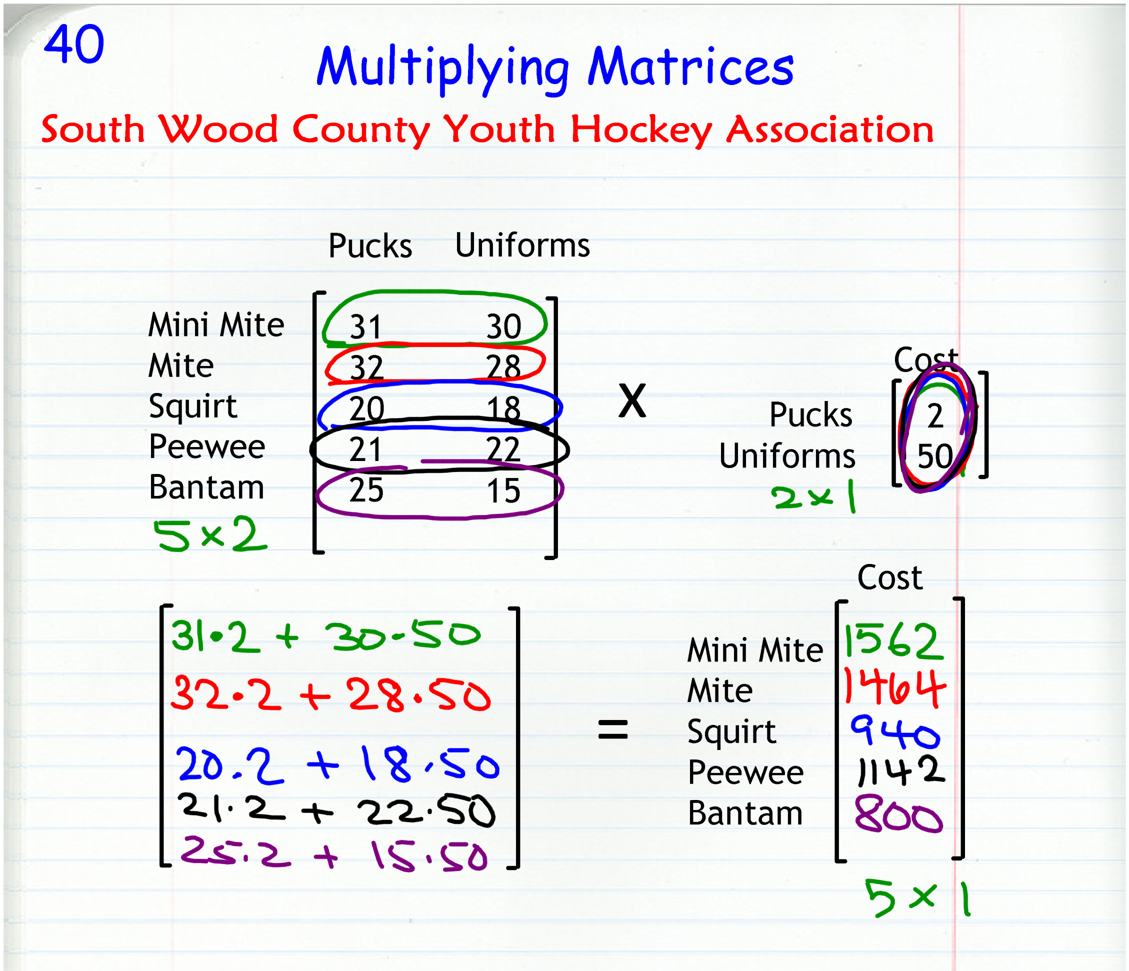

40

Multiplying Matrices

South Wood County Youth Hockey Association

$$\begin{array}{lcc} & \text{Pucks} & \text{Uniforms} \\ \text{Mini Mite} & 31 & 30 \\ \text{Mite} & 32 & 28 \\ \text{Squirt} & 20 & 18 \\ \text{Peewee} & 21 & 22 \\ \text{Bantam} & 25 & 15 \end{array} \times \begin{array}{lc} & \text{Cost} \\ \text{Pucks} & 2 \\ \text{Uniforms} & 50 \end{array}$$

5×2 2×1

$$\begin{bmatrix} 31\cdot 2 + 30\cdot 50 \\ 32\cdot 2 + 28\cdot 50 \\ 20\cdot 2 + 18\cdot 50 \\ 21\cdot 2 + 22\cdot 50 \\ 25\cdot 2 + 15\cdot 50 \end{bmatrix} = \begin{array}{lc} & \text{Cost} \\ \text{Mini Mite} & 1562 \\ \text{Mite} & 1464 \\ \text{Squirt} & 940 \\ \text{Peewee} & 1142 \\ \text{Bantam} & 800 \end{array}$$

5×1

Multiplying Matrices

Row x Column X Row x Column

$$\boxed{5} \times 2 \quad \times \quad 2 \times \boxed{1}$$

Answer:
Matrix 5 x 1

Example 2:

$$2 \times \underline{\underline{1}} \quad X \quad \underline{\underline{5}} \times 2$$

Cannot be multiplied.

Multiplying Matrices (cont.)

$$\begin{bmatrix} 2 & 3 & 6 \\ 4 & 5 & 7 \end{bmatrix} \times \begin{bmatrix} 8 \\ 9 \\ 10 \end{bmatrix}$$

Can these be multiplied? Yes.

Answer matrix: 2×1

2 × ___ X ___ × 1

$$\begin{bmatrix} -2 & 3 \\ 3 & 1 \end{bmatrix} \times \begin{bmatrix} 2 & -3 \\ -1 & 0 \\ 4 & 5 \end{bmatrix}$$

Can these be multiplied? No.

2 × ___ X ___ × 2

$$\begin{bmatrix} 2 & -3 \\ -1 & 0 \\ 4 & 5 \end{bmatrix} \times \begin{bmatrix} -2 & 3 \\ 3 & 1 \end{bmatrix}$$

Can these be multiplied? Yes

Answer Matrix 3×2

$\boxed{3}$ × ___ X ___ × $\boxed{2}$

$$\begin{bmatrix} 2 & -3 \\ -1 & 0 \\ 4 & 5 \end{bmatrix} \times \begin{bmatrix} -2 & 3 \\ 3 & 1 \end{bmatrix} = \begin{bmatrix} \quad & \quad \end{bmatrix}$$

$$\begin{bmatrix} 2 & -3 \\ -1 & 0 \\ 4 & 5 \end{bmatrix} \times \begin{bmatrix} -2 & 3 \\ 3 & 1 \end{bmatrix} = \begin{bmatrix} \quad & \quad \end{bmatrix}$$

$$\begin{bmatrix} 2 & -3 \\ -1 & 0 \\ 4 & 5 \end{bmatrix} \times \begin{bmatrix} -2 & 3 \\ 3 & 1 \end{bmatrix} = \begin{bmatrix} \quad & \quad \end{bmatrix}$$

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$$\begin{bmatrix} 2 & -3 \\ -1 & 0 \\ 4 & 5 \end{bmatrix} \times \begin{bmatrix} -2 & 3 \\ 3 & 1 \end{bmatrix} = \begin{bmatrix} \quad & \quad \end{bmatrix}$$

Multiplying Matrices (cont.)

row 1 col. 1

$$\overset{\boxed{3}\times 2}{\begin{bmatrix}2&-3\\-1&0\\4&5\end{bmatrix}}\times\overset{2\times\boxed{2}}{\begin{bmatrix}-2&3\\3&1\end{bmatrix}}=\overset{3\times 2}{\begin{bmatrix}-13&\underline{\quad}\\\underline{\quad}&\underline{\quad}\\\underline{\quad}&\underline{\quad}\end{bmatrix}}$$

row 1 col. 2

$$\begin{bmatrix}2&-3\\-1&0\\4&5\end{bmatrix}\times\begin{bmatrix}-2&3\\3&1\end{bmatrix}=\begin{bmatrix}\underline{\quad}&3\\\underline{\quad}&\underline{\quad}\\\underline{\quad}&\underline{\quad}\end{bmatrix}$$

row 2 col. 1

$$\begin{bmatrix}2&-3\\-1&0\\4&5\end{bmatrix}\times\begin{bmatrix}-2&3\\3&1\end{bmatrix}=\begin{bmatrix}\underline{\quad}&\underline{\quad}\\2&\underline{\quad}\\\underline{\quad}&\underline{\quad}\end{bmatrix}$$

row 2 col. 2

$$\begin{bmatrix}2&-3\\-1&0\\4&5\end{bmatrix}\times\begin{bmatrix}-2&3\\3&1\end{bmatrix}=\begin{bmatrix}\underline{\quad}&\underline{\quad}\\\underline{\quad}&-3\\\underline{\quad}&\underline{\quad}\end{bmatrix}$$

row 3 column 1

$$\begin{bmatrix}2&-3\\-1&0\\4&5\end{bmatrix}\times\begin{bmatrix}-2&3\\3&1\end{bmatrix}=\begin{bmatrix}\underline{\quad}&\underline{\quad}\\\underline{\quad}&\underline{\quad}\\7&\underline{\quad}\end{bmatrix}$$

row 3 col 2

$$\begin{bmatrix}2&-3\\-1&0\\4&5\end{bmatrix}\times\begin{bmatrix}-2&3\\3&1\end{bmatrix}=\begin{bmatrix}\underline{\quad}&\underline{\quad}\\\underline{\quad}&\underline{\quad}\\\underline{\quad}&17\end{bmatrix}$$

Answer $\begin{bmatrix}-13&3\\2&-3\\7&17\end{bmatrix}$