Math 4
Lessons 2-1 & 2-2 Learning Check

Name_____

Date _____

No Calculator

Use the following matrices for problems 1 – 4. Read each question and circle the best answer.

$$M=\begin{bmatrix}3 & -2 & 0\\ 1 & 0 & -1\end{bmatrix} \qquad Q=\begin{bmatrix}0 & -1 & 2\\ 1 & 7 & -3\\ -5 & 1 & 4\end{bmatrix} \qquad P=\begin{bmatrix}5 & -4 & -2\\ 1 & 3 & 2\end{bmatrix}$$

---

1. $-2M$

(A.) $\begin{bmatrix}-6 & 4 & 0\\ -2 & 0 & 2\end{bmatrix}$ B. $\begin{bmatrix}1 & -4 & -2\\ -1 & -2 & -3\end{bmatrix}$ C. $\begin{bmatrix}6 & -4 & 0\\ 2 & 0 & -2\end{bmatrix}$

D. $\begin{bmatrix}-6 & 4 & 0\\ 1 & 0 & -1\end{bmatrix}$ E. Not Possible or None of These

---

2. $2M-P$

A. $\begin{bmatrix}6 & -4 & 0\\ -5 & 4 & 2\\ 2 & 0 & -2\\ -1 & -3 & -2\end{bmatrix}$ B. $\begin{bmatrix}11 & -8 & -2\\ 3 & 3 & 0\end{bmatrix}$ C. $\begin{bmatrix}1 & 0 & 2\\ 0 & -3 & -3\end{bmatrix}$

$\begin{bmatrix}6 & -4 & 0\\ 2 & 0 & -2\end{bmatrix}-P$

(D.) $\begin{bmatrix}1 & 0 & 2\\ 1 & -3 & -4\end{bmatrix}$ E. Not Possible or None of These

---

3. $Q+M$

A. $\begin{bmatrix}3 & -3 & 2\\ 2 & 7 & -4\\ 1 & 0 & -1\end{bmatrix}$ B. $\begin{bmatrix}3 & -3 & 2\\ 2 & 7 & -4\\ -2 & -1 & 4\end{bmatrix}$

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

(E.) Not Possible or None of These

---

4. Assuming it is not a singular matrix, which matrix is invertible? M (Q) P

OVER →

5. $\underset{1\times3}{[-3 \quad 2 \quad 5]} \bullet \underset{3\times3}{\begin{bmatrix} 0 & -1 & 2 \\ 4 & 6 & -2 \\ -8 & 3 & -7 \end{bmatrix}} = \underset{1\times3}{[0+8+-40 \quad 3+12+15 \quad -6+-4+-35]}$

$= \boxed{[-32 \quad 30 \quad -45]}$

In numbers 6 – 9, use the below matrices to decide if the given matrix multiplication is possible. If it is possible, give the **dimension of the product matrix**. If it is not possible, **explain why**.

YOU DO NOT HAVE TO MULTIPLY THE MATRICES!!!

$A = \overset{2\times2}{\begin{bmatrix} a & b \\ c & d \end{bmatrix}}$ $B = \overset{2\times2}{\begin{bmatrix} d & a \\ b & c \end{bmatrix}}$ $C = \overset{2\times3}{\begin{bmatrix} a & b & c \\ a & c & d \end{bmatrix}}$ $D = \overset{3\times2}{\begin{bmatrix} a & d \\ c & a \\ c & b \end{bmatrix}}$

6. $A \cdot B$ $\boxed{2\times2}$

7. $B \cdot C$ $\boxed{2\times3}$

8. $C \cdot D$ $\boxed{2\times2}$

9. $C \cdot B$ Not possible

$2 \times \boxed{3 \cdot 2} \times 2$

Doesn't match

Challenge

10. Given the below matrix equation, solve for a and b.

$\underset{2\times3}{\begin{bmatrix} 3 & 1 & 0 \\ 5 & 2 & 1 \end{bmatrix}} \bullet \underset{3\times2}{\begin{bmatrix} 2 & 0 \\ a & 1 \\ 5 & b \end{bmatrix}} = \begin{bmatrix} 11 & 1 \\ 25 & 6 \end{bmatrix}$

$3.2 + 1.a + 0.5$

$6 + a + 0 = 11$

$\boxed{a = 5}$

$5.0 + 2.1 + 1.b$

$0 + 2 + b = 6$

$\boxed{b = 4}$

11. Given $A = \begin{bmatrix} 5 & 2 \\ 7 & 3 \end{bmatrix}$ Does $A^{-1} = \begin{bmatrix} 3 & -2 \\ -7 & 4 \end{bmatrix}$? Explain why or why not.

$\begin{bmatrix} 5 & 2 \\ 7 & 3 \end{bmatrix} \cdot \begin{bmatrix} 3 & -2 \\ -7 & 4 \end{bmatrix} = \begin{bmatrix} 15+-14 & -10+8 \\ 21+-21 & -14+12 \end{bmatrix} = \begin{bmatrix} 1 & -2 \\ 0 & -2 \end{bmatrix}$

$A^{-1} \neq \begin{bmatrix} 3 & -2 \\ -7 & 4 \end{bmatrix}$ since $A \cdot A^{-1}$ doesn't give you the 2×2 identity matrix $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$