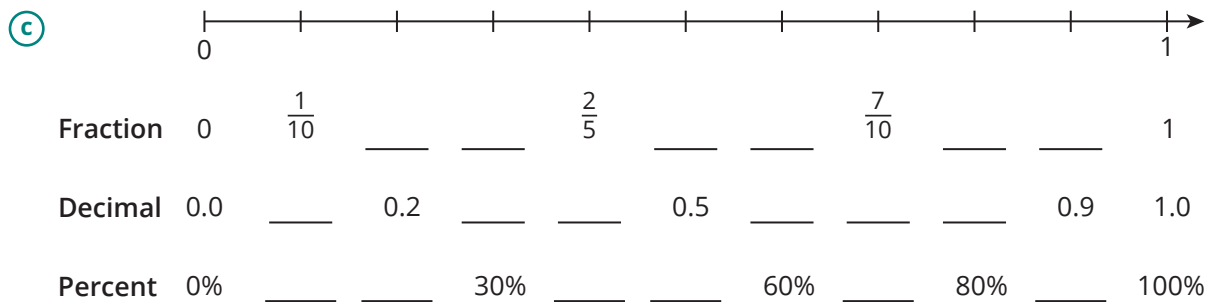
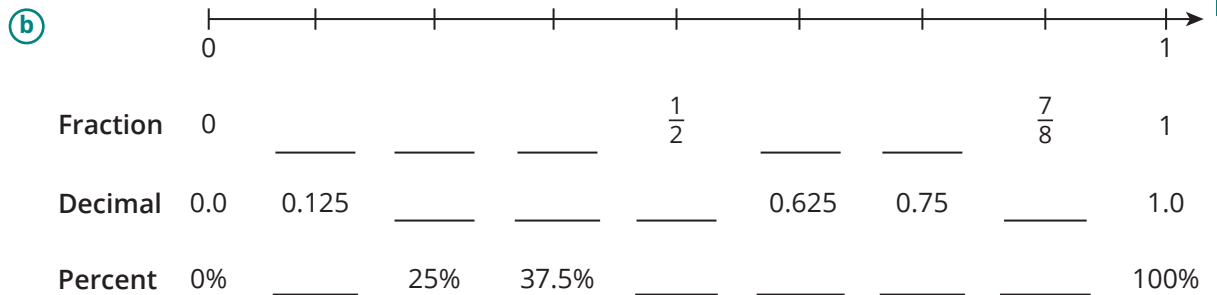
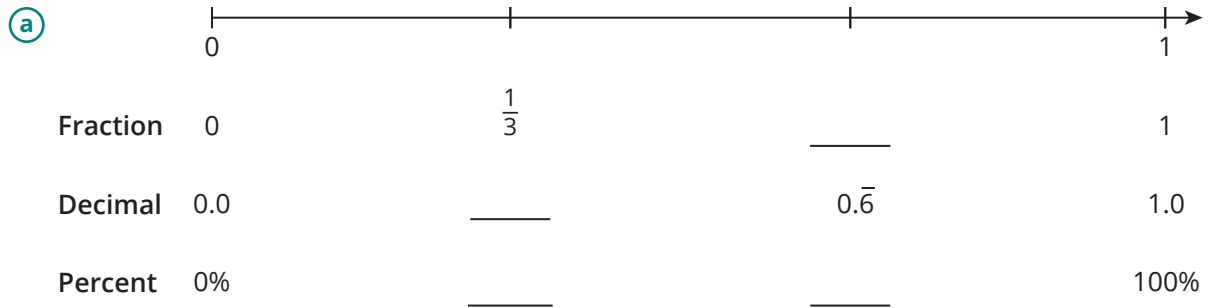
(b) $\frac{3}{10}$

(c) $\frac{3}{8}$

(d) $\frac{3}{2}$



7 Label each mark on the number line with a fraction, decimal, and percent. Write each fraction in lowest terms.





Reasoning with Ratios and Percents

HABITS OF MIND

- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.

On Saturday, Melanie won 3 out of 4 of her tennis matches at the Redstone Tournament. On Sunday, she won 1 out of 4 of her matches at the Mesa Tennis Tournament.

Each student summarized Melanie's record over the weekend.

Patrick

Melanie won 100% of her matches!

$$\frac{3}{4} + \frac{1}{4} = \frac{4}{4} = 1$$



Laura

Melanie won 50% of her matches!

$$\frac{3 \text{ matches won}}{4 \text{ matches played on Sat}} + \frac{1 \text{ match won}}{4 \text{ matches played on Sun}} = \frac{4 \text{ matches won}}{8 \text{ total matches played}}$$



Jonathon

Melanie won 4 out of 8 matches played.

3 matches won : 4 matches played on Saturday.

1 match won : 4 matches played on Sunday.

4 matches won : 8 matches played.



REMEMBER . . .

You can write part-to-part and part-to-whole ratios in fractional form and colon notation. Labeling ratios with units is important.

1 What is wrong with Patrick's reasoning?

2 What is the same about Laura's and Jonathon's reasoning? What is different?



Matching Percents, Fractions, and Decimals

HABIT OF MIND

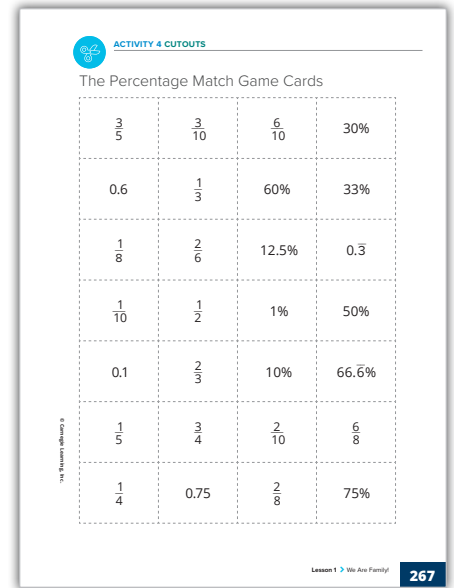
- Attend to precision.

It's time to play The Percentage Match Game. In this game, you will use your knowledge of percents, fractions, and decimals.

- Either you or your partner needs to cut out the cards located on page 267.

Rules of the Game:

- Lay out all the cards facedown.
- The first player chooses any card. That player then turns over another card to see if it is an equivalent match.
 - When the values on the two cards are equivalent, the player keeps the match and repeats the process.
- When the first player does not have an equivalent match, turn the cards back over.
 - The second player now follows the same process for picking and matching cards.
- Continue taking turns until the players have made all possible matches.
- The player with the most equivalent matches wins the game.





Family Resemblances

You can interchange percents, fractions, and decimals. The chart shows some common equivalent fractions, decimals, and percents.

Common Equivalent Fractions, Decimals, and Percents									
Fraction	$\frac{1}{5}$	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{2}{5}$	$\frac{1}{2}$	$\frac{3}{5}$	$\frac{2}{3}$	$\frac{3}{4}$	$\frac{4}{5}$
Decimal	0.2	0.25	$0.\overline{3}$	0.4	0.5	0.6	$0.\overline{6}$	0.75	0.8
Percent	20%	25%	$33\frac{1}{3}\%$	40%	50%	60%	$66\frac{2}{3}\%$	75%	80%

1 How are percents similar to decimals? How are percents and decimals different?

2 How are percents similar to fractions? How are percents and fractions different?

3 How are percents similar to ratios? How are percents and ratios different?



The Percentage Match Game Cards

$\frac{3}{5}$	$\frac{3}{10}$	$\frac{6}{10}$	30%
0.6	$\frac{1}{3}$	60%	33%
$\frac{1}{8}$	$\frac{2}{6}$	12.5%	$0.\overline{3}$
$\frac{1}{10}$	$\frac{1}{2}$	1%	50%
0.1	$\frac{2}{3}$	10%	$66.\overline{6}\%$
$\frac{1}{5}$	$\frac{3}{4}$	$\frac{2}{10}$	$\frac{6}{8}$
$\frac{1}{4}$	0.75	$\frac{2}{8}$	75%

Why is this page blank?

So you can cut out the cards on the other side



LESSON 1 ASSIGNMENT

➤ Use a separate piece of paper for your Journal entry.

JOURNAL

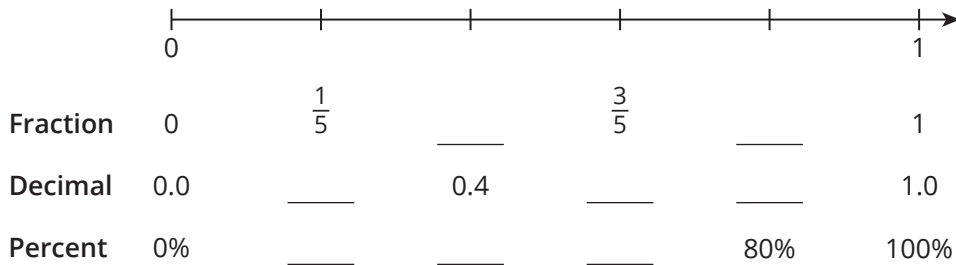
Define *percent* in your own words. Then, describe how to write fractions and decimals as percents.

REMEMBER

A percent is a part-to-whole relationship with a whole of 100. To convert a decimal to a percent, multiply the decimal by 100. To convert a percent to a decimal, divide the percent by 100.

PRACTICE

- 1 Label each mark on the number line with a fraction, decimal, and percent.



- 2 The table shows the portion of sixth-graders at a school who have a particular number of siblings. Complete the table by representing each portion as a part-to-whole ratio, a fraction, a decimal, and a percent.

Number of Siblings	Ratio	Fraction	Decimal	Percent
0		$\frac{3}{20}$		
1		$\frac{1}{5}$		20%
2	3 : 8	$\frac{3}{8}$		
		$\frac{6}{25}$	0.24	
4 or more		$\frac{7}{200}$		





STRETCH Optional

Write each percent as a fraction and as a decimal. Explain your strategy.

1 117%

2 1048%

3 0.15%

4 0.0593%