Say It with Decimals

Let's use decimals to describe increases and decreases.

3.1 Notice and Wonder: Fractions to Decimals

A calculator gives the following decimal representations for some unit fractions:

$\frac{1}{2} = 0.5$

$\frac{1}{3} = 0.3333333$

$\frac{1}{4} = 0.25$

$\frac{1}{5} = 0.2$

$\frac{1}{6} = 0.1666667$

$\frac{1}{7} = 0.1428571$

$\frac{1}{8} = 0.125$

$\frac{1}{9} = 0.1111111$

$\frac{1}{10} = 0.1$

$\frac{1}{11} = 0.0909091$

What do you notice? What do you wonder?

3.2 Repeating Decimals

1. Use **long division** to express each fraction as a decimal.

   $\frac{9}{25}$ $\frac{11}{30}$ $\frac{4}{11}$

2. What is similar about your answers to the previous question? What is different?

3. Use the decimal representations to decide which of these fractions has the greatest value. Explain your reasoning.

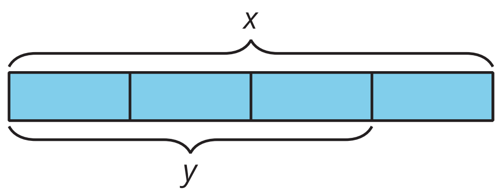
Are you ready for more?

One common approximation for π is $\frac{22}{7}$. Express this fraction as a decimal. How does this approximation compare to 3.14?

3.3 More and Less with Decimals

1. Match each diagram with a description and an equation.

A



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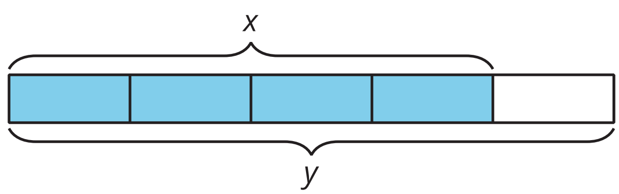

Descriptions:

- an increase by $\frac{1}{4}$
- an increase by $\frac{1}{3}$
- an increase by $\frac{2}{3}$
- a decrease by $\frac{1}{5}$
- a decrease by $\frac{1}{4}$

Equations:

- $y = 1.\overline{6}x$
- $y = 1.\overline{3}x$
- $y = 0.75x$
- $y = 0.4x$
- $y = 1.25x$

2. Draw a diagram for one of the unmatched equations.

3.4 Card Sort: Decimal Relationships

Your teacher will give you a set of cards. Take turns with your partner to match a description with an equation.

1. For each match that you find, explain to your partner how you know it's a match.
2. For each match that your partner finds, listen carefully to their explanation. If you disagree, discuss your thinking, and work to reach an agreement.

Lesson 3 Summary

Long division gives us a way of finding decimal representations for fractions. It finds the quotient one digit at a time, from left to right. For example:

To find a decimal representation for $\frac{9}{8}$, we can divide 9 by 8.

$$
\begin{array}{r}
1.125 \\
8\overline{)9.000} \\
\underline{-8} \\
10 \\
\underline{-8} \\
20 \\
\underline{-16} \\
40 \\
\underline{-40} \\
0
\end{array}
$$

So $\frac{9}{8} = 1.125$.

To find a decimal representation for $\frac{8}{9}$, we can divide 8 by 9.

$$
\begin{array}{r}
0.888 \\
9\overline{)8.000} \\
\underline{-0} \\
80 \\
\underline{-72} \\
80 \\
\underline{-72} \\
80 \\
\underline{-72} \\
8
\end{array}
$$

So $\frac{8}{9} = 0.\overline{8}$. This is a **repeating decimal** because the digits keep going in this same pattern over and over.

Sometimes it is easier to work with the decimal representation of a number, and sometimes it is easier to work with its fraction representation. It is important to be able to work with both. For example, consider the following pair of problems:

- Priya earned x dollars doing chores, and Kiran earned $\frac{6}{5}$ as much as Priya. How much did Kiran earn?
- Priya earned x dollars doing chores, and Kiran earned 1.2 times as much as Priya. How much did Kiran earn?

Since $\frac{6}{5} = 1.2$, these are both exactly the same problem, and the answer is $\frac{6}{5}x$ or $1.2x$. When we work with percentages in later lessons, the decimal representation will come in especially handy.