

LESSON **Problem Solving**

4-4 **Determinants and Cramer's Rule**

The chart shows the activity time, and the total calories burned each day. How many calories per hour are burned for each activity?

Triathlon Training Record			
Day	Cycling (hours)	Running (hours)	Total Calories Burned
Friday	2.0	0.5	1565
Saturday	3.0	1.5	2835

1. Write a system of equations that relates the time to the number of calories burned each day. Use c , and r for the calories burned per hour for the two activities.

$$\begin{array}{r} 2.0c + 0.5r = 1565 \\ \hline \underline{\quad\quad} + \underline{\quad\quad} = \underline{\quad\quad} \end{array}$$

2. Write the coefficient matrix for the system of equations.

$$D = \begin{bmatrix} 2.0 & 0.5 \\ \underline{\quad} & \underline{\quad} \end{bmatrix}$$

3. What is the value, D , for the determinant of the coefficient matrix?

4. Use Cramer's rule to solve this system of equations. Give the values for c and r .

$$c = \frac{\begin{vmatrix} 1565 & 0.5 \\ 2835 & 1.5 \end{vmatrix}}{D} \qquad r = \frac{\begin{vmatrix} \underline{\quad} & \underline{\quad} \\ \underline{\quad} & \underline{\quad} \end{vmatrix}}{D}$$

Choose the letter for the best answer.

5. Ty has a bag of pennies, nickels, and dimes. He has 10 times as many pennies as dimes. He has a total of 52 coins and twice as many nickels as dimes. Which coefficient matrix could you use to solve this problem?

A $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 0 & -10 \\ 0 & 1 & -2 \end{bmatrix}$ **C** $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 0 & -10 \\ 0 & -1 & 2 \end{bmatrix}$

B $\begin{bmatrix} 1 & 1 & 1 \\ 10 & 0 & -1 \\ 0 & 2 & -1 \end{bmatrix}$

6. Phyllis collects silver dollars and Kennedy half-dollars. She has 5 times as many half-dollars as dollar coins. She has a total of 192 coins. Which solution could you use to find the number of silver dollars Phyllis has?

A $\frac{\begin{vmatrix} 192 & 1 \\ 0 & -5 \end{vmatrix}}{-6}$ **C** $\frac{\begin{vmatrix} 1 & 192 \\ -5 & 0 \end{vmatrix}}{-6}$

B $\frac{\begin{vmatrix} 1 & 192 \\ 1 & 0 \end{vmatrix}}{-6}$

LESSON
4-4

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1. Write a system of equations that relates the time to the number of calories burned each day. Use c , and r for the calories burned per hour for the two activities.

$$\begin{array}{r} 2.0c + 0.5r = 1565 \\ \hline 3.0c + 1.5r = 2835 \end{array}$$

2. Write the coefficient matrix for the system of equations.

$$D = \begin{bmatrix} 2.0 & 0.5 \\ 3.0 & 1.5 \end{bmatrix}$$

3. What is the value, D , for the determinant of the coefficient matrix?

$$D = 2.0(1.5) - 0.5(3.0) = 1.5$$

4. Use Cramer's rule to solve this system of equations. Give the values for c and r .

$$c = 620; r = 650$$

$$c = \frac{\begin{vmatrix} 1565 & 0.5 \\ 2835 & 1.5 \end{vmatrix}}{D}$$

$$r = \frac{\begin{vmatrix} 1565 & 2.0 \\ 2835 & 3.0 \end{vmatrix}}{D}$$

Choose the letter for the best answer.

5. Ty has a bag of pennies, nickels, and dimes. He has 10 times as many pennies as dimes. He has a total of 52 coins and twice as many nickels as dimes. Which coefficient matrix could you use to solve this problem?

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6. Phyllis collects silver dollars and Kennedy half-dollars. She has 5 times as many half-dollars as dollar coins. She has a total of 192 coins. Which solution could you use to find the number of silver dollars Phyllis has?

A $\begin{vmatrix} 192 & 1 \\ 0 & -5 \\ -6 \end{vmatrix}$

C $\begin{vmatrix} 1 & 192 \\ -5 & 0 \\ -6 \end{vmatrix}$

B $\begin{vmatrix} 1 & 192 \\ 1 & 0 \\ -6 \end{vmatrix}$