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Lesson 1: Percent

Student Outcomes

* Students understand that percent is the number and that the symbol means percent.
* Students convert between a fraction, decimal, and percent, including percents that are less than or greater than
* Students write a non-whole number percent as a complex fraction.

Classwork

Fluency Exercise (9 minutes): Fractions, Decimals, and Percents

*Sprint:* Students complete a two-round Sprint exercise where they practice their fluency of converting between percents, fractions, and decimals. Provide one minute for each round of the Sprint. Refer to the Sprints and Sprint Delivery Script sections in the Module Overview for directions to administer a Sprint. Be sure to provide any answers not completed by the students. The Sprint and answer keys are provided at the end of this lesson.

Opening Exercise 1 (4 minutes): Matching

Students will use mental math and their knowledge of percents to match the percent with the word problem/clue. Students share their answers with their neighbors and discuss the correct answers as a class.

Opening Exercise 1: Matching

Match the percents with the correct sentence clues.

|  |  |
| --- | --- |
|  | I am half of a half.  cubic inches of water filled in a cubic inch bottle. |
|  | I am less than .  out of contestants won a prize. |
|  | I am the chance of birthing a boy or a girl.  Flip a coin, and it will land on heads or tails. |
|  | I am less than a half but more than one-fourth.  out of play drums in a band. |
|  | I am equal to .  questions out of questions were answered correctly. |
|  | I am more than .  Instead of the expected to be raised, was collected for the school’s fundraiser. |
|  | I am a tenth of a tenth.  One penny is this part of one dollar. |
|  | I am less than a fourth but more than a hundredth.  out of earned is saved in the bank. |

Opening Exercise 2 (3 minutes)

Opening Exercise 2

Color in the grids to represent the following fractions:

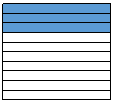
|  |  |  |
| --- | --- | --- |
|  |  |  |
|  | | |

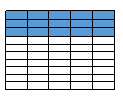
**Discussion (3 minutes)**

* How are these fractions and representations related to percents?
  + *Percent means out of one hundred and can be written as a fraction with a denominator of .*
* What are equivalent representations of ?

*Scaffolding:*

Show students the visual representation of the equivalent expressions:





* + *, , , and*
* What do these have in common?
  + *They are all equal to . The first two are equivalent fractions simplified by a common factor. The is in percent form, and the last is in decimal form.*
* Why are these all equal to ?
  + *Because the numerator-denominator is a part-to-whole relationship, and out of is The decimal represents three-tenths, which is also equivalent to*
* What are other equivalent representations of ?
  + *,, , and*

Example 1 (4 minutes)

Example 1

Use the definition of the word *percent* to write each percent as a fraction and then as a decimal.

|  |  |  |
| --- | --- | --- |
| Percent | Fraction | Decimal |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

* What is the pattern or process that you recall or notice when converting percents to fractions?
  + *Place the percent value over and simplify if possible.*
* If I gave you a number as a fraction, how could you tell me what percent the fraction represents?

*Scaffolding:*

For example, to convert a fraction, , to a percent:

* + *Find the equivalent fraction with the denominator of .*
* What mathematical process is occurring for the percent to convert to a decimal?
  + *The percent is being divided by .*
* If I gave you a number as a decimal, how could you tell me what percent the decimal represents?
  + *Multiply by .*

Example 2 (4 minutes)

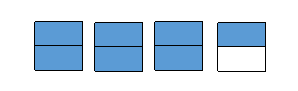
Example 2

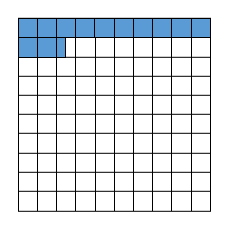
Fill in the chart by converting between fractions, decimals, and percents. Show your work in the space below.

|  |  |  |
| --- | --- | --- |
| Fraction | Decimal | Percent |
|  |  |  |
|  |  |  |
|  |  |  |

as a fraction:

as a decimal:





as a fraction: or as a percent: or

as a percent: or as a decimal:

Exercise 1 (11 minutes): Class Card Activity

Prior to class, copy and cut out the cards found at the end of the lesson. Mix up the cards, and pass out one card per student. Ask any student to begin by asking the class the question on the card in boldface. The student with the equivalent value on his card should respond by reading his sentence and then read his question for another student to respond. Students will attend to precision when reading the clues and answers, using the correct place value terms when reading decimal numbers. Provide half sheets of blank paper or personal white boards if accessible so students can work out the problems that are being read. This will continue until the first person to read her question answers somebody’s equivalent value.

*Scaffolding:*

If there are less than students in the class, pass out more than one card to the advanced learners.

MP.6

Exercise 1: Class Card Activity

Read your card to yourself (each student will have a different card), and work out the problem. When the exercise begins, listen carefully to the questions being read. When you have the card with the equivalent value, respond by reading your card aloud.

Examples:

should be read “twenty two-hundredths.”

should be read “one-fifth thousandths” or “one-fifth over one thousand.”

should be read “seven-three hundredths” or “seven over three hundred.”

should be read “two hundred-hundredths” or “two hundred over one hundred.”

Closing (3 minutes)

* What does *percent* mean?
  + *It means per hundred or each hundred.*
* Is the value of less than or greater than the value of ? Why?
  + *The value of is greater than because the percent means it is over , which makes equivalent to .*
* How are the fraction and decimal representations related to the percent?
  + *They are related to , where is the given percent.*
* What do percents greater than look like? Why?
  + *They are percents greater than %, improper fractions, or decimals greater than .*

Lesson Summary

* *Percent* means per hundred. percent is the same as . Use as a symbol for percent.
* Usually, there are three ways to write a number: a percent, a fraction, and a decimal. Fraction and decimal forms of the percent, , are equivalent to .

Exit Ticket (4 minutes)

Name Date

Lesson 1: Percent

Exit Ticket

1. Fill in the chart converting between fractions, decimals, and percents. Show work in the space provided.

|  |  |  |
| --- | --- | --- |
| **Fraction** | **Decimal** | **Percent** |
|  |  |  |
|  |  |  |
|  |  |  |

1. Using the values from the chart in Problem 1, which is the least and which is the greatest? Explain how you arrived at your answers.

Exit Ticket Sample Solutions

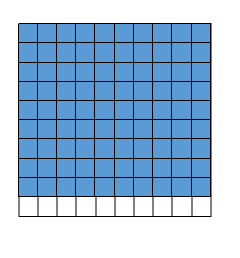
1. Fill in the chart converting between fractions, decimals, and percents. Show work in the space provided.

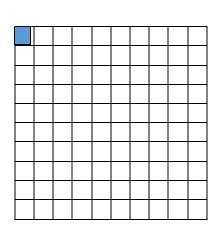
|  |  |  |
| --- | --- | --- |
| Fraction | Decimal | Percent |
|  |  |  |
|  |  |  |
|  |  |  |

1. Using the values from the chart in Problem 1, which is the least and which is the greatest? Explain how you arrived at your answers.

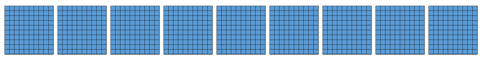
The least of the values is , and the greatest is . To determine which value is the least and which is the greatest, compare all three values in decimal form, fraction form, or percents. When comparing the three decimals, ,,and, one can note that is the smallest value, so is the least of the values and is the greatest.

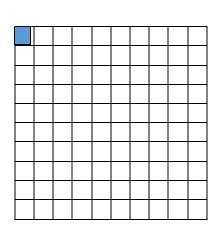
Problem Set Sample Solutions

1. Create a model to represent the following percents.







* 1. 

1. Benjamin believes that is equivalent to . Is he correct? Why or why not?

Benjamin is not correct, because is equivalent to , which is equal to . The second percent is equivalent to . These percents are not equivalent.

1. Order the following from least to greatest.

, , ,, , , , and

, , , , , , , and

1. Fill in the chart by converting between fractions, decimals, and percents. Show work in the space below.

|  |  |  |
| --- | --- | --- |
| Fraction | Decimal | Percent |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
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|  |  |  |
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|  |  |  |

Exercise 1 Cards

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| I have the equivalent value, .  Who has the card equivalent to ? | I have the equivalent value, .  Who has the card equivalent to ? | I have the equivalent value, .  Who has the card equivalent to ? | I have the equivalent value, .  Who has the card equivalent to ? | I have the equivalent value,.  Who has the card equivalent to ? |
| I have the equivalent value, .  Who has the card equivalent to? | I have the equivalent value, .  Who has the card equivalent to ? | I have the equivalent value, .  Who has the card equivalent to ? | I have the equivalent value, .  Who has the card equivalent to ? | I have the equivalent value, .  Who has the card equivalent to ? |
| I have the equivalent value, .  Who has the card equivalent to ? | I have the equivalent value, .  Who has the card equivalent to ? | I have the equivalent value, .  Who has the card equivalent to ? | I have the equivalent value, .  Who has the card equivalent to ? | I have the equivalent value,.  Who has the card equivalent to ? |
| I have the equivalent value, .  Who has the card equivalent to ? | I have the equivalent value, .  Who has the card equivalent to ? | I have the equivalent value, .  Who has the card equivalent to ? | I have the equivalent value, .  Who has the card equivalent to ? | I have the equivalent value, .  Who has the card equivalent to ? |
| I have the equivalent value, .  Who has the card equivalent to ? | I have the equivalent value, .  Who has the card equivalent to ? | I have the equivalent value, .  Who has the card equivalent to ? | I have the equivalent value, .  Who has the card equivalent to ? | I have the equivalent value, .  Who has the card equivalent to ? |
| I have the equivalent value, .  Who has the card equivalent to ? | I have the equivalent value, .  Who has the card equivalent to ? | I have the equivalent value, .  Who has the card equivalent to ? | I have the equivalent value, .  Who has the card equivalent to ? | I have the equivalent value, .  Who has the card equivalent to ? |

Fractions, Decimals, and Percents—Round 1

Number Correct: \_\_\_\_\_\_

**Directions:** Write each number in the alternate form indicated.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | as a percent |  |  |  | as a percent |  |
|  | as a percent |  |  |  | as a percent |  |
|  | as a percent |  |  |  | as a percent |  |
|  | as a percent |  |  |  | as a percent |  |
|  | as a percent |  |  |  | as a percent |  |
|  | as a percent |  |  |  | as a percent |  |
|  | as a percent |  |  |  | as a percent |  |
|  | as a percent |  |  |  | as a fraction |  |
|  | as a percent |  |  |  | as a fraction |  |
|  | as a percent |  |  |  | as a fraction |  |
|  | as a percent |  |  |  | as a fraction |  |
|  | as a decimal |  |  |  | as a fraction |  |
|  | as a decimal |  |  |  | as a decimal |  |
|  | as a decimal |  |  |  | as a decimal |  |
|  | as a decimal |  |  |  | as a decimal |  |
|  | as a decimal |  |  |  | as a decimal |  |
|  | as a fraction |  |  |  | as a decimal |  |
|  | as a fraction |  |  |  | as a decimal |  |
|  | as a fraction |  |  |  | as a percent |  |
|  | as a fraction |  |  |  | as a percent |  |
|  | as a fraction |  |  |  | as a percent |  |
|  | as a fraction |  |  |  | as a percent |  |

Fractions, Decimals, and Percents—Round 1 [KEY]

**Directions:**Write each number in the alternate form indicated.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | as a percent |  |  |  | as a percent |  |
|  | as a percent |  |  |  | as a percent |  |
|  | as a percent |  |  |  | as a percent |  |
|  | as a percent |  |  |  | as a percent |  |
|  | as a percent |  |  |  | as a percent |  |
|  | as a percent |  |  |  | as a percent |  |
|  | as a percent |  |  |  | as a percent |  |
|  | as a percent |  |  |  | as a fraction | ***or*** |
|  | as a percent |  |  |  | as a fraction |  |
|  | as a percent |  |  |  | as a fraction |  |
|  | as a percent |  |  |  | as a fraction |  |
|  | as a decimal |  |  |  | as a fraction |  |
|  | as a decimal |  |  |  | as a decimal |  |
|  | as a decimal |  |  |  | as a decimal |  |
|  | as a decimal |  |  |  | as a decimal |  |
|  | as a decimal |  |  |  | as a decimal |  |
|  | as a fraction |  |  |  | as a decimal |  |
|  | as a fraction |  |  |  | as a decimal |  |
|  | as a fraction |  |  |  | as a percent |  |
|  | as a fraction |  |  |  | as a percent |  |
|  | as a fraction |  |  |  | as a percent |  |
|  | as a fraction |  |  |  | as a percent |  |

Fractions, Decimals, and Percents—Round 2

Number Correct: \_\_\_\_\_\_

Improvement: \_\_\_\_\_\_

**Directions:**Write each number in the alternate form indicated.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | as a percent |  |  |  | as a percent |  |
|  | as a percent |  |  |  | as a percent |  |
|  | as a percent |  |  |  | as a percent |  |
|  | as a percent |  |  |  | as a percent |  |
|  | as a percent |  |  |  | as a percent |  |
|  | as a percent |  |  |  | as a percent |  |
|  | as a percent |  |  |  | as a percent |  |
|  | as a percent |  |  |  | as a fraction |  |
|  | as a percent |  |  |  | as a fraction |  |
|  | as a percent |  |  |  | as a fraction |  |
|  | as a percent |  |  |  | as a fraction |  |
|  | as a decimal |  |  |  | as a fraction |  |
|  | as a decimal |  |  |  | as a decimal |  |
|  | as a decimal |  |  |  | as a decimal |  |
|  | as a decimal |  |  |  | as a decimal |  |
|  | as a decimal |  |  |  | as a decimal |  |
|  | as a fraction |  |  |  | as a decimal |  |
|  | as a fraction |  |  |  | as a decimal |  |
|  | as a fraction |  |  |  | as a percent |  |
|  | as a fraction |  |  |  | as a percent |  |
|  | as a fraction |  |  |  | as a percent |  |
|  | as a fraction |  |  |  | as a percent |  |

Fractions, Decimals, and Percents—Round 2 [KEY]

**Directions:**  Write each number in the alternate form indicated.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | as a percent |  |  |  | as a percent |  |
|  | as a percent |  |  |  | as a percent |  |
|  | as a percent |  |  |  | as a percent |  |
|  | as a percent |  |  |  | as a percent |  |
|  | as a percent |  |  |  | as a percent |  |
|  | as a percent |  |  |  | as a percent |  |
|  | as a percent |  |  |  | as a percent |  |
|  | as a percent |  |  |  | as a fraction | ***or*** |
|  | as a percent |  |  |  | as a fraction | ***or*** |
|  | as a percent |  |  |  | as a fraction |  |
|  | as a percent |  |  |  | as a fraction |  |
|  | as a decimal |  |  |  | as a fraction |  |
|  | as a decimal |  |  |  | as a decimal |  |
|  | as a decimal |  |  |  | as a decimal |  |
|  | as a decimal |  |  |  | as a decimal |  |
|  | as a decimal |  |  |  | as a decimal |  |
|  | as a fraction |  |  |  | as a decimal |  |
|  | as a fraction |  |  |  | as a decimal |  |
|  | as a fraction |  |  |  | as a percent |  |
|  | as a fraction |  |  |  | as a percent |  |
|  | as a fraction |  |  |  | as a percent |  |
|  | as a fraction |  |  |  | as a percent |  |