CCSS Advanced Algebra Reversing Operations (Other Functions) Part 1

Show your work in your math notebook.

1. Solve the equation $2(x-4)^2+6=78$ for x by Reversing Operations.

$-6\ -6$

$\frac{2(x-4)^2}{2}=\frac{72}{2}$

$\sqrt{(x-4)^2}=\sqrt{36}$

$x-4=6 \rightarrow x=10$ (circled)

$+4\ +4$

$x-4=-6 \rightarrow x=-2$ (circled)

$+4\ +4$

2. Solve the equation $-4(x+1)^2-10=-10$ for x by Reversing Operations.

$+10\ +10$

$\frac{-4(x+1)^2}{-4}=\frac{0}{-4}$

$\sqrt{(x+1)^2}=\sqrt{0}$

$x+1=0 \rightarrow x=-1$ (circled)

$-1\ -1$

3. Why do you get 2 solutions in #1 but only 1 solution in #2?

Because 36 has 2 square roots (6 or -6), but 0 has only 1 square root.

4. Reversing Operations can be applied to other types of equations as well -- it's just that the operations are different. With your table group, assign each member a different equation to solve by Reversing Operations. Then each member is responsible for explaining their type of equation to the other members -- be sure to take notes about each type of equation.

a. $\frac{(x-3)^2}{5}-1=19$

$+1\ +1$

$5\left(\frac{(x-3)^2}{5}=20\right)\cdot 5$

$\sqrt{(x-3)^2}=\sqrt{100}$

$x-3=10 \rightarrow x=13$ (circled)

$+3\ +3$

$x-3=-10 \rightarrow x=-7$ (circled)

$+3\ +3$

b. $3\sqrt{x+1}-2=4$

$+2\ +2$

$\frac{3\sqrt{x+1}}{3}=\frac{6}{3}$

$(\sqrt{x+1})^2=(2)^2$

$x+1=4$

$-1\ -1$

$x=3$ (circled)

c. $10(x+4)^3-3=77$

$+3\ +3$

$\frac{10(x+4)^3}{10}=\frac{80}{10}$

$\sqrt[3]{(x+4)^3}=\sqrt[3]{8}$

$x+4=2$

$-4\ -4$

$x=-2$ (circled)

d. $\left(\frac{x}{2}+\frac{1}{3}=\frac{x}{3}\right)\cdot 2$

$3\left(x+\frac{2}{3}=\frac{2x}{3}\right)\cdot 3$

$3x+2=2x$

$-3x\ \ -3x$

$2=-x$

$-2=x$ (circled)

5. Practice. Solve each equation for x without graphing. Check your answers.

a. $\frac{3(x+1)^2}{4}+2=83$

$-2\ \ -2$

$4\left(\frac{3(x+1)^2}{4}=81\right)4$

$\frac{3(x+1)^2}{3}=\frac{324}{3}$

$(x+1)^2=108$

$x+1=10.4 \quad x+1=-10.4$

$x=9.4,\ x=-11.4$

b. $5\sqrt{x-4}-2=8$

$+2\ \ +2$

$\frac{5\sqrt{x-4}}{5}=\frac{10}{5}$

$(\sqrt{x-4})^2=(2)^2$

$x-4=4$

$+4\ \ +4$

$x=8$

c. $4(x-1)^3+8=12$

$-8\ \ -8$

$\frac{4(x-1)^3}{4}=\frac{4}{4}$

$\sqrt[3]{(x-1)^3}=\sqrt[3]{1}$

$x-1=1$

$+1\ \ +1$

$x=2$

d. $\frac{5x}{12}+\frac{1}{3}=\frac{2x}{3}$

$12\left(\frac{15x}{12}+1=2x\right)12$

$15x+12=24x$

$-15x\ \ -15x$

$12=9x$

$x=4/3$

e. $5\left(\frac{\sqrt{x-1}}{5}+1=\frac{3}{10}\right)-5$

$10\left(\sqrt{x-1}+5=\frac{15}{10}\right)10$

$10\sqrt{x-1}+50=15$

$-50\ \ -50$

$\frac{10\sqrt{x-1}}{10}=\frac{-35}{10}$

$(\sqrt{x-1})^2=(-3.5)^2$

$x-1=12.25$

$x=13.25$

f. $\left(\sqrt{x+7}\right)^2=(x+1)^2$

$x+7=(x+1)(x+1)$

$x+7=x^2+2x+1$

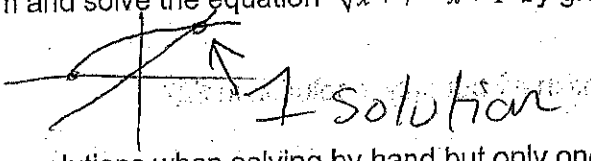
$0=x^2+x-6$

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

$x=-3,\ x=2$

6. In question 5(f), you should have found two solutions when solving the equation.

a. Go to desmos.com and solve the equation $\sqrt{x+7}=x+1$ by graphing. How many solutions do you find?.



1 solution

b. Why do you get two solutions when solving by hand but only one solution when graphing? Be specific.

Because the negative solution assumes that we have a full sideways parabola 2 sided shape

7. Discussion Questions:

- Why would you expect to get two solutions for equations like $2(x-1)^2-9=99$?
- Why would you expect to get only one solution for equations like $2\sqrt{x-1}-9=99$ or $2(x-1)^3-9=99$?

1 sided shape

CCSS Advanced Algebra Reversing Operations (Other Functions) Part 2

Complete work in your math notebook.

1. Absolute Value Equations

   a. Evaluate or solve each of the following:

   - $|4| = ?$ 4
   - $|-4| = ?$ 4
   - $|x+3| = ?$ when $x = -10$ $|-10+3| = |-7| = 7$
   - $|x| = 1$, $x = ?$ [2 answers] $x = 1$ or $x = -1$
   - $|x| = -2$, $x = ?$ No solution
   - $|x-1| = 0$, $x = ?$ $x = 1$

   b. What does it mean to take the Absolute Value of a number, for example, $|-32|$.

   Calculate distance from zero

   c. To solve equations with Absolute Value, you need to understand that $|5| = |-5| = 5$. Watch the screencast on Solving Absolute Value Equations. Then practice on the problems below.

   i. $|x-4| = 2$ → $x-4=2 \rightarrow x=6$ or $x-4=-2 \rightarrow x=2$

   ii. $|x+5|-3 = 10$ → $|x+5| = 13$ → $x+5=13 \rightarrow x=8$ or $x+5=-13 \rightarrow x=-18$

   iii. $2|x-1|+4 = 10$ → $2|x-1| = 6$ → $|x-1| = 3$ → $x-1=3 \rightarrow x=4$ or $x-1=-3 \rightarrow x=-2$

   iv. $-4|x+1|+7 = -13$ → $-4|x+1| = -20$ → $|x+1| = 5$ → $x+1=5 \rightarrow x=4$ or $x+1=-5 \rightarrow x=-6$

   v. $-4|x+1|+7 = 7$ → $x=-1$

   vi. $-4|x+1|+7 = 27$ No solution

2. Rational Equations (Equations involving fractions)

   a. Solve each equation below by first removing the fractions.

   i. $3\left(\frac{x}{3}+1 = \frac{5}{2}\right)\cdot 3$ → $x+3 = \frac{15}{2}$ → $\cdot 2$ → $2x+6 = 15$ → -6 → $2x = 9$ → $\div 2$ → $x = \frac{9}{2}$

   ii. $20\left(\frac{2x}{5}+\frac{1}{20} = \frac{x}{10}\right)\cdot 20$ → $8x+1 = 2x$ → $-6x$ → $1 = -6x$ → $\div -6$ → $x = -\frac{1}{6}$

   iii. $2\left(\frac{(x-4)^2}{2}+1 = \frac{11}{2}\right)2$ → $(x-4)^2+2 = 11$ → -2 → $(x-4)^2 = 9$ → $x-4=3 \rightarrow x=7$ or $x-4=-3 \rightarrow x=1$

   iv. $6\left(\frac{2|x-1|}{3}-\frac{1}{6} = 2\right)\cdot 6$ → $4|x-1|-1 = 12$ → $+1$ → $4|x-1| = 13$ → $\div 4$ → $|x-1| = 3.25$ → $x = 4.25, -2.25$

   v. $\left(\frac{2}{3}x+1\right)\left(\frac{x}{5}-\frac{1}{10}\right) = 0$ $x = -\frac{3}{2}, \frac{1}{2}$

   b. Rational Equations can also have the variables in the denominator of the fraction. Consider the equation $\frac{5}{x}+3 = \frac{2}{x}$. What operation would remove the fractions in this problem?

   Multiply by x

   c. Simplify the equation $\frac{5}{x}+3 = \frac{2}{x}$ by removing the fractions and then solve.

   $5+3x = 2$ → -5 → $3x = -3$ → $\div 3$ → $x = -1$

3. More Rational Equations:

a. $5x\left(\frac{1}{x}+\frac{6}{5x}=1\right)5x$

$5+6=5x$

$\frac{11}{5}=\frac{5x}{5}$

$11/5=x$

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

$2+2x=1$

$-2 \quad -2$

$\frac{2x}{2}=\frac{-1}{2}$

$x=-1/2$

c. $x\left(x+1=\frac{72}{x}\right)x$

$x^2+x=72$

$x^2+x-72=0$

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

$x=-9, x=8$

d. $x-3\left(x+\frac{x-1}{x-3}=\frac{2}{x-3}\right)x-3$

$x^2-3x+x-1=2$

$x^2-2x-1=2$

$x^2-2x-3=0$

$(x-3)(x+1)=0$

$x=3 \quad x=-1$

4. Consider the equation $\frac{1}{x-1}+\frac{1}{x}=\frac{-1}{x(x-1)}$.

a. What would you need to multiply the equation by to remove the fractions? By $x(x-1)$

b. Explain, based on your answer to part (a), why the equation above can be changed to $x+x-1=-1$. Cancel the bottoms

c. Solve this equation for x. $x=1$

d. Check your solution by plugging the value of x into the original equation. What happened? This is called an extraneous solution. Can't divide by zero.

e. Show that $\frac{1}{x-2}+\frac{1}{x+2}=\frac{4}{(x-2)(x+2)}$ has an extraneous solution.

f. Use desmos.com or the TI-84 to check the solutions in parts (c) and (e). What is it about the graphs that creates an extraneous solution? Explain fully.

$(x-2)(x+2)\left(\frac{1}{x-2}+\frac{1}{x+2}=\frac{4}{(x-2)(x+2)}\right)(x-2)(x+2)$

$x+2+x-2=4$

$2x=4$

$x=2$

Can't divide by zero

CCSS Advanced Algebra 3 Reversing Operations (part 3) Name _____

1. Solve the equation below that you've been assigned by reversing operations. **Show your steps and check your solutions in the space below.** Be prepared to share your steps with your group.

KING. $3|x-5|+11=20$

QUEEN. $5|x+1|+6=186$

JACK. $\left(\frac{3}{x-5}-\frac{2}{x}=\frac{-11}{x}\right)\cdot x$

ACE. $\left(\frac{5}{x}-\frac{3x}{x-1}=-3\right)\cdot x(x-1)$

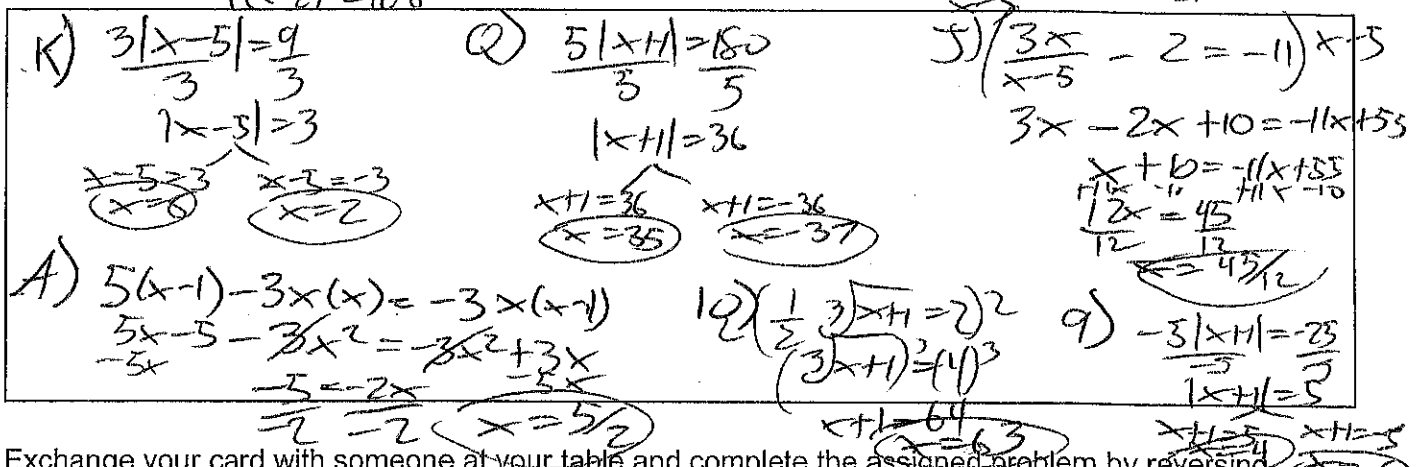
10. $\frac{1}{2}\sqrt[3]{x+1}-5=-3$

9. $4-5|x+1|=-21$

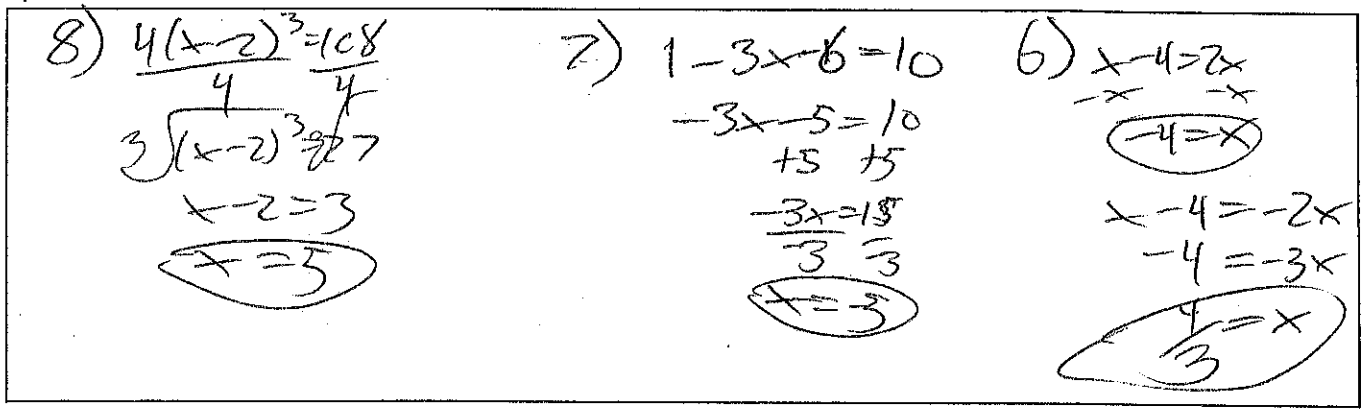
8. $4(x-2)^3-7=101$

7. $\left(\frac{1}{x+2}-3=\frac{10}{x+2}\right)\cdot(x+2)$

6. $|x-4|=2x$



2. Exchange your card with someone at your table and complete the assigned problem by reversing operations.



Extra Practice:

3. A model rocket is launched from a 6-foot tall platform in a field. The rocket reached it's maximum height of 70 feet 2 seconds after liftoff. Let t represents seconds after liftoff and $p(t)$ represents the rocket's height in feet.

   a. Find the function that models the rocket's flight path in the form $p(t)=\#(x-\#)^2+\#$. Show how you found your function.

   $p(t)=\#(x-2)^2+70$

   $6=\#(0-2)^2+70$

   $-70 \quad -70$

   $-64=\#(-2)^2$

   $-64=\#\cdot 4 \rightarrow \#=-16$,

   $p(t)=-16(x-2)^2+70$

   b. A low cloud settled over the field at 50 feet obscuring the rocket during its flight. Write and solve an equation to determine the amount of time the rocket was hidden by the cloud.

   $50=-16(x-2)^2+70$

   $-70 \quad -70$

   $-20=-16(x-2)^2$

   $\frac{-20}{-16}=\frac{-16(x-2)^2}{-16}$

   $\sqrt{\frac{20}{16}}=\sqrt{(x-2)^2}$

   $1.1=x-2$

   $+2 \quad +2$

   $3.1=x$

   $-1.1=x-2$

   $+2 \quad +2$

   $.9=x$

4. Use REVERSING OPERATIONS to solve the equations below. **Show your steps and check your solutions.**

$\sqrt{x-1}+2=5$ $-2\ -2$ $(\sqrt{x-1})^2=(3)^2$ $x-1=9$ $+1\ +1$ $x=10$	$-12+4\sqrt{x+1}=-8$ $+12\qquad +12$ $\frac{4\sqrt{x+1}}{4}=\frac{4}{4}$ $(\sqrt{x+1})^2=1^2$ $x+1=1$ $-1\ -1$ $x=0$	$2\sqrt{3x-2}+4=16$ $-4\qquad -4$ $\frac{2\sqrt{3x-2}}{2}=\frac{12}{2}$ $(\sqrt{3x-2})^2=(6)^2$ $3x-2=36$ $+2\ +2$ $\frac{3x}{3}=\frac{38}{3}$ $x=\frac{38}{3}$	$\left(\sqrt{2x^2-100}\right)^2=(x)^2$ $2x^2-100=x^2$ $-2x^2\qquad -2x^2$ $\frac{-100}{-1}=\frac{-x^2}{-1}$ $\sqrt{100}=\sqrt{x^2}$ $-10=x$ $10=x$
$5(x-1)^3+1=-4$ $-1\ -1$ $\frac{5(x-1)^3}{5}=\frac{-5}{5}$ $\sqrt[3]{(x-1)^3}=\sqrt[3]{-1}$ $x-1=-1$ $+1\ +1$ $x=0$	$\left(\frac{\sqrt[3]{x+4}}{2}-1=\frac{1}{2}\right)2$ $3\sqrt{x+4}-2=1$ $+2\ +2$ $(\sqrt[3]{x+4})^3=3^3$ $x+4=27$ $-4\ -4$ $x=23$	$3\sqrt[5]{x-4}+2=5$ $-2\ -2$ $\frac{3\sqrt[5]{x-4}}{3}=\frac{3}{3}$ $(\sqrt[5]{x-4})^5=1^5$ $x-4=1$ $+4\ +4$ $x=5$	$4(x-3)^{100}+6=2$ $-6\ -6$ $\frac{4(x-3)^{100}}{4}=\frac{-4}{4}$ $\sqrt[100]{(x-3)^{100}}=\sqrt[100]{-1}$ No sol.
$\lvert x-6\rvert-2=14$ $+2\ +2$ $\lvert x-6\rvert=16$ $x-6=16 \quad x-6=-16$ $x=22 \quad x=-10$	$5\lvert x+3\rvert+1=26$ $-1\ -1$ $\frac{5\lvert x+3\rvert}{5}=\frac{25}{5}$ $\lvert x+3\rvert=5$ $x+3=5 \quad x+3=-5$ $-3\ -3 \quad -3\ -3$ $x=2 \quad x=-8$	$2-3\lvert x+11\rvert=-13$ $-2\qquad -2$ $\frac{-3\lvert x+11\rvert}{-3}=\frac{-15}{-3}$ $\lvert x+11\rvert=5$ $x+11=5 \quad x+11=-5$ $-11\ -11 \quad -11\ -11$ $x=-6 \quad x=-16$	$\frac{2\lvert x+3\rvert}{2}=\frac{6x}{2}$ $\lvert x+3\rvert=3x$ $x+3=3x \quad x+3=-3x$ $3=2x \quad 3=-4x$ $\frac{3}{2}=x \quad \frac{3}{-4}=x$

Algebra 3-4
Unit 1: Solving QUIZ #1A

Name: _____ Per: _____
Date: _____

Solve the following equations using reversing operations. Show ALL work. If the equation has no solutions explain why in a complete sentence.

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

$-1 \quad -1$

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

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

$x - 4 = 1$

$+4 \quad +4$

$x = 5$

2. $|3x+2| - 3 = 6$

$+3 \quad +3$

$|3x+2| = 9$

$3x+2 = 9 \qquad 3x+2 = -9$

$-2 \quad -2 \qquad -2 \quad -2$

$\frac{3x}{3} = \frac{7}{3} \qquad \frac{3x}{3} = \frac{-11}{3}$

$x = 7/3 \qquad x = -11/3$

3. $\frac{x+1}{2} - 3 = \frac{x}{4}$

$2x + 2 - 12 = x$

$2x - 10 = x$

$-2x \quad -2x$

$-10 = -x$

$10 = x$

4. $-3(x-2)^2 - 4 = 7$

$+4 \quad +4$

$\frac{-3(x-2)^2}{-3} = \frac{11}{-3}$

$(x-2)^2 = -11/3$

No sol, can't $\sqrt{-\#}$

5. $\left(\frac{x}{x+2} - 3 = \frac{4}{x+2}\right)(x+2)$

$x - 3x - 6 = 4$

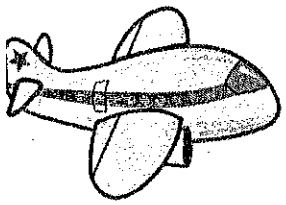
$-2x - 6 = 4$

$+6 \quad +6$

$\frac{-2x}{-2} = \frac{10}{-2}$

$x = -5$

6. In 1942 I.M. Chisov jumped out of an airplane without a parachute. $f(t) = -16t^2 + 21980$ represents his fall (height in feet and time in seconds).



a. How high was the airplane when he jumped out? Show evidence to support your answer.

21980

b. How long was I.M. Chisov in the air before he landed on the ground? Show evidence to support your answer.

$0 = -16t^2 + 21980$

$-21980 \quad -21980$

$\frac{-21980}{-16} = \frac{-16t^2}{-16}$

$1373.75 = t^2$

$37.06 = t$

Algebra 3-4
Unit 1: Solving QUIZ #2A

Name: _____ Per: _____
Date: _____

Solve the following equations using reversing operations. Show ALL work. If there are no solutions, explain why. You may draw pictures to help your explanation.

1.

a. $4|6-2x|-5=3$

$+5 \quad +5$

$\frac{4|6-2x|}{4}=\frac{8}{4}$

$|6-2x|=2$

$6-2x=2$ or $6-2x=-2$

$-6 \quad -6 \qquad -6 \quad -6$

$\frac{-2x}{-2}=\frac{4}{-2} \qquad \frac{-2x}{-2}=\frac{-8}{-2}$

$x=-2 \qquad x=4$

b. $4|6-2x|+5=3$

$-5 \quad -5$

$\frac{4|6-2x|}{4}=\frac{-2}{4}$

$|6-2x|=-\frac{1}{2}$

No sol.

c. $3-5(x+1)^2=-42$

$-3 \quad -3$

$\frac{-5(x+1)^2}{-5}=\frac{-45}{-5}$

$(x+1)^2=9$

$x+1=3 \qquad x+1=-3$

$x=2 \qquad x=-4$

d. $3-5(x+1)^2=42$

$-3 \quad -3$

$\frac{-5(x+1)^2}{-5}=\frac{39}{-5}$

$(x+1)^2=-\frac{39}{5}$

No sol.

2. The Gonzales family spent $53.75 at the movies for 2 adult tickets and 3 child tickets. The Xi family spent $95.25 for 3 adult tickets and 6 child tickets. How much would the Alonso family spend on 4 adult tickets and 2 child tickets?

$3(2x+3y=53.75) \rightarrow 6x+9y=161.25$

$2(3x+6y=95.25) \rightarrow 6x+12y=190.5$

$3y=29.25$

$\frac{3y}{3}=\frac{29.25}{3}$

$y=9.75$

$2x+3(9.75)=53.75$

$2x+29.25=53.75$

$-29.25 \quad -29.25$

$2x=24.5$

$x=12.50$

Alonso $=4(12.5)+2(9.75)$

$60+19.50=79.50$

3. A large pizza at Palanzio's Pizzeria costs $6.80 plus $0.90 for each topping. The cost of a large cheese pizza at Guido's Pizza is $8.30 plus $0.65 for each topping. How many toppings need to be added to a large cheese pizza from Palanzio's Pizzeria and Guido's Pizza in order for the pizzas to cost the same? What would that cost be?

$y=.90x+6.80$

$y=.65x+8.30$

$.90x+6.80=.65x+8.30$

$-.65x \qquad -.65x$

$.25x+6.80=8.30$

$-6.80 \quad -6.80$

$\frac{.25x}{.25}=\frac{1.50}{.25}$

$x=6$

$y=.90(6)+6.80$

$5.40+6.80$

$y=12.20$

Solve the systems using algebra. Show ALL work.

4. $-2x+6y=32$
   $3y-5x=-4$

$-2x+6y=32$ → $2(-5x+3y=-4)$ → $-2x+6y=32$, $-(-10x+6y=-8)$

$8x=40$

$\frac{8x}{8}=\frac{40}{8}$

$x=5$

$-2(5)+6y=32$

$-10+6y=32$

$+10 \quad +10$

$\frac{6y}{6}=\frac{42}{6}$ → $y=7$

5. $y=3x-9$
   $y=-4x+5$

$3x-9=-4x+5$

$+4x \quad +4x$

$7x-9=5$

$+9 \quad +9$

$\frac{7x}{7}=\frac{14}{7}$

$x=2$

$y=3(2)-9$

$6-9$

$y=-3$

6. $y=43$
   $y=3(x+1)^2-5$

$43=3(x+1)^2-5$

$+5 \quad +5$

$\frac{48}{3}=\frac{3(x+1)^2}{3}$

$\sqrt{16}=\sqrt{(x+1)^2}$

$4=x+1$ or $x+1=-4$

$x=3$ $\quad x=-5$

$y=43$

Solve the system using any technique. Make sure to show ALL work.

7. $y=-2x-3$
   $x+3y=6$

$x+3(-2x-3)=6$

$x-6x-9=6$

$-5x-9=6$

$+9 \quad +9$

$\frac{-5x}{-5}=\frac{15}{-5}$

$x=-3$

$y=-2(-3)-3$

$=6-3$

$y=3$

CCSS Algebra 2 A6: Solving One-Variable Inequalities Name_____

1. How do you solve equations if they have parentheses? Write a description of how you remove the parentheses in each type of problem shown below. Distribute

a. $3(x + 1) = -12$

$3x+3=-12$
$-3 \quad -3$
$\frac{3x}{3}=\frac{-15}{3}$
$x=-5$

b. $5 - 2(x - 3) = 11$

$5-2x+6=11$
$-2x+11=11$
$-11 \quad -11$
$\frac{-2x}{-2}=\frac{0}{-2}$
$x=0$

c. $12 - (x + 4) = -20$

$12-x-4=-20$
$8-x=-20$
$-8 \quad -8$
$-x=-28$
$x=28$

2. How do you solve equations if they have variables (x) in different locations in the equation? Write a description of how you combine variables in each type of problem shown below. Get them on the same side.

a. $3x - 7 = 5x + 21$

$-3x \quad -3x$
$-7=2x+21$
$-21 \quad -21$
$\frac{-28}{2}=\frac{2x}{2}$
$-14=x$

b. $4x - 2(x + 3) = -10$

$4x-2x-6=-10$
$2x-6=-10$
$+6 \quad +6$
$\frac{2x}{2}=\frac{-4}{2}$
$x=-2$

c. $-2x + 5 = 3x - 25$

$+2x \quad +2x$
$5=5x-25$
$+25 \quad +25$
$\frac{30}{5}=\frac{5x}{5}$
$6=x$

3. Consider the inequality: $5x + 1 \geq -14$.

a. Show that $x = 4$ is a solution to the inequality.

$5(4)+1=21 \quad 21 \geq -14$

b. Show that $x = -4$ is not a solution to the inequality.

$5(-4)+1=-19 \quad -19 < -14$

c. Solve the equation $5x + 1 = -14$ for x. Is this answer a solution to the inequality above? Explain why or why not.

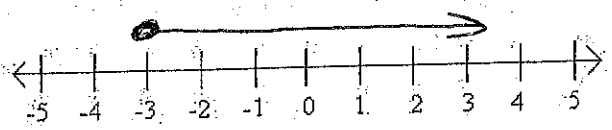
$-1 \quad -1$
$\frac{5x}{5}=\frac{-15}{5}$
$x=-3.$

Yes. $5(-3)+1=-14$
$-14 \geq -14$

d. Explain why the solution to part (c) is the SMALLEST possible solution to the inequality $5x + 1 \geq -14$.

Because it makes the left side exactly equal the right.

e. Determine 3 three other solutions to the inequality $5x+1 \geq -14$. Mark all of the solutions you have found so far on the number line below: $x=100$, $x=1000$, $x=12345$



f. Use your answer to parts (d) and (e) to show all of the solutions on the number line above. Write the solutions as an inequality.

$x \geq -3$

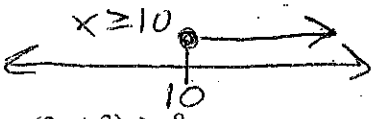
4. For each inequality below,
   i. Find the boundary point.
   ii. Choose and test a point.
   iii. Use the boundary point and your test point to shade the solutions on a number line.
   iv. Write the solution as an inequality (using $<, >, \leq, \geq$).

a. $10 - 3x \leq -20$

$-10 \quad -10$

$\frac{-3x}{-3} \leq \frac{-30}{-3}$

$x \geq 10$



b. $4 - 2(x+1) > 6$

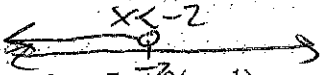
$-4 \quad -4$

$\frac{-2(x+1)}{-2} > \frac{2}{-2}$

$x+1 < -1$

$-1 \quad -1$

$x < -2$



c. $-5x + 13 < 5(2-x)$

$-5x + 13 < 10 - 5x$

$+5x \quad +5x$

$13 < 10$

No solution

d. $1 - (2x+3) > 8$

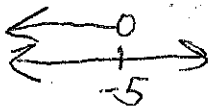
$1 - 2x - 3 > 8$

$-2x - 2 > 8$

$+2 \quad +2$

$\frac{-2x}{-2} > \frac{10}{-2}$

$x < -5$



e. $10x - 3 \geq 7x + 3(x-1)$

$10x - 3 \geq 7x + 3x - 3$

$10x - 3 \geq 10x - 3$

$-3 \geq -3$

All #'s

3. Mason is working during April as a salesman at a computer retail store. He is paid a flat salary of $500 plus $12 for every computer he sells. He finds that he must earn at least $1500 to pay for his April expenses.

a. Can Mason cover his monthly expenses if he sells 20 computers? If he sells 75 computers? Show how you found your answer. $500 + 20 \cdot 12 = 740$ No

$500 + 75 \cdot 12 = 1400$ No

b. Write and solve an inequality to represent Mason's situation.

$500 + 12x \geq 1500 \rightarrow \frac{12x}{12} \geq \frac{1000}{12} \rightarrow x \geq 83.3$

$-500 \quad -500$

c. What does your solution tell you about Mason's job and how many computers he sells?

Must sell 84 or more computers to breakeven.

Algebra 3-4
Unit 1 Solving Review

Name: _____ Per: _____
Date: _____

Complete all problems on a separate sheet of paper. The answer key is posted on my webpage!

1. **Find the solution(s) of the following systems using algebra:**

a) $\{6x - 2y = -4\ y = 3x + 2$

b) $\{x + y = -2\ y = 4x - 7$

c) $\{5x + y = 8\ -3x + 2y = -10$

d) $\{4x^2 + y^2 = 13\ x^2 + y^2 = 10$

e) $\{y = x^2 + 4x + 5\ y = x^2 + 2x - 1$

2. **Solve using algebra. Make sure you check that your solutions work!**

a) $\sqrt{2x+5} = \sqrt{3x-1}$

b) $-2|x-1|+3 \geq -5$

c) $4(x-2)^2 + 9 < 25$

d) $\left(\frac{5}{2x} + \frac{3}{4x^2} = \frac{2}{3x}\right) 4x^2$

e) $\sqrt{x-4} + 3 > 4$

f) $3|3-5x| - 3 = 18$

g) $27 - 2(x-1)^2 = 9$

h) $\frac{x-3}{7} = \frac{4x+12}{7}$

i) $3(2x-1) + 12 = 4x - 3$

3. **Solve using your calculator to help.**

a) $|x+1| = \frac{1}{2}x + 3$

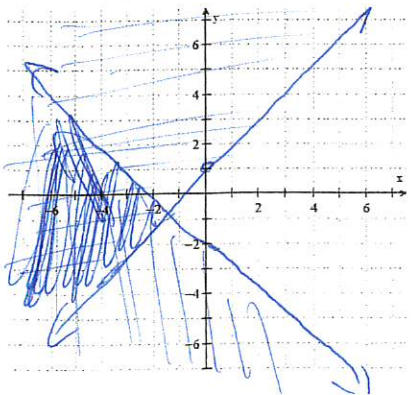
b) $(x+3)^2 - 2 < 3x + 7$

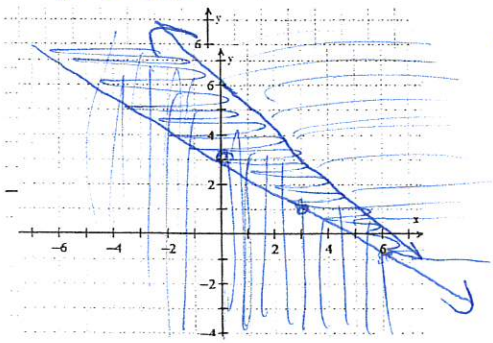
4. **Sketch the systems of inequalities.**

a) $\{y < -x - 2\ y > x + 1$

b) $\{2x + 3y - 9 \geq 0\ x + y - 6 < 0$

c) ~~$\{x - y < -3\ y \geq x^2 + 1$~~





5. Solve.

a) Two times a number added to another number is 25. Three times the first number minus the other number is 20. Find the two numbers. $2x+y=25$, $3x-y=20$; $5x=45$, $x=9$; $2(9)+y=25$, $18+y=25$, $y=7$

b) At a sale on winter clothing, Cody bought two pairs of gloves and four hats for $43.00. Tori bought two pairs of gloves and two hats for $30.00. Find the prices of the hats and gloves.

$2x+4y=43$, $2x+2y=30$, $2y=13$, $y=6.50$; $2x+2(6.50)=30$, $2x+13=30$, $2x=17$, $x=8.50$

c) A swimmer dives off a diving board into a pool below. The dive is represented by the equation $h(x)=-(x-3)^2+23$ where $h(x)$ represents the height of the swimmer above the pool and x represents the horizontal distance from the diving board. Answer the following:

a. Make a sketch & label your axes.

b. How high above the water is the diving board? $h(0)=-(0-3)^2+23=-9+23=14$ ft

c. How far away from the diving board do they land in the water? $0=-(x-3)^2+23$, $23=(x-3)^2$, $4.795=x-3$, $x=7.795$

d. When $x=1$ what is $h(x)$? What does this mean in context of the problem? $h(1)=-(1-3)^2+23=-4+23=19$. Diver was 19 ft high after 1 sec.

e. When $x=8$ what is $h(x)$? What does this mean in context of the problem? $h(8)=-(8-3)^2+23=-25+23=-2$. Already under water

f. When the swimmer is 22 feet in the air, how far away from the board are they? $22=-(x-3)^2+23 \rightarrow 1=(x-3)^2 \rightarrow x=2$ or $x=4$

g. When the swimmer is 25 feet in the air, how far away from the board are they? Never reaches 25 feet

d) Can you have a system of inequalities with no solution? Explain.

Yes. Parallel lines