

# 7.8 Inverse Functions and Relations

- 1) Find the inverse of a function or relation
- 2) Determine whether two functions or relations are inverses.

The inverse of  $f(x)$  is written as:  $f^{-1}(x)$

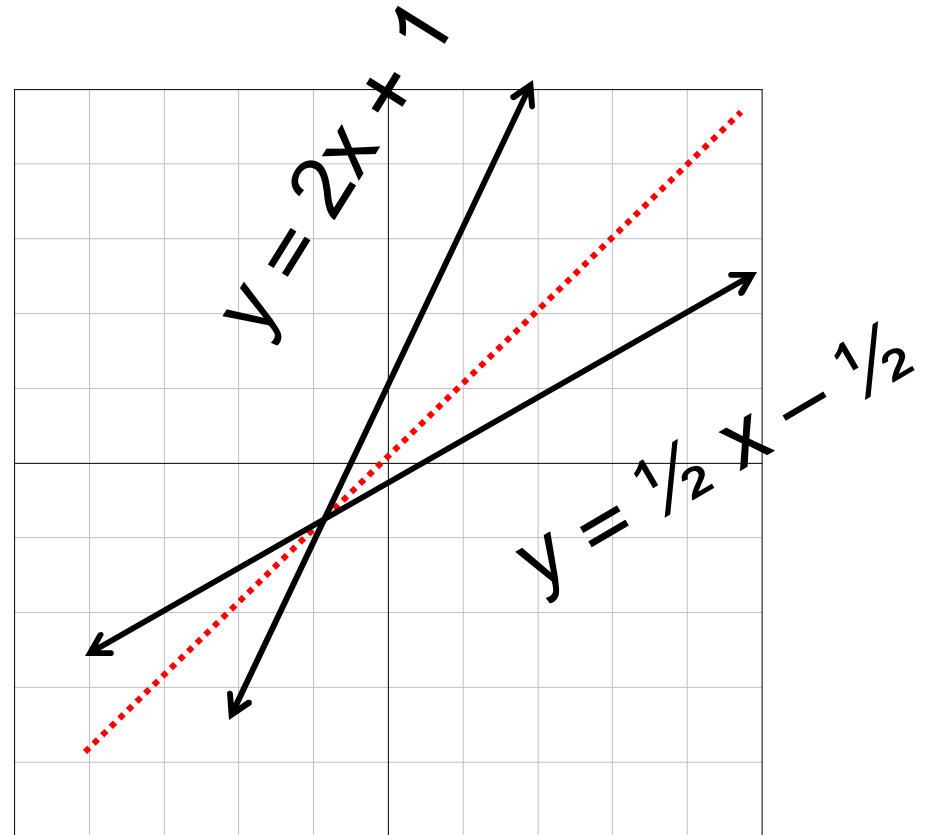
$$f(x) \cdot f^{-1}(x) = x$$

Property of Inverse Functions: Suppose  $f$  and  $f^{-1}$  are inverse functions. Then,  $f(a) = b$  if  $f^{-1}(b) = a$ .

If  $f(5) = 7$  then  $f^{-1}(7) = 5$

# Graphs of Inverse functions

The graphs of inverse functions will be reflections over the  $y = x$  line.



# Inverse of a relation

Two relations are inverse relations if one relation contains the element  $(a,b)$  and the other relation contains the element  $(b,a)$ .

Example:  $q = (1,2), (3,4), (5,6)$

$r = (2,1), (4,3), (6,5)$

If you are able to switch places with the ordered pairs, then:

Q and R are inverse functions...

Find the inverse of the relation  $f(x)$   
with coordinates  $(3,2)$ ,  $(4,7)$ ,  $(6,1)$

$$f^{-1} =$$

# Inverse Functions

Two functions are inverse functions if their compositions =  $x$ .

$$[f \circ g](x) = x \text{ and } [g \circ f](x) = x$$

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Are  $f(x) = 5x + 10$  and  $g(x) = \frac{1}{5}x - 2$  inverse functions?

# How to find the inverse...

Find the inverse of  $f(x) = \frac{x + 6}{2}$

Step 1: rewrite  $f(x)$  with  $y$

Step 2: Interchange  $x$  and  $y$

Step 3 solve for  $y$

Step 4: replace  $y$  with  $f^{-1}(x)$

Find the inverse of

$$f(x) = 4x - 2$$

# Homework

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