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THE FORMULA SCRIBNER LOG RULE

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The Scribner Decimal C is the accepted log rule in the Pacific Northwest. Usually volume, growth and yield tables are expressed by this rule to give them practical meaning. Yet in the research required for such studies, the rule is unsatisfactory because of rounded values and irregular jumps in volume from diameter to diameter and length to length.

As long ago as 1925, Donald Bruce published a mathematical formula fitted to the Scribner volumes for 16-foot logs $\frac{1}{10}$: $V = .79D^2 - 2D - 4$, in which V is the volume in board feet and D is the diameter, inside bark, in inches at the small end of the log. For scientific purposes, volumes calculated from this formula are superior to either the Decimal C rule or the original values from which the Decimal C was taken.

Volume of a one-foot section of a log may then be taken as $\frac{1}{16}$ the volume of a 16-foot log:

$$.0625(79D^2 - 2D - 4),$$

or

$$.049375D^2 - .125D - .25$$

Volumes computed from this formula are given in table 1 for logs from 6 to 40 inches in diameter by $\frac{1}{10}$ -inch classes.

1/ Bruce, Donald. A formula for the Scribner rule. Journal Forestry 23:432-433. 1925.

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Since the Scribner rule makes no taper allowance for logs up to 40 feet long, the volume of any log may be determined by multiplying the volume of the one-foot section by the length of the log in feet. Table 2 gives the volumes so computed for logs from 8 to 40 feet long by one-inch diameter classes.

These tables are particularly useful for volume table construction but also have wider application. A unique use for table 1 is in determination of the diameter of the average log when the length and volume are known. Such information is often wanted in lumber grade recovery studies, cost of logging studies, and other studies in which those two variables are known. It is only necessary to divide the volume of the average log by its length to get its per-foot volume; then by comparing this volume with tabular values in the table, its diameter may be read directly. This is much simpler than interpolation for length and diameter in a conventional table. Research workers will find many more uses for the tables.

Table 1.--Formula Scribner log rule
 Volumes for a 1-foot section by tenth-inch diameter classes^{1/}

Dia. In.	Volume Bd.ft.	Dia. In.	Volume Bd.ft.	Dia. In.	Volume Bd.ft.	Dia. In.	Volume Bd.ft.	Dia. In.	Volume Bd.ft.
6-10 inch diameter									
6.0	.7775	7.0	1.2944	8.0	1.9100	9.0	2.6244	10.0	3.4375
.1	.8247	.1	1.3515	.1	1.9770	.1	2.7012	.1	3.5242
.2	.8730	.2	1.4096	.2	2.0450	.2	2.7791	.2	3.6120
.3	.9222	.3	1.4687	.3	2.1139	.3	2.8579	.3	3.7007
.4	.9724	.4	1.5288	.4	2.1839	.4	2.9378	.4	3.7904
.5	1.0236	.5	1.5898	.5	2.2548	.5	3.0186	.5	3.8811
.6	1.0758	.6	1.6519	.6	2.3268	.6	3.1004	.6	3.9728
.7	1.1289	.7	1.7149	.7	2.3997	.7	3.1832	.7	4.0654
.8	1.1831	.8	1.7790	.8	2.4736	.8	3.2670	.8	4.1591
.9	1.2382	.9	1.8440	.9	2.5485	.9	3.3517	.9	4.2537
11-15 inch diameter									
11.0	4.3494	12.0	5.3600	13.0	6.4694	14.0	7.6775	15.0	8.9844
.1	4.4460	.1	5.4665	.1	6.5857	.1	7.8037	.1	9.1205
.2	4.5436	.2	5.5740	.2	6.7031	.2	7.9310	.2	9.2576
.3	4.6422	.3	5.6824	.3	6.8214	.3	8.0592	.3	9.3957
.4	4.7418	.4	5.7919	.4	6.9408	.4	8.1884	.4	9.5348
.5	4.8423	.5	5.9023	.5	7.0611	.5	8.3186	.5	9.6748
.6	4.9439	.6	6.0138	.6	7.1824	.6	8.4498	.6	9.8159
.7	5.0464	.7	6.1262	.7	7.3047	.7	8.5819	.7	9.9579
.8	5.1500	.8	6.2396	.8	7.4280	.8	8.7151	.8	10.1010
.9	5.2545	.9	6.3540	.9	7.5522	.9	8.8492	.9	10.2450
16-20 inch diameter									
16.0	10.3900	17.0	11.8944	18.0	13.4975	19.0	15.1994	20.0	17.0000
.1	10.5360	.1	12.0502	.1	13.6632	.1	15.3750	.1	17.1855
.2	10.6830	.2	12.2071	.2	13.8300	.2	15.5516	.2	17.3720
.3	10.8309	.3	12.3649	.3	13.9977	.3	15.7292	.3	17.5594
.4	10.9799	.4	12.5238	.4	14.1664	.4	15.9078	.4	17.7479
.5	11.1298	.5	12.6836	.5	14.3361	.5	16.0873	.5	17.9373
.6	11.2808	.6	12.8444	.6	14.5068	.6	16.2679	.6	18.1278
.7	11.4327	.7	13.0062	.7	14.6784	.7	16.4494	.7	18.3192
.8	11.5856	.8	13.1690	.8	14.8511	.8	16.6320	.8	18.5116
.9	11.7395	.9	13.3327	.9	15.0247	.9	16.8155	.9	18.7050

^{1/} Diameter is diameter inside bark at the small end of the log. Volume for any length may be computed by multiplying the length of log in feet by the 1-foot volume.

Table 1.--(Continued)

Dia.	Volume	Dia.	Volume	Dia.	Volume	Dia.	Volume	Dia.	Volume
In.	Bd.ft.	In.	Bd.ft.	In.	Bd.ft.	In.	Bd.ft.	In.	Bd.ft.

21-25 inch diameter

21.0	18.8994	22.0	20.8975	23.0	22.9914	24.0	25.1900	25.0	27.4844
.1	19.0947	.1	21.1027	.1	23.2095	.1	25.4150	.1	27.7192
.2	19.2911	.2	21.3090	.2	23.4256	.2	25.6410	.2	27.9551
.3	19.4884	.3	21.5162	.3	23.6427	.3	25.8679	.3	28.1919
.4	19.6868	.4	21.7244	.4	23.8608	.4	26.0959	.4	28.4298
.5	19.8861	.5	21.9336	.5	24.0798	.5	26.3248	.5	28.6686
.6	20.0864	.6	22.1438	.6	24.2999	.6	26.5548	.6	28.9084
.7	20.2877	.7	22.3549	.7	24.5209	.7	26.7857	.7	29.1492
.8	20.4900	.8	22.5671	.8	24.7430	.8	27.0176	.8	29.3910
.9	20.6932	.9	22.7802	.9	24.9660	.9	27.2505	.9	29.6337

26-30 inch diameter

26.0	29.8775	27.0	32.3694	28.0	34.9600	29.0	37.6494	30.0	40.4375
.1	30.1222	.1	32.6240	.1	35.2245	.1	37.9237	.1	40.7217
.2	30.3680	.2	32.8796	.2	35.4900	.2	38.1991	.2	41.0070
.3	30.6147	.3	33.1362	.3	35.7564	.3	38.4754	.3	41.2932
.4	30.8624	.4	33.3938	.4	36.0239	.4	38.7528	.4	41.5804
.5	31.1111	.5	33.6523	.5	36.2923	.5	39.0311	.5	41.8686
.6	31.3608	.6	33.9119	.6	36.5618	.6	39.3104	.6	42.1578
.7	31.6114	.7	34.1724	.7	36.8322	.7	39.5907	.7	42.4479
.8	31.8631	.8	34.4340	.8	37.1036	.8	39.8720	.8	42.7391
.9	32.1157	.9	34.6965	.9	37.3760	.9	40.1542	.9	43.0312

31-35 inch diameter

31.0	43.3244	32.0	46.3100	33.0	49.3944	34.0	52.5775	35.0	55.8594
.1	43.6185	.1	46.6140	.1	49.7082	.1	52.9012	.1	56.1930
.2	43.9136	.2	46.9190	.2	50.0231	.2	53.2260	.2	56.5276
.3	44.2097	.3	47.2249	.3	50.3389	.3	53.5517	.3	56.8632
.4	44.5068	.4	47.5319	.4	50.6558	.4	53.8784	.4	57.1998
.5	44.8048	.5	47.8398	.5	50.9736	.5	54.2061	.5	57.5373
.6	45.1039	.6	48.1488	.6	51.2924	.6	54.5348	.6	57.8759
.7	45.4039	.7	48.4587	.7	51.6122	.7	54.8644	.7	58.2154
.8	45.7050	.8	48.7696	.8	51.9330	.8	55.1951	.8	58.5560
.9	46.0070	.9	49.0815	.9	52.2547	.9	55.5267	.9	58.8975

36-40 inch diameter

36.0	59.2400	37.0	62.7194	38.0	66.2975	39.0	69.9744	40.0	73.7500
.1	59.5835	.1	63.0727	.1	66.6607	.1	70.3475		
.2	59.9280	.2	63.4271	.2	67.0250	.2	70.7216		
.3	60.2734	.3	63.7824	.3	67.3902	.3	71.0967		
.4	60.6199	.4	64.1388	.4	67.7564	.4	71.4728		
.5	60.9673	.5	64.4961	.5	68.1236	.5	71.8498		
.6	61.3158	.6	64.8544	.6	68.4918	.6	72.2279		
.7	61.6652	.7	65.2137	.7	68.8609	.7	72.6069		
.8	62.0156	.8	65.5740	.8	69.2311	.8	72.9870		
.9	62.3670	.9	65.9352	.9	69.6022	.9	73.3680		

Table 2.--Formula Scribner log rule
 Volumes for logs 8- to 40-feet long by 1-inch diameter classes

Top diameter of log inside bark	Volume of log by length								Top diameter of log inside bark
	8 feet	10 feet	12 feet	14 feet	16 feet	18 feet	20 feet	22 feet	
Inches	Board feet								Inches
6	6	8	9	11	12	14	16	17	6
7	10	13	16	18	21	23	26	28	7
8	15	19	23	27	31	34	38	42	8
9	21	26	31	37	42	47	52	58	9
10	28	34	41	48	55	62	69	76	10
11	35	43	52	61	70	78	87	96	11
12	43	54	64	75	86	96	107	118	12
13	52	65	78	91	104	116	129	142	13
14	61	77	92	107	123	138	154	169	14
15	72	90	108	126	144	162	180	198	15
16	83	104	125	145	166	187	208	229	16
17	95	119	143	167	190	214	238	262	17
18	108	135	162	189	216	243	270	297	18
19	122	152	182	213	243	274	304	334	19
20	136	170	204	238	272	306	340	374	20
21	151	189	227	265	302	340	378	416	21
22	167	209	251	293	334	376	418	460	22
23	184	230	276	322	368	414	460	506	23
24	202	252	302	353	403	453	504	554	24
25	220	275	330	385	440	495	550	605	25
26	239	299	359	418	478	538	598	657	26
27	259	324	388	453	518	583	647	712	27
28	280	350	420	489	559	629	699	769	28
29	301	376	452	527	602	678	753	828	29
30	324	404	485	566	647	728	809	890	30
31	347	433	520	607	693	780	866	953	31
32	370	463	556	648	741	834	926	1019	32
33	395	494	593	692	790	889	988	1087	33
34	421	526	631	736	841	946	1052	1157	34
35	447	559	670	782	894	1005	1117	1229	35
36	474	592	711	829	948	1066	1185	1303	36
37	502	627	753	878	1004	1129	1254	1380	37
38	530	663	796	928	1061	1193	1326	1459	38
39	560	700	840	980	1120	1260	1399	1539	39
40	590	738	885	1032	1180	1328	1475	1622	40