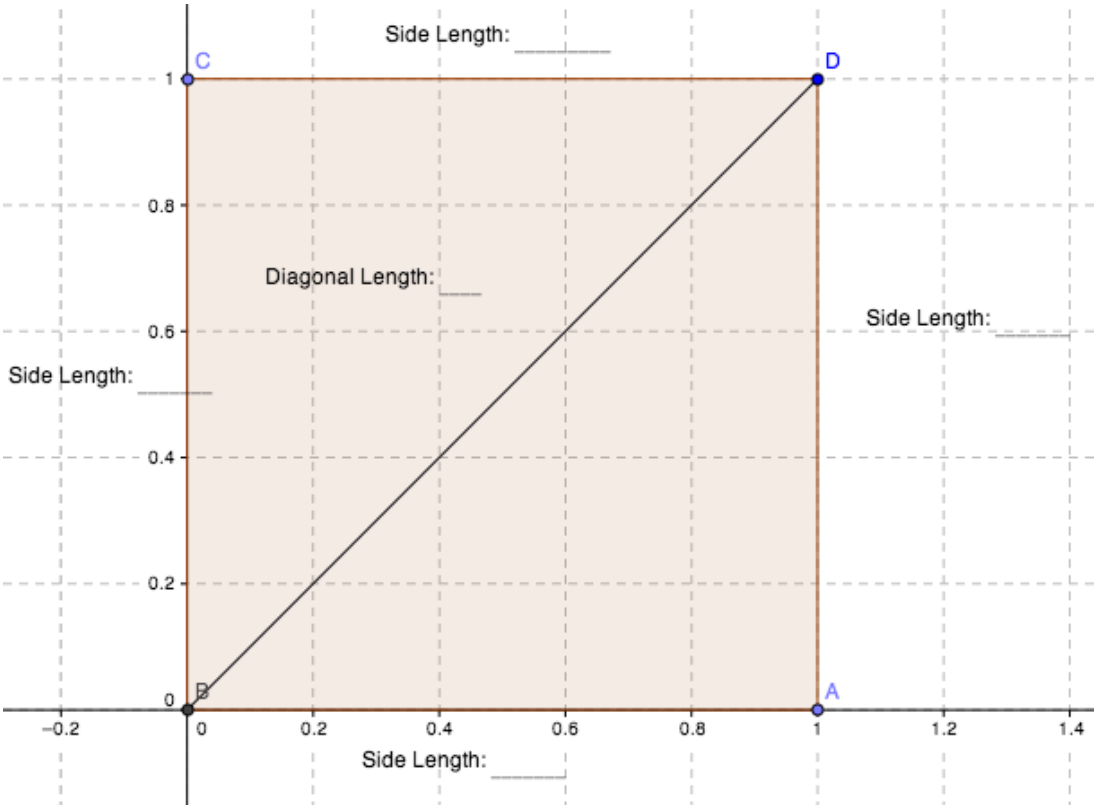
Extension: Pythagoras and the Number Line

I can use the Pythagorean Theorem to graph irrational numbers on a number line.

DO NOW: Find the 5 lengths marked on the polygon below.



How can you find the exact length of the diagonal?

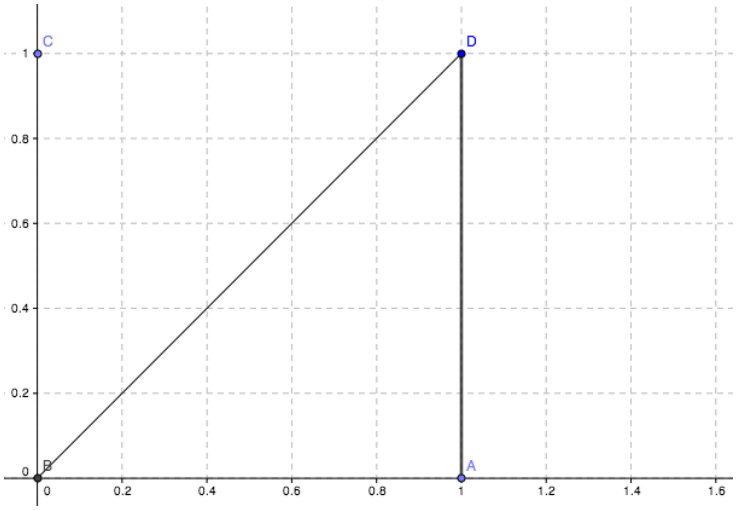
What type of triangle is made with the diagonal?

STOP: Wait for the class to discuss the DO NOW.

Lets use the pythagorean theorem to find the diagonal of the square above.

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

Continue: Approximate the location of √2 on the x axis.



Is this the exact location?

Think of a strategy to find the √2 precisely on the number line

Stop: Wait for class.

Now we will find the exact location of the √2 by using the hypotenuse of this isosceles triangle as the radius for a circle.

1. Follow the directions of the teacher. ☐

2. Open Geogebra. ☐

3. Add the grid ☐

4. Zoom to about a 2x2 window ☐

5. Create the right triangle with legs of 1 ☐

6. Use the measurement tool to confirm that the hypotenuse is the √2 ☐

7. Use the compass to mark off the √2 on the number line (a-axis) ☐

8. REFLECTION: Do you think this is the real location of the √2?

This is a compass and straight edge. In Pythagoras' day (over 2000 years ago in Greece), these would be their only tools to construct anything geometric and to do measurements. Notice, this is not a ruler, there are no length markings. It is simply a straight piece of wood.

Challenge +: Thinking about what we just did above, could you find the √3? or the √5? How about any whole number square root, rational or irrational? Use the pythagorean theorem guide sheets that are attached to do some work and see if you can come up with a plan to construct the √3 using geogebra. If there is time, try another.

Looking for the √____	
Steps	**Work**
$a^2 + b^2 = c^2$	

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