Algebra 2B
M.1

Name Key

Assignment

State the dimensions of each matrix.

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

2. $\begin{bmatrix} 3 & 2 \\ 1 & 8 \end{bmatrix}$ 2×2

3. $\begin{bmatrix} 6 & 1 & 2 \\ -3 & 4 & 5 \\ -2 & 7 & 9 \end{bmatrix}$ 3×3

Solve each equation.

4. $[5x \quad 3y] = [15 \quad 12]$

$5x = 15$

5. $\begin{bmatrix} 7x \\ 14 \end{bmatrix} = \begin{bmatrix} -14 \\ 2y \end{bmatrix}$

$7x = -14$ $\quad x = \frac{-14}{7} = -2$

$14 = 2y$ $\quad y = \frac{14}{2} = 7$

6. $\begin{bmatrix} 4x-1 \\ 9y+5 \end{bmatrix} = \begin{bmatrix} 3x \\ y-3 \end{bmatrix}$

7. $\begin{bmatrix} 5x \\ 4y-3 \\ 8z \end{bmatrix} = \begin{bmatrix} 4x+1 \\ 13 \\ 4z \end{bmatrix}$

$5x = 4x+1$ $\quad 4y-3 = 13$

$x = 1$ $\quad 4y = 16$

$\frac{4y}{4} = \frac{16}{4}$

$y = 4$

$8z = 4z$

$\frac{4z}{4} = \frac{0}{4}$

$z = 0$

Algebra 2B
M.2

Name _____

Assignment

Perform the indicated matrix operations. If the matrix does not exist, write *impossible*.

1. $[5 \quad -4] + [4 \quad 5]$

$[9 \quad 1]$

2. $[3 \quad 1 \quad 6] + \begin{bmatrix} 4 \\ -1 \\ 2 \end{bmatrix}$ impossible

1×3 3×1

3. $3[9 \quad 4 \quad -3]$

$[27 \quad 12 \quad -9]$

4. $[6 \quad -3] - 4[4 \quad 7]$

$[6 \quad -3] - [16 \quad 28]$

$[-10 \quad -31]$

5. $3\begin{bmatrix} 8 \\ 0 \\ -3 \end{bmatrix} - 4\begin{bmatrix} 2 \\ 2 \\ 10 \end{bmatrix}$

$\begin{bmatrix} 24 \\ 0 \\ -9 \end{bmatrix} - \begin{bmatrix} 8 \\ 8 \\ 40 \end{bmatrix}$

$\begin{bmatrix} 16 \\ -8 \\ -49 \end{bmatrix}$

6. $5\begin{bmatrix} -4 & 6 \\ 10 & 1 \\ -1 & 1 \end{bmatrix} + 2\begin{bmatrix} 6 & 5 \\ -3 & -2 \\ 1 & 0 \end{bmatrix}$

3×2 3×2

$\begin{bmatrix} -8 & 40 \\ 44 & 1 \\ -3 & 5 \end{bmatrix}$

Use $A=\begin{bmatrix}3 & 2\\ 4 & 3\end{bmatrix}$, $B=\begin{bmatrix}2 & 2\\ 1 & -2\end{bmatrix}$, and $C=\begin{bmatrix}-3 & 4\\ 3 & 1\end{bmatrix}$ to find the following.

7. $A+B$

$\begin{bmatrix}5 & 4\\ 5 & 1\end{bmatrix}$

8. $A+B+C$

$\begin{bmatrix}2 & 8\\ 8 & 2\end{bmatrix}$

~~9. $-5C$~~

~~10. $A-4C$~~

Algebra 2B **Name** _____
M.3 **Assignment**

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

1. $A_{2\times 5}\cdot B_{5\times 1}$

Yes, 2x1

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

not possible

3. $R_{4\times 4}\cdot S_{4\times 1}$

Yes, 4x1

4. $A_{6\times 4}\cdot B_{4\times 5}$

Yes, 6x5

Find each product, if possible.

5. $\begin{bmatrix}3 & 2\end{bmatrix}\cdot\begin{bmatrix}2\\ 1\end{bmatrix}$

1x2 2x1 $\begin{bmatrix}8\end{bmatrix}$

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

2x2 2x2 $=\begin{bmatrix}28 & -19\\ 7 & -9\end{bmatrix}$

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

2x2 2x1 $=\begin{bmatrix}9\\ -1\end{bmatrix}$

8. $\begin{bmatrix}3\\ -2\end{bmatrix}\cdot\begin{bmatrix}1 & 3\\ -1 & 1\end{bmatrix}$

2x1 2x2

~~2x2~~ NOT possible

9. $\begin{bmatrix}-1\\ 3\end{bmatrix}\cdot\begin{bmatrix}2 & -3 & -2\end{bmatrix}$

2x1 1x3

$\begin{bmatrix}-2 & 3 & 2\\ 6 & -9 & -6\end{bmatrix}$

10. $\begin{bmatrix}0 & 1 & 1\\ 1 & 1 & 0\end{bmatrix}\cdot\begin{bmatrix}2\\ 2\\ 2\end{bmatrix}$

2x3 3x1

$\begin{bmatrix}4\\ 4\end{bmatrix}$

Use $A=\begin{bmatrix}2 & 1\\ 2 & 1\end{bmatrix}$, $B=\begin{bmatrix}-3 & 2\\ 5 & 1\end{bmatrix}$, $C=\begin{bmatrix}3 & -1\\ 1 & 0\end{bmatrix}$, and scalar $c = 2$ to determine whether the following equations are true for the given matrices.

11. $AB = BA$

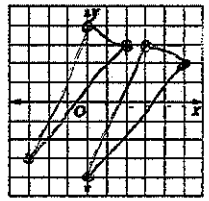
$\begin{bmatrix}2 & 1\\ 2 & 1\end{bmatrix}\cdot\begin{bmatrix}-3 & 2\\ 5 & 1\end{bmatrix}=\begin{bmatrix}-3 & 2\\ 5 & 1\end{bmatrix}\cdot$ $\begin{bmatrix}2 & 1\\ 2 & 1\end{bmatrix}$

Algebra 2B
M.4

Name _____

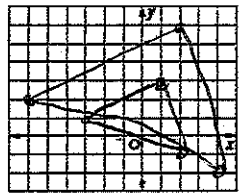
Assignment

For Exercises 1–3, use the following information.
Triangle ABC with vertices $A(2, 3)$, $B(0, 4)$, and $C(-3, -3)$ is translated 3 units right and 1 unit down.



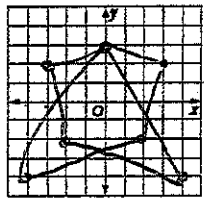
1. Write the translation matrix. $\begin{bmatrix}2 & 0 & -3\\ 3 & 4 & -3\end{bmatrix}+\begin{bmatrix}3 & 3 & 3\\ -1 & -1 & -1\end{bmatrix}$
2. Find the coordinates of $\triangle A'B'C'$.
3. Graph the preimage and the image. $\begin{bmatrix}5 & 3 & 0\\ 2 & 3 & -4\end{bmatrix}$

For Exercises 4–6, use the following information.
The vertices of $\triangle RST$ are $R(-3, 1)$, $S(2, -1)$, and $T(1, 3)$. The triangle is dilated so that its perimeter is twice the original perimeter.



4. Write the coordinates of $\triangle RST$ in a vertex matrix. $2\begin{bmatrix}-3 & 2 & 1\\ 1 & -1 & 3\end{bmatrix}$
5. Find the coordinates of the image $\triangle R'S'T'$.
6. Graph $\triangle RST$ and $\triangle R'S'T'$. $\begin{bmatrix}-6 & 4 & 2\\ 2 & -2 & 6\end{bmatrix}$

For Exercises 7–10, use the following information.
The vertices of quadrilateral $ABCD$ are $A(-3, 2)$, $B(0, 3)$, $C(4, -4)$, and $D(-2, -2)$. The quadrilateral is reflected over the y-axis.



7. Write the coordinates of $ABCD$ in a vertex matrix. $\begin{bmatrix}-1 & 0\\ 0 & 1\end{bmatrix}\cdot\begin{bmatrix}-3 & 0 & 4 & -2\\ 2 & 3 & -4 & -2\end{bmatrix}$
8. Write the reflection matrix for this situation.
9. Find the coordinates of $A'B'C'D'$. $\begin{bmatrix}3 & 0 & -4 & 2\\ 2 & 3 & -4 & -2\end{bmatrix}$
10. Graph $ABCD$ and $A'B'C'D'$.

Algebra 2B
M.5

Name _____

Assignment

Find the value of each determinant.

1. $\begin{vmatrix} 5 & 2 \\ 1 & 3 \end{vmatrix}$ 15-2 = 13

2. $\begin{vmatrix} 2 & 5 \\ 3 & 1 \end{vmatrix}$ 2 - 15 = -13

3. $\begin{vmatrix} 3 & 12 \\ 2 & 8 \end{vmatrix}$ 0

4. $\begin{vmatrix} -5 & 2 \\ 8 & -6 \end{vmatrix}$ 14

5. $\begin{vmatrix} 1 & -5 \\ 1 & 6 \end{vmatrix}$ 11

6. $\begin{vmatrix} -1 & -3 \\ 5 & -2 \end{vmatrix}$ 17

7. $\begin{vmatrix} 2 & 2 \\ -1 & 4 \end{vmatrix}$ 10

8. $\begin{vmatrix} -1 & 6 \\ 2 & 5 \end{vmatrix}$ -17

Evaluate each determinant using a calculator.

9. $\begin{vmatrix} 2 & -1 & 1 \\ 3 & 2 & -1 \\ 2 & 3 & -2 \end{vmatrix}$ -1

10. $\begin{vmatrix} 6 & -1 & 1 \\ 5 & 2 & -1 \\ 1 & 3 & -2 \end{vmatrix}$ -2

11. $\begin{vmatrix} 2 & 6 & 1 \\ 3 & 5 & -1 \\ 2 & 1 & -2 \end{vmatrix}$ -1

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

Algebra 2B
M.6

Name _____

Assignment

Determine whether each pair of matrices are inverses.

1. $X = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}$, $Y = \begin{bmatrix} 1 & 0 \\ -1 & 1 \end{bmatrix}$ $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ Yes

2. $X = \begin{bmatrix} -3 & 2 \\ 5 & -3 \end{bmatrix}$, $Y = \begin{bmatrix} 3 & 2 \\ 5 & 3 \end{bmatrix}$ $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ Yes

3. $M = \begin{bmatrix} -1 & 0 \\ 0 & 3 \end{bmatrix}$, $N = \begin{bmatrix} -1 & 0 \\ 0 & -3 \end{bmatrix}$ $\begin{bmatrix} 1 & 0 \\ 0 & -9 \end{bmatrix}$ No

4. $V = \begin{bmatrix} 0 & 7 \\ -7 & 0 \end{bmatrix}$, $W = \begin{bmatrix} 0 & -\frac{1}{7} \\ \frac{1}{7} & 0 \end{bmatrix}$ $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ Yes

Find the inverse of each matrix, if it exists.

5. $\begin{bmatrix} 0 & 2 \\ 4 & 0 \end{bmatrix}$ $\begin{bmatrix} 0 & \frac{1}{4} \\ \frac{1}{2} & 0 \end{bmatrix}$

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

7. $\begin{bmatrix} 1 & -1 \\ 3 & 3 \end{bmatrix}$ $\begin{bmatrix} .5 & .16\overline{6} \\ -.5 & .16\overline{6} \end{bmatrix}$

8. $\begin{bmatrix} 3 & 6 \\ -1 & -2 \end{bmatrix}$ DNE

Algebra 2B **Name** _____
M.7 **Assignment**

Write a matrix equation for each system of equations.

1. $3a+8b=16$
   $4a+3b=3$

2. $m+3n=-3$
   $4m+3n=6$

3. $6x-y+2z=-4$
   $-3x+2y-z=10$
   $x+y+z=3$

4. $a-b+c=5$
   $3a+2b-c=0$
   $2a+3b=8$

Solve each matrix equation or system of equations by using inverse matrices.

5. $\begin{bmatrix}1 & 3\\ 4 & 3\end{bmatrix}\cdot\begin{bmatrix}w\\ z\end{bmatrix}=\begin{bmatrix}-7\\ -1\end{bmatrix}$

6. $\begin{bmatrix}4 & 3\\ 1 & 3\end{bmatrix}\cdot\begin{bmatrix}x\\ y\end{bmatrix}=\begin{bmatrix}6\\ -3\end{bmatrix}$

7. $\begin{bmatrix}5 & 8\\ 3 & 1\end{bmatrix}\cdot\begin{bmatrix}a\\ b\end{bmatrix}=\begin{bmatrix}-1\\ 7\end{bmatrix}$

8. $\begin{bmatrix}7 & -3\\ 5 & 4\end{bmatrix}\cdot\begin{bmatrix}m\\ n\end{bmatrix}=\begin{bmatrix}15\\ 23\end{bmatrix}$

9. $2m+2n=-8$
   $6m+4n=-18$

10. $-3a+b=-9$
    $5a-2b=14$