

Warm-Up:

Factor the following quadratic expressions.

1. $30x^2 - 9x$

$$3x(10x - 3)$$

2. $3x^2 + 17x + 24$

$$(3x+12)(x+2)$$

3. $x^2 - 5x - 6$

$$(x+1)(x-6)$$

4. $9x^2 - 16$

$$(3x+4)(3x-4)$$

Simplify the following radicals.

5. $\sqrt{288}$

$$2 \sqrt{144} = 2 \sqrt{12 \cdot 12}$$

$$12\sqrt{2}$$

6. $\sqrt{12}$

$$2\sqrt{3}$$

7. $\sqrt{36}$

$$6$$

8. $\sqrt{200}$

$$10\sqrt{2}$$

Solving Quadratic Equations – GCF

1. $2x^2 - 128 = 0$

$$2x(x^2 - 64) = 0$$

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

$$x = \pm 8$$

2. $3x^2 = 27x$

$$3x^2 - 27x = 0$$

$$3x(x-9) = 0$$

$$x = 0, 9$$

3. $7x^2 + 35x = 0$

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

$$x = 0, -5$$

4. $8x^2 = 56$

$$8x^2 - 56 = 0$$

$$8(x^2 - 7) = 0$$

$$x^2 - 7 = 0$$

$$x^2 = 7$$

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

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

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

$$x = 0, 1$$

Solving Quadratic Equations – Factoring (a = 1)

1. $x^2 = -8 - 9x$

$$x^2 + 9x + 8 = 0$$

$$D = (9)^2 - 4(1)(8) = 49$$

$$x = \frac{-9 \pm \sqrt{49}}{2(1)} = \frac{-9 \pm 7}{2} \rightarrow \begin{matrix} \frac{-9+7}{2} = (-1) \\ \frac{-9-7}{2} = (-8) \end{matrix}$$

2. $x^2 - 13x = -40$

$$x^2 - 13x + 40 = 0$$

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

$$x = 5, 8$$

$$3. x^2 - 8x + 15 = 0$$

$$(x-5)(x-3)$$

$$x = 3, 5$$

$$4. x^2 = -x + 56$$

$$x^2 + x - 56 = 0$$

$$(x+8)(x-7) = 0$$

$$x = -8, 7$$

$$5. x^2 - 25 = 0$$

$$x = \pm 5$$

Solving Quadratic Equations - Factoring ($a \neq 1$)

$$1. 2x^2 + 5x - 42 = 0$$

$$(2x-7)(x+6) = 0$$

$$x = 7/2, -6$$

$$2. 4x^2 + 1 = -5x$$

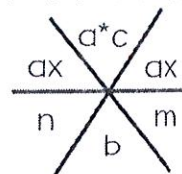
$$4x^2 + 5x + 1 = 0$$

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

$$x = -1/4, -1$$

Wheel/Asterisk Method

$$ax^2 + bx + c = 0$$



n & m are factors of a*c that add to give you b

$$3. 2x^2 + 11x + 14 = 0$$

$$(2x+7)(x+2) = 0$$

$$x = -7/2, -2$$

$$4. 3x^2 - 49 = -14x$$

$$3x^2 + 14x - 49 = 0$$

$$(3x-7)(x+7) = 0$$

$$x = 7, 7/3$$

$$5. 5x^2 - 12x + 7 = 0$$

$$(5x-7)(x-1) = 0$$

$$x = 7/5, 1$$

Solving Quadratic Equations - Extracting the Square Root

$$1. 2x^2 + 1 = -22$$

$$2x^2 = -23$$

no sol

$$2. 3(x-5)^2 = 81$$

$$(x-5)^2 = 27$$

$$x-5 = \pm\sqrt{27}$$

$$x = \pm 3\sqrt{3} + 5$$

$$3. 6x^2 = 480$$

$$x^2 = 80$$

$$x = \pm\sqrt{80}$$

$$x = \pm 4\sqrt{5}$$

$$4. -2(x+1)^2 + 3 = 19$$

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

no solution

$$5. 5x^2 - 7 = -47$$

$$5x^2 = -40$$

no sol.

Solving Quadratic Equations - Completing the Square Root

1. $x^2 + 6x + 5 = 0$

$$x^2 + 6x + 9 = -5 + 9$$

$$(x+3)^2 = 4$$

$$x+3 = \pm 2$$

$$x = \pm 2 - 3$$

$$x = -5, -1$$

3. $x^2 + 2x - 29 = 0$

$$x^2 + 2x + 1 = 30$$

$$(x+1) = \pm \sqrt{30}$$

$$x = \pm \sqrt{30} - 1$$

4. $x^2 - 20x + 75 = 0$

$$x^2 - 20x + 100 = 25$$

$$(x-10)^2 = 25$$

$$x = \pm 5 + 10$$

$$x = 15, 5$$

2. $x^2 - 8x - 6 = 0$

$$x^2 - 8x + 16 = 22$$

$$(x-4)^2 = 22$$

$$x = \pm \sqrt{22} + 4$$

5. $x^2 + 6x - 41 = 0$

$$x^2 + 6x + 9 = 41 + 9$$

$$x+3 = \pm \sqrt{50}$$

$$x = \pm 5\sqrt{2} - 3$$

Determining the Nature of Roots from the Discriminant: $b^2 - 4ac$

Find the discriminant and tell what kind & how many roots there are!

1. $10x^2 + 9x - 9 = 0$

$$D = 81 - 4(10)(-9)$$

$$D = 81 + 360$$

$$D = 441, 2 \text{ roots}$$

3. $5x^2 + 7 = 0$

$$D = -144$$

0 solutions

4. $-4x^2 - 4 = -10x$

$$-4x^2 + 10x - 4 = 0$$

$$(10)^2 - 4(-4)(-4)$$

$$100 - 64 = 36$$

2 solutions

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

$$D = (4)^2 - 4(1)(4) = 0$$

1 solution

5. $2x^2 - 5x = 8$

$$D = 89$$

2 solutions

Solving Quadratic Equations - Quadratic Formula Remember:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

1. $8x^2 = 10x - 5$

$$D = (-10)^2 - 4(8)(5)$$

$$D = 100 - 160$$

$$8x^2 - 10x + 5 = 0 \quad D = -40$$

no solution

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

$$D = (-5)^2 - 4(5)(-4)$$

$$D = 25 - 80$$

no solution

3. $x^2 - 6x - 10 = 0$

$$D = 36 + 40$$

$$D = 76$$

$$x = \frac{6 \pm \sqrt{76}}{2(1)} = \frac{6 \pm 2\sqrt{19}}{2}$$

$$x = \frac{2(3 \pm \sqrt{19})}{2} = 3 \pm \sqrt{19}$$

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

5. $x^2 - 10x + 2 = 0$

$$D = 100 - 4(1)(2)$$

$$D = 92$$

$$x = \frac{10 \pm \sqrt{92}}{2} = \frac{10 \pm 2\sqrt{23}}{2}$$

$$= 5 \pm \sqrt{23}$$