

## LESSONS 39/40 : EQUIVALENT EQUATIONS, RECIPROCALS

Pages 127-136

### LESSON 39

**Equivalent equations** in 39.A should be pretty straightforward to them. Remind them that  $x$  here is called a **variable** because it can vary, i.e. it can be set to equal any number you wish. However, the only number that *satisfies* the equation in all of these is  $x = 6$ . Because of that we call  $x = 6$  the **solution**. Since all of these have the same solution, they are called equivalent equations.

39.B - pay special attention to the **addition-subtraction rule** for equations and read the definition of the rule in the box aloud.

Look at example 39.1. Though a simple example like this is normally something we could just work out in our head ( $x - 3 = 7$ ,  $x$  must be 10), it is good to get in the habit of using the addition-subtraction rule as problems get more complex. Notice how 3 is added to both sides. On the left it cancels out the -3 to leave  $x$  by itself (what we want), and on the right we get  $7+3 = 10$ .

Example 39.2 is quite similar, just using subtraction.

Example 39.3 is the same, just a bit more complex because it involves subtracting fractions.

Example 39.4 is the same as 39.3 except it adds fractions.

Try the practice problems on page 129.

### LESSON 40

**Reciprocals** - pretty straightforward, just flip it upside down. Remember that for a whole number like 4, that is the same as  $4/1$ . So the reciprocal is  $1/4$ .

Remember! *Multiply any number (except 0) by its reciprocal and it equals 1.*

### **40.B - Multiplication Rule**

Learn and remember the term '*coefficient*.' It's just the number that is multiplied by the variable ( $x$ ,  $y$ ,  $n$ , etc.). With  $4x$ , the coefficient is 4. With  $x$ , the coefficient is just 1. With  $x/2$ , that is the same as  $1/2 * x$ , so the coefficient is  $1/2$ .

Example 40.1 - this is just like what you just went over in lesson 39, except now instead of addition and subtraction you will be using multiplication and division. The key is asking yourself -what do I need to add, subtract, multiply, or divide by to get  $x$  by itself? So with  $4x = 12$ , we need to divide by 4 to get  $x$  by itself. OR, we could say (it's the same thing) we need to multiply  $x$  by its RECIPROCAL, because any number multiplied by its reciprocal = 1. So  $4x * 1/4 = x$ .  $12 * 1/4 = 3$ .  $x = 3$ .

Example 40.2 - this is where the understanding of reciprocal really comes in handy.

Example 40.3 - Since  $m$  is being divided by 3, we just need to multiply by 3 to 'undo' the division and get 1.

**REMEMBER**, *multiplication and division 'undo' each other, and addition and subtraction 'undo' each other.*

**40. C - Division Rule** - read this carefully.

This is just the same things we have been working on, but now we are dividing instead of multiplying. Remember that dividing by 4 is the same as multiplying by  $1/4$ .

What we just looked at is called the **Multiplication-Division Rule for Equations** (p. 135). So now we have learned the Addition-Subtraction Rule and the Multiplication-Division Rule.

**Try the practice problems on page 135. I will be available from 9am to 11am on the GroupMe for questions, and beyond those hours likely as well. You got this!**