Construction of a table for estimation of item validity indices in terms of Davis Discrimination for Criterion groups based on Median Split

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[*Davis Discrimination index is obtained by using the product-moment coefficients from the percentages of frequencies in the upper and lower* 27% *of the cases. In case of small group,* 27% *split can not give a reliable estimate. So Davis Discrimination indices are obtained by splitting the group at the median and these values are put in the form of a table with the corresponding percentages of passing the item in the upper and lower* 50%.]

There are many techniques of item analysis available for use for purposes of test construction. Davis in his publication entitled "Item Analysis Data" (1) has presented an adequate review of the various statistics frequently used.

According to Davis, the biserial correlation coefficient is most satisfactory measure of relationship for internal consistency among the different statistics frequently used for expressing the discriminating power of an item. As the computation necessary for calculating these coefficients are rather prohibitive, a short cut procedure was suggested by Kelly for estimating these coefficients from the upper and lower 27% of a sample. On the basis of this suggestion Flanagan (1936) constructed a chart for reading the item validity indices in terms of the product moment coefficient from the percentage frequencies in the upper and lower 27% of the cases. But there is some disadvantage, *i.e.*, the difference between two correlations are not of similar significance at the different levels. For example a difference of .15 between .80 and .95 represents a greater degree of disparity in actual relationship than shown by a similar difference of .15 between .05 and .20.

So to meet the needs of the test constructors for an index of item discriminating power which is truly comparable from item to item Davis suggests a linear function of the hyperbolic arc tangent of the product moment r (estimated from Flanagan's Table) which has been termed as z by R. A. Fisher. Davis points out that z values based on these coefficients may be legitimately added, subtracted, and averaged, and the standard error of z value is independent of the true correlation which is

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unknown. Davis further remarks that for the practical purpose a linear function of z that will do away with decimals, transforming the range from $\pm$ 1.66 to $\pm$ 100, would be suitable. As Flanagan had already prepared a table for estimation of the product moment r, from the 27% upper and lower tails of the distribution, Davis simply converted these values into his Discrimination indices, and presented in a table the equivalent values of his Discrimination index, Fisher z, and the product-moment r estimated from Flanagan's table.

It should however be noted that estimating the discrimination values of the items on the basis of the 27% tails of the distribution is advisable only when the relevant group is sufficiently large ; otherwise the number of cases in the high and the low scoring groups would tend to become too small for obtaining reliable results. This is of special importance when several regional samples are drawn and analysis on the basis of total group and the regional sub-groups is contemplated. Generally in the practical field it is found that in such sub-samples the number of cases are small, and there this difficulty regarding the use of 27% tails of the distribution assumes special importance. In such cases it would be rather advisable to use some splitting point other than the 27% limit. When the groups are quite small it would be best to split the sub-groups at the median for getting the ' high ' and the ' low ' groups, though with respect to the total group it would be advisable to use the 27% tails of the distribution, and the statistics to be used should ideally be the Davis Index. Hence for the sub-groups too the statistics to be used should be the same Davis Index. Here comes the problem. No abac or chart is available for estimating Davis Index when the group is split at the median. So if the sub-group, or small group item validity indices are to be obtained in terms of the Davis Index, then there could be only two alternatives. One of them being to calculate each and every item validity index : a procedure requiring tremendous amount of computational labour. The second alternative was to either construct or modify one of the charts or abac's (for groups split at the median) in such a way that the items validity indices could directly be read in terms of the Davis Discrimination Index.

It was noted in this connection that abac's are available for estimating both biserial and tetrachoric r when the group is split at the median of the score distribution, and both of the statistics require that the underlying trait being measured is normally distributed. When it comes to modifying any one of these two abac's so as to yield item validity indices in terms of Davis Index, it could be seen that both of them are suitable. Because, it is on the basis of the estimates of product-moment r from Flanagan's table (1, 2) that Davis constructed his chart, and when the distribution is normal both the biserial and the tetrachoric coefficients are analogous to product-moment coefficients. With respect to these coefficients McNemar (5) has pointed out that—

> " ...We can regard them as the values we would expect the product-moment coefficients to take if we had measuring scales for the dichotomous trait that actually did yield normal distribution of continuous variables ...

> the tetrachoric *r* is particularly useful in estimating the degree of correlation between the variables for which we have only dichotomized information, but it can also be used instead of biserial *r* or the product-moment *r*, since situation for which these two methods apply can readily be converted into fourfolded tables by simply dichotomizing the graduated variables." (Ch. 10)

Hence it appears that when the distribution is continuous and normal whether the biserial or the tetrachoric *r* is used, the obtained indices would be analogous to the product-moment indices estimated from Flanagan's table.

Hence it seems quite reasonable to assume that when the distribution is normal and underlying trait is a continuous variable no matter which of the coefficients is used for estimating the item validity index it could be readily converted into the discrimination index proposed by Davis, by simply substituting the obtained coefficients in place of the corresponding *r* values in the table of equivalent values referred to earlier (1) and therefrom reading the corresponding value on the Discrimination scale proposed by Davis.

Here a table has been constructed for estimating Davis Discrimination Index when the group is split at the median by converting the reading from the abac presented by Guilford (3) for estimating tetrachoric *r* (when the group is split at the median).

In order to construct the table the following steps were followed :

Firstly, the corresponding discrimination index in terms of the tetrachoric correlation coefficient was estimated for different combination of the high and low group percentages from aforesaid abac.

Secondly, looking up Davis's table of equivalent values (1) the corresponding discrimination values for his index was found.

Finally, the different values of Davis Discrimination Index are tabulated against the corresponding percentages in the upper and lower groups.

The following illustration will show how to use the table.

If for an item the percentages of passing the item in the upper and lower 50% groups are 50 and 20 respectively, then the corresponding Davis Discrimination Index will be 33, because, from the table it can be seen that the value corresponding to the row 50 and column 20 is 33.

A copy of this table is being attached herewith.

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High ↓ \ Low →	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1																								
2	6																							
3	12	6																						
4	22	12	6																					
5	26	17	7	4																				
6	28	19	11	6	2																			
7	33	22	14	9	5	2																		
8	33	26	19	12	8	6	2																	
9	42	26	22	15	12	8	5	2																
10	42	29	24	18	12	11	6	5	1															
11	42	31	26	17	15	12	9	5	3	1														
12	42	33	28	24	17	15	12	9	5	3	1													
13	42	33	29	25	18	17	12	10	7	5	3	1												
14	52	34	32	26	22	18	15	12	9	7	4	3	1											
15	52	35	33	27	23	20	17	14	11	8	6	4	3	1										
16	52	36	34	29	26	23	18	15	12	11	8	6	4	3	1									
17	56	39	36	32	28	26	19	16	15	12	11	7	6	4	3	1								
18	56	40	39	33	28	26	21	18	15	14	12	10	7	6	4	3	1							
19	56	42	41	33	29	27	22	19	16	15	13	11	9	7	6	4	3	1						
20	58	43	42	35	31	28	23	20	18	15	14	12	11	8	7	6	4	2	1					
21	66	45	42	36	32	30	26	23	18	17	15	14	12	10	8	6	5	3	2	1				
22	66	47	43	38	33	32	28	26	22	18	17	15	14	11	9	8	6	5	3	2	1			
23	66	47	45	39	34	33	28	26	23	21	18	17	15	14	11	9	7	6	5	3	2	1		
24	66	51	47	41	36	34	31	27	25	23	20	18	16	14	12	11	9	7	6	5	3	2	1	
25	66	52	48	42	38	35	32	28	26	24	22	18	17	15	14	12	11	8	7	6	5	3	2	1

High ↓ \ Low →	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
26	66	54	49	42	38	35	32	29	27	26	23	22	18	17	15	13	12	10	8	7	6	5	3	2	1															
27	66	55	51	43	40	37	33	30	28	27	25	22	18	17	17	15	13	12	9	8	7	6	5	3	2	1														
28	70	55	52	46	42	38	34	32	29	28	26	23	20	18	17	16	14	12	12	9	8	7	6	5	3	2	1													
29	70	58	52	47	43	39	35	33	30	28	27	24	23	20	18	17	15	14	12	11	9	8	7	5	5	3	2	1												
30	75	63	53	48	43	40	36	34	32	30	28	26	23	22	19	18	17	15	12	12	11	9	8	7	5	5	3	2	1											
31	88	63	54	49	44	42	38	36	32	32	29	27	24	23	21	18	17	17	15	12	12	10	9	7	7	5	4	3	2	1										
32	88	64	55	50	46	43	39	37	33	32	31	28	25	23	22	20	18	17	16	15	13	11	10	9	7	6	5	4	3	2	1									
33	88	65	57	51	47	43	41	37	35	33	32	28	27	25	23	20	18	18	17	15	14	12	11	10	9	7	6	5	4	3	2	1								
34	89	66	58	52	49	46	42	40	36	34	33	32	28	26	25	22	20	18	17	16	15	14	12	11	10	9	7	6	5	4	3	2	1							
35	89	67	61	53	49	47	42	41	37	35	34	32	29	27	26	24	22	20	18	17	16	15	14	12	11	9	8	7	6	5	4	3	2	1						
36	89	68	63	54	50	48	43	41	38	36	34	32	30	28	27	25	23	21	20	18	17	16	15	13	12	11	9	8	7	6	5	4	3	2	1					
37	90	69	63	56	51	50	45	42	40	37	35	33	32	28	28	27	25	23	21	20	18	17	16	14	12	12	11	9	8	7	6	5	4	3	2	1				
38	90	71	64	57	52	50	47	43	41	39	37	33	32	30	28	27	26	23	22	21	20	18	17	15	14	12	11	11	9	8	7	6	5	4	3	2	1			
39	90	73	66	58	53	51	48	44	42	40	39	36	33	32	30	28	27	26	23	22	20	19	17	16	15	14	12	11	10	9	8	7	6	5	4	3	2	1		
40	90	75	67	60	55	52	48	46	43	42	40	36	35	32	31	29	28	27	25	23	22	20	18	17	16	15	13	12	11	10	9	8	7	6	5	4	3	2	1	
41	91	76	67	61	58	53	50	47	43	42	41	38	35	33	32	31	29	27	26	24	23	20	19	18	17	16	15	13	12	11	10	9	8	7	6	5	4	3	2	1
42	91	77	68	63	59	54	51	48	45	42	42	39	36	34	32	31	30	28	27	26	24	23	20	19	18	17	16	15	13	12	11	10	9	8	7	6	5	4	3	2
43	91	80	69	64	60	55	52	49	46	44	42	40	38	35	33	33	31	29	28	27	25	23	21	20	18	18	17	15	14	13	12	11	10	9	8	7	6	5	4	3
44	92	81	70	65	61	55	53	50	48	45	44	42	39	36	35	33	32	30	28	28	26	24	23	21	20	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4
45	93	82	71	66	61	57	53	51	48	46	44	43	40	37	35	35	32	31	29	28	28	26	24	22	21	20	18	17	16	15	14	13	12	11	10	9	8	7	6	5
46	99	83	72	67	62	60	54	52	48	47	45	43	41	38	37	35	34	32	31	29	28	27	25	23	22	20	19	18	17	16	15	14	12	12	11	10	9	8	7	6
47	*	84	73	67	63	60	56	53	50	48	46	44	42	40	38	36	35	33	32	31	28	27	26	25	23	22	20	19	18	17	16	15	14	12	12	11	10	9	8	7
48	*	85	74	68	65	61	57	54	51	49	47	45	43	41	39	37	35	34	32	31	30	28	27	26	24	23	22	20	19	18	17	16	15	14	12	12	11	10	9	8
49	*	86	76	70	66	64	57	56	52	51	48	46	44	42	40	39	37	35	33	32	31	29	28	27	26	24	23	21	20	19	18	17	16	15	14	12	12	11	10	9
50	*	86	78	71	67	65	60	57	53	50	49	48	46	42	41	40	38	35	34	33	32	30	28	28	27	25	23	22	21	*20	19	18	17	16	15	14	12	12	11	10

* means 100

↓ High	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
51	*	87	80	73	66	65	62	57	53	51	50	49	46	43	42	41	39	37	35	34	32	31	29	28	27	26	25	23	22	21	20	18	18	17	16	15	14	12	11	10
52	*	87	81	74	67	66	62	57	55	52	51	49	46	45	43	42	40	38	36	35	33	32	30	29	28	27	26	24	23	22	21	20	18	18	17	16	15	14	12	11
53	*	88	81	75	68	67	63	60	56	54	52	50	48	47	44	43	40	38	37	36	34	33	31	30	29	29	27	25	24	23	22	21	20	18	18	17	16	15	13	12
54	*	89	80	77	70	68	64	60	57	55	54	51	49	48	45	44	42	41	38	37	35	34	32	31	30	29	28	26	25	24	23	22	21	20	18	18	17	16	15	13
55	*	90	83	78	70	68	64	61	60	56	55	52	50	48	46	45	43	42	40	39	36	35	33	32	31	29	28	27	26	25	24	23	21	20	20	18	17	17	16	16
56	*	91	84	80	71	69	65	61	60	57	56	53	51	49	47	46	44	43	41	38	37	36	35	33	32	30	29	28	27	26	25	23	22	21	20	20	18	17	17	16
57	*	92	85	81	73	70	66	64	60	58	57	54	52	50	48	47	46	44	42	39	38	37	35	34	33	31	30	29	28	27	26	25	23	22	21	20	20	18	17	17
58	*	94	85	82	75	71	67	64	63	60	58	55	53	51	49	48	46	45	42	40	39	38	36	35	34	32	31	30	29	28	27	26	25	23	22	21	20	19	18	17
59	*	*	87	83	77	73	69	66	63	60	60	56	54	52	50	49	48	46	44	42	42	39	37	36	35	34	32	31	30	29	28	27	26	25	23	22	20	20	19	18
60	*	*	89	84	78	73	70	66	64	62	60	57	55	52	51	50	49	47	45	44	42	40	38	37	36	35	33	32	31	30	29	28	27	26	25	23	22	21	20	19
61	*	*	90	85	78	75	71	67	65	62	61	60	56	54	52	51	49	48	47	45	43	41	40	38	37	36	34	33	32	31	30	28	28	27	26	25	23	22	20	20
62	*	*	91	86	80	77	72	68	66	64	62	60	57	56	54	52	50	49	48	46	45	42	41	40	38	37	35	34	33	32	31	30	28	28	27	26	24	23	22	20
63	*	*	94	87	80	77	73	70	67	65	63	61	59	56	55	54	51	50	48	48	46	45	42	41	39	38	36	35	34	33	32	31	30	29	28	27	25	24	23	22
64	*	*	97	88	81	78	74	71	68	66	63	61	60	58	56	54	52	51	49	48	48	45	45	42	41	41	38	36	35	34	33	32	31	30	29	28	27	25	24	23
65	*	*	98	89	81	79	76	73	70	67	66	63	60	59	57	56	53	52	50	49	48	47	46	44	42	41	39	38	37	36	35	33	33	31	30	29	29	27	26	25
66	*	*	*	90	84	80	79	73	72	70	67	65	62	62	57	56	54	53	51	49	48	47	46	45	43	42	41	39	38	36	35	33	33	32	31	31	29	28	27	26
67	*	*	*	91	85	81	79	74	72	70	68	66	63	62	58	57	56	54	53	51	49	48	47	46	45	43	42	41	39	38	37	36	35	33	33	31	30	29	28	27
68	*	*	*	94	87	81	79	77	74	72	70	67	64	63	60	57	56	55	54	51	51	49	48	47	46	45	43	42	41	39	37	36	36	35	33	32	31	30	29	28
69	*	*	*	96	87	84	80	77	74	72	70	68	65	63	61	58	57	56	55	53	51	50	49	48	47	46	45	43	42	41	39	38	36	35	34	33	32	31	31	29
70	*	*	*	97	90	87	84	80	76	74	72	69	67	65	62	61	59	57	56	54	54	51	50	49	48	47	46	45	43	42	41	40	39	36	36	35	33	32	32	31
71	*	*	*	98	91	88	84	80	79	75	73	71	68	65	63	62	60	60	57	56	54	54	51	50	49	48	47	46	45	44	42	41	40	39	38	36	35	33	32	32
72	*	*	*	*	96	93	87	81	79	76	74	73	70	69	65	63	62	60	59	57	56	54	53	51	50	49	48	47	46	45	43	42	41	40	39	38	36	35	33	33
73	*	*	*	*	97	93	87	81	80	79	74	72	71	69	67	65	63	62	60	58	57	56	54	53	51	50	49	48	47	46	45	43	42	41	40	39	37	36	35	34
74	*	*	*	*	*	93	89	84	81	79	76	74	72	70	68	67	65	62	61	60	57	56	56	54	53	51	50	50	49	47	46	45	43	42	41	40	39	38	36	35
75	*	*	*	*	*	99	90	87	84	81	79	74	73	72	70	67	65	63	62	60	59	57	57	56	55	53	51	50	49	48	47	46	45	44	42	41	40	39	37	36

High ↓	Low → 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
76	*	*	*	*	*	*	91	88	84	81	79	76	74	72	70	69	67	65	63	62	60	59	57	56	55	54	51	51	49	49	48	47	46	45	43	42	41	40	39	38
77	*	*	*	*	*	*	99	91	87	82	81	79	75	74	72	70	69	65	64	63	62	60	60	57	56	55	54	52	51	50	49	48	47	46	45	44	43	41	40	39
78	*	*	*	*	*	*	*	93	89	84	81	80	76	75	74	72	70	69	65	63	63	62	60	59	57	56	55	54	53	51	50	48	48	47	46	45	44	43	41	40
79	*	*	*	*	*	*	*	97	93	87	82	81	80	76	74	73	71	70	68	65	64	63	61	60	59	57	57	55	54	53	51	50	49	48	47	46	45	44	43	42
80	*	*	*	*	*	*	*	*	98	89	86	82	81	79	78	74	73	71	69	68	67	65	63	62	60	58	57	56	55	54	53	51	50	49	49	48	46	45	44	43
81	*	*	*	*	*	*	*	*	98	93	89	85	81	80	79	76	74	73	72	70	69	66	65	63	62	60	59	57	56	55	54	53	51	50	49	48	47	46	46	46
82	*	*	*	*	*	*	*	*	*	98	91	88	84	81	80	79	76	74	73	72	70	69	66	65	63	62	60	60	58	57	56	56	55	54	52	51	50	49	48	47
83	*	*	*	*	*	*	*	*	*	*	98	91	87	84	81	80	79	77	75	74	72	70	67	66	65	63	62	61	60	59	57	56	56	55	54	53	51	50	49	48
84	*	*	*	*	*	*	*	*	*	*	*	93	90	85	82	81	80	79	78	74	73	72	70	68	67	65	63	62	61	60	59	58	57	56	55	54	53	51	51	50
85	*	*	*	*	*	*	*	*	*	*	*	*	94	89	85	82	81	80	79	76	74	73	72	71	70	69	67	65	63	62	61	60	59	57	56	55	54	54	53	51
86	*	*	*	*	*	*	*	*	*	*	*	*	*	94	89	87	84	82	81	79	76	74	73	72	71	70	69	67	65	64	63	62	61	60	59	57	56	55	54	53
87	*	*	*	*	*	*	*	*	*	*	*	*	*	*	94	91	87	84	82	81	80	79	77	74	73	72	71	70	69	67	65	64	63	62	61	60	59	57	56	55
88	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	94	91	87	85	84	81	80	79	78	75	74	73	72	71	70	69	68	66	65	63	62	61	60	59	57
89	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	94	91	88	85	84	81	80	80	79	76	75	74	73	72	71	70	69	67	65	64	63	62	61	60
90	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	94	90	88	87	84	82	82	81	80	79	76	75	74	73	72	70	69	68	67	65	63	62	62
91	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	97	91	90	87	85	84	82	81	80	79	77	75	74	73	72	71	70	69	68	66	65	64
92	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	98	95	91	89	87	85	84	82	81	80	79	78	76	75	74	73	72	71	70	68	67
93	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	98	97	91	89	87	85	84	82	81	80	80	79	77	76	75	74	72	70	70
94	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	98	97	93	90	89	87	85	84	82	82	81	80	79	78	76	74	73
95	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	98	94	91	90	88	88	87	85	84	82	81	80	80	77
96	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	98	97	94	93	90	87	87	85	84	83	82	82
97	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	98	97	93	91	90	89	88	87
98	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	98	97	96	95	94
99	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

←—High																									
42	1																								
43	2	1																							
44	3	2	1																						
45	4	3	2	1																					
46	5	4	3	2	1																				
47	6	5	4	3	2	1																			
48	7	6	5	4	3	2	1																		
49	8	7	6	5	4	3	2	1																	
50	9	8	7	6	5	4	3	2	1																
51	9	8	7	7	6	5	4	3	2	1															
52	10	9	8	7	7	6	5	4	3	2	1														
53	11	10	9	8	7	7	6	5	4	3	2	1													
54	12	11	10	9	8	7	7	6	5	4	3	2	1												
55	13	12	11	10	9	8	7	6	5	4	3	2	1	1											
56	15	13	12	11	10	9	8	7	6	5	4	3	2	1	1										
57	16	15	13	12	11	10	9	8	7	6	5	4	3	2	2	1									
58	17	16	15	13	12	11	10	9	8	7	6	5	4	3	3	2	1								
59	17	17	16	15	13	12	11	9	8	8	7	6	5	4	4	3	2	1							
60	18	17	17	16	14	13	12	11	9	8	8	7	6	5	5	4	3	2	1						
61	19	18	17	17	16	14	13	12	11	10	9	8	7	6	6	5	4	3	2	1					
62	20	19	18	17	17	16	14	13	12	11	9	8	8	7	7	6	5	4	3	2	1				
63	21	20	19	18	18	17	16	14	13	12	11	9	8	8	8	7	6	5	4	3	2	1			
64	22	21	20	19	18	17	16	15	14	13	12	11	9	9	8	8	7	6	5	4	3	2	1		
65	24	23	22	21	19	19	18	17	16	15	13	12	12	11	10	9	8	7	6	5	4	3	2	1	

High ↓ \ Low →	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
66	25	24	23	22	21	19	18	18	17	16	15	14	12	12	11	10	9	8	7	6	5	4	3	2	1															
67	26	25	24	23	22	21	20	18	18	18	16	15	14	13	12	11	10	8	7	7	6	5	4	3	2	1														
68	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1													
69	28	27	26	25	24	23	22	21	19	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1												
70	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1											
71	31	29	29	28	27	26	25	24	23	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1										
72	32	31	30	29	28	28	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	7	6	6	5	4	2	1									
73	33	32	31	30	29	29	28	27	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	1								
74	34	33	32	31	30	30	28	28	27	25	24	24	23	21	20	19	18	17	16	15	14	12	11	10	9	8	7	6	5	4	3	2	1							
75	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20	18	17	16	16	15	13	12	11	11	10	8	7	6	5	4	3	2	1						
76	36	36	35	33	32	32	31	29	28	27	27	25	24	24	23	21	20	19	18	18	17	15	13	12	11	11	10	8	7	6	6	5	4	2	1					
77	38	36	36	35	33	33	32	31	30	29	28	27	25	24	23	23	21	20	19	18	17	16	15	14	13	12	11	10	8	7	6	5	4	3	2	1				
78	39	38	36	36	35	34	33	32	31	30	29	28	27	25	24	23	22	20	19	18	18	17	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1			
79	41	39	38	36	36	35	35	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	13	12	11	10	9	8	7	6	5	3	2	1		
80	42	41	40	39	38	36	35	34	33	33	32	31	30	29	28	27	25	24	23	23	21	20	19	18	17	17	16	14	12	11	10	9	8	7	6	5	4	2	1	
81	45	43	42	41	40	39	37	36	35	34	33	32	31	30	29	28	27	26	25	24	23	22	20	19	19	18	17	15	14	13	12	11	10	8	7	6	5	4	3	1
82	46	45	43	42	41	41	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25	23	22	21	20	19	18	17	16	15	13	12	11	10	9	7	6	5	4	3
83	47	46	45	44	43	42	41	40	39	38	36	35	34	33	32	32	31	29	28	27	26	25	24	23	22	20	19	18	18	17	15	13	12	11	10	9	7	6	5	4
84	49	48	47	46	45	44	43	41	41	41	38	37	36	35	34	33	32	31	29	29	28	27	26	24	23	23	21	20	19	18	17	15	14	13	12	11	10	8	7	6
85	50	49	48	48	47	46	43	44	43	42	41	39	38	37	36	35	33	32	32	31	30	29	28	27	26	25	23	22	20	19	18	17	16	15	14	13	11	10	8	7

	Low → 41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
86	51	51	50	49	48	47	46	45	44	43	42	41	40	39	38	36	35	34	33	32	31	30	29	28	27	26	25	24	23	21	20	19	18	17	15	14	13	11	10	8
87	54	53	52	51	50	49	48	48	47	46	44	43	42	41	40	39	37	36	35	34	33	32	31	30	29	28	27	26	25	24	23	21	19	18	17	16	15	14	13	11
88	56	54	53	53	51	51	50	49	49	48	46	45	44	43	42	41	40	38	37	36	35	33	32	32	31	30	29	28	27	26	25	23	21	19	18	18	17	15	14	12
89	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	36	35	34	33	32	31	30	29	28	27	26	25	22	21	20	19	17	16	15
90	60	60	59	57	56	55	54	53	51	51	51	50	49	48	46	45	44	43	41	41	40	39	38	36	35	34	33	32	31	30	28	27	26	25	24	23	21	19	18	17
91	63	62	61	60	58	58	58	55	54	53	53	52	51	50	49	48	47	46	45	43	42	41	40	39	38	36	35	34	33	32	30	29	28	27	26	25	23	21	19	19
92	65	64	63	63	62	61	59	58	57	56	55	54	53	51	51	50	49	48	47	46	45	44	42	41	41	39	38	36	35	34	32	31	30	29	28	27	25	23	22	21
93	69	67	66	65	64	63	62	61	60	59	57	56	55	54	53	52	51	50	49	48	48	47	46	45	43	42	41	40	38	36	35	34	33	32	31	30	28	27	26	25
94	72	71	70	68	67	66	65	64	63	62	62	60	58	57	55	54	53	51	51	50	49	48	47	47	46	44	43	42	40	39	38	37	35	34	33	32	30	28	27	
95	76	75	74	73	72	70	69	68	67	66	66	65	64	63	62	60	59	58	57	55	54	52	51	51	50	49	48	47	46	44	42	41	41	39	38	36	35	34	33	31
96	82	81	81	80	79	78	77	74	73	72	70	69	67	66	65	64	64	62	61	60	59	57	55	54	53	51	50	50	49	48	47	46	44	42	42	41	40	38	36	35
97	86	85	84	83	82	82	81	80	79	78	78	76	75	72	70	69	68	67	66	65	64	63	62	60	59	57	55	54	53	52	51	50	48	47	45	43	42	41	39	39
98	93	91	90	89	86	85	85	85	84	84	82	81	80	79	77	76	74	72	70	69	68	67	65	65	64	63	60	59	57	54	53	51	51	50	50	48	46	44	42	
99	...	...	...	...	...	...	99	98	95	93	92	91	90	89	88	87	86	85	84	82	81	79	77	75	74	72	70	69	67	66	65	62	60	59	57	56	55	54	53	52	51

High ↓

High ↓ \ Low →	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
82	1																			
83	3	1																		
84	5	3	1																	
85	6	5	3	1																
86	7	6	5	3	1															
87	10	8	7	5	4	2														
88	11	9	7	6	5	4	2													
89	13	12	11	9	6	5	3	2												
90	16	15	12	11	10	8	6	5	3											
91	18	16	15	13	11	9	7	6	4	2										
92	20	18	17	16	14	12	9	7	6	4	1									
93	24	22	19	18	17	16	13	12	9	6	4	1								
94	26	24	23	20	19	18	16	13	12	9	7	6	3							
95	30	27	26	25	23	20	18	18	16	13	12	9	6	3						
96	33	33	31	29	27	26	24	20	18	16	13	12	9	6	3					
97	38	36	34	33	32	31	28	26	23	21	19	17	13	9	5	3				
98	42	42	41	41	37	35	33	32	29	27	26	22	17	13	9	5	3			
99	47	45	43	42	42	41	40	37	35	31	27	26	22	17	13	9	5	3		