

In this activity you'll perform dances based on several functions, first physically (with your feet) and then virtually (with your mouse or finger).

PHYSICAL FUNCTION DANCE

1. From your team choose an independent and a dependent dancer. The remaining team members are choreographers. Record your roles on your worksheet.
2. Choose a function family for your first dance, and collect any needed props (domain markers and a vector, a mirror, a protractor and angle, or a center-point and scale factor).
3. Record the function family and use function notation to name the dance (including any relevant parameters such as angle, scale factor, and distance).
For instance, if you do a 90° rotation dance about center point C , name it $R_{C,90^\circ}$.
4. The choreographers set up the props for the chosen dance. The independent dancer begins with simple, slow movements so that the dependent dancer can stay in the correct relationship with the help of the choreographers.
5. As the dancers practice, the choreographers call *Freeze!* at appropriate times to check distances and angles, and to correct any inaccuracies they find.
6. After a few minutes of practice, the independent and dependent dancers switch roles, and the choreographers put domain markers on the floor to restrict the domain of the independent dancer.
7. The new independent dancer moves from one marker to the next around the domain. At each marker, the dancer pauses for the choreographers to place a range marker at the dependent dancer's location. Once the dance is complete, the choreographers compare the range markers to the domain markers for accuracy.
8. The team records the rest of the Dance 1 column on their dance cards.
9. Now that you've practiced the basics, the team finishes by planning and performing a faster dance with speed variations and a more complicated restricted domain. The dancers and choreographers rehearse this dance several times, striving to get the coordination between dancers as accurate as possible.
10. The team repeats steps 1–9 for two more dances from different function families, being sure that each team member has at least one turn as an independent dancer and one turn as a dependent dancer as well as several turns as a choreographer.

If you like, shoot a video of your dance, or perform it for the class.

VIRTUAL FUNCTION DANCE

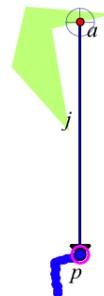
You and your partner will take turns as the dependent dancer in several Sketchpad dances.

- Open **Dance the Dependent Variable.gsp**. On page 1, drag variable p .

Because you can drag point p , it's not actually a dependent variable. Your job will be to drag p to keep it as close as you can to the correct location for the dependent variable $T_j(a)$ —the translation by vector j of point a . Fortunately, there's a copy of vector j attached to point p to help you.



- Drag p so that the circle at the other end of the translation vector j is centered at independent variable a . This is the location of $T_j(a)$.
- Press *Ready...Set...Go* to start the countdown.
- When the countdown ends, independent variable a begins to move along the domain. Your job is to drag point p to keep the center of the circle on point a . (As you do this, you will trace out the range).
- When independent variable a stops, press *Check Result* to see how closely your dance (the traces of point p) matches the actual range.
- Now have your partner take a turn dragging p .
- Taking turns with your partner, repeat steps 12–16 once or twice, trying to improve the accuracy of your dance. Make the dance easier by using a slower speed, or test your dance prowess by using a faster speed.
- Fill in a column on your dance card for the dance you performed.
- Each of the remaining pages has a different dance. Practice each dance, and fill in a column of your dance card for each one you perform.



EXPLORE MORE

- Go to page *Choreograph* and make your own dance. Transform the independent variable x by translating it using the vector, by reflecting using the mirror, by rotating using the angle parameter, or by dilating using the scale factor. You can also change the shape of the domain. Hide the objects you don't need, and then challenge yourself or your partner to be the dependent dancer, following the lead of the independent variable.
- Work with a group to create a physical dance with an independent variable and multiple dependent variables. Possible examples include a translation dance with two translated images (one to the left and one to the right) or a rotation dance with one image rotated by 90° , another rotated by 180° , and a third by 270° . Be creative!

Dance the Dependent Variable Dance Card **Name:** _____

Use this table to record the behavior of the dancers in each physical dance.

Dance	1	2	3
Independent Dancer			
Dependent Dancer			
Choreographers			
Function Family			
Dance Name			
Relative Speed of Dancers			
Relative Direction of Dancers			
Fixed Points of Dance			
Patterns Formed by Restricted Dance (Include Drawing)			

Dance the Dependent Variable Dance Card *(continued)*

Use this table to record the behavior of the virtual dance function on each page of the sketch.

Page	1	2	3	4
Dance Name (Function Notation)				
Relative Speed of Variables				
Relative Direction of Variables				
Fixed Points				
Patterns Formed (Include Drawing)				

Dance	5	6	7	8
Dance Name (Function Notation)				
Relative Speed of Variables				
Relative Direction of Variables				
Fixed Points				
Patterns Formed (Include Drawing)				

Dance the Dependent Variable Exit Ticket Name:

1. What was the most interesting part of doing these function dances?

2. What did you find most challenging when you were doing the dances?