

Notes Setting up and Solving Systems of Equations

- 1) Decide whether each situation represents a Standard Form or Slope Intercept form.
- 2) Define the variables (unknowns)

- constant rate of change

starting fee

Substitution or Elimination

1) Rebecca has 45 coins, all nickels and dimes. The total value of the coins is \$3.60. How many of each type of coin does Rebecca have? **STANDARD FORM**

X: # of nickels
Y: # of dimes

Equations: $X + Y = 45$ Total #
 $.05X + .1Y = 3.60$ Total value

$$\begin{array}{r} (X + Y = 45) \cdot .05 \\ .05X + .05Y = 2.25 \\ + \cdot 05X - .05Y = -2.25 \\ \hline .05Y = 1.35 \\ Y = 27 \end{array}$$

$\rightarrow X + 27 = 45$
 $X = 18$
(18, 27)
18 nickels + 27 dimes

3) The bill for 5 glasses of apple juice and four salads is \$9.50 but the bill for four glasses of apple juice and five salads is \$10.30. What would be the bill for 1 glass of apple juice and one salad?

STANDARD FORM
X: cost for AJ
Y: cost for salad

Equations: $5X + 4Y = 9.50$ same situation
 $4X + 5Y = 10.30$ different values

$$\begin{array}{r} 4(5X + 4Y = 9.50) \\ -5(4X + 5Y = 10.30) \\ \hline 20X + 16Y = 38 \\ + 20X - 25Y = -51.50 \\ \hline -9Y = -13.5 \\ Y = 1.5 \end{array}$$

$\rightarrow 5X + 4(1.5) = 9.5$
 $X = .70$
(.70, 1.5)
\$.20 for 1 glass of aj + 1 salad

Elimination

2) Bowl-o-Rama charges \$2.50 per game plus \$2.00 for shoe rental. Bowling Pinz charges \$2.00 per game plus a \$4.00. When is the cost the same to bowl at both places?

Slope-Intercept
X: # of games
Y: total cost

Equations: $y = 2.5x + 2$
 $y = 2x + 4$

$$\begin{array}{r} y = 2.5x + 2 \\ y = 2x + 4 \\ \hline 2x + 4 = 2.5x + 2 \\ .5x = 2 \\ X = 4 \end{array}$$

$\rightarrow y = 2(4) + 4$
 $y = 12$
(4, 12)
Both companies charge \$12 for 4 games

Graph or Substitution

4) A grocer prepares a mixture of 30 pounds of dried fruit to be sold for \$4.10 per pound. He will be using a mixture of two types of dried fruit, one selling for \$4.30 per pound and one selling at \$3.90 per pound. How many pounds of each type of fruit should he use?

STANDARD
X: lbs of A
Y: lbs of B

Equations: $X + Y = 30$ Total #
 $4.30X + 3.90Y = 123$ Total cost
(30 x 4.10)

Substitution or Elimination

Standard Form or Slope - Intercept Form??

a) A video rental company offers a plan that includes a monthly membership fee of \$5 and charges \$5 for every DVD borrowed. They also offer a second plan that costs \$15 per month for unlimited DVD rentals. If a customer borrows enough DVDs in a month, the two plans cost the same amount. How many DVDs is that?

x : # of DVDs borrowed
 y : total cost
 $y = 5x + 5$
 $y = 15$

b) A zookeeper needs to mix feed for the prairie dogs so that the feed has the right amount of protein. Feed A has 12% protein. Feed B has 5% protein. How many pounds of each does he need to get 100 pounds of feed that is 8% protein?

x : lbs of 12% protein
 y : lbs of 5% protein
 $x + y = 100$
 $.12x + .05y = 8$

c) Kerry asked a bank teller to cash a \$390 check using \$20 bills and \$50 bills. If the teller have her a total of 15 bills, how many of each type of bill did she receive?

x : # of \$20 bills
 y : # of \$50 bills
 $x + y = 15$
 $20x + 50y = 390$

d) The junior and senior class at H. Frank Carey High School planned separate trips to New York City. The senior class rented 1 van and 6 buses for 372 students. The junior class used 4 vans and 12 buses for 780 students. How many students can a van carry?

x : students in bus
 y : students in van
 $6x + y = 372$
 $12x + 4y = 780$

e) You spend \$20 total on tubes of paint and disposable brushes for an art project. Tubes of paint cost \$4 each and paintbrushes cost \$0.50 each. You purchase twice as many brushes as tubes of paint. How many brushes and tubes of pain did you purchase?

x : # of tubes of paint
 y : # of brushes
 slope-intercept + standard
 $4x + .5y = 20$
 $y = 2x$
 $4x + .5(2x) = 20$
 $4x + x = 20$
 $x = 4$
 $y = 2(4)$
 $y = 8$
 4 tubes of paint +
 8 brushes

f) Two high school wrestlers want to change weight classes. One wrestler is 190 pounds and wants to lose a pound a week. The other wrestler wants to gain 2 pounds per week and is starting at 130 pounds. When will they weight the same?

x : # of weeks
 y : weight
 $y = 190 - x$
 $y = 130 + 2x$

g) An adult ticket to a museum costs \$3 more than a children's ticket. When 200 adult tickets and 100 children's tickets are sold, the total revenue is \$2100. What is the cost of a children's ticket

x : cost of Adult ticket
 y : cost of childrens ticket
 $200x + 100y = 2100$
 $x = y + 3$ or $y = x - 3$

h) How many ounces of 20% hydrochloric acid solution and 70% hydrochloric acid solution must be mixed to obtain 20 ounces of 50% hydrochloric acid solution?

x : ounces of 20% solution
 y : ounces of 70% solution
 $x + y = 20$
 $.20x + .70y = 10$