

Dilations - Discovery Activity

Alice in Wonderland

In the story, Alice's Adventures in Wonderland, Alice changes size many times during her adventures. The changes occur when she drinks a potion or eats a cake. Problems occur throughout her adventures because Alice does not know when she will grow larger or smaller.



Part 1

As Alice goes through her adventure, she encounters the following potions and cakes:

Red potion – shrink by $\frac{1}{9}$ Chocolate cake – grow by 12 times

Blue potion – shrink by $\frac{1}{36}$ Red velvet cake – grow by 18 times

Green potion – shrink by $\frac{1}{15}$ Carrot cake – grow by 9 times

Yellow potion – shrink by $\frac{1}{4}$ Lemon cake – grow by 10 times

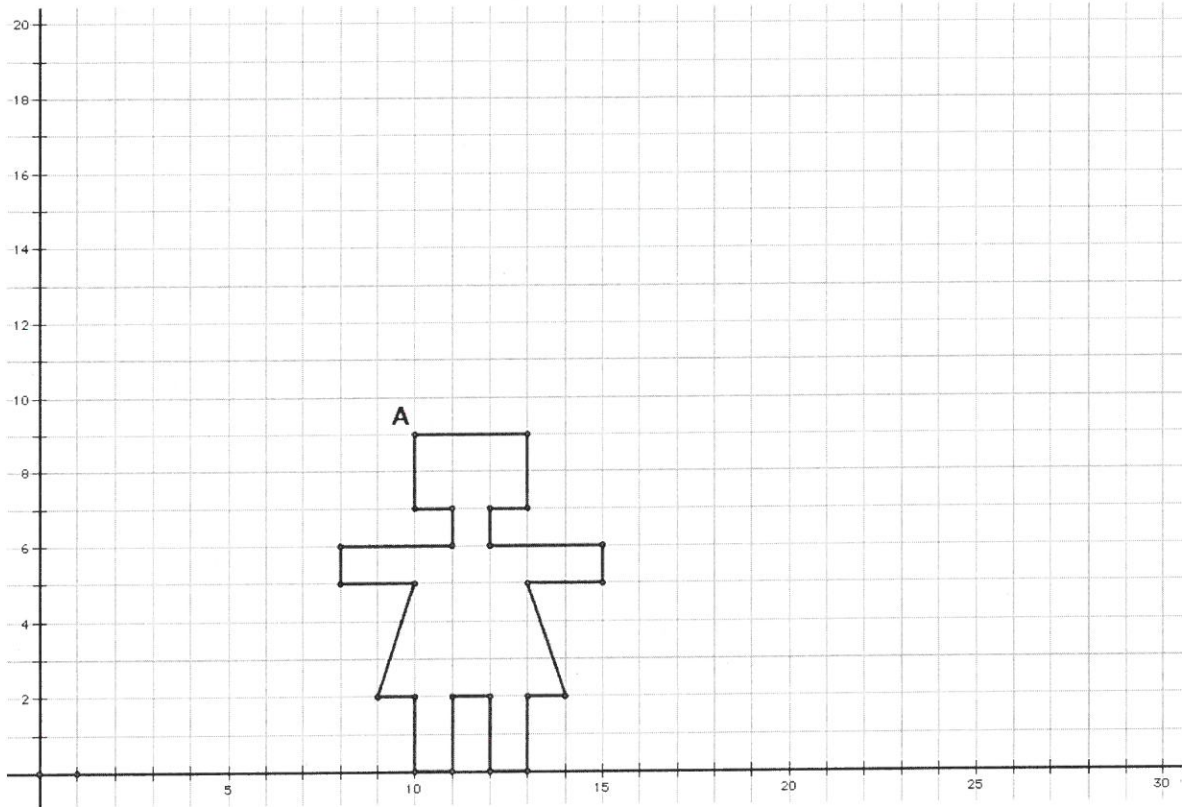
Find Alice's height after she drinks each potion or eats each bite of cake. If everything goes correctly, Alice will return to her normal height by the end.

| Starting Height | Alice Eats or Drinks | Scale factor from above | New Height |
|-----------------|----------------------|-------------------------|------------|
| 54 inches | Red potion | $\frac{1}{9}$ | 6 inches |
| 6 inches | Chocolate cake | | |
| | Yellow potion | | |
| | Carrot cake | | |
| | Blue potion | | |
| | Lemon cake | | |
| | Green potion | | |
| | Red velvet cake | | 54 inches |

Part 2

A) The graph below shows Alice at her normal height.

B) Place a ruler so that it goes through the origin and point A. Plot point A' such that it is twice as far from the origin as point A. Do the same with all of the other points. Connect the points to show Alice after she has grown. (Hint: measure with centimeters so that you can use decimal values.)



C) Label some of the corresponding preimage and image coordinate pairs. Compare their values to complete the questions below.

1. How many times larger is the new Alice? _____
2. How much farther away from the origin is the new Alice? _____
3. What are the coordinates for point A? _____ Point A'? _____
4. What arithmetic operation do you think happened to the coordinates of A?
5. Write your conclusion as an Algebraic Rule $(x, y) \rightarrow (\quad , \quad)$