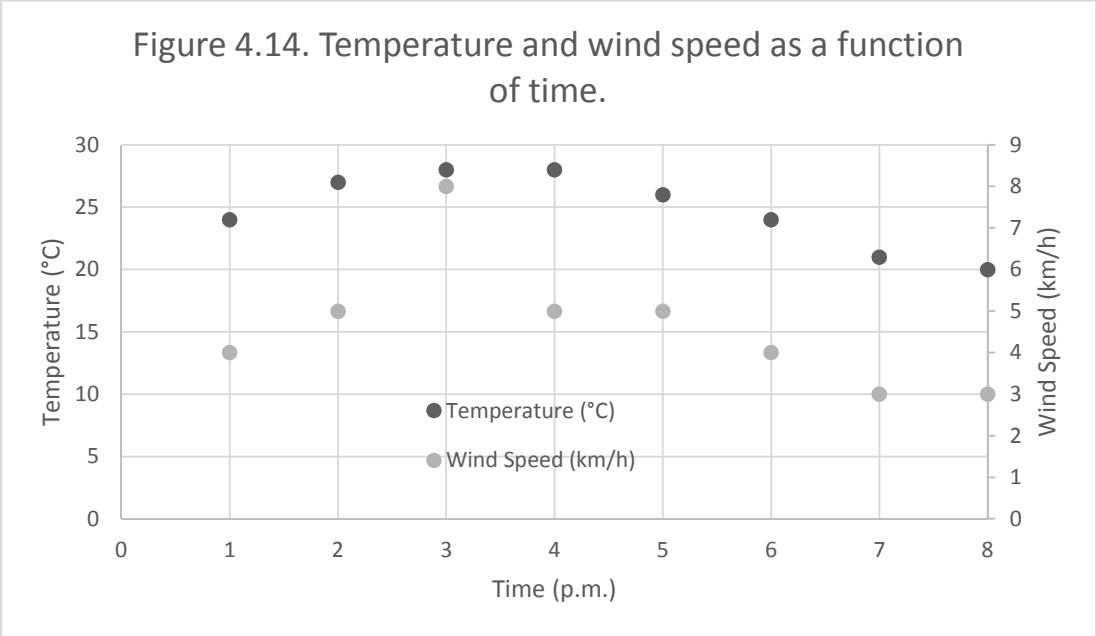
Chapter 4: Engineering Communication

4.14. Plot the following data. Use two different y-axes. Use a scale of zero to 30° C for temperature, and zero to 12 km/h for wind speed. Present your work using the ideas discussed in this chapter and engineering papers.

Time (p.m.)	Temperature (°C)	Wind Speed (km/h)
1	24	4
2	27	5
3	28	8
4	28	5
5	26	5
6	24	4
7	21	3
8	20	3

SOLUTION



4. 15. Create a table that shows the relationship between the units of temperature in degree Celsius and Fahrenheit in the range of -50° C to 50° C. Use increments of 10° C. Present your work incorporating the ideas discussed in this chapter and engineering paper.

SOLUTION

Table 4.15 The relationship between the units of temperature in degrees Celsius and Fahrenheit

Temperature (°C)	Temperature (°F)
-50	-58
-45	-49
-40	-40
-35	-31
-30	-22
-25	-13
-20	-4
-15	5
-10	14
-5	23
0	32
5	41
10	50
15	59
20	68
25	77
30	86
35	95
40	104
45	113
50	122

4.16. Create a table that shows the relationship between the units of mass in kilograms and pound mass in the range of 50 kg to 120 kg. Use increments of 10 kg. Present your work incorporating the ideas discussed in this chapter and engineering paper.

SOLUTION

Table 4.16 The relationship between the units of mass in kilograms and pound mass

mass (kg)	mass (lb_m)
50	110.2
60	132.3
70	154.3
80	176.4
90	198.4
100	220.5
110	242.5
120	264.6

4.17. The given data show the result of a model known as *stopping sight distance*, used by civil engineers to design roadways. This simple model estimates the distance a driver needs in order to stop his or her car, traveling at a certain speed, after detecting a hazard. Plot the data using the ideas discussed in this chapter.

SOLUTION

Speed (km/h)	Speed (m/s)	Stopping sight distance (m)
5	1.4	6
10	2.8	14
15	4.2	23
20	5.6	34
25	6.9	47
30	8.3	60
35	9.7	76
40	11.1	93
45	12.5	111
50	13.9	131
55	15.3	152
60	16.7	175
65	18.1	200
70	19.4	226
75	20.8	253
80	22.2	282

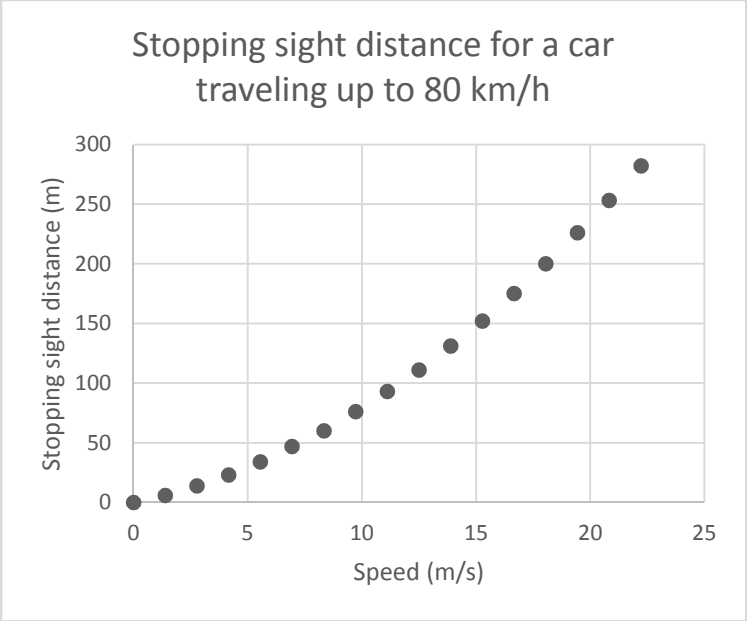
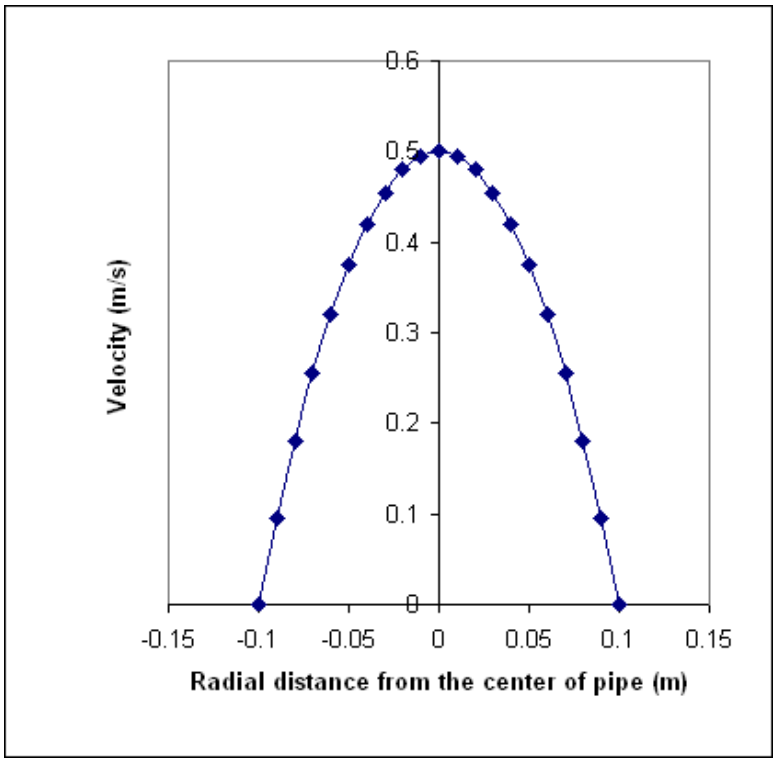


Figure 4.17 The stopping sight distance for a car traveling up to speed of 80 km/h.

4.18. The given data represent the velocity distribution for a flow of a fluid inside a pipe with a radius of 0.1 m. Plot the data using engineering paper and incorporating the ideas discussed in this chapter.

SOLUTION

r	u(r)
-0.1	0
-0.09	0.095
-0.08	0.18
-0.07	0.255
-0.06	0.32
-0.05	0.375
-0.04	0.42
-0.03	0.455
-0.02	0.48
-0.01	0.495
0	0.5
0.01	0.495
0.02	0.48
0.03	0.455
0.04	0.42



0.05	**0.375**
0.06	**0.32**
0.07	**0.255**
0.08	**0.18**
0.09	**0.095**
0.1	**0**

Figure 4.18 A fluid velocity distribution inside a pipe.

4.19. In an annealing process–a process wherein materials such as glass and metal are heated to high temperatures and then cooled slowly to toughen them–thin steel plates are heated to temperatures of 900º C and then cooled in an environment with temperature of 35º C. The results of an annealing process for a thin plate is shown below. Plot the data using engineering paper incorporating the ideas discussed in this chapter.

SOLUTION

Time (hr)	Temperature (°C)
0	900
0.2	722
0.4	580
0.6	468
0.8	379
1	308
1.2	252
1.4	207
1.6	172
1.8	143
2	121
2.2	103
2.4	89
2.6	78
2.8	69
3	62
3.2	57
3.4	52
3.6	49
3.8	46
4	44
4.2	42
4.4	40
4.6	39
4.8	38
5	38

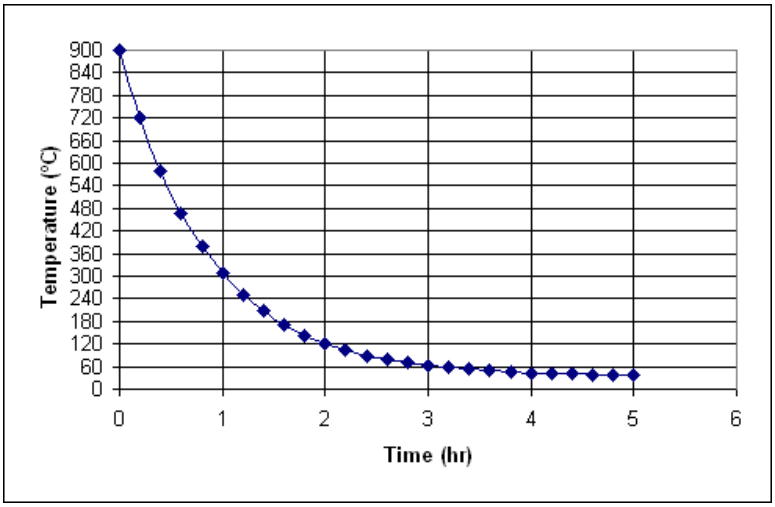


Figure 4.19 The cooling of a piece of metal

4.20. The relationship between spring force and its deflection is given below. Plot the results using engineering paper and incorporating the ideas discussed in this chapter.

SOLUTION

X (mm)	*F* (N)
0	0
5	10
10	20
15	30
20	40

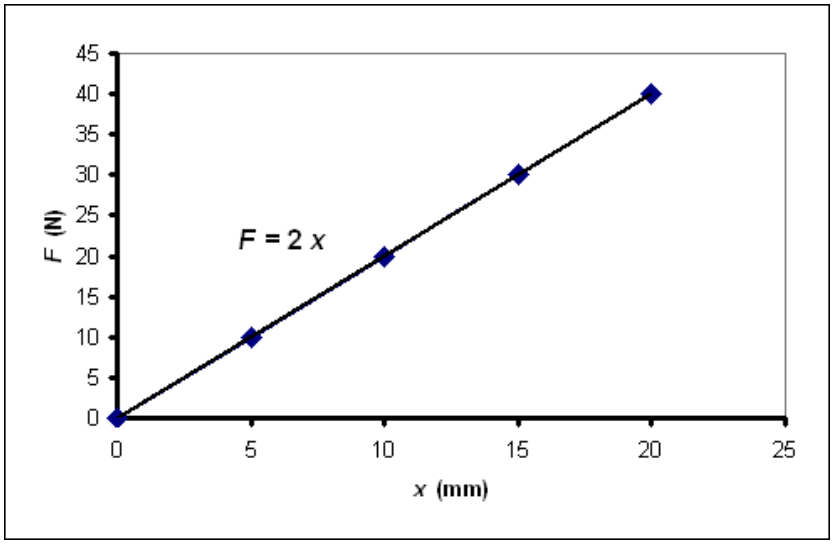


Figure 4.20 The relationship between a spring force and its deflection