Algebra 2 3.6

Multiply matrices

Use the properties of matrix multiplication

row

column

element

dimensions (of a matrix) r x c

whiteboards 2 x 3

[A]+[B]

k[C] = Scalar mult

[A]·[B]

Clementine



2 3 1

- The table shows the scoring summary for Lisa Leslie, the WNBA's all-time scoring leader, during her highest scoring seasons. Her total baskets can be summarized

Lisa Leslie Regular Season Scoring				
Type	2005	2006	[illegible]	2009
Field Goal	197	249	184	143
3-Point Field Goal	7	8	4	1
Free Throw	102	158	117	65

Source: WNBA

517

394

21

102

How would you calculate her point total for 2005?

Lisa Leslie Regular Season Scoring				
Type	2005	2006	2008	2009
Field Goal	197	249	184	143
3-Point Field Goal	7	8	4	1
Free Throw	102	158	117	65

Source: WNBA

2005 2006 2008 2009

Point Values

$A = [\,1 \quad 2 \quad 3 \quad 1\,]$

Baskets

$$B = \begin{bmatrix} 197 & 249 & 184 & 143 \\ 7 & 8 & 4 & 1 \\ 102 & 158 & 117 & 65 \end{bmatrix}$$

dimensions have to work out...

dimensions must work out...

Example 1 Dimensions of Matrix Products

Determine whether each matrix product is defined. If so, state the dimensions of the product.

a. $A_{3\times 4}$ and $B_{4\times 2}$

yes 3×2

b. $A_{5\times 3}$ and $B_{5\times 4}$

no

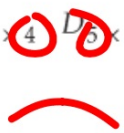
whiteboards

Determine whether each matrix product is defined. If so, state the dimensions of the product.

1. $A_{2 \times 4} \cdot B_{4 \times 3}$



2. $C_{5 \times 4} \cdot D_{5 \times 4}$

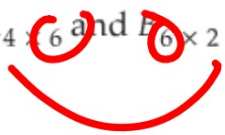


3. $E_{8 \times 6} \cdot F_{6 \times 10}$

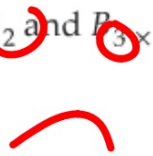


GuidedPractice

1A. $A_{4 \times 6}$ and $B_{6 \times 2}$



1B. $A_{3 \times 2}$ and $B_{3 \times 2}$



40 - 6

Example 2 Multiply Square Matrices

Find XY if $X = \begin{bmatrix} 6 & -3 \\ -10 & -2 \end{bmatrix}$ and $Y = \begin{bmatrix} -5 & -4 \\ 3 & 3 \end{bmatrix}$.

$= \begin{bmatrix} -39 & -33 \\ 44 & 34 \end{bmatrix}$

2 x 2 (2) x 2

50 - 6

$-30 - 9 \quad -24 - 9$

$-39 \quad -33$

Matrix Multiplication

(My Darling Clementine)

Row by column, row by column,
Multiply them line by line.
Add them up to form a matrix,
Now you're doing it just fine!

2. Find UV if $U = \begin{bmatrix} 5 & 9 \\ -3 & -2 \end{bmatrix}$ and $V = \begin{bmatrix} 2 & -1 \\ 6 & -5 \end{bmatrix}$.

10 + 64 −5 − 45 3 + 10

$\begin{bmatrix} 64 & -50 \\ -18 & 13 \end{bmatrix}$

−6 −12 2 × 2 2 × 2

−6 −12

3 × 2 3 × 2

2 × 3 3 × 2

whiteboards

Find each product, if possible.

4. $\begin{bmatrix} 2 & 1 \\ 7 & -5 \end{bmatrix} \cdot \begin{bmatrix} -6 & 3 \\ -2 & -4 \end{bmatrix}$

6. $\begin{bmatrix} 9 & -2 \end{bmatrix} \cdot \begin{bmatrix} -2 & 4 \\ 6 & -7 \end{bmatrix}$ $\therefore$ $[-30 \quad 50]$

$-18-12$

$36+14$

3×2

Real-World Example 3 Multiply Matrices

SWIM MEET At a particular swim meet, 7 points were awarded for each first-place finish, 4 points for second, and 2 points for third. Find the total number of points for each school. Which school won the meet?

School	First Place	Second Place	Third Place
Central	4	7	3
Franklin	8	9	1
Hayes	10	5	3
Lincoln	3	3	6

$$\begin{matrix} 7 \\ 4 \\ 2 \end{matrix}$$

8. $\begin{bmatrix} -8 & 7 & 4 \\ -5 & -3 & 8 \end{bmatrix} \begin{bmatrix} 10 & 6 \\ 8 & 4 \end{bmatrix}$

2×3 2×2

NP

Is 3x4=4x3?

Is AxB = BxA ?

$2+6-5 \quad 0+5+15$

$$\begin{bmatrix} 2 & 1 & 5 \\ 3 & 3 & 8 \\ 0 & 1 & 1 \end{bmatrix} \cdot \begin{bmatrix} 0 & 1 \\ 5 & 6 \\ 3 & -1 \end{bmatrix} = \begin{bmatrix} 20 & 3 \\ \cdot & \cdot \\ \cdot & \cdot \end{bmatrix}$$

$3 \times \textcircled{3}$ $\quad$ $\textcircled{3} \times 2$

15-33 odd

p 184