Accelerated Precalculus Name_____

Operations on Matrices Worksheet

Directions: Make sure you can do the following by hand and on the calculator. If an operation cannot be done, state why.

1. $5\begin{bmatrix}2 & -4 & 6\end{bmatrix} = \begin{bmatrix}10 & -20 & 30\end{bmatrix}$

2. $\begin{bmatrix}3 & -4\\ 7 & 9\end{bmatrix}+\begin{bmatrix}7 & -6\\ -8 & -5\end{bmatrix} = \begin{bmatrix}10 & -10\\ -1 & 4\end{bmatrix}$

3. $\begin{bmatrix}5 & 8 & -1\\ 0 & -2 & 5\\ 2 & 3 & 3\end{bmatrix}+\begin{bmatrix}3 & -7\\ 8 & 6\\ 1 & 0\end{bmatrix}$ D.M.

4. $\begin{bmatrix}5 & 8 & -1\\ 0 & -2 & x\\ 2 & 3 & 3\end{bmatrix}-4\begin{bmatrix}3 & 9 & 0\\ -2 & 2 & 1\\ 0 & 2 & 4y\end{bmatrix} = \begin{bmatrix}-7 & -28 & -1\\ 8 & -10 & x-4\\ 2 & -5 & 3-16y\end{bmatrix}$

5. $\begin{bmatrix}2 & 0\\ 0 & 2\end{bmatrix}\cdot\begin{bmatrix}1 & 5\\ -6 & 7\end{bmatrix} = \begin{bmatrix}2 & 10\\ -12 & 14\end{bmatrix}$
↑ Scalar Matrix

6. $\begin{bmatrix}1 & 5\\ -6 & 7\end{bmatrix}\cdot\begin{bmatrix}2 & 0\\ 0 & 2\end{bmatrix} = \begin{bmatrix}2 & 10\\ -12 & 14\end{bmatrix}$
↑ scalar

7. $\begin{bmatrix}1 & 5\\ -6 & 7\end{bmatrix}\cdot\begin{bmatrix}2 & 4\\ 3 & -2\end{bmatrix} = \begin{bmatrix}17 & -6\\ 9 & -38\end{bmatrix}$

8. $\begin{bmatrix}2 & 4\\ 3 & -2\end{bmatrix}\cdot\begin{bmatrix}1 & 5\\ -6 & 7\end{bmatrix} = \begin{bmatrix}-22 & 38\\ 15 & 1\end{bmatrix}$

multiplication not communitive

9. $\begin{bmatrix}1 & -6 & 5\\ x & 4 & 1\\ -7 & 8 & 3\end{bmatrix}\cdot\begin{bmatrix}7 & 1 & 6\\ 3 & 0 & -x\\ 6 & 3 & 9\end{bmatrix} = \begin{bmatrix}19 & 16 & 6x+51\\ 7x+18 & x+3 & 2x+9\\ -7 & 2 & -8x-15\end{bmatrix}$

10. $\begin{bmatrix}7 & 1 & 6\\ 3 & 0 & -2\\ 6 & 3 & 9\end{bmatrix}\cdot\begin{bmatrix}1 & -6 & 5\\ 2 & 4 & 1\\ -7 & 8 & 3\end{bmatrix} = \begin{bmatrix}-33 & 10 & 54\\ 17 & -34 & 9\\ -51 & 48 & 60\end{bmatrix}$

11. $\begin{bmatrix}1 & 2\\ 3 & 4\end{bmatrix}\cdot\begin{bmatrix}3 & 5 & 0\\ 2 & 1 & -1\end{bmatrix} = \begin{bmatrix}7 & 7 & -2\\ 17 & 19 & -4\end{bmatrix}$
2x2 · 2x3

12. $\begin{bmatrix}3 & 5 & 0\\ 2 & 1 & -1\end{bmatrix}\cdot\begin{bmatrix}1 & 2\\ 3 & 4\end{bmatrix}$ D.M.
2x3 · 3x2

13. $\begin{bmatrix}9\\ x\\ 3\end{bmatrix}+\begin{bmatrix}y\\ -2\\ -4\end{bmatrix} = \begin{bmatrix}y+9\\ x-2\\ -1\end{bmatrix}$

14. $\begin{bmatrix}9\\ -5\\ 3\end{bmatrix}+\begin{bmatrix}4 & -2 & 5\\ -8 & 4 & 2\\ 4 & 4 & 0\end{bmatrix}$ DM

15. $\begin{bmatrix}4 & a & 3 & -6 & 0\\ 2 & 5 & b & 3 & 7\\ -3 & -b & 5 & 5 & 2\end{bmatrix}\cdot\begin{bmatrix}4 & 7\\ a & -4\\ 3 & -b\\ 0 & 6\\ 4 & -2\end{bmatrix} = \begin{bmatrix}a^2+25 & -4a-3b-8\\ 5a+3a+36 & -b^2-2\\ -ab+11 & -b+5\end{bmatrix}$

16. $2\begin{bmatrix}4 & 8\\ 3 & -1\end{bmatrix}\cdot\begin{bmatrix}7 & 3\\ 5 & 0\end{bmatrix} = \begin{bmatrix}136 & 24\\ 32 & 18\end{bmatrix}$

17. $\begin{bmatrix}1&0&0\\0&1&0\\0&0&1\end{bmatrix}\cdot\begin{bmatrix}3&9&4\\-7&4&8\end{bmatrix}$ DM

18. $\begin{bmatrix}3&9&4\\-7&4&8\end{bmatrix}\cdot\begin{bmatrix}1&0&0\\0&1&0\\0&0&1\end{bmatrix}=\begin{bmatrix}3&9&4\\-7&4&8\end{bmatrix}$

19. $4\begin{bmatrix}-8&5&3\end{bmatrix}-2\begin{bmatrix}-5&-1&7\end{bmatrix}=\begin{bmatrix}-22&22&-2\end{bmatrix}$

20. $\frac{1}{2}\left(2\begin{bmatrix}4&5\\2&-1\end{bmatrix}+\begin{bmatrix}3&-6\\0&7\end{bmatrix}\right)=\begin{bmatrix}11/2&2\\2&5/2\end{bmatrix}$

21. When can a matrix be multiplied by a scalar? always

22. When can two matrices be added or subtracted? Dimensions match

23. How do you add or subtract two matrices? corresponding entries

24. When matrices are added or subtracted, how does the size of the resulting matrix compare with the size of the original matrices? same size

25. When can two matrices be multiplied? middles match

26. How do you multiply two matrices? row by column (1st by 1st, etc)

27. When matrices are multiplied, how does the size of the resulting matrix compare with the size of the original matrices? ends = end result

28. Discuss how this impacts the commutative property of matrix multiplication.
not

29. Define a square matrix.
same dimension ex: 2x2, 3x3 etc

30. The matrix equation below contains the unknown matrix X. Solve for X.

$2\begin{bmatrix}5&1\\3&4\end{bmatrix}+3X=\begin{bmatrix}1&-4\\3&-7\end{bmatrix}$ $\quad 8+3x=-7,\ 3x=-15,\ X=\begin{bmatrix}-3&-2\\-1&-5\end{bmatrix}$

31. Find x and y given: $-2\left(\begin{bmatrix}-3x&-1\\4&y\end{bmatrix}+\begin{bmatrix}9&-4\\-6&3\end{bmatrix}\right)=\begin{bmatrix}6&10\\4&-20\end{bmatrix}$. $\quad x=4,\ y=7$

$-2[-3x+9]=6$, $-3x+9=-3$, $-3x=-12$; $\quad -2[y+3]=-20$, $y+3=10$, $y=7$

32. Find x, y and z given: $\begin{bmatrix}x+4&8&-3\\1&22&2y\\7&-2&z+2\end{bmatrix}=\begin{bmatrix}2x+9&8&-3\\1&22&-8\\7&-2&11\end{bmatrix}$ $\quad x=-5,\ y=-4,\ z=9$

$x+4=2x+9$, $x=-5$; $\quad z+2=11$, $z=9$