

SP#1 Notes and Examples

Set it up...use the 3-column method!!

LET	SHOW	ANSWER
X = ???	write an equation using from the "let" column; reflect the story; solve	be sure to answer the question (<u>label</u>)

example:

Jim is twice as old as Bob. The sum of their ages is 21 years. How old is Jim?

x = Bob' age	$x + 2x = 21$	Jim is 14 yrs old
2x = Jim's age	$(\frac{1}{3})3x = 21(\frac{1}{3})$	
	$x = 7$	

Number 11 – sheet #1

x = games lost	$x = x = 7 = 35$	They won 21 games go back and look at the "let" column; answer the question
x+7=games won	$2x + 7 = 35$	
	$\frac{-7}{-7} \quad \frac{-7}{-7}$	
	$(\frac{1}{2})2x = 28(\frac{1}{2})$	
	$x = 14$	

Number 12 – sheet #1

x = amount Doug
has
 $2x$ = amount
Robert has

$$\begin{aligned}x + 2x &= 78 \\ \left(\frac{1}{3}\right)3x &= 78\left(\frac{1}{3}\right) \\ x &= 26\end{aligned}$$

Doug has \$26

Number 13 – sheet #1

x = # of girls
 $x - 15$ = # of boys

$$\begin{aligned}x + x - 15 &= 135 \\ 2x + (-15) &= 135 \\ \hline &+15 \quad +15 \\ \left(\frac{1}{2}\right)2x &= 150\left(\frac{1}{2}\right) \\ x &= 75\end{aligned}$$

There are 75 girls in
the band

- Be specific in the let column
- Do not solve or simplify before you write the equation.
- Use what is in the LET column in your equation
- Show steps for solving
- Be sure to answer the question-use a label

SP#2 Notes and Examples

<i>Let</i> When a certain number is added to 23, the sum is 62. Find the number. Let $x = a \#$	<i>Show/Equation</i> $\begin{array}{r} 23 + x = 62 \\ -23 \quad -23 \\ \hline x = 39 \end{array}$	<i>Answer</i> the number is 39
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A 23 in piece of string is cut so that one piece is 8 in shorter than the other. Find the length of each piece.

$x = \text{longer piece}$ $x - 8 = \text{shorter piece}$	$\begin{array}{r} x + x - 8 = 23 \\ 2x - 8 = 23 \\ +8 \quad +8 \\ \hline (\frac{1}{2})2x = 31(\frac{1}{2}) \\ X = 15\frac{1}{2} \end{array}$	the longer piece is $15\frac{1}{2} \text{ in}$ the shorter piece is $7\frac{1}{2} \text{ in}$
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Find two **consecutive** integers whose sum is 67. Consecutive means right in a row

$X = \text{one \#}$ $X + 1 = \text{next \#}$	$\begin{array}{r} x + x + 1 = 67 \\ 2x + 1 = 67 \\ -1 \quad -1 \\ \hline (\frac{1}{2})2x = 66(\frac{1}{2}) \\ X = 33 \end{array}$	the two integers are 33 and 34
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Erica spent \$34.80 at Hy-Vee on groceries and dry cleaning. If the dry-cleaning was \$7 less than the cost of the groceries, how much was the dry-cleaning?

$x = \text{groceries}$ $x - 7 = \text{dry cleaning}$	$x + x - 7 = 34.80$ $2x - 7 = 34.80$ $\quad +7 \quad +7.00$ $\left(\frac{1}{2}\right)2x = 41.80\left(\frac{1}{2}\right)$ $X = \$20.90$	the dry cleaning was \$13.90
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- Be specific in the let column about “smaller piece” and “larger piece”
- Do not solve simplify before you write the equation.
- Use what is in the LET column in your equation
- Show steps for solving
- Be sure to label the answer and answer the question

SP#3 Notes and Examples

Jimmy earns 3 times as much money as Paul.

x = amt. Jimmy earns

_____ = amt. Paul earns

Sally's test score was 5 points higher than Linda's.

Linda's test score was 9 pts. Higher than Michelle's/

x = Michelle's score

_____ = Linda's score

_____ = Sally's score

David's soccer team played a total of 12 games.

x = number of games won

_____ = number of games lost

Louise ran 2 miles farther than Pam. Lucy ran $\frac{1}{2}$ mile less than Louise.

x = distance run by Pam

_____ = distance run by Louise

_____ = distance run by Lucy

The length of a rectangle is 3 times the width. The perimeter is 32 inches. What is the length of the rectangle?

THE PERIMETER IS = $2l + 2w$

REMEMBER THAT FOR THE EQUATION!!

$x = \text{width}$

$3x = \text{length}$

$$2x + 2(3x) = 32$$

$$2x + 6x = 32$$

$$\frac{1}{8}(8x) = (32)\frac{1}{8}$$

$$x = 4$$

the length
is 12 inches

Story Problems #6

The sum of three consecutive integers is 81. Find the numbers

$$\begin{aligned}x &= 1^{\text{st}} \text{ integer} \\x + 1 &= 2^{\text{nd}} \text{ int.} \\x + 2 &= 3^{\text{rd}} \text{ int.}\end{aligned}$$

$$x + x + 1 + x + 2 = 81$$

$$3x + 3 = 81$$

$$\begin{array}{r} -3 \quad -3 \\ \hline \end{array}$$

$$\left(\frac{1}{3}\right) 3x = 78\left(\frac{1}{3}\right)$$

$$x = 26$$

The numbers are 26,
27, and 28

The sum of three consecutive even integers is 66. Find the numbers.

$$\begin{aligned}x &= 1^{\text{st}} \text{ integer} \\x + 2 &= 2^{\text{nd}} \text{ int.} \\x + 4 &= 3^{\text{rd}} \text{ int.}\end{aligned}$$

$$x + x + 2 + x + 4 = 66$$

$$3x + 6 = 66$$

$$\begin{array}{r} -6 \quad -6 \\ \hline \end{array}$$

$$\left(\frac{1}{3}\right) 3x = 60\left(\frac{1}{3}\right)$$

$$x = 20$$

The numbers are 20,
22, and 24

Two-thirds of a number 16. What is the number?

$$x = \text{the number}$$

$$\left(\frac{3}{2}\right) \frac{2}{3} x = 16\left(\frac{3}{2}\right)$$

$$x = 24$$

The number is 24

HELPFUL HINTS:

Make sure all units of measure are the same!!!! (all cm, all feet, all inches, etc. You may have to change some so they are all the same.)

“Adjacent” means “next to”

STORY PROBLEMS #7 AGE PROBLEMS

When Jimmy and Erica entered school in Iowa, the age of Jimmy was three times the age of Erica. Five years later, Jimmy is only twice as old as Erica is. What were their ages at first?

	THEN	LATER (+5)
JIMMY		
ERICA		

	THEN	LATER (+5)
JIMMY	$3x$	$3x + 5$
ERICA	x	$x + 5$

Five years later Jimmy is twice as old as Erica
 $3x + 5 = 2 \text{ times } (x + 5)$

$$\begin{aligned} 3x + 5 &= 2(x + 5) \\ 3x + 5 &= 2x + 10 \\ \underline{-2x} \quad \underline{-2x} & \\ x + 5 &= 10 \\ \underline{-5} \quad \underline{-5} & \\ x &= 5 \end{aligned}$$

Jimmy was 15 years old; Erica was 5 years old.

Four years ago, Lucy was 3 times as old as Pam.
 Now, four years later, Lucy is only twice as old
 as Pam. How old are Lucy and Pam now?

	THEN	LATER (+4)
LUCY		
PAM		

	THEN	LATER (+4)
LUCY	$3x$	$3x + 4$
PAM	x	$x + 4$

LATER Lucy is twice as old as Pam
 $3x + 4 = 2 \text{ times } (x + 4)$

$$\begin{aligned}
 3x + 4 &= 2(x + 4) \\
 3x + 4 &= 2x + 8 \\
 \underline{-2x} \quad \underline{-2x} & \\
 x + 4 &= 8 \\
 \underline{-4} \quad \underline{-4} & \\
 x &= 4
 \end{aligned}$$

Lucy is now 16 yrs. old and Pam is 8 yrs. old.
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Mark's age is $\frac{1}{4}$ of Paul's age. In 6 years, Mark will be $\frac{1}{2}$ as old as Paul will be then. How old will Mark and Paul be then?

	NOW	Then (+6)
Paul		
Mark		

	Now	In 6 years
Paul	x	$x + 6$
Mark	$\frac{1}{4}x$	$\frac{1}{4}x + 6$

Mark will be half as old as Paul

$$\frac{1}{4}x + 6 = \frac{1}{2}(x + 6)$$

$$4(\frac{1}{4}x + 6) = 4(\frac{1}{2}x + 3)$$

$$x + 24 = 2x + 12$$

$$\begin{array}{r} -x \quad -x \\ \hline 24 = x + 12 \end{array}$$

$$x + 12 = 24 \text{ (exchange)}$$

$$\begin{array}{r} -12 \quad -12 \\ \hline x = 12 \end{array}$$

Paul will be 18 and Mark will be 9.

Story Problems 8 – Coin Problems

Coins (just list them)	How many (One is x, the others based on story)	Value (multiply by value of each coin)

EASIER NOT TO USE DECIMALS; CAN USE THEM AT THE END IF NECESSARY

- 1) Make table
- 2) Write coins
- 3) Fill in # of coins (let one be x, the others relating to x)
- 4) Multiply # times value
- 5) Write the equation
- 6) Solve
- 7) Answer the question (look at the let column!!)

Jimmy has some money in a piggy bank. He has 3 times as many dimes as nickels. In all, he has \$1.75. How many dimes does he have?

	#	value
N	x	5x
D	3x	10(3x)= 30x

$$5x + 30x = 175$$

$$\left(\frac{1}{35}\right)35x = 175\left(\frac{1}{35}\right)$$

$$x = 5$$

He has 15 dimes

Jimmy has some \$12.00. He has twice as many nickels as dimes, 2 fewer quarters than twice the number of nickels, and 3 more half-dollars than nickels. How many quarters does he have?

	#	value
N	$2x$	$5(2x)=10x$
D	x	$10x$
Q	$2(2x)-2$	$25(4x-2)=100x - 50$
HD	$2x + 3$	$50(2x + 3)=100x + 150$

$$10x + 10x + 100x - 50 + 100x + 150 = 1200$$

$$220x + 100 = 1200 \text{ (no decimals!)}$$

$$\begin{array}{r} -100 \quad -100 \\ \hline \end{array}$$

$$\left(\frac{1}{220}\right)220x = 1100\left(\frac{1}{220}\right)$$

$$x = 5$$

He has
18 Quarters

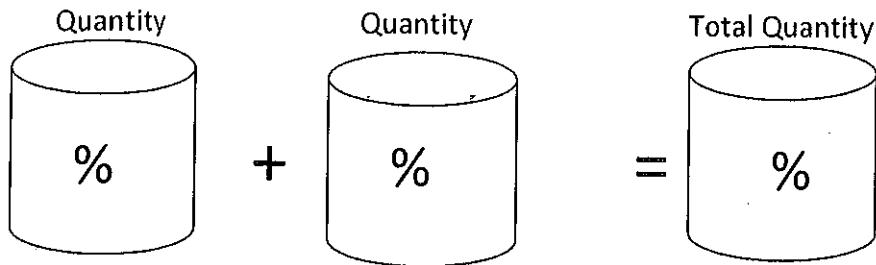
Story Problems #9 Tickets and Mixture

TICKETS – can be set up like the coin problems – quantity and value columns

There are 26 tickets sold for the movie for a total of \$54.00. Adult tickets cost \$2.75 each, children's tickets cost \$1.50 each. How many of each were sold?

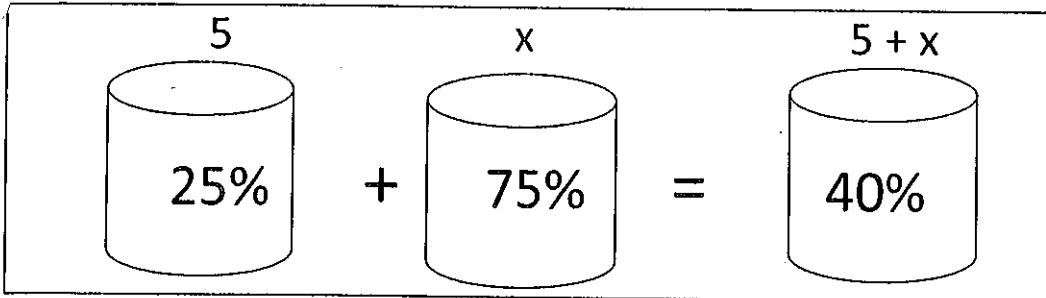
What?	How many?	value		
Adult	x	2.75x	$2.75x + 1.5(26 - x) = 54$ $2.75x + 39 - 1.5x = 54$ $1.25x + 39 = 54$ $\quad -39 \quad -39$ $\frac{1}{1.25}(1.25x) = (15) \frac{1}{1.25}$ $x = 12$	There were 12 adult tickets sold and 14 children's tickets sold
Children	26 - x	1.5(26 - x)		

MIXTURE PROBLEMS



To write the equation, multiply each quantity times the %.

Mr. Altemeier has 5 gallons of liquid containing 25% sulfuric acid. He would like to obtain a solution of 40% sulfuric acid by adding a solution of 75% sulfuric acid to his original solution. How much of the more concentrated solution must he add?



$$5(25) + 75x = 40(5 + x)$$

$$125 + 75x = 200 + 40x$$

$$\begin{array}{r} -40x \qquad -40x \\ \hline \end{array}$$

$$125 + 35x = 200$$

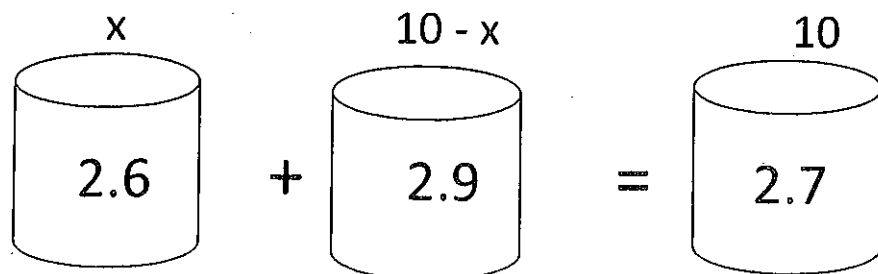
$$\begin{array}{r} -125 \qquad -125 \\ \hline \end{array}$$

$$\left(\frac{1}{35}\right)35x = 75\left(\frac{1}{35}\right)$$

$$x = 2\frac{1}{7}$$

He must add $2\frac{1}{7}$ gallons of the 75% solution

A mixture of 10 lbs. of candy (worth \$2.70 per pound) is to be made up of caramels costing \$2.60 per pound and creams costing \$2.90 per pound. How much of each?



$$2.6x + 2.9(10 - x) = 2.7(10)$$

$$2.6x + 29 - 2.9x = 27$$

$$-0.3x + 29 = 27$$

$$\begin{array}{r} -29 \quad -29 \\ -0.3x + 29 = 27 \\ \hline -0.3x = -2 \end{array}$$

$$-0.3x = -2$$

$$\left(-\frac{10}{3}\right)\left(-\frac{3}{10}x\right) = -2\left(-\frac{10}{3}\right)$$

$$x = 6\frac{2}{3}$$

You would use $6\frac{2}{3}$ pounds of caramels and $3\frac{1}{3}$ pounds of creams.

If you add **water** to a solution use **0%** for the water.