

# Grading Multiple Choice exams at the DPECS

Oliver Lindemann

## Method

### Risbo's method

Grades are calculated from score using a single linear interpolation between the point of the passing grade,  $P_1$ , and the highest possible grade,  $P_2$ . The smallest score of passing the exam has to fulfil the criterion of at least 55% knowledge, that is, 55% correct questions after guessing correction. The calculated passing score will to be rounded up.

For example, if we have  $n = \mathbf{40 \text{ questions with 4 choices}}$ , the guessing correction is set to  $c_g = 40/4 = 10$ . With a passing criterion  $k_p = .55$  and a passing grade  $g_p = 5.5$ , the passing score  $s_p$  is:

$$s_p = k_p(n - c_g) + c_g = .55(40 - 10) + 10 = 26.5 \rightarrow 27$$

Thus, if the highest possible grade is  $g_h = 10$ , the interpolation used the following points:

$$P_1 = (s_p, g_p) = (27, 5.5)$$

$$P_2 = (n, g_h) = (40, 10)$$

### Remindo's method

Remindo's method<sup>1</sup> is somewhat different from the method used by Risbo:

1. If answer option of some questions post hoc excluded for the test, the guessing correction will be accordingly adapted.
2. For the passing score will be be rounded up. With the example above, interpolation uses the point  $P_1 = (26.5, 5.5)$
3. The method uses a bi-linear interpolation:

---

<sup>1</sup>Please note that I have only access to the grades of a few exams and I don't know whether that applies to all Remindo exam.

# Grading tables

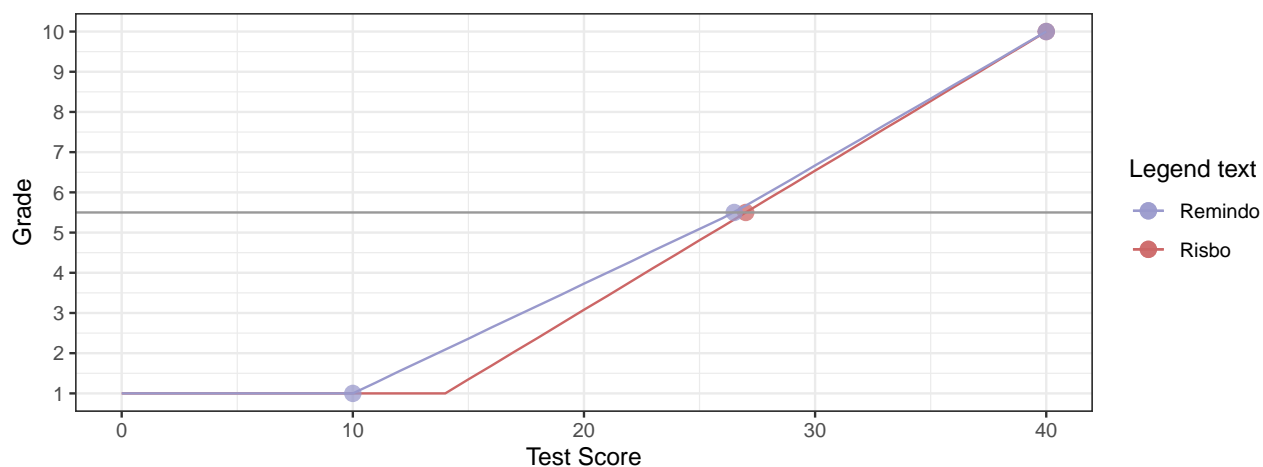
## MC exam with 40 questions and 4 choices

Risbo's method:

$$grade = \begin{cases} -3.846 + 0.346 \cdot score & \text{if } score > 14 \\ 1 & \text{if } score \leq 14 \end{cases}$$

Remindo's method:

$$grade = \begin{cases} -3.333 + 0.333 \cdot score & \text{if } score \geq 26.5 \\ -1.727 + 0.273 \cdot score & \text{if } 10 < score < 26.5 \\ 1 & \text{if } score \leq 10 \end{cases}$$



score.1	risbo.1	remindo.1	score.2	risbo.2	remindo.2
1	1.00	1.00	21	3.42	4.00
2	1.00	1.00	22	3.77	4.27
3	1.00	1.00	23	4.12	4.55
4	1.00	1.00	24	4.46	4.82
5	1.00	1.00	25	4.81	5.09
6	1.00	1.00	26	5.15	5.36
7	1.00	1.00	27	5.50	5.67
8	1.00	1.00	28	5.85	6.00
9	1.00	1.00	29	6.19	6.33
10	1.00	1.00	30	6.54	6.67
11	1.00	1.27	31	6.88	7.00
12	1.00	1.55	32	7.23	7.33
13	1.00	1.82	33	7.58	7.67
14	1.00	2.09	34	7.92	8.00
15	1.35	2.36	35	8.27	8.33
16	1.69	2.64	36	8.62	8.67
17	2.04	2.91	37	8.96	9.00
18	2.38	3.18	38	9.31	9.33
19	2.73	3.45	39	9.65	9.67
20	3.08	3.73	40	10.00	10.00

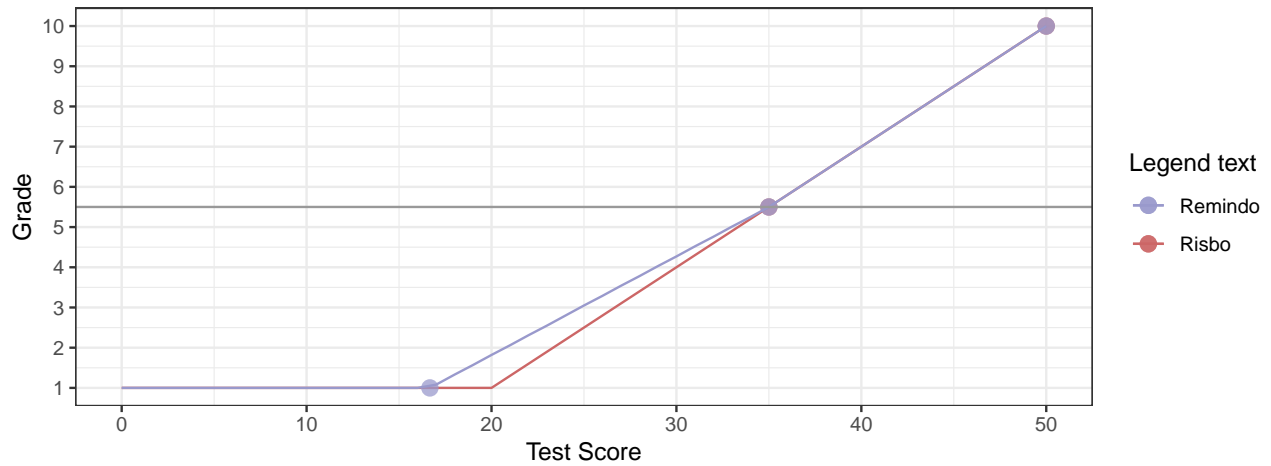
## MC exam with 50 questions and 3 choices

Risbo's method:

$$grade = \begin{cases} -5 + 0.3 \cdot score & \text{if } score > 20 \\ 1 & \text{if } score \leq 20 \end{cases}$$

Remindo's method:

$$grade = \begin{cases} -5 + 0.3 \cdot score & \text{if } score \geq 35 \\ -3.091 + 0.245 \cdot score & \text{if } 16.67 < score < 35 \\ 1 & \text{if } score \leq 16.67 \end{cases}$$



score.1	risbo.1	remindo.1	score.2	risbo.2	remindo.2	score.3	risbo.3	remindo.3
1	1	1.00	21	1.3	2.06	41	7.3	7.3
2	1	1.00	22	1.6	2.31	42	7.6	7.6
3	1	1.00	23	1.9	2.55	43	7.9	7.9
4	1	1.00	24	2.2	2.80	44	8.2	8.2
5	1	1.00	25	2.5	3.05	45	8.5	8.5
6	1	1.00	26	2.8	3.29	46	8.8	8.8
7	1	1.00	27	3.1	3.54	47	9.1	9.1
8	1	1.00	28	3.4	3.78	48	9.4	9.4
9	1	1.00	29	3.7	4.03	49	9.7	9.7
10	1	1.00	30	4.0	4.27	50	10.0	10.0
11	1	1.00	31	4.3	4.52	NA	NA	NA
12	1	1.00	32	4.6	4.76	NA	NA	NA
13	1	1.00	33	4.9	5.01	NA	NA	NA
14	1	1.00	34	5.2	5.25	NA	NA	NA
15	1	1.00	35	5.5	5.50	NA	NA	NA
16	1	1.00	36	5.8	5.80	NA	NA	NA
17	1	1.08	37	6.1	6.10	NA	NA	NA
18	1	1.33	38	6.4	6.40	NA	NA	NA
19	1	1.57	39	6.7	6.70	NA	NA	NA
20	1	1.82	40	7.0	7.00	NA	NA	NA

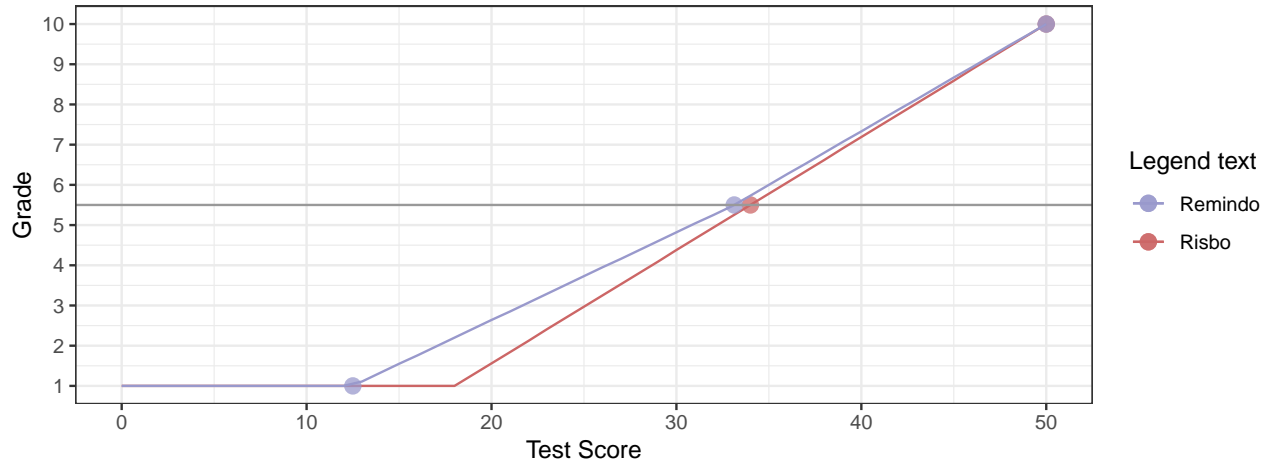
## MC exam with 50 questions and 4 choices

Risbo's method:

$$grade = \begin{cases} -4.062 + 0.281 \cdot score & \text{if } score > 18 \\ 1 & \text{if } score \leq 18 \end{cases}$$

Remindo's method:

$$grade = \begin{cases} -3.333 + 0.267 \cdot score & \text{if } score \geq 33.12 \\ -1.727 + 0.218 \cdot score & \text{if } 12.5 < score < 33.12 \\ 1 & \text{if } score \leq 12.5 \end{cases}$$



score.1	risbo.1	remindo.1	score.2	risbo.2	remindo.2	score.3	risbo.3	remindo.3
1	1.00	1.00	21	1.84	2.85	41	7.47	7.60
2	1.00	1.00	22	2.12	3.07	42	7.75	7.87
3	1.00	1.00	23	2.41	3.29	43	8.03	8.13
4	1.00	1.00	24	2.69	3.51	44	8.31	8.40
5	1.00	1.00	25	2.97	3.73	45	8.59	8.67
6	1.00	1.00	26	3.25	3.95	46	8.88	8.93
7	1.00	1.00	27	3.53	4.16	47	9.16	9.20
8	1.00	1.00	28	3.81	4.38	48	9.44	9.47
9	1.00	1.00	29	4.09	4.60	49	9.72	9.73
10	1.00	1.00	30	4.38	4.82	50	10.00	10.00
11	1.00	1.00	31	4.66	5.04	NA	NA	NA
12	1.00	1.00	32	4.94	5.25	NA	NA	NA
13	1.00	1.11	33	5.22	5.47	NA	NA	NA
14	1.00	1.33	34	5.50	5.73	NA	NA	NA
15	1.00	1.55	35	5.78	6.00	NA	NA	NA
16	1.00	1.76	36	6.06	6.27	NA	NA	NA
17	1.00	1.98	37	6.34	6.53	NA	NA	NA
18	1.00	2.20	38	6.62	6.80	NA	NA	NA
19	1.28	2.42	39	6.91	7.07	NA	NA	NA
20	1.56	2.64	40	7.19	7.33	NA	NA	NA

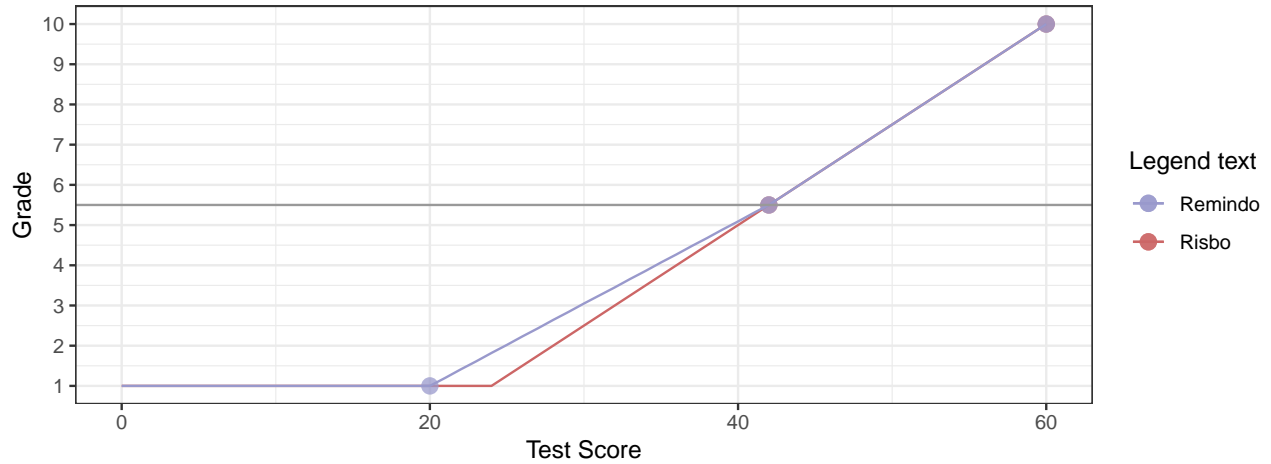
## MC exam with 60 questions and 3 choices

Risbo's method:

$$grade = \begin{cases} -5 + 0.25 \cdot score & \text{if } score > 24 \\ 1 & \text{if } score \leq 24 \end{cases}$$

Remindo's method:

$$grade = \begin{cases} -5 + 0.25 \cdot score & \text{if } score \geq 42 \\ -3.091 + 0.205 \cdot score & \text{if } 20 < score < 42 \\ 1 & \text{if } score \leq 20 \end{cases}$$



score.1	risbo.1	remindo.1	score.2	risbo.2	remindo.2	score.3	risbo.3	remindo.3
1	1	1	21	1.00	1.20	41	5.25	5.30
2	1	1	22	1.00	1.41	42	5.50	5.50
3	1	1	23	1.00	1.61	43	5.75	5.75
4	1	1	24	1.00	1.82	44	6.00	6.00
5	1	1	25	1.25	2.02	45	6.25	6.25
6	1	1	26	1.50	2.23	46	6.50	6.50
7	1	1	27	1.75	2.43	47	6.75	6.75
8	1	1	28	2.00	2.64	48	7.00	7.00
9	1	1	29	2.25	2.84	49	7.25	7.25
10	1	1	30	2.50	3.05	50	7.50	7.50
11	1	1	31	2.75	3.25	51	7.75	7.75
12	1	1	32	3.00	3.45	52	8.00	8.00
13	1	1	33	3.25	3.66	53	8.25	8.25
14	1	1	34	3.50	3.86	54	8.50	8.50
15	1	1	35	3.75	4.07	55	8.75	8.75
16	1	1	36	4.00	4.27	56	9.00	9.00
17	1	1	37	4.25	4.48	57	9.25	9.25
18	1	1	38	4.50	4.68	58	9.50	9.50
19	1	1	39	4.75	4.89	59	9.75	9.75
20	1	1	40	5.00	5.09	60	10.00	10.00

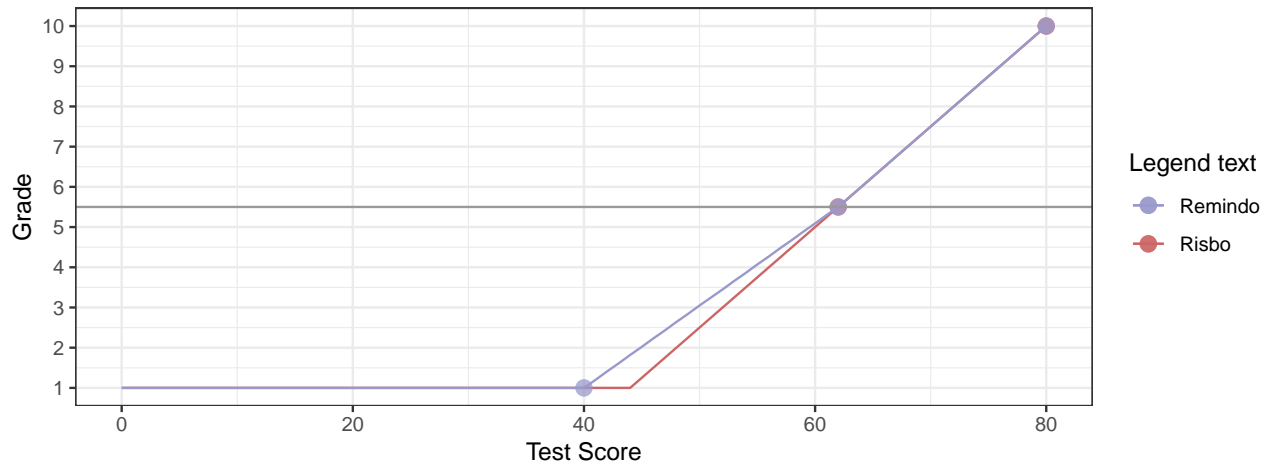
## MC exam with 80 questions and 2 choices

Risbo's method:

$$grade = \begin{cases} -10 + 0.25 \cdot score & \text{if } score > 44 \\ 1 & \text{if } score \leq 44 \end{cases}$$

Remindo's method:

$$grade = \begin{cases} -10 + 0.25 \cdot score & \text{if } score \geq 62 \\ -7.182 + 0.205 \cdot score & \text{if } 40 < score < 62 \\ 1 & \text{if } score \leq 40 \end{cases}$$



score.1	risbo.1	remindo.1	score.2	risbo.2	remindo.2	score.3	risbo.3	remindo.3	score.4	risbo.4	remindo.4
1	1	1	21	1	1	41	1.00	1.20	61	5.25	5.30
2	1	1	22	1	1	42	1.00	1.41	62	5.50	5.50
3	1	1	23	1	1	43	1.00	1.61	63	5.75	5.75
4	1	1	24	1	1	44	1.00	1.82	64	6.00	6.00
5	1	1	25	1	1	45	1.25	2.02	65	6.25	6.25
6	1	1	26	1	1	46	1.50	2.23	66	6.50	6.50
7	1	1	27	1	1	47	1.75	2.43	67	6.75	6.75
8	1	1	28	1	1	48	2.00	2.64	68	7.00	7.00
9	1	1	29	1	1	49	2.25	2.84	69	7.25	7.25
10	1	1	30	1	1	50	2.50	3.05	70	7.50	7.50
11	1	1	31	1	1	51	2.75	3.25	71	7.75	7.75
12	1	1	32	1	1	52	3.00	3.45	72	8.00	8.00
13	1	1	33	1	1	53	3.25	3.66	73	8.25	8.25
14	1	1	34	1	1	54	3.50	3.86	74	8.50	8.50
15	1	1	35	1	1	55	3.75	4.07	75	8.75	8.75
16	1	1	36	1	1	56	4.00	4.27	76	9.00	9.00
17	1	1	37	1	1	57	4.25	4.48	77	9.25	9.25
18	1	1	38	1	1	58	4.50	4.68	78	9.50	9.50
19	1	1	39	1	1	59	4.75	4.89	79	9.75	9.75
20	1	1	40	1	1	60	5.00	5.09	80	10.00	10.00

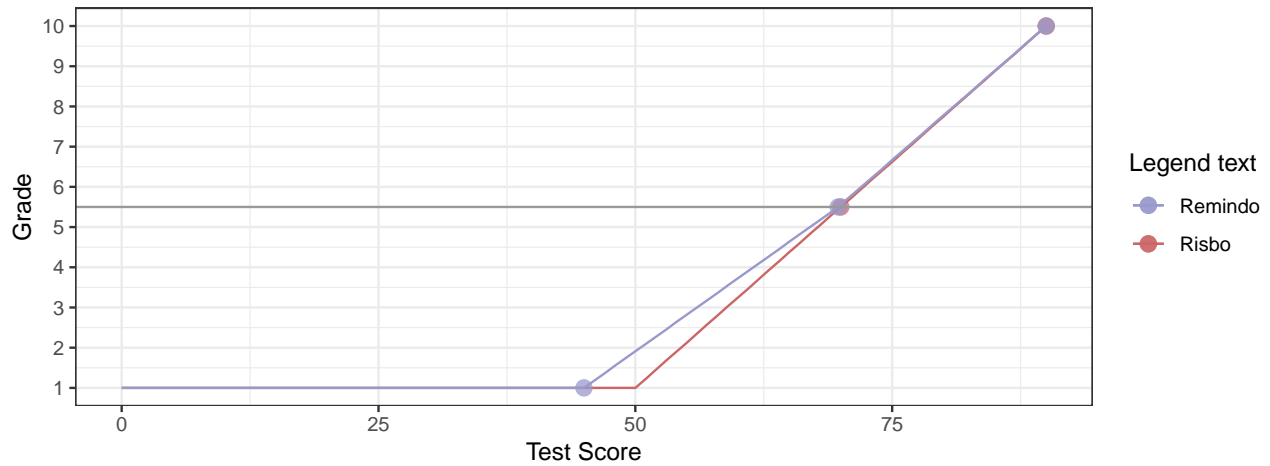
## MC exam with 90 questions and 2 choices

Risbo's method:

$$grade = \begin{cases} -10.25 + 0.225 \cdot score & \text{if } score > 50 \\ 1 & \text{if } score \leq 50 \end{cases}$$

Remindo's method:

$$grade = \begin{cases} -10 + 0.222 \cdot score & \text{if } score \geq 69.75 \\ -7.182 + 0.182 \cdot score & \text{if } 45 < score < 69.75 \\ 1 & \text{if } score \leq 45 \end{cases}$$



score.1	risbo.1	remindo.1	score.2	risbo.2	remindo.2	score.3	risbo.3	remindo.3	score.4	risbo.4	remindo.4	score.5	risbo.5	remindo.5
1	1	1	21	1	1	41	1.00	1.00	61	3.47	3.91	81	7.98	8.00
2	1	1	22	1	1	42	1.00	1.00	62	3.70	4.09	82	8.20	8.22
3	1	1	23	1	1	43	1.00	1.00	63	3.93	4.27	83	8.43	8.44
4	1	1	24	1	1	44	1.00	1.00	64	4.15	4.45	84	8.65	8.67
5	1	1	25	1	1	45	1.00	1.00	65	4.38	4.64	85	8.88	8.89
6	1	1	26	1	1	46	1.00	1.18	66	4.60	4.82	86	9.10	9.11
7	1	1	27	1	1	47	1.00	1.36	67	4.83	5.00	87	9.32	9.33
8	1	1	28	1	1	48	1.00	1.55	68	5.05	5.18	88	9.55	9.56
9	1	1	29	1	1	49	1.00	1.73	69	5.28	5.36	89	9.78	9.78
10	1	1	30	1	1	50	1.00	1.91	70	5.50	5.56	90	10.00	10.00
11	1	1	31	1	1	51	1.22	2.09	71	5.72	5.78	NA	NA	NA
12	1	1	32	1	1	52	1.45	2.27	72	5.95	6.00	NA	NA	NA
13	1	1	33	1	1	53	1.68	2.45	73	6.18	6.22	NA	NA	NA
14	1	1	34	1	1	54	1.90	2.64	74	6.40	6.44	NA	NA	NA
15	1	1	35	1	1	55	2.12	2.82	75	6.62	6.67	NA	NA	NA
16	1	1	36	1	1	56	2.35	3.00	76	6.85	6.89	NA	NA	NA
17	1	1	37	1	1	57	2.58	3.18	77	7.07	7.11	NA	NA	NA
18	1	1	38	1	1	58	2.80	3.36	78	7.30	7.33	NA	NA	NA
19	1	1	39	1	1	59	3.03	3.55	79	7.53	7.56	NA	NA	NA
20	1	1	40	1	1	60	3.25	3.73	80	7.75	7.78	NA	NA	NA