GRAPHING QUADRATIC EQUATIONS

Step 1: Find the axis of symmetry using the formula $X = \frac{-b}{2a}$

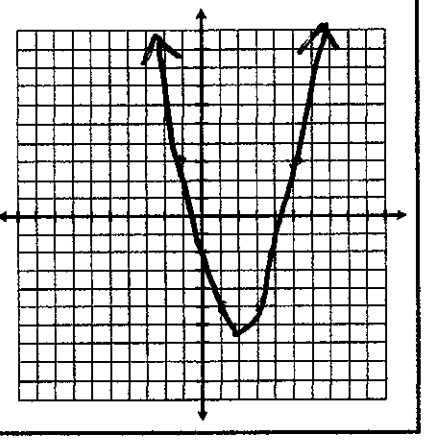
Step 2: Find the vertex (x, y) using the axis of symmetry.

Step 3: Complete a table of values, placing the vertex in the middle row.

Step 4: Graph the points and connect to create the parabola!

1 $y = x^2 - 4x - 2$ $\quad X = \frac{4}{2(1)} = 2$

x	y
-1	3
0	-2
1	-5
2	-6
3	-5
4	-2
5	3



28 $3x^2 - 8x = 17 \rightarrow 3x^2 - 8x - 17 = 0$

$$X = \frac{8 \pm \sqrt{(-8)^2 - 4(3)(-17)}}{2(3)}$$

$$X = \frac{8 \pm \sqrt{268}}{6}$$

$$\boxed{X = \{4.06, -1.4\}}$$

29 $-2x^2 = -41 \rightarrow -2x^2 + 41 = 0$

$$X = \frac{0 \pm \sqrt{0^2 - 4(-2)(41)}}{2(-2)}$$

$$X = \frac{0 \pm \sqrt{328}}{-4}$$

$$\boxed{X = \{-4.53, 4.53\}}$$

30 $9x^2 + 1 = 6x \rightarrow 9x^2 - 6x + 1 = 0$

$$X = \frac{6 \pm \sqrt{(-6)^2 - 4(9)(1)}}{2(9)}$$

$$X = \frac{6 \pm \sqrt{0}}{18}$$

$$\boxed{X = \frac{1}{3}}$$

31 $x^2 + x + 19 = 0$

$$X = \frac{-1 \pm \sqrt{1^2 - 4(1)(19)}}{2(1)}$$

$$X = \frac{-1 \pm \sqrt{-75}}{2}$$

$$\boxed{X = \emptyset}$$

QUADRATIC FORMULA

SOLVE BY THE QUADRATIC FORMULA

Step 1: Move everything to one side and set the equation equal to 0.

Step 2: Substitute a, b, and c into the quadratic formula.

Step 3: Simplify the value under the radical sign.

Step 4: Solve both equations. One with the "+" sign and the other with the "–" sign".

Step 5: Write your answer as a solution set. x = (__, __)

Quadratic Formula:

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

26 $x^2 - 4x = 15 \rightarrow x^2 - 4x - 15 = 0$

$$x = \frac{4 \pm \sqrt{(-4)^2 - 4(1)(-15)}}{2(1)}$$

$$x = \frac{4 \pm \sqrt{76}}{2}$$

$$x = \{6.36, -2.36\}$$

27 $-x^2 = -20 - 6x \rightarrow -x^2 + 6x + 20 = 0$

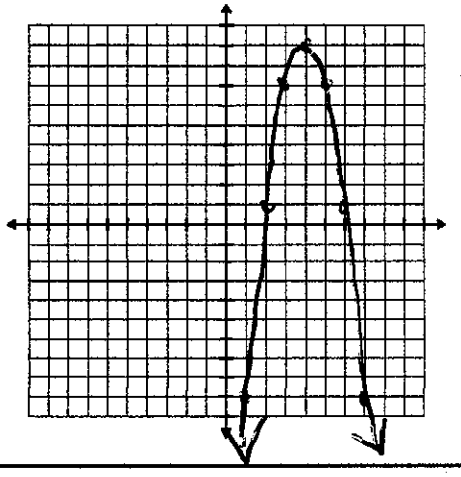
$$x = \frac{-6 \pm \sqrt{6^2 - 4(-1)(20)}}{2(-1)}$$

$$x = \frac{-6 \pm \sqrt{116}}{-2}$$

$$x = \{-2.39, 8.39\}$$

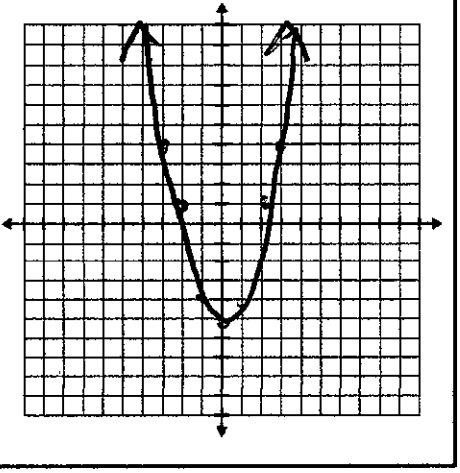
2 $y = -2x^2 + 16x - 23$ $\quad x = \frac{-16}{2(-2)} = 4$

x	y
1	-9
2	1
3	7
4	9
5	7
6	1
7	-9



3 $y = x^2 - 5$ $\quad x = \frac{0}{2(1)} = 0$

x	y
-3	4
-2	-1
-1	-4
0	-5
1	-4
2	-1
3	4



GRAPHING

SOLVE BY FACTORING

Step 1: Move everything to one side and set the equation equal to 0.

Step 2: Factor!

Step 3: Set each factor equal to 0 and solve for x.

Step 4: Write your answer as a solution set.
x = {___, ___}

4 $x^2 + 13x + 40 = 0$

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

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

$\boxed{x=\{-8,-5\}}$

5 $x^2 - 8x = 9 \rightarrow x^2-8x-9=0$

$(x-9)(x+1)=0$

$x-9=0 \quad x+1=0$

$\boxed{x=\{9,-1\}}$

6 $x^2 - 13x = x - 49 \rightarrow x^2-14x+49=0$

$(x-7)^2=0$

$x-7=0$

$\boxed{x=7}$

22 $5x^2 - 10x - 44 = -4 \rightarrow \frac{5x^2-10x}{5}=\frac{40}{5}$

$x^2-2x=8 \quad \leftarrow (-2/2)^2=1$

$x^2-2x+1=9$

$\sqrt{(x-1)^2}=\sqrt{9}$

$x-1=3 \quad x-1=-3$

$\boxed{x=\{4,-2\}}$

23 $4x^2 + 16x - 87 = -3 \rightarrow \frac{4x^2+16x}{4}=\frac{84}{4}$

$x^2+4x=21 \quad \leftarrow (4/2)^2=4$

$x^2+4x+4=25$

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

$x+2=5 \quad x+2=-5$

$\boxed{x=\{3,-7\}}$

24 $\frac{8x^2 + 16x}{8}=\frac{42}{8} \rightarrow x^2+2x=5.25$

$x^2+2x+1=6.25$

$\sqrt{(x+1)^2}=\sqrt{6.25}$

$x+1=2.5 \quad x+1=-2.5$

$\boxed{x=\{1.5,-3.5\}}$

25 $x^2 - 10x - 27 = 0 \rightarrow x^2-10x=27$

$x^2-10x+25=52$

$\sqrt{(x-5)^2}=\sqrt{52}$

$x-5=\sqrt{52} \quad x-5=-\sqrt{52}$

$\boxed{x=\{-2.21,12.21\}}$

COMPLETING THE SQUARE

SOLVE BY COMPLETING THE SQUARE

Step 1: Move "c" to the right so it reads $ax^2 + bx = c$

Step 2: Divide the entire equation by "a" to eliminate it. (If $a > 1$)

Step 3: Find $(b/2)^2$ and add to both sides. This creates a perfect square trinomial.

Step 4: Factor the trinomial. Write your factors as $(x + \_\_)^2$

Step 5: Square root both sides, then solve both equations for x.

Step 6: Write your answer as a solution set. $x = \{\_\_, \_\_\}$

20 $x^2 + 18x + 45 = 0 \rightarrow x^2 + 18x = -45$

$(18|2)^2 = 81$

$x^2 + 18x + 81 = 36$

$\sqrt{(x+9)^2} = \sqrt{36}$

$x + 9 = 6 \quad x + 9 = -6$

$\boxed{x = \{-3, -15\}}$

21 $x^2 - 8x - 19 = 14 \rightarrow x^2 - 8x = 33$

$(-8|2)^2 = 16$

$x^2 - 8x + 16 = 49$

$\sqrt{(x-4)^2} = \sqrt{49}$

$x - 4 = 7 \quad x - 4 = -7$

$\boxed{x = \{11, -3\}}$

1 $6x^2 + 15x = 0$

$3x(2x+5) = 0$

$3x = 0 \quad 2x + 5 = 0$

$\boxed{x = \{0, -\frac{5}{2}\}}$

8 $4x^2 = 25 \rightarrow 4x^2 - 25 = 0$

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

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

$\boxed{x = \{-\frac{5}{2}, \frac{5}{2}\}}$

9 $2x^2 + 12x = 32 \rightarrow 2x^2 + 12x - 32 = 0$

$2(x^2 + 6x - 16) = 0$

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

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

$\boxed{x = \{-8, 2\}}$

10 $3x^2 - 14x - 24 = 0$

$(3x+4)(x-6) = 0$

$3x + 4 = 0 \quad x - 6 = 0$

$\boxed{x = \{-\frac{4}{3}, 6\}}$

FACTORING

SOLVE BY SQUARE ROOTS

** This method only works for equations in the form $ax^2 + c = 0$! **

Step 1: Isolate "x^2"

Step 2: Square root both sides.

Step 3: Write your answer as a solution set.
$x = \{\_\_\_, \_\_\_\}$

11 $x^2 - 64 = 0$

$\sqrt{x^2} = \sqrt{64}$

$x = \{-8, 8\}$

12 $x^2 - 10 = -1$

$\sqrt{x^2} = \sqrt{9}$

$x = \{-3, 3\}$

13 $-6x^2 = -150$

$\sqrt{x^2} = \sqrt{25}$

$x = \{-5, 5\}$

14 $x^2 + 17 = 13$

$\sqrt{x^2} = \sqrt{-4}$

$x = \emptyset$

15 $\frac{1}{3}x^2 = 48$ ·3

$\sqrt{x^2} = \sqrt{144}$

$x = \{-12, 12\}$

16 $2x^2 + 1 = 163$

$\frac{2x^2}{2} = \frac{162}{2}$

$\sqrt{x^2} = \sqrt{81}$ $x = \{-9, 9\}$

17 $\frac{16x^2}{16} = \frac{1}{16}$

$\sqrt{x^2} = \sqrt{\frac{1}{16}}$ $x = \{-\frac{1}{4}, \frac{1}{4}\}$

18 $\frac{9x^2}{9} = \frac{100}{9}$

$\sqrt{x^2} = \sqrt{\frac{100}{9}}$ $x = \{-\frac{10}{3}, \frac{10}{3}\}$

19 $4x^2 + 11 = 60$

$\frac{4x^2}{4} = \frac{49}{4}$

$\sqrt{x^2} = \sqrt{\frac{49}{4}}$ $x = \{-\frac{7}{2}, \frac{7}{2}\}$

SQUARE ROOTS