# Lesson 25: A Fraction as a Percent

## Student Outcomes

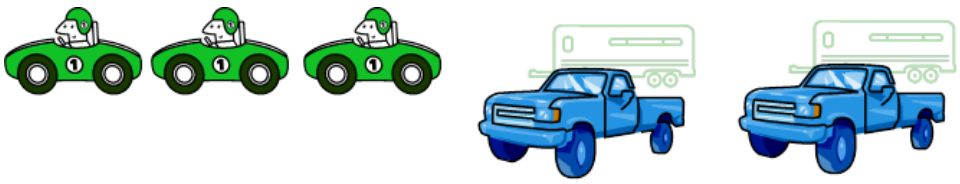
- Students write a fraction and a decimal as a percent of a whole quantity and write a percent of whole quantity as fraction or decimal.

## Classwork

### Example 1 (5 minutes)

Have students discuss the image with a partner. First, students should create two ratios that would describe the images. Then, students should use the ratios to help them discuss and work through the two claims. Students will place answers in the box provided on the student pages.

**Example 1**



- Create two ratios that accurately describe the picture.
  - *Part to Whole: Car to Whole* $3:5$ *,* $3$ *to* $5$ *or Truck to Whole* $2:5$ *,* $2$ *to* $5$

Note: Students could also give the answers as green to blue, blue to green, truck to car, car to truck, blue to total, and green to total. Some students may write part-to-part ratios. When the class comes back together, this could be a good time to discuss why a part-to-whole ratio is more useful when comparing statements that include percents. Students may need to be reminded that percents are a form of a part-to-whole comparison where the whole is $100$ .

**Sam says** $50$ **% of the vehicles are cars. Give three different reasons or models that prove or disprove Sam's statement. Models can include tape diagrams,** $10$ **x** $10$ **grids, double number lines, etc.**

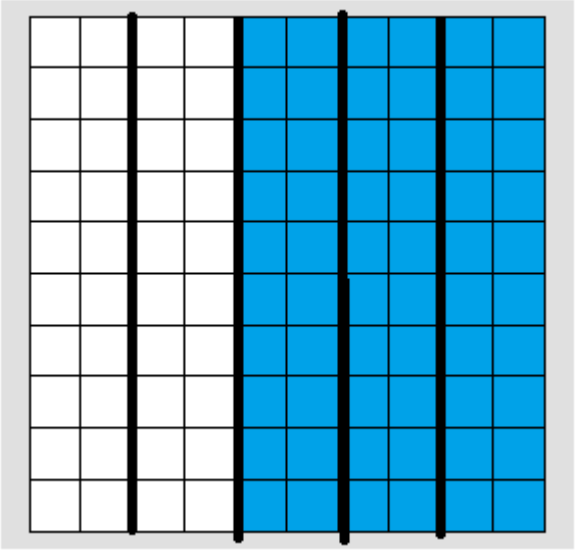
| *[----------* | *---------- Cars---------* | *----------]* | *[----------Trucks* | *----------]* |
|---|---|---|---|---|

1. $\frac{3}{5} = \frac{60}{100} \rightarrow 60\%$ *are cars.*
2.

*0 20 40 60 80 100*

3. $50\% = \frac{50}{100} = \frac{1}{2}$ $5 \times \frac{1}{2} = \frac{5}{2} = 2\ \frac{1}{2}$ *There are more than* $2\frac{1}{2}$ *cars.*

Another example of a possible model used is a $10 \times 10$ grid. It can be used to visually show students that $3$ out of $5$ is not the same as $50$ out of $100$.



At this point, students will be given a chance to share some of their ideas on percent. Help to mold the discussion to see that percentages are based on part-to-whole ratios.

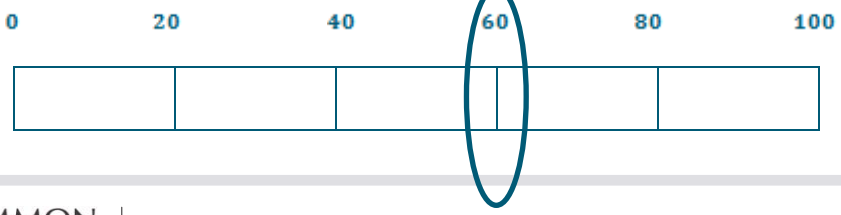
- $50\%$ means $50$ out of $100$ which is equivalent to $1$ out of $2$ that would have to be cars. In other words, half of the vehicles would have to be cars.

During the discussion, the class and teacher can discuss the three following questions:

**How is the fraction of cars related to the percent?**

$\frac{3}{5}$ *is equal to* $\frac{60}{100}$. *Since percents are out of 100, the two are the same.*

**Use a model to prove that the fraction and percent are equivalent.**



0 1 2 3 4 5

$\frac{3}{5} = 60\%$

**What other fractions or decimals are equal to the same percent?**

$\frac{3}{5} = \frac{6}{10} = \frac{9}{15} = \frac{12}{18} = \frac{15}{25} = 0.6$

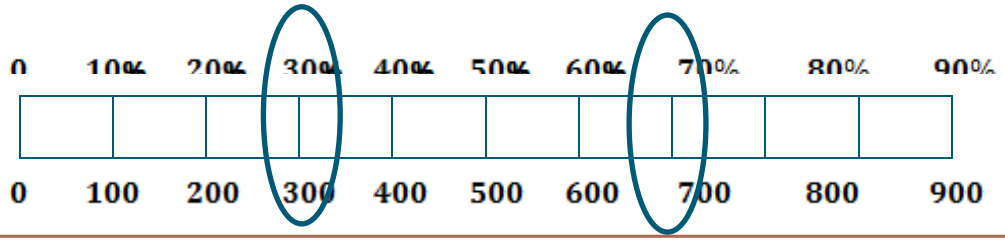
## Example 2 (10 minutes)

**Example 2**

**A survey was taken that asked participants whether or not they were happy with their job. An overall score was given. 300 of the participants were unhappy while 700 of the participants were happy with their job. Give a part-to-whole ratio for comparing happy participants to the whole. Then write a part-to-whole ratio of the unhappy participants to the whole. What percent were happy with their job, and what percent were unhappy with their job?**

| | | | | |
|---|---|---|---|---|
| Happy | $\frac{700}{1000}$ | $70\%$ | Unhappy | $\frac{300}{1000}$ | $30\%$ |
| | Ratio | Percent | | Ratio | Percent |

**Create a model to justify your answer.**




Have students write a fraction to represent the number of people that are happy with their job compared to the total.

$\frac{part\ happy}{total\ number\ questioned} = \frac{700}{1{,}000} = \frac{70}{100} = 70\%$, Students should also see that $30\%$ were unhappy.

- Why is it helpful to write this fraction with a denominator of $100$ ?
  - *Percents are also out of* $100$ .
- How would we represent this as a decimal?
  - $0.70 = 0.7$
- How can you model this question using a double number line?
  - *Time does not have to be spent having students make the number line because it so similar to the tape diagram. They can simply give a verbal description.*

The same reasoning could be used to create double number line graphs with percents on one line and the values being used on the other.

The two questions are meant to help show students that fractions with denominators other than $100$ can also be changed to percents. Before letting students work on the problem set, it would be important to review how to change a fraction to a percent.

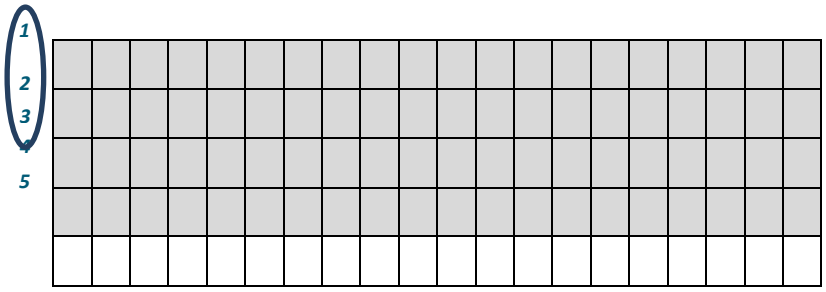
- We can scale up or scale down to get $100$ as a denominator.
- What if the denominator is not a multiple or a factor of $100$ ? What would we do now? For example, what if I ate $\frac{1}{8}$ of a pizza and wanted to know what percent of the pizza I ate. How would I calculate this?
  - *I can change a fraction to a decimal by dividing.*

**Exercises 1–6: Group/Partner/Independent Practice (20 minutes)**

Students will work on the practice problems where they will be asked to convert from fraction to decimal to percent. In addition, they will be asked to use models to help prove some of their answers. You may want to have $10$ x$10$ grids ready for some students to use for these questions. A reproducible has been provided for you.

**Exercise 1**

**Renita claims that a score of $80\%$ is the same as the fraction $\frac{4}{5}$. She drew the following picture in order to support her claim.**




**Is Renita correct?**

*Yes*

**Why or why not?**

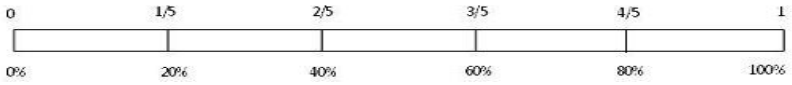
$4/5 = 40/50 = 80/100$ ( $80\%$

**How could you change Renita's picture to make it easier for Renita to see why she is correct or incorrect?**

***I could change her picture so that there is a percent scale down the right side showing 20%, 40%, etc. I could also change the picture so that there are ten strips with eight shaded.***

**Exercise 2**

**Use the tape diagram to answer the following questions.**



**80%** is what fraction of the whole quantity?

$\frac{4}{5}$

$\frac{1}{5}$ is what percent of the whole quantity?

20%

**50%** is what fraction of the whole quantity?

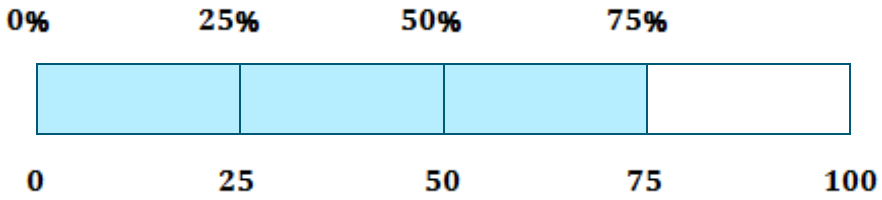
½ or 5/10

**1** is what percent of the whole quantity?

1=5/5 *This would be* **100%** .

**Exercise 3**

Maria completed $\frac{3}{4}$ of her workday. Create a model that represents what percent of the workday Maria has worked.




*She has completed 75% of the workday.*

What percent of her workday does she have left?

*25%*

How does your model prove that your answer is correct?

*My model shows that* $\frac{3}{4} = 75\%$ *, and that the* $\frac{1}{4}$ *she has left is the same as* **25%** .

**Exercise 4**

Matthew completed $\frac{5}{8}$ of his workday. What decimal would also describe the portion of the workday he has finished?

$$5 \div 8 = 0.625 \text{ or } \frac{5}{8} \text{ of } 100\% = 62.5\%$$

**How can you use the decimal to get the percent of the workday Matthew has completed?**

*$\frac{5}{8}$ is the same as $0.625$. This is $625$ thousandths or $\frac{625}{1,000}$. If I divide both the top and bottom by ten, I can see that $\frac{625}{1,000} = \frac{62.5}{100}$.*

Before students solve #3, have students go back to the previous examples and write the percent and fraction as a decimal. Then have them work with fractions like $\frac{5}{8}$.

Some students may have difficulty changing a decimal with three places back to a fraction.

**Exercise 5**

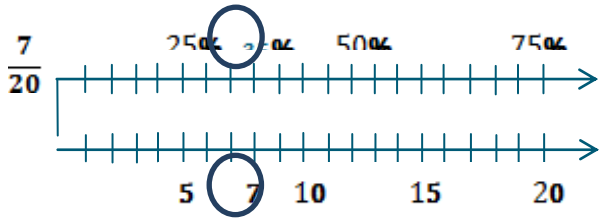
**Complete the conversions from fraction to decimal to percent.**

| Fraction | Decimal | Percent |
|---|---|---|
| $\frac{3}{8}$ | 0.125 | 12.5% |
| $\frac{7}{20}$ | 0.35 | 35% |
| $\frac{84.5}{100} = \frac{845}{1,000}$ | 0.845 | 84.5% |
| $\frac{32.5}{100} = \frac{325}{1,000}$ | 0.325 | 32.5% |
| $\frac{2}{25}$ | 0.08 | 8% |

**Exercise 6**

**Choose one of the rows from the conversion table in Exercise 5 and use models to prove your answers. (Models could include a $10 \times 10$ grid, a tape diagram, a double number line, etc.)**

***Answers will vary. One possible solution is shown:***




$\frac{7}{20} = \frac{35}{100} = 0.35 \rightarrow 35\%$

## Closing (5 minutes)

Choose different pairs of small groups to post diagrams and explain how the diagram helped them to see the relationship between the fractions, percents, and decimals. If possible, it may be helpful to choose groups that have used two different diagrams and compare the two visuals. Students could draw on a blank overhead or have pre-made grids and tape diagrams that they can fill in on a smart board.

Lesson Summary

**Fractions, Decimals, and Percentages are all related.**

**To change a fraction to a percentage, you can scale up or scale down so that $100$ is in the denominator.**

**Example:**

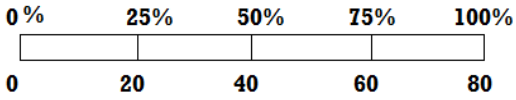
$$\frac{9}{20} = \frac{9 \times 5}{20 \times 5} = \frac{45}{100} = 45\%$$

**If this is not possible, you can change the fraction to a decimal and then convert to a percentage.**

**Example:**

$$\frac{5}{8} = 0.625 = 62.5 \text{ hundredths} = 62.5\%$$

**Models, like tape diagrams and number lines, can also be used to model the relationships.**




$\frac{20}{\quad} = 25\%$

## Exit Ticket (5 minutes)

Name _____ Date_____

# Lesson 25: A Fraction as a Percent

## Exit Ticket

Show all the necessary work to support your answer.

1. Convert $0.3$ to a fraction and a percent.

2. Convert $9\%$ to a fraction and a decimal.

3. Convert $\frac{3}{8}$ to a decimal and percent.

## Exit Ticket Sample Solutions

The following solutions indicate an understanding of the objectives of this lesson:

**Show all the necessary work to support your answer.**

1. Convert $0.3$ to a fraction and a percent.

$\frac{3}{10} = \frac{30}{100}, 30\%$

2. Convert $9\%$ to a fraction and a decimal.

$\frac{9}{100}, 0.09$

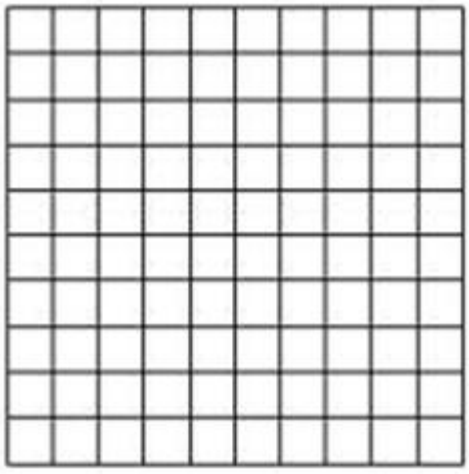
3. Convert $\frac{3}{8}$ to a decimal and percent.

$0.375 = \frac{375}{1000} = 37.\frac{5}{100} = 37.5\%$

## Problem Set Sample Solutions

1. Use the $10 \times 10$ grid to express the fraction $\frac{11}{20}$ as a percent.

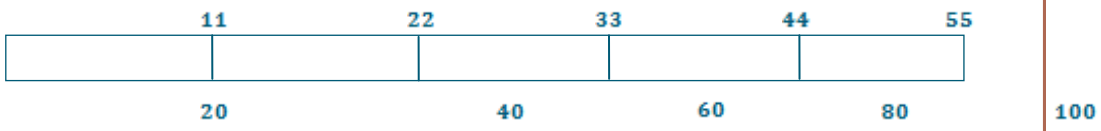
*Students should be shading $55$ of the squares in the grid. They might divide it into $5$ sections of $20$ each and*



*shade in* $11$ *of the* $20$ .

2. Use a tape diagram to relate the fraction $\frac{11}{20}$ to a percent.

*Answers will vary.*




3. How are the diagrams related?

*Both show that* $\frac{11}{20}$ *is the same as* $\frac{55}{100}$.

4. What decimal is also related to the fraction?

$0.55$

5. Which diagram is the most helpful for converting the fraction to a decimal? _____ Explain why.

*Answers will vary according to student preferences.*

## 10X10 Grid Reproducible