

In this activity, we will explore transformations of figures using matrices.

Applet: [Matrix_Transformations.html](#); [Matrix_Transformations.ggb](#)

Take a few moments and explore the applet. Use the questions below to help guide your exploration.

Questions:

1. What does matrix M represent?
2. What does matrix M' represent?
3. What does matrix T represent?

Move slider a in the positive direction to different values. Each time look at how the three matrices M , M' and T change.

4. Move slider a such that $a=5$. Record each matrix M , M' and T below.
5. What do you notice about the value of slider a and its relationship to the translation matrix T ?
Move the slider from $a=5$ to $a=4$.

6. Write the matrices M , M' and T when $a = 4$ below. What values in M' changed from those in problem 5? By how many units?

7. Write a matrix equation that shows how M , T and M' are related when $a=4$.

8. What if a were negative? Which direction does the pre-image translate?

9. Write a matrix equation showing the relationship between M' and T that represents the translation when $a = -3$.

10. Which coordinate does a seem to affect? Make a conjecture on what coordinate b will affect.
Set $a = 0$ and $b = 5$.

11. Write the matrix equation that shows the relationship between M , M' and T below.

12. Write 3 general translation matrices T so that the first produces only a *horizontal shift to the right*, the second a *vertical shift down*, and the third a *shift to the left and up*. For each T , determine a and b .

13. Write a general equation that we could use to find M' when given M and T .

14. Set $a = -2$ and $b = -3$ and write an equation that shows this translation below. State the direction of the shift.