

Compare and Order Rational Numbers



Getting the Idea

All rational numbers can be located on a number line. A number line will help you compare and order rational numbers.

To compare numbers, you can use the symbols $>$ (**is greater than**), $<$ (**is less than**), or $=$ (**is equal to**). The expression $p > q$ (*p is greater than q*) means that p is located to the right of q on a number line. The expression $p < q$ (*p is less than q*) means that p is located to the left of q on a number line.

Example 1

Walter and four friends decided to compare the balances in their bank accounts. The table below shows each person's balance.

Bank Balances

Person	Account Balance
Walter	\$35
Ellen	-\$10
Christine	-\$5
Randy	\$40
Peter	-\$20

Order the account balances from greatest to least.

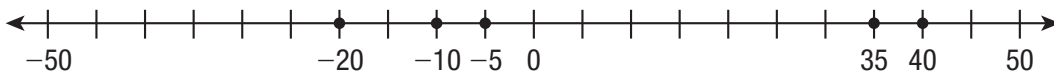
Strategy Use a number line.

Step 1 Write each account balance as an integer.

35, -10, -5, 40, -20

Step 2 Plot each integer on a number line.

The negative integers will be to the left of 0. The positive integers will be to the right of 0.



Step 3

Order the integers from greatest to least.

List the integers as they appear on the number line, going from right to left.

40, 35, -5 , -10 , and -20

Solution From greatest to least, the account balances are \$40, \$35, $-\$5$, $-\$10$, and $-\$20$.

In Example 1 you found that -20 is to the left of -5 on a number line, or $-20 < -5$. Now remember that $|-20| = 20$ and $|-5| = 5$. In other words, $|-20|$ is to the right of $|-5|$ on a number line, or $20 > 5$. So in Example 1, Peter's account balance is less than Christine's balance, but his debt is greater than Christine's debt.

To compare and order fractions, you will need fractions with common denominators. One way to find a common denominator is to multiply the denominators of the fractions.

To compare mixed numbers, first look at the whole-number parts. If the whole-number parts are equal, then compare the fraction parts.

Example 2

Which symbol makes this sentence true? Use $>$, $<$, or $=$.

$$2\frac{3}{4} \bigcirc 2\frac{2}{3}$$

Strategy Compare the whole-number parts. If necessary, use a common denominator to compare the fraction parts.

Step 1

Compare the whole-number parts.

$$2 = 2$$

Step 2

Find a common denominator for the fraction parts.

Multiply the denominators to find a common denominator.

$$4 \times 3 = 12$$

Step 3

Write the fraction parts as equivalent fractions with a common denominator.

$$\frac{3}{4} = \frac{3 \times 3}{4 \times 3} = \frac{9}{12}$$

$$\frac{2}{3} = \frac{2 \times 4}{3 \times 4} = \frac{8}{12}$$

Step 4

Compare the fractions.

$$\frac{9}{12} > \frac{8}{12}$$

Solution $2\frac{3}{4} > 2\frac{2}{3}$

When comparing decimals, align the digits on the decimal point, then compare from left to right. The number of decimal places does not affect whether a decimal is greater than or less than another decimal.

Example 3

Kelly owns two Portuguese water dogs. One dog weighs 23.592 kilograms, and the other weighs 23.64 kilograms. Write an expression to compare the dogs' weights. Use $>$, $<$, or $=$.

$$23.592 \bigcirc 23.64$$

Strategy Align the numbers on the decimal point. Compare from left to right.

23.592

23.64

Step 1 Compare the tens place.

$2 = 2$, so compare the next greatest place: the ones.

Step 2 Compare the ones place.

$3 = 3$, so compare the next greatest place: the tenths.

Step 3 Compare the tenths.

$5 < 6$

Solution **23.592** $<$ **23.64**

Example 4

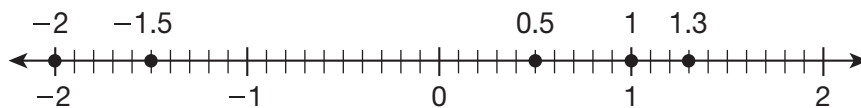
Last winter, Cedric recorded the low temperature, in degrees Fahrenheit, at his farm over 5 days. His data is shown below.

0.5, 1.3, -2 , 1, -1.5

Order the temperatures from lowest to highest.

Strategy Use a number line.

Step 1 Plot the numbers on a number line divided into tenths.



Step 2 List the numbers as they appear from left to right on the number line.

-2 , -1.5 , 0.5, 1, 1.3

This can be written as: $-2 < -1.5 < 0.5 < 1 < 1.3$

Solution From lowest to highest, the temperatures, in degrees Fahrenheit, are -2 , -1.5 , 0.5, 1, 1.3



Coached Example

Order the following numbers from greatest to least:

$$-3, 2.6, 3, 2\frac{3}{10}, -3\frac{1}{4}$$

Separate the positive numbers from the negative numbers.

The positive numbers are _____, _____, and _____.

Rename 2.6 as a mixed number with a denominator of 10.

$$2.6 = \underline{\hspace{2cm}}$$

The greatest positive number is _____.

Compare the remaining two positive numbers. _____ > _____

From greatest to least, the positive numbers are _____, _____, and _____.

The negative numbers are _____ and _____.

Which negative number is greater? _____

From greatest to least, the numbers are _____, _____, _____, _____, and _____.