Key

Pre-Calculus Academic
Solving Equations (Quadratic, Absolute Value, Rational and Radical) Study Guide

Name:_____
Date:_____ Pd.____

Directions: Solve for x. Check for extraneous solutions. SHOW ALL WORK!

1. $8x^2 + 4x - 16 = -x^2$

$9x^2+4x-16=0$

$a=9$, $b=4$, $c=-16$

$x=\frac{-4\pm\sqrt{4^2-4(9)(-16)}}{2(9)}$

$x=\frac{-4\pm\sqrt{592}}{18} \rightarrow x=\frac{-4\pm\sqrt{16}\cdot\sqrt{37}}{18}$

$x=\frac{-4\pm4\sqrt{37}}{18}$

$\boxed{x=\frac{-2\pm2\sqrt{37}}{9}}$

2. $6x^2 - 18x - 18 = 6$

$6x^2-18x-24=0$

$6(x^2-3x-4)=0$

$6(x-4)(x+1)=0$

$x-4=0 \mid x+1=0$

$\boxed{x=4 \quad x=-1}$

3. $\sqrt{4x+8} - 3 = x$

$(\sqrt{4x+8})^2=(x+3)^2$

$4x+8=x^2+6x+9$

$x^2+2x+1=0$

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

$x+1=0$

$\boxed{x=-1}$

4. $|x + 2| = 7$

$x+2=7 \mid x+2=-7$

$\boxed{x=5} \mid \boxed{x=-9}$

5. $20x^3 - 125x = 0$

$5x(4x^2-25)=0$

$5x(2x+5)(2x-5)=0$

$5x=0 \mid 2x+5=0 \mid 2x-5=0$

$\boxed{x=0 \mid x=-5/2 \mid x=5/2}$

6. $\frac{6}{x}-\frac{2}{x+3}=\frac{3x+15}{x^2+3x}$

$\left(\frac{6}{x}\right)^{x+3}-\left(\frac{2}{x+3}\right)^{x}=\frac{3x+15}{x(x+3)}$

$6x+18-2x=3x+15$

$4x+18=3x+15$

$x=-3$

makes denominator undefined

$\frac{6}{-3}-\frac{2}{-3+3}=\frac{3(-3)+15}{(-3)^2+3(-$

$2-$

No Solution

7. $(x-5)^2 + 9 = 73$

$\sqrt{(x-5)^2}=\sqrt{64}$

$x-5=\pm8$

$x-5=8 \mid x-5=-8$

$\boxed{x=13 \mid x=-3}$

8. $9x^2 = 4 + 7x$

$9x^2-7x-4=0$

$a=9$, $b=-7$, $c=-4$

$x=\frac{7\pm\sqrt{(-7)^2-4(9)(-4)}}{2(9)}$

$\boxed{x=\frac{7\pm\sqrt{193}}{18}}$

9. $\frac{5x-4}{5x+4} = \frac{2}{3}$

$3(5x-4) = 2(5x+4)$

$15x-12 = 10x+8$

$5x = 20$

$\boxed{x=4}$

10. $15x^2 - 3x - 3 = -7x$

$15x^2+4x-3=0$

P(-45)	S(4)
9, -5	✓

or Quad Form.

$(15x^2-5x)(9x-3)=0$

$5x(3x-1)+3(3x-1)=0$

$(5x+3)(3x-1)=0$

$5x+3=0$	$3x-1=0$
$x=-3/5$	$x=1/3$

11. $\frac{3}{x+2} - \frac{4}{x-2} = 5$

$(x+2)(x-2)$

$x^2-2x+2x-4$

x^2-4

$\frac{3(x-2)}{(x+2)(x-2)} - \frac{4(x+2)}{(x+2)(x-2)} = \frac{5(x^2-4)}{(x+2)(x-2)}$

$3x-6-4x-8 = 5x^2-20$

$-x-14 = 5x^2-20$

$5x^2+x-6=0$

P(-30)	S(1)
-5, 6	✓

or Quad Form.

$(5x^2-5x)(6x-6)=0$

$5x(x-1)+6(x-1)=0$

$(5x+6)(x-1)=0$

$5x+6=0$	$x-1=0$
$x=-6/5$	$x=1$

12. $\frac{x+5}{x^2+x} = \frac{1}{x^2+x} - \frac{x-6}{x+1}$

$\frac{(x+5)}{x(x+1)} = \frac{(1)}{x(x+1)} - \frac{(x-6)x}{x(x+1)}$

$x+5 = 1-x^2+6x$

$x^2-5x+4=0$

$(x-4)(x-1)=0$

$x-4=0$	$x-1=0$
$x=4$	$x=1$

13. $|x-10| = x^2-10x$

$x-10 = x^2-10x$

$x^2-11x+10=0$

$(x-10)(x-1)=0$

$x-10=0$	$x-1=0$
$x=10$	$x=1$ ✗

$x-10 = -x^2+10x$

$x^2-9x-10=0$

$(x-10)(x+1)=0$

$x-10=0$	$x+1=0$
$\boxed{x=10}$	$\boxed{x=-1}$

$|1-10| = 1^2-10(1)$

$|-9| = -9$

$9 \neq -9$

14. $3(x+1)^2 - 5 = 70$

$3(x+1)^2 = 75$

$\sqrt{(x+1)^2} = \sqrt{25}$

$x+1 = \pm 5$

$x+1=5$	$x+1=-5$
$x=4$	$x=-6$

15. $x^4 + 5x^2 - 36 = 0$

$(x^2)^2 + 5(x^2) - 36 = 0$

$(x^2+9)(x^2-4)=0$

$x^2-4=0$

$x^2=4$ $\quad \boxed{x=\pm 2}$

16. $x^4 + 2x^3 - 8x - 16 = 0$

$x^3(x+2) - 8(x+\ ) = 0$

$(x^3-8)(x+2)=0$

$x^3-8=0$	$x+2=0$
$\sqrt[3]{x^3} = \sqrt[3]{8}$	
$x=2$	$x=-2$

17. $\left(\sqrt{3x-58}\right)^2 = \left(\sqrt{\frac{x}{10}}\right)^2$

$10(3x-58) = \left(\frac{x}{10}\right)10$

$30x-580 = x \longrightarrow -580 = 29x$

$\boxed{x=20}$

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

on separate sheet

18.) $\left(\sqrt{x+1}\right)^2 = \left(3-\sqrt{4-x}\right)^2$

$x+1 = (3-\sqrt{4-x})(3-\sqrt{4-x})$

$x+1 = 9 - 3\sqrt{4-x} - 3\sqrt{4-x} + 4 - x$

$x+1 = 13 - 6\sqrt{4-x} - x$

$+x \quad -13 \quad -13 \quad +x$

$(2x-12)^2 = (-6\sqrt{4-x})^2$

$(2x-12)(2x-12) = 36(4-x)$

$4x^2 - 24x - 24x + 144 = 144 - 36x$

$4x^2 - 48x + 144 = 144 - 36x$

$+36x \quad -144 \quad -144 \quad +36x$

$4x^2 - 12x = 0$

$4x(x-3) = 0$

$\boxed{x=0}$ $x=3$