One method in which students can develop an understanding of the imaginary number is by utilizing prior knowledge of transformational geometry (scale factors and rotations). The following is taken from lesson 37 of [Engage NY Algebra II, Module 1].

Recall that multiplying by rotates the number line in the plane by about the point .

Think about the equation =4.

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Which transformation x, when applied two times in a row will turn a 1 into a 4? Scale by 2 or scale by -2. What if the equation was = -4.

Is there a number we can multiply by that corresponds to a rotation?

Such a number map the number line to itself, so we must another number line that is a rotation of the original:

This is like the coordinate plane. However, how should we label the points on the vertical axis?

Well, since we

What happens if we multiply a point on the vertical number line by ? We rotate that point by 90 counterclocku1 434466.913(d)4 474.69

Examples of operations involving complex numbers:

1. Express in simplest form: