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SEW Math 090 **Worksheet 1.1: Linear Equations in one variable** **Summer 2016**

1. Solve the following equations.

(a) $4x - 17 = 35$

$4x = 35 + 17 \rightarrow 4x = 52 \rightarrow \boxed{x = \frac{52}{4} = 13}$

(b) $13y + 4 = 5(y - 4)$

$13y + 4 = 5y - 20 \rightarrow 13y - 5y = -20 - 4$

$8y = -24 \rightarrow \boxed{y = \frac{-24}{8} = -3}$

(c) $\frac{2}{3}x - \frac{1}{6} = -\frac{5}{12}x + \frac{3}{2} - \frac{1}{6}x$

$\frac{2}{3}x + \frac{5}{12}x + \frac{1}{6}x = \frac{3}{2} + \frac{1}{6} \rightarrow \left(\frac{2}{3} + \frac{5}{12} + \frac{1}{6}\right)x = \left[\frac{(2\times4) + 5 + (1\times2)}{12}\right]x = \frac{3\times3+1}{6}$

$= \left(\frac{8+5+2}{12}\right)x = \frac{10}{6} \rightarrow \frac{5}{4}\frac{15}{12}x = \frac{5}{3}\frac{10}{6} \rightarrow x = \frac{\frac{5}{3}}{\frac{5}{4}}$

$\boxed{x = \frac{20}{15} = \frac{4}{3}}$

(d) $\frac{2y-4}{5} = \frac{5y+13}{4} + \frac{y}{2}$

$\frac{2y-4}{5} = \frac{5y+13+2y}{4} \rightarrow 4(2y-4) = 5(7y+13)$

$\rightarrow 8y - 16 = 35y + 65 \rightarrow -16 - 65 = 35y - 8y$

$-81 = 27y \rightarrow \boxed{y = \frac{-81}{27} = -3}$

2. The sum of two consecutive odd integers is -148. Find the two integers.

• Assume n is an odd integer, then $n, n+2, n+4$ will be 3 consecutive integers

$n + n + 2 = -148 \quad 2n + 2 = -148 \rightarrow 2n = -150 \rightarrow n = \frac{-150}{2} = \boxed{-75}$

$n + 2 = -75 + 2 = \boxed{-73}$

3. Wayne County has a sales tax rate of 7%. How much does a used Honda Civic cost before tax, if the total cost of the car *including tax* is \$13,888.60?

$H + \frac{7}{100}H = 13,888.60$

$\frac{107}{100}H = 13,888.60 \rightarrow H = \frac{13,888.60}{107} = \boxed{12,980\ \$}$

4. The price of a textbook after a 35% markdown is \$29.25. What was the original price?

$$B - \frac{35}{100}B = 29.25$$

$$\frac{65}{100}B = 29.25 \rightarrow B = \frac{2,925}{65} = \boxed{45\$}$$

5. A salesperson earns \$50 a day plus a 12% commission on sales over \$200. If their earnings for the day are \$76.88, how much merchandise did they sell?

$$50 + \frac{12}{100}m = 76.88$$

$$\frac{12}{100}m = 26.88 \rightarrow m = \frac{2688}{12} = \boxed{224\$}$$

6. A volleyball court is twice as long as it is wide. If the perimeter is 177 ft, find the dimensions of the court.

$L = 2W$ (I) $\quad 29.5 : W$ $\quad L : 59$

$2(L+W) = 177$

$2L + 2W = 177$; (I) $\Rightarrow 2(2W) + 2W = 177$

$6W = 177 \Rightarrow W = \frac{177}{6} = \boxed{29.5\ ft}$

$L = 2(29.5) = \boxed{59\ ft}$

7. A family builds a rectangular pen for their rabbits, such that the length of the pen is 7 ft less than twice the width. If the perimeter is 40 ft, what are the dimensions of the pen?

$L = 2W - 7$ (I)

$2(L+W) = 40$; (I) $\Rightarrow 2(2W - 7 + W) = 40$

$3W - 7 = 20 \Rightarrow 3W = 27 \Rightarrow W = \frac{27}{3} = \boxed{9}$

$L = 2W - 7 = 2(9) - 7 = 18 - 7 = \boxed{11}$

SEW Math 090 **Worksheet 1.2: Inequalities** Summer 2016

1. Solve the following inequalities. Give your answer in (i) set builder notation, (ii) interval notation, and (iii) graphically on a number line.

   (a) $2x + 6 \leq 4$

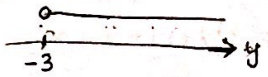
   $2x \leq -2$

   $\rightarrow x \leq -1$ $\quad (-\infty, -1]$

   (b) $-2y + 4 < 10$

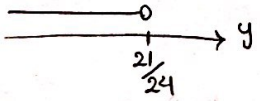
   $\rightarrow -2y < 6 \rightarrow y > -3 \rightarrow (-3, +\infty)$

   (c) $-\frac{3}{2}y > -\frac{21}{16}$

   $\rightarrow \frac{3}{2}y < \frac{21}{16} \rightarrow 24y < 21 \rightarrow y < \frac{21}{24}$

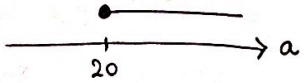
   $\rightarrow (-\infty, \frac{21}{24})$

   (d) $\frac{2}{5}a - 3 \geq 5$

   $\rightarrow \frac{2}{5}a \geq 8 \rightarrow a \geq \frac{40}{2} \rightarrow a \geq 20$

   $\rightarrow [20, +\infty)$

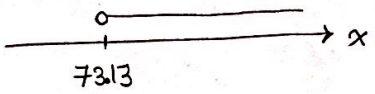
2. The revenue R for selling x fleece jackets is given by the equation $R = 49.95x$. The cost to produce x jackets is $C = 2300 + 18.50x$. Find the number of jackets that the company can sell to produce a profit. Give your answer in interval notation.

   $P = R - C > 0$

   $= 49.95x - 2300 - 18.5x > 0$

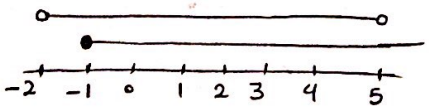
   $= 31.45x > 2300 \rightarrow x > 73.13$

   $\Rightarrow$ So, the # of jackets is at least $\boxed{74}$

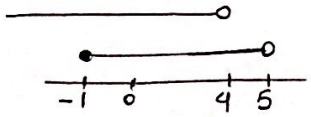
3. Find the intersection or union of the following sets, as indicated. Give your answer in interval notation.

   (a) $(-2, 5) \cap [-1, \infty)$

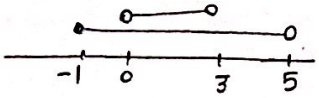
   $[-1, 5)$

(b) $(-\infty, 4) \cup [-1, 5)$



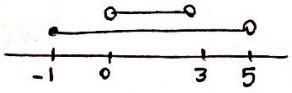
$(-\infty, 5)$

(c) $[-1, 5) \cup (0, 3)$



$[-1, 5)$

(d) $[-1, 5) \cap (0, 3)$



$(0, 3)$

4. The inequality $4 < t < 1$ has no solution. Why not?

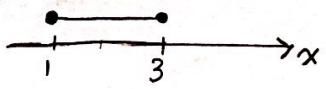
It is impossible for the equation to be true no matter what value we assign to the variable. This means $(-\infty, 1) \cap (+4, +\infty)$ which has no solution.

5. Solve the compound inequality. Give your answer in (i) set builder notation, (ii) interval notation, and (iii) graphically on a number line.

(a) $-6 < 3x - 9 \leq 0$

$3 < 3x \leq 9 \rightarrow 1 < x \leq 3$

$[1, 3]$

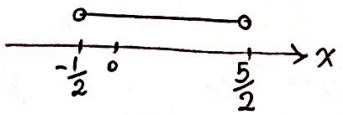


(b) $-1 < -2x + 4 < 5$

$-5 < -2x < 1$

$-\frac{1}{2} < x < \frac{5}{2}$

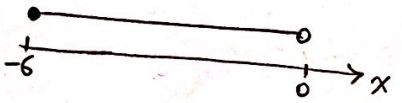
$(-\frac{1}{2}, \frac{5}{2})$



(c) $-3 \leq \frac{1}{2}x < 0$

$-6 \leq x < 0$

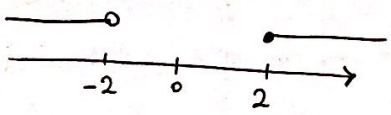
$[-6, 0)$



(d) $2y - 1 \geq 3$ or $y < -2$

$2y \geq 4 \quad y \geq 2$ or $y < -2$

$(-\infty, -2) \cup [2, +\infty)$

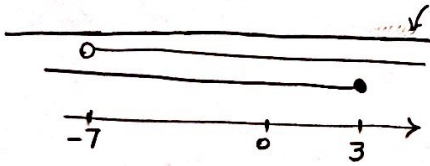


(e) $\frac{5}{3}v \leq 5$ or $-v - 6 < 1$

$v \leq 3$ or

$-v < 7 \quad v > -7$

answer is the whole line!



$(-\infty, 3]$

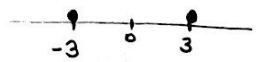
SEW Math 090

Worksheet 1.3: Absolute Value Equations and Inequalities

Summer 2016

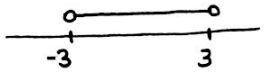
For exercises 1-6, solve the equations and the inequalities. For each inequality, express your answer as a graph and in interval notation.

1. $|x| = 3$ $x=3,\ x=-3$

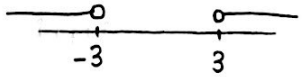


$\{-3,3\}$

$|x| < 3$ $-3 < x < 3$



$|x| > 3$ $x > 3,\ x < -3$



$(-\infty, -3) \cup (3, +\infty)$

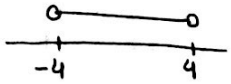
2. $|x| + 4 = 8$

$|x| = 4$ $x=4,\ x=-4$

$\{-4,4\}$

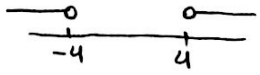
$|x| + 4 < 8$

$|x| < 4$ $-4 < x < 4$



$|x| + 4 > 8$

$|x| > 4$ $x > 4,\ x < -4$



$(-\infty, -4) \cup (4, +\infty)$

3. $|w + 2| = 6$

$w+2 = \pm 6$

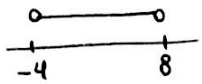
$w = 4,\ w = -8$

$\{-8,4\}$

$|w + 2| < 6$

$-6 < w-2 < 6$

$-4 < w < 8$



$|w + 2| > 6$

$w+2 > 6$

$w+2 < -6$

$w > 4$ $(-\infty, -8) \cup (4, \infty)$

$w < -8$

4. $|z - 4| = -2$

$\emptyset$

$|z - 4| < -2$

$\emptyset$

$|z - 4| > -2$

$\mathbb{R}$

$(-\infty, \infty)$

5. $|x-6|+5=6$

$|x-6|=1$

$x-6=1 \rightarrow x=7$

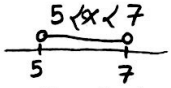
$x-6=-1 \rightarrow x=5$

$|x-6|+5<6$

$|x-6|<1$

$-1<x-6<1$

$5<x<7$

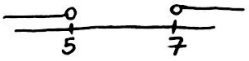


$|x-6|+5>6$

$|x-6|>1$

$x-6>1 \quad x>7$

$x-6<-1 \quad x<5$



6. $7|y+1|-3=11$

$7|y+1|=3+11$

$7|y+1|=14$

$|y+1|=2$

$y+1=\pm 2$

$y=1, y=-3$

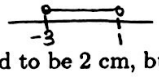
$7|y+1|-3<11$

$7|y+1|<14$

$|y+1|<2$

$-2<y+1<2$

$-3<y<1$

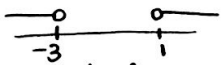


$7|y+1|-3>11$

$|y+1|>2$

$y+1>2 \quad y>1$

$y+1<-2 \quad y<-3$



7. The width, w, of a bolt is supposed to be 2 cm, but it may have a 0.01-cm margin of error. Solve the inequality $|w-2| \leq 0.01$. What does the solution mean in this context?

$|w-2| \leq 0.01 \rightarrow -0.01 \leq w-2 \leq 0.01$

$1.99 \leq w \leq 2.01$

It means the true value of width is between 1.99 and 2.01.

8. A bag of potato chips states that its weight is $6\frac{3}{4}$ oz. The maximum measurement error is $\pm\frac{1}{8}$ oz. Write an absolute value inequality that represents the range for the weight, x, of the bag of ships.

$\rightarrow |w-6\frac{3}{4}| \leq \frac{1}{8}$

$\rightarrow -\frac{1}{8} \leq w-6\frac{3}{4} \leq \frac{1}{8}$

$\rightarrow 6\frac{3}{4}-\frac{1}{8} \leq w \leq 6\frac{3}{4}+\frac{1}{8}$

$\rightarrow 6.625 \leq w \leq 6.875$