2.1 Worksheet **Algebra 2** **Name:**_____

For #1 – 10 use the matrices: $\boldsymbol{A} = \begin{bmatrix} \mathbf{5} & \mathbf{0} \\ \mathbf{-1} & \mathbf{2} \end{bmatrix}$, $\boldsymbol{B} = \begin{bmatrix} \mathbf{-3} & \mathbf{8} \\ \mathbf{-5} & \mathbf{10} \end{bmatrix}$, $\boldsymbol{C} = \begin{bmatrix} \mathbf{3.2} & \mathbf{1} \\ \mathbf{-1.5} & \mathbf{0} \end{bmatrix}$.

1. $A + B$

2. $A - B$

3. $C + A$

4. $B - C$

5. $2A$

6. $5A$

7. $-C$

8. $-3A + B$

9. $A + B + 2C$

10. $-10C + A$

11. $B + \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$

For #12-13, find the missing values:

12. $\begin{bmatrix} 5 & z+3 \\ -1 & 2 \\ 9+x & y \end{bmatrix} = \begin{bmatrix} a+3 & -50 \\ b-8 & 2+c \\ 15 & 2.5 \end{bmatrix}$

13. $3\begin{bmatrix} 5 & x+1 & 6 \\ y-3 & z & 2 \end{bmatrix} = \begin{bmatrix} 15 & 24 & 18 \\ 21 & 0 & 6 \end{bmatrix}$

For #14-16, find the missing values:

14. $\begin{bmatrix} 8 & z-1 \\ b+2 & 3+c \\ 10-x & y+1 \end{bmatrix} = \begin{bmatrix} a-1 & -5 \\ -8 & 2 \\ 8 & 5.5 \end{bmatrix}$

15. $2\begin{bmatrix} 7.5 & 2x-2 & 6 \\ y+7 & 4z & 5 \end{bmatrix} = \begin{bmatrix} 15 & 20 & 12 \\ 2 & 20 & 10 \end{bmatrix}$

16. $[3 \quad 2 \quad x] - 2\,[y \quad z-5 \quad 10] = [-1 \quad 14 \quad -8]$

17. In the price matrix P, the rows represent prices for sweatshirts and sweatpants. The columns represent the color scheme of the items: white, red, and tie-dye. If the sales tax rate is 7%, find the sales tax of each item.

$P = \begin{bmatrix} 30 & 40 & 50 \\ 25 & 35 & 55 \end{bmatrix}$.

2.2 Worksheet **Algebra 2** **Name:**_____

For #1 – 7 use the matrices to find the dot product, or if it is not possible to multiply them, tell why.

$$\boldsymbol{A} = \begin{bmatrix} \mathbf{8} & \mathbf{7} & \mathbf{-4} \\ \mathbf{1} & \mathbf{-4} & \mathbf{0} \end{bmatrix}, \quad \boldsymbol{B} = \begin{bmatrix} \mathbf{-9} & \mathbf{-7} \\ \mathbf{-2} & \mathbf{2} \\ \mathbf{10} & \mathbf{9} \end{bmatrix}, \quad \boldsymbol{C} = \begin{bmatrix} \mathbf{-1} & \mathbf{-5} \\ \mathbf{-2} & \mathbf{8} \end{bmatrix}, \quad \boldsymbol{D} = \begin{bmatrix} \mathbf{-10} \\ \mathbf{1} \\ \mathbf{7} \end{bmatrix}, \quad \boldsymbol{E} = [\mathbf{10} \quad \mathbf{-5} \quad \mathbf{-5}]$$

1. $A \cdot B$

2. $B \cdot A$

3. $A \cdot C$

4. $B \cdot C$

5. $C \cdot D$

6. $D \cdot E$

7. $E \cdot D$

8. Find IQ, if $I = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ and $Q = \begin{bmatrix} 1 & -3 & 2 \\ -4 & 5 & -6 \\ 9 & -7 & 8 \end{bmatrix}$

11. Raul owns and operates two souvenir stands. At his baseball park stand, sweatshirts cost $45 and T-shirts cost $20. At his football stadium stand, sweatshirts cost $50 and T-shirts cost $15. Today Raul sold 20 sweatshirts and 25 T-shirts at each stand. Use matrix multiplication to find the total amount in daily sales at each souvenir stand.

For #12-13: A drama teacher assigns final grads in her class based on the weighted system shown below.

The matrix G represents the grades for Kiyo and his two friends, Rachel and Leo. $G = \begin{matrix} tests \\ proj \\ part \end{matrix} \begin{bmatrix} 90 & 83 & 78 \\ 94 & 88 & 96 \\ 98 & 94 & 89 \end{bmatrix}$

12. Write matrix W as a 1x3 matrix to represent the weighted grading system.

Drama Syllabus
Tests 45%
Projects 30%
Participation 25%

13. Perform matrix multiplication to find the final grades for each of the three students.

2.3 Worksheet **Algebra 2** **Name:**_____

For 1 − 5, find the determinants of the following matrices, or if it's not possible, explain why:

1. $\begin{bmatrix} -8 & -9 \\ 5 & -10 \end{bmatrix}$

2. $\begin{bmatrix} -2 & -4 \\ 10 & -10 \end{bmatrix}$

3. $\begin{bmatrix} 7 & 2 & -6 \\ 10 & 5 & -4 \end{bmatrix}$

4. $\begin{bmatrix} -5 & 9 & 9 \\ -10 & -8 & 4 \\ 10 & 3 & -4 \end{bmatrix}$

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

For #6-10, Does each given matrix have an inverse? If so, find it.

6. $P = \begin{bmatrix} 1 & -3 \\ -1 & 4 \end{bmatrix}$

7. $R = \begin{bmatrix} -2 & 8 & -5 \\ 3 & -11 & 7 \\ 9 & -34 & 21 \end{bmatrix}$

8. $Q = \begin{bmatrix} -6 & -9 \\ -4 & -6 \end{bmatrix}$

9. $S = \begin{bmatrix} -24 & 18 & 5 \\ 20 & -15 & -4 \\ -5 & 4 & 1 \end{bmatrix}$

10. Are $\begin{bmatrix} 8 & 4 \\ 4 & -2 \end{bmatrix}$ and $\begin{bmatrix} \frac{1}{16} & \frac{1}{8} \\ \frac{1}{8} & -\frac{1}{4} \end{bmatrix}$ inverses? Explain how you know.

2.4 Worksheet **Algebra 2** **Name:**_____

For #1-2, Solve the matrix $A \cdot X = B$ for the following matrices:

1. $A = \begin{bmatrix} 8 & -7 \\ -6 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 11 \\ -12 \end{bmatrix}$

2. $A = \begin{bmatrix} 2 & 8 & 4 \\ 1 & -1 & -3 \\ -3 & 2 & -9 \end{bmatrix}$, $B = \begin{bmatrix} 26 \\ -2 \\ 37 \end{bmatrix}$

For #3-6, Rewrite each system as a Matrix equation, then solve using inverse matrices, if possible.

3. $\begin{cases} -x + 2y = 8 \\ -3x + 6y = -12 \end{cases}$

4. $\begin{cases} x + 2y + 3z = -8 \\ 3x - 2y + z = -1 \\ x + y - 2z = 6 \end{cases}$

5. $\begin{cases} -3x + 4y = -4 \\ \frac{1}{2}x - 3y = -11 \end{cases}$

6. $\begin{cases} 2x + \frac{2}{3}y + z = -8 \\ x + 2y - \frac{1}{3}z = 6 \\ -\frac{1}{2}x + 3y - 2z = 22 \end{cases}$

For #7-8: Luke had some quarters and dimes in his pocket. The quarters and dimes are worth $2.55. He has 3 times as many quarters as dimes.

7. Write a matrix equation to find the number of quarters, x, and dimes, y, Luke has.

8. How many quarters and dimes does Luke have?

9. The coordinates (x, y) of a point in a plane are the solution of the matrix equation $\begin{bmatrix} -1 & 2 \\ 3 & 4 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -5 \\ 2 \end{bmatrix}$. In what quadrant is the point located?