Name: _____ Date: _____ **Unit 9 Class Work**

# Exploring Inverse Relations Class Work

**Objective:** *You will be able to determine, explain, and graph inverses of relations.*

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★ **Let's Consider This…**

**Consider the "function" of purchasing a new pair of shorts! What would you consider to be the input and output?** Input: $ Output: shorts

**What would you deem to be the "inverse" of this function of purchasing the pair of shorts?**

returning the shorts

**Describe the "inverse" of the purchase in terms on "inputs and outputs."**

Input: shorts Output: $

**What is your hypothesis about inverses in general in terms of inputs and outputs?**

input : output switch

★ **Another Algebraic Example:**

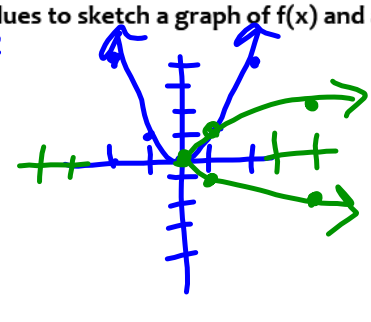
**Consider a function, $f(x) = x^2$.**

**What is the inverse of this function?**

$\pm\sqrt{x}$

**Use two tables of values to sketch a graph of f(x) and a graph of its inverse.**

| x | $x^2$ |
|---|---|
| -2 | 4 |
| -1 | 1 |
| 0 | 0 |
| 1 | 1 |
| 2 | 4 |



| x | $\pm\sqrt{x}$ |
|---|---|
| 4 | 2, -2 |
| 1 | 1, -1 |
| 0 | 0 |

***What can you conclude about inverses in general in terms of inputs and outputs?

inputs : outputs switch

Exploring Inverse Relations Class Work

**Objective:** *You will be able to determine, explain, and graph inverses of relations.*

**★ Inverse Relations:**

relations in which the inputs & outputs are switched

**Notation:**

*Remember, a simpler way of writing "the value of the function for an input, x," is $f(x)$.

*A simpler way of writing "the value of the ***inverse*** function for an input, x," is $f^{-1}(x)$. f inverse of x

**WORK TOGETHER:** *Determine the inverse of each situation below.*

1. Sean deposits $350 into a bank account. Sean withdraws $350.

2. $y = 8x^2 - 4$

* switch x & y
* isolate y

$x = 8y^2 - 4$

$y^2 = \frac{x+4}{8}$

$y = \pm\sqrt{\frac{x+4}{8}}$

$f^{-1}(x) = \pm\sqrt{\frac{x+4}{8}}$

3. $f(x) = \sqrt[3]{4x-1} + 3$

$x = \sqrt[3]{4y-1} + 3$

$x - 3 = \sqrt[3]{4y-1}$

$(x-3)^3 = 4y - 1$

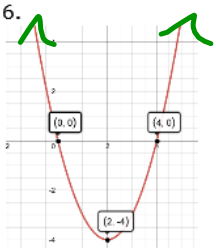
$f^{-1}(x) = \frac{(x-3)^3 + 1}{4}$

4. The set of points: {(7,9), (-1,3), (8,2), (0,5)} $\{(9,7),(3,-1),(2,8),(5,0)\}$

5. The set of points: {(0,0), (-4,3), (2,-1), (10,12), (8,-7)} $\{(0,0),(3,-4),(-1,2),(12,10),(-7,8)\}$

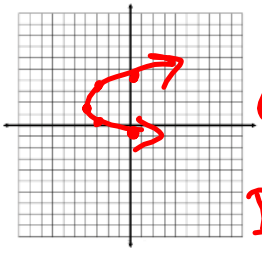
**For #6 & 7, state the domain and range for the function, graph the inverse, and state the domain & range of the inverse relation.**

6.

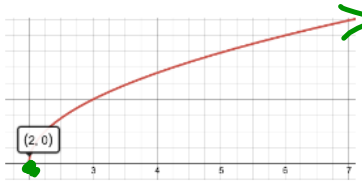



D: $(-\infty, \infty)$
R: $[-4, \infty)$
(0,0) (1,-3) (2,-4) (3,-3) (4,0)

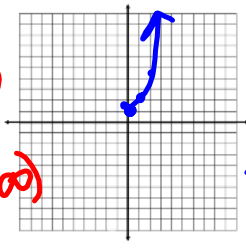
inverse
(0,0) (-3,1) (-4,2) (-3,3) (0,4)
D: $[-4, \infty)$ R: $(-\infty, \infty)$



7.




D: $[2, \infty)$
R: $[0, \infty)$
(2,0) (3,1) (5,2)



inverse
(0,2) (1,3) (2,5)
D: $[0, \infty)$
R: $[2, \infty)$

*What can you conclude about the domain & range of a relation and its inverse relation, and why?!

Domain & Range switch b/c inputs & outputs switch

10) $f^{-1}(x) = \frac{10-3x}{7}$

11) $f^{-1}(x) = \pm\sqrt{\frac{x-5}{2}}$

12) $f^{-1}(x) = \sqrt[3]{x}+1$

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

14) $f^{-1}(x) = (x+4)^3+3$

15) $x=4$

16) $\{(-4,3),(-3,0),(10,9),(4,4)\}$

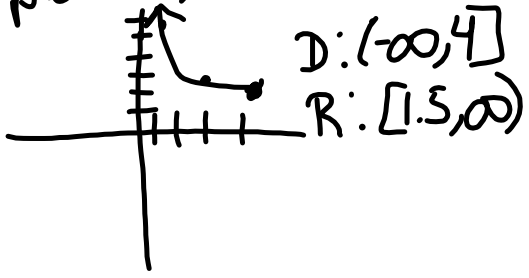
17) $f(x)$

D: $[1.5,\infty)$

R: $(-\infty,4]$

$f^{-1}(x)$

plot $(4,1.5)$ $(3,2)$ $(1,6)$



D: $(-\infty,4]$

R: $[1.5,\infty)$

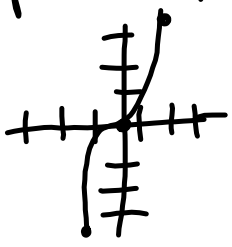
18) $f(x)$

D: $[-\pi,\pi]$ $\pi \approx 3.14$ :)

R: $[-1,1]$

$f^{-1}(x)$

plot $(-1,-\pi)$ $(0,0)$ $(1,\pi)$



D: $[-1,1]$

R: $[-\pi,\pi]$

Name: _____ Date: _____ **Unit 9 Class Work**

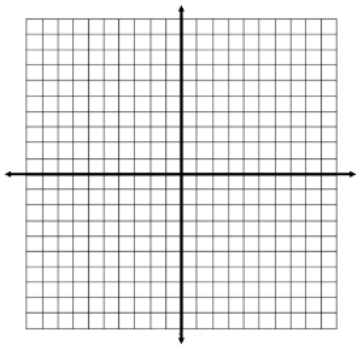
8. A. Use your knowledge of transformations to sketch the function $f(x) = -\sqrt{x+3} - 4$. Use a dotted curve.

B. What is the domain and range of the function?

C. What should the domain & range of the inverse of f(x) be? Why?

D. Sketch $f^{-1}(x)$ using a solid curve.

9. A. Use your knowledge of transformations to sketch the function g(x) = |x| - 3. Use a dotted curve.



B. What is the domain and range of the function?

C. What should the domain & range of the inverse of g(x) be? Why?

D. Sketch $g^{-1}(x)$ using a solid curve.

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***TRY SOME ON YOUR OWN:*** *Determine the inverse of each situation below.*

10. 3y + 7x = 10

11. $f(x) = 2x^2 + 5$

12. $f(x) = (x-1)^3$

13. $f(x) = \dfrac{1}{3x+2}$

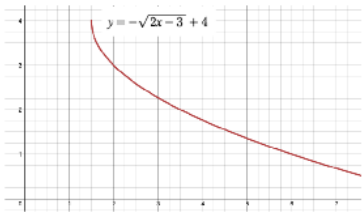
14. $y + 4 = \sqrt[3]{x-3}$

15. $y = 4$

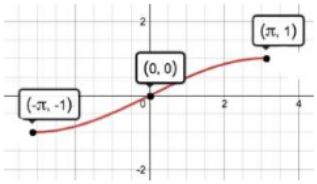
16. The set of points: {(3,-4), (0,-3), (9,10), (4,4)} _____

**For #17 & 18, state the domain and range for the function, graph the inverse, and state the domain & range of the inverse relation.**

17.

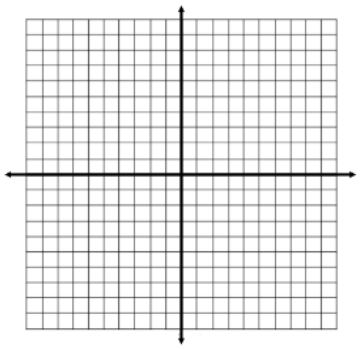



18.



Name: _____ Date: _____ **Unit 9 Class Work**

19. A. Use your knowledge of transformations to sketch the function $f(x) = -\sqrt{x-2} + 3$. Use a dotted curve.



B. What is the domain and range of the function?

C. What should the domain & range of the inverse of f(x) be? Why?

D. Sketch $f^{-1}(x)$ using a solid curve.

20. A. Use your knowledge of transformations to sketch the function g(x) = |x| + 4. Use a dotted curve.

B. What is the domain and range of the function?

C. What should the domain & range of the inverse of g(x) be? Why?

D. Sketch $g^{-1}(x)$ using a solid curve.

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## HOMEWORK:

*Pace yourself over the two days appropriately. ☺
*Solutions are on the website.

**Pages 404-406**

#1, 5, 9, 13, 15, 19, 20, 23, 25, 28, 29, 36, 38, 41, 42, 45, 46, 47, 56, and 60

**Complete the Analogy:**

Inverse relations are like

_____

because

_____.

**Be Creative!:**

Create ANY function (equation, set of points, table, real world situation, etc. – you choose!)

Switch with a partner, and determine the inverse relation of his/her function!

*Also be sure to write any questions you still have regarding inverse relations, and show me before you leave the room. ☺