

Set up each word problem into a **matrix equation**. You may then use either $X = A^{-1}B$ or $rref$ to solve.

Write and solve systems of equations.

- Gerardo bought some neon fish at \$2 each and some angel fish at \$3 each for his new aquarium. Cory bought a total of 20 fish and spent \$45. How many of each fish did he buy?
- John inherited \$25,000 and invested part of it in a money market account, part in municipal bonds, and part in a mutual fund. After one year, he received a total of \$1,620 in simple interest from the three investments. The money market paid 6% annually, the bonds paid 7% annually, and the mutual fund paid 8% annually. There was \$6,000 more invested in the bonds than the mutual funds. Find the amount John invested in each category.
- An ice cream stand sells chocolate, strawberry, and vanilla ice cream. Yesterday they sold a total of 232 ice creams. The number of strawberry is equal to 4 fewer than 3 times the number of vanilla. The number of strawberry and vanilla combined equals the number of chocolates sold. How many of each did they sell?
- Juan's taco Hut sells tacos, burritos and enchilladas. Yesterday they sold a total of 952 food items. The number of tacos they sold was 12 less than 2 times the number of burritos. The number of enchilladas they sold was half the number of tacos sold. What is the amount of each food item sold.
- A college entrance test consists of 112 questions. The test contains true/false (7 points each), fill-in-the-blank (9 points each), and multiple choice (13 points each). There are 1172 possible points total on the test. The number of fill-in-the-blank is 34 less than the number of true/false. How many points come from fill-in-the-blank questions?
- An architect is determining the rectangular dimensions of a room. The length measures 6 more than the width. The height is 8 feet less than the length. The sum of all three measures is 46. What are the measurements of the room?
- Eva had a bake sale to earn extra money. On the first day, she earned \$6.25 selling 5 cookies and 2 brownies. On the second day, she earned \$7.75 selling 3 brownies and 4 pieces of pie. On the third day, she earned \$6.00 selling 8 cookies. If Eva sold 6 cookies and 1 piece of pie the next day, how much did she make?

1. x : # of neon fish
 y : # of angel fish

$$\begin{cases} x + y = 20 \\ 2x + 3y = 45 \end{cases}$$

$$\begin{bmatrix} 1 & 1 \\ 2 & 3 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 20 \\ 45 \end{bmatrix}$$

15 neon fish
5 angel fish

2. x : amt in mm
 y : amt in mb
 z : amt in mf

$$\begin{cases} x + y + z = 25000 \\ .06x + .07y + .08z = 1620 \\ y = z + 6000 \end{cases}$$

$$\begin{bmatrix} 1 & 1 & 1 \\ .06 & .07 & .08 \\ 0 & 1 & -1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 25000 \\ 1620 \\ 6000 \end{bmatrix}$$

\$15000 in money market, \$8000 in municipal bonds, \$2000 in mutual funds

3. c : # of choc
 s : # of straw
 v : # of vanilla

$$\begin{cases} c + s + v = 232 \\ s = 3v - 4 \\ s + v = c \end{cases}$$

$$\begin{bmatrix} 1 & 1 & 1 \\ 0 & 1 & -3 \\ -1 & 1 & 1 \end{bmatrix} \begin{bmatrix} c \\ s \\ v \end{bmatrix} = \begin{bmatrix} 232 \\ -4 \\ 0 \end{bmatrix}$$

116 chocolate
86 strawberry
30 vanilla

4. t : # of tacos
 b : # of burritos
 e : # enchilladas

$$\begin{cases} t + b + e = 952 \\ t = 2b - 12 \\ e = \frac{1}{2}t \end{cases}$$

$$\begin{bmatrix} 1 & 1 & 1 \\ 1 & -2 & 0 \\ -\frac{1}{2} & 0 & 1 \end{bmatrix} \begin{bmatrix} t \\ b \\ e \end{bmatrix} = \begin{bmatrix} 952 \\ -12 \\ 0 \end{bmatrix}$$

473 tacos
242.5 burritos
236.5 enchilladas

5. $x = \# \text{ of T/F}$
 $y = \# \text{ of fill-in-blank}$
 $z = \# \text{ of mult choice}$

$$\begin{aligned} x + y + z &= 112 \\ 7x + 9y + 13z &= 1172 \\ y &= x - 34 \end{aligned}$$

$$\begin{bmatrix} 1 & 1 & 1 \\ 7 & 9 & 13 \\ -1 & 1 & 0 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 112 \\ 1172 \\ -34 \end{bmatrix}$$

of T/F: 42
 # of fill-in-blank: 8
 # of mult choice: 62

6. length = l
 width = w
 height = h
 $l = w + 6$
 $h = l - 8$
 $l + w + h = 46$
 length: 20 units
 width: 14 units
 height: 12 units

$$\begin{bmatrix} 1 & -1 & 0 \\ -1 & 0 & 1 \\ 1 & 1 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 6 \\ -8 \\ 46 \end{bmatrix}$$

7. c : # of cookies
 b : # of brownies
 p : # of pieces of pie

$$\begin{aligned} 5c + 2b &= 6.25 \\ 3b + 4p &= 7.75 \\ 8c &= 6.00 \end{aligned}$$

$$\begin{bmatrix} 5 & 2 & 0 \\ 0 & 3 & 4 \\ 8 & 0 & 0 \end{bmatrix} \begin{bmatrix} c \\ b \\ p \end{bmatrix} = \begin{bmatrix} 6.25 \\ 7.75 \\ 6.00 \end{bmatrix}$$

cookies are 75¢
 brownies are \$1.25
 piece of pie is \$1.00