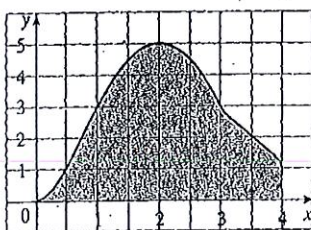

Example On a ship at sea, it is easier to measure how fast you are going than it is to measure how far you have gone. Suppose you are navigator aboard a supertanker. The speed of the ship is measured each 15 minutes and recorded in the table shown. Estimate the distance the ship has gone between 7:30 p.m. and 9:15 p.m.

time	mi/hr	time	mi/hr
7:30	28	8:30	7
7:45	25	8:45	10
8:00	20	9:00	21
8:15	22	9:15	26

ASSIGNMENT: pp. 304-305, #33, 39, 41, 44; Problems 1-6 following.

1. Estimate the area under the graph in the figure by using the Trapezoidal Rule with $n = 4$.



2. The speedometer reading (v) on a car was observed at 1-minute intervals and recorded in the chart. Use the Trapezoidal Rule to estimate the distance traveled by the car.

t (min)	0	1	2	3	4	5	6	7	8	9	10
v (mi/h)	40	42	45	49	52	54	56	57	57	55	56

3. The amount of water that has flowed over the spillway on a dam can be estimated from the flow rate and the length of time the water has been flowing. Suppose that the flow rate has been recorded every 3 hours for a 24-hour period, as shown in the table. Estimate the number of cubic feet of water that has flowed over the dam in this period.

time	ft ³ /hr	time	ft ³ /hr
12:00 a.m.	5,000	12:00 p.m.	11,000
3:00 a.m.	8,000	3:00 p.m.	7,000
6:00 a.m.	12,000	6:00 p.m.	4,000
9:00 a.m.	13,000	9:00 p.m.	6,000
		12:00 a.m.	9,000

4. The table shows the cross-sectional area, A , of a football at various distances, d , from one end. The distances are in inches and the areas are in square inches. Use the Trapezoidal Rule to find, approximately, the integral of area with respect to distance. What are the units of this integral? What, then, do you suppose the integral represents?

d (in.)	A (in ²)	d (in.)	A (in ²)
0	0.0	7	30.3
1	7.0	8	27.2
2	10.5	9	23.0
3	23.0	10	10.5
4	27.2	11	7.0
5	30.3	12	0.0
6	31.8		

5. An observer measures the outside temperature every hour from noon until midnight, recording the temperatures in the following table. What was the average temperature for the 12-hour period?

Time	N	1	2	3	4	5	6	7	8	9	10	11	M
Temp	63	65	66	68	70	69	68	68	65	64	62	58	55

6. The accompanying table shows time-to-speed data for a 1994 Ford Mustang Cobra accelerating from rest to 130 mph. Use trapezoids to estimate how far the Mustang had traveled by the time it reached this speed.

Speed Change	Time (sec)
Zero to 30 mph	2.2
40 mph	3.2
50 mph	4.5
60 mph	5.9
70 mph	7.8
80 mph	10.2
90 mph	12.7
100 mph	16.0
110 mph	20.6
120 mph	26.2
130 mph	37.1