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Graphing Rational Numbers on a Number Line

Number lines have many uses both in mathematics and everyday life. This lesson will teach you how to graph numbers on a number line and give real-world examples of how to use number lines.

How Old Am I?

I was watching a game show the other day where contestants were given six pictures of a famous actor depicting him at various times during his career. They were then asked to put the pictures in chronological order. It turned out to be more difficult than it first appeared, with only one contestant getting it right.

This is just one kind of silly example of where you can find number lines in real life. In actuality, number lines are everywhere. Thermometers, fuel gauges, historical timelines, your Facebook timeline - all of these are examples of number lines.

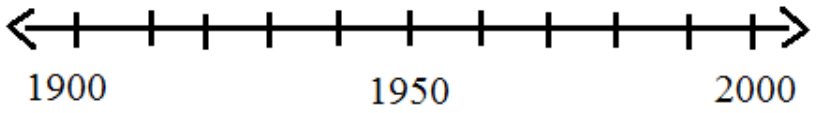
How to Draw a Number Line

The formal definition of a **number line** is 'a picture of a straight line on which every point corresponds to a real number.' For this lesson, we will only be graphing **rational numbers**. A rational number is any number that can be made by dividing one integer by another. The word 'rational' comes from the word '**ratio**,' which depicts the relationship between two different numbers. An **integer** is a number that is not a fraction or decimal.

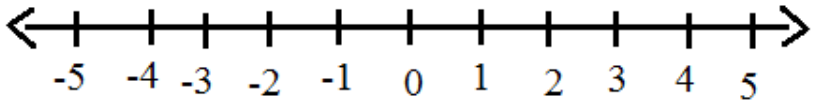
So rational numbers are numbers like 1/2, 2.3, -6. or -3.4. Numbers such as pi (3.14159...) are not rational numbers because they cannot be written as the ratio of two numbers.

All number lines start with the same basic premise - a straight line with hash marks depicting a certain scale. The set of numbers that make up the scale is where each number line becomes unique. The scale does not have to start with any particular number, end with any particular number or even include any particular number. Here is an example of a basic number line:

This line is great for plotting small numbers, but it would be useless for plotting temperatures - even in someplace cold, like Alaska! If you extended the line to reach from even 80 degrees to 32 degrees, it would be extremely long. It would also not work for plotting a timeline of the major events to occur in the 20th century. Extending it to include the year 2000 would take up way too much space and time. A better number line for that graph might look like this:



How to Graph Rational Numbers on a Number Line



So now that you know what a number line is, let's use one to graph some numbers. The way you graph numbers on a number line is to place a solid dot on the line at that number. For example, graph -1 on a number line.

You can also graph multiple numbers on the same line. For this example, graph -4, 0, 2 and 5.

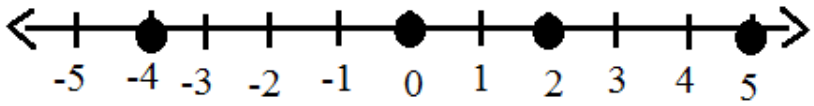
What if you want to graph a number that is not represented on the number line, like 3.5? You can always draw your dot in between two of the hash marks, estimating to put it as closely as you can to where it needs to be.

If you are asked to plot numbers on a number line but are not given a line, you can always draw your own. It is just a straight line with hash marks and numbers depicting the scale. You can start and end with any number that you would like; although it's best to have enough numbers to give a good representation. If you were asked to graph 13 on a number line, you shouldn't make your line consist of the numbers 12, 13 and 14 only but

maybe go from 10-16. Also, if you were told to graph today's temperature on a number line, it's probably best not to start with -50 unless you live someplace really cold!

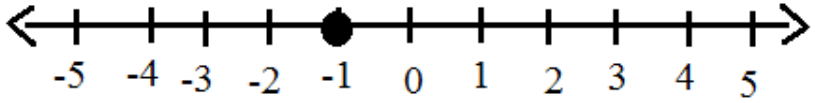
The scale for the number line is also up to you. You can go by 1s, 2s, 5s, even 100s - just make sure it fits what you're trying to graph. Let's try this example: A box turtle hibernates in sand at 1 5/8 feet below the surface. A spotted turtle hibernates at 1 16/25 feet below the surface. Graph each on a number line to see which turtle sleeps deeper.

The first step is that we need to convert both numbers to decimals to make them easier to graph.



- 1 5/8 is the same as 1.625
- 1 16/25 is the same as 1.64

Now we can draw a number line to graph our points. Since they are decimals, I would probably draw a number line from 1.60 to 1.70, placing a hash every 0.01 points - something like this:



Then graph the two points of the number line.

As you can see from this line, the spotted turtle sleeps further from the surface than the other.

Lesson Summary

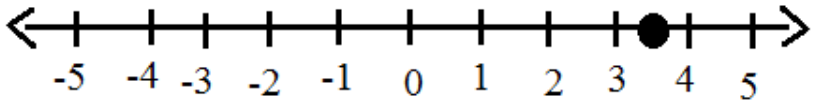
Rational numbers are numbers that can be written as a ratio between two integers. You can graph rational numbers on a number line by drawing a line with the appropriate scale and then placing a dot at the correct position on the number line. If

there is not a hash mark at the number you need to graph, you can place the dot between the hash marks at the appropriate place.

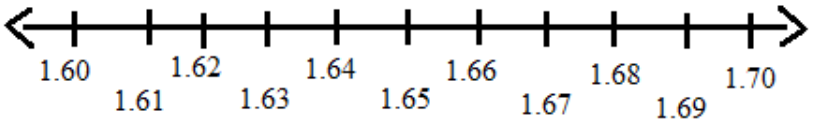
Learning Outcomes

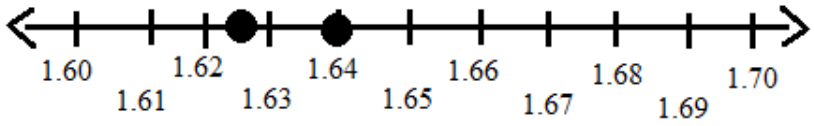
When this lesson has been successfully completed, you could achieve these objectives:

- Recall the definitions of rational numbers and integers
- Identify a number line and use it to graph rational numbers



- Understand the rules for graphing numbers not represented on a number line
- Draw a number line appropriate for a given data set

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