

Divided Line (contributor: Garry Turner)

Garry's lesson plan for the Divided Line

What is his aim?

To introduce algebra in context using a hands on tool to highlight the relationships between the context, the variables, the table and the graph.

I take every opportunity to create links between mathematics and as many other subjects as possible. With the divided line activity I also incorporate part of our measurement unit by using the strip of metal to make a steel or aluminium ruler for the students to keep. This allows me to include both science outcomes such as the properties of various metals and technology outcomes such as tempering and etching. The activity also doubles as a measurement activity with the students discussing which units to use and what graduations they should include given that the ruler is 30 cm long and 1 inch wide. On the back of their rulers the students also design a geometric pattern which I use as an task to assess their understanding of the outcomes of transformation unit of study.

What equipment does Garry use?

- A strip of paper 2cm x 20cm
- A large piece of paper, A1 size
- Vivid pen
- Map pins

What vocabulary does Garry use?

variable, multiple representations, independent, dependent, x-axis, y-axis, predictor, response, input, output, table, column, row, product, sum

What instructions does Garry give his students?

1. *Using your strip of paper, draw a centre line from one end to the other.*
2. *Choose a random point along the line you have drawn. Now mark a point.*
3. *Draw a semi circle at one end of the line.*

I am intentionally vague here so that my students are forced to think about what they are doing and the different ways of following my instructions. I especially do not show them an example of what it might look like because a large number of students will try to copy exactly what I have shown them.)

4. *Measure the distance of the line from the semi circle to your point. Record this distance in your notebook.*
5. *Measure the distance from your point to the other end the line that does not contain the semi circle. Record this distance in your notebook.*

Question: *What do you notice about the two numbers?*

6. Draw a table in your book with four columns and enough rows to record data from everyone in the class. Label the first column 'length' and the second column 'left over'.
7. Now collect everybody's measurement. Ensure that the measurement from semi circle to the person's point goes in the 'length' column and the measurement from point to the other end the line that does not contain the semi circle goes in the 'left over' column.

Question: What do you notice about each row?

8. Now take your strip of paper to the axes drawn on chart paper pinned to the wall of the classroom. Align your strip of paper along the vertical axis by putting the semicircle on the origin. Place a pin through your point and then rotate your strip of paper 90 degrees. Place another pin in the wall at the other end of your paper strip. Label this point with your name.

Length	Left over	Sum	Product
14.9	15.1	30	225
15.3	14.7	30	225
16	14	30	224
0.5	29.5	30	15
8	22	30	176
1.1	28.9	30	32
10.5	19.5	30	205
14.9	15.1	30	225
3.9	26.1	30	102
23.9	6.1	30	146
29.5	0.5	30	15
1.2	28.8	30	35
9.65	20.35	30	196
27.7	2.3	30	64
28.7	1.3	30	37
2.48	27.52	30	68
1.2	28.8	30	35
1	29	30	29
1.5	28.5	30	43
1	29	30	29
25.9	4.1	30	106
28	2	30	56
28.3	1.8	30.1	51
29.5	0.5	30	15
15	15	30	225
29.2	0.5	29.7	15
8.3	21.7	30	180

Figure 1. An example of a class set of data.

9. When all students have recorded their data on the class graph, the teacher draw a line through the points. (Teachers can photograph the graph and make copies for their students. Students are expected to construct their own graphs of the class' data in their notebooks).

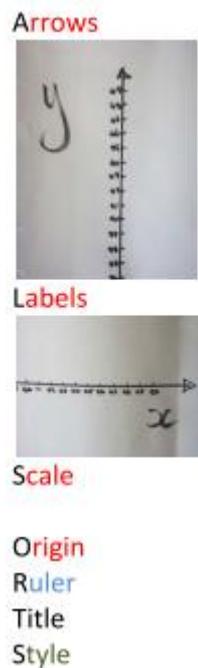


Figure2. ALSORTS – A way to help my students remember the parts of a graph.

Questions:

Can you suggest a label for the first two columns of your table?

Where should these labels go on our graph?

Add each row in your table together?

What do you notice?

Has anybody made a mistake? How do you know?

Suggest a label for the third column of your table?

10. *Fold your strip into a right angle at your point. Glue this shape into your book. Use parallel lines to complete the rectangle. Calculate the area of your rectangle. Write an expression that describes everybody's area calculation. Multiply the first two columns together and write your answer in the fourth column. Suggest a title for this column.*
11. *Graph column one against column two using column one as your independent variable.*

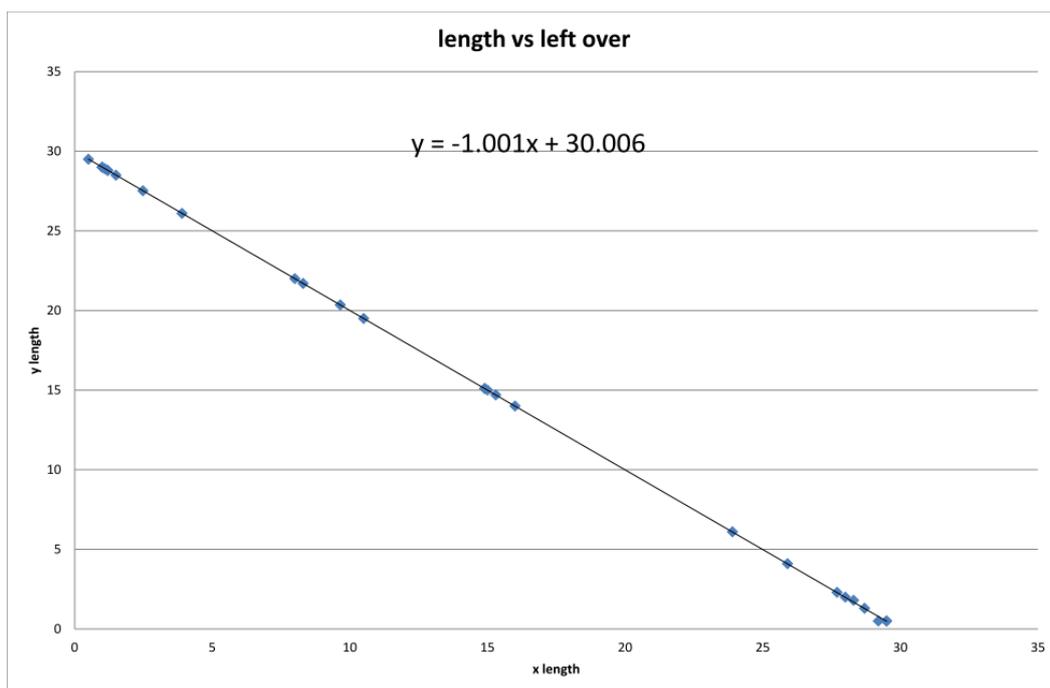


Figure 3. An example of a class graph completed with Excel.

A few final thoughts from Garry about this activity:

I take every opportunity to create links between mathematics and as many other subjects as possible. The divided line activity allows me to include science (the properties of various metals) and technology (tempering, etching etc) outcomes in my lessons.

With the divided line activity I also incorporate part of our measurement unit by using the strip of metal to make a steel ruler for the students to keep. The students discuss what units to use and what graduations they should include. The ruler is 30 cm long and 1 inch wide, so this makes the activity challenging. On the back of their rulers, the students also design a geometric pattern as part of their transformation unit.