

1) $x - \sqrt{3x-2} = 4$

$$x - 4 = \sqrt{3x-2}$$

$$(x-4)^2 = 3x-2$$

$$x^2 - 8x + 16 = 3x - 2$$

$$x^2 - 11x + 18 = 0$$

$$(x-2)(x-9) = 0$$

~~$x=2$~~ $x=9$

$$\{9\}$$

2) $\frac{1}{x+5} + \frac{2}{x+3} = \frac{-2}{x^2 + 8x + 15}$

$$\text{LCD} = (x+5)(x+3)$$

$$1(x+3) + 2(x+5) = -2$$

$$x+3 + 2x+10 = -2$$

$$3x+13 = -2$$

$$3x = -15$$

~~$x = -5$~~

No Solution

3) $x^3 + 2x^2 - 9x - 18 = 0$

$$x^2(x+2) - 9(x+2) = 0$$

$$(x+2)(x^2-9) = 0$$

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

$$\{-3, -2, 3\}$$

4) $x^{3/2} = 27$

$$(x^{3/2})^{2/3} = (27)^{2/3}$$

$$x = (\sqrt[3]{27})^2 = 3^2 = \{9\}$$

5) $x^4 - 30x^2 + 125 = 0$

$$(x^2 - 5)(x^2 - 25) = 0$$

$$x^2 - 5 = 0 \quad (x-5)(x+5) = 0$$

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

$$x = \pm\sqrt{5}$$

$$\{\pm\sqrt{5}, \pm 5\}$$

6) $|6x + 5| = |x - 9|$

$6x + 5 = x - 9$ $6x + 5 = -(x - 9)$

$5x = -14$ $6x + 5 = -x + 9$

$x = \frac{-14}{5}$

$7x = 4$

$x = \frac{4}{7}$

$\left\{ -\frac{14}{5}, \frac{4}{7} \right\}$

Solve the problem.

7) An object is propelled vertically upward from the top of a 96-foot building. The quadratic function $s(t) = -16t^2 + 128t + 96$ models the ball's height above the ground, $s(t)$, in feet, t seconds after it was thrown. Round answers to the nearest tenth of a second if needed.

a) After how many seconds does the object reach its maximum height?

$t = \frac{-b}{2a} = \frac{-128}{2(-16)} = 4 \text{ secs}$

b) What is the maximum height?

$s(4) = \text{~~352~~} 352 \text{ ft}$

c) When will the arrow hit the ground?

$-16t^2 + 128t + 96 = 0$
 $\frac{-16}{-16} \quad \frac{128}{-16} \quad \frac{96}{-16} \quad \frac{0}{-16}$

$t^2 - 8t - 6 = 0$

$t \approx \frac{8 \pm \sqrt{64 + 24}}{2} = \frac{8 \pm \sqrt{88}}{2}$

about 8.7 seconds

Solve the problem. Be sure to define your variables, write an equation(s), solve the equation and state your solution in a complete sentence.

8) A faucet is used to add water to a large bottle that already contained some water. After it has been filling for 4 seconds, the gauge on the bottle indicates that it contains 11 ounces of water. After it has been filling for 11 seconds, the gauge indicates the bottle contains 25 ounces of water. Let y be the amount of water in the bottle x seconds after the faucet was turned on. Write a linear equation that models the amount of water in the bottle in terms of x . Interpret the slope in a sentence.

$m = \frac{25 - 11}{11 - 4} = \frac{14}{7} = 2$

time x	amt y
4	11
11	25

$y - 11 = 2(x - 4)$

$y - 11 = 2x - 8$

$y = 2x + 3$

The bottle is filling at a rate of 2 oz/sec.

Solve the problem. Be sure to define your variables, write an equation(s), solve the equation and state your solution in a complete sentence.

9) Julie and Eric row their boat (at a constant speed) 45 miles downstream for 5 hours, helped by the current. Rowing at the same rate, the trip back against the current takes 9 hours. Find the rate of the current.

Let c = rate of current
 r = rowing rate

$\begin{cases} 5(r+c) = 45 \\ 9(r-c) = 45 \end{cases} \Rightarrow \begin{cases} r+c = 9 \\ r-c = 5 \end{cases}$

$2r = 14$

$r = 7$

$c = 2$

The rate of the current is 2 mph.