

# Wintry Transformational Geometry

## **Phase 1:**

Create part of one branch of a snowflake

### Steps:

1. Use the segment tool to create a vertical line about 5 cm long;
2. Use the segment tool to create branches that link to only one side of the branch (see illustration at right for finished sample)

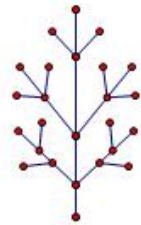


## **Phase 2:**

Use reflection to complete the branch

### Steps:

3. Mark the vertical line (from step 1 above) as a mirror
4. Select all of the branch
5. Transform > Reflect (see illustration at right for finished sample)

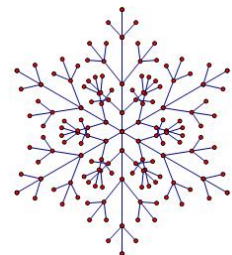


## **Phase 3:**

Use rotation to create all 6 branches of the snowflake

### Steps:

6. Select the bottom point of the branch as a rotation center
7. Transform > Rotate (enter  $60^\circ$  as the angle)
8. Leave the rotated branch selected (pink); repeat step 7 until the snowflake is complete (see illustration at right for finished sample)

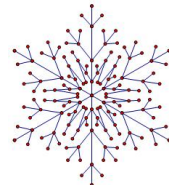


## **Phase 4:**

Use properties of a rotation to tweak all 6 branches of the snowflake

### Steps:

9. Click any point and drag it
10. Repeat until the snowflake is adjusted as you wish



## **Phase 5:**

Use copy-paste and dilations to create a “snowstorm” of varying-size flakes

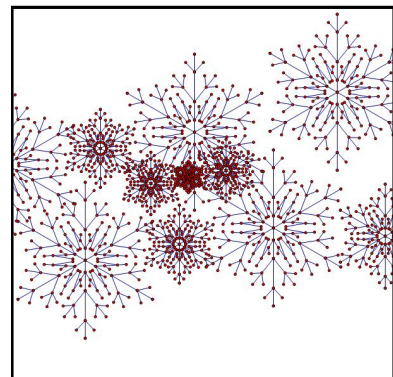
### To copy-paste:

- a. Select the snowflake
- b. Copy with CTRL+C; paste with CTRL+V (right-clicking for “Copy” will not work in Sketchpad)
- c. Move the pasted object whilst it is still selected (pink)

### To dilate:

- a. Select the snowflake(s) to dilate
- b. Transform > Dilate
- c. Select a fraction to use (the screen will use a “ghost” to allow you to preview it before you click the “Dilate” button)

*Note:* Dilation affects the original as well as dilated copies when you move them, and affects the distance between them - be careful with this process!



Experiment with more: You can hide points; you can alter line colors and thicknesses (see “Display” menu); adjust individual flakes so they are different; try to make “plate” or “column” snowflakes.