

The second of these has a marked resemblance to Simpson's rule applied three times, which would give :

$$\frac{1}{3} \{1, 4, 2, 4, 2, 4, 1\}.$$

13. In my original investigation I deduced further formulæ expressed in terms of two and of three of the weights, but the results, although curious and interesting, appear to have little practical value.

14. In view of the results here shown it is suggested that Weddle's rule might with advantage be more frequently applied in practice than is at present the case. A strong case could also be made for the consideration of the second formula in paragraph 12. Where the weights are to be applied to a function of the fifth or lower degree, it is immaterial, from the point of view of accuracy, which of the formulæ in paragraph 11 is applied ; but where, as is usually the case in actuarial practice, the smoothness is only approximate, it is generally desirable that the equidistant ordinates should all be weighted, and that the weights themselves should form a relatively smooth series. From this point of view the formula

$$\cdot 3 \{1\cdot 1, 4\cdot 4, 2\cdot 5, 4, 2\cdot 5, 4\cdot 4, 1\cdot 1\}$$

has some advantages over both Hardy's and Weddle's.

Yours faithfully,

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HEIGHTS AND WEIGHTS.

To the Editors of the Journal of the Institute of Actuaries.

DEAR SIRS,—I enclose tables which have been prepared by Mr. V. W. Tyler, F.I.A., from records supplied by seven important British Life Offices.

These records gave the results of 28,697 medical examinations for life assurance made during the years 1921 and 1922. Only male lives were included, and in all cases the examinations were made in Great Britain or Ireland. It was decided that having regard to the

divergent practice of offices in respect of the acceptance of certain types of proposal at ordinary rates, it would be advisable to include in the experience every case in which a medical examination took place, provided that it appeared from the report that actual measurements had been made by the doctor. No regard was paid to the ultimate fate of the proposal if these primary conditions were satisfied.

The method adopted in the compilation was as follows :

(1) The data having been distributed among the various ages at entry, the results for both years and for all the offices were added together and average weights at each recorded height were then deduced for groups of 5 consecutive ages at entry.

(2) These rough averages were then plotted out and smooth curves for each height were obtained graphically. The unadjusted data in respect of the more important heights needed very little alteration, but at the upper and lower limits of height the figures were necessarily somewhat irregular on account of paucity of cases. It was thought advisable to set out on the same sheets curves representing the "Scottish Life" and the "Medico-Actuarial" Experiences in order as far as possible to secure consistency. Attention was paid, of course, to the relationship between the curves for each different height.

(3) The fractional portions of the results were transformed from decimals into pounds and an inspection of the differences was made in order to remove any avoidable irregularities.

The abridged summary of graduated results printed below shows, for various ages, not only the new figures but also similar figures taken from the two experiences already mentioned. The other table gives a complete record of results from ages 15 to 60 next birthday for a range of heights which it is felt should be sufficient in practice.

It will be observed that although the new weights are almost always somewhat less than those shown by the other investigations, the differences are slight except for the taller entrants. There appears to be no doubt that this feature is inherent in the data and is not the result of the graduation.

Yours faithfully,

A. LEVINE.

Bartholomew Lane. E.C. 2.

Abridged Summary of Graduated Results.

MALES		HEIGHT											
		5' 3"	5' 4"	5' 5"	5' 6"	5' 7"	5' 8"	5' 9"	5' 10"	5' 11"	6' 0"	6' 1"	6' 2"
		st. lbs.	st. lbs.	st. lbs.	st. lbs.	st. lbs.	st. lbs.	st. lbs.	st. lbs.	st. lbs.	st. lbs.	st. lbs.	st. lbs.
A.	Experience of 7 Offices, 1921/2	8 5	8 8	8 12	9 1	9 4	9 8	9 11	10 1	10 5	10 9	10 13	11 3
B.	Scotch Infir., 1881/1915	8 8	8 11	9 0	9 4	9 7	9 11	10 1	10 5	10 9	10 12	11 4	11 8
C.	"Medico-Actualial" Figures	8 9	8 12	9 2	9 6	9 10	10 0	10 4	10 8	10 13	11 4	11 9	12 0
	Age 17 next Birth day	8 11	9 0	9 4	9 7	9 11	10 0	10 4	10 8	10 12	11 2	11 6	11 10
"	"	8 13	9 2	9 6	9 10	9 13	10 4	10 8	10 11	11 2	11 6	11 11	12 2
	" 22	9 1	9 5	9 9	9 13	10 2	10 6	10 10	11 0	11 4	11 9	12 5	13 0
"	"	9 2	9 6	9 10	9 12	10 1	10 5	10 9	10 13	11 3	11 8	12 4	13 0
	" 27	9 3	9 6	9 10	10 0	10 3	10 8	10 10	11 0	11 4	11 9	12 6	13 1
"	"	9 5	9 8	9 12	10 2	10 6	10 10	11 0	11 4	11 9	12 6	13 2	13 7
	" 32	9 6	9 9	9 13	10 2	10 5	10 10	11 0	11 4	11 9	12 6	13 2	13 7
"	"	9 5	9 9	9 13	10 3	10 7	10 12	11 2	11 7	12 2	12 7	13 2	13 7
	" 37	9 8	9 11	10 1	10 5	10 9	11 0	11 4	11 8	12 3	12 7	13 2	13 6
"	"	9 8	9 12	10 2	10 6	10 10	11 1	11 5	12 0	12 4	12 8	13 3	13 7
	" 42	9 10	10 0	10 4	10 8	10 12	11 3	11 7	12 1	12 5	12 9	13 4	13 8
"	"	9 10	10 0	10 4	10 8	10 12	11 3	11 7	12 1	12 5	12 9	13 4	13 8
	" 47	9 11	10 1	10 5	10 9	11 0	11 4	11 8	12 0	12 4	12 8	13 1	13 5
"	"	9 13	10 2	10 6	10 10	11 0	11 4	11 8	12 1	12 5	12 9	13 1	13 5
	" 52	9 12	10 2	10 6	10 10	11 0	11 4	11 8	12 1	12 5	12 9	13 1	13 5
"	"	10 0	10 4	10 8	10 13	11 3	11 7	12 1	12 5	12 9	13 0	13 4	13 8
	" 57	10 1	10 4	10 8	10 12	11 2	11 6	12 0	12 4	12 8	13 1	13 5	13 9
"	"	9 13	10 4	10 8	10 12	11 2	11 6	12 0	12 4	12 8	13 1	13 5	13 9
	" 57	10 3	10 7	10 11	11 1	11 5	12 0	12 4	12 8	13 1	13 5	13 9	14 2
"	"	10 2	10 5	10 9	10 13	11 4	11 8	12 2	12 6	13 0	13 4	13 8	14 2
	" 57	10 0	10 5	10 9	10 13	11 3	11 8	12 3	12 7	13 1	13 5	13 9	14 2
"	"	10 0	10 5	10 9	10 13	11 3	11 8	12 3	12 7	13 1	13 5	13 9	14 2
	" 57	...	...	...	...	...	...	...	...	...	...	...	...
"	"
	" 57	...	...	...	...	...	...	...	...	...	...	...	...

Heights and Weights (Male Lives). A table deduced from the records of seven Life Officers in respect of 28,697 Medical Examinations for Assurance made during the years 1921 and 1922.

Age next Birth-day	HEIGHT												Age next Birth-day
	5' 3"	5' 4"	5' 5"	5' 6"	5' 7"	5' 8"	5' 9"	5' 10"	5' 11"	6' 0"	6' 1"	6' 2"	
	st. lbs.	st. lbs.	st. lbs.	st. lbs.	st. lbs.	st. lbs.	st. lbs.	st. lbs.	st. lbs.	st. lbs.	st. lbs.	st. lbs.	
15	8 2	8 6	8 9	8 12	9 1	9 5	9 9	9 12	10 2	10 6	10 10	11 0	15
16	8 3	8 7	8 10	8 13	9 3	9 6	9 10	10 0	10 4	10 8	10 12	11 2	16
17	8 5	8 8	8 12	9 1	9 4	9 8	9 11	10 1	10 5	10 9	10 13	11 3	17
18	8 6	8 9	8 13	9 2	9 5	9 9	9 13	10 3	10 6	10 11	11 1	11 5	18
19	8 7	8 11	9 0	9 3	9 7	9 11	10 0	10 4	10 8	10 12	11 2	11 6	19
20	8 9	8 12	9 1	9 5	9 8	9 12	10 2	10 5	10 9	10 13	11 3	11 7	20
21	8 10	8 13	9 3	9 6	9 9	9 13	10 3	10 6	10 11	11 1	11 4	11 9	21
22	8 11	9 0	9 4	9 7	9 11	10 0	10 4	10 8	10 12	11 2	11 6	11 10	22
23	8 12	9 1	9 5	9 8	9 12	10 1	10 5	10 9	10 13	11 3	11 7	11 11	23
24	8 13	9 2	9 6	9 9	9 13	10 2	10 6	10 10	11 0	11 4	11 8	11 12	24
25	9 0	9 3	9 7	9 10	10 0	10 3	10 7	10 11	11 1	11 5	11 9	12 0	25
26	9 1	9 4	9 8	9 11	10 1	10 4	10 8	10 12	11 2	11 6	11 10	12 1	26
27	9 2	9 5	9 9	9 12	10 1	10 5	10 9	10 12	11 3	11 7	11 11	12 2	27
28	9 3	9 6	9 10	9 13	10 2	10 6	10 9	10 13	11 4	11 8	11 12	12 3	28
29	9 4	9 7	9 11	10 0	10 3	10 7	10 10	11 0	11 5	11 9	11 13	12 4	29
30	9 5	9 8	9 11	10 1	10 4	10 8	10 11	11 1	11 5	11 10	12 0	12 5	30
31	9 5	9 9	9 12	10 1	10 5	10 9	10 12	11 2	11 6	11 11	12 1	12 6	31
32	9 6	9 9	9 13	10 2	10 5	10 10	10 13	11 2	11 7	11 12	12 2	12 7	32
33	9 6	9 10	9 13	10 3	10 6	10 10	10 13	11 3	11 8	11 12	12 3	12 8	33
34	9 7	9 10	10 0	10 3	10 7	10 11	11 0	11 4	11 9	11 13	12 4	12 9	34
35	9 7	9 11	10 1	10 4	10 8	10 12	11 1	11 4	11 9	12 0	12 5	12 10	35
36	9 8	9 11	10 1	10 4	10 8	10 12	11 2	11 5	11 10	12 1	12 6	12 11	36
37	9 8	9 12	10 2	10 5	10 9	10 13	11 2	11 6	11 11	12 2	12 7	12 12	37
38	9 9	9 12	10 2	10 6	10 10	11 0	11 3	11 7	11 12	12 3	12 8	12 12	38
39	9 9	9 13	10 3	10 6	10 10	11 0	11 4	11 8	11 13	12 3	12 8	12 13	39
40	9 10	9 13	10 3	10 7	10 11	11 1	11 5	11 9	12 0	12 4	12 9	13 0	40
41	9 10	10 0	10 4	10 7	10 11	11 2	11 5	11 9	12 0	12 5	12 10	13 0	41
42	9 10	10 0	10 4	10 8	10 12	11 2	11 6	11 10	12 1	12 6	12 10	13 1	42
43	9 11	10 1	10 4	10 8	10 12	11 3	11 6	11 11	12 2	12 6	12 11	13 1	43
44	9 11	10 1	10 5	10 9	10 13	11 3	11 7	11 12	12 2	12 7	12 12	13 2	44
45	9 12	10 2	10 5	10 9	10 13	11 3	11 8	11 12	12 3	12 8	12 12	13 3	45
46	9 12	10 2	10 6	10 10	11 0	11 4	11 8	11 12	12 3	12 8	12 13	13 3	46
47	9 12	10 2	10 6	10 10	11 0	11 4	11 9	11 13	12 4	12 9	12 13	13 4	47
48	9 12	10 3	10 6	10 10	11 1	11 5	11 9	12 0	12 5	12 10	13 0	13 4	48
49	9 12	10 3	10 7	10 11	11 1	11 5	11 10	12 0	12 5	12 10	13 0	13 5	49
50	9 13	10 3	10 7	10 11	11 1	11 6	11 10	12 1	12 6	12 11	13 1	13 5	50
51	9 13	10 4	10 8	10 11	11 2	11 6	11 11	12 1	12 6	12 11	13 1	13 6	51
52	9 13	10 4	10 8	10 12	11 2	11 6	11 11	12 2	12 6	12 11	13 2	13 6	52
53	10 0	10 4	10 9	10 12	11 2	11 7	11 11	12 2	12 7	12 12	13 2	13 6	53
54	10 0	10 4	10 9	10 12	11 3	11 7	11 12	12 3	12 7	12 12	13 2	13 7	54
55	10 0	10 4	10 9	10 12	11 3	11 7	11 12	12 3	12 7	12 12	13 3	13 7	55
56	10 0	10 5	10 9	10 13	11 3	11 8	11 12	12 3	12 8	12 13	13 3	13 7	56
57	10 0	10 5	10 9	10 13	11 3	11 8	11 12	12 3	12 8	12 13	13 3	13 8	57
58	10 0	10 5	10 9	10 13	11 3	11 8	11 13	12 3	12 8	12 13	13 3	13 8	58
59	10 0	10 5	10 9	10 13	11 3	11 8	11 13	12 4	12 8	12 13	13 4	13 8	59
60	10 0	10 5	10 9	10 13	11 3	11 8	11 13	12 4	12 8	12 13	13 4	13 8	60