

Accelerated Precalculus
Solving Problems Using Systems

Date: _____ Block: _____

Write a system of equations that models the given situation then solve the system using matrices and your graphing calculator. You MUST show your system and the inverse matrix equation to receive proper credit. Answers can be found at the end of this worksheet.

1. In a factory there are three machines A, B and C. When all three are running, they produce 222 suitcases per day. If A and B work but C does not, they produce 159 suitcases per day. If B and C work but A does not, they produce 147 suitcases per day. What is the daily production of each machine?

$x = \#$ of suitcases (A)
 $y = \#$ of suitcases (B)
 $z = \#$ of suitcases (C)

$$\begin{aligned} x+y+z &= 222 \\ x+y &= 159 \\ y+z &= 147 \end{aligned}$$

$$\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 0 \\ 0 & 1 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 222 \\ 159 \\ 147 \end{bmatrix}$$

machine A produces 75 suitcase, B produces 84, and C produces 63.

2. The sum of three numbers is 57. The second is 3 more than the first. The third is 6 more than the first. Find the numbers.

$x = 1^{\text{st}}$ number $y = 2^{\text{nd}}$ number $z = 3^{\text{rd}}$ number

$$\begin{aligned} y &= x+3 \\ -x+y &= 3 \\ z &= x+6 \\ -x+z &= 6 \end{aligned}$$

$$\begin{aligned} x+y+z &= 57 \\ -x+y &= 3 \\ -x+z &= 6 \end{aligned}$$

$$\begin{bmatrix} 1 & 1 & 1 \\ -1 & 1 & 0 \\ -1 & 0 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 57 \\ 3 \\ 6 \end{bmatrix}$$

The 1st integer is 16, the 2nd is 19, and the 3rd integer is 22.

3. In triangle ABC, the measure of angle B is 2° more than three times the measure of angle A. The measure of angle C is 8° more than the measure of angle A. Find the angle measures.

$x = m\angle A$, $y = m\angle B$, $z = m\angle C$

$$-3x + y = 2$$

$$-x + z = 8$$

$$x + y + z = 180$$

$$\begin{bmatrix} -3 & 1 & 0 \\ -1 & 0 & 1 \\ 1 & 1 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 2 \\ 8 \\ 180 \end{bmatrix}$$

$$\begin{aligned} y &= 3x+2 \\ z &= x+8 \end{aligned}$$

The $m\angle A$ is 34° , $m\angle B$ is 104° , and the $m\angle C$ is 42° .

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4. Pat picked strawberries on three days. He picked a total of 87 quarts. On Tuesday he picked 15 quarts more than on Monday. On Wednesday he picked 3 quarts fewer than on Tuesday. How many quarts did he pick each day?

$$\begin{aligned} x + y + z &= 87 \\ -x + y &= 15 \\ -y + z &= -3 \end{aligned}$$

$$\begin{aligned} y &= x + 15 \\ z &= y - 3 \end{aligned}$$

$$\begin{bmatrix} 1 & 1 & 1 \\ -1 & 1 & 0 \\ 0 & -1 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 87 \\ 15 \\ -3 \end{bmatrix}$$

He picked 20 qts on Monday, 35 qts on Tuesday, and 32 quarts on Weds.

5. A grocer wants to mix three kinds of hard candy to sell for \$2.40/lb. He needs 50 pounds of candy all together. He mixes sour balls worth \$3.50/lb, butterballs worth \$2.50/lb, and starlight mints worth \$1.75/lb. He mixes twice as many butterballs as sour balls. Find the number of pounds of each kind of candy he mixes together.

$$\begin{aligned} x + y + z &= 50 \\ -2x + y &= 0 \\ 3.5x + 2.5y + 1.75z &= 120 \end{aligned}$$

$$y = 2x$$

$$3.5x + 2.5y + 1.75z = 2.4(50)$$

$$\begin{bmatrix} 1 & 1 & 1 \\ -2 & 1 & 0 \\ 3.5 & 2.5 & 1.75 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 50 \\ 0 \\ 120 \end{bmatrix}$$

He mixes 10 lbs of Sourballs, 20 lbs of butterballs, and 20 lbs of starlight mints.

Answers: Fold here if you do not want to see your answers while you work

1. A produces 75 suitcases per day, B produces 84 suitcases per day, C produces 63 suitcases per day
2. Your three integers are 16, 19, 22
3. $\angle A = 34^\circ$, $\angle B = 104^\circ$, $\angle C = 42^\circ$
4. 20 quarts on Monday, 35 quarts on Tuesday, 32 quarts on Wednesday
5. 10 pounds of sour balls, 20 pounds of butterballs, 20 pounds of starlight mints