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Converting Fractions and Decimals

Unit 1 Lesson 3

Students will be able to:

Convert fractions and decimals

Key Vocabulary:

Terminating decimal

Repeating decimal

Fraction

Converting a Fraction to a Decimal

- To convert a fraction to a decimal, divide the numerator by the denominator.
- To convert a fraction to a decimal, write an equivalent fraction (if possible) whose denominator is 10, 100, or 1000.
- Remember that the numerator is the dividend and the denominator is the divisor.

Converting a Fraction to a Decimal

- **A terminating decimal** is a decimal with a finite number of digits after the decimal point.
- **A repeating decimal** is a decimal in which one digit or a group of digits is repeated without end.

Sample Problem 1: Convert each fraction to a decimal, then determine if its decimal expansion is repeating or terminating.

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

Sample Problem 1: Convert each fraction to a decimal, then determine if its decimal expansion is repeating or terminating.

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

$$\frac{3}{4} = \frac{3 * 25}{4 * 25} = \frac{75}{100} = 0.75$$

$\frac{3}{4} = 0.75$ A terminating decimal

Sample Problem 1: Convert each fraction to a decimal, then determine if its decimal expansion is repeating or terminating.

b. $\frac{3}{11}$

Sample Problem 1: Convert each fraction to a decimal, then determine if its decimal expansion is repeating or terminating.

b. $\frac{3}{11} = 3 \div 11 = 0.2727 \ldots \ldots \ldots$

$$\begin{array}{r} -0 \\ \hline 30 \\ -22 \\ \hline 80 \\ -77 \\ \hline 30 \\ -22 \\ \hline 80 \\ -77 \\ \hline 3 \end{array}$$

$\frac{3}{11} = 0.27272 \ldots \ldots$

$\frac{3}{11} = 0.\overline{27}$

A repeating decimal

Sample Problem 1: Convert each fraction to a decimal, then determine if its decimal expansion is repeating or terminating.

c. $\frac{12}{128}$

Sample Problem 1: Convert each fraction to a decimal, then determine if its decimal expansion is repeating or terminating.

c. $\frac{12}{128} = 12 \div 128 = 0.09375$

$$
\begin{array}{r}
-0 \\
\hline
120 \\
-0 \\
\hline
1,200 \\
-1,152 \\
\hline
480 \\
-384 \\
\hline
960 \\
-896 \\
\hline
640 \\
640
\end{array}
$$

$\frac{12}{128} = 0.09375$

A terminating decimal

Sample Problem 1: Convert each fraction to a decimal, then determine if its decimal expansion is repeating or terminating.

d. $\frac{3}{16}$

Sample Problem 1: Convert each fraction to a decimal, then determine if its decimal expansion is repeating or terminating.

d. $\frac{3}{16} = 3 \div 16 = 0.1875$

$$\begin{array}{r} -0 \\ \hline 30 \\ -16 \\ \hline 140 \\ -128 \\ \hline 120 \\ -112 \\ \hline 80 \\ -80 \\ \hline 0 \end{array}$$

$\frac{3}{16} = 0.1875$

A terminating decimal

Converting a Decimal to a Fraction

A terminating decimal can be written as a fraction simply by writing it as decimal fractions.

Sample Problem 2: Convert each terminating decimal to a fraction.

a. 1.25

Sample Problem 2: Convert each terminating decimal to a fraction.

a. 1.25

$$1.25 = 1\frac{25}{100} = 1\frac{1 * 25}{4 * 25} = 1\frac{1}{4}$$

$$1.25 = 1\frac{1}{4}$$

Sample Problem 2: Convert each terminating decimal to a fraction.

b. 4.5

Sample Problem 2: Convert each terminating decimal to a fraction.

b. 4.5

$$4.5 = 4\frac{5}{10} = 4\frac{5 * 1}{5 * 2} = 4\frac{1}{2}$$

$$4.5 = 4\frac{1}{2}$$

Sample Problem 2: Convert each terminating decimal to a fraction.

c. 0.04

Sample Problem 2: Convert each terminating decimal to a fraction.

c. 0.04

$$0.04 = \frac{4}{100} = \frac{4 * 1}{4 * 25} = \frac{1}{25}$$

$$0.04 = \frac{1}{25}$$

Sample Problem 2: Convert each terminating decimal to a fraction.

d. -5.12

Sample Problem 2: Convert each terminating decimal to a fraction.

d. -5.12

$$-5.12 = -5\frac{12}{100} = -5\frac{4 * 3}{4 * 25} = -5\frac{3}{25}$$

$$-5.12 = -5\frac{3}{25}$$

A repeating decimal can be written as a fraction.

Follow these steps, to change each repeating decimal to a fraction.

- **Step 1:** Let x equal the repeating decimal.
- **Step 2:** Multiply by powers of 1, 10, or 100 to create 2 equations that isolate the repeating part of the decimal.
- **Step 3:** Subtract the equations to remove the repeating part of the decimal.
- **Step 4:** Solve the resulting equation and simplify the fraction.

Sample Problem 3: Convert each repeating decimal to a fraction.

a. $0.666666\ldots\ldots$

Sample Problem 3: Convert each repeating decimal to a fraction.

a. $0.666666\ldots\ldots$

$$10x = 6.66666$$
$$-\ x = 0.66666$$
$$9x = 6$$
$$x = \frac{6}{9} = \frac{2 * 3}{3 * 3}$$
$$x = \frac{2}{3}$$

Sample Problem 3: Convert each repeating decimal to a fraction.

b. $1.252525\ldots\ldots$

Sample Problem 3: Convert each repeating decimal to a fraction.

b. $1.252525\ldots\ldots$

$$100x = 125.2525$$
$$-\ x = \quad 1.2525$$
$$99x = 124$$
$$x = \frac{124}{99}$$

Sample Problem 3: Convert each repeating decimal to a fraction.

c. $0.181818\ldots\ldots$

Sample Problem 3: Convert each repeating decimal to a fraction.

c. $0.181818\ldots$

$$\begin{array}{r} 100x = 18.1818 \\ -\ x = \quad 0.1818 \\ \hline 99x = 18 \end{array}$$

$$x = \frac{18}{99} = \frac{9 * 2}{9 * 11}$$

$$x = \frac{2}{11}$$

Sample Problem 3: Convert each repeating decimal to a fraction.

d. $0.3717171717\ldots\ldots$

Sample Problem 3: Convert each repeating decimal to a fraction.

d. $0.3717171717\ldots\ldots$

$$1{,}000x = 371.7171$$
$$-\ 10x = \quad 3.7171$$
$$990x = 368$$
$$x = \frac{368}{990} = \frac{2 * 184}{2 * 495}$$
$$x = \frac{184}{495}$$