



Lesson Plan: Line Graphs

Level: Stage 3

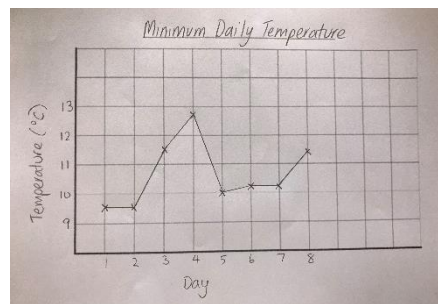
Syllabus link: MA3-18SP “uses appropriate methods to collect data and constructs, interprets and evaluates data displays, including dot plots, line graphs and two-way tables”

LESSON OUTLINE

This lesson is divided into three parts. In the first part, students will be exploring and interpreting real-time line graphs from the SWAQ website. In the second and third parts, they will download weather data from SWAQ and use it to draw line graphs firstly by hand and then using excel.

Resources/Materials:

- Worksheet available at [include link]
- Device with access to SWAQ website
- Microsoft Excel
- Ruler
- Pencil and eraser



Description of activity:

This lesson’s focus is looking at how daily temperature measurements can be represented using line graphs. Before beginning the lesson, students should already be familiar with the format of a line graph and have enough knowledge to be able to answer simple questions.

In Part 1, students will be interpreting a temperature line graph from the SWAQ website. Each student or pair of students will need a device with internet access through which they can access the site. The instructions for how to find the graph are given at the beginning of the worksheet.

In Part 2, students will be using downloaded data to draw a line graph by hand. Once again, the instructions for how to download the data as well as for how to draw the graph are included in the worksheet. We recommend that you encourage your students to draw their graphs using pencil, so that they can erase any mistakes they may make. If students have not plotted any points before, they may require some additional help with this step.

The lesson concludes with Part 3 in which students use the same downloaded data to draw a temperature line graph using Microsoft Excel. Step-by-step instructions with pictures are included on the worksheet. If you think your students might struggle with this, it can also be a good idea to do a demonstration using an overhead projector first. In the demonstration, you should follow the same steps as on the worksheet. Students will then be able to use the worksheet steps as a reminder of the steps they should already be familiar with.

Things to note:

In Part 3, when inserting the title for the vertical axis of the graph in Excel, ideally students would write 'Temperature (°C)'. However, please note that this requires the use of the special symbol for degrees or the use of superscript. If you or your students do not know how to do this, it is also fine for students to write 'Temperature (degrees Celsius)' using words instead.

Additional Resources:

- ▶ An animated video in which a student and robot introduce what a line graph is, how to read a line graph and how to draw your own line graph from a table of data.

<https://www.youtube.com/watch?v=yg7hz7mLH2E>

Key Questions to Ask

What does a line graph look like?

Why is a line graph a good choice for representing daily temperature data? (it shows how a measurement is changing over time)

What steps are required to draw a line graph?

What do you need to remember to include when you draw a line graph (or any graph)? (A title!)

Where should you put the units when making the scale for a line graph? (in the axis title)

Line Graphs

Part 1: Interpreting Line Graphs



Instructions

1. Go to www.swaq.org.au and click 'explore the data'
2. Scroll down until you see the list of school names
3. Click on the name of your school (or if you don't go to one of those schools, you can click on any school)
4. Scroll down until you see a line graph under the heading in the blue banner called 'historical data'
5. Use the temperature line graph to answer the following questions

1. What was the lowest temperature recorded in the last 24 hours?
2. What was the highest temperature recorded in the last 24 hours?
3. What was the temperature at 11 am?
4. Was the temperature mainly increasing or decreasing in the morning?
5. Between which hours was the biggest decrease in temperature?
6. (Extension) Draw a table to show the temperature at each hour.

Part 2: Constructing Line Graphs by Hand

Instructions:

1. Go to www.swaq.org.au and click 'explore the data'
2. Scroll down until you see the list of school names
3. Click on the name of your school (or if you don't go to one of those schools, you can click on any school)
4. Scroll down to the bottom of the page and click on 'download data'
5. Save the file onto your computer. You will be using the data to create a line graph.

1

Look at the data in the first temperature column to see what the highest and lowest temperatures are. In our example, the highest temperature is 12.7 and the lowest is 9.5.

This will help you to create the vertical scale for your graph. You should start the scale from the nearest whole number that is smaller than the lowest temperature, and you should finish the scale with the nearest whole number that is larger than the highest temperature.

In our example, the nearest whole number smaller than 9.5 is 9, and the nearest whole number larger than 12.7 is 13. So, our vertical scale will be from 9 to 13.

Look at your data and decide what the vertical scale for your line graph should be.

	A	B	C
1	Date	Temperature Min	Temperat Hu
2	8/13/2020	9.5	22
3	8/14/2020	9.5	18
4	8/15/2020	11.5	20
5	8/16/2020	12.7	20.4
6	8/17/2020	10	20.4
7	8/18/2020	10.2	21.5
8	8/19/2020	10.2	21.3
9	8/20/2020	11.4	18.8
10			
11			
12			

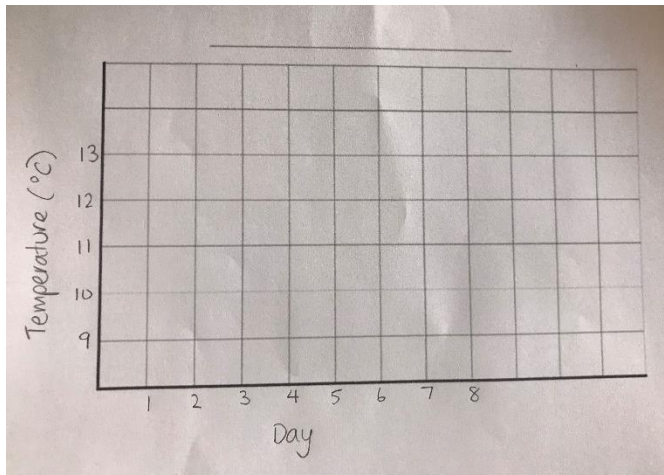
2

Count the number of rows of data you have. Each row represents the temperature on one day. The total number of rows will tell you how many days the temperature was recorded for.

This will help you create the horizontal scale for your graph. Begin at 1 and finish with the number of rows. In our example, the scale will be from 1 to 8.

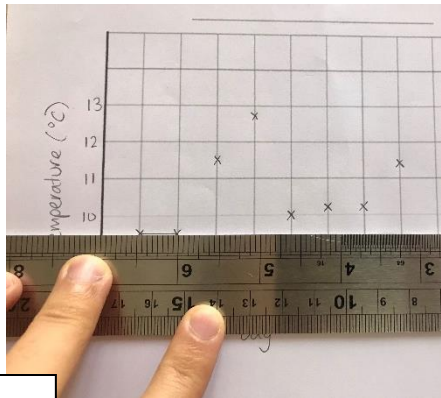
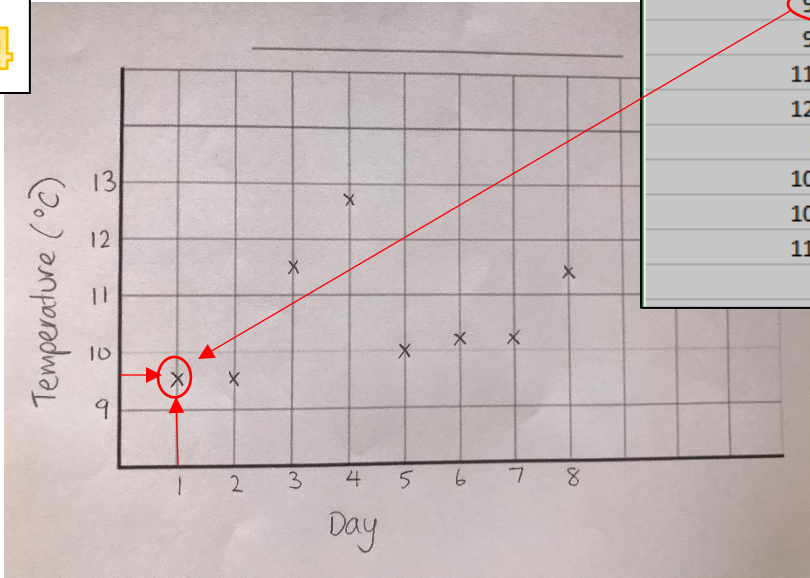
Look at your data and decide what the horizontal scale for your line graph should be.

	A	B	C
1	Date	Temperature Min	Temperat Hu
2	8/13/2020	9.5	1
3	8/14/2020	9.5	2
4	8/15/2020	11.5	3
5	8/16/2020	12.7	4
6	8/17/2020	10	5
7	8/18/2020	10.2	6
8	8/19/2020	10.2	7
9	8/20/2020	11.4	8
10			

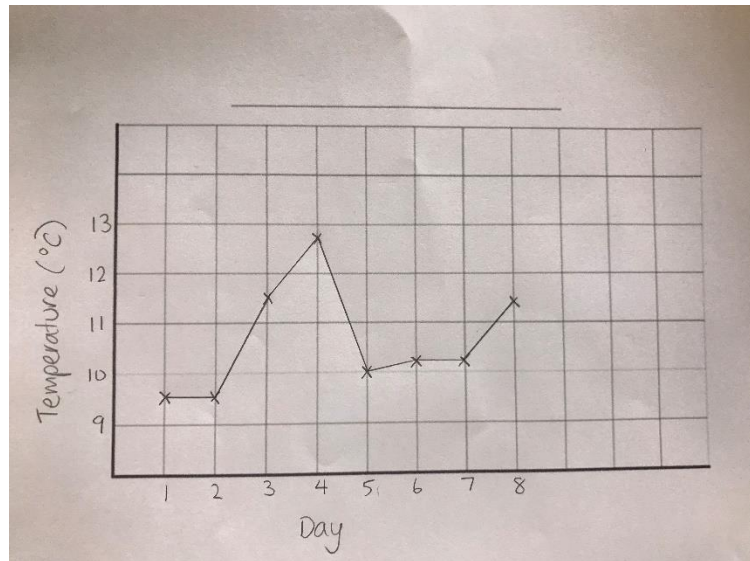


3 Mark your horizontal and vertical scales onto the graph and label each axis, including units for the temperature.

4 Look at your data in Excel to see what the temperature was for each day and mark each data point with a cross. In our example, the temperature was 9.5°C on the first day, so we have marked a cross above the number 1 for the day, and halfway between the 9 and 10 for the temperature. Mark one cross for each day.



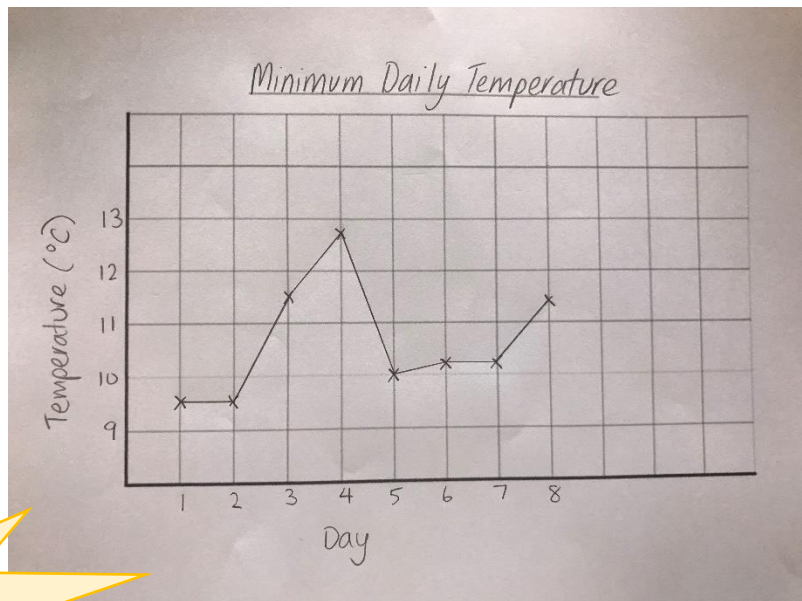
5 Connect each of the crosses by drawing a line between them using a ruler.



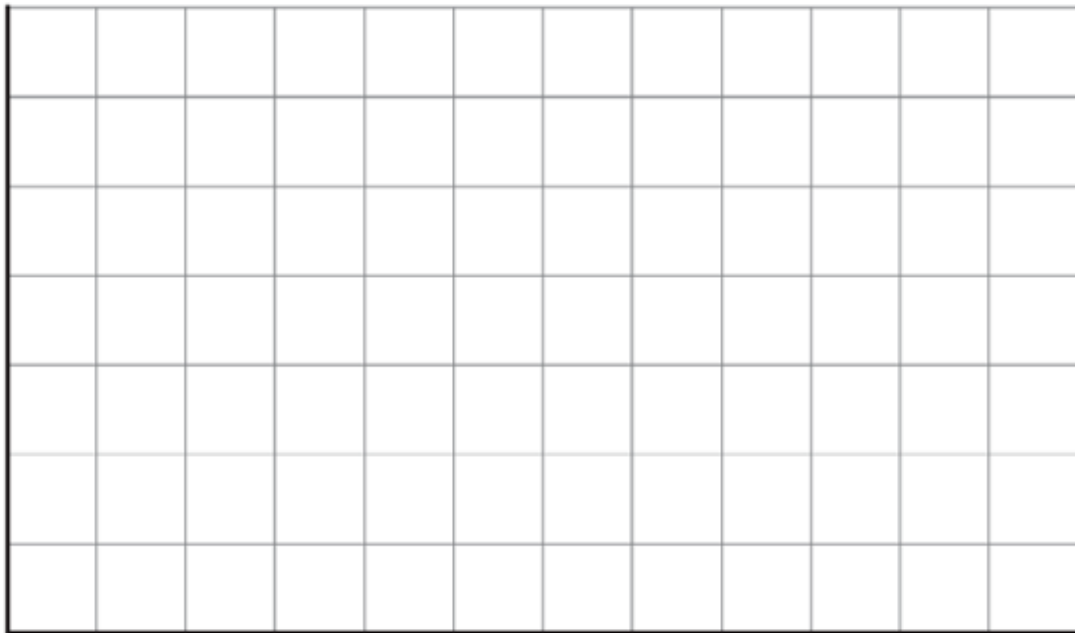
6

Give your graph a title and write it on the line above the graph.

That's it! Your line graph is finished!



Sketch your graph here!



Part 3: Constructing Line Graphs Using Excel

Instructions:

1. Go to www.swaq.org.au and click 'explore the data'
2. Scroll down until you see the list of school names
3. Click on the name of your school (or if you don't go to one of those schools, you can click on any school)
4. Scroll down to the bottom of the page and click on 'download data'
5. Save the file onto your computer, then open it and follow the instructions below

1

Click on the first cell that says 'Temperature' (as shown in the first image). Wait for the white cross to appear, then click and hold on the bottom right-hand corner of the cell and drag the mouse to select the data from the two temperature columns (as shown in the second image).

	A	B	C
1	Date	Temperat	Tempera
2	8/13/2020	9.5	22
3	8/14/2020	9.5	18
4	8/15/2020	11.5	20
5	8/16/2020	12.7	20.4
6	8/17/2020	10	20.4
7	8/18/2020	10.2	21.5
8	8/19/2020	10.2	21.3
9	8/20/2020	11.4	18.8
10			
11			

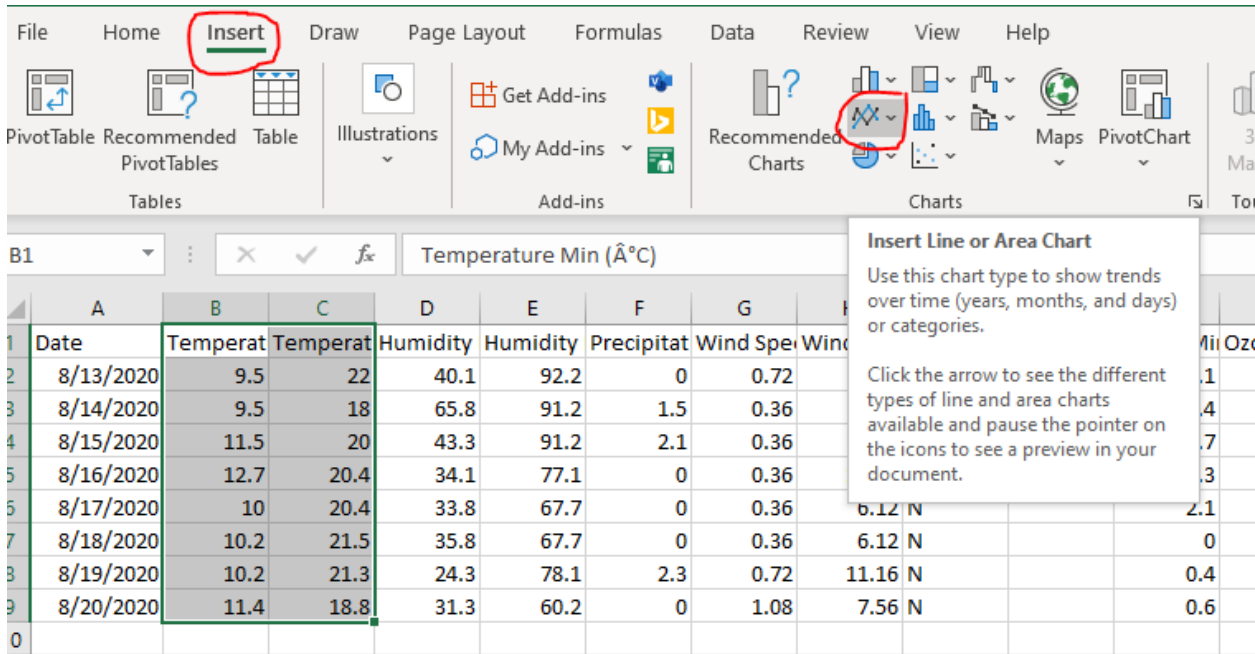


	A	B	C	D	E
1	Date	Temperat	Temperat	Humidity	Hun
2	8/13/2020	9.5	22	40.1	
3	8/14/2020	9.5	18	65.8	
4	8/15/2020	11.5	20	43.3	
5	8/16/2020	12.7	20.4	34.1	
6	8/17/2020	10	20.4	33.8	
7	8/18/2020	10.2	21.5	35.8	
8	8/19/2020	10.2	21.3	24.3	
9	8/20/2020	11.4	18.8	31.3	
10					
11					



2

Click on 'Insert' and then click on the arrow next to the small image of a line chart. This will show you several options of line charts to choose from. Click on the first option under the heading '2-D line'.



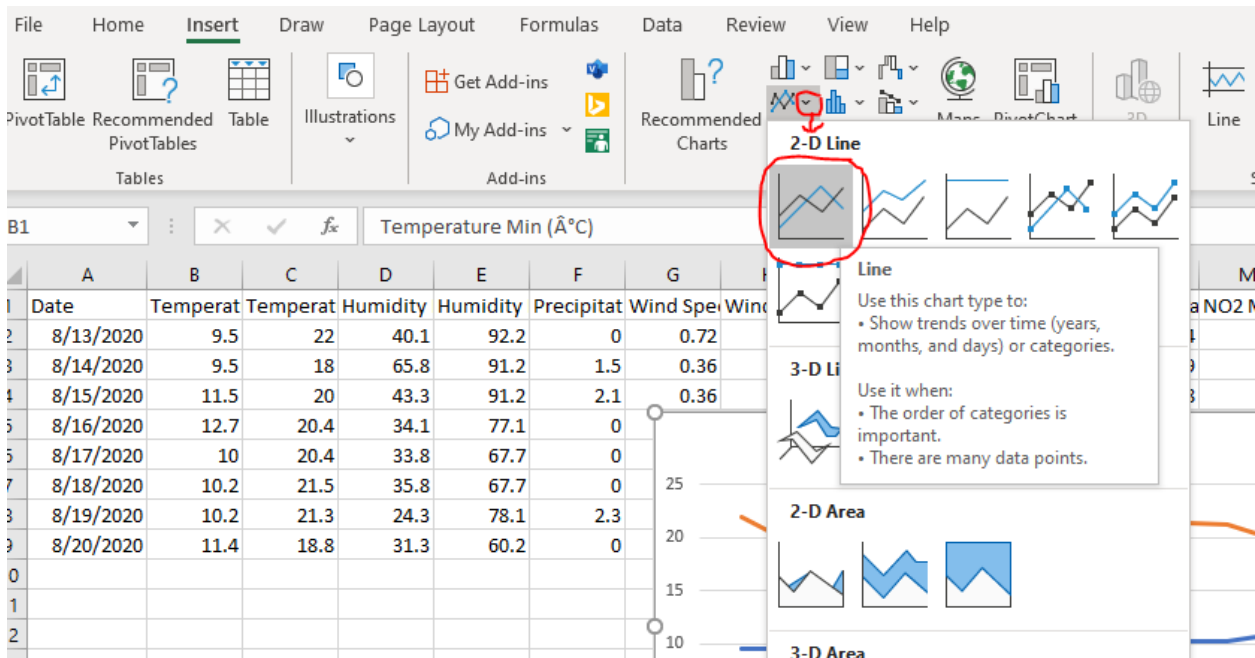
File Home **Insert** Draw Page Layout Formulas Data Review View Help

PivotTable Recommended Table Illustrations Get Add-ins My Add-ins Recommended Charts Maps PivotChart

B1 : x ✓ fx Temperature Min (°C)

	A	B	C	D	E	F	G	H	I	J
1	Date	Temperat	Temperat	Humidity	Humidity	Precipitat	Wind Spe	Wind		Mi Oz
2	8/13/2020	9.5	22	40.1	92.2	0	0.72			1
3	8/14/2020	9.5	18	65.8	91.2	1.5	0.36			4
4	8/15/2020	11.5	20	43.3	91.2	2.1	0.36			7
5	8/16/2020	12.7	20.4	34.1	77.1	0	0.36			3
6	8/17/2020	10	20.4	33.8	67.7	0	0.36	6.12 N		2.1
7	8/18/2020	10.2	21.5	35.8	67.7	0	0.36	6.12 N		0
8	8/19/2020	10.2	21.3	24.3	78.1	2.3	0.72	11.16 N		0.4
9	8/20/2020	11.4	18.8	31.3	60.2	0	1.08	7.56 N		0.6
0										

Insert Line or Area Chart
Use this chart type to show trends over time (years, months, and days) or categories.
Click the arrow to see the different types of line and area charts available and pause the pointer on the icons to see a preview in your document.



File Home **Insert** Draw Page Layout Formulas Data Review View Help

PivotTable Recommended Table Illustrations Get Add-ins My Add-ins Recommended Charts Maps PivotChart 2-D Line

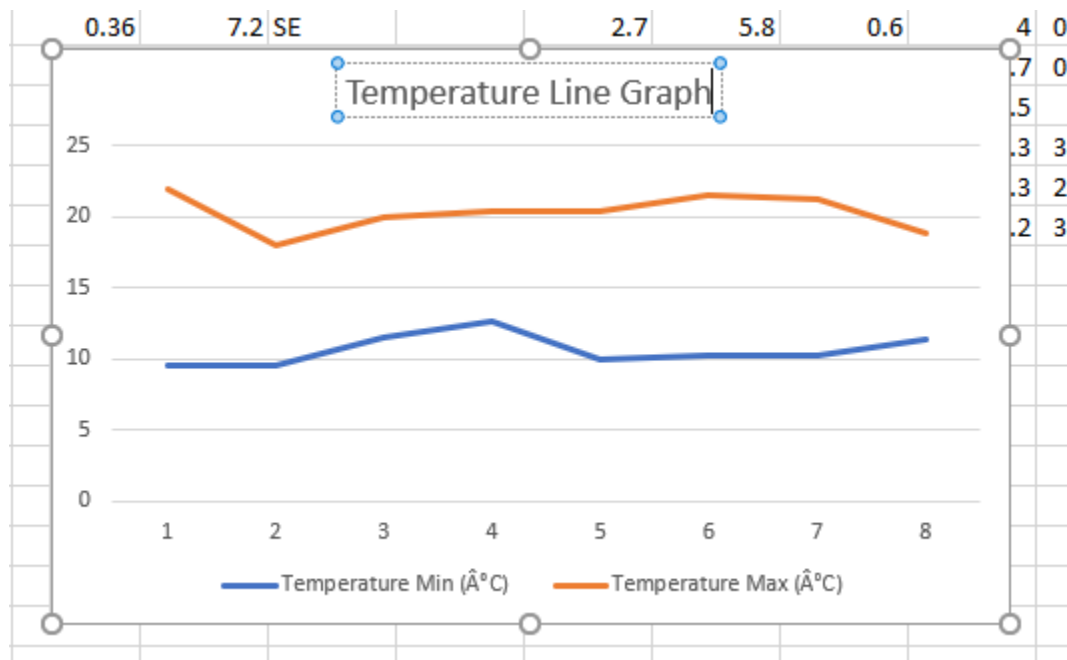
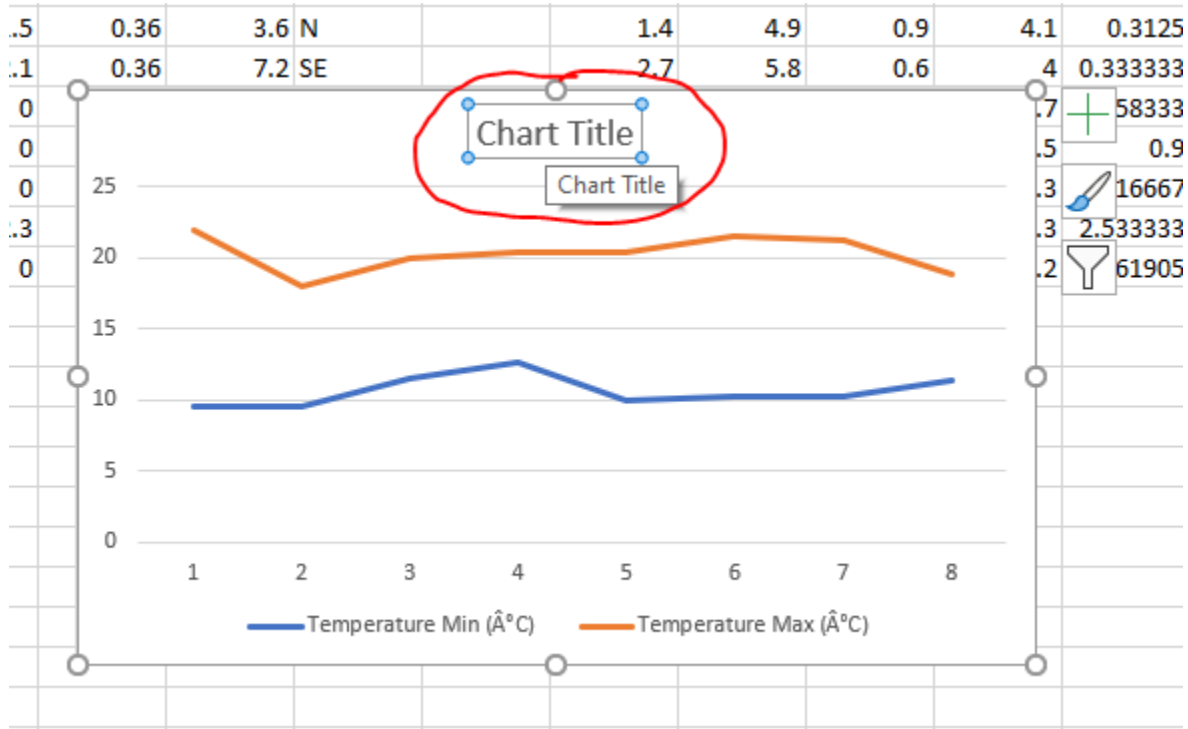
B1 : x ✓ fx Temperature Min (°C)

	A	B	C	D	E	F	G	H	I	J
1	Date	Temperat	Temperat	Humidity	Humidity	Precipitat	Wind Spe	Wind		M
2	8/13/2020	9.5	22	40.1	92.2	0	0.72			a NO2 M
3	8/14/2020	9.5	18	65.8	91.2	1.5	0.36			9
4	8/15/2020	11.5	20	43.3	91.2	2.1	0.36			3
5	8/16/2020	12.7	20.4	34.1	77.1	0				
6	8/17/2020	10	20.4	33.8	67.7	0				
7	8/18/2020	10.2	21.5	35.8	67.7	0	25			
8	8/19/2020	10.2	21.3	24.3	78.1	2.3	20			
9	8/20/2020	11.4	18.8	31.3	60.2	0	15			
0							10			
1										
2										

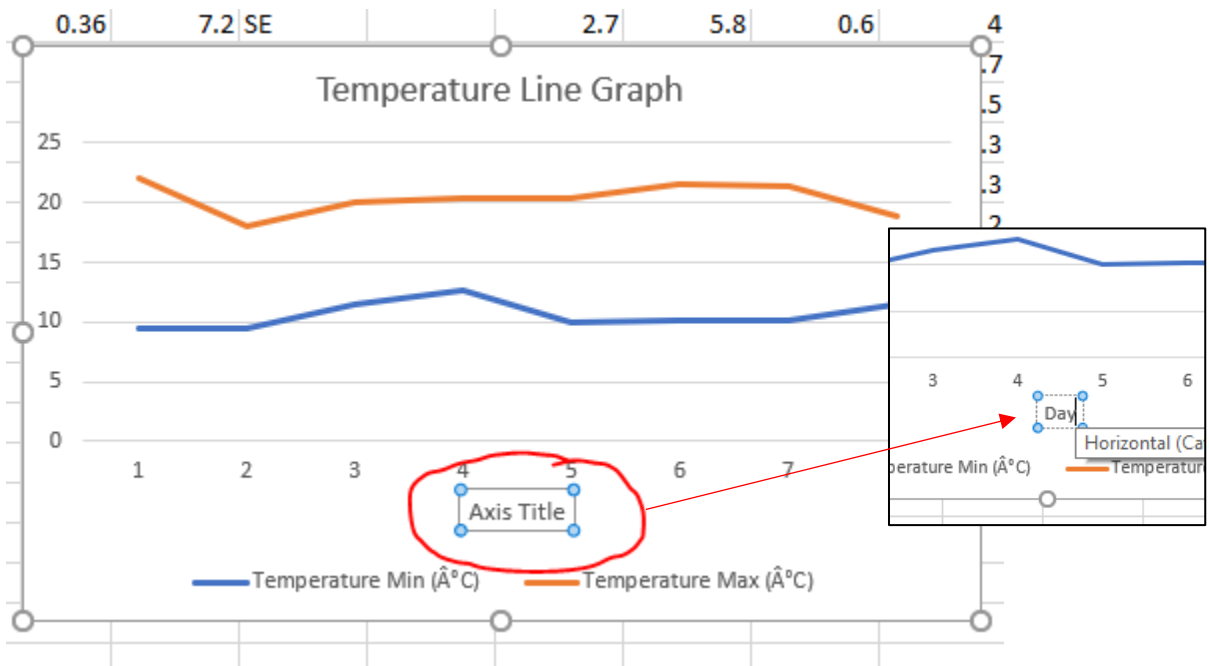
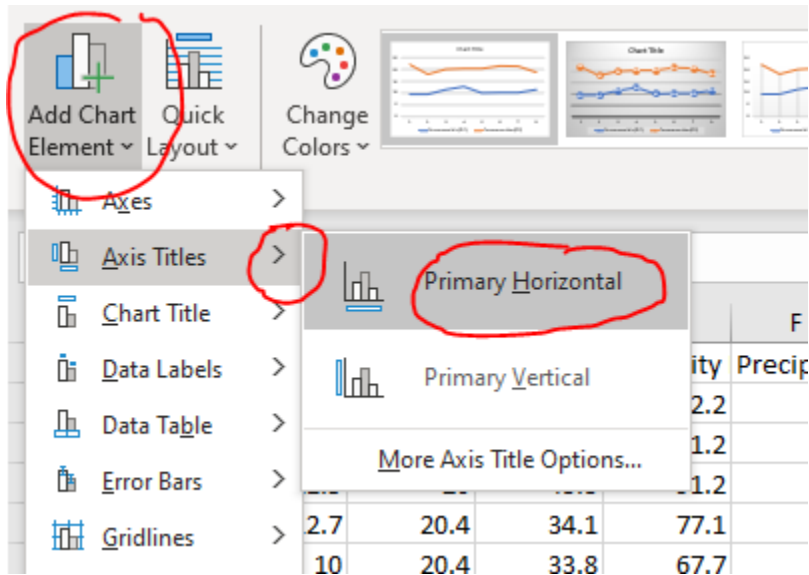
2-D Line
Line
Use this chart type to:
• Show trends over time (years, months, and days) or categories.
3-D Line
Use it when:
• The order of categories is important.
• There are many data points.
2-D Area
3-D Area

4

A text box will appear above your graph with the words 'Chart Title'. Create your new title by deleting these words and typing your own new words into the text box.

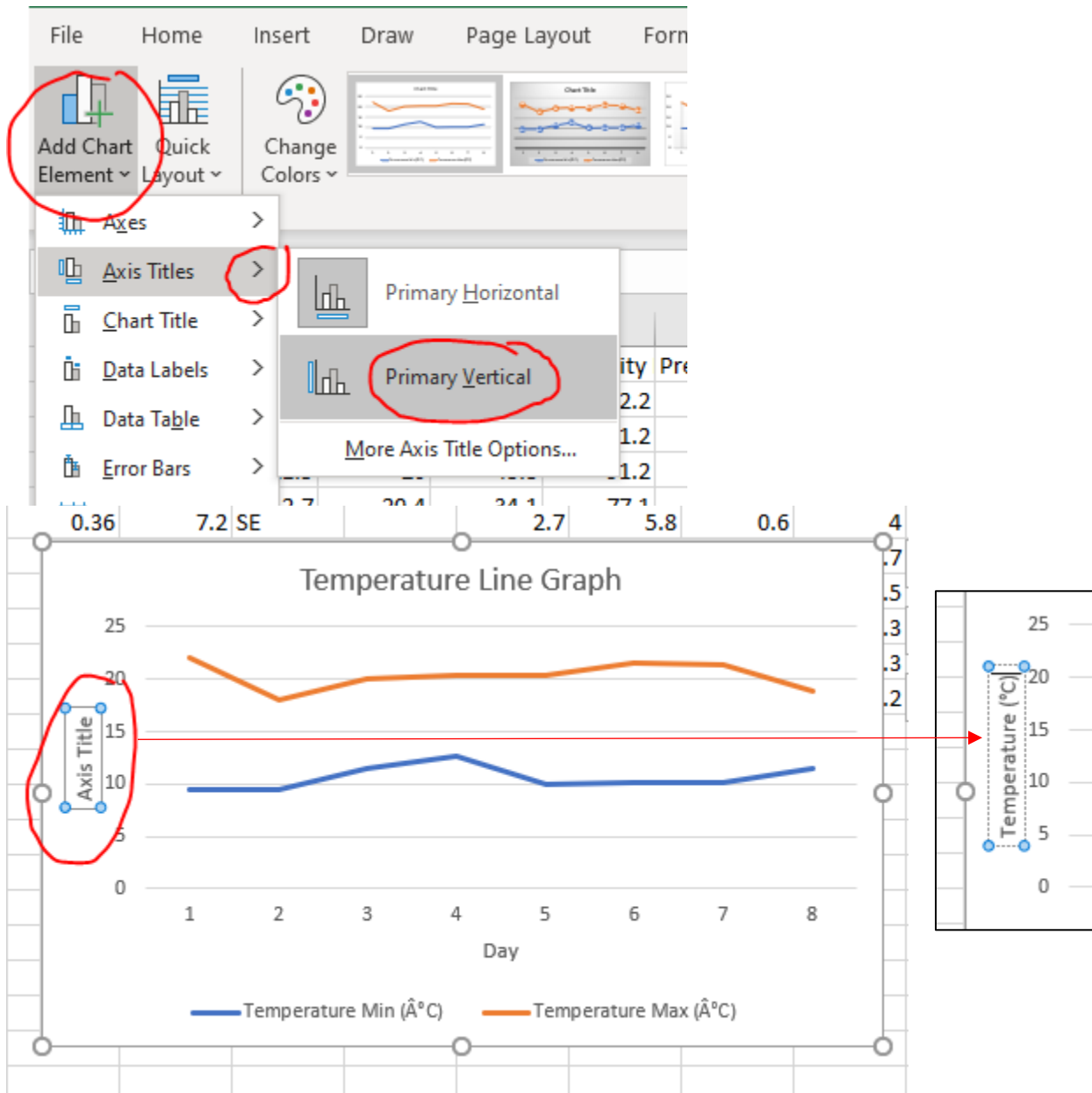


5 Click on 'Add Chart Element' again, this time selecting 'Axis Titles' and 'Primary Horizontal'. A text box will appear below the horizontal axis. You should type your new title into this box. The title should describe what the numbers on the axis represent. In this case, they represent the different days.



6

Click on 'Add Chart Element' again, this time selecting 'Axis Titles' and 'Primary Vertical'. A text box will appear beside the vertical axis. You should type your new title into this box. In this case, they represent the temperature. Don't forget to include the units ($^{\circ}\text{C}$) in your title.



Congratulations! You've finished your Excel line graph!