

**Solve by factoring:**

- 1)  $2x^2 - 3x - 5 = 0$     2)  $x^2 = -9x - 14$     3)  $12x^2 + 13x = 4$     4) Find the discriminant and nature of roots of  $3x^2 + 17 = 8x$
- $\{-1, \frac{5}{2}\}$      $\{-7, -2\}$      $\{-\frac{4}{3}, \frac{1}{4}\}$
- Discriminant:  $-140$   
Nature of Roots: 2 imaginary

**Solve by the square root method:**

- 5)  $25x^2 - 4 = 0$     6)  $\frac{3(x-2)^2}{3} = \frac{27}{3}$
- $\frac{25x^2}{25} = \frac{4}{25}$      $\sqrt{x^2} = \sqrt{\frac{4}{25}}$      $\sqrt{(x-2)^2} = \sqrt{9}$
- $x = \pm \frac{2}{5}$      $x - 2 = \pm 3$
- $\{\pm \frac{2}{5}\}$      $\{-5, 1\}$

**Solve by the quadratic formula:**

- 9)  $7x^2 - 2x - 14 = 0$
- $\{\frac{1 \pm 3\sqrt{11}}{7}\}$

**Solve by completing the square:**

- 7)  $x^2 + 6x + 7 = 0$     8)  $x^2 - 5x + 1 = 0$
- $x^2 + 6x + (\frac{6}{2})^2 = -7 + (\frac{6}{2})^2$      $x^2 - 5x + (\frac{-5}{2})^2 = -1 + (\frac{-5}{2})^2$
- $x^2 + 6x + 9 = -7 + 9$      $x^2 - 5x + \frac{25}{4} = -1 + \frac{25}{4}$
- $\sqrt{(x+3)^2} = \sqrt{2}$      $\sqrt{(x-\frac{5}{2})^2} = \sqrt{\frac{21}{4}}$
- $x + 3 = \pm\sqrt{2} - 3$      $x - \frac{5}{2} = \pm\sqrt{\frac{21}{4}} + \frac{5}{2}$
- 10)  $3x^2 - 2x - 4 = 0$
- $\{\frac{1 \pm \sqrt{13}}{3}\}$      $\{\frac{5}{2} \pm \frac{\sqrt{21}}{2}\}$

**Solve by the graphing method to find all the real solutions to the following:**

- 11)  $|x^4 + x - 3| = 0$     12)  $\sqrt{x^4 + x^3 - x - 3} = 0$     13)  $\frac{x^3 - 4x + 1}{x^2 + x - 6} = 0$
- $\{-1.4526, 1.1640\}$      $\{-1.4751, 1.2372\}$      $\{-2.1149, -0.4255, 1.8608\}$

**Write the equations. Use a graphing calculator to solve:**

14) A real estate investment yields a return of 9% per year, and a certificate of deposit (CD) pays 5% interest per year. How much of \$2000 should be put in real estate and how much should be put in the CD to earn a return of 6% on the entire \$2000?

$x = \text{Real Estate Investment}$      $y = \text{CD}$

$\begin{cases} x + y = 2000 \\ 0.09x + 0.05y = 2000(0.06) \end{cases}$      $\$1500$

15) A radiator contains 9 quarts of fluid, 40% of which is antifreeze. How much fluid should be drained and replaced with pure antifreeze so that the new mixture is 50% antifreeze.

$x = \text{Antifreeze}$      $y = \text{Fluid}$

$\begin{cases} x + y = 9 \\ 0.4x + y = 9(0.5) \end{cases}$      $1.5 \text{ quarts}$

16) The average of two real numbers is 53.5. Their product is 2790. What are the numbers?

$x = \text{1st Number}$      $y = \text{2nd Number}$

$\begin{cases} \frac{x+y}{2} = 53.5 \\ xy = 2790 \end{cases}$      $\{45, 62\}$

17) A pilot wants to make an 840 mile round trip from Cleveland, OH to Peoria, IL in 5 hours. There will be a headwind of 30 mph going to Peoria and a 40 mph tailwind returning to Cleveland. At what constant rate of speed should the plane be flown?

$x = \text{headwind time}$      $y = \text{rate (miles)}$

	d	r	t
HW	420	r-30	$\frac{420}{r-30}$
TW	420	r+40	$\frac{420}{r+40}$

$170 \text{ mph}$     headwind: Losing Velocity  
tailwind: Increasing velocity