Integrated Math 3
Unit 7: Modeling Rational Representations
7.9

Name: ____________________

Date:__________ Period:______

Objective: To determine the inverse of a rational function.

Recall:

An **inverse** function has the unique property of mirroring a function over the line $y = x$.

How to Determine an Inverse Function

- Change the function notation to $y=$ $f(x)=$
- Switch x and y
- Solve for y (get y alone / by itself)
- Rewrite y using function notation ($f^{-1}(x)=$)

Example 1: $f(x) = \frac{3}{x+2}$

$$y = \frac{3}{x+2}$$

$$(y+2)\ x = \frac{3}{y+\cancel{2}}\ (y\cancel{+2})$$

$$x(y+2) = 3$$

$$xy + 2x = 3$$
$$-2x \quad -2x$$

$$\frac{xy}{x} = \frac{3-2x}{x}$$

$$y = \frac{3-2x}{x}$$

$$f^{-1}(x) = \frac{3-2x}{x}$$

or

$$f^{-1}(x) = \frac{3}{x} - 2$$

Example 2: $g(x) = \frac{x+4}{x}$

$$y = \frac{x+4}{x}$$

$$f^{-1}(x) = \frac{4}{x-1}$$

$$\cancel{y} \cdot x = \frac{y+4}{\cancel{y}} \cdot \cancel{y}$$

$$xy = y+4$$
$$-y \quad -y$$

$$xy - y = 4$$
$$\frac{y(x-1)}{x-1} = \frac{4}{x-1}$$

factor out the GCF

$$y = \frac{4}{x-1}$$

Example 3: $h(x) = \frac{2x-5}{x+3}$

$$y = \frac{2x-5}{x+3}$$

$$(y+3) \cdot x = \frac{2y-5}{y+3} \cdot (y+3)$$

$$f^{-1}(x) = \frac{-3x-5}{x-2}$$

$$x(y+3) = 2y-5$$
$$xy + 3x = 2y - 5$$
$$-2y \quad -2y$$

$$xy - 2y + 3x = -5$$
$$-3x \quad -3x$$

$$xy - 2y = -3x - 5$$
$$\frac{y(x-2)}{x-2} = \frac{-3x-5}{x-2}$$

factor out the GCF

$$y = \frac{-3x-5}{x-2}$$