Name: Keys Algebra II Period:

Creating Linear Equations

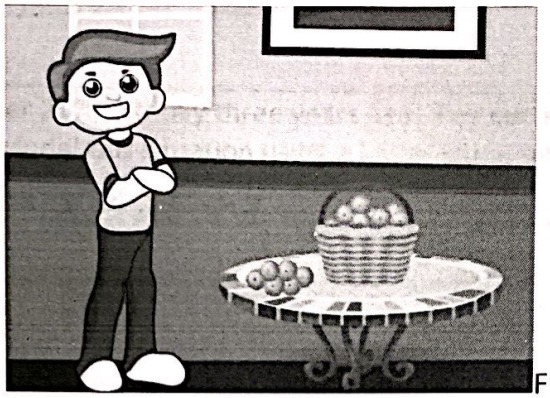
Opening Problem: Victor has 24 oranges – some in a basket, and 6 on the table. He is unsure of the number of oranges in the basket. How can this be represented in algebraic form?

X: # of oranges in basket

$6 + X = 24$

or

$X = 24 - 6$



$\therefore X = 18$

Vocabulary:

- Equation: an algebraic statement that equates two algebraic expressions by an equal sign.
- Linear Equation: an equation in which the highest power of the variable(s) is one.

Examples of Linear Equations

$$3x = 5$$
$$2x + y = 9$$
$$7a - 3b + 9c = 12$$

Verbal phrases can be translated into algebraic forms by identifying keywords. Some of them are given in the tables below:

Keywords	Operations
Plus Increased by More than	Addition
Minus Decreased by Less than	Subtraction
Times The product of Multiplied by	Multiplication
Divided Quotient of	Division

Other phrases	Symbol
- "in total"	- $+$
- "is the same as"	- $=$
- "a number"	- x
- "twice as much as"	- $2x$
- "per"	- $\times$ or $\div$

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Forming Linear Equations

Example 1: Four less than four times a number, *N*, is twelve. Translate the verbal phrase to algebraic form.

$4x \quad x \to N = 12$

$$\boxed{4N - 4 = 12}$$

$x = 2x \quad y$

Example 2: Cindy celebrated her 25th birthday three years ago. Her current age is two times Fred's age. Model this situation using a linear equation.

Cindy's current age: $X = 25 + 3$
Fred's age: y

$\therefore \boxed{25 + 3 = 2y}$

or

$\boxed{2y = 28}$

$+3 \quad = \quad 1 + 2x \quad x$

Example 3: Three years from now, Jenny's age will be one plus two times her current age. What is Jenny's current age?

Jenny's current age: X

$$X + 3 = 1 + 2X$$
$$-X \qquad -X$$
$$3 = 1 + X$$
$$-1 \quad -1$$
$$\therefore \boxed{X = 2}$$

Example 4: Jalen went to the grocery store to get turkey, cheese, and bread for his lunches for the week. Turkey costs $4.50 per pound, cheese costs $2 per pound, and a loaf of bread is $7.

a.) Write an equation to model the total cost of Jalen's trip to the grocery store.

lbs. of turkey: t
lbs. of cheese: c
loaf of bread: b
Total cost: $T \quad T$

$$\boxed{T = 4.5t + 2c + 7b}$$

$t \qquad b$

b.) If Jalen spent $23.50 and purchased 3 pounds of turkey and one loaf of bread, how many pounds of cheese did he purchase?

$23.50 = 4.5(3) + 2c + 7(1)$

$23.50 = 13.5 + 2c + 7$

$23.50 = 20.5 + 2c \qquad c = 1.5$

$-20.5 \quad -20.5$

$\frac{3.00}{2} = \frac{2c}{2}$

$\boxed{1\frac{1}{2} \text{ pounds}}$