Relate Fractions, Decimals, and Percents

Getting the Idea

Rational numbers are numbers that can be expressed in the form $\frac{a}{b}$, where a and b are **integers** and $b \neq 0$. **Fractions, decimals**, and **percents** are rational numbers that can be used to show parts of a whole. Percent means *per hundred*. For example, 70% of a number means $\frac{70}{100}$ times the quantity. The symbol for percent is %.

You can convert rational numbers to different forms. To convert a percent to a fraction, write the percent as the numerator over a denominator of 100. Then simplify the fraction using the greatest common factor (GCF).

Example 1

Write 72% as a fraction in simplest form.

Strategy   **Write the percent as a fraction with a denominator of 100. Simplify.**

Step 1   Remove the percent sign. Write the percent as the numerator and 100 as the denominator.

$72\% \longrightarrow \frac{72}{100}$

Step 2   Simplify the fraction using the GCF.

The GCF of 72 and 100 is 4.

Divide the numerator and denominator by 4.

$\frac{72}{100} = \frac{72 \div 4}{100 \div 4} = \frac{18}{25}$

Solution $72\% = \frac{18}{25}$

Example 2

What is 84% written as a decimal?

Strategy   **Remove the percent sign and move the decimal point two places to the left.**

$84\% \longrightarrow 84. \longrightarrow 0.84$

Solution $84\% = 0.84$

Example 3

What is $\frac{2}{5}$ written as a decimal?

Strategy   **Write an equivalent fraction with a denominator of 10.**

   Step 1   Find a fraction equivalent to $\frac{2}{5}$ that has a denominator of 10.

             Since $5 \times 2 = 10$, multiply the numerator and denominator by 2.

             $\frac{2}{5} = \frac{2 \times 2}{5 \times 2} = \frac{4}{10}$

   Step 2   Write the decimal equivalent of $\frac{4}{10}$.

             $\frac{4}{10}$ is read "four tenths."

             $\frac{4}{10} = 0.4$

Solution $\frac{2}{5} = 0.4$

Example 4

Write 0.65 as a fraction in simplest form.

Strategy   **Write the digits after the decimal point as the numerator.**
             The denominator is the place value of the last digit. Simplify.

   Step 1   Write the digits 65 as the numerator of the fraction.

             The denominator is 100 because the last digit, 5, is in the hundredths place.

             $0.65 = \frac{65}{100}$

   Step 2   Simplify using the GCF.

             The GCF of 65 and 100 is 5.

             $\frac{65}{100} = \frac{65 \div 5}{100 \div 5} = \frac{13}{20}$

Solution $0.65 = \frac{13}{20}$

To convert a decimal to a percent, multiply the decimal by 100 and insert a percent sign. Multiplying a decimal by 100 is the same as moving the decimal point 2 places to the right.

Example 5

What is 0.875 written as a percent?

Strategy **Multiply the decimal by 100.**

Move the decimal point two places to the right.

$0.875 \times 100 = 87.5$

Insert a percent sign.

87.5%

Solution **0.875 = 87.5%**

Example 6

Write $\frac{16}{25}$ as a percent.

Strategy **Write an equivalent fraction.**

Step 1 Percent means per hundred, so write an equivalent fraction with a denominator of 100.

$25 \times 4 = 100$, so multiply the numerator and denominator by 4.

$$\frac{16}{25} = \frac{16 \times 4}{25 \times 4} = \frac{64}{100}$$

Step 2 Insert a percent sign next to the numerator.

$$\frac{64}{100} \longrightarrow 64\%$$

Solution $\frac{16}{25} = 64\%$

If the denominator is not a factor of 100, convert the fraction to a decimal.

Then convert the decimal to a percent. Some decimals, such as $\frac{1}{3}$, are repeating decimals.

To write a repeating decimal as a percent, write the percent and the part that repeats as a fraction.

Example 7

What is $\frac{2}{3}$ written as a percent?

Strategy   **Convert the fraction to a decimal. Then convert the decimal to a percent.**

Step 1   Divide the numerator by the denominator.

$$\frac{2}{3} = 2 \div 3 = 0.\overline{6}$$

Step 2   Multiply the decimal by 100.

$$0.\overline{6} \times 100 = 66.\overline{6}$$

Insert a percent sign.

$66.\overline{6}\%$ or $66\frac{2}{3}\%$

Solution $\frac{2}{3} = 66\frac{2}{3}\%$

Coached Example

Maria received 55% of the vote in a student council election. What decimal and fraction, written in simplest form, are equivalent to the percentage of the vote Maria received?

To convert a percent to a decimal, remove the percent sign and move the decimal point 2 places to the _____.

The decimal _____ is equivalent to 55%.

To convert a percent to a fraction, write the percent as the numerator over a denominator of _____.

What is the GCF of the numerator and denominator? _____

Divide the numerator and denominator by _____.

Simplify. _____

55% written as a decimal is _____. 55% written as a fraction is _____.

Lesson Practice

Choose the correct answer.

1. About 60.7% of eligible voters voted in the election. Which decimal is equivalent to 60.7%?

   A. 0.0607

   B. 0.607

   C. 6.07

   D. 60.7

2. In a survey of patients, Dr. Molar found that 8% of his patients floss daily. Which fraction is equivalent to 8%?

   A. $\frac{4}{5}$

   B. $\frac{2}{5}$

   C. $\frac{4}{25}$

   D. $\frac{2}{25}$

3. Kristen made $\frac{3}{8}$ of her free throws for the season. Which percent is equivalent to $\frac{3}{8}$?

   A. 37.5%

   B. 38%

   C. 38.5%

   D. 375%

4. Tomas correctly spelled 18 out of 20 words on his last spelling quiz. What decimal represents the portion of the words that Tomas spelled correctly?

   A. 0.18

   B. 0.36

   C. 0.8

   D. 0.9

5. Which fraction is equivalent to 48%?

   A. $\frac{4}{5}$

   B. $\frac{4}{8}$

   C. $\frac{12}{25}$

   D. $\frac{8}{25}$

6. Sales at Cycle Time increased by 370% this year. Which of the following is equivalent to 370%?

   A. $\frac{37}{100}$

   B. 3.7

   C. $3\frac{7}{100}$

   D. 37

7. Which rational number is **not** equivalent to the others?

   A. 75%

   B. $\frac{3}{4}$

   C. 0.75

   D. $\frac{7}{50}$

8. Which of the following shows a set of equivalent rational numbers?

   A. $\frac{2}{5}$ 0.4   25%

   B. $\frac{2}{3}$ 0.6   66%

   C. $\frac{3}{10}$ 0.3   30%

   D. $\frac{73}{100}$ 0.73   730%

9. The Lions won 35 out of 40 games this season.

   A. What fraction of games played did the Lions win? Write your answer in simplest form.

   _____

   B. Write a decimal and a percent equivalent to the fraction of games the Lions won. Show your work.

   _____

   _____

10. Victor correctly answered 18 of the 20 questions on his math quiz. Circle the fraction that makes the statement true.

The fraction of questions that Victor answered correctly is
$$\begin{array}{c} \frac{4}{5} \\[6pt] \frac{9}{10} \\[6pt] \frac{7}{15} \\[6pt] \frac{3}{25} \end{array}$$.

11. Which shows a set of equivalent rational numbers? Circle all that apply.

    A. $\frac{4}{5}$, 0.8, 80%

    B. $\frac{3}{4}$, 0.75, 75%

    C. $\frac{3}{1}$, 0.3, 3%

    D. $\frac{5}{8}$, 0.625, 6.25%

12. Draw a line from each fraction or decimal to its equivalent percent.

    A. $\frac{1}{8}$ •   • 87.5%

    B. $\frac{1}{5}$ •   • 30%

    C. 0.875   •   • 20%

    D. 0.3   •   • 12.5%

    E. 0.05   •   • 5%

13. Look at each equation. Are the numbers equivalent? Select Yes or No.

    A. $\frac{2}{5} = 0.4$ ○ Yes ○ No

    B. $0.329 = 3.29\%$ ○ Yes ○ No

    C. $\frac{1}{8} = 12.5\%$ ○ Yes ○ No

    D. $0.1 = 10\%$ ○ Yes ○ No

14. Write each number under its equivalent number in the table.

| $\frac{7}{10}$ | 40% | 0.4 | 55% | 0.7 | $\frac{11}{20}$ |

70%	$\frac{2}{5}$	0.55

15. Antonia ate $\frac{3}{8}$ of a bunch of grapes. Circle the percent that makes the statement true.

Antonia ate

| 3.8% |
| 37.5% |
| 38% |
| 375% |

of the bunch of grapes.

16. Brent read 56 pages of his 64-page book. Which value represents the part of the book that Brent read? Circle all that apply.

A. 0.875

B. $\frac{7}{8}$

C. 0.0875

D. 87.5%

E. $\frac{5}{6}$

F. 8.75%