

How to pair test items (For course content experts)

For each item, create an **equivalent** item to compose the second item of the pair. Within each pair, make both items cover the **same content area** and have the **same difficulty** level. One item in each pair will randomly be assigned to the pre-test. The remaining items will form the post-test. This aims to create test of equivalent difficulty while minimizing recall from the pre-test.

Although the difficulty level of an item is best judged after the item is administered to participants, following these guidelines can help you create items of equivalent difficulty:

1. Write items that cover the **same content area** (i.e., test the same piece of knowledge).
2. Write items that relate to the **same cognitive domain**, either “knowledge and concept” or “application” as defined in the test specification matrix.
3. Write items that have about the **same length**.
4. Write items in the **same format**. Multiple choice items have three basic formats: “normal”, “not,” and “compound.”
 - a. **“Normal items”** have a simple positively stated stem that directly leads to the response options. This is the recommended format.
 - b. **“Not items”** ask for what is “not,” least” or “worst” or use words like “except” or “but.” This type of item may be good for testing knowledge of procedures. However, “not” items require a mental switch from normal questions. As this may confuse participants, they should be avoided particularly when the questions are not in their native language.
 - c. **“Compound items”** ask the participants to identify a combination of elements that result in the correct answers. Compound items can be useful when several conditions or elements are needed to compose the correct answer. However, they make the test appear longer and more complex. Therefore, they should be used rarely, if at all.

Below are examples of paired items using different formats and related to both cognitive domains.

Example pair of “Normal Items” at the cognitive domain “Application”

1a. A trainee scores a 75 on a test. To determine how well he did relative to all the others who took the test, which of the following would be most informative?

- a. The highest and lowest scores
- b. The frequency distribution ^
- c. The standard deviation
- d. The mean
- e. I don't know.

1b. A student scores a 76 on an exam. To know how well she did relative to all the others who took the exam, which of the following would be most useful?

- a. The mean
- b. The standard deviation
- c. The frequency distribution ^
- d. The lowest and highest scores
- e. I don't know.

Example pair of “Not Items” at the cognitive domain “Application”

2a. To see if there was a difference in salary between men and women based on census data, which of the following statistics would **not** be needed?

- a. Means
- b. Standard deviation
- c. Measure of association
- d. Test for statistical significance ^
- e. I don't know.

2b. To determine if salaries differ by gender based on census data, which of the following statistics would **not** be necessary?

- a. Test for statistical significance ^
- b. Measure of association
- c. Standard deviation
- d. Means
- e. I don't know.

Example pair of “Compound Items” at the cognitive domain “Knowledge and Concepts”

3a. Which of the following combination defines four elements in Michael Porter's “Diamond of National Competitive Advantage?”

- A. Company's core expertise
 - B. Country's size and population
 - C. Demand conditions
 - D. Factor conditions
 - E. Firm's strategy, structure and concurrence
 - F. Related and supporting industries
- a. A, B, E, F
 - b. A, C, D, E
 - c. B, C, D, F
 - d. C, D, E, F ^
 - e. I don't know.

3b. Michael Porter's “Diamond of National Competitive Advantage” includes which combination of four elements?

- A. Company's structure, strategy and rivalry
 - B. Country's population and size
 - C. Demand conditions
 - D. Factor conditions
 - E. Firm's main competency
 - F. Supporting and related commerce
- a. A, B, E, F
 - b. A, C, D, E
 - c. A, C, D, F ^
 - d. B, C, D, F
 - a. I don't know.