Name:_____ Period:_____ SCORE:_____

Secondary 1 Honors   Chapter 9 – Matrix Review

Solve for each variable.

1. $\begin{bmatrix} 3x+1 \\ 2y \end{bmatrix} = \begin{bmatrix} 10 \\ 4+y \end{bmatrix}$ $x=3$
   $y=4$

2. $\begin{bmatrix} 2x & y+1 \\ 13 & -2 \end{bmatrix} = \begin{bmatrix} -16 & -7 \\ 13 & z-8 \end{bmatrix}$ $x=-8$
   $y=-8$
   $z=6$

3. $\begin{bmatrix} 43 & z \\ 7x-2 & 2x+3 \end{bmatrix} = \begin{bmatrix} z+3 & 2m+5 \\ y & 37 \end{bmatrix}$ $m=17.5$
   $x=17$
   $y=117$
   $z=40$

Evaluate if possible.

4. $\begin{bmatrix} 1 & 2 \\ 9 & 1 \\ 6 & 7 \end{bmatrix} + \begin{bmatrix} 3 & -2 \\ 5 & -1 \\ 6 & 9 \end{bmatrix} = \begin{bmatrix} 4 & 0 \\ 14 & 0 \\ 12 & 16 \end{bmatrix}$

5. $\begin{bmatrix} 9 & -2 & 6 \\ -6 & 1 & 3 \end{bmatrix} - \begin{bmatrix} -7 & 4 & 0 \\ -2 & 3 & -2 \end{bmatrix} = \begin{bmatrix} 16 & -6 & 6 \\ -4 & -2 & 5 \end{bmatrix}$

6. $\begin{bmatrix} 2 & -4 & 1 \\ 3 & 8 & -2 \end{bmatrix} - 2\begin{bmatrix} 1 & 2 & -4 \\ -2 & 3 & 7 \end{bmatrix}$

   $\begin{bmatrix} 0 & -8 & 9 \\ 7 & 2 & -16 \end{bmatrix}$

7. $-4\begin{bmatrix} 3 & -2 & 5 \\ 0 & -9 & 4 \end{bmatrix} - 3\begin{bmatrix} 4 & 0 & -2 \\ -1 & 12 & -5 \end{bmatrix}$

   $\begin{bmatrix} -24 & 8 & -14 \\ 3 & 0 & -1 \end{bmatrix}$

8. $\frac{1}{2}\begin{bmatrix} -4 & 3 \\ -5 & 2 \end{bmatrix} + 3\begin{bmatrix} 1 & -3 \\ 3 & -8 \end{bmatrix} = \begin{bmatrix} 1 & -7\frac{1}{2} \\ 6\frac{1}{2} & -23 \end{bmatrix}$

9. $\begin{bmatrix} 1 & -5 \\ -2 & 3 \end{bmatrix} + \frac{3}{4}\begin{bmatrix} 0 & 4 \\ -16 & 8 \\ 8 & 28 \end{bmatrix}$

   NOT possible

Evaluate if possible.

10. $\begin{bmatrix} 1 & 6 & 7 \\ 1 & -3 & -4 \end{bmatrix} \cdot \begin{bmatrix} -4 & 3 \\ -1 & -2 \\ 2 & 5 \end{bmatrix} = \begin{bmatrix} 4 & 26 \\ -9 & -11 \end{bmatrix}$

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

NOT possible

12. $\begin{bmatrix} 8 & -3 \\ 6 & 1 \end{bmatrix} \cdot \begin{bmatrix} 2 & -3 \\ 1 & -5 \end{bmatrix} = \begin{bmatrix} 13 & -9 \\ 13 & -23 \end{bmatrix}$

13. $\begin{bmatrix} 2 & 7 \end{bmatrix} \cdot \begin{bmatrix} 5 \\ -4 \end{bmatrix} = \begin{bmatrix} -18 \end{bmatrix}$

14. $\begin{bmatrix} 11 & 9 & -2 \\ 3 & -1 & -4 \end{bmatrix} \cdot \begin{bmatrix} 4 & -2 \\ 5 & 1 \end{bmatrix}$

NOT possible

15. $\begin{bmatrix} 3 & 0 & -1 \\ 4 & -2 & 3 \end{bmatrix} \cdot \begin{bmatrix} 7 & 1 \\ 6 & -3 \\ 2 & 1 \end{bmatrix} = \begin{bmatrix} 19 & 2 \\ 22 & 13 \end{bmatrix}$

16. $\begin{bmatrix} 6 & 4 & 1 \end{bmatrix} \cdot \begin{bmatrix} 2 & 5 \\ -3 & 0 \\ -1 & 3 \end{bmatrix} = \begin{bmatrix} -1 & 33 \end{bmatrix}$

17. $\begin{bmatrix} 2 & 1 & -3 \\ 1 & -3 & 2 \end{bmatrix} \cdot \begin{bmatrix} 1 & 4 & 9 \\ -2 & 6 & -3 \\ 3 & 2 & 1 \end{bmatrix} = \begin{bmatrix} -9 & 8 & 12 \\ 13 & -10 & 20 \end{bmatrix}$

Evaluate the determinant.

18. $\begin{vmatrix} -1 & 4 \\ -6 & 3 \end{vmatrix} = 21$

19. $\begin{vmatrix} 4 & 11 \\ -7 & 8 \end{vmatrix} = \cancel{105}$

109

20. $\begin{vmatrix} 6 & -7 \\ -5 & 3 \end{vmatrix} = \cancel{18/3}$

-17

21. $\begin{vmatrix} 12 & 8 \\ 9 & 6 \end{vmatrix} = 0$

Evaluate the determinant using diagonals.

22. $\begin{vmatrix} 2 & -3 & 1 \\ 0 & 1 & 0 \\ 2 & 1 & 0 \end{vmatrix} = -2$

23. $\begin{vmatrix} 0 & 1 & 0 \\ 2 & 4 & 2 \\ -1 & -6 & 1 \end{vmatrix} = -4$

24. $\begin{vmatrix} 1 & 6 & -1 \\ 1 & -4 & 3 \\ 0 & -1 & 2 \end{vmatrix} = -16$

25. $\begin{vmatrix} 5 & -3 & 2 \\ -6 & 1 & 3 \\ -1 & 4 & 7 \end{vmatrix} = -188$

26. $\begin{vmatrix} 3 & 1 & 5 \\ 1 & -2 & 1 \\ 0 & -1 & 2 \end{vmatrix} = -16$

27. $\begin{vmatrix} 6 & 3 & -2 \\ -4 & 2 & 5 \\ -3 & -1 & 0 \end{vmatrix} = -35$

Given the vertices, find the area of the triangle using a determinant.

28. (3,4) (-5,-3) (-2,1)

5.5 units^2

29. (0,-3) (1,2) (-6,3)

18 units^2

30. (-1,5) (2,0) (3,-5)

5 units^2

Solve the following systems of equations using augmented matrices.

31.
$$x+4y=-4$$
$$x+10y=-16$$

$x=4$
$y=-2$

32.
$$2x+2y=4$$
$$2x-8y=-46$$

$x=-3$
$y=5$

33.
$$2x+9y=3$$
$$5x+4y=26$$

$x=6$
$y=-1$

Use the matrices below to answer the following questions.

$$A = \begin{bmatrix} 2 & 6 \\ 3 & 6 \end{bmatrix} \quad B = \begin{bmatrix} -1 & 1 \\ 1 & -\dfrac{1}{3} \\ 2 & \end{bmatrix} \quad C = \begin{bmatrix} -6 & 3 \\ 2 & -6 \end{bmatrix}$$

34. Find A+B

$$= \begin{bmatrix} 1 & 7 \\ \dfrac{7}{2} & 5\dfrac{2}{3} \end{bmatrix}$$

35. Find 3C − A

$$\begin{bmatrix} -20 & 3 \\ 3 & -24 \end{bmatrix}$$

36. A·C

$$\begin{bmatrix} 0 & -30 \\ -6 & -27 \end{bmatrix}$$

37. Are A and C inverses? Explain why or why not.

NO, when you multiply them together you do not get the identity matrix

38. Are A and B inverses? Explain why or why not.

Yes, multiplying them together gives you the identity matrix.

39. Are B and C inverses? Explain why or why not.

NO, multiplying them together does not give you the identity.

Also— B's inverse is A. Not C.

Given matrices $A = \begin{bmatrix} 3 & -4 & 5 \\ 2 & -1 & 0 \\ -5 & 2 & 1 \end{bmatrix}$ $B = \begin{bmatrix} 3 & 2 \\ 5 & -2 \end{bmatrix}$ and $C = \begin{bmatrix} -5 & 2 & 11 \\ \frac{1}{2} & -13 & -2 \end{bmatrix}$

40. Evaluate A^2

$$\begin{bmatrix} -24 & 2 & 20 \\ 4 & -7 & 10 \\ -16 & 20 & -24 \end{bmatrix}$$

41. Evaluate B^3

$$\begin{bmatrix} 67 & 34 \\ 85 & -18 \end{bmatrix}$$

42. Evaluate C^2 NOT possible

Solve the matrix equation.

43.

$$\begin{bmatrix} 2 & -5 \\ -3 & 7 \end{bmatrix} X = \begin{bmatrix} 48 & -10 \\ -69 & 14 \end{bmatrix}$$

$$X = \begin{bmatrix} 9 & 0 \\ -6 & 2 \end{bmatrix}$$

44.

$$\begin{bmatrix} 3 & 3 \\ 5 & 6 \end{bmatrix} X = \begin{bmatrix} 0 & 15 \\ 2 & 26 \end{bmatrix}$$

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

Find the inverse of each of the following matrices, if possible.

45. $\begin{bmatrix} 1 & -5 \\ -1 & 4 \end{bmatrix}$

46. $\begin{bmatrix} 6 & 2 \\ 5 & 2 \end{bmatrix}$

47. $\begin{bmatrix} 8 & -4 \\ -6 & 3 \end{bmatrix}$

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

$\begin{bmatrix} 1 & -1 \\ -2.5 & 3 \end{bmatrix}$

Does Not
Have an
inverse

48. $\begin{bmatrix} -4 & -6 \\ 4 & 7 \end{bmatrix}$

49. $\begin{bmatrix} -24 & 60 \\ -6 & 30 \end{bmatrix}$

$\begin{bmatrix} -1.75 & -1.5 \\ 1 & 1 \end{bmatrix}$

$\begin{bmatrix} -\frac{1}{12} & \frac{1}{6} \\ -\frac{1}{60} & \frac{1}{15} \end{bmatrix}$

Solve the matrix equation

50. $\begin{bmatrix} 5 & 2 \\ 0 & 1 \end{bmatrix} X + \begin{bmatrix} -8 & -18 \\ 10 & 1 \end{bmatrix} = \begin{bmatrix} -1 & 16 \\ 6 & 3 \end{bmatrix}$

$X = \begin{bmatrix} 3 & 6 \\ -4 & 2 \end{bmatrix}$