

## Explanation of the guess correction in MC exams

*A 'common sense' explanation of a complicated fact*

If Multiple Choice (MC) questions are used in an exam, there is a guess chance. For example, with a four options question, each student without any knowledge still has a 25% chance of answering the question correctly; with a three option question, it is even 33%<sup>1</sup>. This is also called the 'blind guess chance'.

Within the Faculty of Law, as is customary in Higher Education, this guess chance is corrected for each examination with MC-questions when calculating the partial score or final grade. After all, someone who has not mastered the subject matter and does not know any of the answers will answer this percentage of the questions correctly by blind filling in (probability calculation). The formula <sup>2</sup>for calculating the partial score or final grade can be shown as follows:

$$\text{score or mark} = [(ns - nr) / (n - nr)] \times \text{smax}$$

ns = number of questions answered correctly

nr = guess chance (based on the number of answer options)

n = number of questions

smax = maximum score or highest grade attainable

### Example of correction for guessing

An exam consists of 40 questions, and each questions has 4 answer options.

The guess chance (25% of 40) is 10 questions; these do not count in determining the grade. The 10 points to be gained are then divided proportionally among the remaining 30 questions, i.e. 0.3333 point per correct answer over the 10 that do not count.

Suppose Marly answered 32 questions correctly. That is 22 questions above 10, so  $22 \times 0.3333 = 7.3326$ . The final grade that Marly obtained for the exam is therefore, after applying the correction for guessing and when rounding to half numbers, a 7.5. The calculation of this grade according to the formula is shown below:

$$\begin{aligned} & [(32-10) / (40-10)] \times 10 = \\ & 22 / 30 \times 10 = \\ & 7,33 \text{ (if rounded to half digits: 7,5)} \end{aligned}$$

The calculation can also be reversed: Marly's grade (7.33) expresses that she has mastered the learning goals for 73.3%. Based on this mastery of the subject matter, Marly will (if the exam assesses perfectly) make up 73.3% fo the 40 questions = 29.3 questions. On the remainder of the questions (40 – 29.3 = 10.7 questions) she does not know the answer, but will guess an answer. If all options are equally plausible, given the number of options per question, she will guess  $10.7 / 4 = 2.7$  questions correctly

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<sup>1</sup> Other closed question types have a significantly lower guess chance and will not be taken into account in this explanation.

<sup>2</sup> Based on: W. Bender, Toetsen in het Hoger Onderwijs, 2003, p. 58.

(probability calculation). These 2.7 correct guessed answers plus the 29.3 she achieved on mastery of the subject matter, gives her a total of 32 correctly answered questions.

### Caesura

The caesura is the limit between passing and failing: from what score does a student get a grade 5.5 or higher? The required score for the cut-off point can also be calculated using the above formula for any number of questions and number of answer options.

For a usual exam with 40 four-choice questions, the cut-off point is 26.5:

- 0 to 26 answers correct, gives an insufficient score or grade (<5.5);
- 27 to 40 questions correct, gives a satisfactory score or grade (>5.5)

See the table below for a summary of the unrounded (partial) scores and the final grades (rounded to whole or half numbers) for each number of correct answers:

<i>Number of correct answers</i>	<b>Not rounded (for partial score)</b>	<b>Rounded (for final grade)</b>
0	0.00	1.0
1	0.00	1.0
2	0.00	1.0
3	0.00	1.0
4	0.00	1.0
5	0.00	1.0
6	0.00	1.0
7	0.00	1.0
8	0.00	1.0
9	0.00	1.0
10	0.00	1.0
11	0.33	1.0
12	0.67	1.0
13	1.00	1.0
14	1.33	1.5
15	1.67	1.5
16	2.00	2.0
17	2.33	2.5
18	2.67	2.5
19	3.00	3.0
20	3.33	3.5
21	3.67	3.5
22	4.00	4.0
23	4.33	4.5
24	4.67	4.5
25	5.00	5.0
26	5.33	5.0
27	5.67	6.0
28	6.00	6.0
29	6.33	6.5

<b>30</b>	<b>6.67</b>	<b>6.5</b>
<b>31</b>	<b>7.00</b>	<b>7.0</b>
<b>32</b>	<b>7.33</b>	<b>7.5</b>
<b>33</b>	<b>7.67</b>	<b>7.5</b>
<b>34</b>	<b>8.00</b>	<b>8.0</b>
<b>35</b>	<b>8.33</b>	<b>8.5</b>
<b>36</b>	<b>8.67</b>	<b>8.5</b>
<b>37</b>	<b>9.00</b>	<b>9.0</b>
<b>38</b>	<b>9.33</b>	<b>9.5</b>
<b>39</b>	<b>9.67</b>	<b>9.5</b>
<b>40</b>	<b>10.00</b>	<b>10.0</b>