

SOL 6.2 – Relating Frac, Dec, & Percents

6.2 The student will

- no calculator
- investigate and describe fractions, decimals and percents as ratios;
 - identify a given fraction, decimal or percent from a representation;
 - demonstrate equivalent relationships among fractions, decimals, & percents; and
 - compare and order fractions, decimals, and percents.

Understanding the Standard:

- Percent means “per 100” or how many “out of 100”; percent is another name for hundredths.
- A number followed by a percent symbol (%) is equivalent to that number with a denominator of 100 (e.g., $30\% = \frac{30}{100} = \frac{3}{10} = 0.3$).
- Percents can be expressed as fractions with a denominator of 100 (e.g., $75\% = \frac{75}{100} = \frac{3}{4}$).
- Percents can be expressed as a decimal (e.g. $38\% = \frac{38}{100} = 0.38$)
- Some fractions can be rewritten as equivalent fractions with denominators of powers of 10, and can be represented as decimals or percents (e.g., $\frac{3}{5} = \frac{6}{10} = \frac{60}{100} = 0.60 = 60\%$)
- Decimals, fractions, and percents can be represented using concrete materials (e.g., Base-10 blocks, number lines, decimal squares, or grid paper).
- Percents can be represented by drawing shaded regions on grids or by finding a location on number lines.
- Percents are used in real life for taxes, sales, data description, and data comparison.
- Fractions, decimals and percents are equivalent forms representing a given number.
- The decimal point is a symbol that separates the whole number part from the fractional part of a number.
- The decimal point separates the whole number amount from the part of a number that is less than one.
- The symbol \bullet can be used in Grade 6 in place of “x” to indicate multiplication.
- Strategies using 0, $\frac{1}{2}$ and 1 as benchmarks can be used to compare fractions.
- When comparing two fractions, use $\frac{1}{2}$ as a benchmark. Example: Which is greater, $\frac{4}{7}$ or $\frac{3}{9}$? $\frac{4}{7}$ is greater than $\frac{1}{2}$ because 4, the numerator, represents more than half of 7, the denominator. The denominator tells the number of parts that make the whole. $\frac{3}{9}$ is less than $\frac{1}{2}$ because 3, the numerator, is less than half of 9, the denominator, which tells the number of parts that make the whole. Therefore, $\frac{4}{7} > \frac{3}{9}$.
- When comparing two fractions close to 1, use distance from 1 as your benchmark. Example: Which is greater, $\frac{6}{7}$ or $\frac{8}{9}$? $\frac{6}{7}$ is $\frac{1}{7}$ away from 1 whole. $\frac{8}{9}$ is $\frac{1}{9}$ away from 1 whole. Since $\frac{1}{7} > \frac{1}{9}$, then $\frac{6}{7}$ is a greater distance away from 1 whole than $\frac{8}{9}$ so $\frac{8}{9} > \frac{6}{7}$.
- Students should have experience with fractions such as $\frac{1}{8}$, whose decimal representation is a terminating decimal (e. g., $\frac{1}{8} = 0.125$) and with fractions such as $\frac{2}{9}$, whose decimal representation does not end but continues to repeat (e. g., $\frac{2}{9} = 0.222\dots$)
- The repeating decimal can be written with ellipses (three dots) as in $0.222\dots$ or denoted with a bar above the digits that repeat as in $0.\overline{2}$.

SOL 6.2 – Fractions

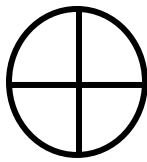
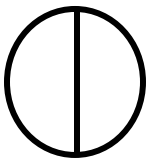
The Meaning of Fractions:

- A fraction names part of a whole

Ex. $\frac{\text{Numerator}}{\text{Denominator}} = \frac{\text{Part}}{\text{Whole}}$

Equivalences:

- All fractions have other fractions that are equal to them.
- Refer to your color coded number lines. = in your notebook p16
- You can find equivalent fractions by:
 - looking at the size of the fraction
 - multiplying by a number
 - or dividing by a number (GCF) = p 33



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

$$\frac{8}{10} \div \frac{2}{2} = \frac{4}{5}$$

simplest form

0, 1/2, and 1 as Benchmarks:

- This is a form of estimating fractions.
- Seeing if a fraction is closest to 0, 1/2, or 1
 - It is close to **0**, if the **numerator is close to 0**. ($\frac{0}{7}$)
 - It is close to **1**, if the **numerator is close to the denominator**. ($\frac{3}{3}$)
 - It is close to $\frac{1}{2}$, if the **numerator is close to half of the denominator**. Remember that odd denominators will have a numerator of .5 ($\frac{5}{10}$) or ($\frac{4.5}{9}$)

Inequalities:

- < Less than
- ≤ Less than or equal to
- > Greater than
- ≥ Greater than or equal to

in calculator $\frac{3}{8}$

$$3 \div 8 = .375$$

Comparing and Ordering Fractions:

- Use the benchmarks (0, $\frac{1}{2}$, and 1)
- If the **denominators are the same** order the numerators.
($\frac{1}{8}, \frac{2}{8}, \frac{3}{8}, \frac{4}{8}, \frac{5}{8}, \frac{6}{8}, \frac{7}{8}, \frac{8}{8}$)
- If the **numerators are the same** the smaller the denominator the larger the part. ($\frac{1}{12}, \frac{1}{10}, \frac{1}{9}, \frac{1}{8}, \frac{1}{6}, \frac{1}{5}, \frac{1}{4}, \frac{1}{2}$)
- If both the numerators and denominators are different, try the benchmarks first, or change the fractions to decimals by dividing and then compare or order them as decimals.
- **ascending** - goes up or gets bigger
- **Descending** - goes down or gets smaller

Comparing and Ordering Decimals:

- Two methods – use what works best for you
 1. Line up the decimals and compare and order each place value, starting on the left and working to the right.
 2. Make sure the decimals have the same number of decimal places by adding zeros or the repeating number, then read and compare them as whole numbers.
- ascending - goes up or gets bigger
- **D**escending - goes down or gets smaller

Practice/Examples:

List the following numbers in ascending order: 0.64, 0.675, $0.\overline{6}$

Method #1	Method #2
<p>0.6 4 0.6 7 5 0.6 6</p>	<p>0.6 4 0 \longrightarrow 640 0.6 7 5 \longrightarrow 675 $0.\overline{6}$ 6 6 \longrightarrow 666</p>
<ul style="list-style-type: none">• Ones places are the same.• Tenths places are the same.• Hundredths places are different, thus order from least to greatest.	

ANSWER: 0.64, $0.\overline{6}$, 0.675

SOL 6.2 – Percents

The Meaning of Percents:

Per Means Divide by	Cent Means 100	Percent Means Divide by 100
Seven Divided by 100	$\frac{7}{100}$	Seven Per Cent 7%

Changing Decimals to Percents:

1. The decimal need to be written to the hundredths place, that number is the percent
2. **SHORTCUT:** move the decimal two places to the right

Method #1

$$0.62 = \frac{62}{100} = 62\%$$

$$0.07 = \frac{7}{100} = 7\%$$

$$0.70 = \frac{70}{100} = 70\%$$

Method #2

$$0.125 = 12.5\%$$

$$0.375 = 37.5\%$$

$$0.625 = 62.5\%$$

Changing Repeating Decimals to Percents:

- Move the decimal two places to the right, and add on the repeating number as needed.

$$\frac{1}{3} = 0.\bar{3}3 = 33\%$$

$$= 3\bar{3}\%$$

$$= 33.\bar{3}\%$$

$$= 33\frac{1}{3}\%$$

$$\frac{2}{3} = 0.\bar{6}6 = 67\%$$

$$= 6\bar{6}\%$$

$$= 66.\bar{6}\%$$

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

Changing Fractions to Percents:

1. If the denominator is 100 then the numerator is the percent.
2. If the denominator is a factor of 100, multiply the whole fraction to make a denominator of 100, then the numerator is the percent.
3. If the fraction does not have a denominator that is a factor of 100, divide and then change to a percent.

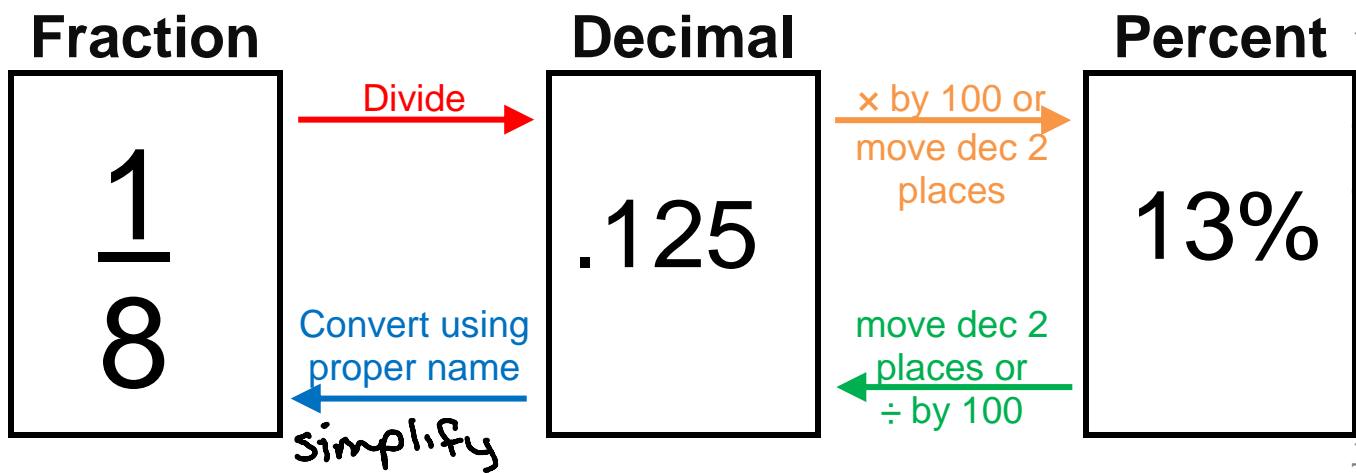
Method #1	Method #2	Method #3
$\frac{85}{100} = 85\%$	$\frac{3 \times 10}{10 \times 10} = \frac{30}{100} = 30\%$	$\frac{3}{6} = 0.50 = 50\%$
$\frac{23}{100} = 23\%$	$\frac{4 \times 4}{25 \times 4} = \frac{16}{100} = 16\%$	$\frac{4}{9} = 0.4\bar{4} = 44\%$

Inequalities:

- < Less than
- ≤ Less than or equal to
- > Greater than
- ≥ Greater than or equal to

Comparing and Ordering:

- ascending - goes up or gets bigger
- Descending - goes down or gets smaller



$$\frac{125 \div 125}{1000 \div 125} = \frac{1}{8}$$

Vocabulary:

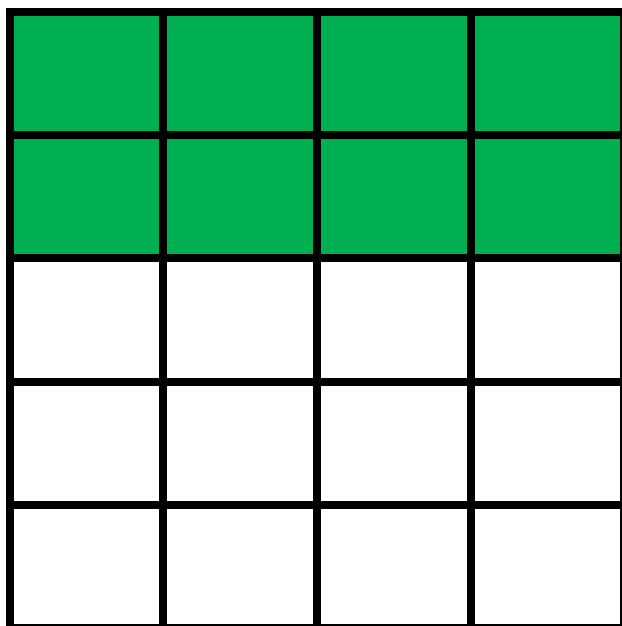
Percent

Divide by hundred

$$56\% = \frac{56}{100} = \frac{14}{25} = 0.56$$

$$\frac{8}{20} \div 4 = \frac{2}{5}$$

Equivalent Relationships



Fraction: $\frac{2}{5}$

Decimal: 0.40

Percent: 40%

Essential Understandings:

What is the relationship among fractions, decimals and percents?

Fractions, decimals + Percents are 3 different ways to express the same #.

Any # that can be written as a fraction can be expressed as a terminating or repeating decimal or a %

Essential Knowledge & Skills:

The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to:

- Order no more than 3 fractions, decimals, and percents (decimals through thousandths, fractions with denominators of 12 or less), in ascending or descending order.
- Identify the decimal and percent equivalents for numbers written in fraction form including repeating decimals.
- Represent fractions, decimals, and percents on a number line.
- Describe orally and in writing the equivalent relationships among decimals, percents, and fractions that have denominators that are factors of 100.
- Represent, by shading a grid, a fraction, decimal, and percent.
- Represent in fraction, decimal, and percent form a given shaded region of a grid.
- Compare two decimals through thousandths using manipulatives, pictorial representations, number lines, & symbols ($<$, \leq , \geq , $>$, $=$)
- Compare two fractions with denominators of 12 or less using manipulatives, pictorial representations, number lines, & symbols ($<$, \leq , \geq , $>$, $=$)
- Compare two percents using pictorial representations and symbols ($<$, \leq , \geq , $>$, $=$).

Practice:

1. Which ratio is equivalent to 4.2?

a. $\frac{21}{5}$

~~b. $\frac{17}{4}$~~

$\frac{42}{10} = \frac{42}{10} = \frac{21}{5}$

~~c. $\frac{42}{100}$~~

~~d. $\frac{21}{42}$~~

2. What ratio is equivalent to 0.3%?

$\frac{3}{1000}$

$30\% = \frac{30}{100}$ | $3\% = \frac{3}{100}$ | $0.3\% = \frac{3}{1000}$

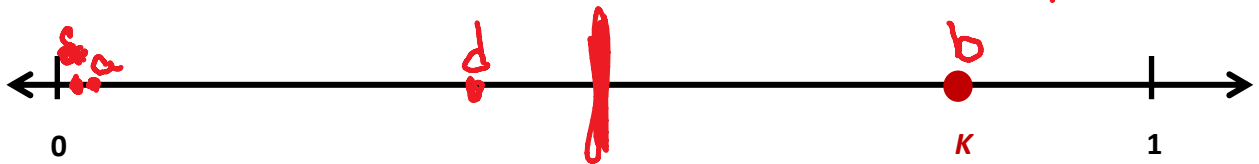
3. Which number could represent point K?

~~a. 0.08~~

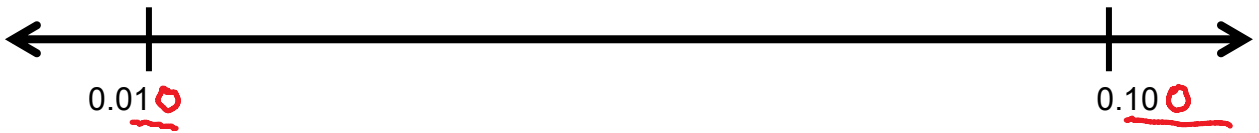
b. $\frac{8}{10}$

~~c. 0.8%~~

~~d. $\frac{3}{8}$~~



4. Select all of the given numbers that lie between 0.01 and 0.10 on the number line.



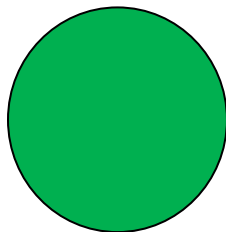
0.015
~~0.004~~

~~0.31~~
~~0.50~~

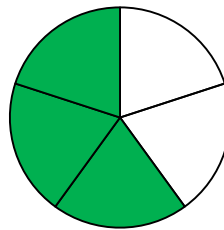
0.023
0.049

~~0.002~~
~~0.205~~

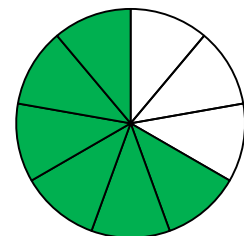
5. This model is shaded to represent one whole.



Write a fraction, decimal, and percent to represent the shaded part of each model.



$\frac{3}{5} = 0.6 = 60\%$



$\frac{6}{9} = 0.\overline{666} = 67\%$

6. Identify each statement that is true.

~~$\frac{5}{20} = 0.25\%$~~

~~$0.25\% = 2.5$~~

~~$2.5 = 250\%$~~

$\frac{1}{4} = 25\%$

$2.5 = \frac{5}{2}$

$25\% = 0.25$

$\frac{25}{10} = \frac{5}{2}$

Released SOL questions:

No calculator for numbers 7 through 9.

7. Which of these numbers is between $\frac{1}{3}$ and $\frac{87}{100}$ on a number line?

$\frac{1}{3}, \quad \frac{87}{100}$

A $\frac{3}{5} = .60$

$.33 \quad \text{---} \quad .87$

B $\frac{3}{10} = .30$

~~**C** $\frac{92}{10} = 9.2$~~

D $\frac{11}{100} = .11$

8. Which statement is true?

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

B $20\% = \frac{1}{20} = \frac{1}{5}$

C $0.3\% = 0.03 = 3\%$

D $8.6 = 0.086\% = 860\%$

Directions: Click and drag each selected number to the correct box.

9. List the numbers in order from least to greatest.

0.63%	0.6	$\frac{2}{3}$
Least \longrightarrow Greatest		

Numbers

$\frac{2}{3}$	$= 0.\overline{66}$
0.63%	$= 0.0063$
0.6	$= 0.60$

10. Which ratio correctly represents 0.1% ?

A $\frac{1}{1}$

B $\frac{1}{10}$

C $\frac{1}{100}$

D $\frac{1}{1,000}$

$.001 = \frac{1}{1000}$

$.3\%$

3%