

## Day 3 – Creating Equations from a Context – Notes

Earlier in our unit, you learned to write expressions involving mathematical operations. You used the following table to help you decode those written expressions. We are going to use those same key words along with words that indicate an expression will become part of an equation or inequality.

Addition	Subtraction	Multiplication	Division	Equals
Sum	Difference	Of	Quotient	Is
Increased by	Decreased by	Product	Ratio of	Equals
More than	Minus	Times	Percent	Will be
Combined	Less	Multiplied by	Fraction of	Gives
Together	Less than	Double	Out of	Yields
Total of	Fewer than	Twice	Per	Costs
Added to	Withdraws	Triple	Divided by	
Gained				
Raised				
Plus				

When taking a word problem and translating it to an equation or inequality, it is important to "talk to the text" or underline/highlight key phrases or words. By doing this it helps you see what is occurring in the problem.

### Modeling Mathematics with Equations

A person's maximum heart rate is the highest rate, in beats per minute, that the person's heart should reach. One method to estimate the maximum heart rate states your age added to your maximum heart rate is 220. Using this method, write and solve an equation to find the maximum heart rate of a 15 year old.

Age		Added to		Maximum Heart Rate		Is		220
15		+		r		=		220

$r = 205$  (max heart rate)

In the equation above, we did not know one of the quantities. When we do not know one of the quantities, we use a **variable** to represent the unknown quantity. When creating equations, it is important that whatever variable you use to represent the unknown quantity, you define or state what the variable represents.

**Practice Examples:** In the examples below, "talk to the text" as you translate your word problems into equations. Define a variable to represent an unknown quantity, create your equation, and then solve your equation.

1. Six less than four times a number is 18. What is the number?

Variables: x: a number

Equation:  $4x - 6 = 18$

$$\begin{array}{r}
 4x - 6 = 18 \\
 +6 \quad +6 \\
 \hline
 4x = 24 \\
 \frac{4}{4} \quad \frac{24}{4} \\
 \hline
 x = 6
 \end{array}$$

2. You and three friends divide the proceeds of a garage sale equally. The garage sale earned \$412. How much money did each friend receive?

Variables:  $x$ : amount each person gets

Equation:  $4x = 412$  or  $\frac{412}{4} = x$

$$\frac{4x}{4} = \frac{412}{4}$$

$x = 103$  per friend

3. On her iPod, Mia has rock songs and dance songs. She currently has 14 rock songs. She has 48 songs in all. How many dance songs does she have?

Variables:  $d$ : number of dance songs

Equation:  $14 + d = 48$

$$\begin{array}{r} 14 + d = 48 \\ -14 \quad -14 \\ \hline \end{array}$$

$d = 34$  dance songs

4. Brianna has saved \$600 to buy a new TV. If the TV she wants costs \$1800 and she saves \$20 a week, how many months will it take her to buy the TV (4 weeks = 1 month)?

Variables:  $W$ : number of weeks

Equation:  $600 + 20w = 1800$

$$\begin{array}{r} 600 + 20w = 1800 \\ -600 \quad -600 \\ \hline 20w = 1200 \\ \frac{20w}{20} = \frac{1200}{20} \end{array}$$

$w = 60$  weeks or 15 months

5. Mrs. Jackson earned a \$500 bonus for signing a one year contract to work as a nurse. Her salary is \$22 per hour. If her first week's check including the bonus is \$1204, how many hours did Mrs. Jackson work?

Variables:  $h$ : number of hours

Equation:  $500 + 22h = 1204$

$$\begin{array}{r} 500 + 22h = 1204 \\ -500 \quad -500 \\ \hline 22h = 704 \\ \frac{22h}{22} = \frac{704}{22} \end{array}$$

$h = 32$  hours worked

6. Morgan subscribes to a website for processing her digital pictures. The subscription is \$5.95 per month and 4 by 6 inch prints are \$0.19. How many prints did Morgan purchase if the charge for January was \$15.83?

Variables:  $p$ : number of prints

Equation:  $0.19p + 5.95 = 15.83$

$$\begin{array}{r} 0.19p + 5.95 = 15.83 \\ -5.95 \quad -5.95 \\ \hline 0.19p = 9.88 \\ \frac{0.19p}{0.19} = \frac{9.88}{0.19} \end{array}$$

$p = 52$  prints in January