Notes on Scalar Multiplication

Scalar multiplication involves multiplying each element of a matrix by the same quantity. This allows for quick calculation when applying a conversion factor or a discount to a set of values.

You may be able to do this in your head:

$$A = \begin{bmatrix} 3 & 2 & -1 \\ 5 & -4 & 2 \end{bmatrix}$$

$s = 3$

Find 3A

3A =

Now let's try one using technology:

Name	Height in Inches	Weight in Pounds
Leandro Barbosa	75	194
Brandon Bass	80	250
Avery Bradley	74	180
Jason Collins	84	255
Kevin Garnett	83	253
Jeff Green	81	235
Kris Joseph	79	210
Courtney Lee	77	200
Fab Melo	84	255
Darko Milicic	84	275
Paul Pierce	79	235
Rajon Rondo	73	186
Jared Sullinger	81	260
Jason Terry	74	180
Chris Wilcox	82	235

Let's convert the height in inches to height in centimeters. Round to the nearest centimeter.

First form a matrix , A, with the heights in inches.

This can either be a 1X15 matrix or a 15X1 matrix

Now multiply the matrix A by the conversion factor 2.54 cm./inch

Name	Height in Centimeters
Leandro Barbosa	
Brandon Bass	
Avery Bradley	
Jason Collins	
Kevin Garnett	
Jeff Green	
Kris Joseph	
Courtney Lee	
Fab Melo	
Darko Milicic	
Paul Pierce	
Rajon Rondo	
Jared Sullinger	
Jason Terry	
Chris Wilcox	

Scalar Multiplication Combined with Matrix Addition and Subtraction.

In Algebra I, you learned to evaluate an expression like 3x + 2y for x = -2 and y = 5.

You simply substituted the values of x and y into the expression and performed the necessary operations (multiplication and addition)

An analogous process exists for matrices.

$$A = \begin{bmatrix} 5 & 2 & 3 \\ 1 & -2 & 7 \\ -6 & 4 & 8 \end{bmatrix} \qquad B = \begin{bmatrix} 1 & 4 & 7 \\ -3 & 2 & 1 \\ 8 & 0 & 4 \end{bmatrix}$$

What is 2A + 3B?

Let's try one using technology.

Name	2 Point Field Goals	3-Point Field Goals	Foul Shots
Kareem Abdul-Jabbar	15,387	1	6,712
Michael Jordan	12,192	531	7,327
Larry Bird	8,591	649	3,960
Magic Johnson	6,211	325	4,960
LeBron James	6,837	1,514	4,558

Let's use three matrices A, B and C to represent the three data columns.

What matrix operation will allow us to find the career points for each of the five N.B.A. greats?

Complete the following matrix

Name	Career Points
Kareem Abdul-Jabbar	
Michael Jordan	
Larry Bird	
Magic Johnson	
LeBron James	

Guided Practice

$$A = \begin{bmatrix} 2 & 5 & 6 \\ -2 & 3 & -5 \end{bmatrix} \qquad B = \begin{bmatrix} 1 & 2 & 4 \\ 1 & 3 & 9 \end{bmatrix}$$

Find

1. $A + B$
2. $2B - A$
3. $5A + 2B$

4. Use a graphing calculator to convert the Celtics weights to kilograms.

Name	Weight in Pounds	Mass in Kilograms
Leandro Barbosa	194	
Brandon Bass	250	
Avery Bradley	180	
Jason Collins	255	
Kevin Garnett	253	
Jeff Green	235	
Kris Joseph	210	
Courtney Lee	200	
Fab Melo	255	
Darko Milicic	275	
Paul Pierce	235	
Rajon Rondo	186	
Jared Sullinger	260	
Jason Terry	180	
Chris Wilcox	235	