







**ORGANIZING DATA** Matrices are useful for organizing data and for performing the same operations on large numbers of data values.



**EXAMPLE 3** TAKS REASONING: Multi-Step Problem

**MANUFACTURING** A company manufactures small and large steel DVD racks with wooden bases. Each size of rack is available in three types of wood: walnut, pine, and cherry. Sales of the racks for last month and this month are shown below.

Small Rack Sales				Large Rack Sales			
	Walnut	Pine	Cherry		Walnut	Pine	Cherry
							
Last month	125	278	225	Last month	100	251	270
This month	95	316	205	This month	114	215	300

Organize the data using two matrices, one for last month's sales and one for this month's sales. Then write and interpret a matrix giving the average monthly sales for the two month period.

**Solution**

**STEP 1** Organize the data using two  $3 \times 2$  matrices, as shown.

	Last Month (A)		This Month (B)	
	Small	Large	Small	Large
Walnut	125	100	95	114
Pine	278	251	316	215
Cherry	225	270	205	300

**STEP 2** Write a matrix for the average monthly sales by first adding  $A$  and  $B$  to find the total sales and then multiplying the result by  $\frac{1}{2}$ .

$$\begin{aligned} \frac{1}{2}(A + B) &= \frac{1}{2} \left( \begin{bmatrix} 125 & 100 \\ 278 & 251 \\ 225 & 270 \end{bmatrix} + \begin{bmatrix} 95 & 114 \\ 316 & 215 \\ 205 & 300 \end{bmatrix} \right) \\ &= \frac{1}{2} \begin{bmatrix} 220 & 214 \\ 594 & 466 \\ 430 & 570 \end{bmatrix} \\ &= \begin{bmatrix} 110 & 107 \\ 297 & 233 \\ 215 & 285 \end{bmatrix} \end{aligned}$$

**STEP 3** Interpret the matrix from Step 2. The company sold an average of 110 small walnut racks, 107 large walnut racks, 297 small pine racks, 233 large pine racks, 215 small cherry racks, and 285 large cherry racks.

**ANOTHER WAY**

You can also evaluate  $\frac{1}{2}(A + B)$  by first using the distributive property to rewrite the expression as  $\frac{1}{2}A + \frac{1}{2}B$ .