FOOTBALL The West High School football team used five running backs throughout its season. Coach Williams wanted to compare the statistics of each player.

Joey: 11 games, 72 attempts, 439 yards, 6.10 average, 8 TDs

DeShawn: 9 games, 143 attempts, 1024 yards, 7.16 average, 12 TDs

Dario: 11 games, 164 attempts, 885 yards, 5.40 average, 15 TDs

Leo: 11 games, 84 attempts, 542 yards, 6.45 average, 7 TDs

Alex: 10 games, 151 attempts, 966 yards, 6.40 average, 11 TDs

a. Organize the data in a matrix, listing players in the first column, in order from most attempts to least attempts.

b. What are the dimensions of the matrix? What value is a_{34}?

a.

Player	Games	Attempts	Yards	Average	TDs
Dario	11	164	885	5.40	15
Alex	10	151	966	6.40	11
DeShawn	9	143	1024	7.16	12
Leo	11	84	542	6.45	7
Joey	11	72	439	6.10	8

b. There are five rows and five columns, so the dimensions are 5×5. The value a_{34}, which is in the third row and fourth column, is 7.16.

$$\begin{bmatrix} 11 & 164 & 885 & 5.40 & 15 \\ 10 & 151 & 966 & 6.40 & 11 \\ 9 & 143 & 1024 & 7.16 & 12 \\ 11 & 84 & 542 & 6.45 & 7 \\ 11 & 72 & 439 & 6.10 & 8 \end{bmatrix}$$

FOOTBALL Coach Williams would like to use the matrix from Example 2 to further analyze his players' statistics.

$$\begin{array}{c} \text{G} \quad \text{Att} \quad \text{Yd} \quad \text{Avg.} \quad \text{TD} \\ \begin{bmatrix} 11 & 164 & 885 & 5.40 & 15 \\ 10 & 151 & 966 & 6.40 & 11 \\ 9 & 143 & 1024 & 7.16 & 12 \\ 11 & 84 & 542 & 6.45 & 7 \\ 11 & 72 & 439 & 6.10 & 8 \end{bmatrix} \end{array}$$

a. Add the elements in columns 2 and 3 and interpret the results.

The sum of column 2 is 614.

This is the total number of attempts for the players.

The sum of column 3 is 3856.

This is the total number of yards gained.

b. Coach Williams wants to determine the average yards per attempt for his five running backs combined. He decides to add the elements in column 4 and divide by 5, the number of players. What is this average?

The average is 6.302.

c. Is this an accurate average? Explain.

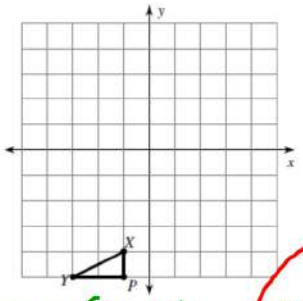
No. The players did not have the same number of attempts, so finding the average of column 4 would not determine an accurate average. Instead, Coach Williams needs to divide the sum of column 3 by the sum of column 2. The accurate average is about 6.28.

d. Would adding the rows provide any meaningful data for Coach Williams? Explain your reasoning.

No. The sum of a row includes five different forms of data.

Transformations Using Matrices

1) translation: 2 units left and 7 units up



X: (-1, -4)

Y: (-3, -5)

P: (-1, -5)

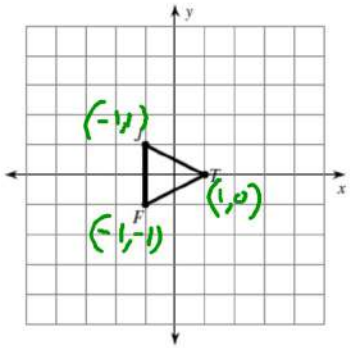
$$\begin{matrix} x & y \end{matrix}$$

$$\begin{bmatrix} -1 & -4 \\ -3 & -5 \\ -1 & -5 \end{bmatrix} + \begin{bmatrix} -2 & 7 \\ -2 & 7 \\ -2 & 7 \end{bmatrix}$$

$$\begin{matrix} x \\ y \end{matrix} \begin{bmatrix} -1 & -3 & -1 \\ -4 & -5 & -5 \end{bmatrix} + \begin{bmatrix} -2 & -2 & -2 \\ 7 & 7 & 7 \end{bmatrix}$$

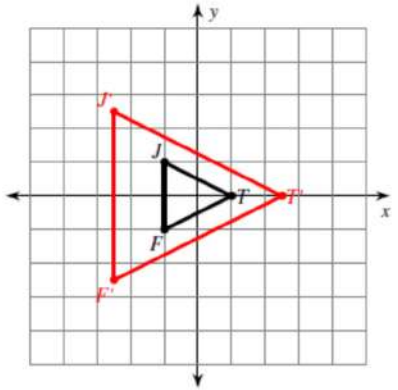
$$\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} \quad \end{bmatrix} =$$

2) dilation of 2.5

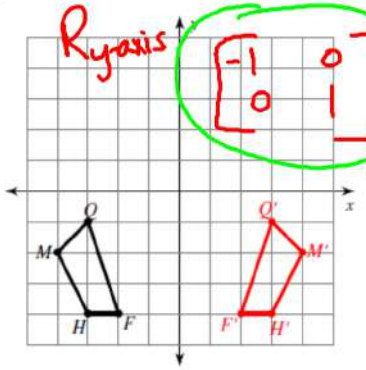


$$2.5 \begin{bmatrix} -1 & -1 & 1 \\ 1 & -1 & 0 \end{bmatrix}$$

2) dilation of 2.5



4) reflection across the y-axis



Ryaxis

$\begin{bmatrix} -1 & 0 \\ 0 & 1 \end{bmatrix}$

FHMQ

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

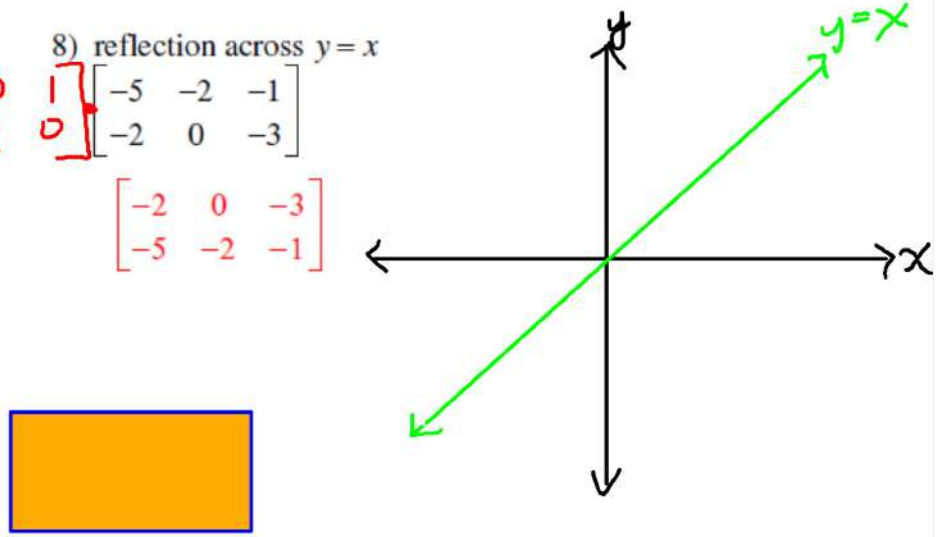
F'H'M'Q'

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

8) reflection across $y = x$

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

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



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

to

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

reflection across the y-axis