



EXAMPLE 5 TAKS REASONING: Multi-Step Problem

GIFTS A company sells three types of movie gift baskets. A basic basket with 2 movie passes and 1 package of microwave popcorn costs \$15.50. A medium basket with 2 movie passes, 2 packages of popcorn, and 1 DVD costs \$37. A super basket with 4 movie passes, 3 packages of popcorn, and 2 DVDs costs \$72.50. Find the cost of each item in the gift baskets.

ANOTHER WAY

For an alternative method for solving the problem in Example 5, turn to page 218 for the **Problem Solving Workshop**.

Solution

STEP 1 Write verbal models for the situation.

$$2 \cdot \begin{array}{|c|} \hline \text{Cost of} \\ \hline \text{movie pass} \\ \hline \end{array} + \begin{array}{|c|} \hline \text{Cost of} \\ \hline \text{popcorn} \\ \hline \end{array} = \begin{array}{|c|} \hline \text{Cost of} \\ \hline \text{basic basket} \\ \hline \end{array} \quad \text{Equation 1}$$

$$2 \cdot \begin{array}{|c|} \hline \text{Cost of} \\ \hline \text{movie pass} \\ \hline \end{array} + 2 \cdot \begin{array}{|c|} \hline \text{Cost of} \\ \hline \text{popcorn} \\ \hline \end{array} + \begin{array}{|c|} \hline \text{Cost of} \\ \hline \text{DVD} \\ \hline \end{array} = \begin{array}{|c|} \hline \text{Cost of} \\ \hline \text{medium basket} \\ \hline \end{array} \quad \text{Equation 2}$$

$$4 \cdot \begin{array}{|c|} \hline \text{Cost of} \\ \hline \text{movie pass} \\ \hline \end{array} + 3 \cdot \begin{array}{|c|} \hline \text{Cost of} \\ \hline \text{popcorn} \\ \hline \end{array} + 2 \cdot \begin{array}{|c|} \hline \text{Cost of} \\ \hline \text{DVD} \\ \hline \end{array} = \begin{array}{|c|} \hline \text{Cost of} \\ \hline \text{super basket} \\ \hline \end{array} \quad \text{Equation 3}$$

STEP 2 Write a system of equations. Let m be the cost of a movie pass, p be the cost of a package of popcorn, and d be the cost of a DVD.

$$2m + p = 15.50 \quad \text{Equation 1}$$

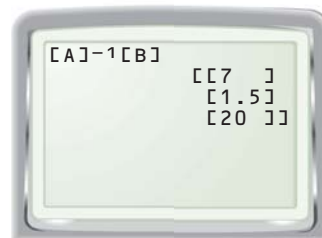
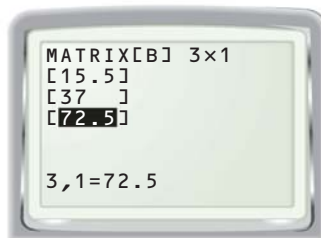
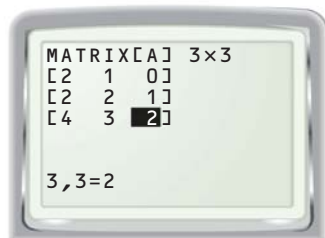
$$2m + 2p + d = 37.00 \quad \text{Equation 2}$$

$$4m + 3p + 2d = 72.50 \quad \text{Equation 3}$$

STEP 3 Rewrite the system as a matrix equation.

$$\begin{bmatrix} 2 & 1 & 0 \\ 2 & 2 & 1 \\ 4 & 3 & 2 \end{bmatrix} \begin{bmatrix} m \\ p \\ d \end{bmatrix} = \begin{bmatrix} 15.50 \\ 37.00 \\ 72.50 \end{bmatrix}$$

STEP 4 Enter the coefficient matrix A and the matrix of constants B into a graphing calculator. Then find the solution $X = A^{-1}B$.



▶ A movie pass costs \$7, a package of popcorn costs \$1.50, and a DVD costs \$20.



GUIDED PRACTICE for Examples 4 and 5

Use an inverse matrix to solve the linear system.

8. $4x + y = 10$
 $3x + 5y = -1$

9. $2x - y = -6$
 $6x - 3y = -18$

10. $3x - y = -5$
 $-4x + 2y = 8$

11. **WHAT IF** In Example 5, how does the answer change if a basic basket costs \$17, a medium basket costs \$35, and a super basket costs \$69?