Introduction to Vectors: Walking Rex

Description: Students learn two ways to describe vectors, convert between the two descriptions, and move vectors around the plane to explore how vectors are independent of specific positions.

Technology Strength: By dragging a dynamic vector and observing the measurements of its components and the measurements of its magnitude and direction as they update, students can quickly discover two ways to describe vectors and how to convert between the two descriptions.

Objectives: Investigate two different ways to describe vectors; use the components of a vector to find its magnitude and direction; use the magnitude and direction of a vector to find its components

Prerequisites: Ability to plot points using their coordinates

Suggested Grade Level: 8 to 11

Sketchpad Level: Beginning

Suggested Duration: 30 minutes. You may wish to do this activity and the activity *Vector Addition and Subtraction* in one class period.

Suggested Classroom Setting: Whole Class, Student Pairs

Preparation: Review the Activity Notes. For a student-pairs activity, preview the student sketch, work through the steps on the worksheet, and make a copy of the worksheet for each student. For a whole-class presentation, use the presentation sketch.

Materials: None

Student Worksheet(s): Introduction to Vectors: Walking Rex

Student Sketch: Introduction to Vectors.gsp

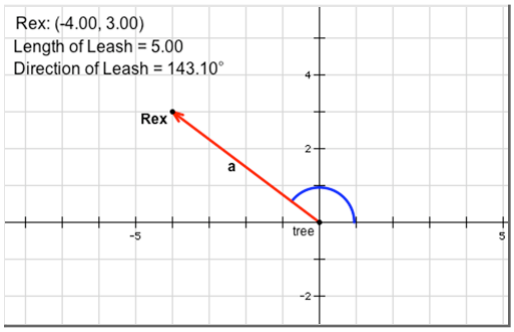
Presentation Sketch: Introduction to Vectors Present.gsp

Vocabulary: Components, magnitude, direction

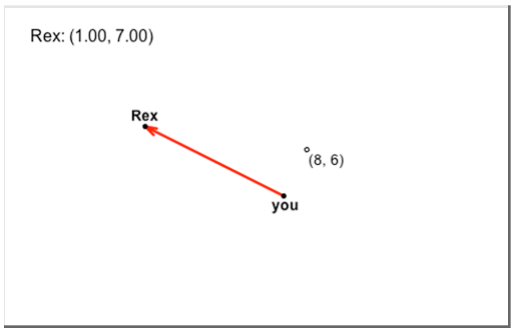
Sketchpad Version: GSP5

Using the Sketch:

On page 1, students are given a coordinate system, a vector, and three measurements for the vector—its coordinates, magnitude, and direction. The tail of the vector is the origin and represents a tree to which a dog, Rex, is tied. Students drag Rex, at the vector's head, so that the vector has given components and then determine the vector's magnitude and direction. They then reverse the process, dragging the vector to match a given magnitude and direction, and then determining the vector's components.



On page 2, students follow a similar procedure except that the tail of the vector is no longer tied to the origin (students are now walking the dog). The vector, however, always faces the same direction and the coordinates are now given for both the tail and the head of the vector. As students move the vector around in the plane, they discover that the component definition of the vector depends on both sets of coordinate measurements and doesn't depend on the vector's exact location in the plane.



Pages 3 and 4 are similar to page 2, with fewer measurements provided. On these pages, students will find puzzles to solve that tests their understanding of the component definition of vectors. To solve the puzzles, students strategically drag the vectors around the plane and observe the measurements.

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**
Question 1: Select, deselect, and drag objects with the **Arrow** tool	Using the Arrow Tool
Step 2: Change to a different page using page tabs	Moving Between Pages