9-21-15

Systems of Equations and Inequalities
Word Problems

Key Words or Phrases:
sum - means add
difference - means subtract
less than - means subtract
more than- means add
twice or double - means multiply by 2
product- means multiply
quotient- means divide
is - means equals
1/2 of, 1/3 of , 2/5 of -- means multiply by that fraction
minimum - means greater than or equal to
maximum - means less than or equal to
at least - means greater than or equal to
at most - means less than or equal to
no more - means less than or equal to

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The (difference) of two numbers is 7

$$x - y = 7$$

The cost, C, of a tv is equal to the price, P plus tax, T.

$$C = P + T$$

She has no more than 50 pairs of shoes

$$x \leq 50$$

The number of boys is at least twice the number of girls

$$B \geq 2G$$

5. Erin is buying hamburgers and hotdogs for a party. She needs to buy a minimum of 30 items, but does not want to (exceed) 70 items. She also decides the number of hamburgers should be at least 3 times the number of hotdogs. Write a system of inequalities for the situation.

$$HM + HD \geq 30$$
$$HM + HD \leq 70$$
$$HM \geq 3HD$$

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STEPS IN SOLVING WORD PROBLEMS WITH LINEAR EQUATIONS & INEQUALITIES

1. Define the variables that you want to find with let statements.
2. Create equations or inequalities that express the information given in the problem's scenario.
3. Solve your system using algebraic methods (graphing, substitution, or elimination).
4. Consider if your answer is reasonable.
5. Label your solution appropriately.
6. Check your answer with the conditions given in the problem.

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6. The admission fee at a small fair is $1.50 for children and $4.00 for adults. On a certain day, 2200 people enter the fair and $5050 is collected. How many children and how many adults attended?

Step 1: Define the variables.
     Let a = the number of adults; let c = the number of children

Step 2: Create equations.

$ $1.50c + 4.00a = 5050$

\# $-4(\quad c + \quad a = 2200)$

$1.50c + 4.00a = 5050$
$-4.00c - 4.00a = 8800$
$\dfrac{-2.50c}{-2.50} = \dfrac{-3750}{-2.50}$
$c = 1500$

Step 3: Solve the system.

$\begin{array}{r} 2200 \\ -1500 \\ \hline a = 700 \end{array}$

Step 4: Is your answer reasonable?

Step 5: Label solutions.

Step 6: Check answer.

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9. An exam worth 145 points contains 50 questions. Some of the questions are worth two points and some are worth five points. How many two point questions are on the test? How many five point questions are on the test?

Step 1: Define variables.
     Let x = the number of 2-point questions; let y = the number of 5-point questions

Step 2: Create equations.

Question $-2(x + y = 50)$ $-2x - 2y = -100$
Points $\quad 2x + 5y = 145$ $2x + 5y = 145$

Step 3: Solve the system.

$\dfrac{3y}{3} = \dfrac{45}{3}$

$y = 15$

$\begin{array}{r} 50 \\ -15 \\ \hline 35 \end{array}$

(3 2pt ?s   15 5pt ?s)

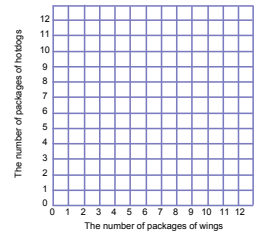Step 4: Is your answer reasonable?

Step 5: Label solutions.

Step 6: Check answer.

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7. Jason is buying wings and hotdogs for a party. One package of wings costs $7. One package of hotdogs costs $4. He knows that he will buy at least 5 packages of hotdogs. How many packages of each can he buy if he must spend less than $40?

Step 1: Define variables.

Step 2: Create inequalities.

Step 3: Solve the system.

(grid graph: y-axis labeled "The number of packages of hotdogs" from 0 to 12; x-axis labeled "The number of packages of wings" from 0 to 12)

Step 4: Is your answer reasonable?
Step 5: Label solutions.
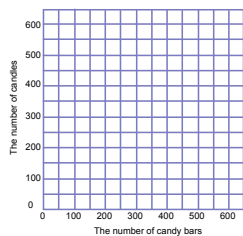
Step 6: Check answer.

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8. The boys' and girls' soccer teams are trying to raise money for new uniforms. The boys' soccer team is selling candy bars for $2 and the girls' soccer team is selling candles for $4. They must raise more than $800. The girls expect to sell at least 100 candles. How many candy bars and candles could be sold to raise the $800?

Step 1: Define variables.
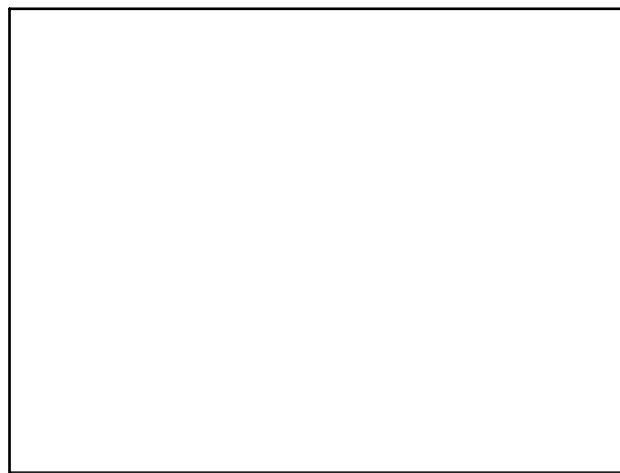
Step 2: Create inequalities.

Step 3: Solve the system.

Step 4: Is your answer reasonable?

Step 5: Label solutions.

Step 6: Check answer.

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