INTERMEDIATE ALGEBRA

GPS # 10 **3.1 LINEAR EQUATIONS** **NAME:** Kelly Fenton

Useful Guidelines:
To solve a Linear Equation in One Variable:
* Eliminate the fractions: Multiply both sides by the least common denominator as needed.
* Clear parentheses and combine like terms as needed.
* Get all terms with the variable on one side of the equation and all numbers on the other side.
* Get an equation with just the variable on one side of the equation.

Solve the following linear equations in one variable:

1. a) $9x-5x+2=3+7x+8$

$4x+2=3+7x+8$ (−7x)
$-3x+2=3+8$
$-3x+2=11$ (−2)
$\frac{-3x}{-3}=\frac{9}{-3}$
$x=-3$

b) $10+2x-1=27x+8$

$9+2x=27x+8$ (−2x)
$9=25x+8$ (−8)
$\frac{1}{25}=\frac{25x}{25}$
$x=\frac{1}{25}$

2. a) $2y+3(y-5)+9y=2+7y$

$2y+3y-15+9y=2+7y$
$14y-15=2+7y$ (−7y)
$7y-15=2$ (+15)
$\frac{7y}{7}=\frac{17}{7}$
$y=\frac{17}{7}$

b) $2(r+4)+3(r-5)+9=3r+7$

$2r+8+3r-15+9=3r+7$
$5r+2=3r+7$ (−3r)
$2r+2=7$ (−2)
$\frac{2r}{2}=\frac{5}{2}$
$r=\frac{5}{2}$

3. a) $\frac{3x+1}{4}+\frac{2x-4}{2(x-2)}=7$

$\frac{3x-15}{3(x-5)}-\frac{x+2}{9}=2x+1$

4. $\frac{5x-3}{4}=7.4$

$5x-3=28$ (+3)
$\frac{5x}{5}=\frac{31}{5}$
$x=\frac{31}{5}$

9. $\frac{2x-13}{9}=2x+1.9$

$2x-13=18x+9$ (−9)
$2x-22=18x$ (−2x)
$\frac{-22}{16}=\frac{16x}{16}$
$x=-\frac{22}{16}=-\frac{11}{8}$

4. a) $100(.03k+.02(k-5))=(.01k)100$

$3k+2(k-5)=1k$
$3k+2k-10=1k$
$5k-10=1k$ (−5k)
$\frac{-10}{-4}=\frac{-4k}{-4}$
$k=\frac{10}{4}$ or $\frac{5}{2}$

b) $100(.15k+.09(k+200))=(.10k+3)100$

$15k+9(k+200)=10k+300$
$15k+9k+1800=10k+300$
$24k+1800=10k+300$ (−300)
$24k+1500=10k$ (−24k)
$\frac{1500}{-14}=\frac{-14k}{-14}$
$k=-\frac{1500}{14}$ or $\frac{750}{7}$

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GPS # 11 **3.2 INTRODUCTION TO PROBLEM SOLVING** **NAME:** Kelly Fenton

Useful Formulas: $r = rate$, $p = principal$, $t = time$

Distance: $d = rt$; Simple Interest: $I = prt$; Perimeter: $P = 2L + 2W$

To solve for a specified variable,

Step 1: Make a sketch or table, if possible.

Step 2: Assign a variable to the unknown value.

Step 3: Write an equation using the variable.

Step 4: Gather all terms without that variable to the other side of the equation.

Step 5: Solve for that variable until the coefficient of the variable is one.

1. Find the following formulas for x:

a) $20 = 2y + 2x$

$-2y \quad -2y$

$\frac{20-2y}{2} = \frac{2x}{2}$

$10 - y = x$

b) $P = 2y + 2x$

$\frac{P-2y}{2} = \frac{2x}{2}$

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

2. It took 30 minutes for James to drive at the speed of 40 miles per hour to work. What was the distance between his home and work?

$d = rt$

$r = 40$ mph or $40 \frac{\text{miles}}{\text{hour}}$

$t = 30 \text{ minutes} = 30 \text{ min}\left(\frac{1 \text{ hr.}}{60 \text{ min}}\right) = \frac{1}{2}$ hr.

$d = (40)\left(\frac{1}{2}\right)$

$= 20$ miles

3. If Fernando invests $1,000.00 in a mutual fund account at the estimated annual interest rate of 15 percent. What is the estimated interest earned after 1 year?

$I = prt$

$P = 1{,}000.00$

$r = 15\% = 0.15$

$t = 1$ yr.

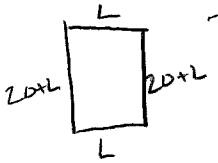
$I = (1{,}000)(0.15)(1)$

$I = \$150.00$

So neat!

4. The width of a rectangle farm land is 20 feet more than the length. Find the width and the length of the rectangle farm land if the perimeter of the farm land is 2,040 feet.

$P = 2L + 2W$



$P = 2L + 2w$

$2040 = 2L + 2(20 + L)$

$2040 = 2L + 40 + 2L$

$2040 = 4L + 40$

$-40 \quad -40$

$\frac{2000}{4} = \frac{4L}{4}$

$L = 500$ ft

$W = L + 20 = 520$ ft.

5. The sum of three consecutive even integers is 18. What are the integers? 2, 4, 6, 8, 10

4 6 8

$x + (x+2) + (x+4) = 18$

$x + (x+2) + (x+4) = 18$

$3x + 6 = 18$

$-6 \quad -6$

$\frac{3x}{3} = \frac{12}{3}$

$x = 4$

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GPS # 12 **3.3 LINEAR INEQUALITIES** **NAME:** Kelly Fenton

Useful Guidelines:
To solve for a linear inequality:
Step 1: Simplify each side by using the distributive property to clear parentheses as needed.
Step 2: Gather all terms with variables on one side of the inequality and all numbers on the other side.
Step 3: Solve for that variable until the coefficient of the variable is one.
Note: Remember to reverse the direction of the inequality symbol when you need to multiply or divide each side of an inequality by a negative number.

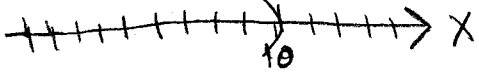
Solve the following linear inequalities and graph the solution sets:

1. a) $2x+30<50$

$-30 \quad -30$

$\frac{2x}{2} < \frac{20}{2}$

$x<10$



Solution Set: $\{x \mid x<10\}$

b) $15+3y \geq y+5$

$-y \quad -y$

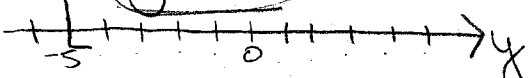
$15+2y \geq 5$

$-15 \quad -15$

$\frac{2y}{2} \geq \frac{-10}{2}$

$y \geq -5$

Solution set: $\{y \mid y \geq -5\}$ such that

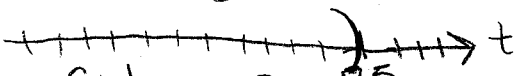


2. a) $3t<150+t$ such that

$-t \quad -t$

$\frac{2t}{2} < \frac{150}{2}$

$t<75$

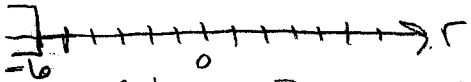


$\{t \mid t<75\}$

b) $\frac{12}{-2} \leq \frac{-2r}{-2}$

$-6 \geq r$

$r \leq -6$



$\{r \mid r \leq -6\}$

3. a) $9-x \geq -4(x-2)+1$

$9-x \geq -4x+8+1$

$9-x \geq -4x+9$

$+x \quad +x$

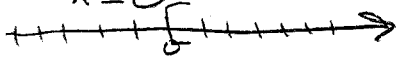
$9 \geq -3x+9$

$-9 \quad -9$

$\frac{0}{-3} \geq \frac{-3x}{-3}$ $\{x \mid x \geq 0\}$ Sol. Set

$0 \leq x$

$x \geq 0$



b) $\frac{3}{4}(m+4) > -2(3-m)+\frac{1}{2}$

$4\left(\frac{3}{4}m+3\right) > \left(-6+2m+\frac{1}{2}\right)4$

$3m+12 > -24+8m+2$

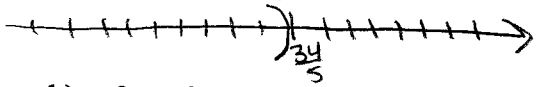
$12 > -24+5m+2$

$34 > 5m$

$\frac{34}{5} > \frac{5m}{5}$

$m < \frac{34}{5}$

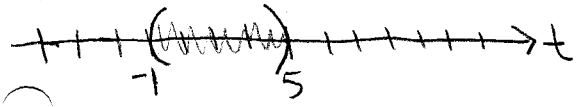
$\{m \mid m < \frac{34}{5}\}$ Sol. Set



4. a) $3<t+4<9$

$-4 \quad -4 \quad -4$

$-1<t<5$



Sol. Set $\{t \mid -1<t<5\}$

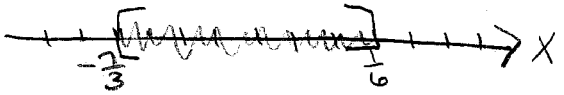
b) $-3 \leq -6x-2 \leq 12$

$+2 \quad +2 \quad +2$

$-1 \leq -6x \leq 14$

$\frac{-1}{-6} \leq \frac{-6x}{-6} \leq \frac{14}{-6}$

$\frac{1}{6} \geq x \geq -\frac{7}{3}$



Sol. Set $\{x \mid \frac{1}{6} \geq x \geq -\frac{7}{3}\}$

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intersection = and union

GPS # 13 **3.4 COMPOUND INEQUALITIES** NAME: Kelly Fenton

Useful Definitions:
Intersection of A and B: $A \cap B = \{x | x \text{ is an element of } A \text{ and } x \text{ is an element of } B\}$
Union of A and B: $A \cup B = \{x | x \text{ is an element of } A \text{ or } x \text{ is an element of } B\}$
Compound Inequality: Two inequalities connected by and or or.

10/10

intersection = And

1. Let $A = \{1,3,6,8,14,15,20\}$ and $B = \{2,4,6,8,10,12\}$

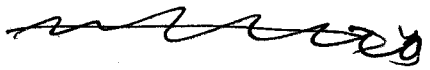
a) $A \cap B = \{6, 8\}$ (intersection)

b) $A \cup B = \{1,2,3,4,6,8,10,12,14,15,20\}$

For each of the following compound inequalities, decide whether intersection or union should be used. Then give the solution set in both interval notation and graph form.

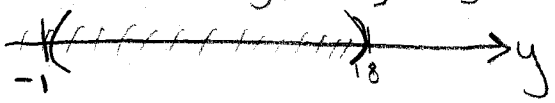
2. a) $y - 3 < 15$ and $y + 2 > 1$

$y < 18 \quad y > -1$



Interval Notation $(-1, 18)$

Solution Set: $\{y | -1 < y < 18\}$



b) $-x + 6 \leq 2$ and $4 + x \leq 10$

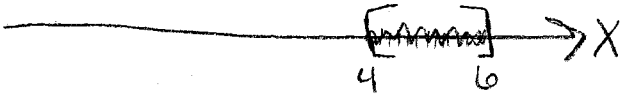
$-6 \quad -6 \quad -4 \quad -4$

$-x \leq -4 \quad x \leq 6$

$x \geq 4$

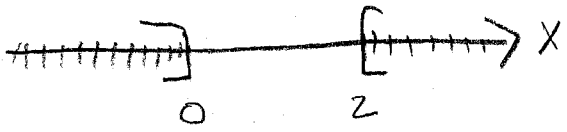
interval notation $[4, 6]$

Solution Set $\{x | 4 \leq x \leq 6\}$



3. a) $-2x \leq -4$ or $-10x \geq 0$

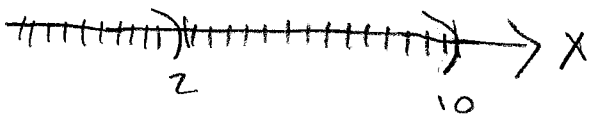
$x \geq 2 \quad x \leq 0$



interval notation $(-\infty, 0] \cup [2, \infty)$ (or)

Solution Set: $\{x | x \geq 2 \text{ or } x \leq 0\}$

b) $x < 2$ or $x < 10$



interval notation: $(-\infty, 2) \cup (-\infty, 10)$

Solution Set: $\{x | x < 2 \text{ or } x < 10\}$ or $\{x | x < 10\}$