Name: _____ Date: _____

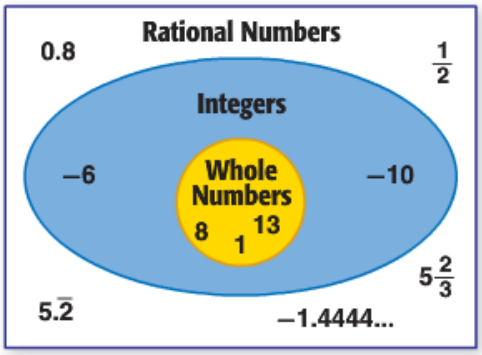
Comparing and Ordering Rational Numbers

Rational Numbers

Words Rational numbers can be written as fractions.

Algebra $\frac{a}{b}$, where a and b are integers and $b \neq 0$.

Model



Repeating Decimals
When dividing, it is sometimes helpful to divide until the repeated pattern is shown at least three times.

Fractions, terminating and repeating decimals, percents, and integers are all rational numbers. Every rational number can be expressed as a decimal by dividing the numerator by the denominator.

Rational Number	Repeating Decimal	Terminating Decimal
$\frac{3}{10}$	0.300...	0.3
$\frac{4}{5}$	0.800...	0.8
$\frac{5}{6}$	0.833...	does not terminate

To indicate the number pattern that repeats indefinitely, use bar notation. Bar notation is a bar placed over the digits that repeat.

$0.545454\ldots = 0.\overline{54}$ $0.583333\ldots = 0.58\overline{3}$

Example

1. **Write $\frac{5}{12}$ as a decimal.**

$$\begin{array}{r} 0.4166 \\ 12\overline{)5.000} \\ -\,48 \\ \hline 20 \\ -\,12 \\ \hline 80 \\ -\,72 \\ \hline 80 \\ -\,72 \\ \hline 8 \end{array}$$

Divide 5 by 12.

$\frac{n}{d} = d\overline{)n}$

The remainder will never be zero.

So, $\frac{5}{12} = 0.4166\ldots$ or $0.41\overline{6}$.

How do you think you would convert negative fractions into decimals?

Write each fraction as a decimal. Use bar notation if necessary.

d. $-\frac{1}{4} = -0.25$

$$\begin{array}{r} .25 \\ 4\overline{)1.00} \\ -\,8 \\ \hline 20 \\ -20 \\ \hline 0 \end{array}$$

e. $-\frac{5}{6} = -0.8\overline{3}$

$$\begin{array}{r} .833 \\ 6\overline{)5.000} \\ -48 \\ \hline 20 \\ -18 \\ \hline 20 \\ -18 \\ \hline 2 \end{array}$$

f. $-2\frac{1}{6} = -\frac{13}{6} = -2.1\overline{6}$

$$\begin{array}{r} 2.166 \\ 6\overline{)13.000} \\ -12 \\ \hline 10 \\ -6 \\ \hline 40 \\ -36 \\ \hline 40 \\ -36 \\ \hline 4 \end{array}$$

$6\overline{)1}$

Positive and negative rational numbers can be represented on a number line. You can use a number line to help you compare and order rational numbers.

Examples

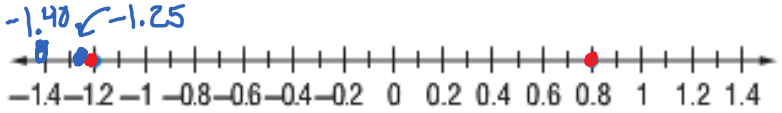
Tutor

Fill in each ◯ with <, >, or = to make a true statement.

(-) < (+)

1. $-1.2 \bigcirc 0.8$

Graph the decimals on a number line.



Since −1.2 is to the left of 0.8, $-1.2 < 0.8$.

2. $-1.40 \bigcirc -1.25$

1.40 > 1.25

−1.4 is more to the left, so it's less than −1.25!

3. $-\frac{3}{8} \bigcirc -\frac{5}{16}$

$\frac{3 \times 2}{8 \times 2} = \frac{6}{16}$

$-\frac{6}{16} < -\frac{5}{16}$

To compare and order rational numbers, first write them in the same form.

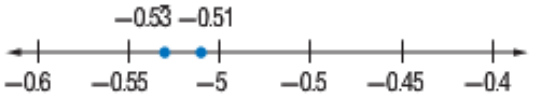
Examples

Fill in each ◯ with <, >, or = to make a true statement.

4. $-0.51 \bigcirc -\frac{8}{15}$

15⟌8

Rename $-\frac{8}{15}$ as a decimal. Then graph both decimals on a number line.



$-\frac{8}{15} = -0.5\overline{3}$

-0.5333...
-0.5100

Since −0.51 is to the right of $-0.5\overline{3}$ on the number line, $-0.51 > -\frac{8}{15}$.

-2.88 -2.10

5. Order the set $\left\{-2.46, -2\frac{22}{25}, -2\frac{1}{10}\right\}$ from least to greatest.

$-2\frac{22}{25}, -2.46, -2\frac{1}{10}$

$-2\frac{22\times4}{25\times4} = -2\frac{88}{100} = -2.88$

$-2\frac{1}{10} = -2.10$

(e) $-3\frac{5}{8} = \frac{-29}{8}$

$8\overline{)29} = -3.625$

Got It? Do these problems to find out.

Fill in each ◯ with <, >, or = to make a true statement.

e. $-3\frac{5}{8}$ (=) -3.625 f. $\frac{3}{7}$ (>) 0.413

-3.625

g. Order the set $\left\{-7\frac{13}{20}, -7.78, -7\frac{17}{100}\right\}$ from greatest to least.

(f) $7\overline{)3.00}$ = .42

28

20

14

6

$-7\frac{13}{20}\times5 = \frac{65}{100}$ $-7\frac{17}{100}$

$-7\frac{17}{100}, -7\frac{13}{20}, -7.78$

$\begin{array}{r} {}^{1}13 \\ \times\ 5 \\ \hline 65 \end{array}$ $-7.65, -7.78, -7.17$

Example

6. **Mr. Plum's science class is growing plants under different conditions. The table shows the difference from the average for some students' plants. Order the differences from least to greatest.**

Student	Difference (in.)
Ricky	$3\frac{1}{4}$
Debbie	-2.2
Suni	1.7
Leonora	$-1\frac{7}{10}$

Express each number as a decimal.

$-2.2, -1\frac{7}{10}, 1.7, 3\frac{1}{4}$

Fill in each ◯ with <, >, or = to make a true statement. (Examples 1–4)

1. $9.7 \; > \; -10.3$

2. $\frac{5}{8} \; > \; -\frac{3}{8}$

3. $-6.7 \; = \; -6\frac{7}{10}$

4. $-\frac{5}{6} \; > \; -0.94$

Work.

1. $\frac{5}{4} \; > \; -\frac{1}{4}$

2. $-6\frac{1}{3} \; > \; -6.375$

3. $-\frac{3}{5} \; = \; -0.6$

4. $-9\frac{2}{7} \; ? \; -9.3$

Show your work.

Order the following sets of numbers from least to greatest. (Example 5)

5. $\left\{-3\frac{1}{3}, 3.3, -3\frac{3}{4}, 3.5\right\}$ $-3\frac{3}{4}, -3\frac{1}{3}, 3.3, 3.5$

$-3\frac{1}{3}\overset{\times 4}{>}-3\frac{3}{4}\overset{\times 3}{\rightarrow}-3\frac{4}{12}>-3\frac{9}{12}$

$3.3 < 3.5$

6. $\left\{2.\overline{1}, -2.1, 2\frac{1}{11}, -2\right\}$ $-2.1, -2, 2\frac{1}{11}, 2.\overline{1}$

$-2.1 < -2.0$

$2.\overline{1}$ $2\frac{1}{11}$

$2.111111\ldots$ $2.\overline{09}$

$11\overline{)1.0000}$ $.0909$, -99, 100

5. $\left\{2.8, -2\frac{3}{4}, 3\frac{1}{8}, -2.\overline{2}\right\}$

$-2\frac{3}{4}, -2.\overline{2}, 2.8, 3\frac{1}{8}$

6. $\left\{\frac{2}{3}, -0.6, 0.65, \frac{4}{5}\right\}$

$-0.6, 0.65, \frac{2}{3}, \frac{4}{5}$

7. **Financial Literacy** The change in four stocks during a day are: $-4\frac{1}{2}$, 5.6, $-2\frac{3}{8}$, and 1.35.

Order the changes from least to greatest. (Example 6)

$-4\frac{1}{2}, -2\frac{3}{8}, 1.35, 5.6$

13. CCSS **Persevere with Problems** Order the fractions $-\frac{1}{2}, \frac{5}{2}, -\frac{12}{4}, \frac{1}{6}$, and $\frac{7}{8}$ from least to greatest.

$-\frac{12}{4}, -\frac{1}{2}, \frac{1}{6}, \frac{7}{8}, \frac{5}{2}$