Name: Key

Period _____

Math 3: 1.5 Solving Radical Equations

Factor each polynomial. *(Factoring never goes away...)*

1. $x^2 - x - 12$ $(x-4)(x+3)$	2. $x^2 + x - 12$ $(x+4)(x-3)$	3. $x^2 + 7x + 12$ $(x+3)(x+4)$
4. $x^2 - 7x + 12$ $(x-3)(x-4)$	5. $x^2 - 4x - 12$ $(x-6)(x+2)$	6. $x^2 - 11x - 12$ $(x-12)(x+1)$

Find the inverse of each function.

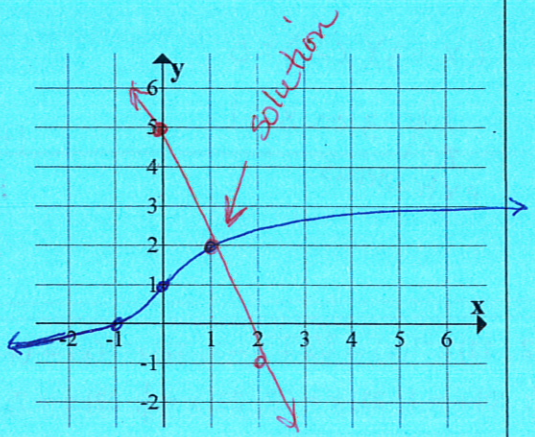
7. $g(x) = -\frac{1}{2}x + 1$ $x = -\frac{1}{2}y + 1$ $-2(x-1) = -\frac{1}{2}y(-2)$ $-2x+2 = y$ $g^{-1}(x) = -2x+2$	8. $f(x) = 4x - 7$ $x = 4y - 7$ $\frac{x+7}{4} = \frac{4y}{4}$ $f^{-1}(x) = \frac{x+7}{4}$ or $f^{-1}(x) = 1/4\,x + 7/4$	9. $h(x) = (x+7)^2, x \geq -7$ $\sqrt{x} = \sqrt{(y+7)^2}$ $\sqrt{x} = y+7$ $\sqrt{x} - 7 = y$ $h^{-1}(x) = \sqrt{x} - 7$
10. $j(x) = \sqrt{x-2} + 7$ $x = \sqrt{y-2} + 7$ $(x-7)^2 = (\sqrt{y-2})^2$ $(x-7)^2 = y-2$ $y = (x-7)^2 + 2$ $j^{-1}(x) = (x-7)^2 + 2$	11. $k(x) = (x+3)^3 - 4$ $x = (y+3)^3 - 4$ $\sqrt[3]{x+4} = \sqrt[3]{(y+3)^3}$ $\sqrt[3]{x+4} = y+3$ $y = \sqrt[3]{x+4} - 3$ $k^{-1}(x) = \sqrt[3]{x+4} - 3$	12. $r(x) = \sqrt[3]{x} + 1$ $x = \sqrt[3]{y} + 1$ $(x-1)^3 = (\sqrt[3]{y})^3$ $(x-1)^3 = y$ $r^{-1}(x) = (x-1)^3$

Solve for x by graphing.

13. $\sqrt[3]{x} + 1 = -3x + 5$

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

$y = -3x + 5$



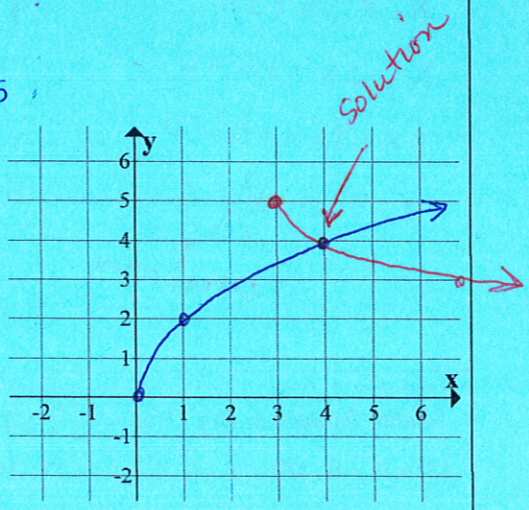
Solution:

$x = 1$

14. $2\sqrt{x} = -\sqrt{x-3} + 5$

$y = 2\sqrt{x}$

$y = -\sqrt{x-3} + 5$



Solution:

$x = 4$

Solve for x. Be sure to check for extraneous solutions.

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

$x = (-2)^3$

$x = -8$

$\sqrt[3]{-8} = -2$

$-2 = -2$

16. $\sqrt{x} - 3 = 5$

$+3 \quad +3$

$(\sqrt{x})^2 = (8)^2$

$x = 64$

$\sqrt{64} - 3 = 5$

$8 - 3 = 5$

$5 = 5$

17. $2\sqrt{x-1} - 3 = 5$

$+3 \quad +3$

$2\sqrt{x-1} = 8$

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

$x - 1 = 16$

$x = 17$

$2\sqrt{17-1} - 3 = 5$

$2(4) - 3 = 5$

$8 - 3 = 5$

$5 = 5$

18. $\sqrt[3]{x+4} + 7 = 4$

$-7 \quad -7$

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

$x + 4 = -27$

$x = -31$

$\sqrt[3]{-31+4} + 7 = 4$

$\sqrt[3]{-27} + 7 = 4$

$-3 + 7 = 4$

$4 = 4$

19. $(\sqrt[3]{4x-9})^3 = (\sqrt[3]{2x-4})^3$

$4x - 9 = 2x - 4$

$-2x + 9 \quad -2x + 9$

$2x = 5$

$x = 5/2$

$\sqrt[3]{4(5/2)-9} = \sqrt[3]{2(5/2)-4}$

$\sqrt[3]{10-9} = \sqrt[3]{5-4}$

$\sqrt[3]{1} = \sqrt[3]{1}$

$1 = 1$

20. $10 + \sqrt{10x-1} = 13$

$-10 \quad -10$

$(\sqrt{10x-1})^2 = (3)^2$

$10x - 1 = 9$

$10x = 10$

$x = 1$

$10 + \sqrt{10(1)-1} = 13$

$10 + \sqrt{9} = 13$

$10 + 3 = 13$

$13 = 13$

21. $\frac{5\sqrt[3]{2x}}{5} = \frac{20}{5}$

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

$2x = 64$

$x = 32$

$5\sqrt[3]{2(32)} = 20$

$5\sqrt[3]{64} = 20$

$5(4) = 20$

$20 = 20$

22. $(\sqrt{2x-1})^2 = (0)^2$

$2x - 1 = 0$

$2x = 1$

$x = \frac{1}{2}$

$\sqrt{2(1/2)-1} = 0$

$\sqrt{1-1} = 0$

$\sqrt{0} = 0$

$0 = 0$

23. $(x)^2 = (\sqrt{35+2x})^2$

$x^2 = 35 + 2x$

$x^2 - 2x - 35 = 0$

$(x-7)(x+5) = 0$

$x = 7$ or $x \neq -5$ (extraneous)

$7 = \sqrt{35+2(7)}$

$7 = \sqrt{49}$

$7 = 7$

or

$-5 = \sqrt{35+2(-5)}$

$-5 = \sqrt{25}$

$-5 \neq 5$

24. $(x+2)^2 = (\sqrt{2x+7})^2$

$x^2 + 4x + 4 = 2x + 7$

$x^2 + 2x - 3 = 0$

$(x+3)(x-1) = 0$

$x \neq -3$ or $x = 1$ (extraneous)

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

$-1 = \sqrt{-6+7}$

$-1 = \sqrt{1}$

$-1 \neq 1$

$1+2 = \sqrt{2(1)+7}$

$3 = \sqrt{9}$

$3 = 3$

Select Answers: **8)** $f^{-1}(x) = \frac{x+7}{4}$; **10)** $j^{-1}(x) = (x-7)^2 + 2$; **11)** $k^{-1}(x) = \sqrt[3]{x+4} - 3$; **12)** $r^{-1}(x) = (x-1)^3$; **14)** $x = 4$; **15)** $x = -8$; **16)** $x = 64$; **17)** $x = 17$; **18)** $x = -31$; **19)** $x = \frac{5}{2}$; **20)** $x = 1$; **21)** $x = 32$; **22)** $x = \frac{1}{2}$; **23)** $x = 7$; **24)** $x = 1$