12.1 – Simplifying Imaginary Numbers

Up until now, you've been told that you can't take the square root of a negative number. Now, however, you can take the square root of a negative number, but it involves using a new number to do it. This new number is called "i", standing for "imaginary".

We define i as $i = \sqrt{-1}$. So, $i^2 =$ -1.

Simplify the following using i.

1. $\sqrt{-8} = \sqrt{-1 \cdot 8}$

   2 | 8
   2 | 4
   2

   $= 2i\sqrt{2}$

2. $\sqrt{-2} = \sqrt{-1 \cdot 2}$

   $= i\sqrt{2}$

3. $\sqrt{-100} = \sqrt{-1 \cdot 100}$

   $= 10i$

Now that you've seen how imaginaries work, it's time to move on to complex numbers. "Complex" numbers have two parts, a "real" part (being any "real" number that you're used to dealing with) and an "imaginary" part (being any number with an "i" in it).

The "standard" form for complex numbers is "$a + bi$"; that is, real-part first and i-part last.

Write the complex number in the form $a + bi$.

1. $\sqrt{-9} + 6$

   $6 + 3i$

2. $\sqrt{-18} - 7$

   2 | 18
   3 | 9
   3

   $-7 + 3i\sqrt{2}$

3. $9 + \sqrt{-54}$

   2 | 54
   3 | 27
   3 | 9
   3

   $9 + 3i\sqrt{6}$