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Review: Writing Equations in $y=mx+b$ to describe real situations:Write an equation in $y=mx+b$ for each situation:Helpful Hints: Clue words for finding
x "per" or "each"y is usually the "total" of
what ever is adding up.

1. A band wants to make their own CD. Fly-by-night producer will create the CD for a fee of \$100 plus \$2 for each CD the band orders.

Define your variables:

Let x = # CDsLet y = cost

Equation: $y = 2x + 100$

2. A certain kind of puppy is born weighing 12 oz., and then gains about 3 oz. each day for the first several days of life.

Define your variables:

Let x = # daysLet y = total weight

Equation: $y = 3x + 12$

3. A certain diet program promises that a 200 pound person can lose 6 pounds per week using their product.

Define your variables:

Let $x =$ # weeks

Let $y =$ total weight

Equation: $y = 200 - 6x$
 ~~$y = 6x - 200$~~

4. For the big tricycle race, Joey is given a 5 meter head start and he is able to ride at 3 meters per second.

Define your variables:

Let $x =$ # seconds

Let $y =$ distance

Equation: $y = 3x + 5$

5. Big Lake holds 40,000 cubic meters of water at the start of the dry season. It typically loses 200 cubic meters per day to evaporation.

Define your variables:

Let $x =$ # days

Let $y =$ amount of water

Equation: $y = 40000 - 200x$

$$m = -200$$

$$b = 40000$$

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Word Problems with Solving Systems Using Substitution

Example 1: Application

- a. Suppose you are testing two fertilizers on bamboo plants A and B, which are growing under identical conditions.

Plant A is 6cm tall and growing at a rate of 4 cm/day.

Plant B is 10cm tall and growing at a rate of 2cm/day.

$d = \# \text{ days}$
 $h = \text{height}$
 $h = 4d + 6$

Which system of equations models the height (h) of each plant as a function of days (d)?

- A. $\begin{cases} h = 6d + 4 \\ h = 10d + 2 \end{cases}$ B. $\begin{cases} h = 6d + 4 \\ h = 2d + 10 \end{cases}$ C. $\begin{cases} h = 4d + 6 \\ h = 10d + 2 \end{cases}$ **D.** $\begin{cases} h = 4d + 6 \\ h = 2d + 10 \end{cases}$

- b. Next, you are testing two fertilizers on bamboo plants C and D.

Write a system of equations that models the height (h) of each plant as a function of days (d).

Plant C is 5cm tall and growing at a rate of 3 cm/day.

Plant D is 1cm tall and growing at a rate of 4 cm/day.

$$\begin{cases} h = 3d + 5 \\ h = 4d + 1 \end{cases}$$

Example 2: Interpreting Solutions

The system below models the heights of the bamboo plants from Example 1.
Find the solution of the system by graphing and algebraically.

Bamboo Plant A: $h = 4d + 6$
Bamboo Plant B: $h = 2d + 10$

$$4d + 6 = 2d + 10$$

$$2d = 4$$

$$d = 2$$

$$h = 4(2) + 6$$

$$h = 14$$

The lines intersect at (2 , 14)

What does the solution mean in terms of the original situation?

On day 2, both plants are 14 cm tall.

