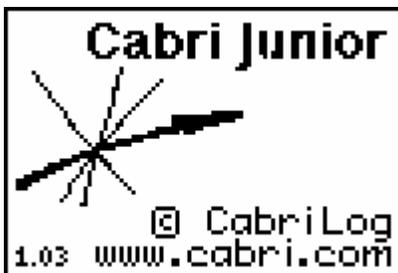


Activity 19 – The Transformational Puppet

First, turn on your TI-84 Plus and press the APPS key. Arrow down until you see Cabri Jr and press **ENTER**. You should now see this introduction screen.

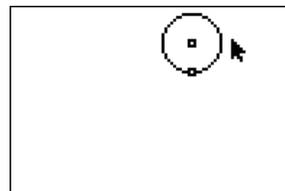


To begin the program, press any key. If a drawing comes up on the screen, press the **Y=** key (note the F1 above and to the right of the key – this program uses F1, F2, F3, F4, F5 names instead of the regular key names) and arrow down to NEW. It will ask you if you would like to save the changes. Press the **2nd** key and then enter to not save the changes.

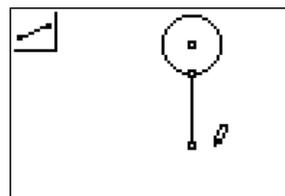
We are now ready to begin.

This activity is designed to reinforce the concepts of reflections and translations. You will create a virtual puppet using the Cabri Jr App on the TI-84 Plus.

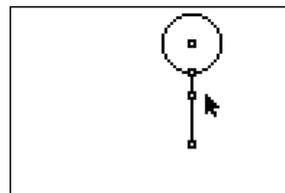
Open a new document in Cabri Jr. To construct the head of your puppet construct a circle near the top of the screen and slightly to the right of center.



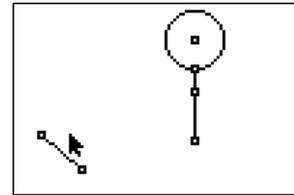
Construct a segment to serve as the body of your stick figure puppet.



Construct a point on the body to serve as the shoulder of the puppet. Be sure to use the “point on” option.

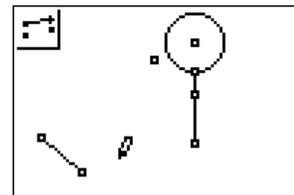


Construct a segment off to the left of the puppet. This will serve as the translation vector that will be used to create an image point (the left hand) from the pre-image point (the shoulder). It is important in this step to start your segment at the bottom right since the order of creation of the segment will dictate the direction of the translation.

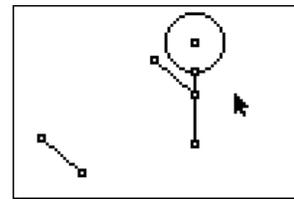


Move your pointer to the location you predict the hand (image point) will be located after the translation. If your teacher is using TI-Navigator, wait for the teacher to collect your screen to verify your prediction.

Translate the shoulder point, by choosing Translation, then clicking on the shoulder and then clicking on the translation segment.

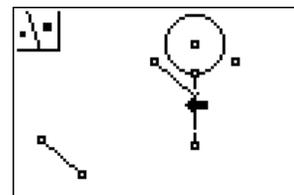


Connect the shoulder to the left hand using a segment.

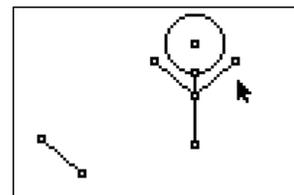


Move your pointer to the place on the screen where you think the right hand will be if you were to reflect the left hand with respect to the body of the stick figure. If your teacher is using TI-Navigator, wait for your teacher to collect your screen image and verify your prediction.

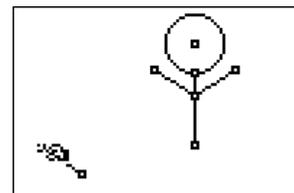
Choose the Reflection tool. Reflect the left hand by clicking on the left hand and then the body of the puppet.



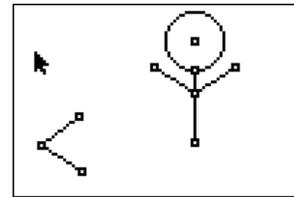
Connect the right hand and the shoulder using a line segment.



Click on the top point of your translation segment and press **[ALPHA]**. Drag the point up and down to watch the puppet's arms move. Why do the arms move when you are not dragging them?

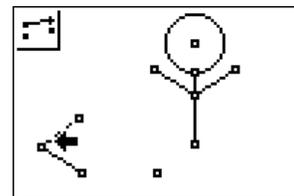


Next, construct the legs of the puppet. To begin, you need to create a translation segment for the legs. This is crucial to the working of the puppet. Draw a segment that begins above and to the right of where your arm segment ended. Have the leg segment end on the same point that your arm translation segment ended.

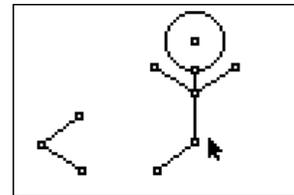


Move your pointer to the place on the screen where you think the left foot will be if you were to translate the hip using the leg translation segment you created in the previous step. If your teacher is using TI-Navigator, wait for your teacher to collect your screen image and verify your prediction.

In the same way you translated the shoulder point to get the left hand, translate the hip point to create a left foot.

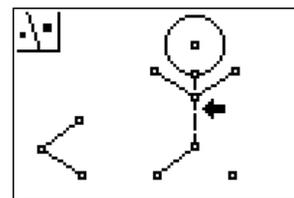


Connect the left foot and the hip using the segment tool.

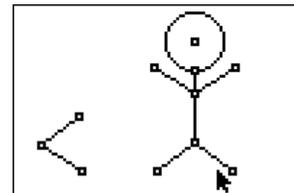


Move your pointer to the place on the screen where you think the right foot will be if you were to reflect the left foot with respect to the body of the stick figure. If your teacher is using TI-Navigator, wait for your teacher to collect your screen image and verify your prediction.

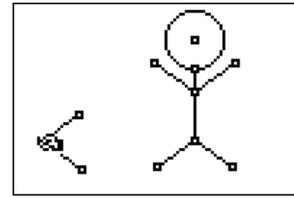
Reflect the left foot with respect to the body to obtain the image point which will serve as the right foot. How good was your guess?



Connect the right foot to the hip using a segment and your puppet will be complete.



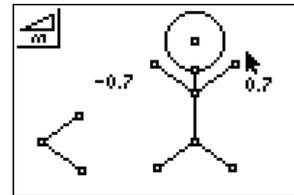
Move your cursor to the point where the arm and leg translation segments meet. Press **ALPHA** to grab the point. Move the point around and watch your puppet move on the screen.



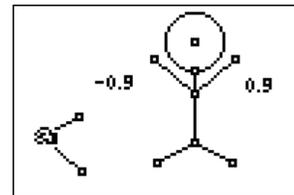
Discuss with your partner why moving one point results in the moving of two arms and two legs. Experiment with stretching out the translation segments and shrinking them just to observe what happens. Discuss your findings with your partner. Come up with at least two findings to share.

How do the slopes of the two arms compare? Discuss with your partner and be prepared to share your answer.

Test your theory by finding the slopes of the arms using Cabri Jr.



Now, grab the intersection point of the arm and leg translation segments again and move it around. What happens to the slope? Why?



Find the coordinates of the left and right hand. Grab the intersection point of the arm and leg translation segments and move the arms and legs. Work with a partner to discuss what happens and why.

