Name: _____

Isolating *x* to Create an Inverse

The **inverse** (**or "opposite"**) of *x* is *y.* To create the inverse of an *xy* equation is a equation you must first solve for *x*, then switch the letter *x* with the letter *y* and vice-a-versa. To isolate the variable, we will still use the order of operations backwards – the only difference is that our answer will be an equation (not a number).

When you have the equation written as $x = something$,
Change the letter *x* to the letter *y* & change *y* to *x.*

Today, we will be isolating *x* so that we can create **inverses**.

Step 1: Do the opposite operation to any number adding or subtracting to *x*.
(You will not be able to combine it with *y*, so just write the number behind the *y*)

Step 2: Do the opposite operation to any number multiplying or dividing with *x*.

Whatever you multiply/divide is done to EVERY term.

If there is an exponent: **Step 3:** Square root both sides to cancel the exponent *(skip this step if there's no exponent).*

Step 4: Switch the sides of the equation, so *x* is on the left.

Step 5: Switch the letter *x* with the letter *y*

And now you have an inverse equation.

Example

$$y = -10x - 50$$

Add 50 to both sides

$$y = -10x - 50$$
$$\underline{+50} \qquad \underline{+50}$$
$$y + 50 = -10x$$

Divide ALL PARTS of both sides by -10

$$\frac{y}{-10} + \frac{50}{-10} = \frac{-10x}{-10}$$

Simplify each fraction

(For the y fraction, move the negative to the front, and put a 1 next to y so there's a number on top and bottom)

$$-\frac{1y}{10} - 5 = x$$

Write the variable fraction as a fraction in front of the variable.

$$-\frac{1}{10}y - 5 = x$$

Switch the sides of the equation

$$x = -\frac{1}{10}y - 5$$

And NOW for the INVERSE…

Switch the x and the y:

$$\boxed{x} = -\frac{1}{10}\boxed{y} - 5$$
$$\boxed{y} = -\frac{1}{10}\boxed{x} - 5$$

$$\boxed{y = -\frac{1}{10}x - 5}$$

1. $y = 2x - 6$

2. $y = -3x + 12$

3. $y = -5x + 10$

4. $y = 7x + 14$

5. $y = 4x + 28$

6. $y = -8x + 8$

Now, we'll create quadratic inverses. The steps are the same, only now you can't skip step 3.

Remember: to remove the ^{2} from x^2, you must use a $\pm\sqrt{\ }$ on both sides.

Example

$$y = 5x^2$$

There's nothing to add or subtract, so start with step 2:

Divide ALL PARTS of both sides by -10

$$y = 5x^2$$

$$\frac{y}{5} = \frac{5x^2}{5}$$

Simplify each fraction

(For the y fraction, move the negative to the front, and put a 1 next to y so there's a number on top and bottom)

$$\frac{1y}{5} = x^2$$

Write the variable fraction as a fraction in front of the variable.

$$\frac{1}{5}y = x^2$$

Square root both sides (cancel it on the x^2 side)

$$\pm\sqrt{\frac{1}{5}y} = \pm\sqrt{x^2}$$

$$\pm\sqrt{\frac{1}{5}y} = x$$

Switch the sides of the equation

$$x = \pm\sqrt{\frac{1}{5}y}$$

And NOW for the INVERSE…

Switch the x and the y:

$$\boxed{x} = \pm\sqrt{\frac{1}{5}\boxed{y}}$$

$$\boxed{y} = \pm\sqrt{\frac{1}{5}\boxed{x}}$$

$$\boxed{y = \pm\sqrt{\frac{1}{5}x}}$$

7. $y = 3x^2$

8. $y = 4x^2$

9. $y = 2x^2$

10. $y = 8x^2$

11. $y = 7x^2$

12. $y = 5x^2$