

The **Equality Explorer: Basics** simulation allows students to explore the conditions that result in equality and inequality and play with the concept of a variable.

## Basics Screen

In the Basics screen, students can discover equality relationships and create functional definitions of equality and inequality.

**OBSERVE** the statement reflecting what is on the balance

**ORGANIZE** objects on the balance

**BUILD** an equality by dragging objects on and off the balance

**SAVE** snapshots of the balance

**RELOAD** a snapshot

**EXPLORE** different sets of objects

Equality Explorer: Basics

## Lab Screen

In the Lab screen, students can change the values of the objects and build unique equations.

**HIDE** the object values

**CLEAR** the balance

**CONTROL** the object values

**SHOW/HIDE** the object values for each snapshot

**RESET** the sim to its original state

Equality Explorer: Basics

## Insights into Student Use

- Students naturally want to find balanced situations. Encourage them to find as many as possible.
- Students enjoy making extremely unbalanced situations. Challenge them to find the “most unbalanced” scenario. What were the values of the objects?

## Suggestions for Use

- Explore proportional relationships on the Basics screen.
- Build equations with different values for each shape.

## Sample Challenge Prompts

- Find as many equations as possible using the objects on the Basics screen.
- Build an equation on the lab screen. What makes this an equation?
- Identify the values for the square and circle. What could these values represent about the square and circle?
- If a dog equals 1, what does a cat equal?
- Using the Lab screen, balance 2 squares with 3 triangles. What values for the square and triangle make this work? Compare with the class.

See all published activities for Equality Explorer: Basics [here](#).

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

**VIEW** original equation

**VIEW** current equation

**APPLY** operations to isolate  $x$ .

The screenshot shows the PhET 'Equality Explorer' interface. At the top, it says 'Level 3 Multi-step equations with fractions' and has a star icon with the number '1'. Below this, there are two input fields for equations: the first is labeled 'Solve for x' and contains  $\frac{7}{2}x - 2 = -\frac{179}{2}$ ; the second contains the solution  $x = -25$ . Below the equations is a calculator interface with buttons for '+', '-', 'x', '+', a display showing '7', and a yellow arrow button. A 'Next' button is also present. In the center, a balance scale is shown with a blue block labeled 'x' on the left pan and a white block labeled '-25' on the right pan. To the right, a 'Snapshots' panel shows a list of equations:  $\frac{7}{2}x - 2 = -\frac{179}{2}$ ,  $7x - 4 = -179$ , and  $7x = -175$ . Below the list are camera icons and a trash icon. At the bottom, there is a navigation bar with icons for 'Equality Explorer', 'Basics', 'Numbers', 'Variables', 'Operations', and 'Solve It!', along with the PhET logo.

**COLLECT** stars for each completed challenge

**SAVE** snapshots of each step to show progress