



Visualization Chapter 5

Graphing Data

Graphing Data

Have you ever created charts and graphs in any of your classes? Maybe you have created them in math, chemistry, physics, or even business or accounting. Did the use of graphics help you explain technical information? Can you think of ways you could use charts and graphs in engineering? Using technical graphics to represent engineering data is another way to help visualize and better understand engineering concepts.

There is more to visualization in engineering than the geometric data represented with sketches, 2D drawings, and 3D models. Engineering also involves a lot of non-geometric technical data and sometimes this information is more easily explained with the use of graphics instead of words and numbers.

You can present this technical data with line graphs, bar graphs, 3D scatter plots, contour plots, and flow charts. The type of data in these graphs and charts can be used to represent: statistical analysis of test results; pressure changes of gases and their relationship to temperature; geographic contours used for civil engineering studies; and organization charts that show who is working on an engineering project, what their job on that project is, and when their work is due.

Exercises

Exercise 1

Create a flowchart specifically for someone who has never had any experience in the task you are trying to teach him or her. Include definitions of terms, if necessary, along with appropriate graphic images to best explain the process shown in your flow chart. Visualize how you would complete the task yourself and that will help you create instructions for someone else.

Create a flow chart that shows one of the following:

- the steps you would follow to download music onto an MP3 player
- the organizational structure of either your school or a student group you belong to
- using a software most people use regularly like a word processor or spreadsheet, describe how to save a file to the computer and then copy it to a USB drive, CD/DVD, or some other type of external storage media
- how to do long division without a calculator
- how to start a car, reverse out of a parking space, and begin driving forward



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Exercise 2

Create a scatter plot, single bar graph, single line graph, or other appropriate chart as assigned by your teacher for the following data tables.

The average minimum wage each year between 1985 and 2005

Year	Average Minimum Wage in \$/hr
1985	3.35
1986	3.35
1987	3.35
1988	3.35
1989	3.35
1990	3.69
1991	4.14
1992	4.25
1993	4.25
1994	4.25
1995	4.25
1996	4.38
1997	4.88
1998	5.15
1999	5.15
2000	5.15
2001	5.15
2002	5.15
2003	5.15
2004	5.15
2005	5.15



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The average retail price of electricity for the years 2007 and 2008 in cents per kilowatt hour, based on type of customer and region of the United States.

US Average Retail Price of Electricity to Customers by Region (Cents per kilowatt hour)										
Region	Residential		Commercial		Industrial		Transportation		All Sectors	
	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007
New England	13.37	11.95	12.01	10.65	8.37	8.24	5.69	5.49	11.79	10.64
Middle Atlantic	12.53	11.86	11.51	11.02	6.77	6.63	8.17	8.03	10.83	10.32
East North Central	8.49	8.31	7.79	7.43	4.9	4.68	6.12	6.16	6.97	6.67
West North Central	7.88	7.6	6.33	6.18	4.77	4.52	5.64	5.88	6.43	6.18
South Atlantic	8.86	8.36	7.62	6.99	5.03	4.79	7.26	6.55	7.59	7.07
East South Central	7.41	7.15	7.16	6.91	4.4	4.05	11.69	11.78	6.17	5.85
West South Central	9.99	9.09	8.38	7.56	6.54	5.58	8.29	7.05	8.43	7.49
Mountain	8.71	8.27	7.43	7.08	5.39	5.06	6.84	6.26	7.28	6.88
Pacific Contiguous	10.06	10.37	10.47	10.14	6.68	7.53	6.35	5.83	9.48	9.65
Pacific Noncontiguous	17.62	15.9	15.55	14.07	14.11	12.25	13.29	13.12	15.76	14.09



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Aluminum wire resistance

Aluminum Wire Resistance	
Size (AWG)	Ohms/1000 ft
1	0.203
2	0.256
3	0.323
4	0.408
5	0.514
6	0.648
7	0.817
8	1.030
9	1.300
10	1.640