

# A TABLE FOR ASCERTAINING ELAPSED TIME IN YEARS AND DECIMALS OF A YEAR BETWEEN ANY TWO DATES<sup>1</sup>

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**S**TANDARD calendar divisions of time constitute a minor nuisance to statisticians. Months are neither equal in length nor simple fractions of a year. Weeks go only unevenly into months. The most satisfactory way of dealing with a mass of material relating to elapsed time appears to us to be to express the time between any two calendar dates in terms of years and decimal fractions of a year.

In connection with an investigation of certain biological aspects of the population problem, which we are carrying on in cooperation with the Division of Research of the Milbank Memorial Fund, it has been necessary to deal with large numbers of records involving the time elapsing between certain events. To facilitate this work the table here printed was prepared. On the original record cards are recorded, among other things, the following items: date of birth of husband and of wife; date of marriage; dates of birth of children. For purposes of tabulation we need to have the ages of husband and wife (i.e., elapsed time from the birth of each to the date of the record); the duration of the marriage; elapsed time between successive pregnancies, et cetera. The accompanying table makes the computation of such elapsed times from dates of events extremely simple and rapid. It has seemed desirable to make the table available to other workers by publication, because the need for a table of this kind comes

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a JAN. b		a FEB. b		a MARCH b		a APRIL b		a MAY b		a JUNE	
0	1 .000	.085	1 .915	.162	1 .838	.247	1 .753	.329	1 .671	.414	1 .586
.003	2 .997	.088	2 .912	.164	2 .836	.249	2 .751	.332	2 .668	.416	2 .584
.005	3 .995	.090	3 .910	.167	3 .833	.252	3 .748	.334	3 .666	.419	3 .581
.008	4 .992	.093	4 .907	.170	4 .830	.255	4 .745	.337	4 .663	.422	4 .578
.011	5 .989	.096	5 .904	.173	5 .827	.258	5 .742	.340	5 .660	.425	5 .575
.014	6 .986	.099	6 .901	.175	6 .825	.260	6 .740	.342	6 .658	.427	6 .573
.016	7 .984	.101	7 .899	.178	7 .822	.263	7 .737	.345	7 .655	.430	7 .570
.019	8 .981	.104	8 .896	.181	8 .819	.266	8 .734	.348	8 .652	.433	8 .567
.022	9 .978	.107	9 .893	.184	9 .816	.268	9 .732	.351	9 .649	.436	9 .564
.025	10 .975	.110	10 .890	.186	10 .814	.271	10 .729	.353	10 .647	.438	10 .562
.027	11 .973	.112	11 .888	.189	11 .811	.274	11 .726	.356	11 .644	.441	11 .559
.030	12 .970	.115	12 .885	.192	12 .808	.277	12 .723	.359	12 .641	.444	12 .556
.033	13 .967	.118	13 .882	.195	13 .805	.279	13 .721	.362	13 .638	.447	13 .553
.036	14 .964	.121	14 .879	.197	14 .803	.282	14 .718	.364	14 .636	.449	14 .551
.038	15 .962	.123	15 .877	.200	15 .800	.285	15 .715	.367	15 .633	.452	15 .548
.041	16 .959	.126	16 .874	.203	16 .797	.288	16 .712	.370	16 .630	.455	16 .545
.044	17 .956	.129	17 .871	.205	17 .795	.290	17 .710	.373	17 .627	.458	17 .542
.047	18 .953	.132	18 .868	.208	18 .792	.293	18 .707	.375	18 .625	.460	18 .540
.049	19 .951	.134	19 .866	.211	19 .789	.296	19 .704	.378	19 .622	.463	19 .537
.052	20 .948	.137	20 .863	.214	20 .786	.299	20 .701	.381	20 .619	.466	20 .534
.055	21 .945	.140	21 .860	.216	21 .784	.301	21 .699	.384	21 .616	.468	21 .532
.058	22 .942	.142	22 .858	.219	22 .781	.304	22 .696	.386	22 .614	.471	22 .529
.060	23 .940	.145	23 .855	.222	23 .778	.307	23 .693	.389	23 .611	.474	23 .526
.063	24 .937	.148	24 .852	.225	24 .775	.310	24 .690	.392	24 .608	.477	24 .523
.066	25 .934	.151	25 .849	.227	25 .773	.312	25 .688	.395	25 .605	.479	25 .521
.068	26 .932	.153	26 .847	.230	26 .770	.315	26 .685	.397	26 .603	.482	26 .518
.071	27 .929	.156	27 .844	.233	27 .767	.318	27 .682	.400	27 .600	.485	27 .515
.074	28 .926	.159	28 .841	.236	28 .764	.321	28 .679	.403	28 .597	.488	28 .512
.077	29 .923	.162	29 .838	.238	29 .762	.323	29 .677	.405	29 .595	.490	29 .510
.079	30 .921			.241	30 .759	.326	30 .674	.408	30 .592	.493	30 .507
.082	31 .918			.244	31 .756			.411	31 .589		

a—fraction of year from January 1 up to this date.

b—fraction of year from this date to January 1 of next year.

## HOW TO FIND FRACTION OF A YEAR BETWEEN TWO DATES

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### RULES FOR USING TABLE

THE following rules are stated for the determination of the age of a woman at the time of delivery of a particular child. They can be applied, *mutatis mutandis*, to any other elapsed time.

#### TO FIND THE AGE OF PATIENT AT DELIVERY

If the date of birth of a patient occurred in an earlier portion of its year than the date of delivery, subtract the former year from the latter and, to obtain the fraction of a year, subtract the fraction under column *a* in the table corresponding to the patient's birthday from the fraction under column *a* corresponding to date of delivery. Thus, if

the date of birth of the patient occurred in a later portion of its year than the date of delivery was March 15, 1907, and the date of delivery was May 15, 1931, leaving 33 years. The fraction of a year corresponding to May twenty-first is .381, and the fraction corresponding to February thirteenth is .291. The age of the patient is 33.291 years.

If, on the other hand, the date of birth of the patient occurred in a later portion of its year than the date of delivery, subtract the former year from the latter and, to obtain the fraction of a year, subtract the fraction under column *b* in the table corresponding to the date of birth of the patient from the fraction under column *b* corresponding to the date of delivery. Thus, if the date of birth of the patient was December 15, 1907, and the date of delivery was May 15, 1931, leaving 33 years, subtract 1907 from 1931 — 1

JULY	b	a	AUG.	b	a	SEPT.	b	a	OCT.	b	a	NOV.	b	a	DEC.	b
1	.504	.581	1	.419	.666	1	.334	.748	1	.252	.833	1	.167	.915	1	.085
2	.501	.584	2	.416	.668	2	.332	.751	2	.249	.836	2	.164	.918	2	.082
3	.499	.586	3	.414	.671	3	.329	.753	3	.247	.838	3	.162	.921	3	.079
4	.496	.589	4	.411	.674	4	.326	.756	4	.244	.841	4	.159	.923	4	.077
5	.493	.592	5	.408	.677	5	.323	.759	5	.241	.844	5	.156	.926	5	.074
6	.490	.595	6	.405	.679	6	.321	.762	6	.238	.847	6	.153	.929	6	.071
7	.488	.597	7	.403	.682	7	.318	.764	7	.236	.849	7	.151	.932	7	.068
8	.485	.600	8	.400	.685	8	.315	.767	8	.233	.852	8	.148	.934	8	.066
9	.482	.603	9	.397	.688	9	.312	.770	9	.230	.855	9	.145	.937	9	.063
10	.479	.605	10	.395	.690	10	.310	.773	10	.227	.858	10	.142	.940	10	.060
11	.477	.608	11	.392	.693	11	.307	.775	11	.225	.860	11	.140	.942	11	.058
12	.474	.611	12	.389	.696	12	.304	.778	12	.222	.863	12	.137	.945	12	.055
13	.471	.614	13	.386	.699	13	.301	.781	13	.219	.866	13	.134	.948	13	.052
14	.468	.616	14	.384	.701	14	.299	.784	14	.216	.868	14	.132	.951	14	.049
15	.466	.619	15	.381	.704	15	.296	.786	15	.214	.871	15	.129	.953	15	.047
16	.463	.622	16	.378	.707	16	.293	.789	16	.211	.874	16	.126	.956	16	.044
17	.460	.625	17	.375	.710	17	.290	.792	17	.208	.877	17	.123	.959	17	.041
18	.458	.627	18	.373	.712	18	.288	.795	18	.205	.879	18	.121	.962	18	.038
19	.455	.630	19	.370	.715	19	.285	.797	19	.203	.882	19	.118	.964	19	.036
20	.452	.633	20	.367	.718	20	.282	.800	20	.200	.885	20	.115	.967	20	.033
21	.449	.636	21	.364	.721	21	.279	.803	21	.197	.888	21	.112	.970	21	.030
22	.447	.638	22	.362	.723	22	.277	.805	22	.195	.890	22	.110	.973	22	.027
23	.444	.641	23	.359	.726	23	.274	.808	23	.192	.893	23	.107	.975	23	.025
24	.441	.644	24	.356	.729	24	.271	.811	24	.189	.896	24	.104	.978	24	.022
25	.438	.647	25	.353	.731	25	.269	.814	25	.186	.899	25	.101	.981	25	.019
26	.436	.649	26	.351	.734	26	.266	.816	26	.184	.901	26	.099	.984	26	.016
27	.433	.652	27	.348	.737	27	.263	.819	27	.181	.904	27	.096	.986	27	.014
28	.430	.655	28	.345	.740	28	.260	.822	28	.178	.907	28	.093	.989	28	.011
29	.427	.658	29	.342	.742	29	.258	.825	29	.175	.910	29	.090	.992	29	.008
30	.425	.660	30	.340	.745	30	.255	.827	30	.173	.912	30	.088	.995	30	.005
31	.422	.663	31	.337				.830	31	.170				.997	31	.003

as February 3, 1898, and 1931, subtract 1898 from 1931, and the fraction under column *a* corresponding to 1898, and the fraction corresponding to 1931. Subtract .090 from the fraction under column *b* corresponding to the date of delivery is

the date of birth of the patient is earlier than the date of delivery. Subtract the latter *minus 1*, and add the fraction under column *a* corresponding to the patient's birthday corresponding to date of delivery. The fraction corresponding to date of birth of the patient was October 16, 1931, and the date of delivery was January 16, 1931, giving 23 years. The fraction

under column *b* corresponding to October fifteenth is .214, and the fraction under column *a* corresponding to January sixteenth is .041. Add .214 and .041, giving .255. The age of the patient is 23.255 years.

To find age of the husband at date of record, substitute in the above rules "date of birth of husband" for "date of birth of patient," and "date of record" for "date of delivery," and proceed as above.

To find the duration of marriage at the time of delivery of a particular child substitute in the above rules "date of marriage" for "date of birth," and proceed as before.

To find the interval between the births of two successive children substitute in the above rules "date of birth of earlier child" for "date of birth" and "date of birth of later child" for "date of delivery" and proceed as before.

And so similarly for other problems.

up in such a wide variety of statistical work outside the range of our particular immediate problems relating to age, marriage, et cetera.

PLAN OF TABLE

The table consists of twelve triple columns, one for each month of the year. The three columns for each month give (a) the fraction of a year from January first up to the date specified in the second or middle column, and (b) the fraction of a year from this date specified in the second or middle column up to January first of the next year. The fractions are given to three places of decimals. The table is calculated on the basis of a 365-day year. Such years are three times as numerous as 366-day years. The error made by regarding leap years as 365 days instead of 366 days long would only affect the third decimal place of the fractions in any ordinary work. We have, however, included February twenty-ninth in the table, and given it the same fraction as March first. It will only come into use in cases where February twenty-ninth is a limiting date, at one end or the other, of an elapsed period of time. Except in cases where this occurs it is our recommendation that the user of the table give no thought whatever to the matter of leap years. The error made by so doing will be insignificant in any practical statistical work to which the table is likely to be put.