

Modeling Activity

(Use with Lesson 13-1)

Graphing Irrationals

Materials: compass , straightedge 

You know how to graph integers and rational numbers on a number line. You can also graph irrational numbers on a number line.

Activity: Use a compass and straightedge to graph $\sqrt{5}$ on a number line.

- ▶ Draw a number line.
- ▶ At 2, construct a perpendicular line segment 1 unit in length. Draw the line segment shown in the drawing as a dashed line. Label it c .
- ▶ The Pythagorean theorem can be used to show that c is $\sqrt{5}$ units long.

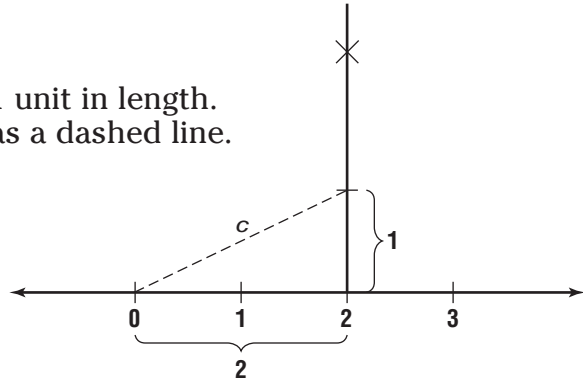
$$c^2 = a^2 + b^2$$

$$c^2 = 1^2 + 2^2$$

$$c^2 = 5$$

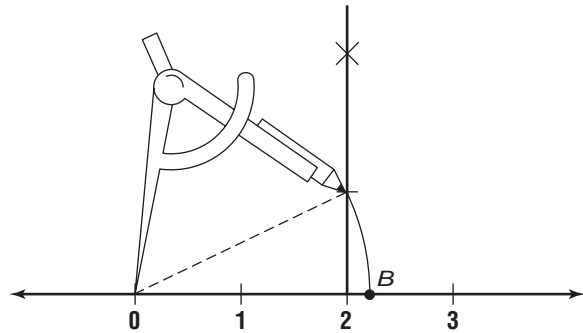
Replace a with 1 and b with 2.

$$c = \sqrt{5}$$



- ▶ Open the compass to the length of c . With the tip of the compass at 0, draw an arc that intersects the number line at B . The distance from 0 to B is $\sqrt{5}$ units.

- 4. Sample answer: Use the graph of $\sqrt{2}$ as the base of a right triangle with a height of 1 unit. The length of the hypotenuse will be $\sqrt{3}$ units. Mark this length on the number line. 1-2. See students' work.**



GRAPH

1. Graph $\sqrt{10}$ on a number line. Think of $\sqrt{10}$ as $\sqrt{3^2 + 1^2}$.
2. Graph $\sqrt{8}$ on a number line. Think of $\sqrt{8}$ as $\sqrt{2^2 + 2^2}$.
3. **Sample answer: Construct a right triangle with each leg 1 unit in length. The length of the hypotenuse will be $\sqrt{2}$ units. Mark this length on the number line.**

WRITE

3. Describe a method to graph $\sqrt{2}$.
4. Explain how the graph of $\sqrt{2}$ can be used to locate the point that represents $\sqrt{3}$.
5. Explain how to graph $-\sqrt{2}$. **Sample answer: Construct $\sqrt{2}$ to the left of 0.**
6. Can all real numbers be graphed on a number line? **yes**