

Finding an Inverse

Name _____

Directions: Algebraically, find the inverse for each of the following relations. Be sure to show your work. Find your answer in the ANSWER CHART. Cross off each answer as it is used.

<p>1. $f(x) = 4x + 1$</p> $x = 4y + 1$ $x - 1 = 4y \quad f^{-1}(x) = \frac{x-1}{4}$ $\frac{x-1}{4} = y$	<p>2. $f(x) = \frac{x+4}{4}$</p> $x = \frac{y+4}{4}$ $4x = y + 4$ $4x - 4 = y$ $f^{-1}(x) = 4x - 4$
<p>3. $f(x) = 4x^2 - 1$</p> $x = 4y^2 - 1$ $x + 1 = 4y^2 \quad f^{-1}(x) = \pm \sqrt{\frac{x+1}{4}}$ $\frac{x+1}{4} = y^2$ $\pm \sqrt{\frac{x+1}{4}} = y$	<p>4. $f(x) = 4x^3$</p> $x = 4y^3$ $\frac{x}{4} = y^3 \quad f^{-1}(x) = \sqrt[3]{\frac{x}{4}}$ $\sqrt[3]{\frac{x}{4}} = y$
<p>5. $f(x) = \frac{4}{x-4}; x \neq 4$</p> $x = \frac{4}{y-4} \quad f^{-1}(x) = \frac{4x+4}{x}$ $x(y-4) = 4$ $xy - 4x = 4$ $xy = 4 + 4x$ $y = \frac{4x+4}{x}$	<p>6. $f(x) = \frac{x+4}{x}; x \neq 0$</p> $x = \frac{y+4}{y} \quad f^{-1}(x) = \frac{4}{x-1}$ $xy = y + 4$ $xy - y = 4$ $y(x-1) = 4$

7. $f(x) = \sqrt{x+4}; x \geq -4$

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

$$x^2 = y+4$$

$$x^2 - 4 = y$$

$$f^{-1}(x) = x^2 - 4$$

8. $f(x) = \frac{x-4}{x+4}; x \neq -4$

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

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

$$xy + 4x = y - 4$$

$$xy - y + 4x = -4$$

$$xy - y = -4x - 4$$

$$y(x-1) = -4x-4$$

Answer Chart:

⑤ $y = \frac{4(x+1)}{x}$	⑦ $y = x^2 - 4$	⑧ $y = \frac{-4(x+1)}{x-1}$	$y = \frac{4-x}{x+4}$
① $y = \frac{x-1}{4}$	④ $y = \sqrt[3]{\frac{x}{4}}$	$y = 4(x+1)$	③ $y = \pm \sqrt{\frac{x+1}{4}}$
$y = \frac{-4(x-1)}{x+1}$	$y = \frac{x-4}{4}$	⑥ $y = \frac{4}{x-1}$	② $y = 4(x-1)$

The four remaining answers in the answer chart form two sets of relations which are inverses of one another. Pair them up correctly and SHOW algebraically (below) that they are inverses.

Set 1:

$$y = 4(x+1)$$

$$x = 4(y+1)$$

$$x = 4y + 4$$

$$x - 4 = 4y$$

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

INVERSES

Set 2:

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

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

$$x(y+4) = 4-y$$

$$xy + 4x = 4 - y$$

$$xy + y + 4x = 4$$

$$xy + y = 4 - 4x$$

$$y(x+1) = -4x+4$$

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

$x+1$