

Do You See What I See?

ID: 13663

Time required
45 minutes

Activity Overview

In this activity, students will discover how pictures formed by graphing ordered pairs can be stretched (and shrunk) by multiplying (and dividing) the coordinates.

Topic: Geometry & Measurements

- *Ordered pairs, graphing ordered pairs*
- *Dilations*

Teacher Preparation and Notes

- *Prior to this activity, students should have had some experience with coordinate graphing and understand the difference between x- and y-axes and how to list an ordered pair*
- *Copies of the tree (page 4 of this document) and the student worksheet should be provided to students.*
- *TI-Navigator is not required for this activity, but an extension is given for those teachers that would like to use it.*
- ***To download the student worksheet and TI-Navigator files, go to education.ti.com/exchange and enter “13663” in the quick search box.***

Associated Materials

- *MGAct24_DoYouSee_worksheet_TI73.doc*
- *MGAct24_DoYouSee_Nav01_TI73.act, MGAct24_DoYouSee_Nav02_TI73.act, MGAct24_DoYouSee_Nav03_TI73.act, MGAct24_DoYouSee_Nav04_TI73.act*
- *L1.73I, L2.73I, L3.73I, L4.73I, L5.73I, L6.73I, L7.73I, L8.73I*

Suggested Related Activities

To download the activity listed, go to education.ti.com/exchange and enter the number in the quick search box.

- *Mapping a Leaf (TI-73 Explorer) — 4019*
- *Do You See What I See? (TI-73 explorer) — 4453*
- *Transformations on the Coordinate Plane (TI-84 Plus family & TI-Navigator) — 9800*
- *Transformations in Geometry (TI-84 Plus family & TI-Navigator) — 1678*

Problem 1 – Creating the Original Image

In this lesson, students will identify coordinate pairs and graph them on the TI-73 to explore the transformation of an image.

Question 1

Students will need to identify and record the coordinates of the points marked on the graph.

Questions 2–4

Have students think about how they could transform the graph based on changes they could make to the x-coordinates and/or the y-coordinates. You can use the original graph as a transparency to plot some modified points for students to see what happens.

L1	L2	L3	1
8	15	-----	
6	13		
7	12		
5	10		
6	9		
4	7		
5	6		

L1(1)=8

Question 5

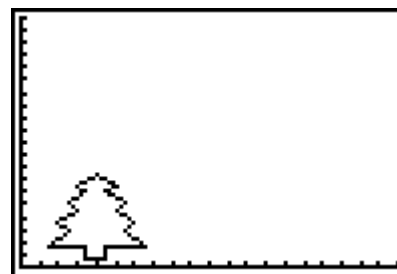
After students have discussed what they think will happen with modifications, have them enter the original lists into L1 and L2.

```

WINDOW
Xmin=0
Xmax=40
ΔX=.4255319148...
Xscl=2
Ymin=0
Ymax=40
Yscl=2
    
```

To enter the lists, press [LIST]. If there are already values in L1 or L2, move to the top of the list and press [CLEAR] [ENTER] to empty the list before starting.

Note: Lists L1 and L2 are provided if you would prefer to send the lists to students using the unit-to-unit link cable. (or TI-Connect).



The suggested window is shown at the right. This is chosen because you will be doubling both the x-coordinates and the y-coordinates. Other windows can be used if the class decides on something different.

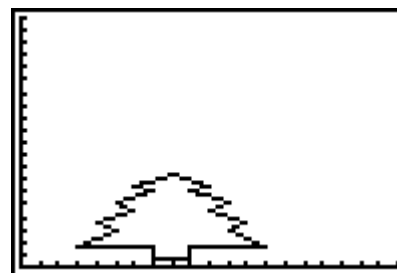
Problem 2 – Changing x-values

After graphing the original image, students will begin by changing the x-values of the coordinate pairs. Students make predictions about the dilation and then graph to confirm.

Questions 6–9

Move to the top of L1. The entry line should read “L1 = {8, 6, 7, 5, 6, 4...”. To double the x-values, press [2nd] [LIST] [1] [x] [2] [ENTER].

After you have doubled the x-values, press [GRAPH] to see the dilated graph.



Problem 3 – Changing y -values

Next, students will change the y -values of the image and see what happens. Before doing this, they will need to return L1 (x -values) to the original amounts. Move the cursor to the top of L1 again and divide by 2.

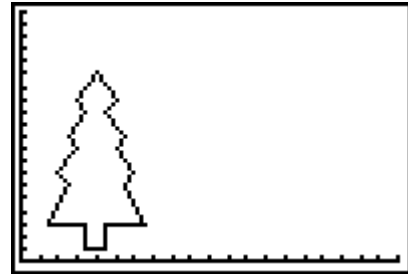
Questions 10–12

Move to the top of L2. The entry line should read “L2 = {15, 13, 12, 10...”. To double the y -values, press $\boxed{2\text{nd}} \boxed{\text{LIST}} \boxed{2} \boxed{\times} \boxed{2} \boxed{\text{ENTER}}$.

After students have discussed what they think will happen, press $\boxed{\text{GRAPH}}$ to see the dilated figure.

Questions 13–14

You can let students continue to modify the lists and explore what happens with each type of modification. If they multiply by something less than 1, what happens?



Extension – TI-Navigator™

- Four files with background images are provided. Open **MGAct24_DoYouSee_Nav01_TI73.act**. This file has the original tree image loaded. You could ask students to predict the translations of the base image as a class. You can also use **QuickPoll** to ask them where certain parts of the graph will be (top, bottom left branch, etc.).

The three other files, **MGAct24_DoYouSee_Nav02_TI73.act** (L3 and L4), **MGAct24_DoYouSee_Nav03_TI73.act** (L5 and L6), and **MGAct24_DoYouSee_Nav04_TI73.act** (L7 and L8) have different shapes that can be translated.

The lists that generate each image are also provided. You could send one image to different groups and have them dilate the image by a given amount.

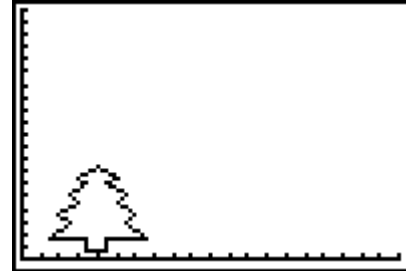
- To shorten the activity time, you can send the lists that create each picture to students through TI-Navigator. This will also ensure all students have the images correct.
- As an extension, have students work in small groups to create lists the construct an image. Use TI-Navigator to retrieve the lists and then redistribute to the rest of the class.
- Use **Screen Capture** throughout to monitor student progress.

Solutions – student worksheet

Problem 1

1. (8, 15), (6, 13), (7, 12), (5, 10), (6, 9), (4, 7), (5, 6), (3, 3), (7, 3), (7, 1), (9, 1), (9, 3), (13, 3), (11,6), (12, 7), (10, 9), (11, 10), (9, 12), (10, 13), (8, 15)
2. Answers will vary. Check students' answers.
Answers should reflect increasing the y -values.
3. Answers will vary. Check students' answers.
Answers should reflect decreasing the y -values.
4. Answer will vary. Students should indicate that doubling the x -values will make the tree wider.

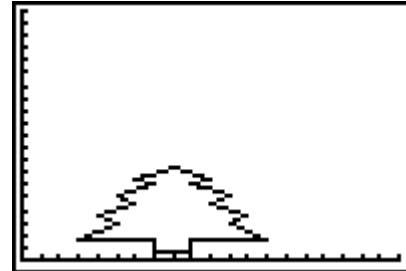
5.



Problem 2

6. Students should indicate that all the x -values doubled.
7. Predictions will vary. Students should state that the tree will be wider than before.
9. Answers will vary.

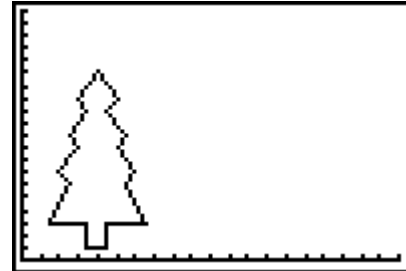
8.



Problem 3

10. Predictions will vary. Students should state that the tree will be taller than before.
12. Answers will vary.
13. Students should realize that the graph would be half as tall and half as wide.
14. Multiply each list by something greater than 1 at the same time.

11.



Graph of Original Tree

