Understanding Solving Equations by Balancing a Scale Part III

Each of the pieces of the algebra models represent an algebraic expression:

small yellow square - 1 unit tile
green rectangle - x tile
blue square - x^2 tile

small red square - negative 1 unit tile
red rectangle - negative x tile
red square - negative x^2 tile

Algebra tiles can be used to model solving equations.

1. Recall that you can keep the ***balanced*** scale in Figure 1 balanced by performing certain steps. Describe all the ways a balanced scale can be kept balanced.

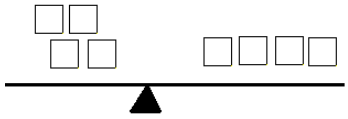

Figure 1

Instead of using the scale this time we will perform all the steps algebraically by working with the equation.

For example, if the equation was 1 + 2x + 3 = 7 you would have built the balance scale in figure 2.
One step you might do first is combine the like terms

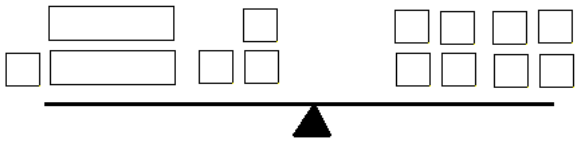

Figure 2

This would result in figure 3. Figure 3 says that 2x+4 = 8.
Now you might think about remove 4 yellow squares from both sides.

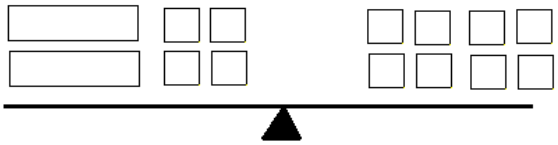

Figure 3

This would leave you with figure 4. Figure 4 says that 2x = 4.
Then you would have divided both sides into two equal groups so the green rectangle equals 2 yellow squares or x = 2.

Figure 4

This time our steps will be more algebraic, but based upon what we did with the balance scale.

$1 + 2x + 3 = 8 \Leftrightarrow$ combine like terms

$2x + 4 = 8 \Leftrightarrow$ remove 4 from both sides

$2x = 4 \Leftrightarrow$ divide both sides into 2 equal groups

x = 2

Think about what each of these equations looks like on a balance scale. Solve each equation by using one of the steps that produces a balanced scale.

2. $2x + 3 + {}^{-}1x = 5$ X = _____

3. $3x + 4 + 1x = 8$ X = _____

4. $9 = 1x + {}^{-}3 + 3x$ X = _____

5. ${}^{-}3 = 3x + 2 + 2x$ X = _____

6. $2x + {}^{-}4 + 3x = {}^{-}2 + 3x + 3$ X = _____

7. $x + 4 = {}^{-}2x + {}^{-}2$ X = _____

8. $6 + {}^{-}5x + {}^{-}4 = 6 + {}^{-}2x + 2$ X = _____