Algebra Review Solving Quadratics

Name _____

PROBLEM SOLVING

I. Solve by Factoring

1.) $x^2 - 64 = 0$

DoS

$(x+8)(x-8)=0$

$x+8=0 \quad x-8=0$

$x=-8 \quad x=8$

2.) $x^2 - 6x - 16 = 0$

Product Sum

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

$x-8=0 \quad x+2=0$

$x=8 \quad x=-2$

3.) $x^2 + 3x = 40$

Prod Sum

$x^2+3x-40=0$

$(x+8)(x-5)=0$

$x+8=0 \quad x-5=0$

$x=-8 \quad x=5$

Hmm 4.) $2x^2+3x+1=0$

$(2x+1)(x+1)=0$

$2x+1=0 \quad x+1=0$

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

5.) $x^2 - 100 = 0$

DoS

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

$x=-10 \quad x=10$

6.) $x^2 + 6x = 0$

GCF:

$x(x+6)=0$

$x=0 \quad x+6=0$

$x=-6$

II. Solve by Square Roots

7.) $x^2 = 64$

$x=\pm 8$

8.) $4x^2 = 81$

$\frac{4}{4} \quad \frac{4}{4}$

$\sqrt{x^2}=\sqrt{\frac{81}{4}}$

$x=\pm\frac{9}{2}$

9.) $x^2 + 7 = -300$

$-7 \quad -7$

$\sqrt{x^2}=\sqrt{-307}$

No Sol

10.) $\sqrt{(x-5)^2}=\sqrt{36}$

$x-5=\pm 6$

$+5 \quad +5$

$x=6+5 \quad x=-6+5$

$x=11 \quad x=-1$

III. Solve by using the **quadratic formula**:

11. $x^2 + 3x + 2 = 0$

$A=1 \quad B=3 \quad C=2$

$$x = \frac{-3 \pm \sqrt{3^2-4(1)(2)}}{2(1)}$$

$$= \frac{-3 \pm \sqrt{1}}{2} = \frac{-3 \pm 1}{2}$$

$$x = \frac{-3+1}{2} = -1$$

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

12. $4x^2 - 8x = 1$

$4x^2 - 8x - 1 = 0$

$a=4 \quad b=-8 \quad c=-1$

$$x = \frac{8 \pm \sqrt{(-8)^2-4(4)(-1)}}{2(4)}$$

$$x = \frac{8 \pm \sqrt{64+16}}{8} = \frac{8 \pm \sqrt{80}}{8}$$

$$x = \frac{8 \pm 4\sqrt{5}}{8} = \boxed{1 \pm \frac{\sqrt{5}}{2}}$$

13. $x^2 + 8x = 0$

$a=1 \quad b=8 \quad c=0$

$$x = \frac{-8 \pm \sqrt{8^2-4(1)(0)}}{2(1)}$$

$$= \frac{-8 \pm \sqrt{64}}{2} = \frac{-8 \pm 8}{2}$$

$$x = \frac{-8+8}{2} = 0$$

$$x = \frac{-8-8}{2} = -8$$

Solve each equation any way you want. Show your work. I'm showing the best method for each.

14. $x^2 + 11x + 18 = 0$

Factor

$(x+9)(x+2) = 0$

$x+9=0 \quad x+2=0$

$x=-9 \quad x=-2$

CTS 15. $x^2 + 2x + 1 = 15$

$\left(\frac{2}{2}\right)^2 = 1$

$x^2+2x+\underline{1} = 14+\underline{1}$

$\sqrt{(x+1)^2} = \sqrt{15}$

$x+1 = \pm\sqrt{15}$

$x = -1 \pm \sqrt{15}$

16. $7x^2 - 9x + 1 = 0$

Quad Formula

$$x = \frac{9 \pm \sqrt{(-9)^2-4(7)(1)}}{2(7)}$$

$$= \frac{9 \pm \sqrt{81-28}}{14}$$

$$x = \frac{9 \pm \sqrt{53}}{14}$$

17. $\sqrt{(x+2)^2} = \sqrt{36}$

Square Root

$x+2 = \pm 6$

$-2 \quad -2$

$x = 6-2 \quad x = -6-2$

$x=4 \quad x=-8$

18. $x^2 - 10x + 25 = 0$

Factor PST

$\sqrt{(x-5)^2} = \sqrt{0}$

$x-5=0$

$x=5$

CTS or Quad Form 19. $x^2 + 3x + 7 = 0$

$\left(\frac{3}{2}\right)^2 = \frac{9}{4}$

$x^2+3x+\frac{9}{4} = -7+\frac{9}{4}$

$\sqrt{\left(x+\frac{3}{2}\right)^2} = \sqrt{-\frac{19}{4}}$

No Sol

20. $\sqrt{x^2} = \sqrt{36}$

Sq Rt

$x = \pm 6$

CTS or QF 21. $x^2 - 6x + 2 = 0$

$\left(\frac{6}{2}\right)^2 = 9$

$x^2-6x+\underline{9} = -2+\underline{9}$

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

$x-3 = \pm\sqrt{7}$

$+3 \quad +3$

$x = 3 \pm \sqrt{7}$

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

Factor

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

$x-4=0 \quad x-1=0$

$x=4 \quad x=1$

REASONING:

20.) Explain why **$x^2 = -81$** DOES NOT have a solution.

Nothing squared will ever be negative

or Can't take Square Root of a negative.

21.) Which method can't you use to solve this problem? **$x^2 - 47 = 0$**

Circle one: (Factoring) Square Roots Quadratic Formula

Explain why: Unfactorable - No GCF and Not a DoS

22.) Which method can't you use to solve this problem? $x^2 + 7x = 0$

Circle one: Factoring (Square Roots) Quadratic Formula

Explain why: There's a first degree term (7x)

23.) Which method can you use to solve all quadratic equations?

Circle one: Factoring Square Roots (Quadratic Formula)

Explain why: All quadratics have a, b, c when in standard form.

24.) What are the **two mistakes** in setting up the quadratic formula:

Solve: $2x^2 - x - 6 = 0$

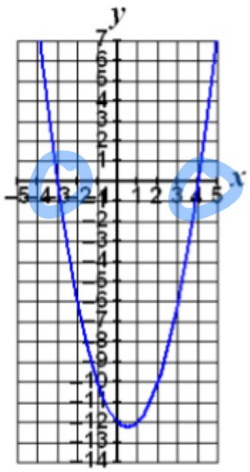
$$x = \frac{-1 \pm \sqrt{(-1)^2 - 4(2)(6)}}{2(2)}$$

Should be +1

should be -6

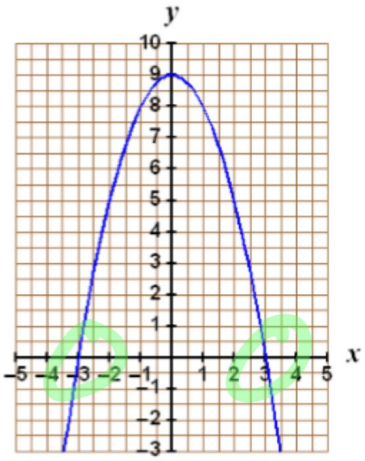
For #21-22, a quadratic function and its graph are shown. Identify the solutions, or roots, of the related quadratic equation.

21.) $f(x) = x^2 - x - 12$



Solve: $x =$ -3 or 4

22.) $y = -x^2 + 9$



Solve: $x =$ -3 or 3

$b^2 - 4ac$

For #13-15, write the expression for the discriminant. Use this to find the number of real solutions for each equation:

13.) $2x^2 - 3x + 1 = 0$

$a=2 \quad b=-3 \quad c=1$

$(-3)^2 - 4(2)(1)$

$9 - 8 > 0$

2 sols

14.) $x^2 + 4x = -7$

$x^2 + 4x + 7 = 0$

$4^2 - 4(1)(7)$

$16 - 28 < 0$

No Sol.

15.) $x^2 + 9 = 6x$

$x^2 - 6x + 9 = 0$

$(-6)^2 - 4(1)(9)$

$36 - 36 = 0$

1 sol.

Solve by completing the square.

11.) $\frac{4x^2}{4} - \frac{8x}{4} = \frac{3}{4}$

$x^2 - 2x + \underline{1} = \frac{3}{4} + \underline{1}$

$\left(\frac{2}{2}\right)^2 = 1$

$(x-1)^2 = \frac{7}{4}$

$x - 1 = \pm\frac{\sqrt{7}}{2}$

$x = 1 \pm \frac{\sqrt{7}}{2}$

12.) $\frac{3x^2}{3} + \frac{6x}{3} - \frac{42}{3} = \frac{0}{3}$

$x^2 + 2x - 14 = 0$

$x^2 + 2x + \underline{1} = 14 + \underline{1}$

$(x+1)^2 = 15$

$x + 1 = \pm\sqrt{15}$

$x = \pm\sqrt{15} - 1$