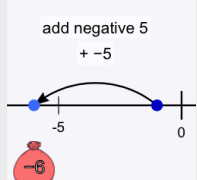


The **Number Line: Operations** simulation builds on **Number Line: Integers** by allowing operations on signed integers. It uses net worth as a realistic context to build upon as students' understanding of operations on signed integers develops.

Chips Screen

In the Chips screen, students can play with adding and subtracting signed integers using a familiar chip model.


SEE the operation description



ADD OR SUBTRACT integers

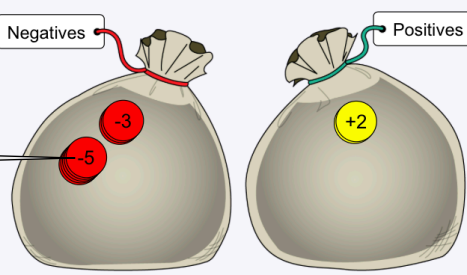
Operation Descriptions
 Operation Labels
 Tick Marks

Total = -6




Negatives

- 1
- 2
- 3
- 4
- 5



Number Line: Operations

Home
Chips
Net Worth
Operations
Generic



VIEW the net value of all chips

WATCH the net value change as chips are added or removed

Net Worth Screen

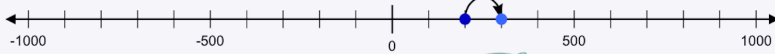
Here students can use a realistic context to solidify their understanding of operations with integers.

ADD OR REMOVE assets (cash, TV, bike, jewelry) and debts (loans and credit card debts)

Operation Descriptions
 Operation Labels
 Tick Marks

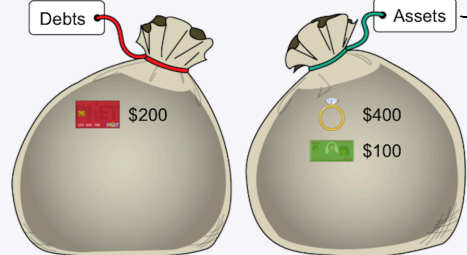
Net Worth = \$300

add asset of \$100
+ +100



Debts

- \$100 Loan
- \$300 Loan
- \$400




Assets

- \$200
- \$300

Number Line: Operations

Home
Chips
Net Worth
Operations
Generic



DESCRIBE the operation in the context of net worth

CONSIDER what net worth means if you have both assets and debts

Operations Screen

The Operations screen builds on Net Worth so students can assume an initial net worth, then perform operations on it. This is a great screen for telling a story about changes to net worth.

SIMPLIFY
negative signs in the expression

VIEW operations on a number line

INITIALIZE the net worth

OPERATE on the net worth by adding or removing assets or debts

EVALUATE the expression

DRAG points to change the operation

Generic Screen

The Generic screen affords the most flexibility for using a number line to model operations with integers, tell a story with values up to 100, and solidify a more abstract understanding of operations.

CHANGE the scale

COMPARE two expressions

OPERATE by adding or subtracting positives or negatives

DRAG points to change the operation

Insights into Student Use

- On the Net Worth screen, students may think of assets as “buying something” and debts as how they pay for it. Teachers can help students by introducing the lesson with an exploration of net worth of

students' favorite celebrities, and discuss what that means for the celebrity. Teachers can ask questions such as, "Is that how much money the celebrity makes? How can one have a net worth of \$25 million but make \$50 million in a month?"

- Students might continue to think about money and net worth when they get to the Generic screen, so it can help to ask them what else those numbers could represent, and provide new contexts as the lesson progresses.

Suggestions for Use

- After playing with Net Worth, ask students to try to define asset, debt, and net worth. Collect responses and use student thinking to prove a collective definition for the class so that they are all using the same definitions when they move on to the Operations screen. Sample definitions could be:
 - ◆Asset: stuff a person owns that has a value
 - ◆Debt: money a person owes
 - ◆Net worth: all the assets and debts added together
- Use the Operations screen to tell a story. Suppose someone starts with a net worth of \$200. What does that mean? Have students come up with different scenarios that could result in an initial net worth of \$200. Then decide if they are adding or removing an asset or a debt and predict how to enter that as an operation before using the sim to operate.

Sample Challenge Prompts

- What must be true if someone has a positive net worth?
- What must be true if someone has a negative net worth?
- How can someone have a net worth of \$0?
- Use the Generic screen to make two different number statements that end at the same integer.
- What are two different ways to make a jump to the right on a number line?
- What are two different ways to make a jump to the left on a number line?

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

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