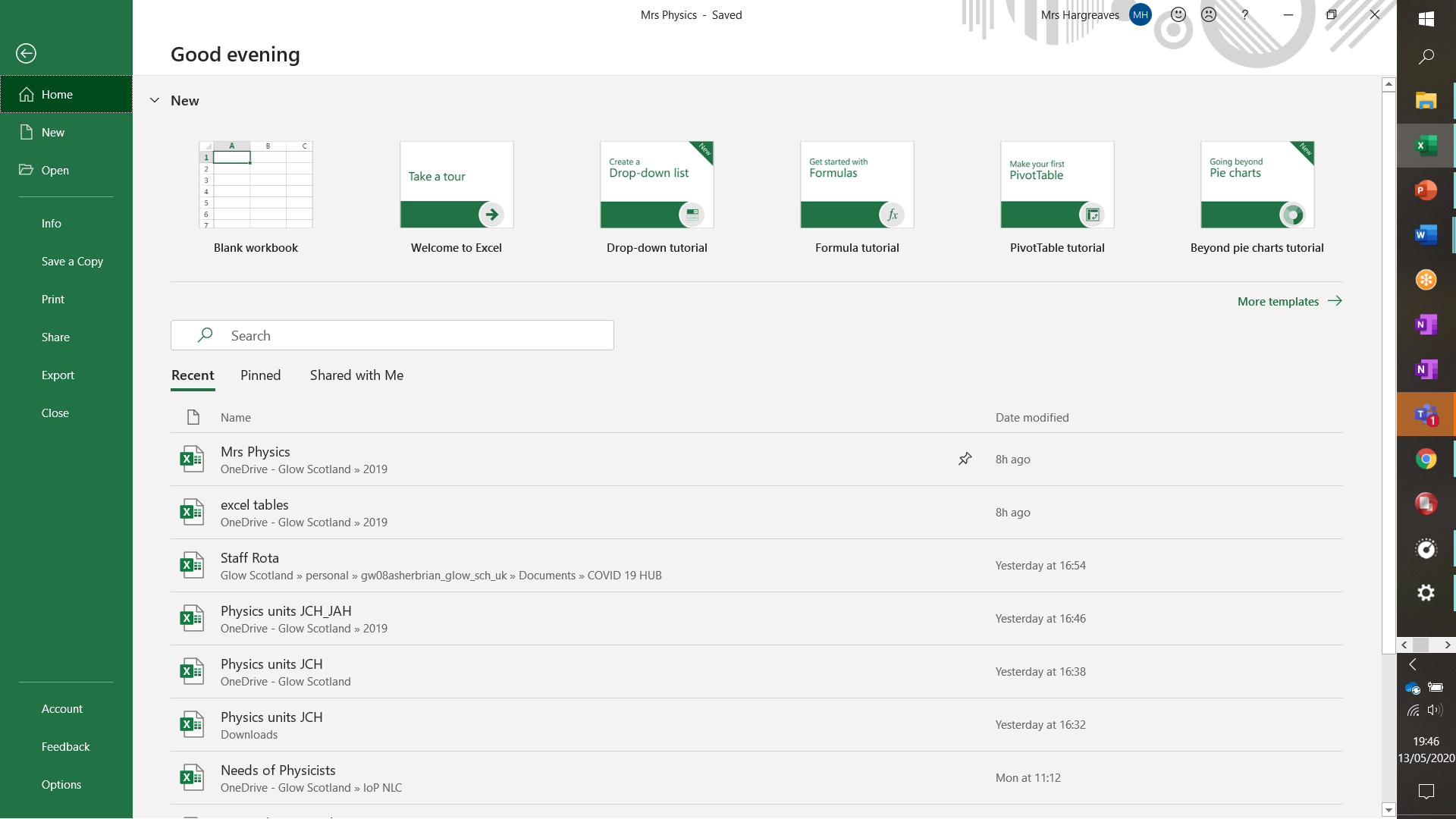
**qwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmrtyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmrtyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmrtyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmrtyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmrtyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmrtyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmrtyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnmqwertyuiopasdfghjklzxcvbnm**

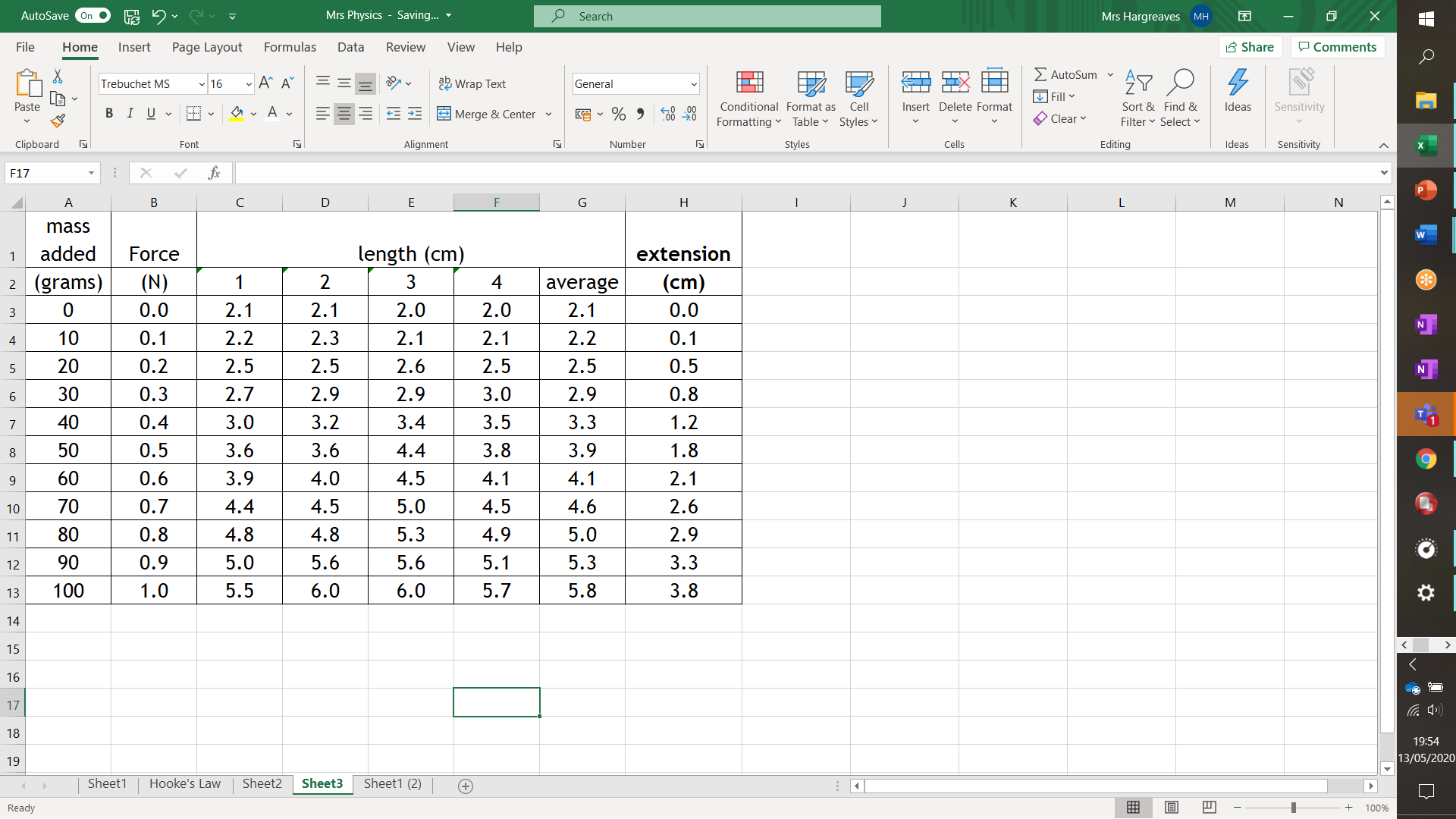
|  |
| --- |
| Plotting Graphs in Excel 2021  For Use with Your Hooke’s Law Data  2020  J A HARGREAVES |

Use of Excel 2016 Physics- A Graph of Hooke’s Law

Hopefully you saved your table properly and even pinned it to the top of the excel page so it can be easily found. You ought to have labelled it something sensible



I pinned my file so it is at the top of the list, but I ought to have named it something more sensible, like Mrs Physics Hookes Law



**Click on Home**

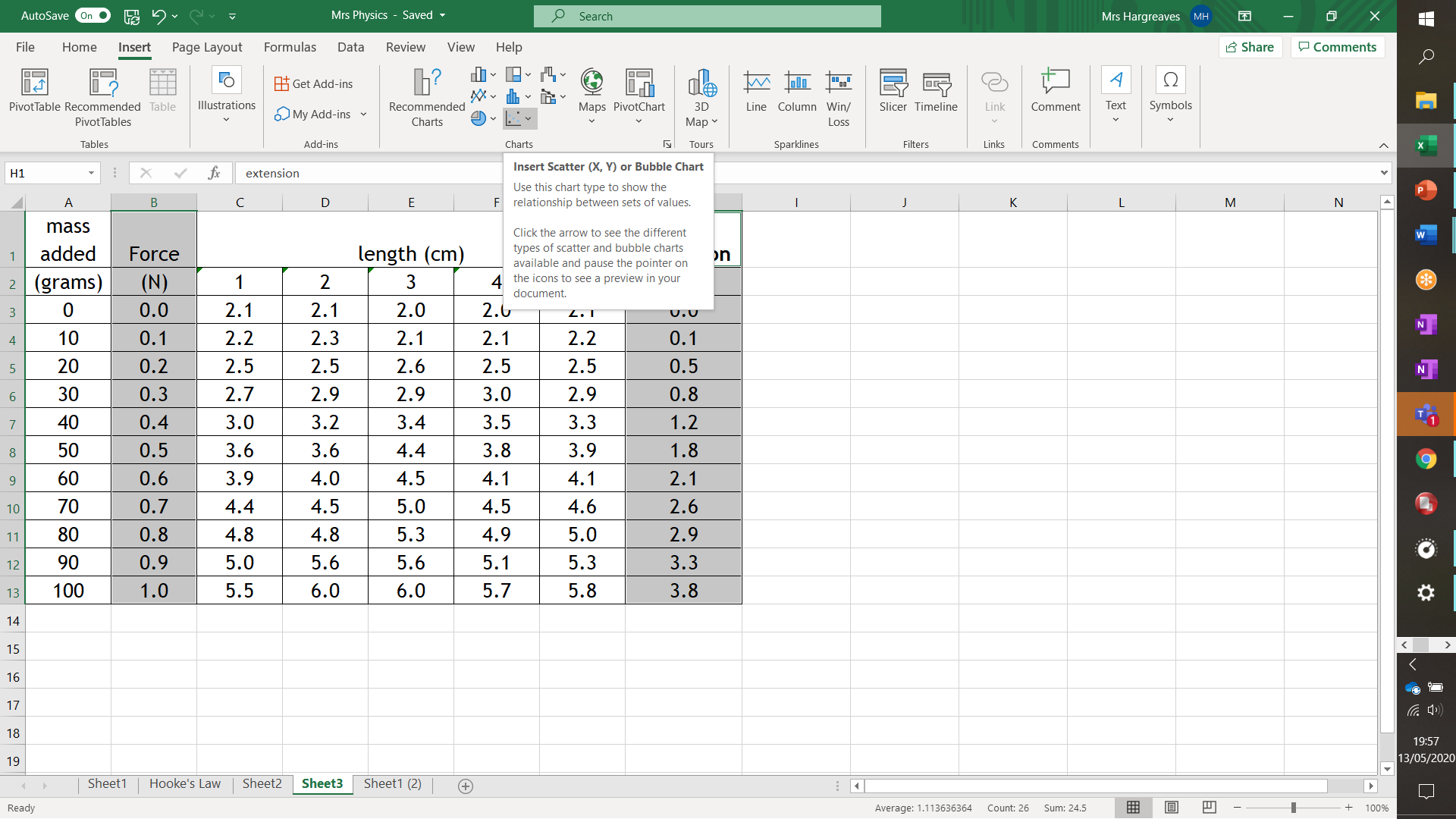
**Insert data, or open up your existing spreadsheet.**

*Please note during this document I use various sheets and do flit back and forwards. It is best read with the video file! Each part is given in detail though.*

**Highlight data to be plotted.**

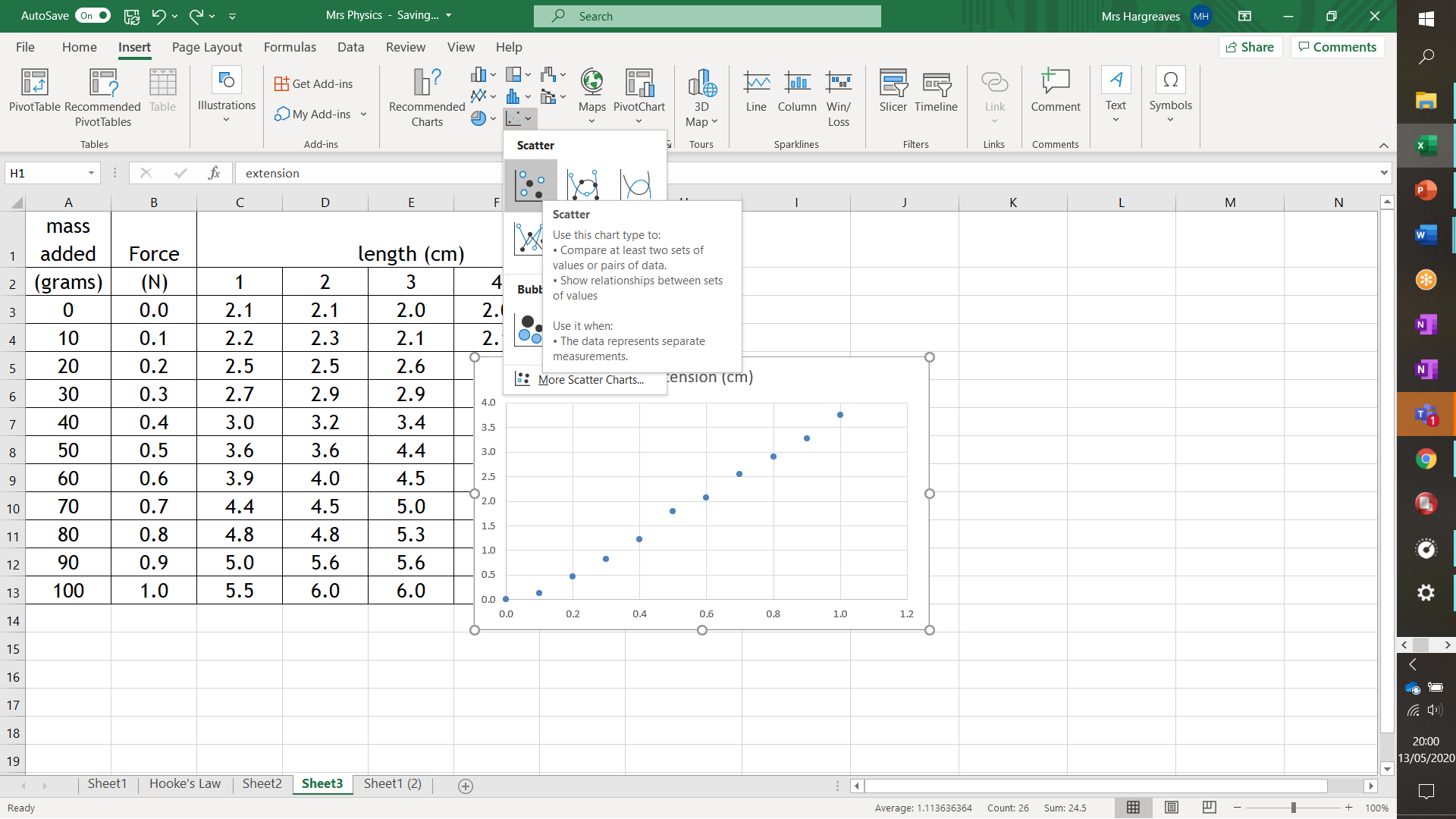
**Click on Insert, then select**

**“Scatter”**



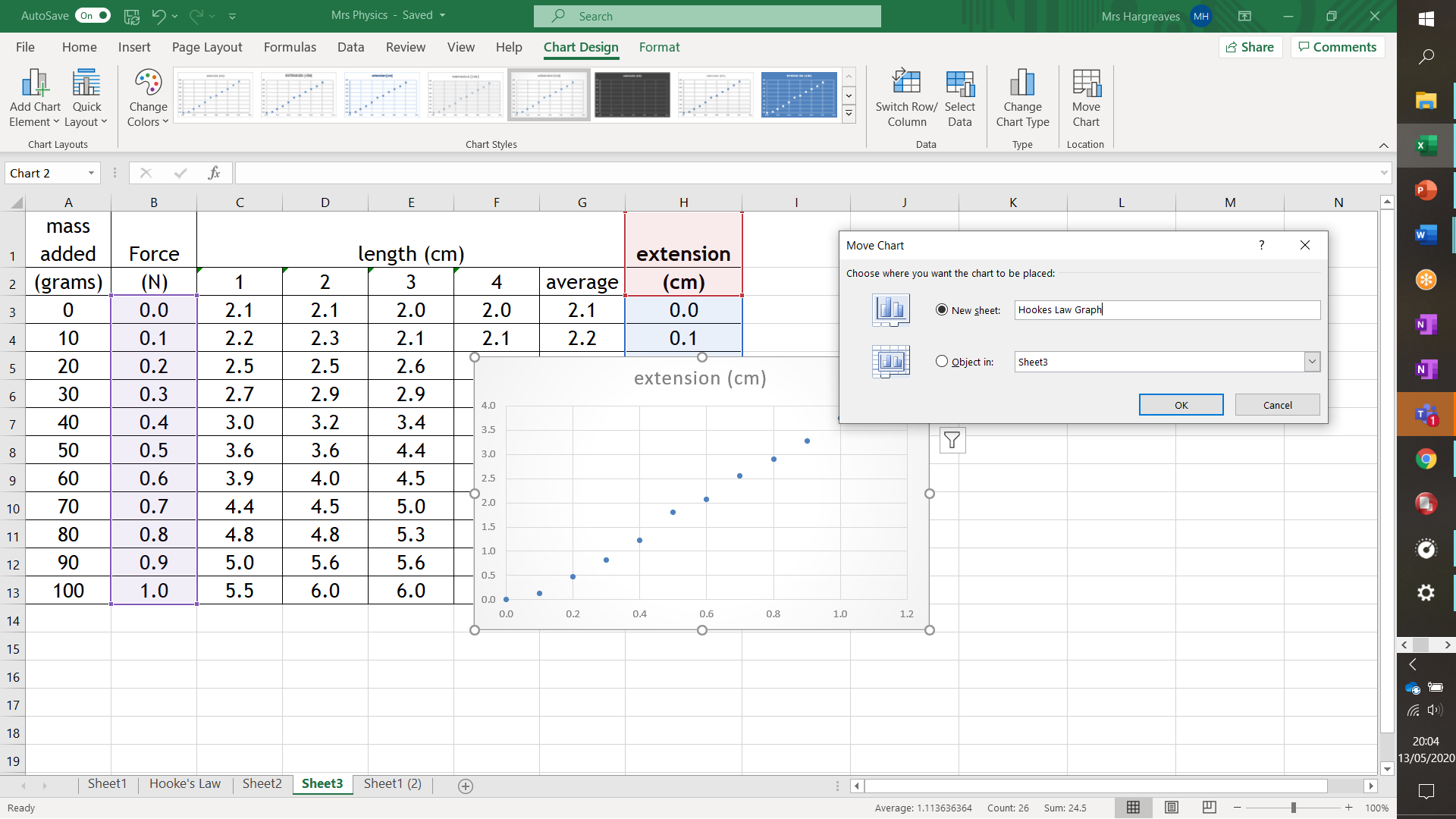
**First highlight the data that you want to plot. As these are not next to each other you should click in the first column and drag down the cells that you want to plot, then holding down the CONTROL key repeat for the other column. This involves the left mouse- try it! Once the two columns are highlighted release the control key**

**Go to INSERT and then in the CHARTS section you need the SCATTER graph. It isn’t the one that stands out most!**

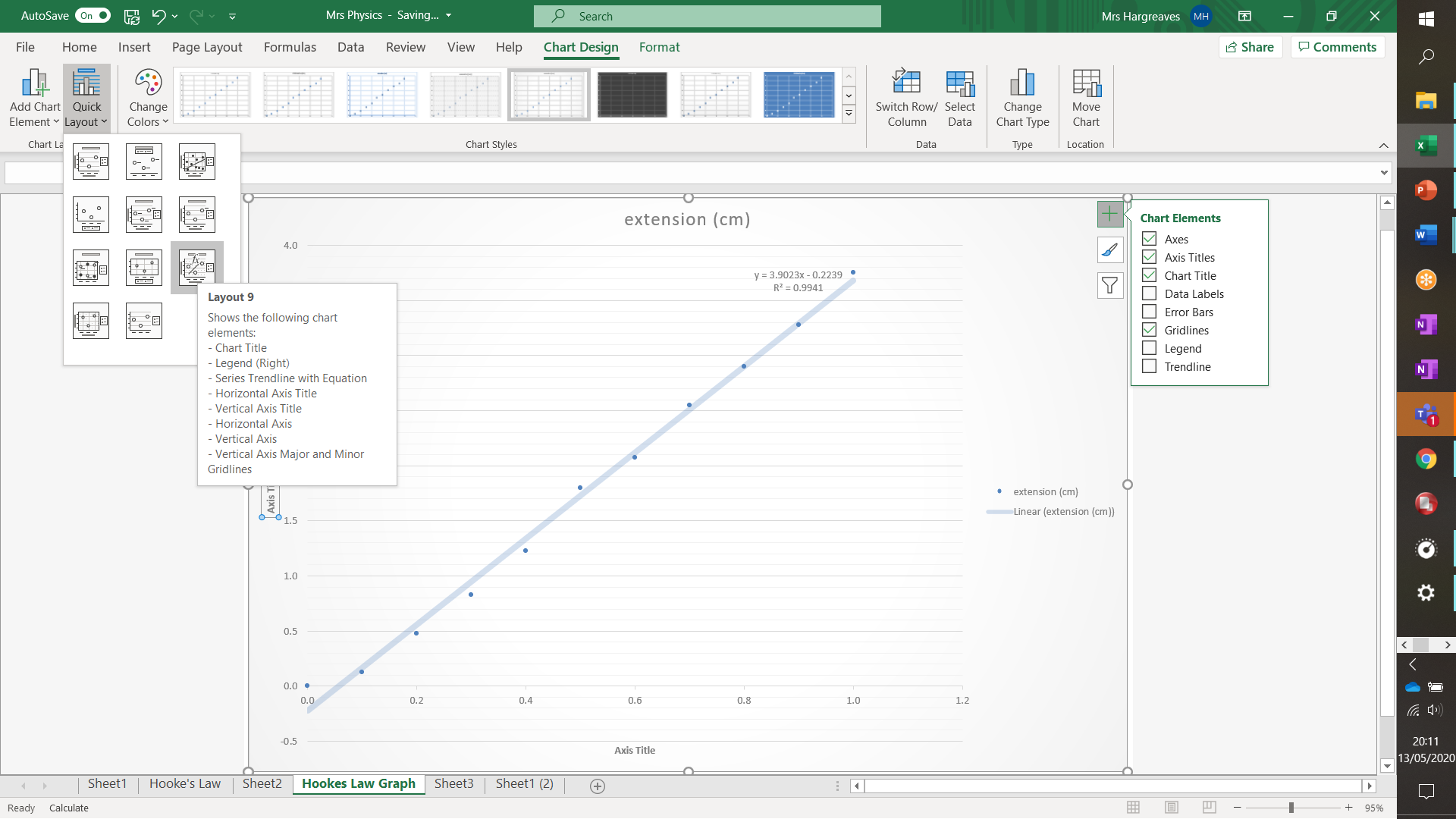


I used to recommend you using the design lab to find a graph similar to how we want it to look but with this version there aren’t any that are close to what we want so we ought to start from scratch, so see below!

Do check that your graph looks correct. Sometimes Excel has a huff and produces nonsense. Usually you need to go back start again and only highlight the data and not the headings! **It doesn’t like blanks in cells**, so don’t leave any. For example if you have a gap under your units with a blank line your results wont plot a scatter graph. Also **do not** plot the line graph, although this is what we would call our graph Excel refers to it as a **scatter graph.**



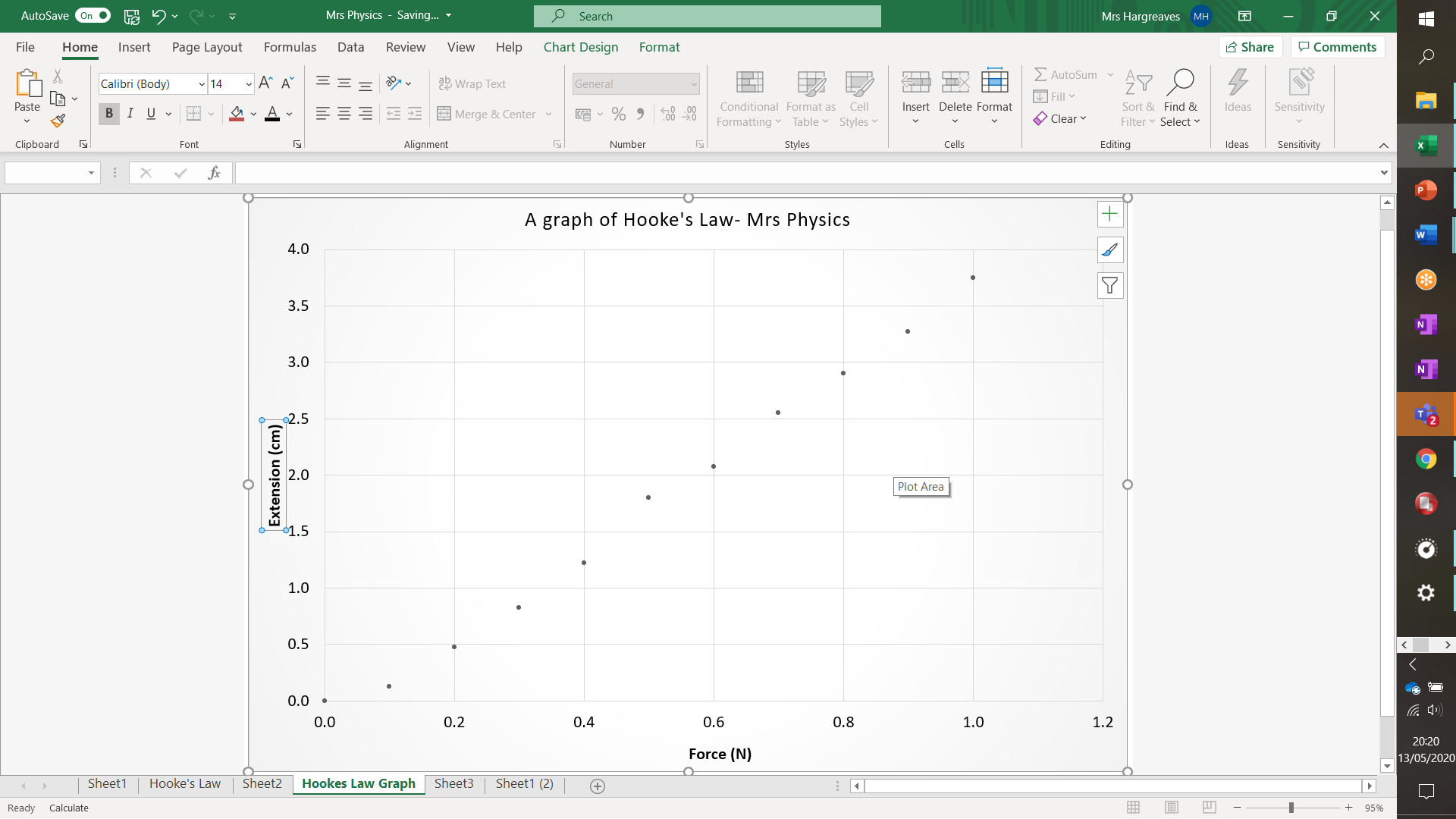
The first thing we should do is move the graph to a new sheet so the table of results doesn’t get in the way. For this you need to be in the CHART DESIGN tab, Click on MOVE CHART (on the right) and click NEW SHEET. Name it Hooke’s Law



We can also click on the cross to the right of the graph and click on the elements we want, currently, axes, axis titles, chart title, gridline and eventually trendline, but I’d recommend doing that later.

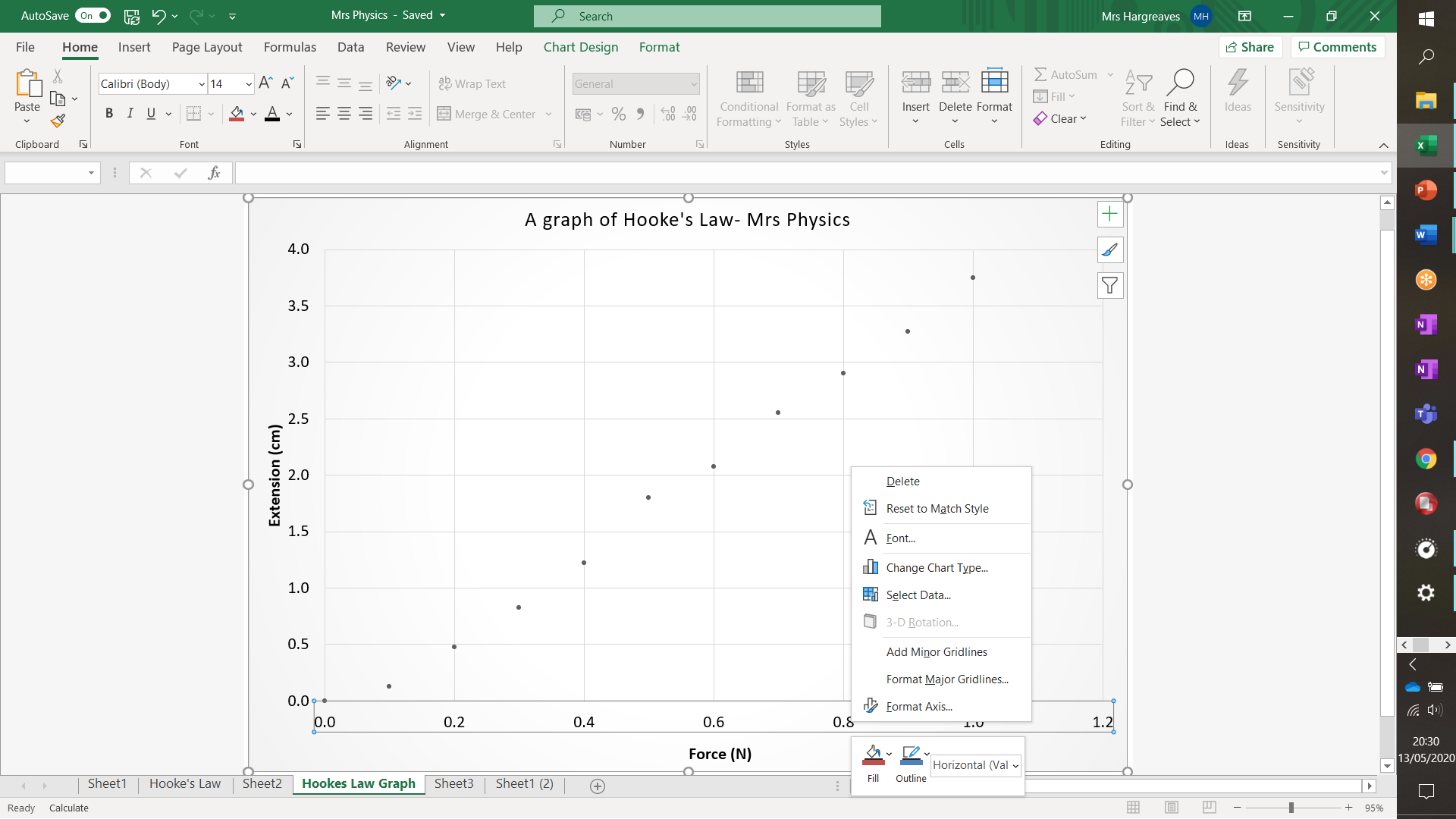
You must be on the CHART DESIGN tab

The closest layout to the one we want to achieve is Layout 9 which you can find in the Quick Layout part of the Chart Design Ribbon



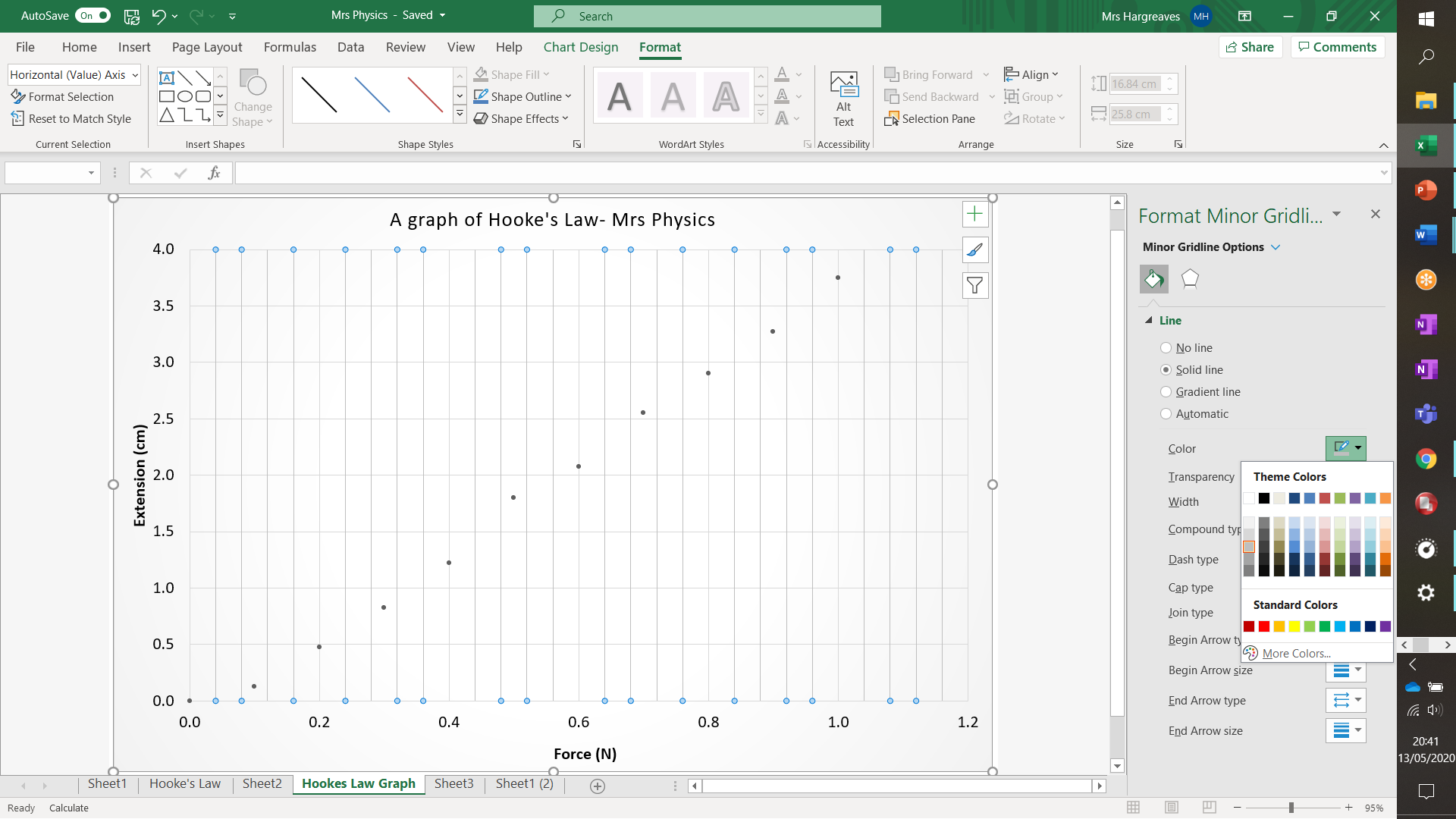
**Label the Axes with headings and units.**

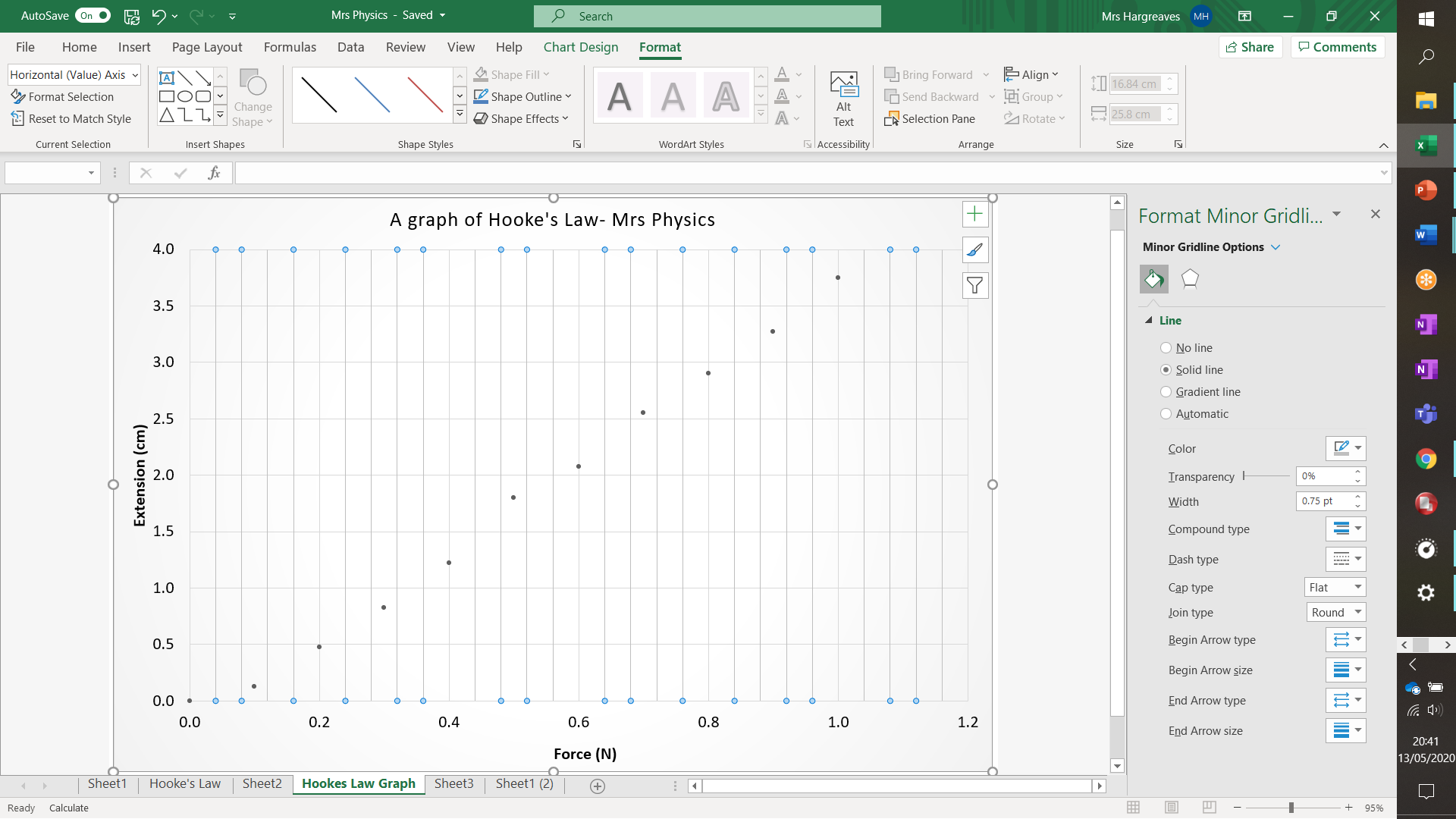
**If you’ve selected Chart Title you’ll get a box if you click in this so you get 4 blue dots at the corners you can type in your own title. I suggest Hooke’s Law – Your Name**



We now want to edit the axes and put more gridlines in (so that it looks like a piece of graph paper). To do this click on the numbers on the Force axis. You’ll know if you’ve done it right as you get a box around the numbers

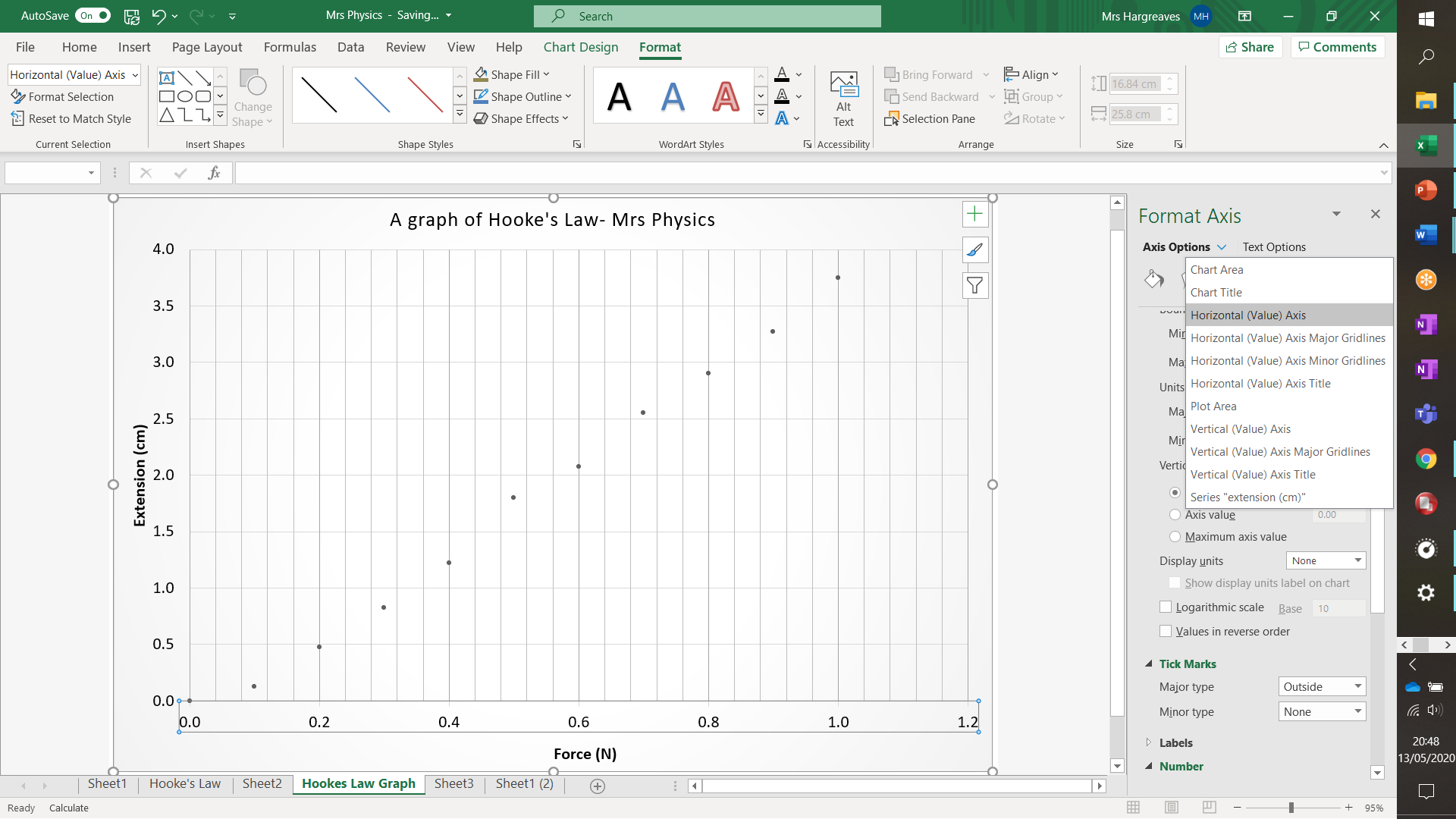
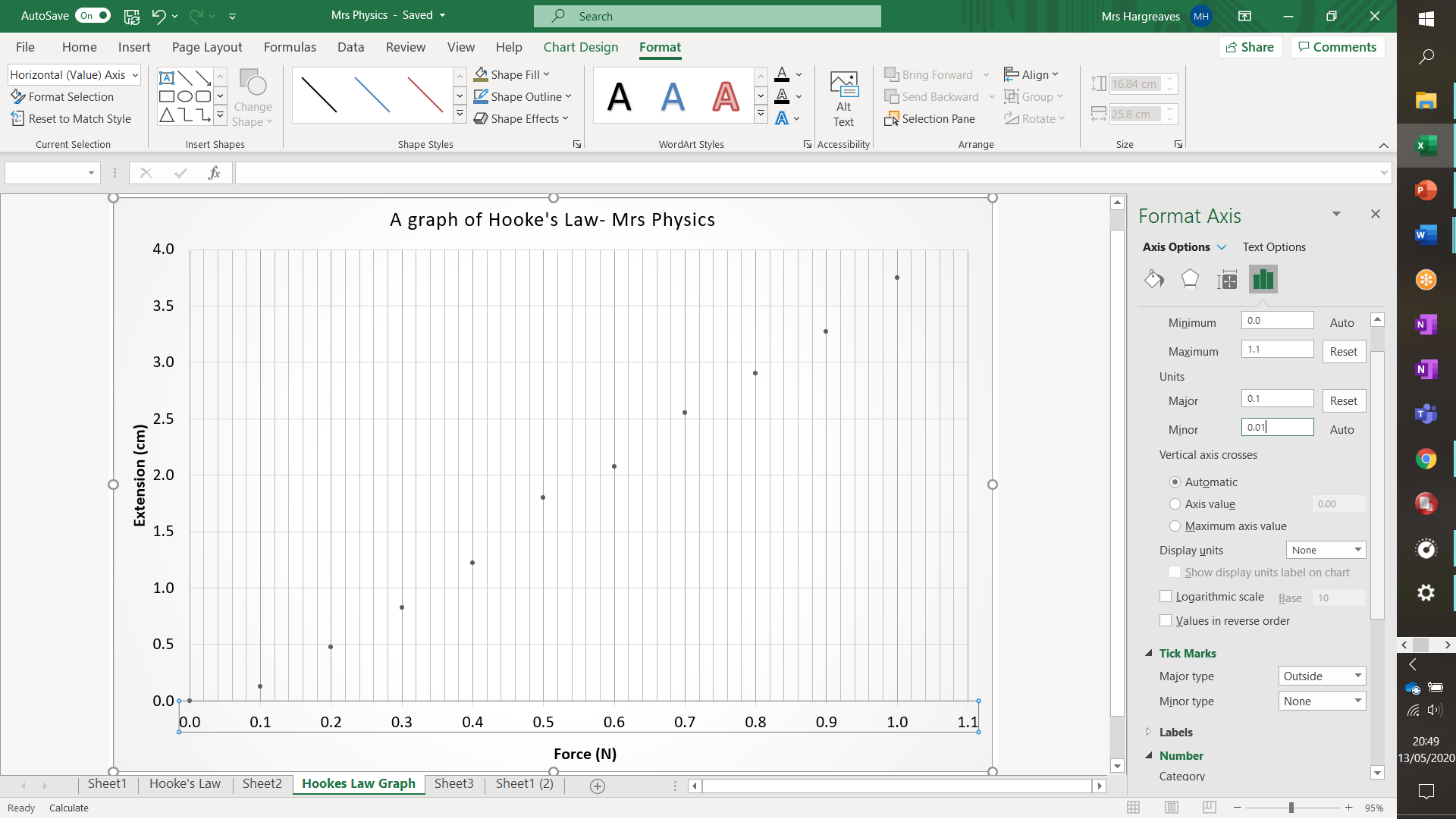
You want to switch on Minor Gridlines and then we are going to format those.





The default minor gridlines are very pale when printed so I’ve found changing them to Background 1, 25% is the best theme colour for minor gridlines and the one down is better for the major gridlines

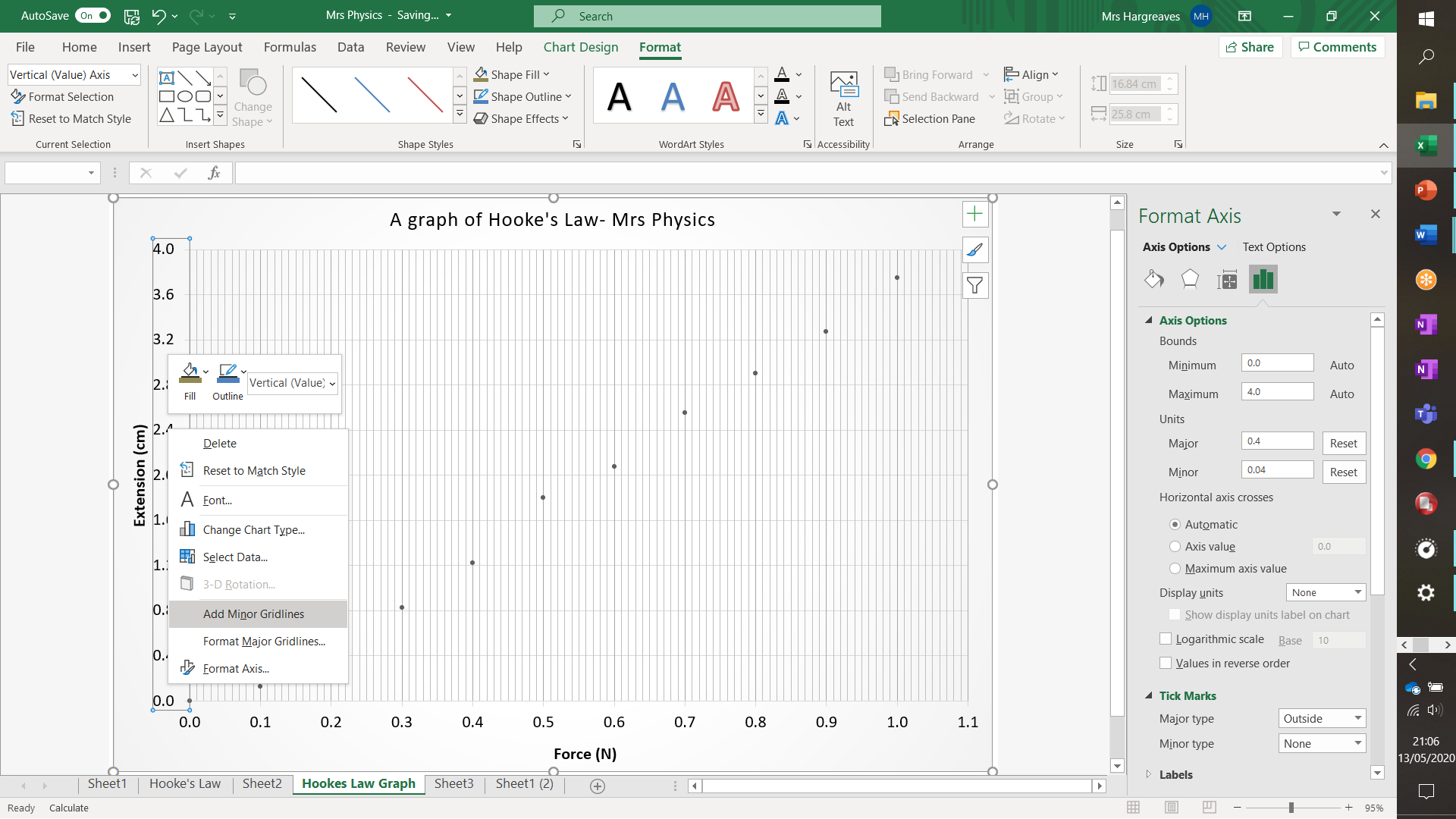
Make sure the gridlines have 0% transparency, are 0.75 pt wide, not compound or dashed. Repeat for the major gridlines. Find that at the top in the bold with the dropdown menu.



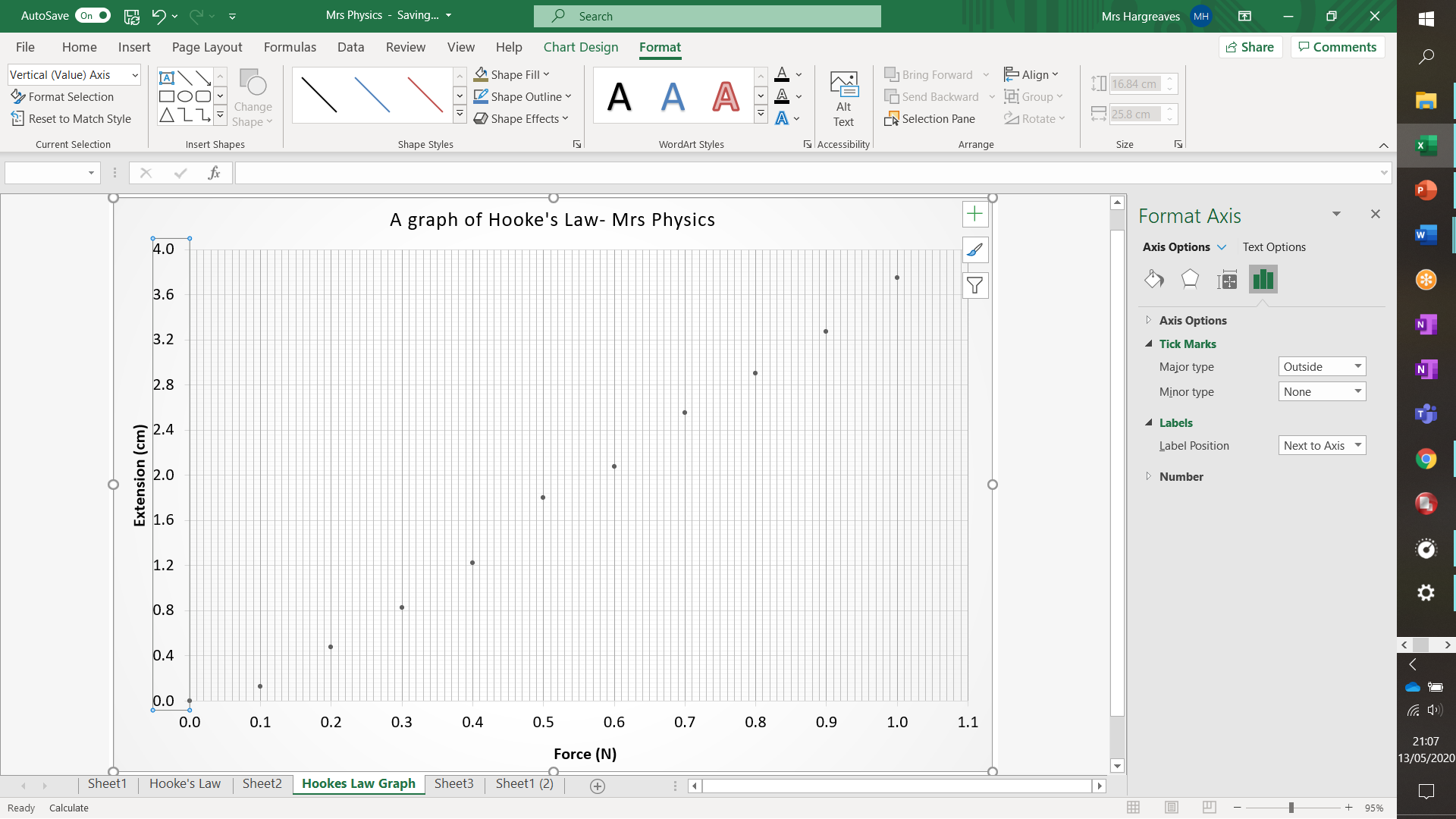
We want to make the axis have a bit more detail, with more lines on the “graph paper”. In the format axis menu we want to click on the Horizontal (Value) Axis (shown on the right) this gives us a menu on the left. You want to start your scale at 0 but maybe go up to a smaller maximum with smaller major and minor units. You’ll have to adjust these numbers for your graph. I like the major tick marks outside, and you don’t want to display units, as they are in the axis title.

Once you get the move chart option click on “ new sheet” and give your graph a name. In this case Hooke’s Law

Click on the axes and give them names. It ought to have a quantity and unit. These are separated by a “\” Titles can be added to this box and click return when finished.



This is what the graph should look like with both the major and minor gridlines checked for the Force (X axis). Now do the same for the extension (Y axis) Click on the axis numbers and a box should appear around it. Then when you right click you’ll get a menu that allows you to switch on the minor gridlines.

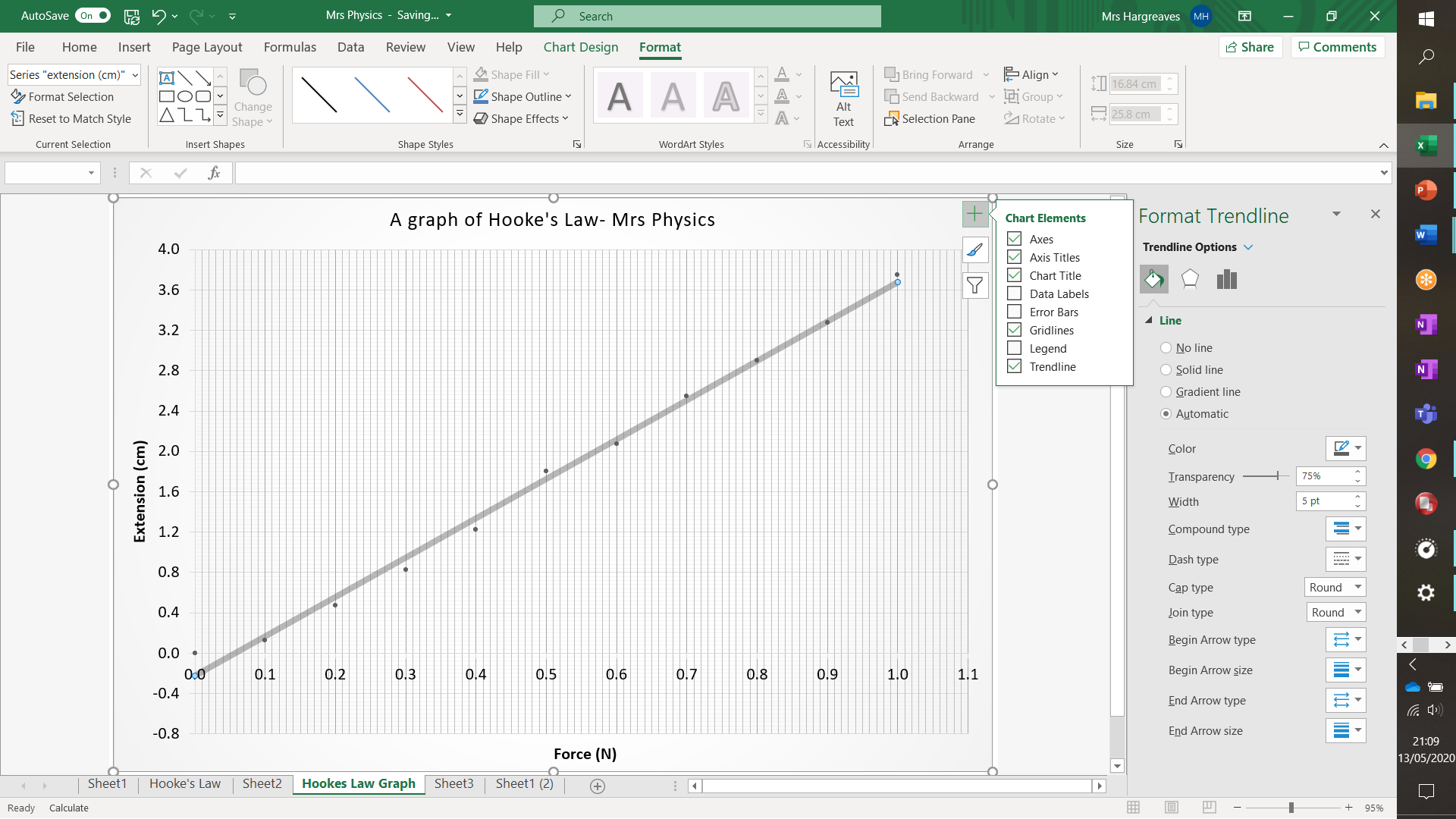
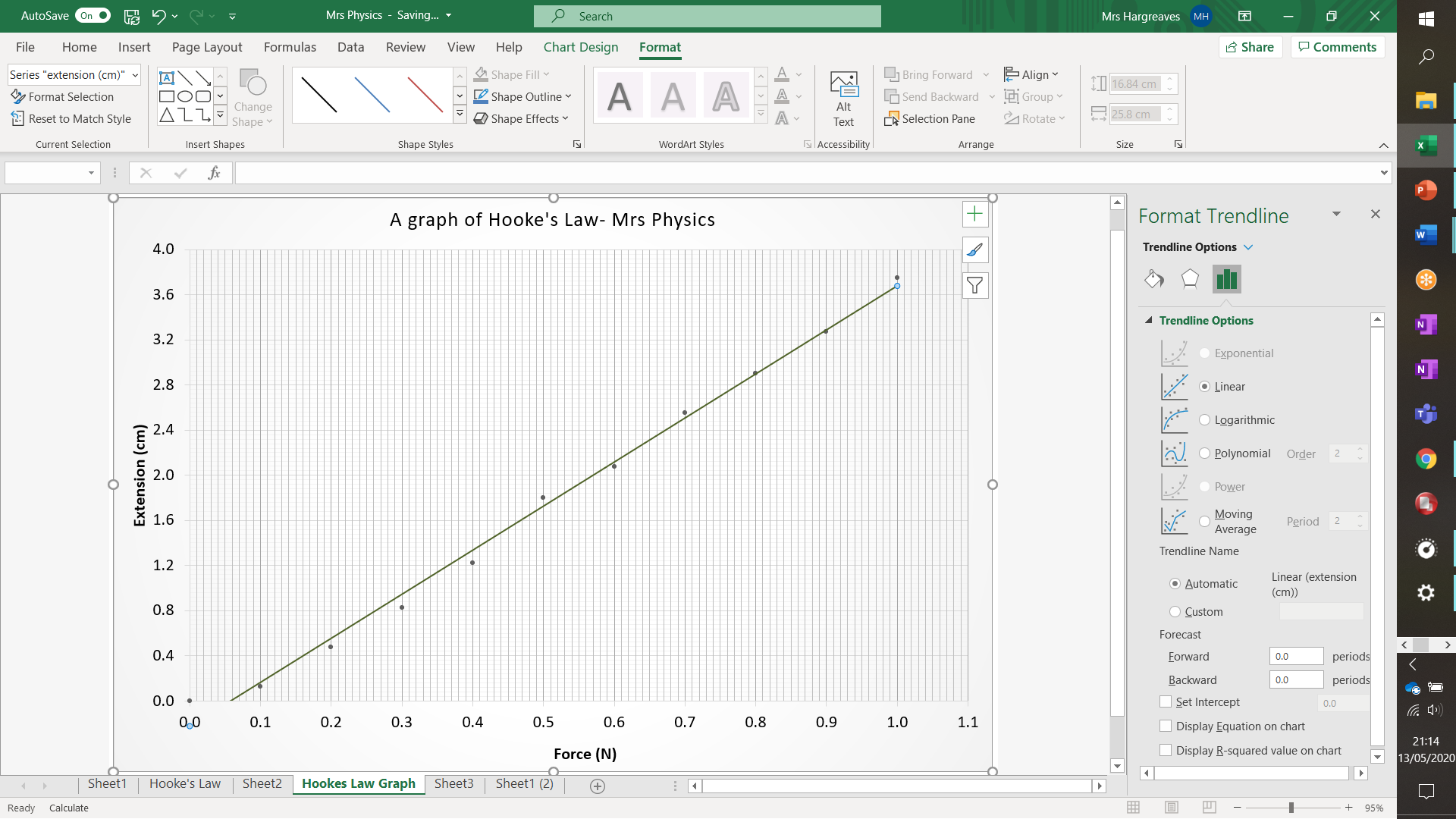


Putting in tick marks makes it easier to read from the groph later, make sure the tick marks are outside the box.

We want small points or crosses not great blobs. Click on the data points on your graph to highlight them, then right click on the mouse until you get a format data series menu. At the bottom. Click on format data series and then change the marker options from the built in menu to about 5 point and + or x shape.

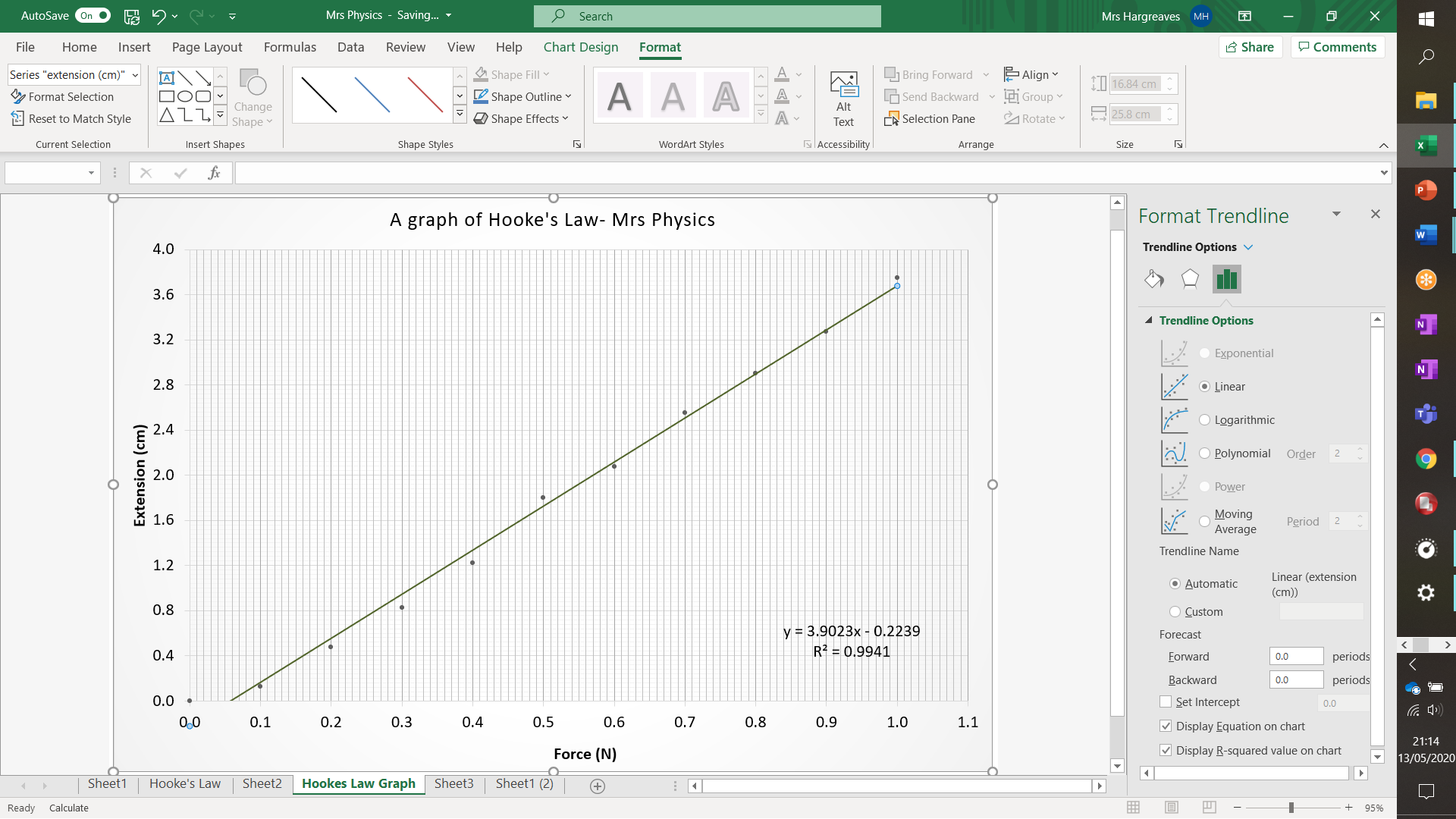
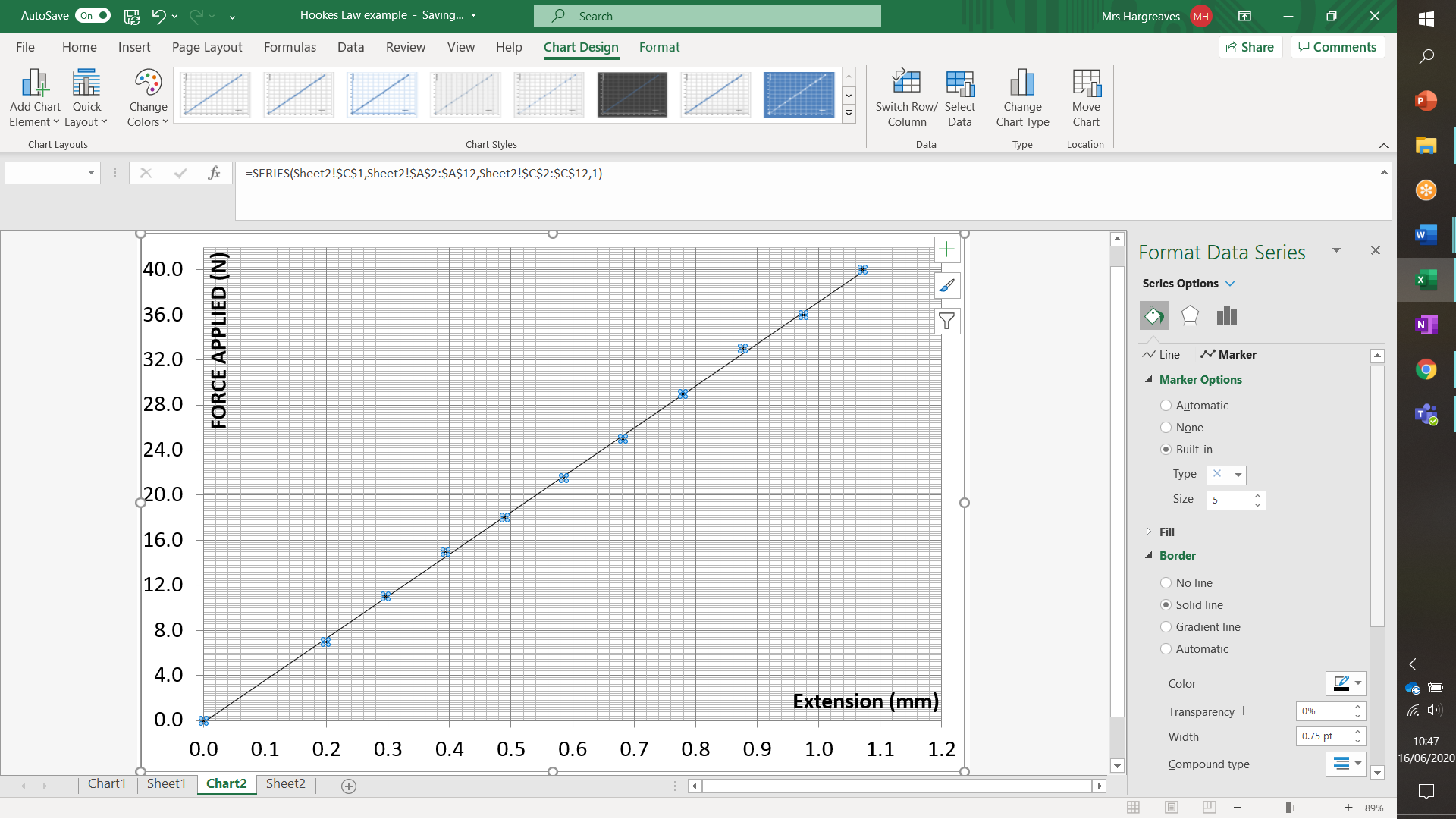
We now need to make your points little x- this is quite tricky so look in the instructions below

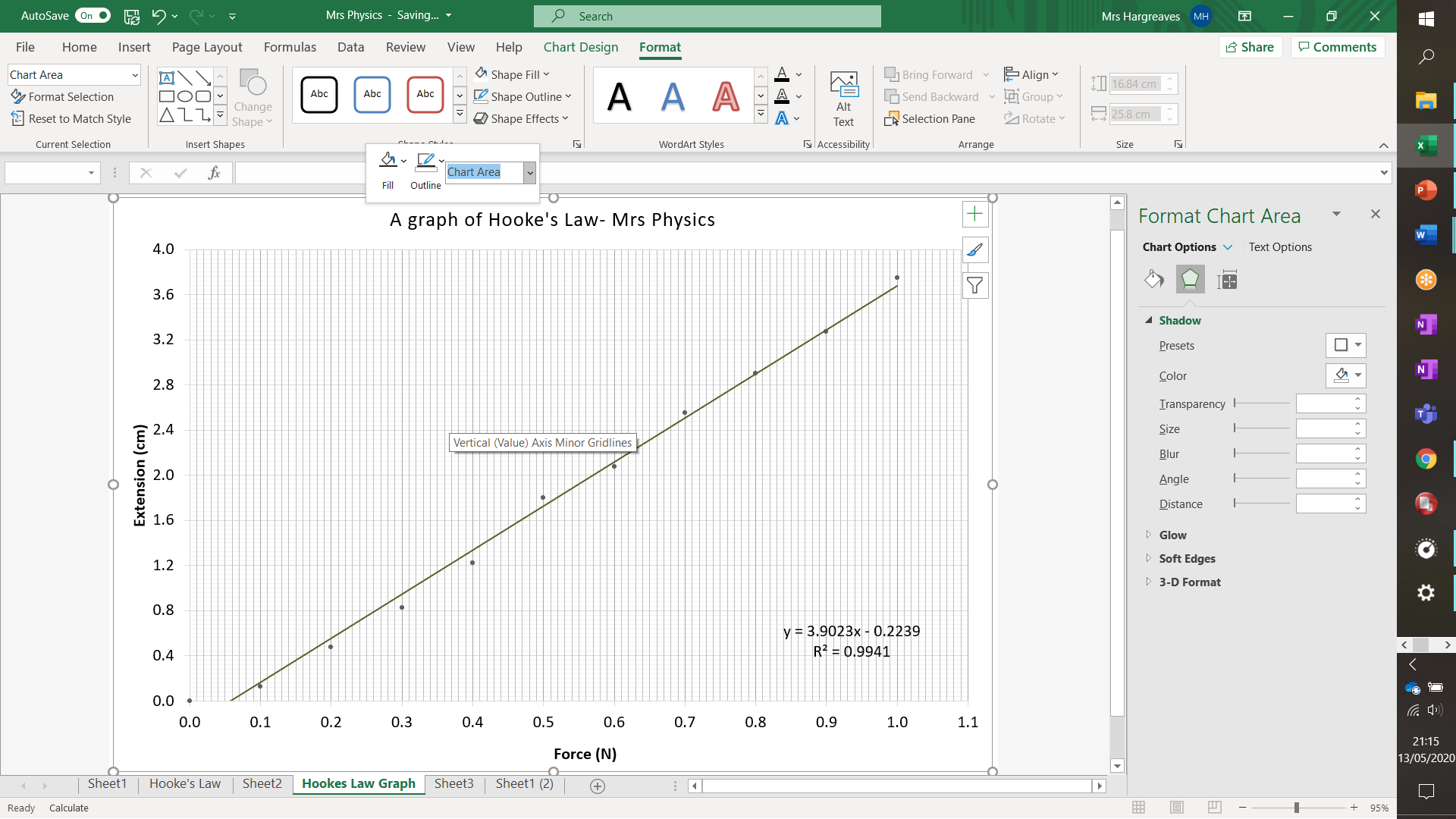
|  |  |  |
| --- | --- | --- |
|  |  |  |
| You need to click on the points so that you get the FORMAT DATA SERIES MENU. | The marker options should be  FILL - NO FILL  BORDER, SOLID LINE  Colour- Black | Then select the crosses from the Marker options and make them 5 pt. |



Now we need to add the trendline. You can switch this on by clicking on the + sign at the corner and checking the trendline, or you can click on the points and then when they are highlighted you can right clicj and the menu for the trendline comes up. You want to click on the linear trendline and if you scroll down check the box for display equation on the chart and R2 value You can do this when the bar chart symbol is highlighted. When the paintpot is highlighted you can change the other menus

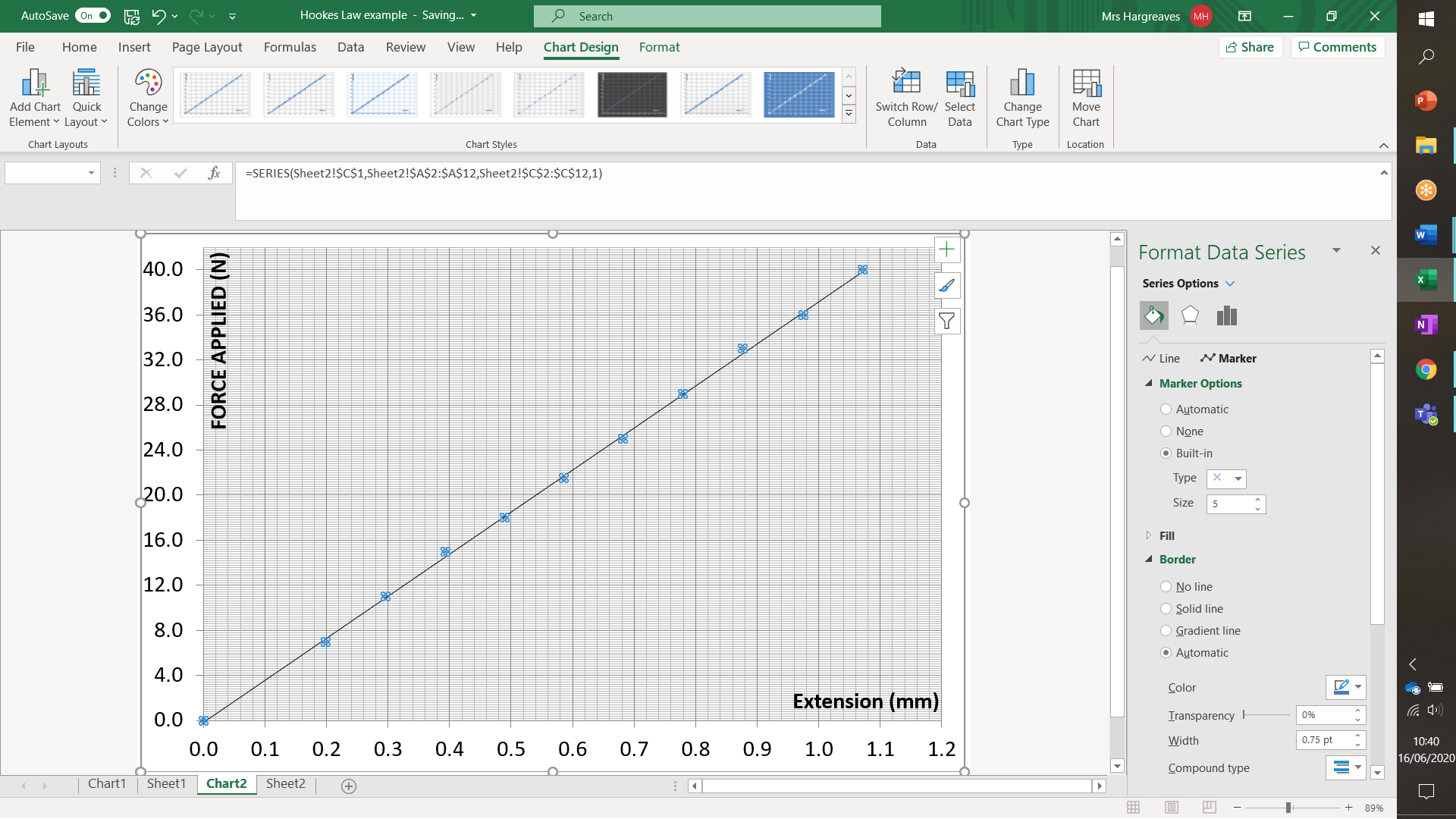
|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| Make the trendline BLACK | Switch the transparency to 0%  The width 0.75 pt  The dash should be changed to solid | The compound type should be plain  There should be no caps or arrows | The display equation on chart and Display R-squared value on the chart should be checked (notice this is when the bar chart at the top is checked) |

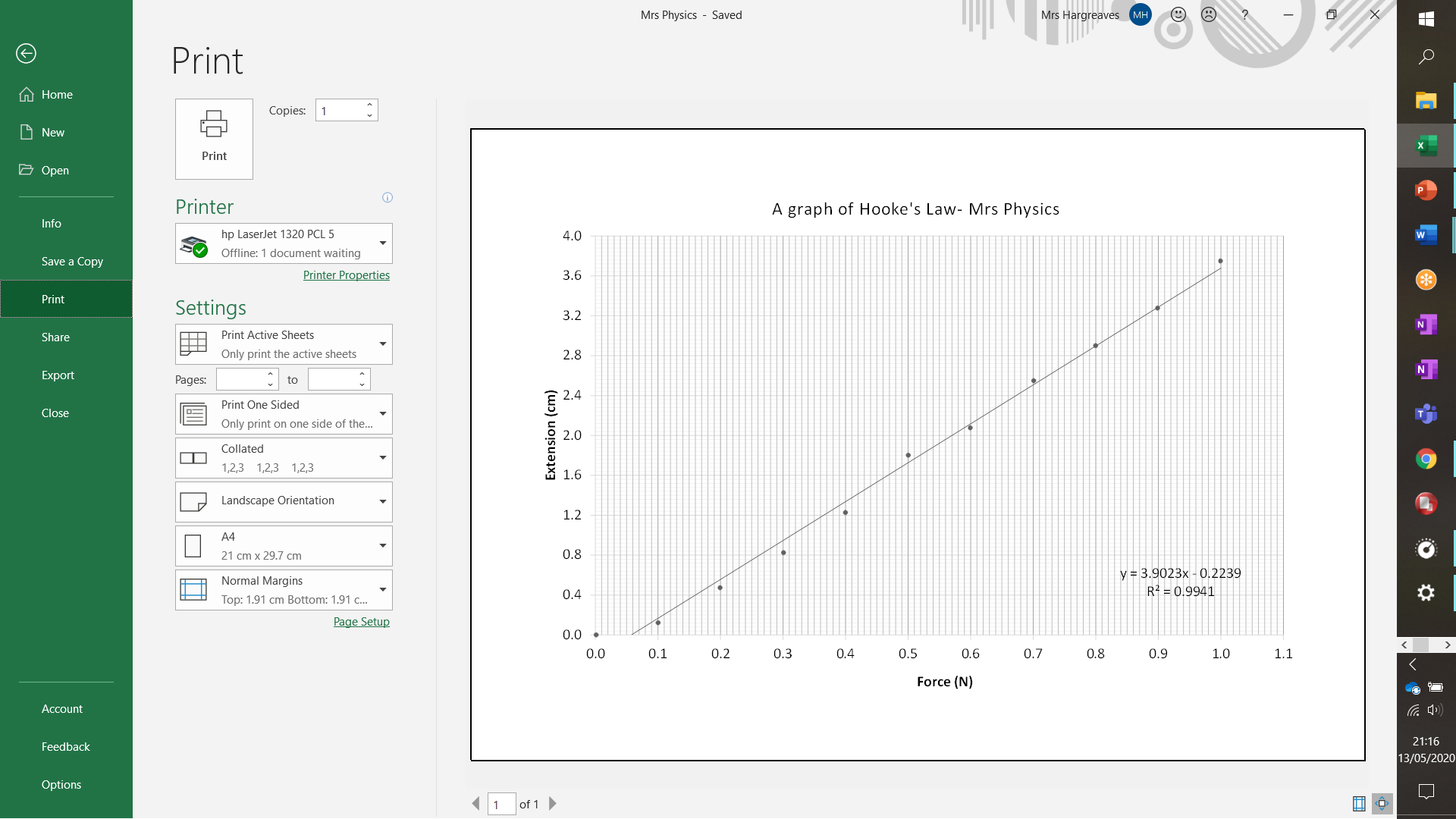




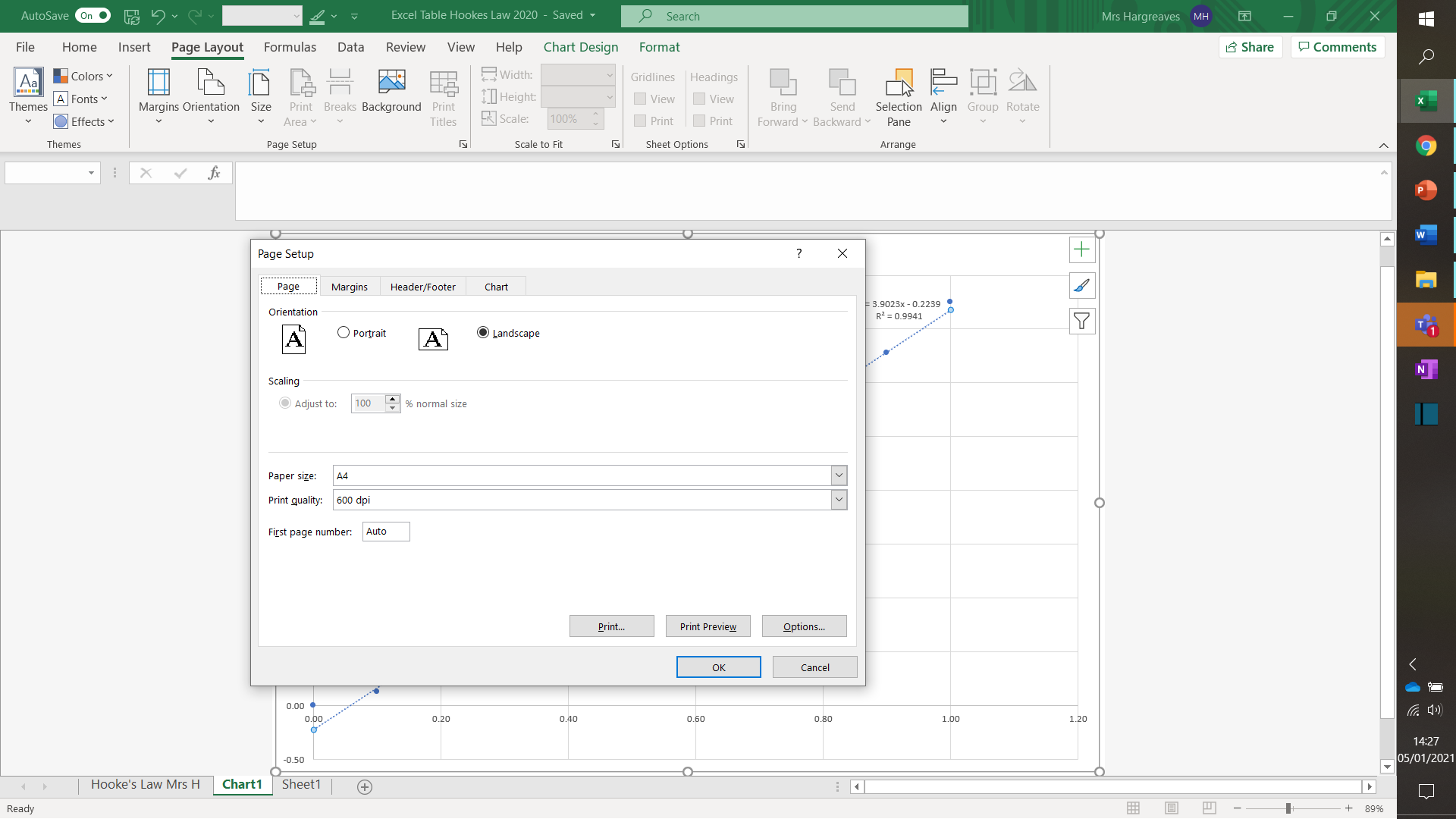
Click on the Chart Title in the Layout menu and give your graph a name. In this case it can be Hooke’s Law, but generally for graphs you would give it the title of

“A Graph of {Y axis} against {X- axis}” by {Name}

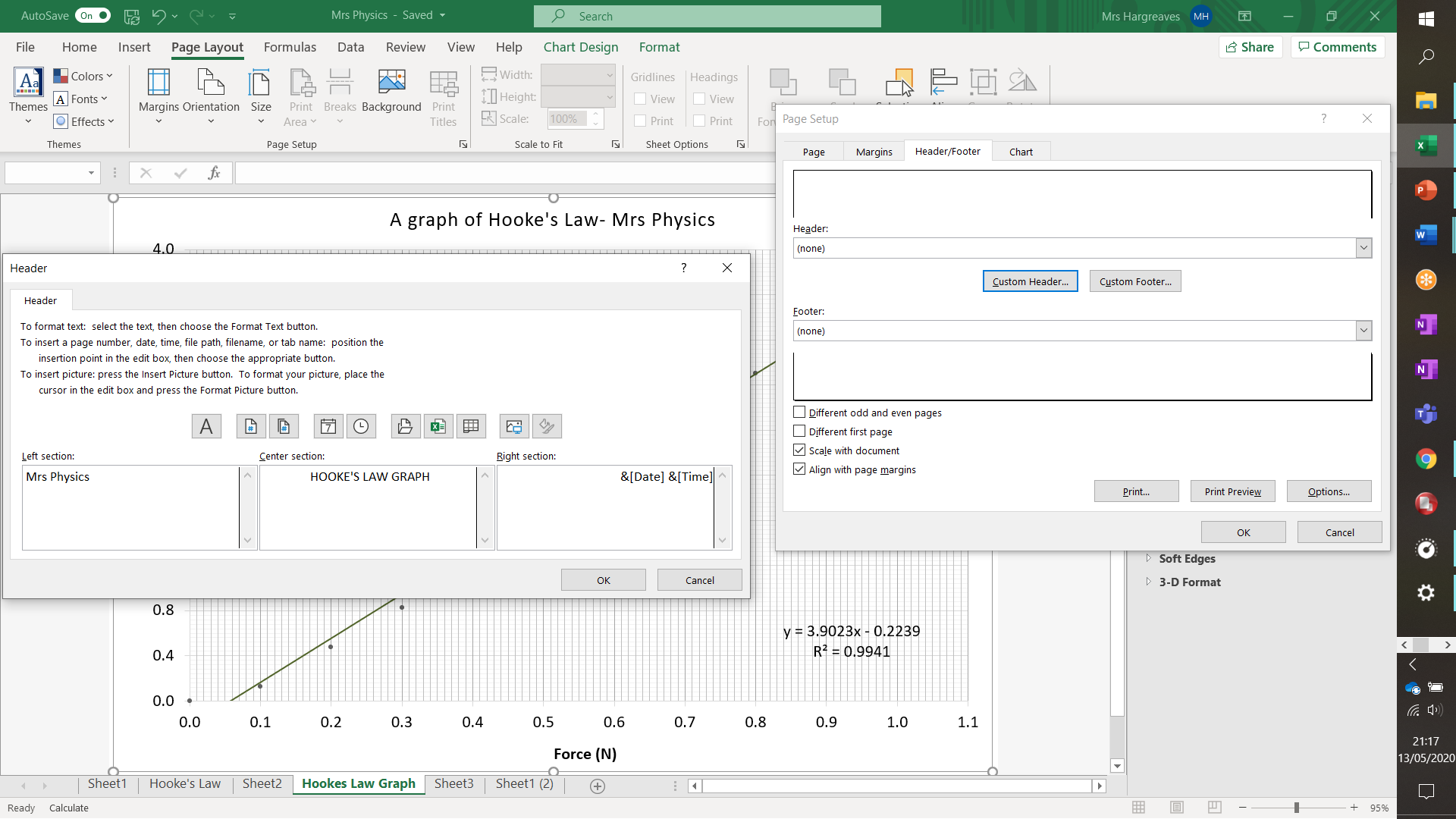




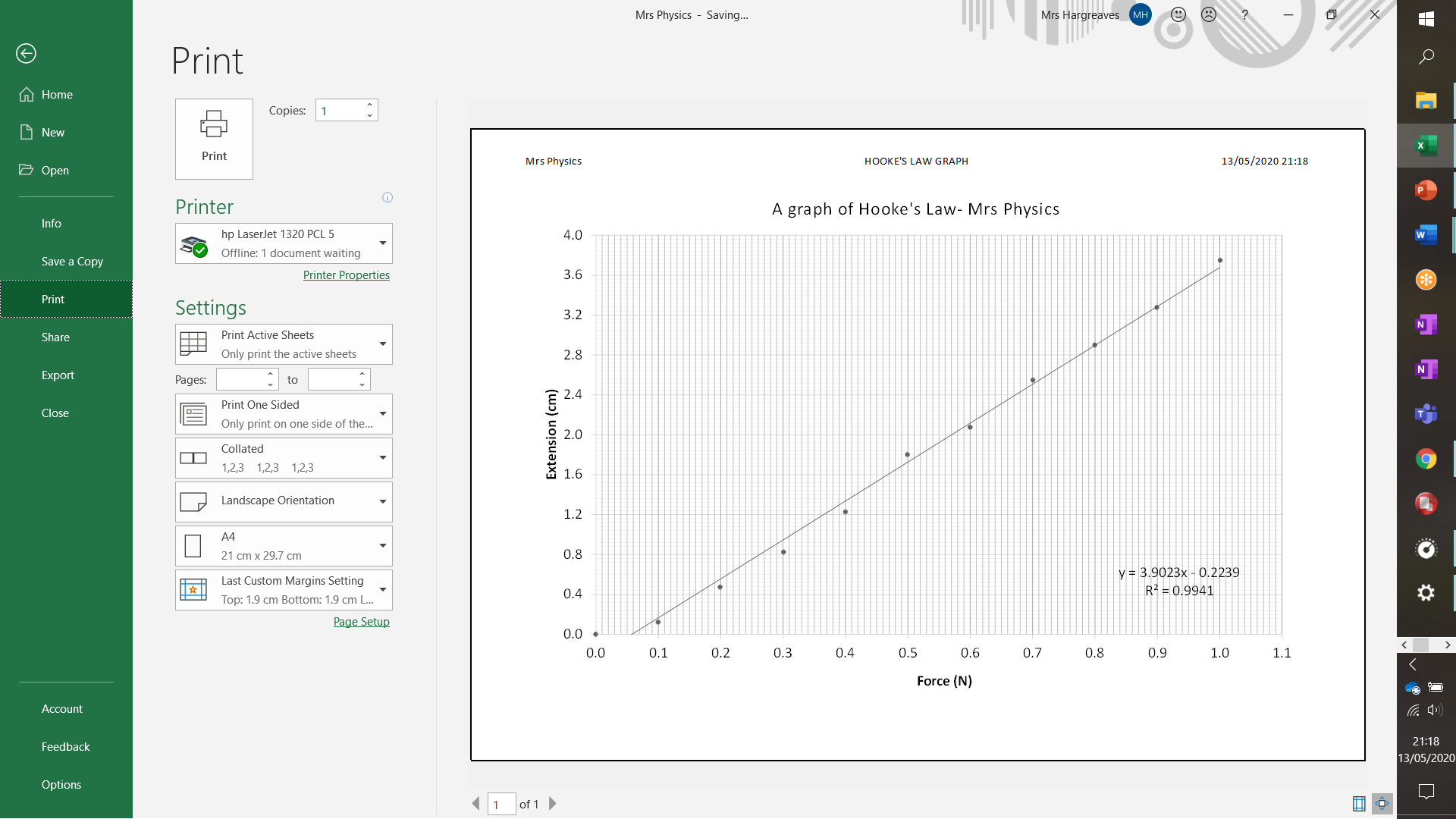
A good graph but your name isn’t on it or other details so we will put a header and footer on the graph.



Click on the page layout, then the extension box at the botton and then when the menu come up click on the header and footer.



In the header and footer you want CUSTOM HEADER. Type in your Name, the title and Register class and maybe the date and time (that comes up by clicking on the calendar and clock)

You can check if you are right when you go to print preview as that is where you’ll see what your graph will look like when it is printed off.

**NOW SUBMIT YOUR GRAPH TO YOUR TEACHER**