There's no magic to solving factorable quadratic equations. All it takes is that you remember how to factor algebraic expressions.

Let's do a quick review of factoring.

(If you need a more in depth look at factoring, check Section 3 from the Math homepage under the Factoring topic.)

There are three types of factoring

*Common Monomial $ab + ac = a(b+c)$

*Difference of Squares $x^2-9 = (x+3)(x-3)$

*Quadratic Trinomial $x^2-5x+6=(x-3)(x-2)$

If you can factor, you can solve factorable quadratic equations. Here are the steps you should follow:

1. Move all terms to the same side, so the equation is set equal to 0.
2. Factor the algebraic expression.
3. Set each factor equal to 0.
   (If the product of two factors equals 0, then either one or both of the factors must be 0.)
4. Solve each resulting equation.

Example 1

Solve for x: $x^2+3x = 0$

$x(x+3)=0$

$x=0$ ✓

$x+3=0$

$-3 \quad -3$

$x=-3$ ✓

Check:

$x^2+3x=0$

$0^2+3(0)=0$ ✓

$0=0$

$(-3)^2+3(-3)=0$

$9-9=0$

$0=0$ ✓

Example 2

Solve for y: $y^2 = 16$

$y^2 - 16 = 0$

$(y+4)(y-4) = 0$

$y+4=0$ | $y-4=0$

$y=-4$ | $y=+4$

$y^2 = 16$

$\sqrt{y^2} = \sqrt{16}$

$y = \pm 4$

Example 3

Solve for c: $c^2-12=c$

$c^2-c-12=0$

$(c+3)(c-4)=0$

$c+3=0$ | $c-4=0$

$c=-3$ | $c=4$ ✓

Check

$(-3)^2-12=-3$

$9-12=-3$

$-3=-3$ ✓

$(4)^2-12=4$

$16-12=4$

$4=4$ ✓

http://regentsprep.org/Regents/math/faceq/PFacEq.htm

$$a^3 - 4a^2 - 5a = 0$$

$$a(a^2 - 4a - 5) = 0$$

$$a\,|\,(a-5)\,|\,(a+1) = 0$$

$a = 0 \quad | \quad a = +5 \quad | \quad a = -1$

$\{0, 5, -1\}$

Checks:

$a = 0$ ✓ $\quad 0^3 - 4(0)^2 - 5(0) = 0$ ✓

$a = 5$ ✓ $\quad 5^3 - 4(5)^2 - 5(5) = 0$

$125 - 100 - 25 = 0$ ✓

$a = -1$ ✓ $\quad (-1)^3 - 4(-1)^2 - 5(-1) = 0$

$-1 - 4 + 5 = 0$

$0 = 0$ ✓

One root of the equation $x^2 + 3x + k = 0$ is -1

a) Find the value of k. $= +2$

b) Find the second root. $x = -2$

a) The value $x = -1$ makes the equation true, so substitute -1 for x:

$$(-1)^2 + 3(-1) + k = 0$$

$$1 - 3 + k = 0$$

$$-2 + k = 0$$

$$+2 \quad +2$$

$$k = +2$$

b) Substitute $k = 2$ into the equation

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

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

Solve + Check:

$$4x^2 = 49$$

$$4x^2 - 49 = 0$$

$$(2x+7)(2x-7) = 0 \qquad x = \left\{\frac{7}{2}, \frac{-7}{2}\right\}$$ ✓ ✓

$2x+7=0$ | $2x-7=0$

$-7 \quad -7$ | $+7 \quad +7$

$\frac{2x}{2} = \frac{-7}{2}$ | $\frac{2x}{2} = \frac{+7}{2}$

Check: $4x^2 - 49$

$4\left(\frac{7}{2}\right)^2 = 49$ | $4\left(\frac{-7}{2}\right)^2 = 49$

$4\left(\frac{49}{4}\right) = 49$ | $4\left(\frac{49}{4}\right) = 49$

Solve and check: (for x)

$$9x^2 - m^2 = 0$$

$$\sqrt{9x^2} - \sqrt{m^2} = 0$$

$$(3x+m)\,|\,(3x-m) = 0$$

$3x+m=0$ | $3x-m=0$

$-m \quad -m$ | $+m \quad +m$

$\frac{3x}{3} = \frac{-m}{3}$ | $\frac{3x}{3} = \frac{m}{3}$

$x = \frac{-m}{3}$ | $x = \frac{m}{3}$ ✓

Check

$9x^2 - m^2 = 0$

$9\left(\frac{m}{3}\right)^2 - m^2 = 0$

$9\left(\frac{m^2}{9}\right) - m^2 = 0$

$0 = 0$

Solve: $\frac{5x^2}{5} = \frac{0}{5}$

$\sqrt{x^2} = \sqrt{0}$

$x = 0$

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h) $\frac{V}{\pi h} = \frac{\pi r^2 h}{\pi h}$

$\sqrt{\frac{V}{\pi h}} = \sqrt{r^2}$

$\sqrt{\frac{V}{\pi h}} = r$