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| **Fill in the Blanks** | **Linear Transformations** |

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| **Linear Transformation** | **Matrix**  | **Object Coords** | **Matrix Calculation** | **Image Coords** |
| $$\left(\begin{matrix}x\\y\end{matrix}\right)↦\left(\begin{matrix}2x+y\\x-y\end{matrix}\right)$$ | $$\left(\begin{matrix}2&1\\1&-1\end{matrix}\right)$$ | $$(5, 3)$$ | $$\left(\begin{matrix}2&1\\1&-1\end{matrix}\right)\left(\begin{matrix}5\\3\end{matrix}\right)=\left(\begin{matrix}13\\2\end{matrix}\right)$$ |  |
| $$\left(\begin{matrix}x\\y\end{matrix}\right)↦\left(\begin{matrix}-x+3y\\2y\end{matrix}\right)$$ | $$\left(\begin{matrix}-1&3\\0&2\end{matrix}\right)$$ | $$(-2, 1)$$ |  |  |
| $$\left(\begin{matrix}x\\y\end{matrix}\right)↦\left(\begin{matrix}3x\\x-2y\end{matrix}\right)$$ |  | $$(4, -1)$$ |  |  |
| $$\left(\begin{matrix}x\\y\end{matrix}\right)↦\left(\begin{matrix}-2y\\5x\end{matrix}\right)$$ |  | $$(-1, -3)$$ |  |  |
|  | $$\left(\begin{matrix}2&-1\\1&4\end{matrix}\right)$$ | $$(0, 6)$$ |  |  |
|  | $$\left(\begin{matrix}-1&3\\0&2\end{matrix}\right)$$ | $$(2, -2)$$ |  |  |
| $$\left(\begin{matrix}x\\y\end{matrix}\right)↦\left(\begin{matrix}-x\\y\end{matrix}\right)$$ |  | $$(5, 4)$$ |  |  |
|  | $$\left(\begin{matrix}3&0\\0&3\end{matrix}\right)$$ | $$(-2, 1)$$ |  |  |
| $$\left(\begin{matrix}x\\y\end{matrix}\right)↦\left(\begin{matrix}y\\x\end{matrix}\right)$$ |  | $$(4, -3)$$ |  |  |
|  | $$\left(\begin{matrix}1&0\\0&1\end{matrix}\right)$$ | $$(3.5, 5)$$ |  |  |
|  | $$\left(\begin{matrix}0.5&2\\-3&1\end{matrix}\right)$$ | $$(0, 0)$$ |  |  |
| $$\left(\begin{matrix}x\\y\end{matrix}\right)↦\left(\begin{matrix}ax+by\\cx+dy\end{matrix}\right)$$ |  | $$(1, 0)$$ |  |  |
|  | $$\left(\begin{matrix}a&b\\c&d\end{matrix}\right)$$ | $$(0, 1)$$ |  |  |