

The **Number Line: Distance** simulation encourages students to explore subtraction in multiple contexts, discover patterns, and generalize how to interpret subtraction as distance.

Explore Screen

In the Explore screen, students can investigate subtraction using two objects and discover that when they are subtracted, the distance between them is also calculated.

SWITCH
between absolute value and simple difference

Location A is 35 degrees colder than location B.

Absolute Value
 Directed Distance

$$|-15 - 20| = 35$$

The difference in temperature is 35 degrees.

35

x_2 x_1

INTERPRET the variables;
SWITCH their locations

$x_1 = B$
 $x_2 = A$

Number Line: Distance

Point Labels
 Distance Labels
 Distance Description
 Tick Marks

HIDE information if needed

INTERPRET
distance statement as subtraction

EXPLORE
distance in different contexts

PHET

Generic Screen

The Generic screen provides the flexibility to think about subtraction in any context, or with no context, and generalize the concept of subtraction as distance between two integers on a number line.

INTERPRET
subtraction statement as distance

Absolute Value
 Directed Distance

$$25 - (-10) = 35$$

y_2 is 35 units more positive than y_1 .

$y_1 = \bullet$
 $y_2 = \circ$

Number Line: Distance

Point Labels
 Distance Labels
 Distance Description
 Tick Marks

DRAG handles to change the values

CHOOSE
horizontal or vertical representation

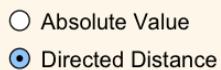
PHET

Suggestions for Use

- Allow students to play with the sim before guiding them with challenge prompts.
- Encourage students to share their discoveries and observations with the class to build confidence and sense-making.

Sample Challenge Prompts

- On the Explore screen, compare the same subtraction problem in all three contexts. Think of another context where the distance between two points could be represented with subtraction.
- With Directed Distance on,
 - Find three different ways to make a distance of 10 and record the distance statements.
 - Find three different ways to make a distance of -10 and record the distance statements.
 - Compare your statements with your partner. What patterns do you notice?
- When does Directed Distance produce a distance that is different from Absolute Value?



Insights into Student Use

- Students may notice a connection between the horizontal and vertical number lines and a cartesian plane if they have plotted cartesian coordinates before.

Customization Options

Query parameters allow for customization of the simulation, and can be added by appending a '?' to the sim URL, and separating each query parameter with a '&'. The general URL pattern is:

`...html?queryParameter1&queryParameter2&queryParameter3`

For example, in Number Line: Distance, if you only want to include the 1st screen (`screens=1`), with pan and zoom disabled (`supportsPanAndZoom=false`) use:

https://phet.colorado.edu/sims/html/number-line-distance/latest/number-line-distance_all.html?screens=1&supportsPanAndZoom=false

To run this in Spanish (`locale=es`), the URL would become:

https://phet.colorado.edu/sims/html/number-line-distance/latest/number-line-distance_all.html?locale=es&screens=1&supportsPanAndZoom=false

⊗ Indicates this customization can be accessed from the Preferences menu within the simulation.

Query Parameter and Description	Example Links
<code>screens</code> - specifies which screens are included in the sim and their order. Each screen should be separated by a comma. For more information, visit the Help Center .	<code>screens=1</code> <code>screens=2,1</code>
<code>initialScreen</code> - opens the sim directly to the specified screen, bypassing the home screen.	<code>initialScreen=1</code> <code>initialScreen=2</code>

Query Parameter and Description	Example Links
❖ <code>locale</code> - specify the language of the simulation using ISO 639-1 codes. Available locales can be found on the simulation page on the Translations tab . Note: this only works if the simulation URL ends in “_all.html”.	<code>locale=es</code> (Spanish) <code>locale=fr</code> (French)
❖ <code>regionAndCulture</code> - Select the portrayal of people, places, or objects in the sim. Images are not intended to represent the entire diversity of a region or culture. Possible values: <code>multi</code> , <code>usa</code> , <code>africa</code> , <code>africaModest</code> , <code>latinAmerica</code> , <code>oceania</code> , <code>asia</code>	<code>latinAmerica</code>
<code>allowLinks</code> - when <code>false</code> , disables links that take students to an external URL. Default is <code>true</code> .	<code>allowLinks=false</code>
<code>supportsPanAndZoom</code> - when <code>false</code> , disables panning and zooming using pinch-to-zoom or browser zoom controls. Default is <code>true</code> .	<code>supportsPanAndZoom=false</code>

See all published activities for Number Line: Distance [here](#).

For more tips on using PhET sims with your students, see [Tips for Using PhET](#).