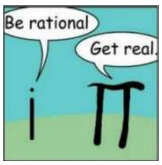
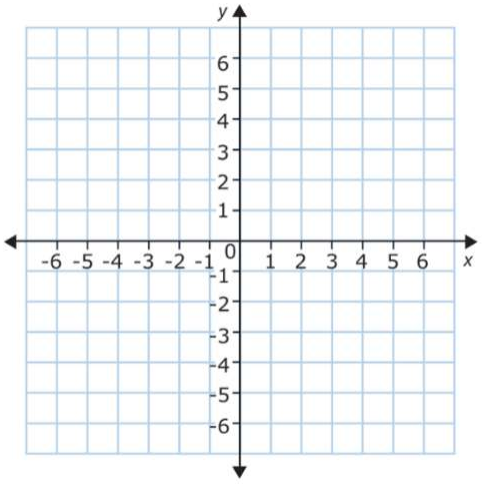
Can we be real for a second? Name:_____



How can we find **all** solutions to a polynomial? With the Fundamental Theorem of Algebra, we know a polynomial has as many roots as its highest degree. What happens when some of those roots don't show up on a graph?

1. Graph $f(x) = x^2 + 4$

   a. How many roots does this quadratic equation have according to the Fundamental Theorem of Algebra?



   b. How many roots does this quadratic equation have according to the graph>

   c. Solve for the zeros algebraically.

2. In the complex math world, $\sqrt{-1} = i$, an imaginary number. We can continue solving 1c by rewriting $x = \pm\sqrt{-4}$ as $x = \pm\sqrt{-1} \cdot \sqrt{4}$. Now finish solving for the zeros.

3. Find the zeros of $f(x) = x^2 + 2x + 5$ using any strategy.

4. Write $f(x)$ in factored form.

5. Can you predict what answer you'll get when you multiply the factors? Use the area model below to check your prediction.

6. Could a quadratic function have one real and one imaginary root? Explain why or why not.

Lesson 2.4—Complex Zeros

Important Ideas:

Check Your Understanding

1. Find all roots: $f(x) = x^2 - x + 4$

2. Multiply: $(-2 - 7i)(-2 + 7i)$

3. We know $6 + i$ and $4 - \sqrt{3}$ are roots of a 4th degree polynomial. Find the remaining roots.

4. **SAT Practice!**

   For $i = \sqrt{-1}$, what is the sum $(7 + 3i) + (-8 + 9i)$?

   A) $-1 + 12i$
   B) $-1 - 6i$
   C) $15 + 12i$
   D) $15 - 6i$

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