Investigating the Height of a Stack of Cookies

Is there a relationship between the height of a stack of sandwich cookies, such as regular Oreo™ cookies, and the number of cookies?

Using sandwich cookies and a centimeter ruler, measure, to the nearest 0.1 centimeter, the height of a variety of stacks, such as 0, 2, 3, 5, 7, and 10 cookies. Record your data.

number of cookies	height of stack
0	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

The collected data can be entered into the accompanying "Just Add Data" Excel spreadsheet (http://academic.pgcc.edu/~ssinex/cookies_stack.xls), which will determine the line of best fit by a linear regression performed on the data. A measure of the goodness of fit for the regression is given by r^2. A perfect fit of the model to the data would yield at $r^2 = 1$. Record your equation in terms of the variable studies (not x and y) and the value of r^2. This is your mathematical model!

What does the slope represent in terms of the variables investigated?

What are the units of the slope?

What should the y-intercept be for this mathematical model?

What are the regression results for the y-intercept? What is the cause of the non-zero value?

What are the heights of 20 and 150 cookies?

How could you verify your predictions?

What can you conclude about the uniformity of the thickness of the cookies?

How would the graph change if Double-Stuf Oreo™ cookies were used? Could you draw this graph with only one measurement? The spreadsheet has a spinner to allow you to investigate the variation in thickness.

Suppose that there was variation in the thickness of the cookies, how would this influence the data on the graph? (You could investigate this by randomly mixing regular and Double-Stuf Oreo™ cookies together!)