

Name SOLUTIONS!

Each of the 19 questions is worth 5 points plus 1 points for each of 5 homework problems for a total of 100

Solve the equation.

1)  $3x + 4 - 7(x + 1) = -(6x - 2)$

$$3x + 4 - 7x - 7 = -6x + 2$$

$$\begin{array}{r} -4x - 3 = -6x + 2 \\ +6x \qquad \qquad +6x \end{array}$$

$$\begin{array}{r} 2x - 3 = 2 \\ +3 \qquad \qquad +3 \\ \hline 2x = 5 \end{array}$$

$$x = \frac{5}{2}$$

Solve for the specified letter.

2)  $I = \frac{nE}{nr + R}$ , for n

$$I(nr + R) = nE$$

$$nIr + IR = nE$$

$$nE = nIr + IR$$

$$\begin{array}{r} -nIr \quad -nIr \\ \hline nE - nIr = IR \end{array}$$

$$n(E - Ir) = IR$$

$$n(E - Ir) = IR$$

$$n = \frac{IR}{E - Ir}$$

Solve the problem.

3) An experienced accountant can prepare a tax return in 10 hours. A novice accountant can do the job in 16 hours. How long will it take them to do the job working together?

	R	T	Work
EXP	1/10	t	t/10
NOV	1/16	t	t/16

$$\frac{t}{10} + \frac{t}{16} = 1$$

$$160 \left( \frac{t}{10} + \frac{t}{16} \right) = 1 \cdot 160$$

$$16t + 10t = 160$$

1

$$26t = 160$$

$$t = \frac{160}{26} =$$

$$t = \frac{80}{13} \text{ HRS}$$

4) In a chemistry class, 8 liters of a 4% silver iodide solution must be mixed with a 10% solution to get a 6% solution. How many liters of the 10% solution are needed?

	QUANT. OF SOLUTION	AMOUNT OF SILVER IODIDE
4%	8	.04(8)
10%	L	.10(L)
6%	B+L	.06(B+L)

$$.04(8) + .10(L) = .06(B+L)$$

$$4(8) + 10L = 6(B+L)$$

$$32 + 10L = 48 + 6L$$

$$\begin{array}{r} -32 \quad -6L \\ \hline 4L = 16 \end{array}$$

$$L = 4$$

4 LITERS

Perform the indicated operations. Simplify the answer.

5)  $\frac{\sqrt{-12} \cdot \sqrt{-3}}{\sqrt{4}}$

$$\frac{i\sqrt{12} \cdot i\sqrt{3}}{2}$$

$$\frac{i^2 \sqrt{36}}{2}$$

$$\frac{-1 \cdot 6}{2} = \boxed{-3}$$

Find the product. Write the answer in standard form.

6)  $(7 - 6i)(8 - 4i)$

$$56 - 28i - 48i + 24i^2$$

$$56 - 76i - 24$$

$$\boxed{32 - 76i}$$

Solve the equation by the zero-factor property.

7)  $4x^2 - 4x - 8 = 0$

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

$$4(x-2)(x+1) = 0$$

$$\boxed{x = -1, 2}$$

Solve by completing the square.

8)  $x^2 + 4x + 40 = 0$

$$\begin{aligned} x^2 + 4x &= -40 \\ x^2 + 4x + 4 &= -40 + 4 \\ (x+2)^2 &= -36 \\ x+2 &= \pm\sqrt{-36} \\ x &= -2 \pm \sqrt{-36} \\ \boxed{x = -2 \pm 6i} \end{aligned}$$

Solve the equation using the quadratic formula.

9)  $30x^2 + 84x + 55 = 0$

$a = 30$

$b = 84$

$c = 55$

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

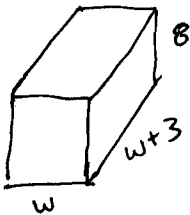
$$x = \frac{-84 \pm \sqrt{84^2 - 4(30)55}}{2 \cdot 30}$$

$$x = \frac{-84 \pm \sqrt{7056 - 6600}}{60}$$

$$x = \frac{-84 \pm \sqrt{456}}{60} = \frac{-84 \pm \sqrt{4} \sqrt{114}}{60} = \boxed{\frac{-42 \pm \sqrt{114}}{30}}$$

Solve the problem.

10) The height of a box is 8 inches. The length is three inches more than the width. Find the width if the volume is 560.



$$w(w+3)8 = 560$$

$$w^2 + 3w = 70$$

$$w^2 + 3w - 70 = 0$$

$$(w+10)(w-7) = 0$$

$$w = -10, 7$$

$$\boxed{\text{WIDTH} = 7 \text{ in.}}$$

- 11) A boat is 92 feet from the base of cliff. If the distance from the top of the cliff to the boat is 23 less than twice the height of the cliff to the water. Find the height of the cliff. Round to the nearest tenth of a foot if necessary.



$$(2h-23)^2 = h^2 + 92^2$$

$$4h^2 - 92h + 529 = h^2 + 8464$$

$$\begin{array}{r} 4h^2 - 92h + 529 \\ -h^2 \qquad -8464 \\ \hline 3h^2 - 92h - 7935 = 0 \end{array}$$

$$a=3$$

$$b=-92$$

$$c=-7935$$

$$h = \frac{-(-92) \pm \sqrt{(-92)^2 - 4(3)(-7935)}}{2 \cdot 3}$$

$$= \frac{92 \pm \sqrt{8464 + 95220}}{6}$$

$$= \frac{92 \pm \sqrt{103684}}{6}$$

$$= \frac{92 \pm 322}{6} = \frac{414}{6} = 69$$

height = 69 feet

Solve the equation.

12)  $\frac{4}{x+3} + \frac{11}{x+4} = \frac{13}{x^2+7x+12}$

$$(x^2+7x+12) \left[ \frac{4}{x+3} + \frac{11}{x+4} \right] = 13$$

$$4(x+4) + 11(x+3) = 13$$

$$4x+16 + 11x+33 = 13$$

$$15x + 49 = 13$$

$$\begin{array}{r} 15x + 49 = 13 \\ -49 \quad -49 \\ \hline 15x = -36 \end{array}$$

$$15x = -36$$

$$x = -\frac{36}{15} = \boxed{-\frac{12}{5}}$$

13)  $1 + \frac{1}{x} = \frac{72}{x^2}$

$$x^2 \left( 1 + \frac{1}{x} \right) = 72$$

$$x^2 + x = 72$$

$$x^2 + x - 72 = 0$$

$$(x+9)(x-8) = 0$$

$$\boxed{x = -9, 8}$$

14)  $\sqrt{2x+5} - \sqrt{x-2} = 3$

$\sqrt{2x+5} = \sqrt{x-2} + 3$

$2x+5 = (\sqrt{x-2})^2 + 6\sqrt{x-2} + 9$

$2x+5 = x-2 + 6\sqrt{x-2} + 9$

$\begin{array}{r} -x+2-9 \\ \hline \end{array}$

$\begin{array}{r} -x+2 \\ \hline x-2 = 6\sqrt{x-2} \end{array}$

$(x-2)^2 = 36(x-2)$

$x^2 - 4x + 4 = 36x - 72$

$\begin{array}{r} -36x + 72 \\ \hline \end{array}$

$x^2 - 40x + 76 = 0$

$(x-38)(x-2) = 0$

$x = 2, 38$

15)  $x^{1/2} = 4x^{1/4}$

$(x^{1/2})^4 = 4^4 (x^{1/4})^4$

$x^2 = 256x$

$\begin{array}{r} -256x \\ \hline \end{array}$

$x^2 - 256x = 0$

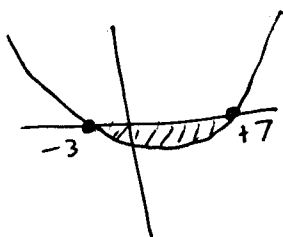
$x(x-256) = 0$

$x = 0, 256$

Solve the quadratic inequality. Write the solution set in interval notation.

16)  $x^2 - 4x - 21 \leq 0$

$(x-7)(x+3) \leq 0$



$-3 \leq x \leq 7$

or

$[-3, 7]$

Solve the rational inequality. Write the solution set in interval notation.

$$17) \frac{x-7}{x+8} \leq 0$$

THE ZEROS (SP?) ARE AT 7 (FROM THE NUMERATOR) AND -8 (FROM THE DENOMINATOR). FOR  $x < -8$ , THE DIVISION IS  $- \div -$ , SO THE QUOTIENT IS  $+$ . FOR  $x > 7$ , THE DIV. IS  $+ \div +$  AND AGAIN THE QUOTIENT IS  $+$ . BETWEEN THOSE POINTS, THE DIV. IS  $- \div +$  WITH A  $-$  RESULT. SO THE SOLUTION IS:

$$-8 < x \leq 7 \quad \text{OR} \quad \boxed{(-8, 7]}$$

(8 CAN'T BE INCLUDED AS IT WOULD MAKE THE DENOM. = 0)

Solve the equation.

$$18) |9x+2| = |3-10x|$$

$$\begin{array}{r} 9x+2 = 3-10x \\ +10x \quad -2 \quad -2+10x \\ \hline 19x = 1 \end{array}$$

$$x = \frac{1}{19}$$

$$\text{OR} \quad 9x+2 = -(3-10x)$$

$$\begin{array}{r} 9x+2 = -3+10x \\ -10x-2 \quad -2-10x \\ \hline -x = -5 \end{array}$$

$$-x = -5$$

$$x = 5$$

$$\boxed{x = \frac{1}{19}, 5}$$

Solve.

$$19) |5x-6| - 8 = -2$$

$$|5x-6| = -2+8 = 6$$

$$\begin{array}{r} 5x-6 = 6 \\ +6 \quad +6 \\ \hline 5x = 12 \end{array}$$

$$x = \frac{12}{5}$$

$$\text{OR} \quad 5x-6 = -6$$

$$\begin{array}{r} +6 \quad +6 \\ \hline 5x = 0 \end{array}$$

$$x = 0$$

$$\boxed{x = 0, \frac{12}{5}}$$