Comparing and Ordering Rational Numbers

What You'll Learn

To compare and order rational numbers

Why Learn This?

You can compare measurements, such as weights or lengths, in different forms when you want to determine the greatest or least amount. Negative rational numbers can represent quantities like debt, temperature below zero, and distance below sea level.

You have plotted positive and negative rational numbers on a number line. A number line can also help you compare and order rational numbers.

EXAMPLE Comparing Decimals

Compare -12.4 and -12.65.

Plot both negative decimals on the same number line. Divide the number line into tenths. Locate -12.65 halfway between -12.6 and -12.7.
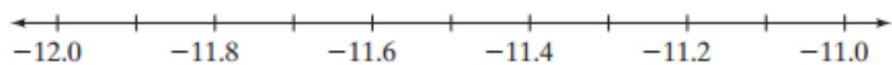

Compare the locations of the points. Since -12.65 is to the left of -12.4 on the number line, -12.65 is less than -12.4.

$-12.65 < -12.4$ or $-12.4 > -12.65$

Examples

❶ Comparing Decimals Compare -11.6 and -11.75.

Plot both negative decimals on the same number line. Divide the number line into tenths. Locate -11.75 halfway between -11.8 and [＿＿＿].
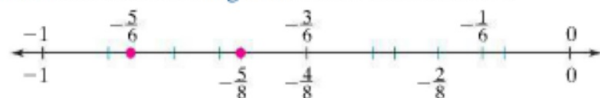

$$-12.0 \quad -11.8 \quad -11.6 \quad -11.4 \quad -11.2 \quad -11.0$$

Compare the locations of the points. Since [＿＿＿] is to the left of -11.6 on the number line, [＿＿＿] is less than [＿＿＿].

-11.6 [＿＿＿] -11.75

EXAMPLE **Comparing Fractions**

❷ Compare $-\frac{5}{6}$ and $-\frac{5}{8}$.

Because the denominators are 6 and 8, divide your number line into sixths and also into eighths. Plot both fractions.
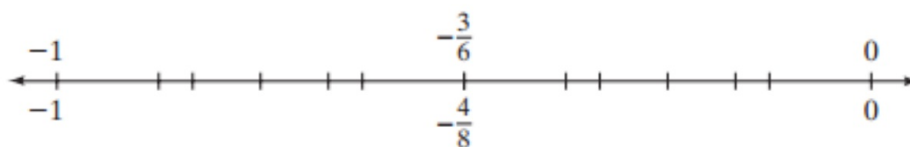

Compare the locations of the points. Since $-\frac{5}{6}$ is to the left of $-\frac{5}{8}$ on the number line, $-\frac{5}{6}$ is less than $-\frac{5}{8}$.

$-\frac{5}{6} < -\frac{5}{8}$ or $-\frac{5}{8} > -\frac{5}{6}$

❷ Comparing Fractions Compare $-\frac{1}{6}$ and $-\frac{3}{8}$.

Because your denominators are 6 and ☐ , divide your number line

into sixths and also into ☐ . Plot both fractions.

$$-1 \qquad\qquad -\frac{3}{6} \qquad\qquad 0$$

$$-1 \qquad\qquad -\frac{4}{8} \qquad\qquad 0$$

Compare the locations of the points. Since $-\frac{1}{6}$ is to the right of $-\frac{3}{8}$ on

the number line, $-\frac{1}{6}$ is ☐ than $-\frac{3}{8}$.

$$-\frac{3}{8} \,\boxed{}\, -\frac{1}{6}$$

Quick Check

Compare using $<$, $=$, or $>$.

1. a. $-12.05\,\boxed{}\,-12.5$ b. $-12.98\,\boxed{}\,-12.89$

2. a. $-\frac{5}{8}\,\boxed{}\,-\frac{1}{2}$ b. $-4\frac{7}{12}\,\boxed{}\,-4\frac{2}{3}$

3 **Elevation** Two cities are below sea level. City A has an elevation of $-1\frac{2}{3}$ feet. City B has an elevation of -1.8 feet. Which city has a lower elevation?

Locate each elevation on the same number line. The denominator is 3 and the decimal is to the tenths place. Mark off thirds and tenths to plot the numbers.
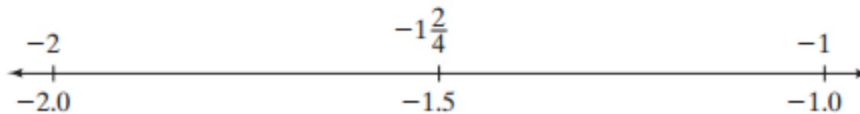

Then compare the locations of the points.

$$-1.8 < -1\frac{2}{3}$$

City B has a lower elevation than City A.

Examples

3 **Comparing Decimals and Fractions** Two cities are below sea level. City A has an elevation of $-1\frac{3}{4}$ feet. City B has an elevation of -1.9 feet. Which city has a lower elevation?

Locate each elevation on the same number line. The denominator is 4 and the decimal is to the tenths place. Mark off ⬚ and ⬚ to plot the numbers.

Then compare the locations of the points. $-1.9 \boxed{} -1\frac{3}{4}$

City B has a ⬚ elevation than City A.

You can order rational numbers by plotting all the numbers on the same number line and comparing the locations of the points.

EXAMPLE **Ordering Rational Numbers**

❹ Temperatures On Monday, the temperature was $-0.2°C$. On Tuesday, the temperature was $-1\frac{1}{2}°C$. It was $-1°C$ on Wednesday, $2.4°C$ on Thursday, and $1\frac{3}{4}°C$ on Friday. Write the temperatures in order from least to greatest.

STEP 1: Draw a number line from -2 to 3 and divide it into halves. Plot each temperature on a number line. Locate numbers on or in between the labels.
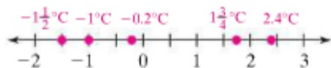
STEP 2: Compare the locations of the points. The least number is on the left.

The temperatures from least to greatest are:

$-1\frac{1}{2}°C, -1°C, -0.2°C, 1\frac{3}{4}°C, 2.4°C.$

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❹ Ordering Rational Numbers On Monday, the temperature was $-0.4°C$. On Tuesday, the temperature was $-1\frac{1}{4}°C$. It was $-2°C$ on Wednesday, $2.5°C$ on Thursday, and $1\frac{1}{2}°C$ on Friday. Write the temperatures in order from least to greatest.

Step 1: Draw a number line from -2 to 3 and divide it into halves. Plot each temperature on a number line. Locate numbers on or in between the labels.

Step 2: Compare the locations of the points. The least number is on the left.

The temperatures from least to greatest are: _____

Quick Check

3. Solve each problem.

a. City C has an elevation of -1.24 feet. City D has an elevation of $-1\frac{3}{10}$ feet. Which city has a higher elevation?

b. City E has an elevation of -6.8 feet. City F has an elevation of $-6\frac{4}{5}$ feet. Which city has a higher elevation?

4. Order the temperatures from least to greatest. $-6.45°C, -6\frac{3}{4}°C, 6.2°C, -6.3°C, -6\frac{1}{2}°C$

Practice 6-4

Compare the decimals using $<$, $=$, or $>$.

1. -7.14 ☐ -6.19

2. -0.65 ☐ -0.6

3. -3.8 ☐ -4.6

4. -12.08 ☐ -12.8

Compare the fractions using $<$, $=$, or $>$.

5. $-\frac{2}{3}$ ☐ $-\frac{3}{5}$

6. $-\frac{2}{5}$ ☐ $-\frac{7}{8}$

7. $-4\frac{3}{8}$ ☐ $-4\frac{6}{7}$

8. $-1\frac{1}{5}$ ☐ $-1\frac{5}{8}$

Compare the fractions and decimals using $<$, $=$, or $>$.

9. $-\frac{4}{5}$ ☐ -0.6

10. -3.9 ☐ $-3\frac{4}{5}$

11. $-\frac{1}{2}$ ☐ -0.5

12. -1.2 ☐ $-1\frac{1}{10}$

13. The city measures the water level in a lake and considers the average depth of the lake to be 0 feet. After Week 1, the water level was -3.1 feet. In Week 2, the water level was $-3\frac{2}{3}$ feet. Compare the numbers. In which week was the water lower?

_____

Order each set of rational numbers from least to greatest.

14. -4.5, $-4\frac{6}{10}$, -4.06 _____

15. $\frac{25}{5}$, -5.2, $-5\frac{5}{20}$ _____

16. Nicholas researched the elevations of various places around Long Beach, California. He found these elevations.

-5.28 ft, $-5\frac{3}{8}$ ft, -5.6 ft, -7ft, 6.4 ft, $-5\frac{3}{4}$ ft

Order the elevations from least to greatest.

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