

**Only to be used for arranged hours, Will count as two  
activites.**

**Math 31**

**Activity # 5**

**"Word Problems"**

Your Name: \_\_\_\_\_

USING MATH TO SOLVE REAL LIFE PROBLEMS

1. Read the question carefully till you understand it, then assign well- defined variable(s) to the unknown in complete sentence(s).
2. Write algebraic expressions, using only the defined variables and information from the question. Pay attention to the **key words**.
3. A sketch of the problem or perhaps a table may help to organize information.
4. Write the equation that can be formed from the question using the information in the question, the variables you have already defined and the algebraic expressions.
5. Solve these equation(s) for the variable(s) and check to make sure the solution makes sense in this real life example, else adjust your solution so that they make sense.
6. State your solution in a complete sentence.

**SHOW ALL WORK CLEARLY. No credit for magically obtained answers**

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**Ex 1.** The **sum** of a number and five is thirteen. Find the number.

**Solution :**

Define your variable : Let the number =  $x$

Write the equation :  $x + 5 = 13$

Solve :  $x = 13 - 5$  . So,  $x = 8$

Check : Is  $8 + 5 = 13$  ?

$13 = 13$  ? Yes

Answer : The number is 13 .

Practice 1 :

The sum of twice a number and four is fourteen. Find the number.

Define the variable :

Write the equation :

Solve the equation :

Check your answer

Practice 2

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One number is **five more than twice another**. If **their sum is decreased by ten**, the **result is twenty-two**. Find the numbers

Since one number depends on another, let the variable be the independent number, ( the number we need to know, in order to know the other)

Solution :

Define your variable : Let one of the numbers =  $x$

Then the other number =  $2x+5$

Equation :  $x + 2x+5 = 22$

Solve :

Check answer

State your solution

Ex 3. Nii is **4 years older** than Maribel. **Five years ago** , the **sum** of their

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ages was 48. How old are they now ?

Solution :

Define your variable : Let Maribels' age now =  $x$

Then Nii's age now =  $x + 4$

Table Names	Age now	Age 5 years ago
Maribel	$x$	$x - 5$
Nii	$x + 4$	$(x + 4) - 5$

Equation :  $x - 5 + (x + 4) - 5 = 48$

Solve :  $x - 5 + x + 4 - 5 = 48$

$$2x - 6 = 48$$

$$2x = 48 + 6$$

$$2x = 54$$

$$X = 27$$

Check ;  $x - 5 + (x + 4) - 5 = 48$

Is  $27 - 5 + (27 + 4) - 5 = 48$  ?

$27 - 5 + (31) - 5 = 48$  ?

$27 - 5 + 31 - 5 = 48$  ?

$22 + 31 - 5 = 48$  ?

$53 - 5 = 48$  ?

$48 = 48$  ? Yes

So, Maribel is 27 years now and Nii is  $27 + 4 = 31$  years now ( I wish )

Practice :

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Diane is **23 years older** than her daughter Amy. **In 6 years**, Diane will be **twice as old** as Amy. How old are they **now** ?

Solution

Define your variable : Let Amy's age now =

Then Diane's age now =

Table

Names	Age now	Age in 6 years
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Amy		
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Diane		
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Equation :

Solve :

Check :

State your solution:

Ex 4. The **length of a rectangle is 5 inches more than the width**. The

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**perimeter is 34 inches. Find the length and the width**

Solution : Let the width of the rectangle =  $x$

Then the length of the rectangle =  $x + 5$

Draw and label the rectangle

Equation : Perimeter = 2 Length + 2 width . That's the total distance around the rectangle

$$P = 2L + 2W$$

$$34 = 2(x + 5) + 2(x)$$

$$34 = 2x + 10 + 2x$$

$$34 = 4x + 10$$

$$24 = 4x$$

$$6 = x$$

Check : Is  $34 = 2(6 + 5) + 2(6)$  ?

$$34 = 2(11) + 12 ?$$

$$34 = 22 + 12 ?$$

$$34 = 34 ? \text{ Yes}$$

State your answer

The width is 6 inches and the length is  $6 + 5 = 11$  inches

Practice # 3

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The length of a rectangle is 3 inches less than twice the width. The perimeter is 54 inches. Find the dimensions ( this means : the length and the width )

Solution:

Let the  $l$  =

Let the  $w$  =

Draw and label the rectangle

Equation :

Solve :

Check :

State your answer

Ex. Jacqueline has \$ 2.10 in dimes and nickels. If she has 9 more dimes

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than nickels, how many of each coin does she have ?

Solution :

Let the number of nickels =  $x$  ( the independent variable )

Then the number of dimes =  $x + 9$

Table ( helpful here)

Formula : number of coins  $\times$  the value of each coin = total value of coins

Type	# of coins	Value of coin	Total value
Nickels	$x$	\$ 0.05	$0.05x$
Dimes	$x + 9$	\$ 0.10	$0.10 ( x + 9 )$

Equation : The total value of nickels + total value of dimes = Total amount

$$0.05 x + 0.10 ( x + 9 ) = 2.10$$

$100[ 0.05 x + 0.10 ( x + 9 ) ] = 100[ 2.10 ]$  why ? we multiply by 100 to get rid of the decimals and work in cents

$$5 x + 10 ( x + 9 ) = 210$$

$$5 x + 10 x + 90 = 210$$

$$15 x + 90 = 210$$

$$15 x = 210 - 90$$

$$15 x = 120$$

$$X = 8 \quad \text{How ? Divide each side by 15}$$

Check : Is  $0.05 ( 8 ) + 0.10 ( 8 + 9 ) = 2.10$  ?

$$0.40 + 0.10 ( 17 ) = 2.10$$

$$0.40 + 1.70 = 2.10 ?$$

$$2.10 = 2.10 ? \text{ Yes}$$

State your answer :

There are 8 nickels and  $8 + 9 = 17$  dimes

Practice 4 : A collection of dimes and quarters has a total value of \$ 2.20. If





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Ex 5. A car leaves SMC traveling toward Las Vegas at the rate of 55 mph. At the same time, another car leaves Las Vegas traveling toward SMC at a rate of 50mph. How long will it take them to meet if the distance between SMC and Las Vegas is 315 miles?

Solution:

Define your variable : Let the time it takes them to meet =  $x$

Table

Rate  $\times$  Time = Distance      Or    $R \times T = D$

Type	Rate	Time	Distance
SMC-Vegas	55	$x$	$55x$
Vegas-SMC	50	$x$	$50x$

Equation :

Distance covered Vegas bound car + Distance by SMC bound car = 315 mi

$$55x + 50x = 315$$

$$110x = 315$$

$$x = 3$$

Check : Is  $55(3) + 50(3) = 315$  ?

$$165 + 150 = 315$$

$$315 = 315 \text{ ? Yes}$$

State your answer :

It will take them 3 hours to meet

Practice 5: Two marathon runners leave the starting gate at the same time.

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One running 12 mph and the other 10 mph. If they maintain the same pace, how long will it take them to be 6 miles apart ?

Define your variable :

Table

Equation

Solve

Check

State your solution

Practice # 6 : Jonna invested \$ 14,000 into two accounts. He put some into

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an account that paid 7 % and the rest at another account that paid 10 % annual interest. The annual income from these two investments was \$1280. We want to find how much he invested at each rate by doing the following.

- a) by defining and using only one variable, write the amounts invested at each rate in algebraic expression form.

Let the amount invested at the 7 % account =  $x$

Then the amount invested at the 10 % account =  $14,000 - x$

- b) Write the investment table and fill in all the information and title

$$\text{Principal} \times \text{Rate} \times \text{Time} = \text{Interest}$$

Type of account	Principal	Rate	Time	Interest	
The 7 % account	$x$		0.07	1	$0.07x$
The 10 % account	$14,000 - x$	0.10	1	$0.10(14,000 - x)$	

- c) Write the equation, solve it and find how much was invested at each rate.

$$\text{Interest from the 7 \% account} + \text{Interest from the 10 \% account} = \text{Total interest}$$

$$0.07x + 0.10(14,000 - x) = 1280$$

$$\text{c) Solve : } 0.07x + 1400 - 0.10x = 1280$$

Multiply each side by 100 to clear the fractions of decimals

$$100 [ 0.07x + 1400 - 0.10x = 1280 ]$$

$$7x + 140000 - 10x = 128000$$

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$$- 3x + 140000 = 128000$$

$$- 3x = 128000 - 140000$$

$$- 3x = - 12000$$

Divide both sides by - 3 and get  $x = 4000$

State your answers :

This implies, \$4000 was invested at 7% and

\$14,000 - \$4000 = \$ 10, 000 was invested at 10 %

**Now try this :**

You invested \$ 20,000 into two accounts. You put some into an account at WAMU that paid 9 % and the rest at CitiBank into an account that paid 12 % annual interest. The annual income from these two investments was \$1650. We want to find how much he invested at each rate by doing the following.

- a) By defining and using only one variable, write the amounts invested at each rate in algebraic expression form.

Let the amount invested at the 9 % account =  $x$

Then the amount invested at the 12 % account =

- b) Write the investment table and fill in all the information and title

$$\text{Principal} \times \text{Rate} \times \text{Time} = \text{Interest}$$

Type of account	Principal	Rate	Time	Interest
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The WAMU

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The CitiBank

- c) Write the equation, solve it and find how much was invested at each rate.

Interest from the 9 % account + Interest from the 12 % account = Total interest

c) Solve :

State your solutions :