

Circles and Squares: Two Unknowns

Description: Students use algebraic thinking as they work with addition statements in which the addends are represented by two symbols. By analyzing the information from two or more statements, students deduce the numerical values of the symbols.

Technology Strength: As students interact with the engaging, puzzle-like model, they see that the computer's use of symbols is neither arbitrary nor abstract, but rather a consistent and understandable approach. Students accept symbolic notation as a natural way to represent numbers. The model supports students in investigating and persevering as it allows them to try many strategies.

Objectives: Understand the use of symbols and variables as a way of representing numbers; use algebraic thinking to solve for unknowns

Prerequisites: Ability to calculate sums to 100; familiarity with multiplication facts

Suggested Grade Level: 4 to 5

Sketchpad Level: Beginning

Suggested Duration: 90 minutes

Suggested Classroom Setting: Whole Class

Preparation: Review the Activity Notes. Preview the student sketch.

Materials: None

Student Worksheet(s): None

Student Sketch: Circles Squares Two Unknowns.gsp

Presentation Sketch: None

Vocabulary: Addend, addition, equal, equal sign, number sentence, statement, symbol, unknown

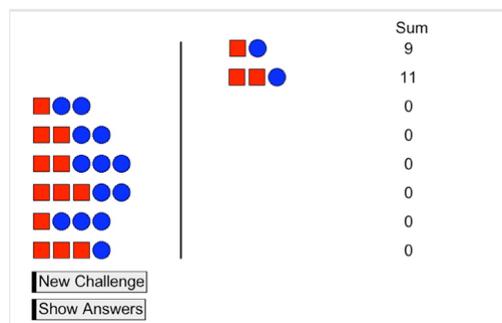
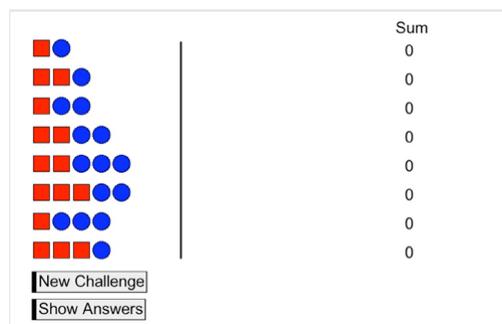
Sketchpad Version: GSP5

Using the Sketch:

The sketch displays eight rows of symbols. Each row presents a different combination of squares and circles. The computer randomly assigns a numerical value to the square and to the circle. Every square is equal to one value; every circle is equal to one value. These values are hidden. The circle and square may have the same value. When students drag a row of symbols across the vertical divider line, the sketch displays the sum of the symbols.

By dragging two or more rows, students gather information and determine the value of the circle and the square. Students check their thinking by pressing *Show Answers*. Students also drag different combinations of rows and investigate which help them find the unknown values easily and why.

Pressing *New Challenge* assigns new random and hidden values to the circle and the square, while the rows of symbols stay the same.



Sketch Tips:

Sketch Tips show skills needed in this activity, and the step at which the skill is first used.

Sketch Tip	Tip Sheet or Tip Video
Open, print, and save a document	Working with Documents
Change to a different page using page tabs	Moving Between Pages
Select, deselect, and drag objects with the Arrow tool	Using the Arrow Tool
Change the value of a number (parameter)	Changing Parameters