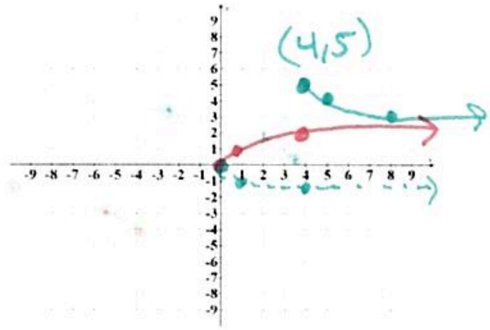
PAP Algebra II
**Chapter 10 Test Review**

Name: key

## Radical Functions

1. Given the function, y = $-\sqrt{x-4}+5$, answer the following:

| +4 | x | y | $\times -1$ | +5 |
|---|---|---|---|---|
| 4 | 0 | 0 | 0 | 5 |
| 5 | 1 | 1 | -1 | 4 |
| 8 | 4 | 2 | -2 | 3 |




Domain: $x \geq 4$

Range: $y \leq 5$

maximum value: $y = 5$

minimum value: NONE

2. Given $y = \sqrt{x}$, write the equation of the graph that has been horizontally compressed, shifted up 2 units, and reflected over the y-axis.

$y = \sqrt{-2(x)} + 2$

3. Given $y = \sqrt[3]{x}$, write the equation of the graph that has been vertically compressed by a factor of $\frac{1}{4}$, shifted right 3 units, and up 7 units.

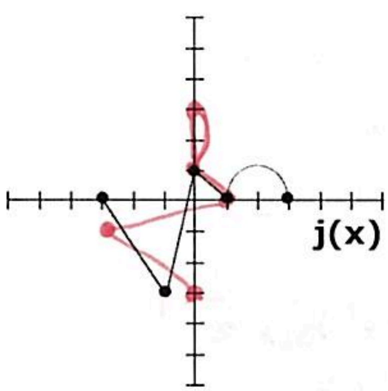
$y = \cancel{\frac{1}{4}}\sqrt[3]{x-3} + 7$

4. In your own words, describe how the graph of $f(x) = 3\sqrt{x-4}+1$ has been transformed to the graph $g(x) = \frac{1}{3}\sqrt{x+5}-2$.

- vertical compress
- left 9
- Down 3

## Inverses

5. Graph the inverse of the function j(x) on the same grid. (*Hint: key points*)

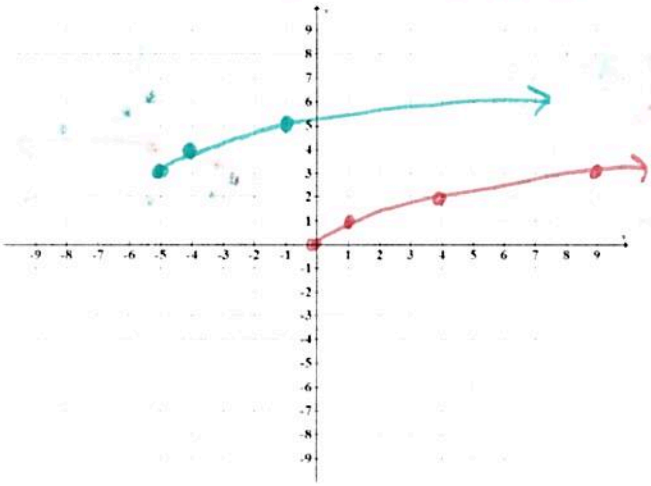


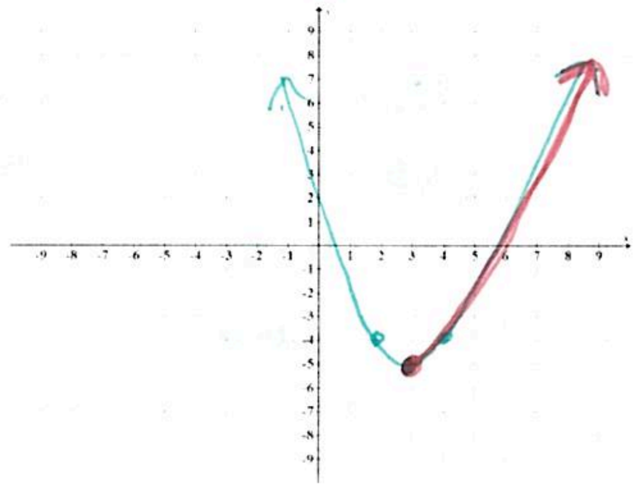

| x | y |
|---|---|
| -3 | 0 |
| -1 | -3 |
| 0 | 1 |
| 1 | 0 |
| 3 | 0 |

| $x^{-1}$ | $y^{-1}$ |
|---|---|
| 0 | -3 |
| -3 | -1 |
| 1 | 0 |
| 0 | 1 |
| 0 | 3 |

6. Graph the following equation. Then, solve for the inverse of the given equation and graph it in the second coordinate grid.

$f(x) = \sqrt{x+5} + 3$ $\qquad f(x) = \sqrt{x}$ $\qquad$ Inverse Equation: $y = (x-3)^2 - 5$





$X = \sqrt{y+5} + 3$

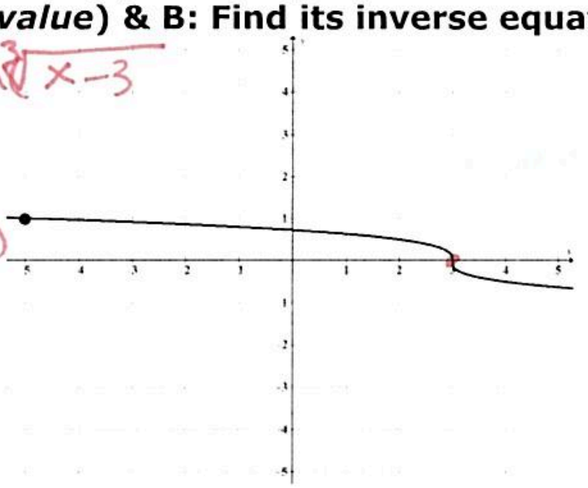
$(x-3)^2 = (\sqrt{y+5})^2$

$(x-3)^2 = y+5 \qquad \boxed{y = (x-3)^2 - 5} \quad x \geq 3$

**For 7-8, given the graphs- A: Find the function equation (*make sure to find the a-value*) & B: Find its inverse equation.**

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

$(-5,1)$



7.

A: $\boxed{y = -\tfrac{1}{2}\sqrt[3]{x-3}}$

$1 = a\sqrt[3]{-5-3}$

$1 = a\sqrt[3]{-8}$

$1 = -2a \qquad \boxed{a = -\tfrac{1}{2}}$

B: $\boxed{y = (-2x)^3 + 3}$

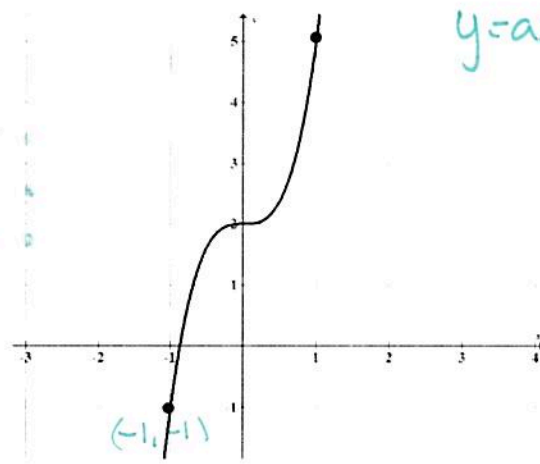
$x = -\tfrac{1}{2}\sqrt[3]{y-3}$

$(-2x)^3 = (\sqrt[3]{y-3})^3$

$(-2x)^3 = y-3$

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

$y = ax^3 + 2$




8.

A: $\boxed{y = 3x^3 + 2}$

$-1 = a(-1)^3 + 2$

$-1 = -a + 2$

$-2 \quad -2$

$-3 = -a \qquad \boxed{a = 3}$

B: $\boxed{y = \sqrt[3]{\tfrac{1}{3}(x-2)}}$

$x = 3y^3 + 2$

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

$y^3 = \frac{x-2}{3} \qquad y = \sqrt[3]{\frac{x-2}{3}}$ or $y = \sqrt[3]{\tfrac{1}{3}(x-2)}$

**For 9-11, use the following functions to find the indicated compositions:**

$$f(x)=x^2-5,\quad g(x)=3x+1,\quad h(x)=\frac{1}{x}$$

9. $h(f(g(2)))$

$h(f(3(2)+1)$

$h(f(7))$

$h(7^2-5)$

$h(44) = \boxed{\frac{1}{44}}$

10. $(g\circ f)(-1)$

$g(f(-1))$

$g((-1)^2-5)$

$g(-4) = 3(-4)+1 = \boxed{-11}$

11. $h(g(f(x)))$

$h(g(x^2-5))$

$h(3(x^2-5)+1)$

$h(3x^2-15+1)$

$h(3x^2-14) = \boxed{\frac{1}{3x^2-14}}$

**For 12-14, use composition of functions to verify that the given two functions are inverses of each other:**

12. $f(x)=(x+3)^2$, $g(x)=\sqrt{x}-3$

$f(g(x)) = (\sqrt{x}-3+3)^2 = (\sqrt{x})^2 = \boxed{x}$ ✓

$g(f(x)) = \sqrt{(x+3)^2}-3 = x+3-3 = \boxed{x}$ ✓

yes!

13. $f(x)=(x-5)^3$, $g(x)=\sqrt[3]{x+5}$

$f(g(x)) = (\sqrt[3]{x+5}-5)^3$

$g(f(x)) = \sqrt[3]{(x-5)^3+5}$

X No!

14. $f(x)=\frac{1}{5}(x+1)^2$, $g(x)=\sqrt{5x}-1$

$f(g(x)) = 1/5(\sqrt{5x-1+1})^2 = \frac{1}{5}(\sqrt{5x})^2 = \frac{1}{5}(5x) = \boxed{x}$ ✓

$g(f(x)) = \sqrt{5(1/5x+1)^2}-1 = \sqrt{5(1/25x^2+2/5x+1)}-1$

$\sqrt{1/5x^2+2x+5}-1$ X $\boxed{NO}$

$(1/5x+1)(1/5x+1)$

$\frac{1}{25}x^2+1/5x+1/5x+1$

$1/25x^2+2/5x+1$

15. Find the inverse of $f(x)=2(x+1)^2+3\ with\ domain\ x\le -1$.

$x = 2(y+1)^2+3$

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

$\sqrt{\frac{1}{2}(x-3)} = \sqrt{(y+1)^2}$

$\sqrt{1/2(x-3)} = y+1$

$\boxed{y = \sqrt{1/2(x-3)}-1 \quad x\le 3}$

16. Find the inverse of $f(x)=-\frac{1}{3}x+5$.

$x = -1/3y+5$

$-3(x-5) = (-1/3y)-3$

$\boxed{y = -3(x-5)}$

**Simplifying Radical Equations**
**Simplify the following :**

17. $(xy)^{\frac{1}{4}}\left(x^2y^2\right)^{\frac{3}{2}}$

$x^{1/4}y^{1/4} \cdot x^3y^3$

$\boxed{x^{3/4}y^{3/4}}$

18. $(x^4y^8)^{\frac{7}{4}}$

$\boxed{x^7y^{14}}$

19. $(9x^{-3})(2xy)^0$

$1$

$\boxed{\frac{1}{9x^3}}$

**Solving Radical Equations**

20. Solve $\sqrt[3]{5x-1} = 4$

$5x-1=4^3$

$5x-1=64$

$+1 \quad +1$

$\frac{5x}{5}=\frac{65}{5}$

$\boxed{x=13}$

21. Solve $(x-2)^{\frac{3}{4}} = 27$

$\sqrt[3]{(\sqrt[4]{x-2})^3}\ \sqrt[3]{27}$

$(\sqrt[4]{x-2})^4 = 3^4$

$x-2=81$

$+2 \quad +2$

$\boxed{x=83}$

22. Solve $\sqrt{3x+1}-1=4$

$+1 \quad +1$

$(\sqrt{3x+1})^2 = 5^2$

$3x+1=25$

$-1 \quad -1$

$\frac{3x}{3}=\frac{24}{3}$

$\boxed{x=8}$

23. Solve $(x+1)^{\frac{1}{3}} + 11 = 9$

$\sqrt[3]{x+1} + 11 = 9$

$-11 \quad -11$

$(\sqrt[3]{x+1})^3 = -2^3$

$x+1=-8$

$-1 \quad -1$

$\boxed{x=-9}$

24. If 3 is a solution to the equation $\sqrt{2ax-2} = \sqrt{7a+4}$, then what is the value of "a"?

$\sqrt{2a(3)-2} = \sqrt{7a+4}$

$\sqrt{6a-2} = \sqrt{7a+4}$

$6a-2=7a+4$

$-6a \quad -6a$

$-2=a+4$

$-4 \quad -4$

$\boxed{a=-6}$