Intermediate Algebra

Name: Key

Solving Review Notes

Date: _____ Block: _____

What are the five methods we have learned to help us solve quadratic equations?

- Graphing
- Square Roots
- Factoring
- Completing the Square
- Quadratic Formula

Section 1: Solve each quadratic equation by Graphing.

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

$x = \frac{-b}{2a}$ $x = \frac{-2}{2(1)} = -1$

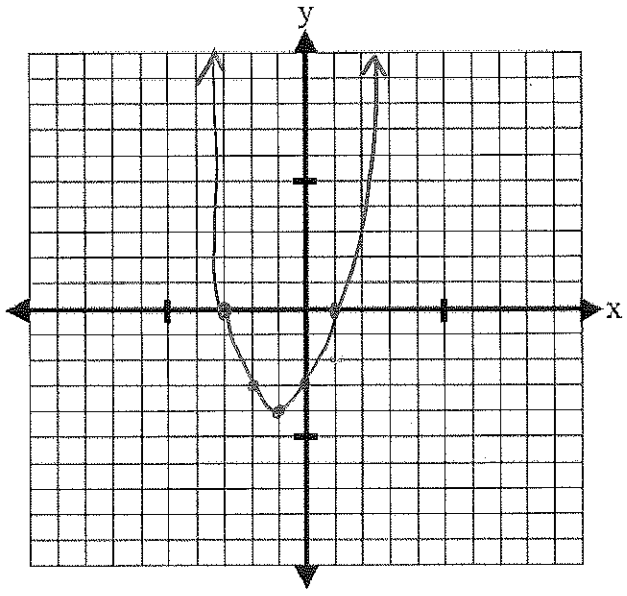
$y = (x+3)(x-1)$ $y = (-1)^2 + 2(-1) - 3$

AOS: $x = -1$

Vertex: $(-1, -4)$

y – intercept: $(0, -3)$

x – intercept(s): $(-3, 0)$ $(1, 0)$



Solution(s): $x = -3$ $x = 1$

2) $y = 2x^2 - 12x + 10$

$y = 2(x^2 - 6x + 5)$

$y = 2(x-5)(x-1)$

$y = 2(3)^2 - 12(3) + 10$

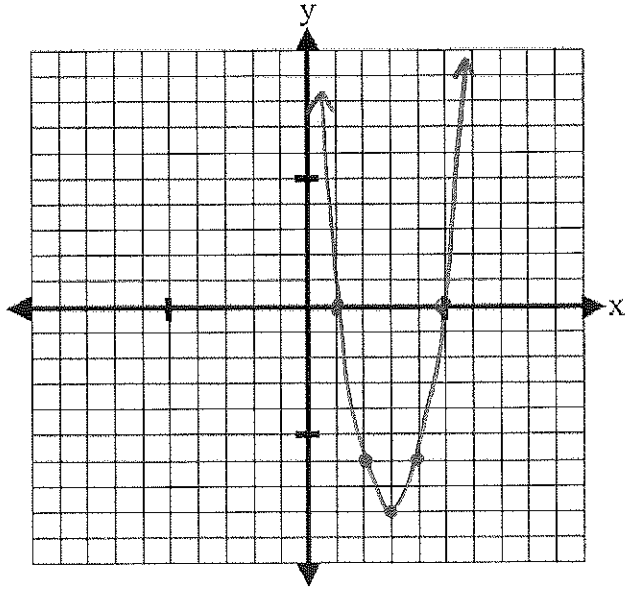
$x = \frac{12}{2(2)} = 3$

AOS: $x = 3$

Vertex: $(3, -8)$

y – intercept: $(0, 10)$

x – intercept(s): $(5, 0)$ $(1, 0)$



Solution(s): $x = 1$ $x = 5$

Section 2: Solve each quadratic equation by Square roots.

3. $\frac{2(x-4)^2}{2} = \frac{32}{2}$

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

$x-4=4 \quad x-4=-4$

$\boxed{x=8 \quad x=0}$

4. $3(x+2)^2 - 30 = 0$

$+30 \quad +30$

$3(x+2)^2 = 30$

$\sqrt{(x+2)^2} = \sqrt{30}$

$x+2=\sqrt{10} \quad x+2=-\sqrt{10}$

$\boxed{x=\sqrt{10}-2 \quad x=-\sqrt{10}-2}$

Section 3: Solve each quadratic equation by factoring.

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

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

$\boxed{x=5 \quad x=3}$

6. $3x^2 - 16x - 7 = 5$

$-5 \quad -5$

$3x^2-16x-12=0$

$(3x+2)(x-6)=0$

$\boxed{x=-2/3 \quad x=6}$

Section 4: Solve each quadratic equation by Completing the Square.

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

$x^2-10x+\underline{25} = -18+\underline{25}$

$(x-5)^2 = 7$

$x-5=\sqrt{7} \quad x-5=-\sqrt{7}$

$\boxed{x=\sqrt{7}+5 \quad x=-\sqrt{7}+5}$

8. $x^2 + 14x - 51 = 0$

$x^2+14x+\underline{49} = 51+\underline{49}$

$\sqrt{(x+7)^2} = \sqrt{100}$

$x+7=10 \quad x+7=-10$

$\boxed{x=3 \quad x=-17}$

Section 5: Solve each quadratic equation by quadratic formula.

9. $4x^2 + 8x + 3 = 0$

$x = \frac{-8 \pm \sqrt{(8)^2-4(4)(3)}}{2(4)}$

$x = \frac{-8 \pm \sqrt{16}}{8} \quad x = \frac{-8 \pm 4}{8}$

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

10. $2x^2 - 7x - 3 = 0$

$x = \frac{7 \pm \sqrt{(-7)^2-4(2)(-3)}}{2(2)}$

$\boxed{x = \frac{7 \pm \sqrt{73}}{4}}$

When is it **BEST** to use each method?

First: Can it be solved by *square roots*?

Ex: $x^2 - 16 = 0$

$x^2 = 16$

$x = 4 \quad x = -4$

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

$(x-3)^2 = 4$

$x - 3 = 2 \qquad x - 3 = -2$

$x = 5 \qquad x = 1$

Second: Can it be solved by *factoring*? (Is it factorable?)

Ex: $x^2 - 2x - 8 = 0$

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

$x = 4 \quad x = -2$

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

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

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

Third: Is a = 1 and is b even? Then *complete the square*.

Ex: $x^2 - 18x - 40 = 0$

$x^2 - 18x + 81 = 40 + 81$

$\sqrt{(x-9)^2} = \sqrt{121}$

$x - 9 = 11 \qquad x - 9 = -11$

$x = 20 \qquad x = -2$

Fourth: If none of the above apply, use the *quadratic formula*!

Ex: $2x^2 + 7x + 4 = 0 \qquad a = 2 \quad b = 7 \quad c = 4$

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

$$x = \frac{-7 \pm \sqrt{49 - 32}}{4}$$

$$x = \frac{-7 \pm \sqrt{17}}{4}$$