

# Grading Multiple Choice Exams at the DPECS

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## Grading procedure

To calculate the grades from the scores of a multiple choices test, the DPECS uses a single linear interpolation between the point of the pass-fail criterion,  $P_1$ , and the highest possible grade,  $P_2$ . The smallest passing score has to fulfil the criterion of at least 55% knowledge, that is, 55% correct questions after guessing correction.

For example, if we have  $n = 40$  **questions with 4 choices**, the guessing correction is  $c_g = 40/4 = 10$ . With a knowledge criterion  $k_p = .55$  and a passing grade  $g_p = 5.5$ , the passing score  $s_p$  (“exact caesura”) is :

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

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

$$P_1 = (s_p, g_p) = (26.5, 5.5)$$

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

## Risbo’s grading procedure

In contrast to the grading procedure described above, the Risbo used in the previous years not an exact caesura and rounded the passing score  $s_p$  that corresponds to the passing grade  $g_p = 5.5$  up. That is,  $s_p = 26.5 \rightarrow 27$ . This results in slightly lower grades for scores near to the pass/fail criterion.

Find below the grading procedure of multiple choice exam often used at the DPECS.

## MC exam with 40 questions and 4 choices

DPECS:

$$grade = \begin{cases} -3.333 + 0.333 \cdot score & \text{if } score > 13 \\ 1 & \text{if } score \leq 13 \end{cases}$$

Risbo:

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

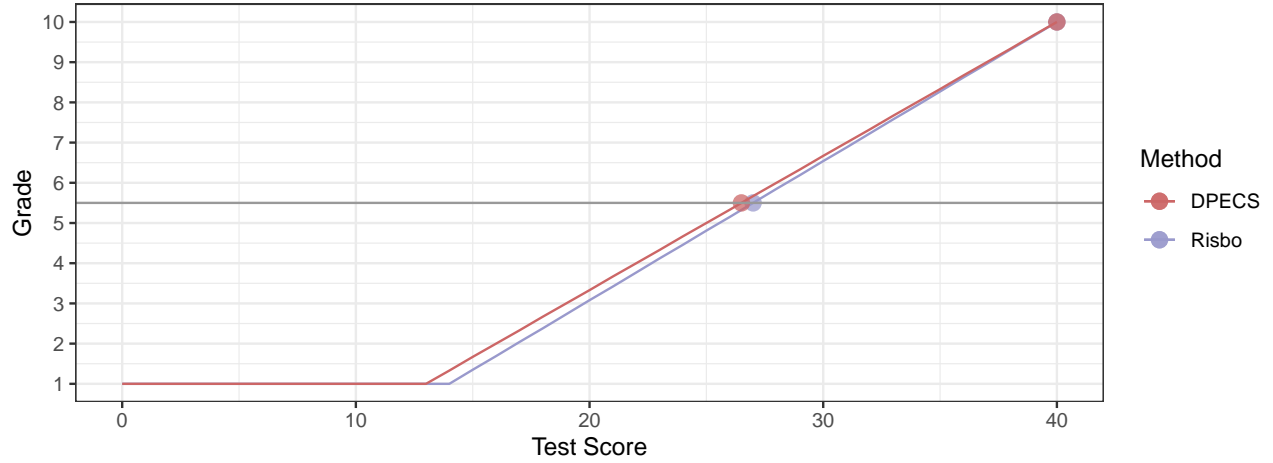


Table 1: Grading table

Score1	DPECS1	Risbo1	Score2	DPECS2	Risbo2
1	1.0	1.0	21	3.7	3.4
2	1.0	1.0	22	4.0	3.8
3	1.0	1.0	23	4.3	4.1
4	1.0	1.0	24	4.7	4.5
5	1.0	1.0	25	5.0	4.8
6	1.0	1.0	26	5.3	5.2
7	1.0	1.0	27	5.7	5.5
8	1.0	1.0	28	6.0	5.8
9	1.0	1.0	29	6.3	6.2
10	1.0	1.0	30	6.7	6.5
11	1.0	1.0	31	7.0	6.9
12	1.0	1.0	32	7.3	7.2
13	1.0	1.0	33	7.7	7.6
14	1.3	1.0	34	8.0	7.9
15	1.7	1.3	35	8.3	8.3
16	2.0	1.7	36	8.7	8.6
17	2.3	2.0	37	9.0	9.0
18	2.7	2.4	38	9.3	9.3
19	3.0	2.7	39	9.7	9.7
20	3.3	3.1	40	10.0	10.0

## MC exam with 50 questions and 3 choices

DPECS:

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

Risbo:

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

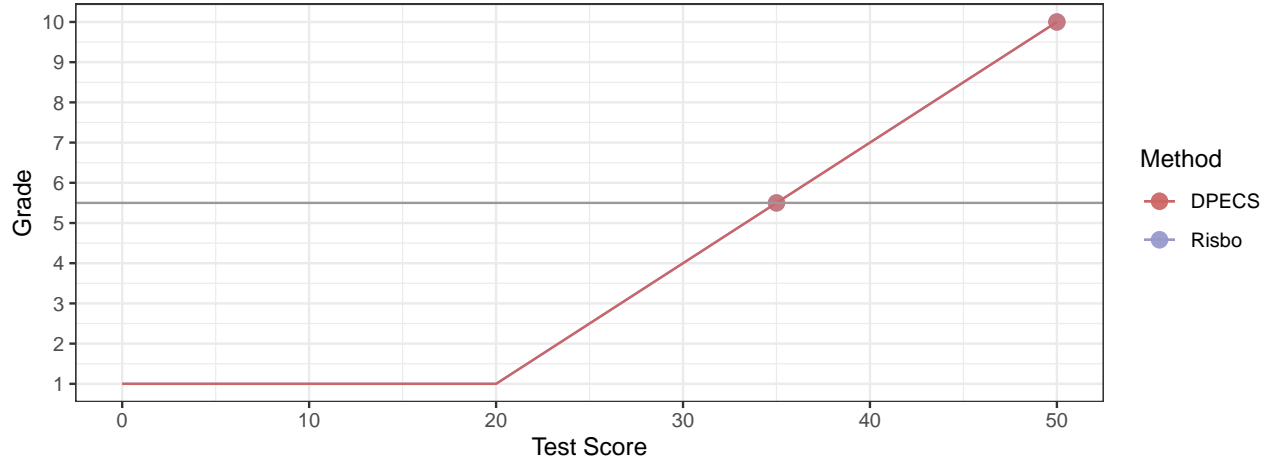


Table 2: Grading table

Score1	DPECS1	Risbo1	Score2	DPECS2	Risbo2	Score3	DPECS3	Risbo3
1	1	1	21	1.3	1.3	41	7.3	7.3
2	1	1	22	1.6	1.6	42	7.6	7.6
3	1	1	23	1.9	1.9	43	7.9	7.9
4	1	1	24	2.2	2.2	44	8.2	8.2
5	1	1	25	2.5	2.5	45	8.5	8.5
6	1	1	26	2.8	2.8	46	8.8	8.8
7	1	1	27	3.1	3.1	47	9.1	9.1
8	1	1	28	3.4	3.4	48	9.4	9.4
9	1	1	29	3.7	3.7	49	9.7	9.7
10	1	1	30	4.0	4.0	50	10.0	10.0
11	1	1	31	4.3	4.3	NA	NA	NA
12	1	1	32	4.6	4.6	NA	NA	NA
13	1	1	33	4.9	4.9	NA	NA	NA
14	1	1	34	5.2	5.2	NA	NA	NA
15	1	1	35	5.5	5.5	NA	NA	NA
16	1	1	36	5.8	5.8	NA	NA	NA
17	1	1	37	6.1	6.1	NA	NA	NA
18	1	1	38	6.4	6.4	NA	NA	NA
19	1	1	39	6.7	6.7	NA	NA	NA
20	1	1	40	7.0	7.0	NA	NA	NA

## MC exam with 50 questions and 4 choices

DPECS:

$$grade = \begin{cases} -3.333 + 0.267 \cdot score & \text{if } score > 16.25 \\ 1 & \text{if } score \leq 16.25 \end{cases}$$

Risbo:

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

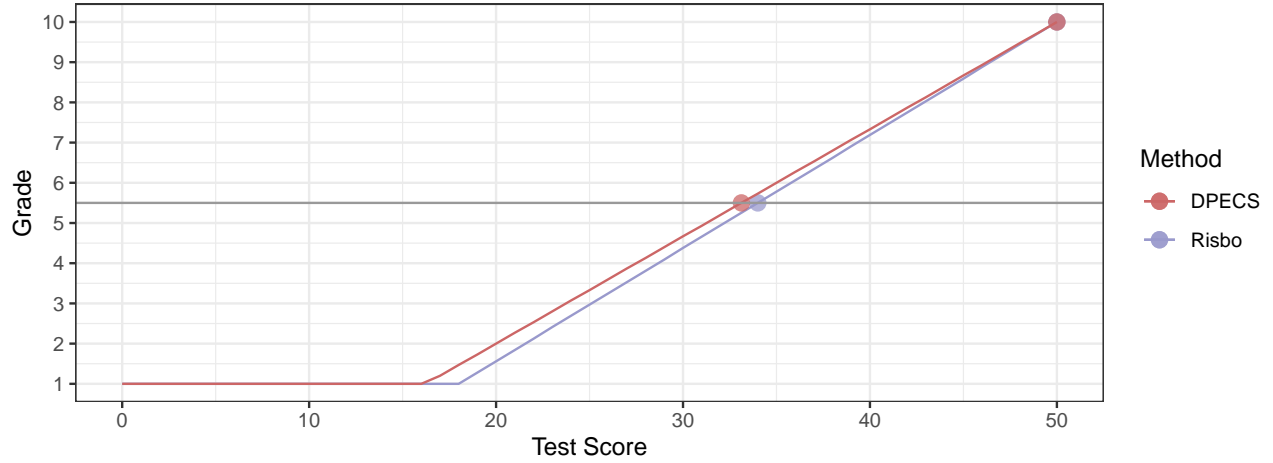


Table 3: Grading table

Score1	DPECS1	Risbo1	Score2	DPECS2	Risbo2	Score3	DPECS3	Risbo3
1	1.0	1.0	21	2.3	1.8	41	7.6	7.5
2	1.0	1.0	22	2.5	2.1	42	7.9	7.8
3	1.0	1.0	23	2.8	2.4	43	8.1	8.0
4	1.0	1.0	24	3.1	2.7	44	8.4	8.3
5	1.0	1.0	25	3.3	3.0	45	8.7	8.6
6	1.0	1.0	26	3.6	3.2	46	8.9	8.9
7	1.0	1.0	27	3.9	3.5	47	9.2	9.2
8	1.0	1.0	28	4.1	3.8	48	9.5	9.4
9	1.0	1.0	29	4.4	4.1	49	9.7	9.7
10	1.0	1.0	30	4.7	4.4	50	10.0	10.0
11	1.0	1.0	31	4.9	4.7	NA	NA	NA
12	1.0	1.0	32	5.2	4.9	NA	NA	NA
13	1.0	1.0	33	5.5	5.2	NA	NA	NA
14	1.0	1.0	34	5.7	5.5	NA	NA	NA
15	1.0	1.0	35	6.0	5.8	NA	NA	NA
16	1.0	1.0	36	6.3	6.1	NA	NA	NA
17	1.2	1.0	37	6.5	6.3	NA	NA	NA
18	1.5	1.0	38	6.8	6.6	NA	NA	NA
19	1.7	1.3	39	7.1	6.9	NA	NA	NA
20	2.0	1.6	40	7.3	7.2	NA	NA	NA

## MC exam with 60 questions and 3 choices

DPECS:

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

Risbo:

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

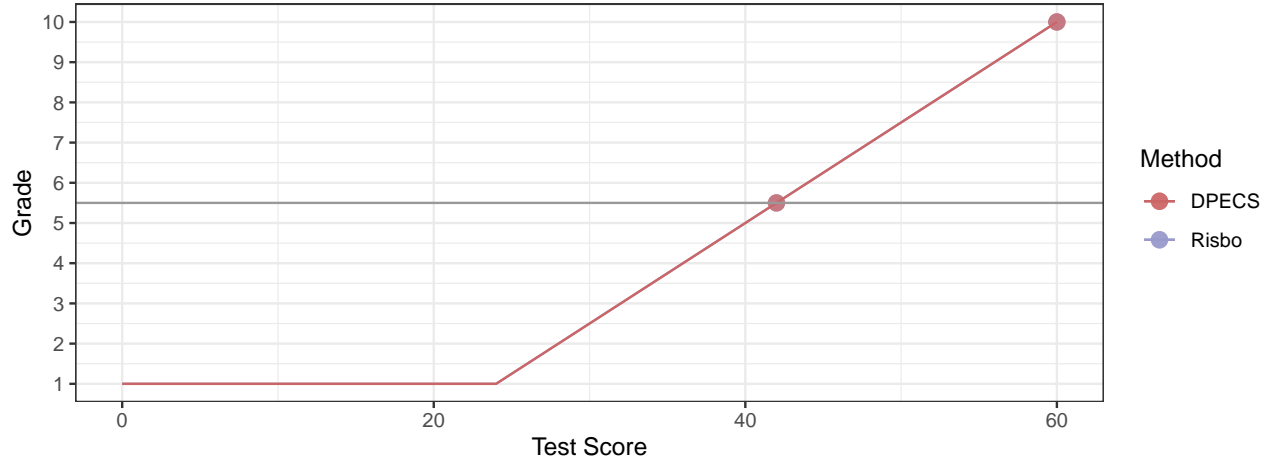


Table 4: Grading table

Score1	DPECS1	Risbo1	Score2	DPECS2	Risbo2	Score3	DPECS3	Risbo3
1	1	1	21	1.0	1.0	41	5.2	5.2
2	1	1	22	1.0	1.0	42	5.5	5.5
3	1	1	23	1.0	1.0	43	5.8	5.8
4	1	1	24	1.0	1.0	44	6.0	6.0
5	1	1	25	1.2	1.2	45	6.2	6.2
6	1	1	26	1.5	1.5	46	6.5	6.5
7	1	1	27	1.8	1.8	47	6.8	6.8
8	1	1	28	2.0	2.0	48	7.0	7.0
9	1	1	29	2.2	2.2	49	7.2	7.2
10	1	1	30	2.5	2.5	50	7.5	7.5
11	1	1	31	2.8	2.8	51	7.8	7.8
12	1	1	32	3.0	3.0	52	8.0	8.0
13	1	1	33	3.2	3.2	53	8.2	8.2
14	1	1	34	3.5	3.5	54	8.5	8.5
15	1	1	35	3.8	3.8	55	8.8	8.8
16	1	1	36	4.0	4.0	56	9.0	9.0
17	1	1	37	4.2	4.2	57	9.2	9.2
18	1	1	38	4.5	4.5	58	9.5	9.5
19	1	1	39	4.8	4.8	59	9.8	9.8
20	1	1	40	5.0	5.0	60	10.0	10.0

## MC exam with 80 questions and 2 choices

DPECS:

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

Risbo:

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

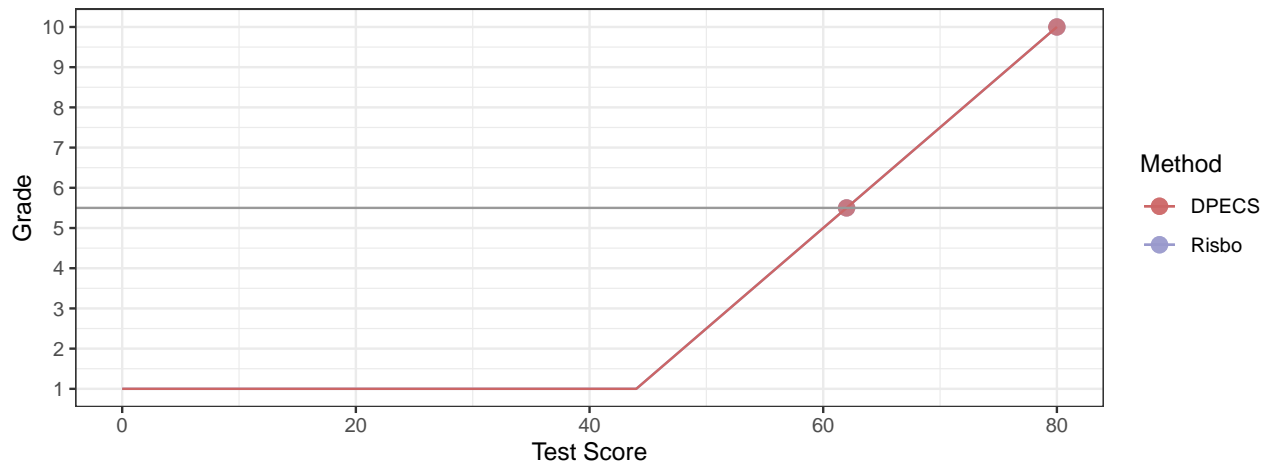


Table 5: Grading table

Score1	DPECS1	Risbo1	Score2	DPECS2	Risbo2	Score3	DPECS3	Risbo3	Score4	DPECS4	Risbo4
1	1	1	21	1	1	41	1.0	1.0	61	5.2	5.2
2	1	1	22	1	1	42	1.0	1.0	62	5.5	5.5
3	1	1	23	1	1	43	1.0	1.0	63	5.8	5.8
4	1	1	24	1	1	44	1.0	1.0	64	6.0	6.0
5	1	1	25	1	1	45	1.2	1.2	65	6.2	6.2
6	1	1	26	1	1	46	1.5	1.5	66	6.5	6.5
7	1	1	27	1	1	47	1.8	1.8	67	6.8	6.8
8	1	1	28	1	1	48	2.0	2.0	68	7.0	7.0
9	1	1	29	1	1	49	2.2	2.2	69	7.2	7.2
10	1	1	30	1	1	50	2.5	2.5	70	7.5	7.5
11	1	1	31	1	1	51	2.8	2.8	71	7.8	7.8
12	1	1	32	1	1	52	3.0	3.0	72	8.0	8.0
13	1	1	33	1	1	53	3.2	3.2	73	8.2	8.2
14	1	1	34	1	1	54	3.5	3.5	74	8.5	8.5
15	1	1	35	1	1	55	3.8	3.8	75	8.8	8.8
16	1	1	36	1	1	56	4.0	4.0	76	9.0	9.0
17	1	1	37	1	1	57	4.2	4.2	77	9.2	9.2
18	1	1	38	1	1	58	4.5	4.5	78	9.5	9.5
19	1	1	39	1	1	59	4.8	4.8	79	9.8	9.8
20	1	1	40	1	1	60	5.0	5.0	80	10.0	10.0

## MC exam with 90 questions and 2 choices

DPECS:

$$grade = \begin{cases} -10 + 0.222 \cdot score & \text{if } score > 49.5 \\ 1 & \text{if } score \leq 49.5 \end{cases}$$

Risbo:

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

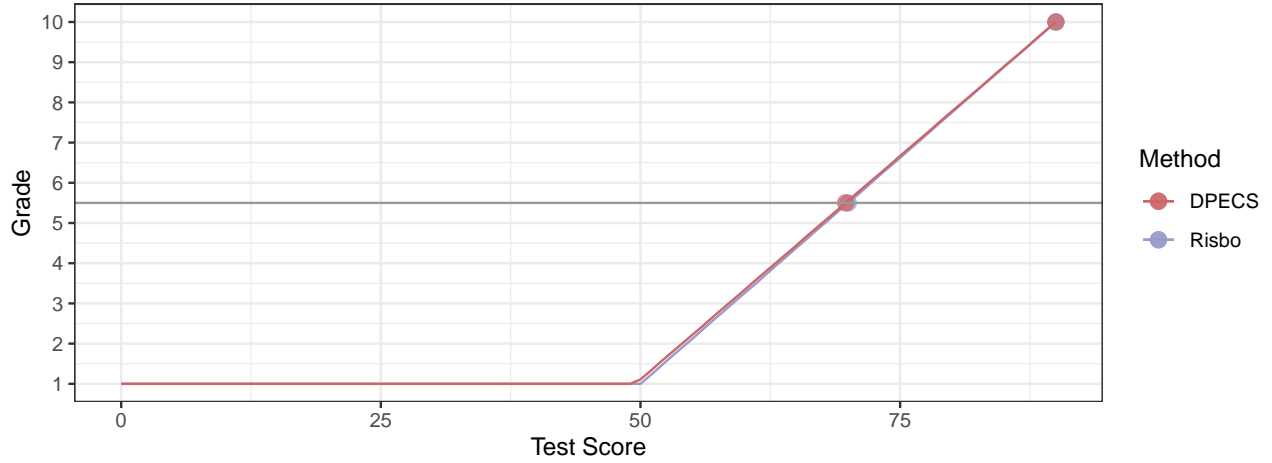


Table 6: Grading table

Score1	DPECS1	Risbo1	Score2	DPECS2	Risbo2	Score3	DPECS3	Risbo3	Score4	DPECS4	Risbo4	Score5	DPECS5	Risbo5
1	1	1	21	1	1	41	1.0	1.0	61	3.6	3.5	81	8.0	8.0
2	1	1	22	1	1	42	1.0	1.0	62	3.8	3.7	82	8.2	8.2
3	1	1	23	1	1	43	1.0	1.0	63	4.0	3.9	83	8.4	8.4
4	1	1	24	1	1	44	1.0	1.0	64	4.2	4.2	84	8.7	8.7
5	1	1	25	1	1	45	1.0	1.0	65	4.4	4.4	85	8.9	8.9
6	1	1	26	1	1	46	1.0	1.0	66	4.7	4.6	86	9.1	9.1
7	1	1	27	1	1	47	1.0	1.0	67	4.9	4.8	87	9.3	9.3
8	1	1	28	1	1	48	1.0	1.0	68	5.1	5.1	88	9.6	9.6
9	1	1	29	1	1	49	1.0	1.0	69	5.3	5.3	89	9.8	9.8
10	1	1	30	1	1	50	1.1	1.0	70	5.6	5.5	90	10.0	10.0
11	1	1	31	1	1	51	1.3	1.2	71	5.8	5.7	NA	NA	NA
12	1	1	32	1	1	52	1.6	1.5	72	6.0	5.9	NA	NA	NA
13	1	1	33	1	1	53	1.8	1.7	73	6.2	6.2	NA	NA	NA
14	1	1	34	1	1	54	2.0	1.9	74	6.4	6.4	NA	NA	NA
15	1	1	35	1	1	55	2.2	2.1	75	6.7	6.6	NA	NA	NA
16	1	1	36	1	1	56	2.4	2.3	76	6.9	6.9	NA	NA	NA
17	1	1	37	1	1	57	2.7	2.6	77	7.1	7.1	NA	NA	NA
18	1	1	38	1	1	58	2.9	2.8	78	7.3	7.3	NA	NA	NA
19	1	1	39	1	1	59	3.1	3.0	79	7.6	7.5	NA	NA	NA
20	1	1	40	1	1	60	3.3	3.2	80	7.8	7.8	NA	NA	NA