# REFLECTION



| 1 | 2 | 3 |
|---|---|---|
| 2 | 1 | 3 |

A

# ROTATION



| 1 | 2 | 3 |
|---|---|---|
| 3 | 1 | 2 |

B

C

D

E
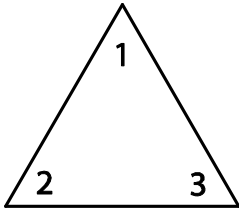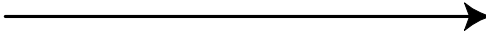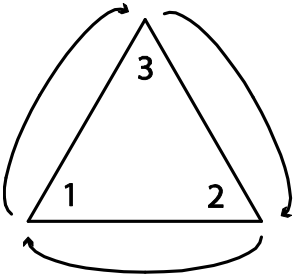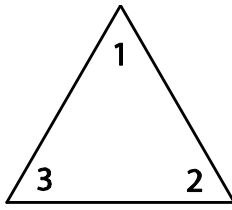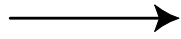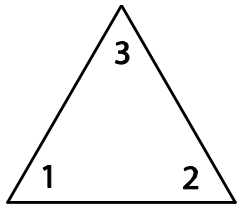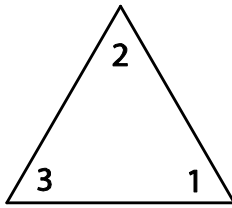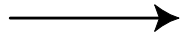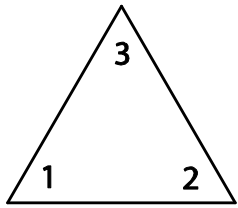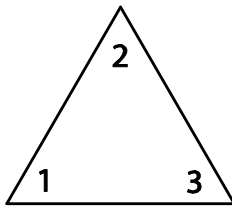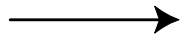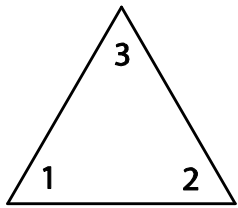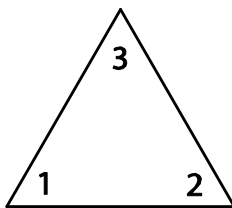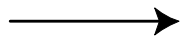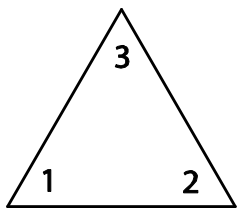
I

# PERMUTATIONS
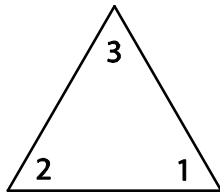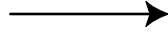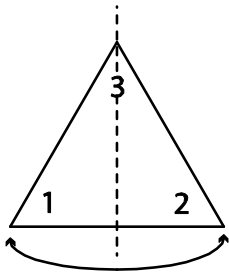


| 1 | 2 | 3 |
|---|---|---|
| 2 | 1 | 3 |

A
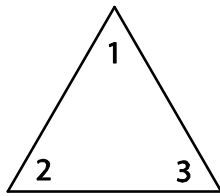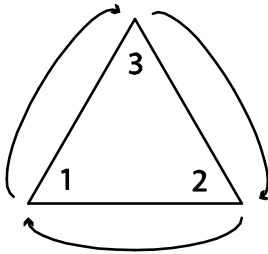
| 1 | 2 | 3 |
|---|---|---|
| 3 | 1 | 2 |

B
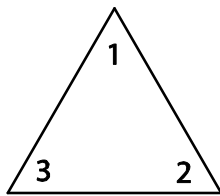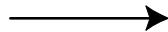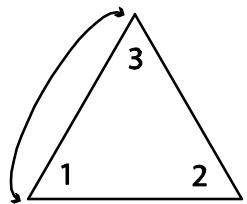
| 1 | 2 | 3 |
|---|---|---|
| 3 | 2 | 1 |

C
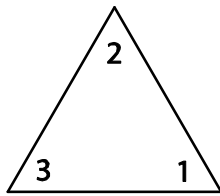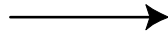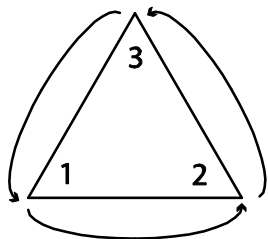
| 1 | 2 | 3 |
|---|---|---|
| 2 | 3 | 1 |

D
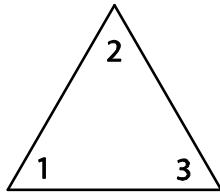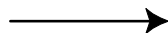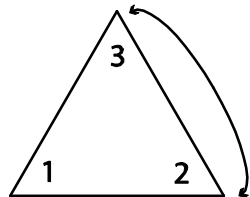
| 1 | 2 | 3 |
|---|---|---|
| 1 | 3 | 2 |

E
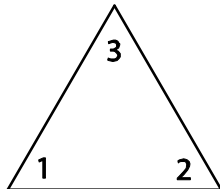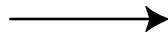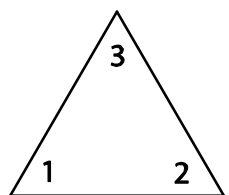
| 1 | 2 | 3 |
|---|---|---|
| 1 | 2 | 3 |

I
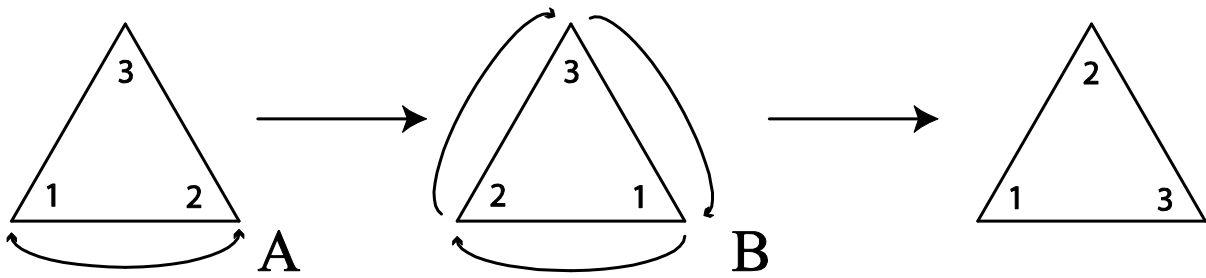
$$AB = \begin{array}{|c|c|c|} \hline 1 & 2 & 3 \\ \hline 2 & 1 & 3 \\ \hline \end{array} \quad \begin{array}{|c|c|c|} \hline 1 & 2 & 3 \\ \hline 3 & 1 & 2 \\ \hline \end{array} = \begin{array}{|c|c|c|} \hline 1 & 2 & 3 \\ \hline 1 & 3 & 2 \\ \hline \end{array} = E$$
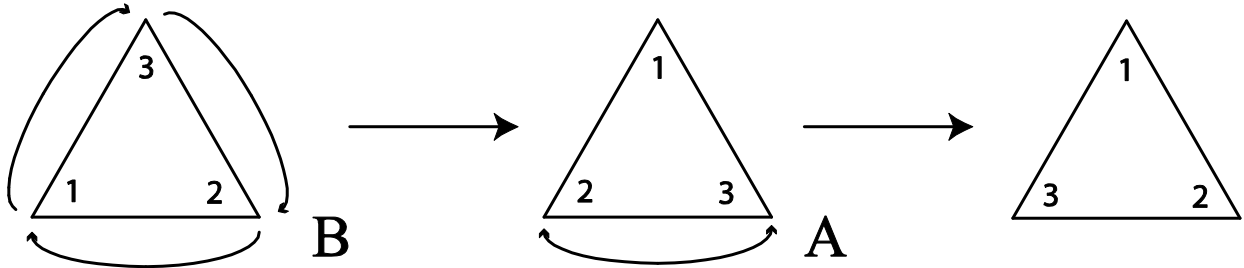


$$BA = \begin{array}{|c|c|c|} \hline 1 & 2 & 3 \\ \hline 3 & 1 & 2 \\ \hline \end{array} \quad \begin{array}{|c|c|c|} \hline 1 & 2 & 3 \\ \hline 2 & 1 & 3 \\ \hline \end{array} = \begin{array}{|c|c|c|} \hline 1 & 2 & 3 \\ \hline 3 & 2 & 1 \\ \hline \end{array} = C$$
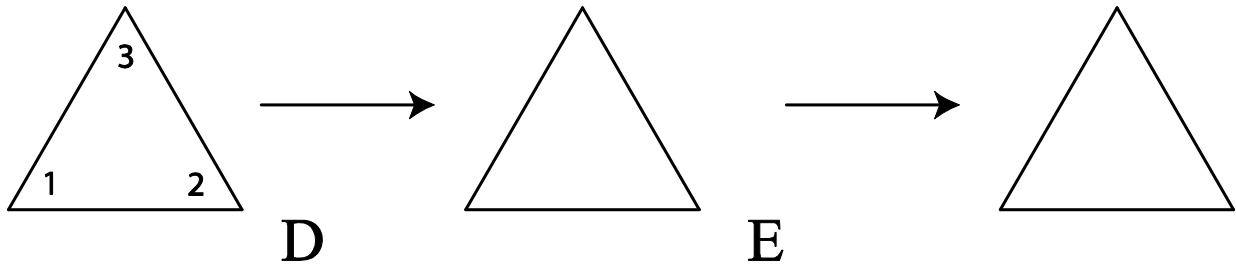
$$DE \;=\; \begin{array}{|c|c|c|}\hline 1 & 2 & 3 \\\hline & & \\\hline\end{array}\; \begin{array}{|c|c|c|}\hline 1 & 2 & 3 \\\hline & & \\\hline\end{array}\;=\; \begin{array}{|c|c|c|}\hline 1 & 2 & 3 \\\hline & & \\\hline\end{array}\;=\;?$$
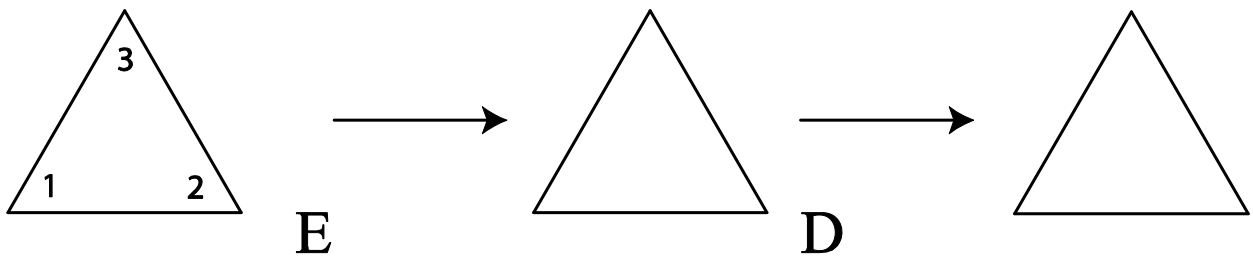


$$ED \;=\; \begin{array}{|c|c|c|}\hline 1 & 2 & 3 \\\hline & & \\\hline\end{array}\; \begin{array}{|c|c|c|}\hline 1 & 2 & 3 \\\hline & & \\\hline\end{array}\;=\; \begin{array}{|c|c|c|}\hline 1 & 2 & 3 \\\hline & & \\\hline\end{array}\;=\;?$$

# HOMEWORK

## COMPLETE THE MULTIPLICATION TABLE

|   | I | A | B | C | D | E |
|---|---|---|---|---|---|---|
| I |   |   |   |   |   |   |
| A |   |   | E |   |   |   |
| B |   | C |   |   |   |   |
| C |   |   |   |   |   |   |
| D |   |   |   |   |   |   |
| E |   |   |   |   |   |   |

**Grid 1:** cell(top-left)=4, row sums = 6, 8; column sums = 7, 7

**Grid 2:** cell(top-right)=9, row sums = 12, 13; column sums = 11, 14

**Grid 3:** cell(top-left)=5, row sums = 9, 10; column sums = 12, 7

**Grid 4:** cell(bottom-right)=7, row sums = 11, 10; column sums = 9, 12

**Grid 5:** cell(top-left)=9, row sums = 13, 13; column sums = 17, 9

**Grid 6:** cell(top-right)=4, row sums = 10, 14; column sums = 11, 13

**Grid 7:** cell(bottom-left)=5, row sums = 10, 12; column sums = 9, 13

**Grid 8:** cell(bottom-left)=3, row sums = 8, 11; column sums = 9, 10

**Grid 9:** cell(bottom-left)=9, row sums = 15, 15; column sums = 16, 14

**Grid 10:** cell(top-right)=1, row sums = 9, 13; column sums = 14, 8

**Grid 11:** cell(bottom-right)=8, row sums = 10, 10; column sums = 9, 11

**Grid 12:** cell(bottom-left)=11, row sums = 19, 19; column sums = 20, 18

Enter the missing numbers into the empty cells so that the sum in each row and column equals the number given on the right or bottom.