

Name _____

Advanced Algebra (H) - Mixture & Inequalities

I. Mixture

1. Soybean meal is 16% protein; corn meal is 9% protein. How many pounds of each should be mixed together to get a 350 pound mixture that is 12% protein?

let S = # pounds of soybean meal
 C = # " " " corn meal
 $S + C = 350$

$$\begin{array}{r} 16S + 9C = 4200 \\ -9S - 9C = -3150 \\ \hline 7S = 1050 \\ \underline{S = 150} \end{array}$$

Soybean 150
Corn 200

$$\begin{array}{l} .16S + .09C = .12(350) \\ \rightarrow 16S + 9C = 4200 \end{array}$$

2. A chemist has one solution that is 25% acid and a second that is 50% acid. How many liters of each should be mixed together to get 10 liters of a solution that is 40% acid?

let x = # L of 25%
 $10 - x$ = # L of 50%

$$\begin{array}{l} .25x + .5(10 - x) = 10(.4) \\ .25x + 5 - .5x = 4 \\ -.25x = -1 \\ x = 4 \end{array}$$

4 L at 25%
6 L at 50%

3. One canned juice drink is 15% orange juice; another is 5% orange juice. How many liters of each should be mixed together to get 10 liters which is 10% orange juice?

let x = # L of 15%
 $10 - x$ = # L of 5%

$$\begin{array}{l} .15x + .05(10 - x) = 10(.10) \\ .15x + .5 - .05x = 1 \end{array}$$

$$\begin{array}{l} .1x = .5 \\ x = 5 \end{array}$$

5 L at 15%
5 L at 5%

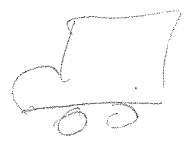
4. Antifreeze A is 18% alcohol. Antifreeze B is 10% alcohol. How many liters of each should be mixed to get 20 L of a mixture that is 15% alcohol?

let A = # L of 18%
 $20 - A$ = # L of 10%

$$\begin{array}{l} .18A + .10(20 - A) = 20(.15) \\ .18A + 2 - .10A = 3 \\ .08A = 1 \\ A = 12.5 \end{array}$$

12.5 L of 18%
7.5 L of 10%

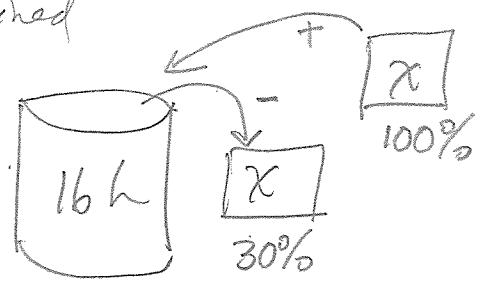
Last problem in class



5. An automobile radiator contains 16 liters of antifreeze and water. This mixture is 30% antifreeze. How much of this mixture should be drained and replaced with pure antifreeze so that there will be 50% antifreeze? Let x = amt of antifreeze @ 30% drained

$$30\%(16) - .30x + x = .5(16)$$

$$x = \frac{32}{7} \text{ or } 4\frac{4}{7} \text{ liters.}$$



II. Inequalities:

class

1. A car rents for \$13.95 per day, plus 10¢ per mile. You are on a daily budget of \$76. What mileages will allow you to stay within the budget?

at most 620.5 miles

$$13.95 + .10x \leq 76$$

class

2. You are taking a history course. There will be 4 tests. You have scores of 89, 92, and 95 on the first three. You must make a total of 360 to get an A. What scores on the last test will give you an A?

$$89 + 92 + 95 + x \geq 360$$

3. You are going to invest \$25,000, part at 14% and part at 16%. What is the most that can be invested at 14% in order to make at least \$3600 interest per year?

x = amt invested at 14%

y = amt invested at 16%

$$.14x + .16y \geq 3600$$

$$x + y = 25,000$$

$$.14x + .16(25,000 - x) \geq 3600$$

$$y = 25,000 - x$$

$$4,000 - .02x \geq 3600$$

$$x \leq 20,000$$

4. You are going to invest \$20,000, part at 12% and part at 16%. What is the most that can be invested at 12% in order to make at least \$3000 interest per year?

let x = principal at 12%

$20,000 - x = p$ at 16%

$$.12x + .16(20,000 - x) \geq 3000$$

KEY

Name _____

Advanced Algebra (H) - Problem Solving : Using Inequalities

1. Corbie Cochran wants to invest \$10,000, some in bonds at 6% interest annually and the rest in stocks at 9% interest annually. If he wishes to earn at least \$720 in interest this year, what is the minimum he should invest in stocks?

Let x = amt of principal at 6%
 $(10,000 - x)$ = amt " at 9%

$$.06x + .09(10,000 - x) \geq 720$$

$$.06x + 900 - .09x \geq 720$$

$$-0.03x \geq -180$$

$$x \leq 6000$$

At least
\$6000 at 6%
and \$4000 at 9%

ck

$$\begin{array}{r} \$360 \\ + 360 \\ \hline \$720 \end{array}$$

class

2. Kym Sutherland has 6 quarts of 90% antifreeze solution. How much 40% antifreeze must she add to make a solution that is at most 70% antifreeze?

Let x = # quarts of 40% AF.

$$(6)(.9) + .4x \leq .7(x+6)$$

$$5.4 + .4x \leq .7x + 4.2$$

$$1.2 \leq .3x$$

$$4 \leq x$$

If 3 qts 40% → 6.3 qts

If 5 qts 40% → 7.7 qts

at least 4 quarts of 40% antifreeze

3. The Municipal Parking Garage charges \$1.50 for the first hour and \$0.50 for each additional hour. For how many hours can you park your car if the most you can pay is \$4.50?

Let x = # hrs. you can park

$$4.50 \geq 1.50 + 0.50x$$

$$3 \geq .50x$$

$$6 \geq x$$

You can park up to 6 hours.

4. Dave Sharp has \$10 to buy stamps. He wants to buy twice as many 22¢ stamps as 14¢ stamps. What is the greatest number of 22¢ stamps he can buy?

Let $x = \#$ of 14¢ stamps $\rightarrow .14x = \text{value}$

$2x = \#$ of 22¢ stamps $\rightarrow .22(2x) = \text{value}$

$$.14x + .44x \leq 10$$

$$.58x \leq 10$$

$$x \leq 17 \frac{14}{58}$$

ck: $17(.14) = 2.38$

$34(.22) = 7.48$
 $\$9.86$

at most 34 - 22¢ stamps

5. A factory can produce a table in 30 minutes and a chair in 12 minutes. It plans to produce dining sets with 4 chairs for each table. What is the maximum number of sets that can be produced in an 8-hour shift?

Let $x = \text{max } \#$ of sets.

$$[30 + 4(12)]x \leq 8(60)$$

$$78x \leq 480$$

$$x \leq \frac{480}{78} \approx 6 \frac{12}{78}$$

At most 6 sets

$\frac{480}{78}$
 $\frac{160}{26}$
 $\frac{80}{13}$

6. Harry Smith left an estate which was estimated to be worth at most \$300,000. His will stated that one-fourth of the estate be given to his church and the remainder be divided equally among his four children. What are the maximum amounts to be paid to the church and to each child?

Let $x = \text{amt to church}$ $75,000 \rightarrow \text{church}$

$$\frac{1}{4} \left(\frac{300,000 - x}{4} \right) = \text{amt to each child}$$

$$\left(\frac{300,000 - x}{4} \right) + \frac{300,000}{4} \leq 300,000$$

$$\frac{300,000}{4} - \frac{x}{4} \leq 225,000$$