Radical and Rational Review Name Key

Graphing Radicals!

- Look for the Keypoint. How did it move? Is there a stretch? Did it reflect? Transformations will be expressed the same way they did in quadratic.

  Parent Function: $y = \sqrt{x}$

- Domain and Range: dependent on the keypoint (Remember, we always go low bound to high bound!)

Solving Radicals!

1. Isolate the Radical.
2. Square both sides.
3. Solve for x!
4. Be sure to check all answers! Some times we do all the math right, but the solution does not work! We call these answers extraneous!

Solving Direct and Inverse Variation!

1. Read the equation and determine the type of variation.
2. Set up the generic equation for that variation problem.

   Direct: $y = kx$

   Inverse: $y = \frac{k}{x}$
3. Plug in the x and y values given! AND Solve for k!
4. Rewrite the generic equation in terms of x & y. But this time plug in _____.
5. Solve for what they ask for after plugging in the giving values!

Graphing Rationals (Inverse)!

- Draw in your asymptotes! Remember, these are lines we approach but never touch or cross! When we have these lines, we ask ourselves: How did it move? Is there a stretch? Did it reflect?

  Parent Function: $y = \frac{1}{x}$

- Domain and Range: dependent on asymptote!
  (Because we will have asymptotes we will have a union in our intervals!)

Solving Rationals (Inverse)!

1. Cross Multiply
2. Distribute if needed.
3. Solve for x!
4. Be sure to check all answers! Some times we do all the math right, but the solution does not work! We call these answers extraneous!

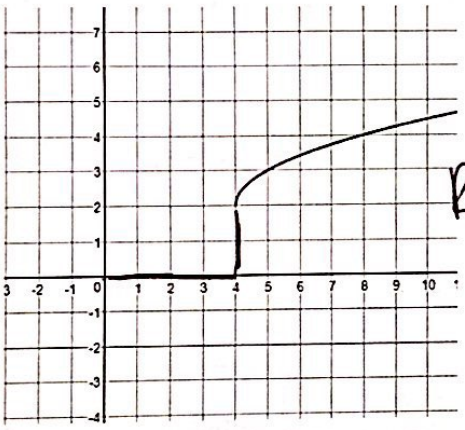
Name: Key Period: _____

Math 2 Review: Unit 6

Radical Functions

C 1. Which of the following equations matches this graph?

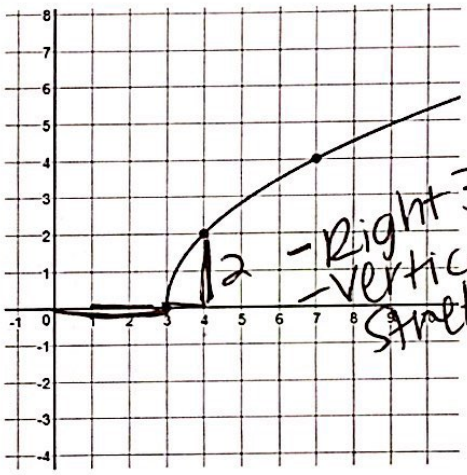
a. $f(x) = \frac{1}{x+4} - 2$
b. $f(x) = \sqrt{x+2} - 4$
c. $f(x) = \sqrt{x-4} + 2$
d. $f(x) = \frac{1}{x-4} + 2$



Right 4 up 2

A 2. Which of the following equation matches this graph?

a. $f(x) = 2\sqrt{x-3}$
b. $f(x) = \frac{2}{x+3}$
c. $f(x) = \frac{2}{x-3}$
d. $f(x) = 2\sqrt{x+3}$



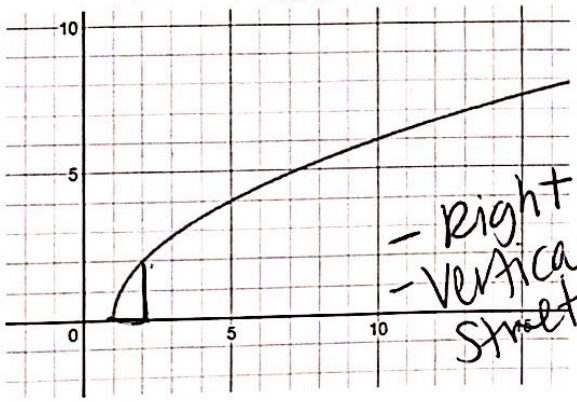
2 - Right 3 - Vertical Stretch by 2

C 3. Which equation models the graph?

a. $f(x) = \sqrt{x-1}$
b. $f(x) = 2\sqrt{x} - 1$
c. $f(x) = 2\sqrt{x-1}$
d. $f(x) = \frac{2}{x-1}$

D 4. What is the domain of the function?

a. $(0, \infty)$
b. $(1, \infty)$
c. $[0, \infty)$
d. $[1, \infty)$



- Right 1 - Vertical Stretch by 2

C 5. What is the range of the function?

a. $(0, \infty)$
b. $(1, \infty)$
c. $[0, \infty)$
d. $[1, \infty)$

* Remember we bracket values we can touch!

6. Write the equation for the following:

a. A square root function is translated 3 units to the right and down 5.

$\sqrt{x-3} - 5$

b. A square root function is vertically stretched by a factor of 2 and reflected over the x-axis.

$-2\sqrt{x}$

c. A square root function is translated 2 units to the left and one unit down.

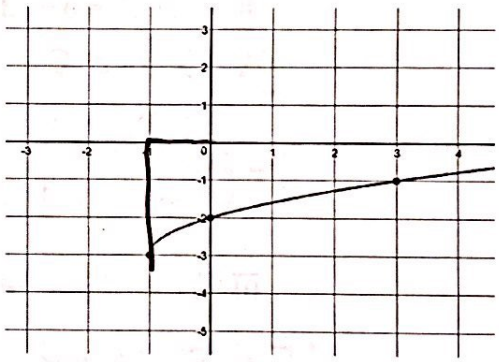
$\sqrt{x-2} - 1$

d. A square root function vertically compressed by a factor of 3, translated 1 unit to the right and 6 units down, and reflected over the x-axis

7. Transformations: left 1 Down 3

Equation: $\sqrt{x+1} - 3$

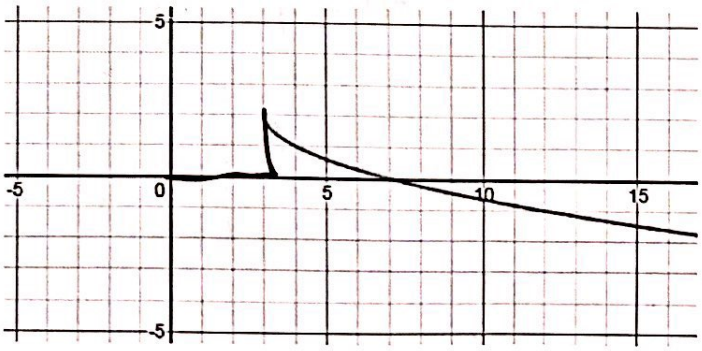
Domain: $[-1, \infty)$ Range: $[-3, \infty)$



8. Transformations: Right 3 Up 2, Reflect over the X-axis

Equation: $-\sqrt{x-3} + 2$

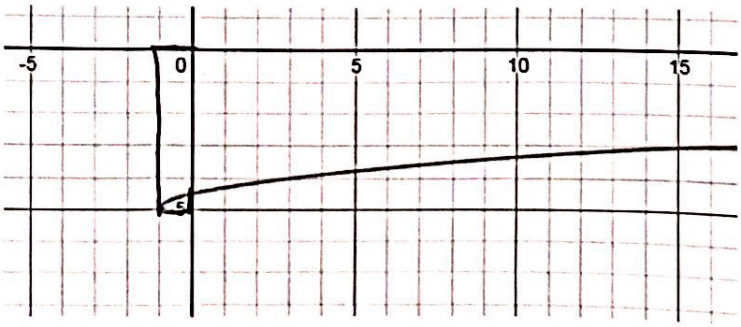
Domain: $[3, \infty)$ Range: $(-\infty, 2]$



9. Transformations: left 1 Down 5, Vertical Shrink by 1/2

Equation: $\frac{1}{2}\sqrt{x+1} - 5$

Domain: $[-1, \infty)$ Range $[-5, \infty)$



✱Be sure to check your answers!✱

10. Solve the following radical equations.

a. $\sqrt{2x-1}=3$

$2x-1=9$

$2x=10$

$\boxed{x=5}$ ✓

b. $\sqrt{x}+3=12$

$\sqrt{x}=9$

$\boxed{x=81}$ ✓

c. $\sqrt{x+2}=6$

$x+2=36$

$\boxed{x=34}$ ✓

d. $3\sqrt{x}-8=7$

$3\sqrt{x}=15$

$\sqrt{x}=5$

$\boxed{x=25}$ ✓

e. $2\sqrt{3x+7}-1=7$

$2\sqrt{3x+7}=8$

$\sqrt{3x+7}=4$

$3x+7=16$

$3x=9$

$\boxed{x=3}$ ✓

f. $-6=\sqrt{x-25}-8$

$2=\sqrt{x-25}$

$4=x-25$

$\boxed{x=29}$ ✓

g. $5=\sqrt{x+6}+3$

$2=\sqrt{x+6}$

$4=x+6$

$\boxed{-2=x}$ ✓

h. $\sqrt{4x+1}=\sqrt{x+10}$

$4x+1=x+10$

$3x+1=10$

$3x=9$

$\boxed{x=3}$ ✓

i. $\sqrt{3x-1}=\sqrt{2x+4}$

$3x-1=2x+4$

$x-1=4$

$\boxed{x=5}$ ✓

j. $5\sqrt{x+7}=25$

$\sqrt{x+7}=5$

$x+7=25$

$\boxed{x=18}$ ✓

k. $2\sqrt{x+8}+6=2$

$2\sqrt{x+8}=-4$

$\sqrt{x+8}=-2$

$x+8=4$

$x=-4$ ✗ Extraneous!

l. $2\sqrt{x+5}-1=3$

$2\sqrt{x+5}=4$

$\sqrt{x+5}=2$

$x+5=4$

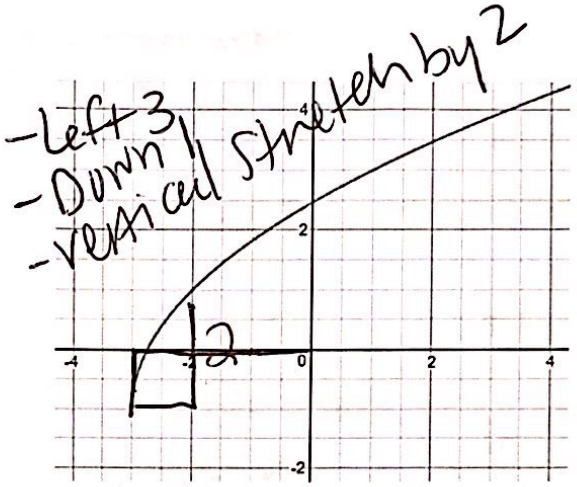
$\boxed{x=-1}$ ✓

★Careful of the Scale on graphs!★

INDEPENDENT PRACTICE

11. Which equation models the graph ?

a. $f(x) = \frac{1}{2}\sqrt{x-3}+1$
b. $f(x) = \sqrt{x+3}-1$
c. $f(x) = 2\sqrt{x+3}-1$
d. $f(x) = \frac{2}{x+3}-1$



12. What is the domain of the function?

a. [0, ∞)
b. [-3, ∞)
c. [-1, ∞)
d. (0, ∞)

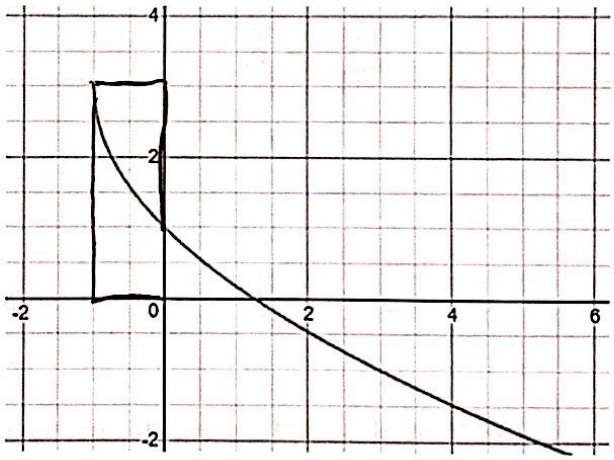
13. What is the range of the function?

a. [0, ∞)
b. [-3, ∞)
c. [-1, ∞)
d. (0, ∞)

14. Transformations: left 1, up 3, Reflect over x-axis, vertical stretch by 2

Equation: $-2\sqrt{x+1}+3$

Domain: $[-1, \infty)$ Range: $(-\infty, 3]$



15. Solve the following radical equations:

a. $3+\sqrt{21-2x}=4$

$\sqrt{21-2x}=1$

$21-2x=1$

$-2x=-20$

$x=10$ ✓

b. $\sqrt{8x+1}=7$

$8x+1=49$

$8x=48$

$x=6$ ✓

Inverse Functions

Determine whether the following functions are direct, inverse or neither.
If direct or inverse, identify the constant of variation.

1. $y = \frac{2}{3}x$ Direct

2. $y = \frac{3}{x}$ Inverse

3. $y = 4x + 2$ Neither

4. $y = 5x$ Direct

5. $y = 2x + 3$ Neither

6. $y = \frac{x}{3}$ Direct

7. $x = \frac{3}{y}$ $xy = 3$ $y = \frac{3}{x}$ Inverse

8. $\frac{1}{2}xy = 2$ $xy = 4$ $y = \frac{4}{x}$ Inverse

Solve for the given variable.
Remember, to do this we must first solve for k and rewrite our equation that relates to x and y

9. y varies inversely with x. y = 9 when x =12. Find x when y =3.

$y = \frac{k}{x}$ $9 = \frac{k}{12}$ $9 \cdot 12 = k$ $k = 108$ $y = \frac{108}{x}$ $3 = \frac{108}{x}$ $3x = 108$ $x = 36$

10. y varies inversely with x. y=0.3 when x =4. Find y when x =5.

$y = \frac{k}{x}$ $.3 = \frac{k}{4}$ $k = .3 \times 4$ $k = .12$ $y = \frac{.12}{5}$ $y = .024$

Solve the following word problems. Remember, we want to solve using the same process.
Be sure to label your equation in context of the problem!

$y = \frac{k}{x}$

11. The number of revolutions made by a tired traveling over a fixed distance varies inversely to the radius of the tire. A 12-inch radius tire makes 100 revolutions to travel a certain distance. How many revolutions would a 16-inch radius tire require to travel the same distance?

$rev = \frac{k}{rad}$ $100 = \frac{k}{12}$ $k = 1200$ $rev = \frac{1200}{rad}$ $rev = \frac{1200}{16}$ $rev = 75$ 75 revolutions

$y = \frac{k}{x}$

12. The time of the trip varies inversely as the speed of the car. If a car being driven at 60 mph takes 4 hours to travel from Wake Forest to Charlotte, if the drive takes you 3 hours, how fast were you driving?

$time = \frac{k}{speed}$ $4 = \frac{k}{60}$ $k = 240$ $time = \frac{240}{speed}$ $3 = \frac{240}{speed}$ $3speed = 240$ $speed = \frac{240}{3}$ speed = 80 mph

D 13. Which of the following equations matches this graph?

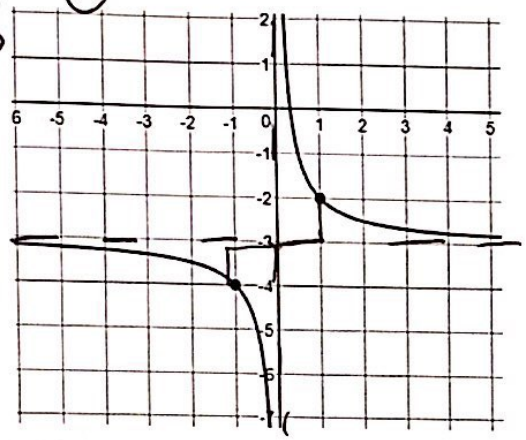
a. $f(x) = \frac{1}{x-3}$

b. $f(x) = \sqrt{x} - 3$

c. $f(x) = \sqrt{x-3}$

d. $f(x) = \frac{1}{x} - 3$

-Down 3



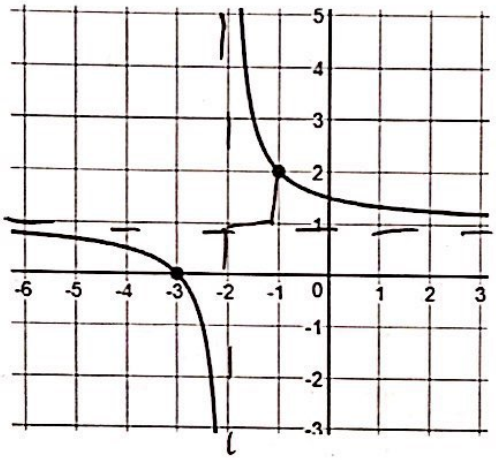
C 14. Which of the following equation matches this graph?

a. $f(x) = \sqrt{x+1} + 2$

b. $f(x) = \sqrt{x+2} + 1$

c. $f(x) = \frac{1}{x+2} + 1$

d. $f(x) = \frac{1}{x+1} + 2$



UP 1
left 2

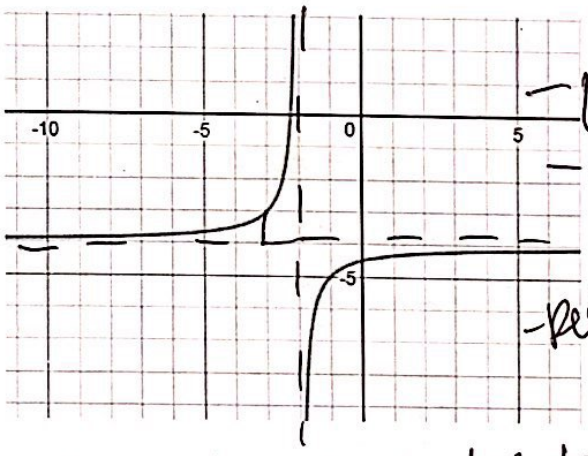
D 15. Which equation models the graph?

a. $f(x) = \frac{1}{x-2} + 4$

b. $f(x) = -\sqrt{x+2} - 4$

c. $f(x) = \frac{-1}{x-2} + 4$

d. $f(x) = \frac{-1}{x+2} - 4$



- left 2
- Down 4
- Reflect!

C 16. What is the domain of the function?

a. $(-\infty, \infty)$

b. $(-\infty, -4) \cup (-4, \infty)$

c. $(-\infty, -2) \cup (-2, \infty)$

d. $(-\infty, -2] \cup [-2, \infty)$

B 17. What is the range of the function?

a. $(-\infty, \infty)$

b. $(-\infty, -4) \cup (-4, \infty)$

c. $(-\infty, -2) \cup (-2, \infty)$

d. $(-\infty, -2] \cup [-2, \infty)$

* Can't touch values due to asymptotes so we must use parenthesis.

18. Write the equation for the following:

a. An inverse variation function that is translated 2 units to the left and 1 unit down.

$\frac{1}{x+2} - 1$

b. An inverse variation function is translated 3 units up and reflected.

$\frac{-1}{x} + 3$

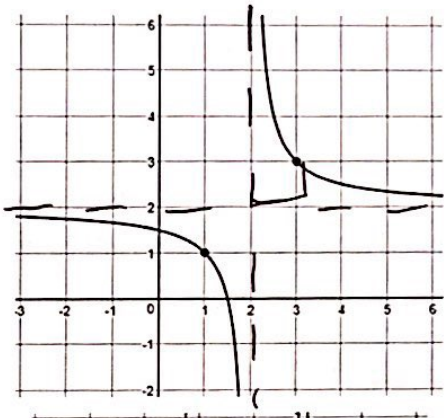
c. An inverse function is vertically compressed by 2 and translated 4 units right.

$\frac{2}{x-4}$

19. Transformations: Right 2, Up 2

Equation: $\frac{1}{x-2}+2$

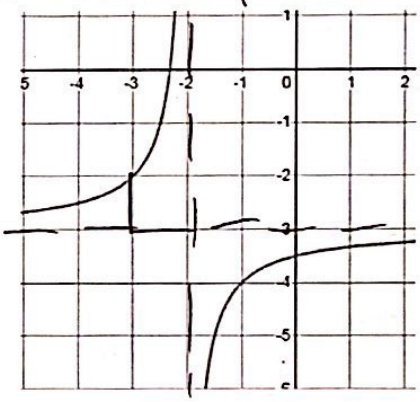
Domain: $(-\infty,2)\cup(2,\infty)$ Range: $(-\infty,2)\cup(2,\infty)$



20. Transformations: Left 2, Down 3
Reflect

Equation: $\frac{1}{x+2}-3$

Domain: $(-\infty,-2)\cup(-2,\infty)$ Range: $(-\infty,-3)\cup(-3,\infty)$



21. Solve the following equations:

a.. $\frac{8}{3x+2}=\frac{4}{2x}$

$8(2x)=4(3x+2)$
$16x=12x+8$
$4x=8$
$\boxed{x=2}$ ✓

b. $\frac{4}{x+2}=\frac{3}{x}$

$4x=3(x+2)$
$4x=3x+6$
$\boxed{x=6}$ ✓

c. $\frac{2}{x-3}=\frac{1}{2x-3}$

$x-3=2(2x-3)$
$x-3=4x-6$
$x+3=4x$
$3=3x$
$\boxed{x=1}$ ✓

d. $\frac{12}{x}=\frac{24}{x+5}$

$24x=12(x+5)$
$24x=12x+60$
$12x=60$
$\boxed{x=5}$ ✓

e. $\frac{x-5}{15}=\frac{4}{5}$

$15(4)=5(x-5)$
$60=5x-25$
$85=5x$
$\boxed{x=17}$ ✓

f. $\frac{3}{5-3x}=\frac{1}{2}$

$3(2)=5-3x$
$6=5-3x$
$1=-3x$
$\boxed{x=\frac{-1}{3}}$ ✓

INDEPENDENT PRACTICE

22. y varies inversely with x. y=4 when x = 6. Find x when y =2.

$y = \frac{k}{x}$ $4 = \frac{k}{6}$ $k = 4 \cdot 6$ $k = 24$ $y = \frac{24}{x}$ $2 = \frac{24}{x}$ $2x = 24$ $x = 12$

$y = \frac{k}{x}$

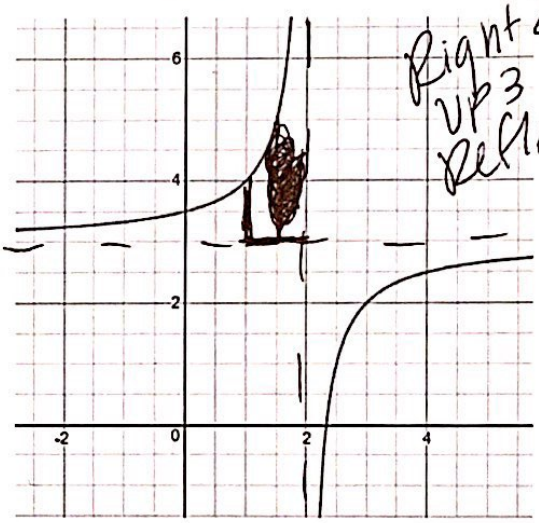
23. The time it takes to fly from Los Angeles to New York varies inversely as the speed of the plane. If the trip takes 6 hours at 900 km/h, how long would it take at 800 km/h?

$time = \frac{k}{speed}$ $6 = \frac{k}{900}$ $k = 6 \cdot 900$ $k = 5400$ $time = \frac{5400}{speed}$ $time = \frac{5400}{800}$ time = 6.75 hours

24. Which equation models the graph?

C

a. $f(x) = \frac{1}{x-2} + 3$
b. $f(x) = -\sqrt{x-2} + 3$
c. $f(x) = \frac{-1}{x-2} + 3$
d. $f(x) = \frac{-1}{x+2} - 3$



25. What is the domain of the function?

a. $(-\infty, \infty)$ b. $(-\infty, 2) \cup (2, \infty)$
c. $(-\infty, 3) \cup (3, \infty)$ d. $(-\infty, 0) \cup (0, \infty)$

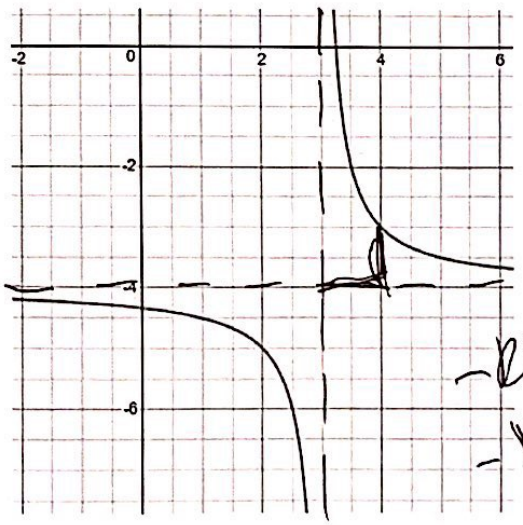
26. What is the range of the function?

a. $(-\infty, \infty)$ b. $(-\infty, 2) \cup (2, \infty)$
c. $(-\infty, 3) \cup (3, \infty)$ d. $(-\infty, 0) \cup (0, \infty)$

27. Transformations: Right 3, Down 4

Equation: $\frac{1}{x-3} - 4$

Domain: $(-\infty, 3) \cup (3, \infty)$ Range: $(-\infty, -4) \cup (-4, \infty)$



28. Solve the following equations:

a. $\frac{6}{x-9} = \frac{4}{6}$

$6(6) = 4(x-9)$
$36 = 4x - 36$
$6 = 4x$
$x = 0$ ✓

b. $\frac{x-6}{7} = \frac{x}{4}$

$7x = 4(x-6)$
$7x = 4x - 24$
$3x = -24$
$x = -8$ ✓