We use multiple-choice questions to ensure a more fine-grained measurement of understanding. Grading is done using an "additive with negation auto" or "partial credit" method [1, 2]. For each correct option selected, the student receives (1/C) points, and for each incorrect option selected, (1/C) points are deducted, with a minimum score of zero. Specifically:

Definitions:

• Number of correct options = C
• Number of correct selections by student = c
• Number of incorrect selections by student = w
• Maximum score for the question = 1 point

Scoring Formula:

Score for single question = max(0, c/C - w/C)

Total score for a quiz = Q1 Score + Q2 Score + Q3 Score …+ Q9 Score

Total score for a quiz is between 0 to 9.

Explanation:

1. Fully Correct:
   - If the participant selects all correct answers without any wrong selections, they receive full score (1 point).
   - Example: Correct answers = {A,B,C}, Student selects {A,B,C} → Score = 1.

2. Partially Correct (No Wrong Selections):
   - Partial credit is awarded proportionally to the number of correct answers chosen.
   - Example: Correct answers = {A,B,C}, Student selects {A,B} → Score = 2/3 ≈ 0.67.

3. Incorrect Selections:
   - Each wrong choice results in a deduction proportional to the number of correct answers.
   - Example: Correct answers = {A,B,C}, Student selects {A,B,D} → Score = (2/3 - 1/3) = 0.33.

4. Partial + Wrong Selections:
   - Both factors are considered, but the minimum score is 0.
   - Example: Correct answers = {A,B,C}, Student selects {A,D} → Score = (1/3 - 1/3) = 0.

Advantages

• Fairness: Encourages participants to answer correctly as much as possible, rather than relying on guessing all.
• Granularity: Better reflects actual performance compared to the "all-or-nothing" approach.
• Authority: Similar "partial credit" methods are often discussed and applied in research and teaching scenario [2, 3].

Reference:

[1] Information on Multiple Choice Scoring Options. https://edcite.zohodesk.com/portal/en/kb/articles/multiple-choice-scoring-rules

[2] Partial Credit on Multiple-choice Exams: Does It Help or Hurt Students?

[3] https://www.cs.utep.edu/vladik/slides/ssci15lorkowski.pdf