

8) The difference of two numbers is 2 and the sum of their squares is 10. Find the numbers.

Equation 1: $x - y = 2$ Equation 2: $x^2 + y^2 = 10$ Solution: _____

9) The sum of two numbers is 7 and the difference of their squares is 21. Find the numbers.

Equation 1: $x + y = 7$ Equation 2: $x^2 - y^2 = 21$ Solution: _____

10) The product of two numbers is 10 and the difference of their squares is 21. Find the numbers.

Equation 1: $xy = 10$ Equation 2: $x^2 - y^2 = 21$ Solution: _____

Difference - Subtract

Sum - Add

Product - Multiply

Quotient - Divide

Quadratic Formula

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

* Can be used to ^{Solve} ~~factor~~ all quadratics.

$$8) \begin{cases} x - y = 2 \rightarrow x = y + 2 \\ x^2 + y^2 = 10 \end{cases}$$

$$(y+2)^2 + y^2 = 10$$

$$y^2 + 4y + 4 + y^2 = 10$$

$$2y^2 + 4y + 4 = 10$$

$$2y^2 + 4y - 6 = 0$$

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

$$2(y+3)(y-1) = 0$$

$$y = -3 \quad y = 1$$

$$x = -3 + 2$$

$$x = -1$$

$$(-1, -3)$$

$$x = 1 + 2$$

$$x = 3$$

$$(3, 1)$$

$$9) \begin{cases} x + y = 7 \rightarrow x = 7 - y \\ x^2 - y^2 = 21 \end{cases}$$

$$(7-y)^2 - y^2 = 21$$

$$49 - 14y + y^2 - y^2 = 21$$

$$49 - 14y = 21$$

$$-14y = -28$$

$$y = 2$$

$$x = 7 - 2$$

$$x = 5$$

$$(5, 2)$$

$$10) \quad \begin{cases} xy = 10 \\ x^2 - y^2 = 21 \end{cases} \rightarrow y = \frac{10}{x}$$

$$x^2 - \left(\frac{10}{x}\right)^2 = 21$$

$$x^2 - \frac{100}{x^2} = 21$$

$$x^4 - 100 = 21x^2$$

$$x^4 - 21x^2 - 100 = 0$$

$$(x^2 - 25)(x^2 + 4) = 0$$

$$(x - 5)(x + 5)(x^2 + 4) = 0$$

$$x = 5 \quad x = -5$$

$$y = \frac{10}{5}$$

$$y = 2$$

$$(5, 2)$$

$$y = \frac{10}{-5}$$

$$y = -2$$

$$(-5, -2)$$