Quadratic Equations

In order to solve a quadratic equation, it needs to be written in the form $Ax^2 + Bx + C = 0$, where A, B, and C are Integers and A is positive. So if you have:

1.) $2x^2 = 9x + 5$, move the 9x and 5 to the left side by subtracting, to get: $2x^2 – 9x – 5 = 0$

Or

2.) $– 2 = 3x^2 + 5x$, move the – 2 to the right by addition, to get $0 = 3x^2 + 5x + 2$

Or

3.) $7x = –4x^2 – 3$, move the $–4x^2$ and – 3 to the left by addition, to get $4x^2 + 7x + 3 = 0$

Or

4) $\frac{1}{2} x^2 – x + \frac{1}{2} = 0$, multiply through by 2 to get Integers, as in $x^2 – 2x + 1 = 0$

When we get them in the correct order, we factor them into two binomials <u>if possible</u>.

So #1 is $2x^2 – 9x – 5 = 0$
we get $(2x+1)(x-5) = 0$

and #2 is $0 = 3x^2 + 5x + 2$
$0 = (3x+1)(x+2)$

and #3 is $4x^2 + 7x + 3 = 0$
$(4x+3)(x+1) = 0$

and #4 is $x^2 – 2x + 1 = 0$
$(x-1)(x-1) = 0$

To solve the quadratic equation, we must find the value of x. Since the product of the two binomials is zero, <u>one</u> of the binomials must equal zero (When the product of two numbers is 0, at least one of them must be 0.) So we split each problem into two simple equations.

So #1 is $2x+1=0$ or $x-5=0$
Solving… $x = -\frac{1}{2}$ or $x = 5$

and #2 is $3x+1=0$ or $x+2=0$
$x = 1/3$ or $x = -2$

And #3 is $4x+3=0$ or $x+1=0$
Solving… $x = -\frac{3}{4}$ or $x= -1$

and #4 is $x-1=0$ or $x-1=0$
$x = 1$ or $x = 1$

We can also solve quadratics by using the Quadratic Formula: $x = \frac{-b \pm \sqrt{b^2 – 4ac}}{2a}$
We get our a, b, and c values from the equations.

So for #1, a=2, b=-9, and c=-5.

and #2, a=3, b=5, and c=2

and #3 a=4, b=7, and c=3

#4 a=1, b=-2, and c=1

One final way of solving quadratics is to use a technique known as “completing the square.” However, any problem that can be solved by completing the square can also be solved by the Quadratic Formula.