

## *Alice in Wonderland* Delicious Dilations



In the story, *Alice's Adventures in Wonderland*, Alice changes size 12 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. Eventually, Alice controls her size changes by nibbling sides of a mushroom. This allows Alice to control her size and use her height changes to her advantage when necessary.

Find the changes in Alice's height after she drinks each potion or eats each bite of cake. Then write an equation to represent the change.

Starting Height	Potion or Cake	New Height	Equation
54 inches	$\frac{1}{9}$ as tall	6 inches	$54 \cdot \frac{1}{9} = 6$
54 inches	$\frac{1}{3}$ as tall		
54 inches	$\frac{1}{6}$ as tall		
60 inches	$\frac{1}{4}$ as tall		
60 inches	$\frac{3}{4}$ as tall		
60 inches	$\frac{2}{3}$ as tall		
60 inches	3 times as tall		
60 inches	$1\frac{1}{2}$ times as tall		
18 inches	2 times as tall		
18 inches	$2\frac{1}{2}$ times as tall		
18 inches	$\frac{2}{3}$ as tall		
18 inches	$\frac{5}{9}$ as tall		
18 inches	6 times as tall		
18 inches	$3\frac{1}{3}$ times as tall		

Activity adapted from *The Mathematics of Alice's Adventures in Wonderland* by  
Susan B. Taber. *Mathematics Teaching in the Middle School*, November 2005

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1. Describe the mathematical situation when Alice gets bigger?
2. Describe the mathematical situation when Alice gets smaller?
3. What was Alice's percent of change in height when she began at 60 inches, ate some cake, and was 3 times as tall? Show your work.
4. What was Alice's percent of change in height when she began at 60 inches, drank a potion, and was  $\frac{1}{4}$  as tall? Show your work.

5. Graph, label, and connect the following points in order.

A (10, 0)	G (11, 6)	M (12, 7)	S (13, 2)
B (10, 2)	H (11, 7)	N (12, 6)	T (13, 0)
C (9, 2)	I (10, 7)	O (15, 6)	U (12, 0)
D (10, 5)	J (10, 9)	P (15, 5)	V (12, 2)
E (8, 5)	K (13, 9)	Q (13, 5)	W (11, 2)
F (8, 6)	L (13, 7)	R (14, 2)	X (11, 0)

Connect point X to point A.

6. Dilate the picture above, using the scale factor assigned by your teacher. List the new ordered pairs. On a new coordinate plane, graph, label, and connect the new ordered pairs in order.

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7. How is the image different from the pre-image?
8. How is the image the same as the pre-image?
9. Find the approximate area of the pre-image. Describe your method for finding the area.
10. Find the approximate area of image. Describe your method for finding the area.
11. Find the percent of change in area. Show your work.
12. Color and decorate your Alice in Wonderland.