





常用對數表

Table with columns: No., 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, Diff. Rows 9800-9850.

常用對數表

Table with columns: No., 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, Diff. Rows 9850-9900.





常用對數表

Table of logarithms for numbers 10100 to 10150. Columns include No., 0-9 digits, and Diff. values. Includes sub-headers for different ranges.

常用對數表

Table of logarithms for numbers 10150 to 10200. Columns include No., 0-9 digits, and Diff. values. Includes sub-headers for different ranges.

常用對數表

Table with columns: No., 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, Diff. Rows include values for 10200, 10211, 10221, 10231, 10241, and 10250.

常用對數表

Table with columns: No., 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, Diff. Rows include values for 10250, 10261, 10271, 10281, 10291, and 10300.

Table of logarithms on page 207. Columns include No., 0-9 digits, and Diff. Values range from 01283722 to 01494035.

Table of logarithms on page 208. Columns include No., 0-9 digits, and Diff. Values range from 01494035 to 01703334.











0° 對數 SINES, COSEC, COTANG, SECANT, AND COSINES.

Table with columns: Sine, Diff., Cosec., Tang., Diff., Cotang., Secant, D., Cosine. Rows 0-60.

1° 對數 SINES, COSEC, COTANG, SECANT, AND COSINES.

Table with columns: Sine, Diff., Cosec., Tang., Diff., Cotang., Secant, D., Cosine. Rows 0-60.



4° 對數 SINES, COSEC, COTANG, SECANT, AND COSINES.

Table of trigonometric functions for 4°. Columns include Sine, Diff., Cosec., Tang., Diff., Cotang., Secant, D., and Cosine. Rows are numbered 0 to 60.

5° 對數 SINES, COSEC, COTANG, SECANT, AND COSINES.

Table of trigonometric functions for 5°. Columns include Sine, Diff., Cosec., Tang., Diff., Cotang., Secant, D., and Cosine. Rows are numbered 0 to 60.





8° 對數 SINES, COSEC, COTANG, SECANT, AND COSINES.

Table of trigonometric functions for 8 degrees. Columns include Sine, Diff., Cosec., Tang., Diff., Cotang., Secant, D., and Cosine. Rows are numbered 0 to 60.

9° 對數 SINES, COSEC, COTANG, SECANT, AND COSINES.

Table of trigonometric functions for 9 degrees. Columns include Sine, Diff., Cosec., Tang., Diff., Cotang., Secant, D., and Cosine. Rows are numbered 0 to 60.

















24° 對數 SINES, COSEC, COTANG, SECANT, AND COSINES.

Table with columns: Sine, Diff., Cosec., Tang., Diff., Cotang., Secant, D., Cosine. Rows 0 to 60.

Cosine Diff. Secant Cotang. Diff. Tang. Cosec. D. Sine

25° 對數 SINES, COSEC, COTANG, SECANT, AND COSINES.

Table with columns: Sine, Diff., Cosec., Tang., Diff., Cotang., Secant, D., Cosine. Rows 0 to 60.

Cosine Diff. Secant Cotang. Diff. Tang. Cosec. D. Sine





30° 對數 SINES, COSEC, COTANG, SECANT, AND COSINES.

Table of trigonometric functions for 30 degrees. Columns include Sine, Diff., Cosec., Tang., Diff., Cotang., Secant, D., and Cosine. Rows range from 0 to 60.

31° 對數 SINES, COSEC, COTANG, SECANT, AND COSINES

Table of trigonometric functions for 31 degrees. Columns include Sine, Diff., Cosec., Tang., Diff., Cotang., Secant, D., and Cosine. Rows range from 0 to 60.



34° 對數 SINES, COSEC, COTANG, SECANT, AND COSINES.

Table of trigonometric values for 34 degrees, including Sine, Diff., Cosec., Tang., Diff., Cotang., Secant, D., and Cosine columns.

35° 對數 SINES, COSEC, COTANG, SECANT, AND COSINES.

Table of trigonometric values for 35 degrees, including Sine, Diff., Cosec., Tang., Diff., Cotang., Secant, D., and Cosine columns.



38° 對數 SINES, COSEC, COTANG, SECANT, AND COSINES.

Table with columns: Sine, Diff., Cosec., Tang., Diff., Cotang., Secant, Diff., Cosine. Rows 0-60.

39° 對數 SINES, COSEC, COTANG, SECANT, AND COSINES.

Table with columns: Sine, Diff., Cosec., Tang., Diff., Cotang., Secant, Diff., Cosine. Rows 0-60.





42° 對數SINES, COSEC, COTANG, SECANT, AND COSINES.

Table of trigonometric values for 42 degrees, including Sine, Diff., Cosec., Tang., Diff., Cotang., Secant, Diff., and Cosine columns.

Cosine Diff. Secant Cotang. Diff. Tang. Cosec. Diff. Sine

43° 對數SINES, COSEC, COTANG, SECANT, AND COSINES.

Table of trigonometric values for 43 degrees, including Sine, Diff., Cosec., Tang., Diff., Cotang., Secant, Diff., and Cosine columns.

Cosine Diff. Secant Cotang. Diff. Tang. Cosec. Diff. Sine

44° 對數SINES, COSEC, COTANG. SECANT, AND COSINES.

Table with columns: Sine, Diff., Cosec., Tang., Diff., Cotang., Secant, Diff., Cosine. Rows 0-60.

半徑 1 ニ對スル弧長表

Table with columns: 0°, 1°, 2°, 3°, 4°, 5°, 6°, 7°. Rows 0-60.

45°

半徑 1 ニ對スル弧長表

Table with columns for angles 8° to 15° and corresponding arc length values. Includes a column for degrees on the right side of the table.

半徑 1 ニ對スル弧長表

Table with columns for angles 16° to 23° and corresponding arc length values. Includes a column for degrees on the right side of the table.

半徑 1 ニ對スル弧長表

Table with columns for angles 24° to 31° and corresponding arc lengths. The table contains 60 rows of data.

半徑 1 ニ對スル弧長表

Table with columns for angles 32° to 39° and corresponding arc lengths. The table contains 60 rows of data.

半徑 1 ニ對スル弧長表

Table with columns for angles 40° to 47° and values for arc lengths. Includes a column for degrees (°) and minutes (').

半徑 1 ニ對スル弧長表

Table with columns for angles 48° to 55° and values for arc lengths. Includes a column for degrees (°) and minutes (').

半徑 1 ニ對スル弧長表

Table with columns for degrees (56 to 62) and corresponding numerical values for arc lengths.

半徑 1 ニ對スル弧長表

Table with columns for degrees (63 to 69) and corresponding numerical values for arc lengths.





半径1ニ對スル弧長表

Table with columns for angles (84°, 85°, 86°, 87°, 88°, 89°, 90°) and corresponding numerical values for arc length, chord, height, area, and central angle.

弧長(L)、縦距(C)、欠圓高(H)、欠圓面積(A)、中心角(θ)、半径(R)

Table with columns for central angle (θ) and corresponding values for arc length (L/R), chord (C/R), height (H/R), and area (A/R²).





3° 眞數 SINES, COSINES, AND CHORDS, &c.

Table with columns: Sine, Diff., Covers., Chord, Co-chord, Vers., Diff., Cosine. Rows 0 to 60.

眞數 SINES, COSINES, AND CHORDS, &c. 86°

4° 眞數 SINES, COSINES, AND CHORDS, &c.

Table with columns: Sine, Diff., Covers., Chord, Co-chord, Vers., Diff., Cosine. Rows 0 to 60.

眞數 SINES, COSINES, AND CHORDS, &c. 85°



7° 眞數 SINES, COSINES, AND CHORDS, &c

Table for 7 degrees: Columns include Sine, Diff., Covers., Chord, Co-chord, Vers., Diff., Cosine. Rows range from 0 to 60.

眞數 SINES, COSINES, AND CHORDS, &c. 82°

8° 眞數 SINES, COSINES, AND CHORDS, &c.

Table for 8 degrees: Columns include Sine, Diff., Covers., Chord, Co-chord, Vers., Diff., Cosine. Rows range from 0 to 60.

眞數 SINES, COSINES, AND CHORDS, &c. 81°

90° 眞數 SINES, COSINES, AND CHORDS, &c.

Table with 8 columns: Sine, Diff., Covers., Chord, Co-chord, Vers., Diff., Cosine. Rows 0 to 90. Bottom row labels: Cosine, Diff., Vers., Co-chord, Chord, Covers., Diff., Sine.

100° 眞數 SINES, COSINES, AND CHORDS, &c.

Table with 8 columns: Sine, Diff., Covers., Chord, Co-chord, Vers., Diff., Cosine. Rows 0 to 90. Bottom row labels: Cosine, Diff., Vers., Co-chord, Chord, Covers., Diff., Sine.

11° 眞數 SINES, COSINES, AND CHORDS, &c.

Table for 11 degrees containing columns for Sine, Diff., Covers., Chord, Co-chord, Vers., Diff., Cosine, and Sine. Rows range from 0 to 60.

眞數 SINES, COSINES, AND CHORDS, &c. 78°

12° 眞數 SINES, COSINES, AND CHORDS, &c.

Table for 12 degrees containing columns for Sine, Diff., Covers., Chord, Co-chord, Vers., Diff., Cosine, and Sine. Rows range from 0 to 60.

眞數 SINES, COSINES, AND CHORDS, &c. 77°





15° 眞數 SINES, COSINES, AND CHORDS, &c.

Table with columns: Sine, Diff., Covers., Chord, Co-chord, Vers., Diff., Cosine. Rows 0-60.

眞數 SINES, COSINES, AND CHORDS, &c. 74°

16° 眞數 SINES, COSINES, AND CHORDS, &c.

Table with columns: Sine, Diff., Covers., Chord, Co-chord, Vers., Diff., Cosine. Rows 0-60.

眞數 SINES, COSINES, AND CHORDS, &c. 73°







23° 眞數 SINES, COSINES, AND CHORDS, &c.

Table for 23 degrees containing columns for Sine, Diff., Covers., Chord, Co-chord, Vers., Diff., Cosine and Cosine, Diff., Vers., Co-chord, Chord, Covers., Diff., Sine. Rows are numbered 0 to 60.

24° 眞數 SINES, COSINES, AND CHORDS, &c.

Table for 24 degrees containing columns for Sine, Diff., Covers., Chord, Co-chord, Vers., Diff., Cosine and Cosine, Diff., Vers., Co-chord, Chord, Covers., Diff., Sine. Rows are numbered 0 to 60.

眞數 SINES, COSINES, AND CHORDS, &c. 66°

眞數 SINES, COSINES, AND CHORDS, &c. 65°

25° 眞數 SINES, COSINES, AND CHORDS, &c.

Table with columns: Sine, Diff., Covers., Chord, Co-chord, Vers., Diff., Cosine. Rows 0 to 60.

眞數 SINES, COSINES, AND CHORDS, &c. 64°

26° 眞數 SINES, COSINES, AND CHORDS, &c.

Table with columns: Sine, Diff., Covers., Chord, Co-chord, Vers., Diff., Cosine. Rows 0 to 60.

眞數 SINES, COSINES, AND CHORDS, &c. 63°

27° 眞數 SINES, COSINES, AND CHORDS, &c.

Table with 10 columns: Sine, Diff., Covers., Chord, Co-chord, Vers., Diff., Cosine. Rows 0 to 60.

眞數 SINES, COSINES, AND CHORDS, &c. 62°

28° 眞數 SINES, COSINES, AND CHORDS, &c.

Table with 10 columns: Sine, Diff., Covers., Chord, Co-chord, Vers., Diff., Cosine. Rows 0 to 60.

眞數 SINES, COSINES, AND CHORDS, &c. 61°











37°

真數

SINES, COSINES, AND CHORDS, &c.

Table for 37 degrees with columns: Sine, Diff., Covers., Chord, Co-chord, Vers., Diff., Cosine. Rows 0-60.

真數

SINES, COSINES, AND CHORDS, &c. 52°

313

38° 真數

SINES, COSINES, AND CHORDS, &c.

Table for 38 degrees with columns: Sine, Diff., Covers., Chord, Co-chord, Vers., Diff., Cosine. Rows 0-60.

真數

SINES, COSINES, AND CHORDS, &c. 51°

314

39° 眞數 SINES, COSINES, AND CHORDS, &c.

Table for 39 degrees containing columns for Sine, Diff., Covers., Chord, Co-chord, Vers., and Cosine. Includes a secondary header at the bottom for Cosine, Diff., Vers., Co-chord, Chord, Covers., and Sine.

40° 眞數 SINES, COSINES, AND CHORDS, &c.

Table for 40 degrees containing columns for Sine, Diff., Covers., Chord, Co-chord, Vers., and Cosine. Includes a secondary header at the bottom for Cosine, Diff., Vers., Co-chord, Chord, Covers., and Sine.

眞數 SINES, COSINES, AND CHORDS, &c. 50°

眞數 SINES, COSINES, AND CHORDS, &c. 49°



43° 眞數 SINES, COSINES, AND CHORDS, &c.

Table for 43 degrees containing columns for Sine, Diff., Covers., Chord, Co-chord, Vers., Diff., and Cosine. Rows are numbered 0 to 60.

眞數 SINES, COSINES, AND CHORDS, &c. 46°

44° 眞數 SINES, COSINES, AND CHORDS, &c.

Table for 44 degrees containing columns for Sine, Diff., Covers., Chord, Co-chord, Vers., Diff., and Cosine. Rows are numbered 0 to 60.

眞數 SINES, COSINES, AND CHORDS, &c. 45°



眞數 TANGENTS.

Table of tangents for angles 0° to 89°. Columns are labeled 0°, 1°, 2°, 3°, 4°, 5°, 6°. Rows are numbered 0 to 89. Values are listed in scientific notation.

眞數 TANGENTS.

眞數 TANGENTS.

Table of tangents for angles 7° to 13°. Columns are labeled 7°, 8°, 9°, 10°, 11°, 12°, 13°. Rows are numbered 0 to 60. Values are listed in scientific notation.

眞數 TANGENTS.

眞數 TANGENTS.

Table of tangent values for angles 14° to 20°. Columns are labeled 14°, 15°, 16°, 17°, 18°, 19°, 20°. Rows are numbered 0 to 60. Values range from 0.2493290 to 0.3888640.

眞數 TANGENTS.

眞數 TANGENTS.

Table of tangent values for angles 21° to 27°. Columns are labeled 21°, 22°, 23°, 24°, 25°, 26°, 27°. Rows are numbered 0 to 60. Values range from 0.3883640 to 0.5317094.

眞數 TANGENTS.

眞數 TANGENTS.

Table of tangent values for angles 28° to 60°. Columns are labeled with degrees and values are listed in two columns per degree.

眞數 TANGENTS.

眞數 TANGENTS.

Table of tangent values for angles 35° to 60°. Columns are labeled with degrees and values are listed in two columns per degree.

眞數 TANGENTS.

眞數 TANGENTS.

Table of tangents for angles 42° to 48°. Columns represent angles and rows represent values from 0 to 60. Values are listed in scientific notation.

眞數 TANGENTS.

眞數 TANGENTS.

Table of tangents for angles 49° to 55°. Columns represent angles and rows represent values from 0 to 60. Values are listed in scientific notation.

眞數 TANGENTS.

眞數 TANGENTS.

Table of tangent values for angles 56° to 62°. Columns are labeled with degrees and rows with values. Includes a small table at the bottom for angles 33° to 27°.

眞數 TANGENTS.

眞數 TANGENTS.

Table of tangent values for angles 63° to 69°. Columns are labeled with degrees and rows with values. Includes a small table at the bottom for angles 26° to 20°.

眞數 TANGENTS.

眞數 TANGENTS.

Table of tangents for angles 70° to 76°. Columns include angle, sine, cosine, and tangent values. Includes a small '眞數' label on the right side of the table.

19° 18° 17° 16° 15° 14° 13°

眞數 TANGENTS.

眞數 TANGENTS.

Table of tangents for angles 77° to 83°. Columns include angle, sine, cosine, and tangent values. Includes a small '眞數' label on the left side of the table.

12° 11° 10° 9° 8° 7° 6°

眞數 TANGENTS.

眞數 TANGENTS.

Table of Tangent values for angles 84° to 89°. Columns represent angles and rows represent values. Values range from approximately 0.95 to infinity.

眞數 TANGENTS.

眞數 SECANTS.

Table of Secant values for angles 0° to 6°. Columns represent angles and rows represent values. Values range from 1.000000 to approximately 1.961200.

眞數 SECANTS.

眞數 SECANTS.

Table of secant values for angles 7° to 82°. Columns are labeled 7°, 8°, 9°, 10°, 11°, 12°, 13°. Rows are numbered 0 to 60.

眞數 SECANTS.

眞數 SECANTS.

Table of secant values for angles 14° to 75°. Columns are labeled 14°, 15°, 16°, 17°, 18°, 19°, 20°. Rows are numbered 0 to 60.

眞數 SECANTS.



真數 SECANTS.

Table with columns 21° to 27° and rows 0 to 60. Each cell contains a numerical value representing the secant of the angle.

真數 SECANTS.

真數 SECANTS.

Table with columns 28° to 34° and rows 0 to 60. Each cell contains a numerical value representing the secant of the angle.

真數 SECANTS.

眞數 SECANTS.

	35°	36°	37°	38°	39°	40°	41°	
0	1.2207746	1.2360680	1.2521357	1.2690182	1.2867596	1.3054073	1.3250130	60
1	1.2210233	1.2363293	1.2524102	1.2693067	1.2870628	1.3057261	1.3253482	59
2	1.2212723	1.2365909	1.2526850	1.2695955	1.2873663	1.3060451	1.3256837	58
3	1.2215215	1.2368526	1.2529601	1.2698845	1.2876700	1.3063644	1.3260194	57
4	1.2217708	1.2371146	1.2532353	1.2701737	1.2879740	1.3066839	1.3263554	56
5	1.2220204	1.2373768	1.2535108	1.2704632	1.2882782	1.3070038	1.3266918	55
6	1.2222702	1.2376393	1.2537865	1.2707529	1.2885827	1.3073239	1.3270284	54
7	1.2225202	1.2379019	1.2540625	1.2710429	1.2888875	1.3076442	1.3273653	53
8	1.2227703	1.2381647	1.2543387	1.2713331	1.2891925	1.3079649	1.3277024	52
9	1.2230207	1.2384278	1.2546151	1.2716235	1.2894977	1.3082858	1.3280399	51
10	1.2232713	1.2386911	1.2548917	1.2719142	1.2898032	1.3086069	1.3283776	50
11	1.2235222	1.2389546	1.2551685	1.2722052	1.2901090	1.3089284	1.3287156	49
12	1.2237732	1.2392183	1.2554456	1.2724963	1.2904150	1.3092501	1.3290539	48
13	1.2240244	1.2394823	1.2557229	1.2727877	1.2907213	1.3095720	1.3293925	47
14	1.2242758	1.2397464	1.2560005	1.2730794	1.2910278	1.3098943	1.3297314	46
15	1.2245274	1.2400108	1.2562782	1.2733712	1.2913346	1.3102168	1.3300706	45
16	1.2247793	1.2402754	1.2565562	1.2736634	1.2916416	1.3105396	1.3304100	44
17	1.2250313	1.2405402	1.2568345	1.2739557	1.2919489	1.3108626	1.3307497	43
18	1.2252836	1.2408052	1.2571129	1.2742484	1.2922564	1.3111860	1.3310897	42
19	1.2255361	1.2410704	1.2573916	1.2745412	1.2925642	1.3115096	1.3314301	41
20	1.2257887	1.2413359	1.2576705	1.2748343	1.2928723	1.3118334	1.3317707	40
21	1.2260416	1.2416016	1.2579497	1.2751276	1.2931806	1.3121575	1.3321115	39
22	1.2262947	1.2418675	1.2582291	1.2754212	1.2934892	1.3124820	1.3324527	38
23	1.2265480	1.2421336	1.2585087	1.2757151	1.2937980	1.3128066	1.3327942	37
24	1.2268015	1.2423999	1.2587885	1.2760091	1.2941071	1.3131316	1.3331359	36
25	1.2270552	1.2426665	1.2590686	1.2763034	1.2944164	1.3134568	1.3334779	35
26	1.2273091	1.2429333	1.2593489	1.2765980	1.2947260	1.3137823	1.3338208	34
27	1.2275633	1.2432003	1.2596294	1.2768928	1.2950359	1.3141081	1.3341629	33
28	1.2278176	1.2434675	1.2599102	1.2771878	1.2953460	1.3144341	1.3345058	32
29	1.2280722	1.2437349	1.2601912	1.2774831	1.2956564	1.3147604	1.3348489	31
30	1.2283269	1.2440026	1.2604724	1.2777787	1.2959670	1.3150870	1.3351924	30
31	1.2285819	1.2442704	1.2607539	1.2780744	1.2962779	1.3154139	1.3355362	29
32	1.2288371	1.2445385	1.2610356	1.2783705	1.2965890	1.3157410	1.3358802	28
33	1.2290924	1.2448069	1.2613175	1.2786667	1.2969004	1.3160684	1.3362246	27
34	1.2293480	1.2450754	1.2615997	1.2789632	1.2972121	1.3163961	1.3365692	26
35	1.2296039	1.2453442	1.2618820	1.2792600	1.2975240	1.3167240	1.3369141	25
36	1.2298599	1.2456131	1.2621647	1.2795570	1.2978362	1.3170523	1.3372594	24
37	1.2301161	1.2458823	1.2624475	1.2798543	1.2981487	1.3173808	1.3376049	23
38	1.2303725	1.2461518	1.2627306	1.2801518	1.2984614	1.3177096	1.3379507	22
39	1.2306292	1.2464214	1.2630140	1.2804495	1.2987743	1.3180386	1.3382968	21
40	1.2308861	1.2466913	1.2632975	1.2807475	1.2990876	1.3183680	1.3386432	20
41	1.2311432	1.2469614	1.2635813	1.2810457	1.2994011	1.3186976	1.3389898	19
42	1.2314004	1.2472317	1.2638653	1.2813442	1.2997148	1.3190274	1.3393368	18
43	1.2316579	1.2475022	1.2641496	1.2816430	1.3000288	1.3193576	1.3396841	17
44	1.2319156	1.2477730	1.2644341	1.2819419	1.3003431	1.3196881	1.3400316	16
45	1.2321736	1.2480440	1.2647188	1.2822412	1.3006576	1.3200188	1.3403795	15
46	1.2324317	1.2483152	1.2650038	1.2825407	1.3009724	1.3203498	1.3407276	14
47	1.2326900	1.2485866	1.2652890	1.2828404	1.3012875	1.3206810	1.3410761	13
48	1.2329486	1.2488583	1.2655745	1.2831404	1.3016028	1.3210126	1.3414248	12
49	1.2332074	1.2491302	1.2658601	1.2834406	1.3019184	1.3213444	1.3417738	11
50	1.2334664	1.2494023	1.2661460	1.2837411	1.3022343	1.3216765	1.3421232	10
51	1.2337256	1.2496746	1.2664322	1.2840418	1.3025504	1.3220089	1.3424728	9
52	1.2339850	1.2499471	1.2667186	1.2843428	1.3028667	1.3223416	1.3428227	8
53	1.2342446	1.2502199	1.2670052	1.2846440	1.3031834	1.3226745	1.3431729	7
54	1.2345044	1.2504929	1.2672921	1.2849455	1.3035003	1.3230077	1.3435234	6
55	1.2347645	1.2507661	1.2675792	1.2852472	1.3038175	1.3233413	1.3438742	5
56	1.2350248	1.2510396	1.2678665	1.2855492	1.3041349	1.3236750	1.3442253	4
57	1.2352852	1.2513133	1.2681541	1.2858514	1.3044526	1.3240091	1.3445767	3
58	1.2355459	1.2515872	1.2684419	1.2861539	1.3047706	1.3243435	1.3449284	2
59	1.2358069	1.2518613	1.2687299	1.2864566	1.3050888	1.3246781	1.3452804	1
60	1.2360680	1.2521357	1.2690182	1.2867596	1.3054073	1.3250130	1.3456327	0

眞數 SECANTS.

眞數 SECANTS.

	42°	43°	44°	45°	46°	47°	48°	
0	1.3456327	1.3673275	1.3901636	1.4142136	1.4395565	1.4662792	1.4944765	60
1	1.3459853	1.3676985	1.3905543	1.4146251	1.4399904	1.4667368	1.4949506	59
2	1.3463382	1.3680699	1.3909453	1.4150370	1.4404246	1.4671948	1.4954431	58
3	1.3466914	1.3684416	1.3913366	1.4154493	1.4408592	1.4676532	1.4959270	57
4	1.3470449	1.3688136	1.3917283	1.4158619	1.4412941	1.4681120	1.4964113	56
5	1.3473987	1.3691859	1.3921203	1.4162749	1.4417295	1.4685713	1.4968961	55
6	1.3477528	1.3695586	1.3925127	1.4166883	1.4421652	1.4690309	1.4973813	54
7	1.3481072	1.3699315	1.3929054	1.4171020	1.4426013	1.4694910	1.4978670	53
8	1.3484619	1.3703048	1.3932985	1.4175161	1.4430379	1.4699514	1.4983531	52
9	1.3488168	1.3706784	1.3936918	1.4179306	1.4434748	1.4704123	1.4988397	51
10	1.3491721	1.3710523	1.3940856	1.4183454	1.4439120	1.4708736	1.4993267	50
11	1.3495277	1.3714266	1.3944796	1.4187605	1.4443497	1.4713354	1.4998141	49
12	1.3498836	1.3718011	1.3948740	1.4191761	1.4447878	1.4717975	1.5003020	48
13	1.3502398	1.3721760	1.3952688	1.4195920	1.4452262	1.4722600	1.5007903	47
14	1.3505963	1.3725512	1.3956639	1.4200082	1.4456651	1.4727230	1.5012791	46
15	1.3509531	1.3729268	1.3960593	1.4204248	1.4461043	1.4731864	1.5017683	45
16	1.3513102	1.3733026	1.3964551	1.4208418	1.4465439	1.4736502	1.5022580	44
17	1.3516677	1.3736788	1.3968512	1.4212592	1.4469839	1.4741144	1.5027481	43
18	1.3520254	1.3740553	1.3972477	1.4216769	1.4474243	1.4745790	1.5032387	42
19	1.3523834	1.3744321	1.3976445	1.4220950	1.4478651	1.4750440	1.5037297	41
20	1.3527417	1.3748092	1.3980416	1.4225134	1.4483063	1.4755095	1.5042211	40
21	1.3531003	1.3751867	1.3984391	1.4229323	1.4487478	1.4759754	1.5047131	39
22	1.3534593	1.3755645	1.3988369	1.4233514	1.4491898	1.4764417	1.5052054	38
23	1.3538185	1.3759426	1.3992351	1.4237710	1.4496322	1.4769084	1.5056982	37
24	1.3541780	1.3763210	1.3996336	1.4241909	1.4500749	1.4773755	1.5061915	36
25	1.3545379	1.3767008	1.4000325	1.4246112	1.4505181	1.4778431	1.5066852	35
26	1.3548980	1.3770789	1.4004317	1.4250319	1.4509616	1.4783111	1.5071793	34
27	1.3552585	1.3774583	1.4008313	1.4254529	1.4514055	1.4787795	1.5076739	33
28	1.3556193	1.3778380	1.4012312	1.4258743	1.4518498	1.4792483	1.5081690	32
29	1.3559803	1.3782181	1.4016315	1.4262961	1.4522946	1.4797176	1.5086645	31
30	1.3563417	1.3785985	1.4020321	1.4267182	1.4527397	1.4801872	1.5091605	30
31	1.3567034	1.3789792	1.4024330	1.4271407	1.4531852	1.4806573	1.5096569	29
32	1.3570654	1.3793602	1.4028343	1.4275636	1.4536311	1.4811278	1.5101538	28
33	1.3574277	1.3797416	1.4032360	1.4279868	1.4540774	1.4815988	1.5106511	27
34	1.3577903	1.3801233	1.4036380	1.4284105	1.4545241	1.4820702	1.5111489	26
35	1.3581532	1.3805053	1.4040403	1.4288345	1.4549712	1.4825420	1.5116472	25
36	1.3585164	1.3808877	1.4044430	1.4292588	1.4554187	1.4830142	1.5121459	24
37	1.3588800	1.3812704	1.4048461	1.4296836	1.4558666	1.4834868	1.5126450	23
38	1.3592438	1.3816534	1.4052494	1.4301087	1.4563149	1.4839599	1.5131446	22
39	1.3596080	1.3820367	1.4056532	1.4305342	1.4567636	1.4844334	1.5136447	21
40	1.3599725	1.3824204	1.4060573	1.4309600	1.4572127	1.4849073	1.5141452	20
41	1.3603372	1.3828044	1.406461					

眞數 SECANTS.

	49°	50°	51°	52°	53°	54°	55°	
0	1.5242531	1.5557228	1.5890157	1.6242692	1.6616401	1.7013016	1.7434468	00
1	1.5247634	1.5562634	1.5895868	1.6248743	1.6622819	1.7019831	1.7441715	59
2	1.5252741	1.5568035	1.5901584	1.6254799	1.6629243	1.7026653	1.7448909	58
3	1.5257854	1.5573441	1.5907306	1.6260861	1.6635673	1.7033482	1.7456230	57
4	1.5262971	1.5578852	1.5913033	1.6266929	1.6642110	1.7040318	1.7463499	56
5	1.5268093	1.5584268	1.5918766	1.6273003	1.6648553	1.7047160	1.7470776	55
6	1.5273219	1.5589689	1.5924504	1.6279083	1.6655002	1.7054010	1.7478060	54
7	1.5278351	1.5595115	1.5930247	1.6285169	1.6661458	1.7060867	1.7485352	53
8	1.5283487	1.5600546	1.5935996	1.6291261	1.6667920	1.7067730	1.7492651	52
9	1.5288627	1.5605982	1.5941751	1.6297359	1.6674389	1.7074601	1.7499958	51
10	1.5293773	1.5611424	1.5947511	1.6303462	1.6680864	1.7081478	1.7507273	50
11	1.5298923	1.5616871	1.5953276	1.6309572	1.6687345	1.7088362	1.7514595	49
12	1.5304078	1.5622322	1.5959048	1.6315688	1.6693833	1.7095254	1.7521924	48
13	1.5309238	1.5627779	1.5964824	1.6321809	1.6700328	1.7102152	1.7529262	47
14	1.5314403	1.5633241	1.5970606	1.6327937	1.6706828	1.7109058	1.7536607	46
15	1.5319572	1.5638708	1.5976394	1.6334070	1.6713336	1.7115970	1.7543959	45
16	1.5324746	1.5644181	1.5982187	1.6340210	1.6719850	1.7122890	1.7551320	44
17	1.5329925	1.5649658	1.5987986	1.6346355	1.6726370	1.7129817	1.7558687	43
18	1.5335109	1.5655141	1.5993790	1.6352507	1.6732897	1.7136750	1.7566063	42
19	1.5340297	1.5660628	1.5999600	1.6358664	1.6739430	1.7143691	1.7573446	41
20	1.5345491	1.5666121	1.6005416	1.6364828	1.6745970	1.7150639	1.7580837	40
21	1.5350689	1.5671619	1.6011237	1.6371097	1.6752517	1.7157594	1.7588236	39
22	1.5355892	1.5677123	1.6017064	1.6377173	1.6759070	1.7164556	1.7595642	38
23	1.5361100	1.5682631	1.6022896	1.6383355	1.6765629	1.7171525	1.7603057	37
24	1.5366313	1.5688145	1.6028734	1.6389542	1.6772195	1.7178501	1.7610478	36
25	1.5371530	1.5693664	1.6034577	1.6395736	1.6778768	1.7185484	1.7617908	35
26	1.5376752	1.5699188	1.6040426	1.6401936	1.6785347	1.7192475	1.7625345	34
27	1.5381980	1.5704717	1.6046281	1.6408142	1.6791983	1.7199472	1.7632791	33
28	1.5387212	1.5710252	1.6052142	1.6414354	1.6798525	1.7206477	1.7640244	32
29	1.5392449	1.5715792	1.6058008	1.6420572	1.6805124	1.7213489	1.7647704	31
30	1.5397690	1.5721337	1.6063879	1.6426796	1.6811730	1.7220508	1.7655173	30
31	1.5402937	1.5726887	1.6069757	1.6433027	1.6818342	1.7227534	1.7662649	29
32	1.5408189	1.5732443	1.6075640	1.6439263	1.6824961	1.7234568	1.7670133	28
33	1.5413445	1.5738004	1.6081528	1.6445506	1.6831586	1.7241609	1.7677625	27
34	1.5418706	1.5743570	1.6087423	1.6451754	1.6838219	1.7248657	1.7685125	26
35	1.5423973	1.5749141	1.6093323	1.6458009	1.6844857	1.7255712	1.7692633	25
36	1.5429244	1.5754718	1.6099228	1.6464270	1.6851503	1.7262774	1.7700149	24
37	1.5434520	1.5760300	1.6105140	1.6470537	1.6858155	1.7269844	1.7707672	23
38	1.5439801	1.5765887	1.6111057	1.6476811	1.6864814	1.7276921	1.7715204	22
39	1.5445087	1.5771479	1.6116980	1.6483090	1.6871479	1.7284005	1.7722743	21
40	1.5450378	1.5777077	1.6122908	1.6489376	1.6878151	1.7291096	1.7730290	20
41	1.5455673	1.5782680	1.6128843	1.6495668	1.6884830	1.7298195	1.7737845	19
42	1.5460974	1.5788289	1.6134783	1.6501966	1.6891516	1.7305301	1.7745409	18
43	1.5466280	1.5793902	1.6140728	1.6508270	1.6898208	1.7312414	1.7752980	17
44	1.5471590	1.5799521	1.6146680	1.6514581	1.6904907	1.7319535	1.7760559	16
45	1.5476906	1.5805146	1.6152637	1.6520898	1.6911613	1.7326663	1.7768146	15
46	1.5482226	1.5810776	1.6158600	1.6527221	1.6918326	1.7333798	1.7775741	14
47	1.5487552	1.5816411	1.6164569	1.6533550	1.6925045	1.7340941	1.7783344	13
48	1.5492882	1.5822051	1.6170544	1.6539485	1.6931771	1.7348091	1.7790955	12
49	1.5498218	1.5827697	1.6176524	1.6545427	1.6938504	1.7355248	1.7798574	11
50	1.5503558	1.5833348	1.6182510	1.6551375	1.6945244	1.7362413	1.7806201	10
51	1.5508904	1.5839005	1.6188502	1.6557329	1.6951990	1.7369585	1.7813836	9
52	1.5514254	1.5844667	1.6194500	1.6563289	1.6958744	1.7376764	1.7821479	8
53	1.5519610	1.5850334	1.6200504	1.6569254	1.6965504	1.7383951	1.7829131	7
54	1.5524970	1.5856007	1.6206513	1.6575224	1.6972271	1.7391145	1.7836790	6
55	1.5530335	1.5861685	1.6212528	1.6581199	1.6979044	1.7398347	1.7844457	5
56	1.5535706	1.5867369	1.6218549	1.6587179	1.6985825	1.7405556	1.7852133	4
57	1.5541081	1.5873058	1.6224576	1.6593164	1.6992612	1.7412673	1.7859817	3
58	1.5546462	1.5878752	1.6230609	1.6600358	1.6999407	1.7419897	1.7867508	2
59	1.5551848	1.5884452	1.6236648	1.6606990	1.7006208	1.7427229	1.7875208	1
60	1.5557238	1.5890157	1.6242692	1.6614016	1.7013016	1.7434468	1.7882916	0
40°	39°	38°	37°	36°	35°	34°		

眞數 SECANTS.

眞數 SECANTS.

	56°	57°	58°	59°	60°	61°	62°	
0	1.7882916	1.8360785	1.8870799	1.9416040	2.0000000	2.0626653	2.1300545	00
1	1.7890633	1.8369013	1.8879589	1.9425445	2.0010083	2.0637484	2.1312205	59
2	1.7898357	1.8377251	1.8888388	1.9434861	2.0020177	2.0648328	2.1323880	58
3	1.7906090	1.8385498	1.8897197	1.9444288	2.0030283	2.0659186	2.1335570	57
4	1.7913831	1.8393753	1.8906016	1.9453725	2.0040402	2.0670056	2.1347274	56
5	1.7921580	1.8402018	1.8914845	1.9463173	2.0050532	2.0680940	2.1358993	55
6	1.7929337	1.8410292	1.8923684	1.9472632	2.0060674	2.0691836	2.1370726	54
7	1.7937102	1.8418574	1.8932532	1.9482102	2.0070828	2.0702746	2.1382475	53
8	1.7944876	1.8426866	1.8941391	1.9491583	2.0080994	2.0713670	2.1394238	52
9	1.7952658	1.8435166	1.8950259	1.9501075	2.0091172	2.0724606	2.1406015	51
10	1.7960449	1.8443476	1.8959138	1.9510577	2.0101362	2.0735556	2.1417808	50
11	1.7968247	1.8451795	1.8968026	1.9520091	2.0111564	2.0746519	2.1429615	49
12	1.7976054	1.8460123	1.8976924	1.9529615	2.0121779	2.0757496	2.1441438	48
13	1.7983869	1.8468460	1.8985832	1.9539150	2.0132005	2.0768486	2.1453275	47
14	1.7991693	1.8476806	1.8994750	1.9548697	2.0142243	2.0779489	2.1465127	46
15	1.7999524	1.8485161	1.9003678	1.9558254	2.0152494	2.0790506	2.1476993	45
16	1.8007365	1.8493525	1.9012616	1.9567822	2.0162756	2.0801536	2.1488875	44
17	1.8015213	1.8501898	1.9021564	1.9577402	2.0173031	2.0812580	2.1500772	43
18	1.8023070	1.8510281	1.9030522	1.9586992	2.0183318	2.0823637	2.1512684	42
19	1.8030935	1.8518672	1.9039491	1.9596593	2.0193618	2.0834708	2.1524611	41
20	1.8038809	1.8527073	1.9048469	1.9606206	2.0203929	2.0845792	2.1536553	40
21	1.8046691	1.8535483	1.9057457	1.9615829	2.0214253	2.0856890	2.1548510	39
22	1.8054582	1.8543903	1.9066456	1.9625464	2.0224589	2.0868002	2.1560482	38
23	1.8062481	1.8552331	1.9075464	1.9635110	2.0234937	2.0879127	2.1572469	37
24	1.8070388	1.8560769	1.9084483	1.9644767	2.0245297	2.0890265	2.1584471	36
25	1.8078304	1.8569216	1.9093512	1.9654435	2.0255670	2.0901418	2.1596489	35
26	1.8086228	1.8577672	1.9102551	1.9664114	2.0266056	2.0912584	2.1608522	34
27	1.8094161	1.8586138	1.9111600	1.9673805	2.0276453	2.0923764	2.1620570	33
28	1.8102102	1.8594612	1.9120659	1.9683507	2.0286863	2.0934957	2.1632633	32
29	1.8110052	1.8603097	1.9129729	1.9693220	2.0297286	2.0946164	2.1644712	31
30	1.8118010	1.8611590	1.9138809	1.9702944	2.0307720	2.0957385	2.1656806	30
31	1.8125977	1.8620093	1.9147899	1.9712680	2.0318168	2.0968620	2.1668915	29
32	1.8133953	1.8628605	1.9156999	1.9722427	2.0328628	2.0979869	2.1681040	28
33	1.8141937	1.8637126	1.9166110	1.9732185	2.0339100	2.0991131	2.1693180	27
34	1.8149929	1.8645657	1.9175230	1.9741954	2.0349585	2.1002408	2.1705335	26
35	1.8157930	1.8654197	1.9184362	1.9751735	2.0360082	2.1013698	2.1717506	25
36	1.8165940	1.8662747	1.9193503	1.9761527	2.0370592	2.1025002	2.1729693	24
37	1.8173958	1.8671306	1.9202655	1.9771331	2.0381114	2.1036320	2.1741895	23
38	1.8181985	1.8679875	1.9211817	1.9781146	2.0391649	2.1047652	2.1754113	22
39	1.8190021	1.8688453	1.9220990	1.9790972	2.0402197	2.1059098	2.1766346	21
40	1.8198065	1.8697040	1.9230173	1.9800810	2.0412757	2.1		

眞數 SECANTS.

Table of secant values for angles 63° to 69°. Columns are labeled with degrees and rows with values. Includes a small table at the bottom for angles 26° to 20°.

眞數 SECANTS.

眞數 SECANTS.

Table of secant values for angles 70° to 76°. Columns are labeled with degrees and rows with values. Includes a small table at the bottom for angles 19° to 13°.

眞數 SECANTS.

眞數 SECANTS.

Table of secant values for angles 77° to 60°. Columns represent angles from 77° to 60° in 1-degree increments. Rows represent values from 0 to 60 in 1-degree increments.

眞數 SECANTS.

眞數 SECANTS.

Table of secant values for angles 84° to 89°. Columns represent angles from 84° to 89° in 1-degree increments. Rows represent values from 0 to 60 in 1-degree increments.

眞數 SECANTS.

### 常用對數ヲ自然對數ニ換算

Com. Log.	Naperian Log.	Com. Log.	Naperian Log.	Com. Log.	Naperian Log.	Com. Log.	Naperian Log.
1	2.30258509	26	59.86721242	51	117.43183974	76	174.96646707
2	4.60517019	27	62.16979751	52	119.73442484	77	177.29905216
3	6.90775528	28	64.47238260	53	122.03700993	78	179.60163725
4	9.21034037	29	66.77496770	54	124.33959502	79	181.90422235
5	11.51292546	30	69.07755279	55	126.64218011	80	184.20680744
6	13.81551056	31	71.38013788	56	128.94476521	81	186.50939253
7	16.11809565	32	73.68272298	57	131.24735030	82	188.81197763
8	18.42068074	33	75.98530807	58	133.54993539	83	191.11456272
9	20.72326584	34	78.28789316	59	135.85252049	84	193.41714781
10	23.02585093	35	80.59047825	60	138.15510558	85	195.71973290
11	25.32843602	36	82.89306335	61	140.45769067	86	198.02231800
12	27.63102112	37	85.19564844	62	142.76027576	87	200.32490309
13	29.93360621	38	87.49823353	63	145.06286086	88	202.62748818
14	32.23619130	39	89.80081863	64	147.36544595	89	204.93007328
15	34.53877639	40	92.10340872	65	149.66803104	90	207.23265837
16	36.84136149	41	94.40598881	66	151.97061614	91	209.53524346
17	39.14394658	42	96.70857391	67	154.27320123	92	211.83782856
18	41.44653167	43	99.01115900	68	156.57578632	93	214.14041365
19	43.74911677	44	101.31374409	69	158.87837142	94	216.44299874
20	46.05170186	45	103.61632918	70	161.18095651	95	218.74558383
21	48.35428695	46	105.91891428	71	163.48354160	96	221.04816893
22	50.65687205	47	108.22149937	72	165.78612670	97	223.35075402
23	52.95945714	48	110.52408446	73	168.08871179	98	225.65333911
24	55.26204223	49	112.82666956	74	170.39129688	99	227.95592421
25	57.56462732	50	115.12925465	75	172.69388197	100	230.25850930

### 自然對數ヲ常用對數ニ換算

Nap. Log.	Common Log.	Nap. Log.	Common Log.	Nap. Log.	Common Log.	Nap. Log.	Common Log.
1	0.43429448	26	11.29165653	51	22.14901858	76	33.00638062
2	0.86858896	27	11.72595101	52	22.58331306	77	33.44067511
3	1.30288345	28	12.16024549	53	23.01760754	78	33.87496959
4	1.73717793	29	12.59453998	54	23.45190202	79	34.30926407
5	2.17147241	30	13.02883446	55	23.88619650	80	34.74355855
6	2.60576689	31	13.46312894	56	24.32049099	81	35.17785303
7	3.04006137	32	13.89742342	57	24.75478547	82	35.61214752
8	3.47435586	33	14.33171790	58	25.18907995	83	36.04644200
9	3.90865034	34	14.76601238	59	25.62337443	84	36.48073648
10	4.34294482	35	15.20030687	60	26.05766891	85	36.91503096
11	4.77723930	36	15.63460135	61	26.49196340	86	37.34932544
12	5.21153378	37	16.06889583	62	26.92625788	87	37.78361993
13	5.64582826	38	16.50319031	63	27.36055236	88	38.21791441
14	6.08012275	39	16.93748479	64	27.79484684	89	38.65220889
15	6.51441723	40	17.37177928	65	28.22914132	90	39.08650337
16	6.94871171	41	17.80607376	66	28.66343581	91	39.52079785
17	7.38300619	42	18.24036824	67	29.09773029	92	39.95509234
18	7.81730067	43	18.67466272	68	29.53202477	93	40.38938682
19	8.25159516	44	19.10895720	69	29.96631925	94	40.82368130
20	8.68588964	45	19.54325169	70	30.40061373	95	41.25797578
21	9.12018412	46	19.97754617	71	30.83490822	96	41.69227026
22	9.55447860	47	20.41184065	72	31.26920270	97	42.12656474
23	9.98877308	48	20.84613513	73	31.70349718	98	42.56085922
24	10.42306757	49	21.28042961	74	32.13779166	99	42.99515371
25	10.85736205	50	21.71472410	75	32.57208614	100	43.42944819

### スタヂヤ表使用法

此ノ表ハアーサー・ウキンスロー氏ノ計算ニ成ルモノニシテ、野樂操作ノ際ニスタヂヤ、ロッドヲ水平ニ垂直ニ立テ測量機械ノ望遠鏡ニ取付ケラレタルスタヂヤノ二線ガ中心十字線ノ水平面ヨリ各上下ニ於テ等距離ニ置カレ而シテ其ノスタヂヤノ二線間ノ距離カスタヂヤ、ロッドノ一尺ノ映象ヲ夾ミタル時ニ對物鏡ノ焦點トスタヂヤ、ロッドノ距離カ百尺ナル様ニ定置セラレタル時ノスタヂヤ、ロッドト機械ノ中心トノ水平距離及直立距離(水準差)ノ關係ヲ下式ニ依リ、各式ノ各項ヲ別々ニ算出表示シタルナリ。

$$\begin{aligned} \text{水平距離} &= (e+f) \cos \alpha + ak \cos^2 \alpha \dots\dots\dots 1 \text{ 式} \\ \text{直立距離} &= (e+f) \sin \alpha + \frac{ak \sin 2\alpha}{2} \dots\dots\dots 2 \text{ 式} \end{aligned}$$

c = 對物鏡ト機械ノ中心トノ距離  
f = 對物鏡ノ焦點距離  
k =  $\frac{\text{焦點距離}}{\text{スタヂヤノ一尺ノ映象ノ長さ}}$   
 $\alpha$  = スタヂヤノ傾角(讀數)  
 $\alpha$  = 直立角

表中上段ニ記サレタル數字ハ直立角ノ(度)ヲ示シ、左側ノ行ニ記サレタル數字ハ直立角ノ二分毎ノ(分)ヲ示シタルモノニシテ、各度ノ下ノ横行ノ左右二行ノ數字ハ夫レ夫レ水平距離及直立距離即チ式中(ak=100ナル時)ノ  $ak \cos^2 \alpha$  及  $\frac{ak \sin 2\alpha}{2}$  ナリ。

下部三段ハ最も普通ニ用ヒラル、機械ノ三箇ノ場合ノ各度ニ於ケル(e+f)ノ水平距離及直立距離即チ式中(e+f)cos α 及 (e+f)sin α ナリシタルモノナリ。

今A、B二點間ノ水平距離及直立距離ヲ此表ニ依リテ求メシムニハ先ヅ一點Aノ直上ニ機械ノ中心ヲ保テ、水平ニ機械ヲ据エ付ケ、次ニ望遠鏡ヲB點ニ向ケ、豫メB點上ニ垂直ニ立テラレタルスタヂヤ、ロッドヲ見テスタヂヤノ二線ニ夾マレルロッドノ尺數(即チ讀數)ト望遠鏡ノ十字交點トロッドトノ一致シタルロッドノ尺數(ロッドノ高)トヲ讀ミ、次テ直立角度ヲ見テ測點ト機械ノ中心トノ距離即チ機械ノ高ヲ測リテ是等ヲ記帳セヨ。

(注意) 讀數ヲ得シタル時ニハ可成的ニ水平線ト大ナル角ヲ避ケ、而シテロッドノ可成的ニ下方ニ於テ求メヨ。

然レ後ニ讀數ト直立角トヲ以テ表ニ依リ

$$\text{水平距離 } ak \cos^2 \alpha \text{ ト } (e+f) \cos \alpha \text{ 及ビ 直立距離 } \frac{ak \sin 2\alpha}{2} \text{ ト } (e+f) \sin \alpha \text{ トヲ求メ}$$

是等ヲ夫レ夫レ相加フレバ水平距離及直立距離ヲ得ベシ。然レドモ直立距離ハ直立角ノ(仰角)ナルト(俯角)ナルトニ從ヒ(ロッドノ高サ=R)ト(機械ノ高=A)ト下式ニヨリ  $\frac{ak \sin 2\alpha}{2} + (e+f) \sin \alpha$  ニ加ヘ或ハ減ヒザルベカラズ

$$\text{直立角ノ仰角ナル時 (但シ測點地上ニ定置セラレタル時)} \\ (+) \text{ 直立距離} = \frac{ak \sin 2\alpha}{2} + (e+f) \sin \alpha + A - R \dots\dots\dots 3 \text{ 式}$$

$$\text{直立角ノ俯角ナル時} \\ (-) \frac{ak \sin 2\alpha}{2} + (e+f) \sin \alpha - A + R \dots\dots\dots 4 \text{ 式}$$

(例) 今機械一點Aニ設置シ他ノ一點Bニ立テタルスタヂヤ、ロッドヲ望ミ、俯角八度三十四分ニ於テスタヂヤノ二線ニヨリテ五尺八寸五分(上ノ線ニテ)及ビ四尺四寸(下ノ線ニテ)中心線ニヨリテ五尺一寸二分(中線ニテ)ヲ讀ミ得ヨリト云フA、B二點間ノ水平距離及直立距離ヲ求ム。

但シ是レニ用キシ機械ノ定數(e+f)ハ1.00尺ニシテ機械ノ高サハ四尺一寸ナリト云フ。

(解) 先ヅスタヂヤノ讀數(5.85-4.4=1.45尺)ヲ求メヨ。

次ニ別表上段ニ於テ8°ヲ見、左側ノ横行ニ於テ34'ヲ見テ(水平)及(直立)ノ行ノ下ノ數字ヲ得ヨ。8°ノ(水平)ノ行ニ於テ34'ノ數97.78ヲ得。

是レハak=100ナルトキノ  $ak \cos^2 \alpha$  ナリ、意味ス故ニ  $ak=145$   
 $ak \cos^2 \alpha = 97.78 \times 1.45 = 141.781$

次ニ下段(e+f)ノ1.00ノ横行ニテ8°ノ(水平)ノ下ノ數0.99ヲ得ヨ(是レハ此場合ニ於テ(e+f)Cos α ナリ)而シテ是レヲ上ノ數ニ加フレバ水平距離ヲ得。

$$\begin{aligned} (e+f) \cos \alpha &= 0.99 \\ \text{水平距離} &= 141.781 + 0.99 = 142.771 \end{aligned}$$

次ニ同様ノ方法ニ由テ直立距離

$$\text{直立距離} = 14.73 \times 1.45 + 0.15 = 21.450 \dots\dots\dots \text{ヲ得。}$$

此ノ直立距離ハ機械ノ中心トロッドノ讀數ノ中數トノ直立距離ナルヲ以テ3式若シクハ4式ニ由テ再ビ計算セザルベカラズ。今直立角ハ仰角ナルヲ以テ3式ニ依リテ計算セヨ。

$$\begin{aligned} \text{直立距離} &= 14.73 \times 1.45 + 0.15 + 4.1 = 5.12 \\ &= 20.489 \end{aligned}$$

直立角ノ仰角ナルト俯角ナルトハ最後ノ3式及4式ヲ除キテ途中ノ計算ニ全ク關係ナシ。

スタチヤ表

分	0°		1°		2°		3°		4°		5°	
	水平	直立	水平	直立	水平	直立	水平	直立	水平	直立	水平	直立
0'	100.00	.00	99.97	1.74	99.88	3.49	99.73	5.25	99.51	6.96	99.24	8.68
2'	"	.06	"	1.80	99.87	3.55	99.72	5.28	"	7.02	99.23	8.74
4'	"	.12	"	1.86	"	3.60	99.71	5.34	99.50	7.07	99.22	8.80
6'	"	.17	99.96	1.92	"	3.66	"	5.40	99.49	7.13	99.21	8.85
8'	"	.23	"	1.98	99.86	3.72	99.70	5.46	99.48	7.19	99.20	8.91
10'	"	.29	"	2.04	"	3.78	99.69	5.52	99.47	7.25	99.19	8.97
12'	"	.35	"	2.09	99.85	3.84	"	5.57	99.46	7.30	99.18	9.05
14'	"	.41	99.95	2.15	"	3.90	99.68	5.65	"	7.36	99.17	9.08
16'	"	.47	"	2.21	99.84	3.95	"	5.69	99.45	7.42	99.16	9.14
18'	"	.52	"	2.27	"	4.01	99.67	5.75	99.44	7.48	99.15	9.20
20'	"	.58	"	2.33	99.83	4.07	99.66	5.80	99.43	7.53	99.14	9.25
22'	"	.64	99.94	2.38	"	4.13	"	5.86	99.42	7.59	99.13	9.31
24'	"	.70	"	2.44	99.82	4.18	99.65	5.92	99.41	7.65	99.11	9.37
26'	99.99	.76	"	2.50	"	4.24	99.64	5.98	99.40	7.71	99.10	9.43
28'	"	.81	99.93	2.56	99.81	4.30	99.63	6.04	99.39	7.76	99.09	9.48
30'	"	.87	"	2.62	"	4.36	"	6.09	99.38	7.82	99.08	9.54
32'	"	.93	"	2.67	99.80	4.42	99.62	6.15	99.37	7.88	99.07	9.60
34'	"	.99	"	2.73	"	4.48	"	6.21	99.37	7.94	99.06	9.65
36'	"	1.05	99.92	2.79	99.79	4.53	99.61	6.27	99.36	7.99	99.05	9.71
38'	"	1.11	"	2.85	"	4.59	99.60	6.33	99.35	8.05	99.04	9.77
40'	"	1.16	"	2.91	99.78	4.65	99.59	6.38	99.34	8.11	99.03	9.83
42'	"	1.22	99.91	2.97	"	4.71	"	6.44	99.33	8.17	99.01	9.88
44'	99.98	1.28	"	3.02	99.77	4.76	99.58	6.50	99.32	8.22	99.00	9.94
46'	"	1.34	99.90	3.08	"	4.82	99.57	6.55	99.31	8.28	98.99	10.00
48'	"	1.40	"	3.14	99.76	4.88	99.56	6.61	99.30	8.34	98.98	10.05
50'	"	1.45	"	3.20	"	4.94	"	6.67	99.29	8.40	98.97	10.11
52'	"	1.51	99.89	3.26	99.75	4.99	99.55	6.73	99.28	8.45	98.96	10.17
54'	"	1.57	"	3.31	99.74	5.05	99.54	6.78	99.27	8.51	98.94	10.22
56'	99.97	1.63	"	3.37	"	5.11	99.53	6.84	99.26	8.57	98.93	10.28
58'	"	1.69	99.88	3.43	99.73	5.17	99.52	6.90	99.25	8.63	98.92	10.34
c+f=.75	.75	.01	.75	.02	.75	.03	.75	.05	.75	.06	.75	.07
c+f=1.00	1.00	.01	1.00	.03	1.00	.04	1.00	.06	1.00	.08	.99	.09
c+f=1.25	1.25	.02	1.25	.03	1.25	.05	1.25	.08	1.25	.10	1.24	.11

分	6°		7°		8°		9°		10°		11°	
	水平	直立	水平	直立	水平	直立	水平	直立	水平	直立	水平	直立
0'	98.91	10.40	98.51	12.10	98.06	13.78	97.55	15.45	96.98	17.10	96.36	18.75
2'	98.90	10.45	98.50	12.15	98.05	13.84	97.53	15.51	96.96	17.16	96.34	18.78
4'	98.88	10.51	98.48	12.21	98.03	13.89	97.52	15.56	96.94	17.21	96.32	18.84
6'	98.87	10.57	98.47	12.26	98.01	13.95	97.50	15.62	96.92	17.26	96.29	18.89
8'	98.86	10.62	98.46	12.32	98.00	14.01	97.48	15.67	96.90	17.32	96.27	18.95
10'	98.85	10.68	98.44	12.38	97.98	14.06	97.46	15.73	96.88	17.37	96.25	19.00
12'	98.83	10.74	98.43	12.45	97.97	14.12	97.44	15.78	96.86	17.43	96.23	19.05
14'	98.82	10.79	98.41	12.49	97.95	14.17	97.43	15.84	96.84	17.48	96.21	19.11
16'	98.81	10.85	98.40	12.55	97.93	14.23	97.41	15.89	96.82	17.54	96.18	19.16
18'	98.80	10.91	98.39	12.60	97.92	14.28	97.39	15.95	96.80	17.59	96.16	19.21
20'	98.78	10.96	98.37	12.66	97.90	14.34	97.37	16.00	96.78	17.65	96.14	19.27
22'	98.77	11.02	98.36	12.72	97.88	14.40	97.35	16.06	96.76	17.70	96.12	19.32
24'	98.76	11.08	98.34	12.77	97.87	14.45	97.33	16.11	96.74	17.76	96.09	19.38
26'	98.74	11.13	98.33	12.83	97.85	14.51	97.31	16.17	96.72	17.81	96.07	19.43
28'	98.73	11.19	98.31	12.88	97.83	14.56	97.29	16.22	96.70	17.86	96.05	19.48
30'	98.72	11.25	98.29	12.94	97.82	14.62	97.28	16.28	96.68	17.92	96.03	19.54
32'	98.71	11.30	98.28	13.00	97.80	14.67	97.26	16.33	96.66	17.97	96.00	19.59
34'	98.69	11.36	98.27	13.05	97.78	14.73	97.24	16.39	96.64	18.03	95.98	19.64
36'	98.68	11.42	98.25	13.11	97.76	14.79	97.22	16.44	96.62	18.08	95.96	19.70
38'	98.67	11.47	98.24	13.17	97.75	14.84	97.20	16.50	96.60	18.14	95.93	19.75
40'	98.65	11.53	98.22	13.22	97.73	14.90	97.18	16.55	96.57	18.19	95.91	19.80
42'	98.64	11.59	98.20	13.28	97.71	14.95	97.16	16.61	96.55	18.24	95.89	19.86
44'	98.63	11.64	98.19	13.33	97.69	15.01	97.14	16.66	96.53	18.30	95.86	19.91
46'	98.61	11.70	98.17	13.39	97.68	15.06	97.12	16.72	96.51	18.35	95.84	19.96
48'	98.60	11.76	98.16	13.45	97.66	15.12	97.10	16.77	96.49	18.41	95.82	20.02
50'	98.58	11.81	98.14	13.50	97.64	15.17	97.08	16.83	96.47	18.46	95.79	20.07
52'	98.57	11.87	98.13	13.56	97.62	15.23	97.06	16.88	96.45	18.51	95.77	20.12
54'	98.56	11.93	98.11	13.61	97.61	15.28	97.04	16.94	96.42	18.57	95.75	20.18
56'	98.54	11.98	98.10	13.67	97.59	15.34	97.02	16.99	96.40	18.62	95.72	20.23
58'	98.53	12.04	98.08	13.73	97.57	15.40	97.00	17.05	96.38	18.68	95.70	20.28
c+f=.75	.75	.08	.74	.10	.74	.11	.74	.12	.74	.14	.75	.15
c+f=1.00	.99	.11	.99	.13	.99	.15	.99	.16	.98	.18	.98	.20
c+f=1.25	1.24	.14	1.24	.16	1.25	.18	1.25	.21	1.25	.23	1.22	.25

スタチヤ表

分	12°		13°		14°		15°		16°		17°	
	水平	直立	水平	直立	水平	直立	水平	直立	水平	直立	水平	直立
0'	95.68	20.34	94.94	21.92	94.15	23.47	93.30	25.00	92.40	26.50	91.45	27.96
2'	95.65	20.39	94.91	21.97	94.12	23.52	93.27	25.05	92.37	26.55	91.42	28.01
4'	95.65	20.44	94.89	22.02	94.09	23.58	93.24	25.10	92.34	26.59	91.39	28.06
6'	95.61	20.50	94.86	22.08	94.07	23.63	93.21	25.15	92.31	26.64	91.35	28.10
8'	95.58	20.55	94.84	22.13	94.04	23.68	93.18	25.20	92.28	26.69	91.32	28.15
10'	95.56	20.60	94.81	22.18	94.01	23.73	93.16	25.25	92.25	26.74	91.29	28.20
12'	95.53	20.66	94.79	22.23	93.98	23.78	93.13	25.30	92.22	26.79	91.26	28.25
14'	95.51	20.71	94.76	22.28	93.95	23.83	93.10	25.35	92.19	26.84	91.22	28.30
16'	95.49	20.76	94.75	22.34	93.93	23.88	93.07	25.40	92.15	26.89	91.19	28.34
18'	95.46	20.81	94.71	22.39	93.90	23.93	93.04	25.45	92.12	26.94	91.16	28.39
20'	95.44	20.87	94.68	22.44	93.87	23.99	93.01	25.50	92.09	26.99	91.12	28.44
22'	95.41	20.92	94.66	22.49	93.84	24.04	92.98	25.55	92.06	27.04	91.09	28.49
24'	95.39	20.97	94.63	22.54	93.81	24.09	92.95	25.60	92.03	27.09	91.06	28.54
26'	95.36	21.03	94.60	22.60	93.79	24.14	92.92	25.65	92.00	27.13	91.02	28.58
28'	95.34	21.08	94.58	22.65	93.76	24.19	92.89	25.70	91.97	27.18	90.99	28.63
30'	95.32	21.13	94.55	22.70	93.73	24.24	92.86	25.75	91.93	27.23	90.96	28.68
32'	95.29	21.18	94.52	22.75	93.70	24.29	92.83	25.80	91.90	27.28	90.92	28.73
34'	95.27	21.24	94.50	22.80	93.67	24.34	92.80	25.85	91.87	27.33	90.89	28.77
36'	95.24	21.29	94.47	22.85	93.65	24.39	92.77	25.90	91.84	27.38	90.86	28.82
38'	95.22	21.34	94.44	22.91	93.62	24.44	92.74	25.95	91.81	27.43	90.82	28.87
40'	95.19	21.39	94.42	22.96	93.59	24.49	92.71	26.00	91.77	27.48	90.79	28.92
42'	95.17	21.45	94.39	23.01	93.56	24.55	92.68	26.05	91.74	27.52	90.76	28.96
44'	95.14	21.50	94.36	23.06	93.53	24.60	92.65	26.10	91.71	27.57	90.72	29.01
46'	95.12	21.55	94.34	23.11	93.50	24.65	92.62	26.15	91.68	27.62	90.69	29.06
48'	95.09	21.60	94.31	23.16	93.47	24.70	92.59	26.20	91.65	27.67	90.66	29.11
50'	95.07	21.66	94.28	23.22	93.45	24.75	92.56	26.25	91.61	27.72	90.62	29.15
52'	95.04	21.71	94.26	23.27	93.42	24.80	92.53	26.30	91.58	27.77	90.59	29.20
54'	95.02	21.76	94.									

スタチヤ表

分	24°		25°		26°		27°		28°		29°	
	水平	直立	水平	直立	水平	直立	水平	直立	水平	直立	水平	直立
0	85.46	37.16	82.14	38.30	80.78	39.40	79.39	40.45	77.96	41.45	76.50	42.40
2	85.41	37.20	82.09	38.34	80.74	39.44	79.34	40.49	77.91	41.49	76.45	42.43
4	85.37	37.25	82.05	38.38	80.69	39.47	79.30	40.52	77.86	41.52	76.40	42.46
6	85.33	37.27	82.01	38.41	80.65	39.51	79.25	40.55	77.81	41.55	76.35	42.49
8	85.28	37.31	81.96	38.45	80.60	39.54	79.20	40.59	77.77	41.59	76.30	42.53
10	85.24	37.35	81.92	38.49	80.55	39.58	79.15	40.62	77.72	41.61	76.25	42.56
12	85.20	37.39	81.87	38.53	80.51	39.61	79.11	40.66	77.67	41.65	76.20	42.59
14	85.15	37.43	81.83	38.56	80.46	39.65	79.06	40.69	77.62	41.68	76.15	42.62
16	85.11	37.47	81.78	38.60	80.41	39.69	79.01	40.72	77.57	41.71	76.10	42.65
18	85.07	37.51	81.74	38.64	80.37	39.72	78.96	40.76	77.52	41.74	76.05	42.68
20	85.02	37.54	81.69	38.67	80.32	39.76	78.92	40.79	77.48	41.77	76.00	42.71
22	84.98	37.58	81.65	38.71	80.28	39.79	78.87	40.82	77.42	41.81	75.95	42.74
24	84.93	37.62	81.60	38.75	80.23	39.83	78.82	40.86	77.38	41.84	75.90	42.77
26	84.89	37.66	81.56	38.78	80.18	39.86	78.77	40.89	77.33	41.87	75.85	42.80
28	84.85	37.70	81.51	38.82	80.14	39.90	78.73	40.92	77.28	41.90	75.80	42.83
30	84.80	37.74	81.47	38.86	80.09	39.93	78.68	40.96	77.23	41.93	75.75	42.86
32	84.76	37.77	81.42	38.89	80.04	39.97	78.63	40.99	77.18	41.97	75.70	42.89
34	84.72	37.81	81.38	38.93	80.00	40.00	78.59	41.02	77.13	42.00	75.65	42.92
36	84.67	37.85	81.33	38.97	79.95	40.04	78.54	41.06	77.09	42.03	75.60	42.95
38	84.63	37.89	81.28	39.00	79.90	40.07	78.49	41.09	77.04	42.06	75.55	42.98
40	84.58	37.93	81.24	39.04	79.86	40.11	78.44	41.12	76.99	42.09	75.50	43.01
42	84.54	37.96	81.19	39.08	79.81	40.14	78.39	41.16	76.94	42.12	75.45	43.04
44	84.49	38.00	81.15	39.11	79.76	40.18	78.34	41.19	76.89	42.15	75.40	43.07
46	84.45	38.04	81.10	39.15	79.72	40.21	78.30	41.22	76.84	42.19	75.35	43.10
48	84.41	38.08	81.06	39.18	79.67	40.24	78.25	41.26	76.79	42.22	75.30	43.13
50	84.36	38.11	81.01	39.22	79.62	40.28	78.20	41.29	76.74	42.25	75.25	43.16
52	84.32	38.15	80.97	39.26	79.58	40.31	78.15	41.32	76.69	42.28	75.20	43.19
54	84.27	38.19	80.92	39.29	79.53	40.35	78.10	41.35	76.64	42.31	75.15	43.22
56	84.23	38.23	80.87	39.33	79.48	40.39	78.06	41.39	76.59	42.34	75.10	43.24
58	84.18	38.26	80.83	39.36	79.44	40.42	78.01	41.42	76.55	42.37	75.05	43.27
c+f=.75	.68	.31	.68	.32	.67	.33	.66	.33	.66	.36	.65	.37
c+f=1.00	.91	.41	.90	.43	.89	.45	.88	.46	.88	.48	.87	.49
c+f=1.25	1.14	.52	1.13	.54	1.12	.56	1.11	.58	1.10	.60	1.09	.62

スタチヤ表

分	36°		37°		38°		39°		40°		41°	
	水平	直立	水平	直立	水平	直立	水平	直立	水平	直立	水平	直立
0	65.45	47.55	65.78	48.06	62.10	48.52	60.40	48.91	58.68	49.24	56.96	49.51
2	65.40	47.57	65.73	48.08	62.04	48.53	60.34	48.92	58.62	49.25	56.90	49.52
4	65.34	47.59	65.67	48.10	61.98	48.54	60.28	48.93	58.57	49.26	56.84	49.53
6	65.29	47.61	65.61	48.11	61.93	48.56	60.22	48.94	58.51	49.27	56.79	49.54
8	65.23	47.62	65.56	48.13	61.87	48.57	60.17	48.95	58.45	49.28	56.73	49.55
10	65.17	47.64	65.50	48.14	61.81	48.58	60.11	48.97	58.40	49.29	56.67	49.55
12	65.12	47.66	65.45	48.16	61.76	48.60	60.05	48.98	58.34	49.30	56.61	49.56
14	65.06	47.68	65.39	48.17	61.70	48.61	60.00	48.99	58.28	49.31	56.55	49.57
16	65.01	47.69	65.33	48.19	61.64	48.63	59.94	49.00	58.22	49.32	56.50	49.58
18	64.95	47.71	65.28	48.21	61.59	48.64	59.88	49.01	58.17	49.33	56.44	49.58
20	64.90	47.73	65.22	48.22	61.53	48.65	59.83	49.02	58.11	49.34	56.38	49.59
22	64.84	47.75	65.17	48.24	61.47	48.67	59.77	49.04	58.05	49.35	56.32	49.60
24	64.79	47.76	65.11	48.25	61.42	48.68	59.71	49.05	57.99	49.36	56.27	49.61
26	64.73	47.78	65.05	48.27	61.36	48.69	59.65	49.06	57.94	49.37	56.21	49.61
28	64.67	47.80	65.00	48.28	61.30	48.71	59.60	49.07	57.88	49.37	56.15	49.62
30	64.62	47.82	64.94	48.30	61.25	48.72	59.54	49.08	57.82	49.38	56.09	49.63
32	64.56	47.85	64.89	48.31	61.19	48.73	59.48	49.09	57.76	49.39	56.04	49.63
34	64.51	47.85	64.83	48.33	61.13	48.74	59.43	49.10	57.71	49.40	55.98	49.64
36	64.45	47.87	64.77	48.34	61.08	48.76	59.37	49.11	57.65	49.41	55.92	49.65
38	64.40	47.88	64.72	48.36	61.02	48.77	59.31	49.12	57.59	49.42	55.86	49.65
40	64.34	47.90	64.66	48.37	60.96	48.78	59.25	49.14	57.53	49.43	55.80	49.66
42	64.29	47.92	64.60	48.39	60.91	48.80	59.20	49.15	57.48	49.44	55.75	49.67
44	64.23	47.95	64.55	48.40	60.85	48.81	59.14	49.16	57.42	49.45	55.69	49.68
46	64.17	47.95	64.49	48.42	60.79	48.82	59.08	49.17	57.36	49.45	55.63	49.68
48	64.12	47.97	64.43	48.43	60.74	48.83	59.03	49.18	57.30	49.46	55.57	49.69
50	64.06	47.98	64.38	48.44	60.68	48.85	58.97	49.19	57.25	49.47	55.52	49.70
52	64.01	48.00	64.32	48.46	60.62	48.86	58.91	49.20	57.19	49.48	55.46	49.70
54	63.95	48.02	64.27	48.48	60.57	48.87	58.85	49.21	57.13	49.49	55.40	49.71
56	63.89	48.05	64.21	48.49	60.51	48.88	58.80	49.22	57.07	49.50	55.34	49.71
58	63.84	48.05	64.15	48.50	60.45	48.90	58.74	49.23	57.02	49.51	55.28	49.72
c+f=.75	.61	.44	.60	.45	.59	.46	.59	.47	.58	.48	.56	.50
c+f=1.00	.81	.59	.80	.60	.79	.61	.78	.63	.77	.64	.75	.66
c+f=1.25	1.01	.74	1.00	.75	.99	.76	.98	.79	.96	.80	.94	.85



# 數學公式

## 第一 代數學ノ部

### [I] 指數法則

$$a^n = a \times a \times a \times \dots \quad (n \text{ 個}), \quad (\sqrt[n]{a})^n = a$$

$$a^{-n} = \frac{1}{a^n} \quad \frac{1}{a^n} = \sqrt[n]{\frac{1}{a}}$$

$$a^m \times a^n = a^{m+n} \quad \frac{a^m}{a^n} = \sqrt[n]{a^m}$$

$$a^m \div a^n = a^{m-n} \quad \sqrt[n]{ab} = \sqrt[n]{a} \cdot \sqrt[n]{b}$$

$$(ab)^n = a^n b^n \quad \sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}$$

$$(a+b)^n = a^n + b^n \quad \sqrt[n]{\sqrt[m]{a}} = \sqrt[mn]{a}$$

$$(a^m)^n = (a^n)^m = a^{mn} \quad (-a)^{2n+1} = -a^{2n+1}$$

### [II] ∞, a, 0 ノ關係 (∞: 無限大, a: 任意數, 0: 零)

$$a \times 0 = 0, \quad a \times \infty = \infty, \quad 0 \times \infty = \text{不定}, \quad a^2 = 1, \quad 0^a = 0, \quad 0^0 = \text{不定}$$

$$0 \div a = 0, \quad a \div 0 = \infty, \quad 0 \div 0 = \text{不定}, \quad \infty^a = \infty, \quad \infty^0 = \text{不定}$$

$$\infty \div a = \infty, \quad a \div \infty = 0, \quad \infty \div \infty = \text{不定},$$

$$a^\infty = \infty \quad (a^2 > 1 \text{ ノトキ}), \quad a^\infty = 0 \quad (a^2 < 1 \text{ ノトキ}), \quad a^\infty = 1 \quad (a^2 = 1 \text{ ノトキ}),$$

$$a^{-\infty} = 0 \quad (a^2 > 1 \text{ ノトキ}), \quad a^{-\infty} = \infty \quad (a^2 < 1 \text{ ノトキ}), \quad a^{-\infty} = 1 \quad (a^2 = 1 \text{ ノトキ}),$$

### [III] 公約數ト公倍數

[A 及 B: 任意數, G: 最大公約數, L: 最小公倍數,]

$$L = A \times \frac{B}{G} = B \times \frac{A}{G} = \frac{A \times B}{G} = \frac{aG \times bG}{G} = abG,$$

### [IV] 一般代數式ノ分解

$$(a \pm b)^2 = a^2 \pm 2ab + b^2, \quad (a \pm b)^3 = a^3 \pm 3a^2b + 3a^2 \pm b^3,$$

$$(a \pm b)^n = a^n \pm \frac{n}{1} a^{n-1} b + \frac{n(n-1)}{1 \cdot 2} a^{n-2} b^2 \pm \frac{n(n-1)(n-2)}{1 \cdot 2 \cdot 3} a^{n-3} b^3 + \dots,$$

$$(a+b+c+d+\dots)^2 = a^2 + b^2 + c^2 + d^2 + \dots + 2a(b+c+d+\dots) + 2b(c+d+\dots) + 2c(d+\dots),$$

$$(a+b+c)^3 = (a+b)^3 + 3(a+b)^2c + 3(a+b)c^2 + c^3, \quad (a^2-b^2) = (a+b)(a-b),$$

$$a^3 \pm b^3 = (a \pm b)(a^2 \mp ab + b^2), \quad a^{2n} - b^{2n} = (a^n + b^n)(a^n - b^n),$$

$$a^n - b^n = (a-b)(a^{n-1} + a^{n-2}b + a^{n-3}b^2 + \dots + b^{n-1}), \quad n \text{ ノ奇數ナルトキ}.$$

$$a^n - b^n = (a+b)(a^{n-1} - a^{n-2}b + a^{n-3}b^2 - \dots - b^{n-1}), \quad n \text{ ノ偶數ナルトキ}.$$

$$a^n + b^n = (a+b)(a^{n-1} - a^{n-2}b + a^{n-3}b^2 - \dots + b^{n-1}), \quad n \text{ ノ奇數ナルトキ}.$$

### [V] 比例

i)  $a:b=c:d$  ナルトキ.

$$\frac{b}{a} = \frac{d}{c}, \quad \frac{a}{b} = \frac{c}{d}, \quad ad = bc, \quad \frac{a \pm b}{c \pm d} = \frac{a}{c} = \frac{b}{d}, \quad \frac{a \pm c}{b \pm d} = \frac{a}{b} = \frac{c}{d},$$

$$\frac{a+b}{a-b} = \frac{c+d}{c-d}, \quad \frac{a+c}{a-c} = \frac{b+d}{b-d}, \quad \frac{ma}{mb} = \frac{nc}{nd}, \quad \frac{ma}{nb} = \frac{mc}{nd},$$

$$\frac{a^n}{b^n} = \frac{c^n}{d^n}, \quad \frac{\sqrt[n]{a}}{\sqrt[n]{b}} = \frac{\sqrt[n]{c}}{\sqrt[n]{d}}, \quad \frac{a^{\frac{m}{n}}}{b^{\frac{m}{n}}} = \frac{c^{\frac{m}{n}}}{d^{\frac{m}{n}}},$$

ii)  $\frac{a}{b} = \frac{c}{d} = \frac{e}{f} \dots$  ナルトキ.

$$\frac{a}{b} = \frac{c}{d} = \frac{e}{f} = \dots = \frac{a+c+e+\dots}{b+d+f+\dots} = \frac{pa+qc+re+\dots}{pb+qd+rf+\dots},$$

iii)  $\frac{a}{b} = \frac{c}{d}$  及  $\frac{e}{f} = \frac{g}{h}$  ナルトキ  $\frac{ae}{bf} = \frac{cg}{fh}$ .

### [VI] 方程式ノ根

i)  $ax+b=0$ , ナルトキ.  $x = -\frac{b}{a}$

ii)  $ax+by+c=0$ , 及  $a'x+b'y+c'=0$  ナルトキ.  $x = \frac{bc'-b'c}{ab'-a'b}, \quad y = \frac{c'a'-c'a}{ab'-a'b},$

iii)  $ax+by+cz=d$ ,  $a'x+b'y+c'z=d'$ , 及  $a''x+b''y+c''z=d''$ , ナルトキ.

$$x = \frac{d(b''c''-b''c') + d'(b''c'-b''c'') + d''(bc'-b'c)}{a(b''c''-b''c') + a'(b''c'-b''c'') + a''(bc'-b'c)}$$

[y 及 z 上式ノ a, b, c ヲ b, c, a 及 c, a, b ノ如ク考ヘテ求メラル]

iv)  $ax^2-b=0$  ナルトキ.

$$x = \pm \sqrt{\frac{b}{a}} \quad (\text{但シ } ab > 0 \text{ ナレバ實根, } ab < 0 \text{ ナレバ虛根}).$$

v)  $ax^2 + bx + c = 0$  ナルトキ.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}, \quad (\text{但シ } b^2 - 4ac \geq 0 \text{ ナレバ } \left. \begin{array}{l} \text{相異ナレル實根} \\ \text{相等シキ實根} \\ \text{相異ナレル虛根} \end{array} \right\} \text{トナル})$$

$$\left[ \text{若シ } b = 2b' \text{ ナルトキ } x = \frac{-b' \pm \sqrt{b'^2 - ac}}{a}, \right.$$

$$\left. \text{尙 } a = 1 \text{ ナルトキ } x = -b' \pm \sqrt{b'^2 - c}, \right]$$

vi) 根ト係数トノ關係

$ax^2 + bx + c = 0$  ニ於テ  $\alpha$  及  $\beta$  ナ二根トスレバ

$$\alpha + \beta = -\frac{b}{a}, \quad \alpha\beta = \frac{c}{a}, \text{ ナリ.}$$

### VII) 等差級數

初項:  $a$ , 公差:  $d$ , 第  $n$  番目ノ項:  $l$ ,  $n$  項ノ和:  $s$ , トスレバ,

$$l = a + (n-1)d, \quad s = \frac{n}{2}(a+l) = \frac{n}{2}\{2a + (n-1)d\},$$

### VIII) 等比級數

初項:  $a$ , 公比:  $r$ , 第  $n$  番目ノ項:  $l$ ,  $n$  項ノ和:  $s$  トスレバ,

$$l = ar^{n-1}, \quad s = \frac{a-rl}{1-r} = \frac{a(1-r^n)}{1-r},$$

## 第二 三角ノ部

### I) 三角函數ノ各象限ニ於ケル符號

象限	sin	cos	tan	col	sec	cosec
I	+	+	+	+	+	+
II	+	-	-	-	-	+
III	-	-	+	+	-	-
IV	-	+	-	-	+	-

### II) 特別角ノ値

函數	角	0°	30°	45°	60°	90°	180°	270°	360°
sin		0	1/2	1/√2	√3/2	1	0	-1	0
cos		1	√3/2	1/√2	1/2	0	-1	0	1
tan		0	1/√3	1	√3	∞	0	∞	0
col		∞	√3	1	1/√3	0	∞	0	∞
sec		1	2/√3	√2	2	∞	-1	∞	1
cosec		∞	2	√2	2/√3	1	∞	-1	∞

### III) 各象限ニ於ケル角ノ關係

函數	角	-A	A-90°	90°±A	180°±A	270°±A	n(360°)±
sin		-sin A	-cos A	+cos A	sin A	-cos A	±sin A
cos		+cos A	+sin A	∓sin A	-cos A	±sin A	+cos A
tan		-tan A	-cot A	∓cot A	±tan A	∓cot A	±tan A
col		-col A	-tan A	∓tan A	±col A	∓tan A	±col A
sec		+sec A	+cosec A	∓cosec A	-sec A	±cosec A	+sec A
cosec		-cosec A	-sec A	+sec A	∓cosec A	-sec A	±cosec A

### IV) 三角函數間ノ基礎的關係

$$\sin A = \frac{1}{\text{cosec } A} = \tan A \cos A, \quad \cot A = \frac{1}{\tan A} = \frac{\cos A}{\sin A}, \quad \sin^2 A + \cos^2 A = 1,$$

$$\cos A = \frac{1}{\text{sec } A} = \sin A \cot A, \quad \sec A = \frac{1}{\cos A}, \quad 1 + \tan^2 A = \sec^2 A,$$

$$\tan A = \frac{1}{\cot A} = \frac{\sin A}{\cos A}, \quad \text{cosec } A = \frac{1}{\sin A}, \quad 1 + \cot^2 A = \text{cosec}^2 A,$$

### V) 一ツノ函數ニテ他ノ函數ヲ表ハス事

	$\sin A = x$	$\cos A = x$	$\tan A = x$	$\cot A = x$	$\sec A = x$	$\operatorname{cosec} A = x$
$\sin A =$	$x$	$\sqrt{1-x^2}$	$\frac{x}{\sqrt{1+x^2}}$	$\frac{1}{\sqrt{1+x^2}}$	$\frac{\sqrt{x^2-1}}{x}$	$\frac{1}{x}$
$\cos A =$	$\sqrt{1-x^2}$	$x$	$\frac{1}{\sqrt{1+x^2}}$	$\frac{x}{\sqrt{1+x^2}}$	$\frac{1}{x}$	$\frac{\sqrt{x^2-1}}{2}$
$\tan A =$	$\frac{x}{\sqrt{1-x^2}}$	$\frac{\sqrt{1-x^2}}{x}$	$x$	$\frac{1}{x}$	$\sqrt{x^2-1}$	$\frac{1}{\sqrt{x^2-1}}$

$\cot$ ,  $\sec$ , 及  $\operatorname{cosec}$  ハ夫々  $\tan$ ,  $\cos$ , 及  $\sin$  ノ逆數ヲ採レバ宜シ.

### [VI] 二角ノ和及差ノ三角函數

$$\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B, \quad \tan(A \pm B) = \frac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$$

$$\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B, \quad \cot(A \pm B) = \frac{\cot A \cot B \mp 1}{\cot B \pm \cot A}$$

### [VII] 倍角ノ三角函數

$$\sin 2A = 2 \sin A \cos A, \quad \tan 2A = \frac{2 \tan A}{1 - \tan^2 A}, \quad \sin 3A = 3 \sin A - 4 \sin^3 A,$$

$$\cos 2A = \cos^2 A - \sin^2 A, \quad \cot 2A = \frac{\cot^2 A - 1}{2 \cot A}, \quad \cos 3A = 4 \cos^3 A - 3 \cos A,$$

$$= 1 - 2 \sin^2 A, \quad \tan 3A = \frac{3 \tan A - \tan^3 A}{1 - 3 \tan^2 A}$$

$$= 2 \cos^2 A - 1, \quad \cot 3A = \frac{3 \cot A - \cot^3 A}{1 - 3 \cot^2 A}$$

### [VIII] 分角ノ三角函數

$$\sin A = 2 \sin \frac{A}{2} \cos \frac{A}{2}, \quad \sin \frac{A}{2} = \pm \sqrt{\frac{1 - \cos A}{2}}$$

$$\cos A = \cos^2 \frac{A}{2} - \sin^2 \frac{A}{2} = 1 - 2 \sin^2 \frac{A}{2} = 2 \cos^2 \frac{A}{2} - 1, \quad \cos \frac{A}{2} = \pm \sqrt{\frac{1 + \cos A}{2}}$$

$$\tan A = \frac{2 \tan \frac{A}{2}}{1 - \tan^2 \frac{A}{2}}, \quad \tan \frac{A}{2} = \pm \sqrt{\frac{1 - \cos A}{1 + \cos A}} = \frac{\sin A}{1 + \cos A} = \frac{1 - \cos A}{\sin A}$$

$$\cot A = \frac{\cot^2 \frac{A}{2} - 1}{2 \cot \frac{A}{2}}, \quad \cot \frac{A}{2} = \frac{1 + \cos A}{\sin A} = \frac{\sin A}{1 - \cos A}$$

### [IX] 二角ノ sine 及 cosine ノ積ト和トノ關係

i) 積ヲ和ト差ニ變ズルモノ.

$$2 \sin A \cos B = \sin(A+B) + \sin(A-B), \quad 2 \cos A \cos B = \cos(A+B) + \cos(A-B)$$

$$2 \cos A \sin B = \sin(A+B) - \sin(A-B), \quad 2 \sin A \sin B = \cos(A-B) - \cos(A+B)$$

ii) 和ト差ヲ積ニ變ズルモノ.

$$\sin A + \sin B = 2 \sin \frac{A+B}{2} \cos \frac{A-B}{2}, \quad \cos A + \cos B = 2 \cos \frac{A+B}{2} \cos \frac{A-B}{2}$$

$$\sin A - \sin B = 2 \cos \frac{A+B}{2} \sin \frac{A-B}{2}, \quad \cos A - \cos B = 2 \sin \frac{A+B}{2} \sin \frac{A-B}{2}$$

$$\tan A \pm \tan B = \frac{\sin(A \pm B)}{\cos A \cos B}$$

### [X] 一般三角形ノ性質

S:  $\triangle ABC$  ノ面積,  $s = \frac{1}{2}(a+b+c)$ , トスルベ

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} = 2R, \dots$$

[正弦比例ノ公式]

$$a = 2R \sin A^* = b \cos C + c \cos B^*$$

$$\frac{a+b}{c} = \frac{\cos \frac{A-B}{2}}{\sin \frac{C}{2}}, \quad \frac{a-b}{c} = \frac{\sin \frac{A-B}{2}}{\cos \frac{C}{2}}$$

$$\frac{a+b}{a-b} = \frac{\tan \frac{A+B}{2}}{\tan \frac{A-B}{2}}$$

$$r = \sqrt{\frac{(s-a)(s-b)(s-c)}{s}} = (s-a) \tan \frac{A}{2}^*$$

$$a^2 = b^2 + c^2 - 2bc \cos A^*$$

$$R = \frac{a}{2 \sin A}^*$$

$$\sin A = \frac{2}{bc} \sqrt{s(s-a)(s-b)(s-c)}^*$$

$$\sin 2(A+B) = -\sin 2C$$

$$\cos A = \frac{(b^2 + c^2 - a^2)}{2bc}^*$$

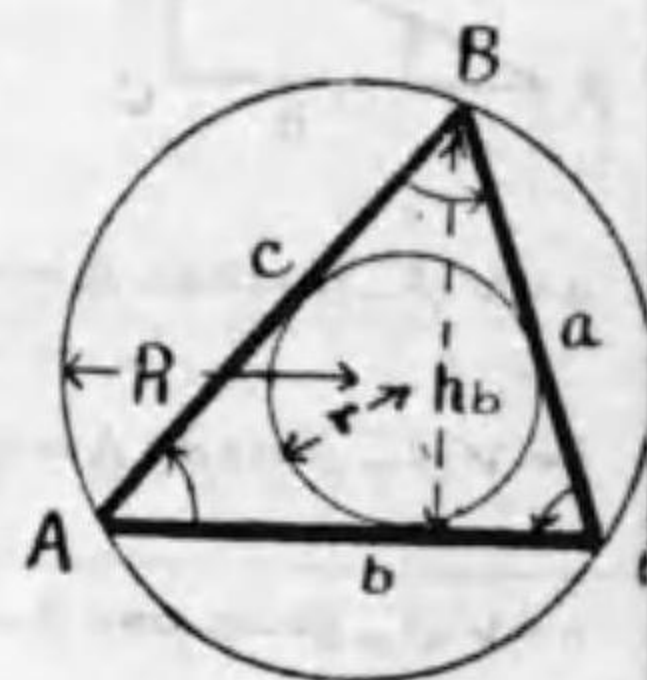
$$\cos 2(A+B) = \cos 2C$$

$$\tan 2(A+B) = -\tan 2C$$

$$\sin \frac{A}{2} = \sqrt{\frac{(s-b)(s-c)}{bc}}^*$$

$$\sin(A+B) = \sin C$$

\* 同一理ニ依リテ其他ノ角及邊ノ場合ニ就キテモ式ノ所定ノ公式ヲ適用シトガ出来ル.



$$\cos \frac{A}{2} = \sqrt{\frac{s(s-a)}{bc}}$$

$$\tan \frac{A}{2} = \sqrt{\frac{(s-b)(s-c)}{s(s-a)}}$$

$$hb = c \sin A = a \sin C^*$$

$$= \frac{2}{b} \sqrt{s(s-a)(s-b)(s-c)}^*$$

$$S = \frac{1}{2} bh = \frac{1}{2} ab \sin C^* = \frac{a^2 \sin B \sin C}{2 \sin A} = \sqrt{s(s-a)(s-b)(s-c)} = rs$$

$$\cos(A+B) = -\cos C$$

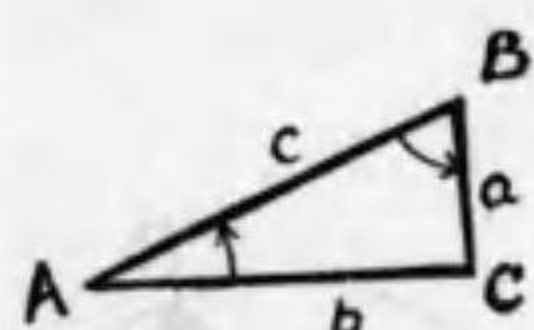
$$\tan(A+B) = -\tan C$$

$$\sin \frac{1}{2}(A+B) = \cos \frac{C}{2}$$

$$\cos \frac{1}{2}(A+B) = \sin \frac{C}{2}$$

$$\tan \frac{1}{2}(A+B) = \cot \frac{C}{2}$$

### (XI) 直角三角形ノ解法



$$\sin A = \frac{a}{c}, \cos A = \frac{b}{c}, \tan A = \frac{a}{b}$$

$$\cot A = \frac{b}{a}, \sec A = \frac{c}{b}, \operatorname{cosec} A = \frac{c}{a}$$

$$B = 90^\circ - A,$$

$$a = \sqrt{c^2 - b^2} = c \sin A = b \tan A, \quad \text{面積 } \triangle ABC = \frac{1}{2} ab = \frac{a^2}{2 \tan A}$$

$$b = \sqrt{c^2 - a^2} = c \cos A = a \cot A,$$

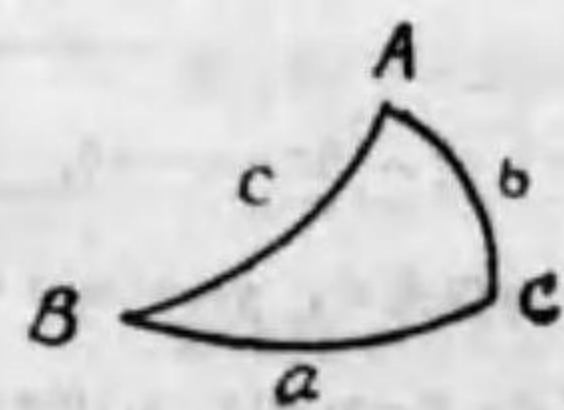
$$c = \sqrt{a^2 + b^2} = a \operatorname{cosec} A = b \sec A,$$

### (XII) 三角形ノ解法 (前諸公式ノ應用)

	太書ハ既知ノ値,	細書ハ未知即チ求メントスル値,
(1)		$A = 180^\circ - (B+C),$ $b = \frac{a \sin B}{\sin A}, \quad c = \frac{a \sin C}{\sin A}$
(2)		$A = 90^\circ - \frac{C}{2} + \tan^{-1} \left( \frac{a-b}{a+b} \cot \frac{C}{2} \right)$ $B = 90^\circ - \frac{C}{2} - \tan^{-1} \left( \frac{a-b}{a+b} \cot \frac{C}{2} \right)$ $\frac{(a+b) \sin \frac{C}{2}}{\cot \frac{1}{2}(A-B)} = \frac{(a-b) c \sin \frac{C}{2}}{\sin \frac{1}{2}(A-B)}$

(3)		$B = \sin^{-1} \left( \frac{b \sin A}{a} \right), \quad C = 180^\circ - (A+B),$ $c = \frac{a \sin C}{\sin A}$
(4)		$\tan \frac{A}{2} = \sqrt{\frac{(s-b)(s-c)}{s(s-a)}}, \quad \tan \frac{B}{2} = \sqrt{\frac{(s-c)(s-a)}{s(s-b)}}$ $\tan \frac{C}{2} = \sqrt{\frac{(s-a)(s-b)}{s(s-c)}}, \quad s = \frac{1}{2}(a+b+c)$
(5)		$m = b+c$ $\frac{1}{2}(B+C) = 90^\circ - \frac{A}{2}, \quad \left( \begin{matrix} \text{此二式ヲ聯立} \\ \text{ニシテ B 及} \\ \text{C ヲ求ム} \end{matrix} \right)$ $\cos \frac{1}{2}(B-C) = \frac{m \sin \frac{A}{2}}{a}$
(6)		$m = b+c$ $2s = a+b+c = a+m \therefore s-a = \frac{m-a}{2}$ $\tan \frac{A}{2} = \frac{r}{s-a}, \quad \tan \frac{B}{2} = \frac{r}{s-b}, \quad \tan \frac{C}{2} = \frac{r}{s-c}$ (b 及 c ハ (1) ノ場合ニヨリテ求ム)

### (XIII) 球面三角ノ解法



$$\frac{\sin a}{\sin A} = \frac{\sin b}{\sin B} = \frac{\sin c}{\sin C}$$

$$\begin{cases} \cos a = \cos b \cos c + \sin b \sin c \cos A \\ \cos b = \cos c \cos a + \sin c \sin a \cos B \\ \cos c = \cos a \cos b + \sin a \sin b \cos C \end{cases}$$

$$\begin{cases} \cos A = -\cos B \cos C + \sin B \sin C \cos a \\ \cos B = -\cos C \cos A + \sin C \sin A \cos b \\ \cos C = -\cos A \cos B + \sin A \sin B \cos c \end{cases}$$

$$\sin A = \frac{\sin a}{\sin c} = \frac{\sin B}{\sin b}$$

$$\sin B = \frac{\sin b}{\sin c} = \frac{\cos A}{\cos a}$$

$$\sin \frac{A}{2} = \sqrt{\frac{\sin(s-b) \sin(s-c)}{\sin b \sin c}}$$

$$\cos A = \frac{\tan b}{\tan c} = \cos a \sin B$$

$$\cos \frac{A}{2} = \sqrt{\frac{\sin s \sin(s-a)}{\sin b \sin c}}$$

$$\cos B = \frac{\tan a}{\tan c} = \cos a \sin A$$

$$\left\{ \begin{aligned} \tan \frac{A}{2} &= \sqrt{\frac{\sin(s-b)\sin(s-c)}{\sin s \sin(s-a)}} \\ \left( \begin{aligned} \text{但シ } a+b+c &= 2s \\ C &= 90^\circ \end{aligned} \right) \end{aligned} \right.$$

$$\begin{aligned} \tan A &= \frac{\tan a}{\sin b}, \quad \tan B = \frac{\tan b}{\sin a} \\ \cos c &= \cos a \cdot \cos b = \cot A \cot B. \end{aligned}$$

### 第三 解析幾何學ノ部

#### [I] 點ノ位置

- 二點  $(x_1, y_1)$  及  $(x_2, y_2)$  間ノ距離ハ、 $\sqrt{(x_1-x_2)^2+(y_1-y_2)^2}$ ,
- 二點  $(x_1, y_1)$  及  $(x_2, y_2)$  間ヲ定比  $m:n$  ニ分ツ點ノ座標ハ  

$$\left( \frac{nx_1+mx_2}{m+n}, \frac{ny_1+my_2}{m+n} \right), \quad (n < 0 \text{ ナレバ外分})$$

#### [II] 線

- $x, y$  ノ一次方程式ハ直線ヲ表ハス.
- 二次或ハ高次方程式ハ曲線又ハ直線群ヲ表ハス.
- 二ツノ二元聯立方程式ノ根ハ各方程式ノ表ハス直線或ハ曲線ノ交點ノ座標ヲ表ハス.
- 定數項ノ異ナル二直線  $ax+by=c$  ト  $a'x+b'y=d$  トハ平行アアル.
- 定數項ノイ方程式ハ原點ヲ通過スル線ヲ表ハス.
- 兩軸上ノ截片  $a, b$  ナル直線ノ方程式ハ、 $\frac{x}{a}+\frac{y}{b}=1$  或ハ  $bx+ay=ab$ ,
- $y$  軸上ノ截片  $b$  ニシテ  $x$  軸ト  $\alpha$  角ヲナス直線ノ方程式ハ、 $y=x \tan \alpha + b$ ,
- $(x_1, y_1)$  ナル點ヲ通過シ  $x$  軸ト  $\alpha$  角ヲナス直線式ハ、 $y-y_1=(x-x_1) \tan \alpha$ ,
- 二直線  $ax+by=c$  ト  $a'x+b'y=c'$  トノ交點ノ座標ハ、 $\left( \frac{b'c-bc'}{ab'-a'b}, \frac{c'a-ca'}{ab'-a'b} \right)$ ,
- 二直線  $ax+by=c$  ト  $a'x+b'y=c'$  トハ平行ナル條件ハ、 $\frac{a}{a'}=\frac{b}{b'}$  或ハ  $\frac{a}{b}=\frac{a'}{b'}$ ,
- 二點  $(x_1, y_1)$  及  $(x_2, y_2)$  トヲ通過スル直線式ハ、 $\frac{x-x_1}{x_2-x_1}=\frac{y-y_1}{y_2-y_1}$ ,
- 二直線  $ax+by=c$  ト  $a'x+b'y=c'$  トハ垂直ナル條件ハ、 $aa'+bb'=0$ ,
- 二直線  $ax+by=c$  ト  $bx-ay=d$  トハ垂直アアル、(但シ  $d$  ハ任意ノ數),

- 二直線  $y=mx+b$  ト  $y=m'x+b'$  トノ交角ヲ  $\beta$  トスレバ、 $\tan \beta = \frac{m-m'}{1+mm'}$ ,
- 原點ヨリ下シタル垂線ノ長サ  $p$  ニシテ  $x$  軸ト  $\alpha$  角ヲナス直線式ハ、 $x \cos \alpha + y \sin \alpha = p$ ,
- 一點  $(x_1, y_1)$  ヨリ直線  $ax+by=c$  ニ下ス垂線ノ長サハ、 $\frac{ax_1+by_1-c}{\sqrt{a^2+b^2}}$ ,

#### [III] 圓

- $(a, b)$  ナ中心トスル半徑  $r$  ノ圓ノ方程式ハ、 $(x-a)^2+(y-b)^2=r^2$ ,
- $x^2+y^2+2gx+2fy+c=0$  ナル方程式ハ中心ガ  $(-g, -f)$  ニアリテ半徑ハ  $\sqrt{g^2+f^2-c}$  ナル圓ヲ表ハス.
- 一般ナル二元二次方程式  $ax^2+2hxy+by^2+2gx+2fy+c=0$  ハ圓ヲ表ハス條件ハ、 $a=b$  ニシテ  $h=0$ ,
- 一點  $(x_1, y_1)$  ヨリ  $x^2+y^2+2gx+2fy+c=0$  ナル圓ニ引ク切線ノ長サハ  $\sqrt{x_1^2+y_1^2+2gx_1+2fy_1+c}$ ,
- $x^2+y^2=r^2$  ナル圓ニ切シテ  $x$  軸ト  $\alpha$  角ヲナス直線ハ  $y=mx \pm r\sqrt{1+m^2}$ ,  
 (但シ  $m=\tan \alpha$ )
- $x^2+y^2=r^2$  ナル圓周上ノ點  $(x_1, y_1)$  ニ於ケル切線ノ方程式ハ、 $x_1x+y_1y=r^2$

#### [IV] 圓錐曲線

- $x$  軸ノ正ノ部分ヲ軸トスル拋物線ノ方程式ハ、 $y^2=2ax$ ,
- 拋物線  $y^2=2ax$  ニ切シ  $x$  軸ト  $\alpha$  角ヲナス直線ノ方程式ハ、 $y=x \tan \alpha + \frac{a}{2 \tan \alpha}$ ,
- 拋物線  $y^2=2ax$  上ノ一點  $(x_1, y_1)$  ニ於ケル切線ノ方程式ハ、 $y_1y=a(x+x_1)$
- 座標軸ヲ兩軸トスル橢圓及ビ双曲線ノ方程式ハ、 $\frac{x^2}{a^2} \pm \frac{y^2}{b^2} = 1$ . (複號  $+$ : 橢圓,  $-$ : 双曲線).
- 上式  $\frac{x^2}{a^2} \pm \frac{y^2}{b^2}$  ノ離心率  $e$  ハ、 $\frac{\sqrt{a^2 \mp b^2}}{a}$ , (複號  $-$ : 橢圓,  $+$ : 双曲線)
- 上ノ曲線ノ周上ノ一點ヨリ焦點ニ至ル距離  $r', r$  ハ、  
 $r'=a+ex, x=a-ex$ , (橢圓)  $r=ex-a$ , (双曲線).
- 上ノ曲線ニ切シテ  $x$  軸ト  $\alpha$  角ヲナス直線ノ方程式ハ、 $y=mx \pm \sqrt{m^2a^2 \pm b^2}$  (但シ  $m=\tan \alpha$ ,  $\sqrt{\quad}$  内  $+$ : 橢圓,  $-$ : 双曲線)

V] 斜交軸 (兩軸ノ交角ヲ  $\omega$  トス)

- 二點間ノ距離ハ、 $\sqrt{(x_1-x_2)^2+(y_1-y_2)^2+2(x_1-x_2)(y_1-y_2)\cos\omega}$
- $x$  軸ハ共通ナル直交軸 (X, Y トス) ト斜交軸 ( $x, y$  トス) トノ間ノ關係ハ、  
 $X=x+y\cos\omega, Y=y\sin\omega$ , 及ビ  $x=X-Y\cot\omega, y=Y\operatorname{cosec}\omega$ ,
- 直線  $y=mx+b$  ハ  $x$  軸トナス角ヲ  $\alpha$  トスレバ,  
 $m=\frac{\sin\alpha}{\sin(\omega-\alpha)}, \tan\alpha=\frac{m\sin\omega}{1+m\cos\omega}$ ,
- 二直線  $y=mx+b$  ト  $y=m'x+b'$  トノ交角ヲ  $\beta$  トスレバ,  
 $\tan\beta=\frac{(m-m')\sin\omega}{1+(m+m')\cos\omega+mm'}$ ,
- 三點  $(x_1, y_1), (x_2, y_2)$  及  $(x_3, y_3)$  ヲ三頂點トスル三角形ノ面積ヲ表ハス絶對值ハ、  
 $\frac{1}{2}\{x_1(y_2-y_3)+x_2(y_3-y_1)+x_3(y_1-y_2)\}\sin\omega$ ,
- 圓ノ方程式ハ、 $(x-x_1)^2+2(x-x_1)(y-y_1)\cos\omega+(y-y_1)^2=r^2$ ,
- 上ノ圓ニ於テ圓ノ中心ハ原點ニアル場合ハ、 $x^2+2xy\cos\omega+y^2=r^2$ ,

VI] 極座標

- 直線ノ方程式ハ、 $P\cos(\theta-\alpha)=p$ , 原點ヲ通過スルトキハ  $\theta=\alpha$ ,
- 圓ノ方程式ハ、 $\rho^2-2l\rho\cos(\theta-\alpha)+(l^2-r^2)=0$ , [但シ中心ハ  $(l, \alpha)$  ニアル場合]
- 直座標ト極座標トヲ變換スル公式ハ、  
 $x=\rho\cos\theta, y=\rho\sin\theta, \rho=\sqrt{x^2+y^2}, \tan\theta=\frac{y}{x}$ , 或ハ  $\theta=\tan^{-1}\frac{y}{x}$ ,

VII] 立體解析幾何ノ大意

- 三元  $x, y, z$  ノ一次方程式ハ平面ヲ表ハシ、二次或ハ高次方程式ハ曲面(或ハ平面群)ヲ表ハス。
- $x$  軸,  $y$  軸,  $z$  軸上ノ截片カ夫々  $a, b, c$  ナル平面ノ方程式ハ  
 $\frac{x}{a}+\frac{y}{b}+\frac{z}{c}=1$ .
- 中心ハ  $(a, b, c)$  ニアル半徑  $r$  ナル球ノ表面ノ方程式ハ、  
 $(x-a)^2+(y-b)^2+(z-c)^2=r^2$ .
- $(a, b, c)$  ナル點ヲ通過スル直線ノ方程式ハ、 $\frac{x-a}{l}=\frac{y-b}{m}=\frac{z-c}{n}$

第四 微積分學ノ部

[I] 微分公式

$\frac{dc}{dx}=0$	$\frac{dx^n}{dx}=nx^{n-1}$
$\frac{d}{dx}\left(\frac{1}{x^2}\right)=-\frac{2}{x^3}$	$\frac{d}{dx}\left(\frac{1}{x^n}\right)=-n\frac{1}{x^{n+1}}$
$\frac{d}{dx}(\sqrt{x})=\frac{1}{2\sqrt{x}}$	$\frac{d}{dx}(u\pm v)=\frac{du}{dx}\pm\frac{dv}{dx} \quad (u, v=f(x))$
$\frac{d}{dx}(uv)=v\frac{du}{dx}+u\frac{dv}{dx}$	$\frac{d}{dx}\left(\frac{1}{\sqrt{x}}\right)=-\frac{1}{2x\sqrt{x}}$
$\frac{d}{dx}(u\cdot w)=u\frac{dw}{dx}+uw\frac{dv}{dx}+v\frac{du}{dx}$	
$\frac{d}{dx}\left(\frac{u}{v}\right)=\frac{v\frac{du}{dx}-u\frac{dv}{dx}}{v^2}$	$y=f(x)$ ナルトキ $\frac{dx}{dy}=\frac{1}{\frac{dy}{dx}}$
	$y=F(u), u=\varphi(z), z=f(x)$ ナルトキ $\frac{dy}{dx}=\frac{dy}{du}\cdot\frac{du}{dz}\cdot\frac{dz}{dx}$
$\frac{d}{dx}\{f(u, v, w)\}=\frac{\partial f}{\partial u}\cdot\frac{du}{dx}+\frac{\partial f}{\partial v}\cdot\frac{dv}{dx}+\frac{\partial f}{\partial w}\cdot\frac{dw}{dx}$	
$\frac{d}{dx}\sin x=\cos x$	$\frac{d}{dx}\cos x=-\sin x$
$\frac{d}{dx}\tan x=\sec^2 x$	$\frac{d}{dx}\cot x=-\operatorname{cosec}^2 x$
$\frac{d}{dx}\sec x=\sec x \tan x$	$\frac{d}{dx}\operatorname{cosec} x=-\operatorname{cosec} x \cot x$
$\frac{d}{dx}a \sin bx=ab \cos bx$	$\frac{d}{dx}\sin mx=m \cos mx$
$\frac{d}{dx}\sin^n x=n \sin^{n-1} x \cos x$	$\frac{d}{dx}\cos^n x=-n \cos^{n-1} x \sin x$
$\frac{d}{dx}\sin^{-1}x=\frac{1}{\sqrt{1-x^2}}$	$\frac{d}{dx}\cos^{-1}x=-\frac{1}{\sqrt{1-x^2}}$
$\frac{d}{dx}\tan^{-1}x=\frac{1}{1+x^2}$	$\frac{d}{dx}\cot^{-1}x=-\frac{1}{1+x^2}$

$$\frac{d}{dx} \sec^{-1} x = \frac{1}{x\sqrt{x^2-1}}$$

$$\frac{d}{dx} \operatorname{cosec}^{-1} x = -\frac{1}{x\sqrt{x^2-1}}$$

$$\frac{d}{dx} \log_a x = \frac{1}{x} \log_a e$$

$$\frac{d}{dx} \log_e x = \frac{1}{x}$$

$$\frac{d}{dx} a^x = a^x \log_e a$$

$$\frac{d}{dx} (e^{kx}) = ke^{kx}$$

$$\frac{d}{dx} e^x = e^x$$

$$\frac{dy}{dx} = -\frac{\frac{\partial f}{\partial x}}{\frac{\partial f}{\partial y}} \quad (f(x,y)=0)$$

$y=f(x)$  ニシテ

$$x=x_1 \text{ ノトキ } \max. \text{ ナレバ } \frac{dy}{dx}=0, \frac{d^2y}{dx^2} < 0$$

$$x=x_1 \text{ ノトキ } \min. \text{ ナレバ } \frac{dy}{dx}=0, \frac{d^2y}{dx^2} > 0$$

### 〔I〕 積分公式 [積分恒数 c ヲ略ス]

$$\int x^n dx = \frac{x^{n+1}}{n+1}$$

$$\int ax^n dx = \frac{ax^{n+1}}{n+1}$$

$$\int \frac{1}{x} dx = \log x$$

$$\int e^x dx = e^x$$

$$\int a^x dx = \frac{a^x}{\log_e a}$$

$$\int \sin x dx = -\cos x$$

$$\int \cos x dx = \sin x$$

$$\int \frac{2}{\sin 2x} dx = \log \tan x$$

$$\int \sin mx dx = -\frac{1}{m} \cos mx$$

$$\int \cos mx dx = \frac{1}{m} \sin mx$$

$$\int \operatorname{cosec} x \cot x dx = -\operatorname{cosec} x$$

$$\int \operatorname{cosec}^2 x dx = -\cot x$$

$$\int \sec x \tan x dx = \sec x$$

$$\int \tan x dx = \log \sec x = -\log \cos x$$

$$\int \cot x dx = \log \sin x$$

$$\int \sec x dx = \log \tan \left( \frac{\pi}{4} + \frac{x}{2} \right)$$

$$\int \operatorname{cosec} x dx = \log \sqrt{\frac{1-\cos x}{1+\cos x}}$$

$$\int \sec^2 x dx = \tan x$$

$$\int_a^b f(x) dx = F(b) - F(a) \quad \text{但シ} \quad \frac{dF(x)}{dx} = f(x)$$

$$\int_a^b f(x) dx = -\int_b^a f(x) dx$$

$$\int_a^b f(x) dx = \int_a^c f(x) dx + \int_c^b f(x) dx$$

$$\int_a^b \{f(x) + \varphi(x)\} dx = \int_a^b f(x) dx + \int_a^b \varphi(x) dx$$

$$\int \frac{dx}{x^2+a^2} = \frac{1}{a} \tan^{-1} \frac{x}{a}$$

$$\int \frac{dx}{x^2-a^2} = \frac{1}{2a} \log \frac{x-a}{x+a}$$

$$\int \frac{dx}{\sqrt{a^2-x^2}} = \sin^{-1} \frac{x}{a} = -\cos^{-1} \frac{x}{a}$$

$$\int \frac{dx}{\sqrt{x^2 \pm a^2}} = \log(x + \sqrt{x^2 \pm a^2})$$

$$\int \frac{dx}{a\sqrt{x^2-a^2}} = \frac{1}{a} \sec^{-1} \frac{x}{a}$$

$$\int \frac{dx}{\sqrt{2ax-x^2}} = \operatorname{vers}^{-1} \frac{x}{a}$$

$$\int \sqrt{a^2-x^2} dx = \frac{x}{2} \sqrt{a^2-x^2} + \frac{a^2}{2} \sin^{-1} \frac{x}{a}$$

$$\int x^2 \sqrt{a^2-x^2} dx = -\frac{x}{4} \sqrt{(a^2-x^2)^3} + \frac{a^2}{8} (x\sqrt{a^2-x^2} + a^2 \sin^{-1} \frac{x}{a})$$

$$\int \frac{dx}{x\sqrt{a \pm x^2}} = \frac{1}{a} \log \frac{x}{a + \sqrt{a^2 \pm x^2}}$$

$$\int \frac{xdx}{\sqrt{a^2 \pm x^2}} = \pm \sqrt{a^2 \pm x^2}$$

附 録

對 數

半徑 1 ナル圓ノ面積	} = π	= 3.1415926536	0.4971499
直徑 1 ナル球ノ面積			
直徑 1 ナル圓周			
直徑 1 ナル圓ノ面積 = $\frac{1}{4}\pi$		= 0.7853981634	1.8950899
直徑 1 ナル球ノ體積 = $\frac{1}{6}\pi$		= 0.5235987756	1.7189986
半徑 1 ナル球ノ體積 = $\frac{4}{3}\pi$		= 4.1887902048	0.6220886
面積 1 ナル圓ノ直徑 = $\sqrt{\frac{4}{\pi}}$		= 1.1283791671	0.0524550
體積 1 ナル球ノ直徑 = $\sqrt[3]{\frac{6}{\pi}}$		= 1.2407009818	0.0936671
$\sqrt{\pi}$		= 1.7724538509	0.2485749
$\pi^2$		= 9.8696044011	0.9942997
$\frac{1}{\pi}$		= 0.3183098862	1.5028501
$2\pi$		= 6.2831853072	0.7981799
$4\pi$		= 12.5663706144	1.0992099
$\frac{\pi}{2}$		= 1.5707963268	0.1961198
$\frac{\pi}{3}$		= 1.0471975512	0.0200286
$\sqrt[3]{\pi}$		= 1.4645921115	0.1657166
$\frac{1}{\sqrt{\pi}}$		= 0.5641896063	1.7514251
$\frac{1}{\sqrt[3]{\pi}}$		= 0.6827842584	1.8342834
$e$		= 2.7182818285	0.4342945
$e^2$		= 7.3890566020	0.8685890
$e^3$		= 20.0855358587	1.3028835
$\sqrt{e}$		= 1.6487213275	0.2171472
$\sqrt[3]{e}$		= 1.3956123572	0.1447648
對數率 M		= 0.4342944819	1.6377848

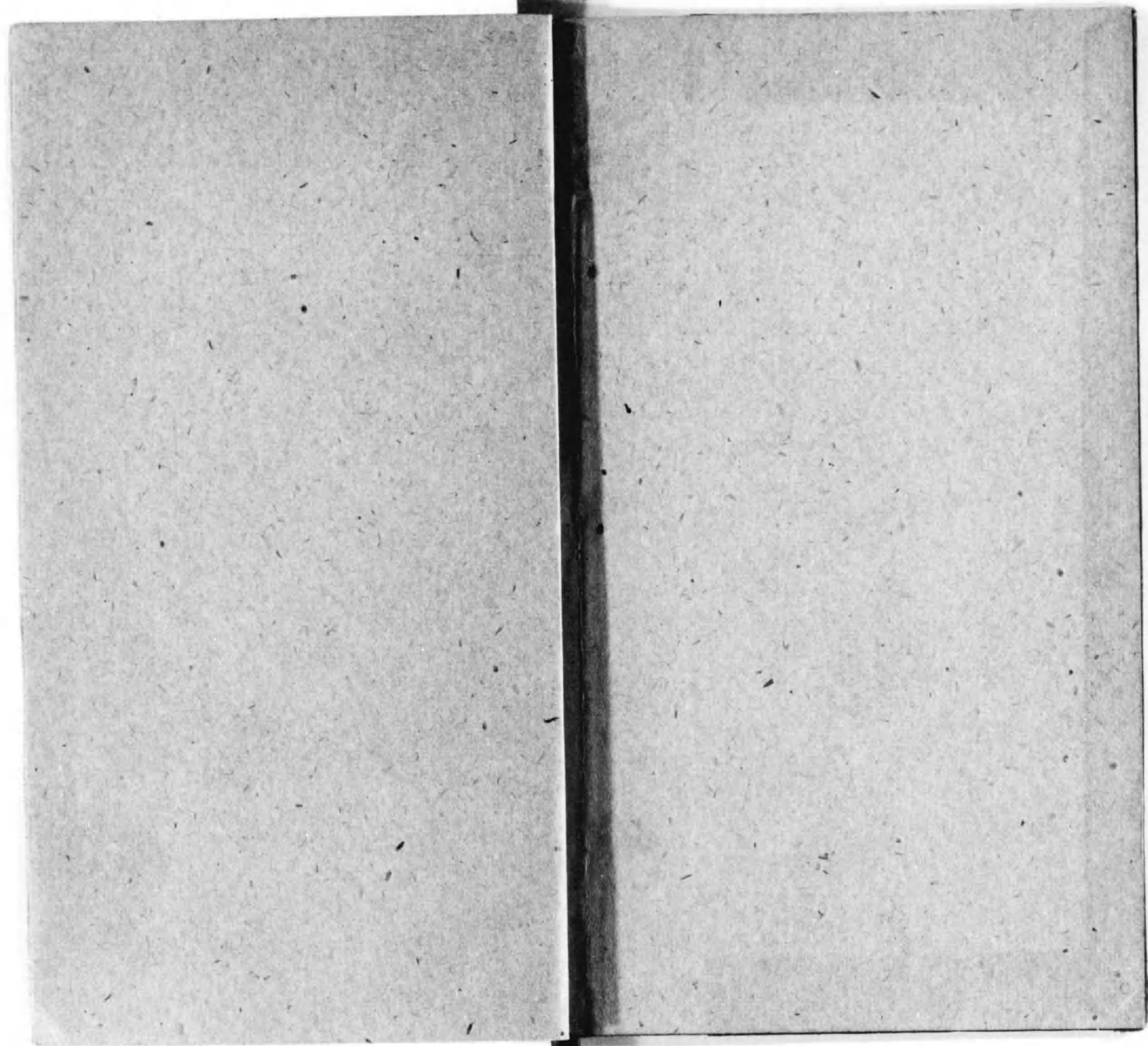
對 數

π / 自然對數	= 1.1447298858	0.0587030
度ニテ表ハシタ「ラヂアン」ノ値	= 57.295779513	1.7581226
分 ” ”	= 3437.74677078	3.5362739
秒 ” ”	= 206264.806247	5.3144251
「ラヂアン」ニテ表ハシタ度ノ値	= 0.174532925	2.2418773
” ” 分 ”	= 0.002908882	4.4637261
” ” 秒 ”	= 0.0000484814	6.6855749
平均太陽日	= 365.256374417	2.5625978
1 米突ヲ呎ニテ表ハシタル値	= 3.28083	0.5159838
” 吋 ” ”	= 39.37079	1.5951741
” 碼 ” ”	= 1.093633067	0.0388716
” 節 ” ”	= 4.970969	0.6964311
” 尺 ” ”	= 3.3	0.5185139
1 籽ヲ哩 ” ”	= 0.62137	1.7933503
” 鎖 ” ”	= 49.709693	1.6964311
” 涅 ” ”	= 0.539607	1.7320777
” 里 ” ”	= 0.25463	1.4059096
” 町 ” ”	= 9.16666.....	0.9622114
” 間 ” ”	= 550	2.7403627
1 砵ヲ封度 ” ”	= 2.20462	0.3433337
” 斤 ” ”	= 1.66666	0.2218487
1 瓦ヲ 匁 ” ”	= 0.26666	1.4259688
1 佛噸ヲ英噸 ” ”	= 0.9842	1.9930834
” 貫 ” ”	= 266.666	2.4259688
1 「リットル」ヲ「ガロン」 ” ”	= 0.21998	1.3423832
” 升 ” ”	= 0.55435	1.7437841



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