

## How do I construct a multiple-choice (MC) item?

### [What is a multiple-choice item and what does it look like?](#)

### [How do I write a multiple-choice item?](#)

### [How do I recognize poorly written multiple-choice items?](#)

### [How do I assign item status, status on compromise, and randomize answers?](#)

### [How do I re-assign multiple-choice items from deleted objectives?](#)

### [How do I align K-levels?](#)

### [What are additional sources of information on multiple-choice item construction?](#)

## What is a multiple-choice item and what does it look like?

Multiple-choice (MC) items are assessment questions that have one stem and multiple alternatives. An advantage of MC items is that they are quickly and objectively scored. Another advantage is that well written and structured MC items can assess many different and specific areas of some content in a quick manner.

MC items can be used to assess any knowledge level except K2: Recall and K5: Synthesize. K2: Recall cannot be tested because the answer is listed. The student would be recognizing the answer from the list and not recalling the answer. K5: Synthesize cannot be tested because it requires the student to apply knowledge to create new and/or unique solutions. If the answer is listed, then the answer is not new and/or unique. While a MC item cannot be written for K5: Synthesize, it is possible to write MC items for K5: Analyze and K5: Evaluate.

There are a few limitations of MC items:

- Guessing of answers may result, because the answer is listed.
- Most of the time, MC items indirectly assess the target behavior.
- MC items are more time-consuming to construct than other types of items.

A MC item has two parts: the stem and the alternatives. The **stem** of the MC item contains the problem statement, and it must include all of the information required to answer the item. The **alternatives** are a list of possible answers, which either complete the stem or fill-in-the-blank within the stem. Only one alternative can be the correct answer. The other incorrect alternatives are **distracters**.

The following is an example of a MC item:

Example:

Of the four stages of sea growth, which of the following would be the first stage?

- a. Grass
- b. Tubeworms

- c. Slime
- d. Barnacles

(Source NAVEDTRA 130A, Volume II, A-6-2-5)

In the example above, “Of the four stages of sea growth, which of the following would be the first stage?” is the stem. Four possible answers are listed. These are the four alternatives for the MC item. Alternative C (c. slime) is the correct answer and the other three alternatives are plausible distracters.

## How do I write a multiple-choice item?

A multiple-choice (MC) item is made up of a stem and multiple alternatives. Click on the steps below to guide the development of multiple-choice items.

1. [Identify the learning objective and K-level to be assessed.](#)
2. [Determine if it is appropriate to write a multiple-choice item for the objective.](#)
3. [Locate a reference source for the multiple-choice item.](#)
4. [Write the stem of the multiple-choice item.](#)
5. [Determine the correct alternative.](#)
6. [Write the incorrect alternatives \(distracters\) of the multiple-choice item.](#)
7. [Correctly format the multiple-choice item.](#)
8. [Review the multiple-choice item.](#)

### 1. Identify the learning objective and K-level to be assessed.

Prior to actually writing a MC item, identify the learning objective and K-level that are to be assessed. The identified learning objective should already have a K-level (knowledge level) associated with it. (See the K-levels Tab of the Objectives Module for more information.) You must determine whether the MC item will be written at or below the objective’s K-level.

- It is important that the knowledge level of the MC item matches the knowledge level of the information used on the job. Thus, the K-level of the MC item should match the K-level of the learning objective. For instance, if the K-level of the objective is K4: Apply, a K1: Recognize MC item will not fully assess the objective because the students will be recognizing information and not applying information.
- However it may be necessary to write and use MC items that are lower than the objective’s K-level. For objectives with K-3: Comprehend, K-4: Apply, or K-5: Analyze/Synthesize/Evaluate levels, items written below the objective’s K-level can be used to pinpoint where students may be having problems with the material. For instance, if the K-level of the objective is K4: Apply, and the student is having problems applying the information, a K1: Recognize MC item may help you determine if the students could not apply the information, because the students could not remember the information.
- Under no circumstances should the K-level of the MC item be higher than the objective’s K-level. For instance, if the K-level of the objective is K1: Recognize, and a K4: Apply MC item is used, the students will be assessed on information that is beyond the objective and not presented to them in the course.

### 2. Determine whether it would be appropriate to write a multiple-choice item for the objective.

For K2: Recall and K5: Synthesize, MC items may not be appropriate since they cannot fully assess these K-levels.


**3. Locate a reference source for the multiple-choice item.**

If the information required to achieve the learning objective is contained in an identifiable document, refer to the information when writing the item and note the reference source. This will be useful for verification purposes in future reviews.

While citing reference sources, avoid taking items directly verbatim from the materials. Students may be able to memorize the material without understanding it.

**4. Write the stem of the multiple-choice item.**

When writing a MC item stem, be sure that it contains only **one** central thought and that it is written to the specified K-level. Writing an item to a specific K-level can be tricky and may require some trial and error. Use the following chart as a reference when writing the MC item stem.

<b>K- Level and Summary Definition</b>	<b>Example Objective</b>	<b>Example Item</b>
<p><b>K1: Recognize</b></p> <p>Knowing the “what is” by sight or sound</p>	Recognize the four stages of sea growth	<p>Of the four stages of sea growth, which of the following would be the first stage?</p> <p>a. Grass b. Tubeworms c. Slime d. Barnacles</p>
<p><b>K2: Recall</b></p> <p>Knowing and remembering the “what is”</p>	List the steps of an emergency procedure	Not Applicable
<p><b>K3: Comprehend</b></p> <p>Knowing and explaining the “whats”, “hows” or “whys”</p>	Explain the difference between formal and informal assessments	<p>Which of the following characteristics is more typical of formal assessments than informal assessments?</p> <p>a. Greater chance of observing all students b. Responsive to needs of individual students c. Better at documenting what is observed d. More likely to measure exemplary performance</p>
<p><b>K4: Apply</b></p> <p>Knowing and using the “how to”</p>	Given the lengths of the sides of a rectangle, calculate the area of the rectangle..	<p>What is the area of the rectangle?</p> <div style="text-align: center;">  </div> <p>a. 5 b. 8 c. 15 d. 16</p>
<p><b>K5: Analyze/Synthesize/Evaluate</b></p>	Given appropriate tactics for an enabling	The instructor of a curriculum development course must teach

Knowing the “how they work”	objective (EO), customize presentation tactics.	students the five knowledge levels (K-Levels). Which of the following presentation tactics would be the <b>best</b> way to ensure that students remember the names of all five levels? a. Clustering b. Outlining c. Repetition d. Venn diagram
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**General rules for multiple-choice item stem creation**

The stem of the MC item should:

- Test only one idea or central thought.
- Be clear and unambiguous, but still contain all information, conditions, assumptions, and details to answer the question correctly. The knowledgeable student should be able to answer the question without reading the alternatives.
- Lead to only one alternative.
- Include certain words or phrase if all alternatives require them.
- Be phrased positively instead of negatively. If a negative must be used, it should be highlighted (in caps or underlined) so that the student will notice it and interpret the item correctly.
- Reference an illustration by its figure number if it uses an illustration on a separate sheet of paper.
- End in a question mark if it is in the form of question and is a complete sentence.
- Preferably be in a completed question form rather than in an incomplete statement form except when it would make the MC item grammatically clumsy or difficult to understand. In general, the question form is easier to construct than the incomplete sentence form.
- Have a maximum of one completion position (blank) either near or at the end of the stem (if an incomplete statement is required).
- Have emphasis (underline, bold, and/or all caps) on any words (usually adverbs or adjectives) that completely change the meaning of the question. For example, “Which is the **MOST** likely to...”

(Source NAVEDTRA 130A, Volume I. 8-B-3-1 to 8-B-3-8)

**5. Determine the correct answer (alternative).**

The alternatives of the MC item are designed to either answer the question or complete the statement in the stem. There should be only one correct alternative. The correct alternative should be clearly correct. Now that the stem has been created, write the answer in a form that matches the item stem. This correct alternative will be used to determine the appropriate format and content of the distracters.

**6. Write the incorrect alternatives (distracters) for the multiple-choice item.**

Each incorrect alternative should be plausible (reasonable or believable) but clearly incorrect. Use the content contained in the correct alternative to guide the content of the incorrect alternatives. The content of all the alternatives should be similar. Also, all of the alternatives should have the same format, structure and grammar. When writing the distracters, it may be helpful to use the corrective alternative and find ways to make it incorrect.

Typically there are four alternatives for each MC item. However, due to the content of the item, it may be more practical to have more than or less than four alternatives. Note that decreasing the number of alternatives for an item increases the guessing factor. For example, if the MC item contains four alternatives, then a student has a 25% (1 in 4) chance of getting the item correct by guessing. If this same item only has three alternatives, the student has a 33% (1 in 3) chance, a higher chance, of correctly guessing the correct alternative.

When selecting the order of the alternatives, position the correct answer among the alternatives by a random selection process to avoid any patterns, which may bias the test. However, when the MC items involve numerical answers, the alternatives must be arranged in ascending or descending order.

### **General rules for creating the alternatives for a multiple-choice item**

The alternatives of the MC item should:

- Fit well with the stem. The grammar, structure, and punctuation should make sense and conform to the grammar, structure, and punctuation of the stem.
- Have only one correct answer. Distracters should be plausible but clearly incorrect. A distracter should not be subject to automatic elimination by the students because they are irrelevant or unrelated to the question. A good rule is to develop distracters based upon common misconceptions and errors. Distracters may be prepared based on how students might incorrectly manipulate terms, symbols, theories, and ideas. Look at the correct answer and determine how it may be made incorrect.
- Be closely related to the other alternatives. The difficulty of the item will depend largely upon the alternatives. The more closely related the alternatives are, the more difficult it is to select the correct answer. This reduces the chance of correctly answering the item by guessing.
- Be of approximately the same length and complexity and be expressed in similar form.
- Not use interrelated answers, such as C is true if A and B are false, all of the above, and none of the above.
- Avoid negative wording, which is confusing—however, if used, highlight negative wording by capitalizing, underlining or italicizing.
- Not contain words such as always, never, or not.
- Use vocabulary that is familiar or can be explained within the limits of the MC item.

(Source NAVEDTRA 130A, Volume I. 8-B-3-1 to 8-B-3-8)

## **7. Correctly format the MC item.**

There are several ways to format a MC item. These formats are based on the MC item's stem type. The formats are closed stem as a question, closed stem as an incomplete statement, and open stem.

Select the multiple-choice format by clicking on the link below for more information.

- [Closed stem as a question](#)
- [Closed stem as an incomplete statement](#)
- [Open stem](#)

Name And Description	Format	Example
<p><b>Closed stem as a question</b></p> <p>The MC item stem is written as a question.</p> <p>This type must have a stem that clearly defines the problem. The alternatives can be written either as a complete or incomplete sentence. The alternatives may be long, but using this type tends not to provide grammatical clues to the students.</p>	<p><b>Stem:</b> Begin the statement with a capital letter and use end-of-sentence punctuation.</p> <p><b>Complete sentence alternatives:</b> Begin the alternative with a capital letter and use end-of-sentence punctuation.</p> <p><b>Incomplete sentence alternatives:</b> Begin the alternative with a capital letter and do <b>not</b> use end-of-sentence punctuation.</p>	<p>Which of the following actions is required to remove a hinged type 2 module on the MTRE Mk 7 Mod 2/4?</p> <p>a. Disconnect plates from the type 2 module.</p> <p>b. Insert "T" handle into quick release fasteners.</p> <p>c. Remove all Type 3 modules and connectors.</p> <p>d. Rotate hold down clamps to vertical position.</p> <p>What piece of equipment is used to measure resistance?</p> <p>a. Voltmeter</p> <p>b. Ohmmeter</p> <p>c. Ammeter</p> <p>d. Oscilloscope</p>
<p><b>Closed stem as an incomplete statement</b></p> <p>The MC item's stem is written as an incomplete statement with a completion position (blank) within the body of the stem.</p> <p>All alternatives are written to grammatically fit into the completion position of the sentence. This item type should be used sparingly because it is susceptible to grammatical clues and incomplete thoughts. When using this type, avoid taking items directly from the study materials. Students may be able to memorize the material without understanding it.</p>	<p><b>Stem:</b> Begin the statement with a capital letter and use end-of-sentence punctuation. Use seven periods (.....) to indicate the incomplete portion in the stem.</p> <p><b>Alternatives:</b> The alternative should be formatted as it would if being placed in the completion position. Do not use end-of-sentence punctuation.</p>	<p>The setting of the AN/ABC-3Q flip-flop.....indicates that intent-to-fire has been energized.</p> <p>a. B43</p> <p>b. C2I</p> <p>c. C24</p> <p>d. D32</p>

<p><b>Open stem</b></p> <p>The MC item's stem is written as an incomplete statement with the completion position (blank) at the end of the statement.</p> <p>Each alternative is written to grammatically complete the statement. The distracters (incorrect alternatives) should be similar to the correct answer so that students are not as likely to guess the correct answer. When using this type, avoid taking items directly from the study materials. Students may be able to memorize the material without understanding it.</p>	<p><b>Stem:</b> Begin the statement with a capital letter. Use seven periods (.....) to indicate the incomplete portion in the stem.</p> <p><b>Alternatives:</b> The alternative should be formatted as it would if being placed in the completion position. Use end-of-sentence punctuation.</p>	<p>When crimping both a stranded wire and a solid wire in the same contact, the solid wire's position in relation to the stranded wire is .....</p> <p>a. above. b. below. c. beside. d. diagonal.</p>
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**8. Review the item.**

After writing the item review it for content, formatting, grammar, and whether the item is written to the intended K-level. The "Quality Checklist for Multiple-Choice (MC) Item Construction" provides a guideline for this. Again, it is important to ensure that the actual K-level of the item is not above the K-level of the learning objective.

**How do I recognize poorly written MC items?**

Writing test questions that challenge the student to correctly answer questions based on their knowledge rather than their guessing ability is easier when some common errors are avoided. Below are some examples of common errors and how to make them better. **The incorrect pieces are underlined.**

**Common error 1:**

Using similar wording in both the stem and only the correct alternative suggests the correct answer.

1. Poor Item

What meter is used to measure resistance?

- a. Voltmeter
- b. Ohmmeter
- c. Ammeter
- d. Oscilloscope

1. Improved Item

What piece of equipment is used to measure resistance?

- a. Voltmeter
- b. Ohmmeter
- c. Ammeter
- d. Oscilloscope

**Common error 2:**

Stating the correct alternative in greater detail than the other alternatives often cues the correct answer. All alternatives should be about the same length and have the same amount of detail.

2. Poor Item

2. Improved Item

When all weapon power is removed from the PIP, which of the following statements is true?

- a. All power is lost to the MCC equipment.
- b. The MCC equipment is furnished power from NAV via the MSR.
- c. The DCCs have heater power applied.
- d. Power from the ship control center may be present in MCC since it only goes through the SHIP JP.

When all weapon power is removed from the PIP, which of the following statements is true?

- a. All power is lost to the MCC equipment.
- b. The MCC equipment is furnished power from NAV via the MSR.
- c. The DCCs have heater power applied.
- d. Power from the ship control center may be present in MCC.

**Common error 3:**

When the grammar and structure of the stem does not match all of the alternatives, the non-matching alternatives may be discarded by the student. In the example above the correct alternative (A) is the only alternative that makes sense when read with the stem.

3. Poor Item

In item response theory, the one-parameter model assumes that each item .....

- a. discriminates equally well.
- b. students perform equally well.
- c. students score the same across items.
- d. guessing affects all items the same.

3. Improved Item

In item response theory, the one-parameter model assumes that each item has the same .....

- a. discrimination.
- b. item difficulty.
- c. correct response.
- d. number of responses.

**Common error 4:**

Using two or more alternatives with the same meaning eliminates them as useful distracters and simplifies the choices. If two or more alternatives have the same meaning and are both correct, this is also incorrect because there can only be one correct answer.

4. Poor Item

What is the final step in performing post-maintenance checks?

- a. Secure the front panel to the chassis.
- b. Make sure the front panel is secure.
- c. Set manual test switch to "OFF."
- d. Rerun the diagnostic tests.

4. Improved Item

What is the final step in performing post-maintenance checks?

- a. Secure the front panel to the chassis
- b. Complete check list
- c. Set manual test switch to "OFF"
- d. Rerun the diagnostic tests

**Common error 5:**

Using alternatives that are included in other alternatives causes confusion for the student. In the example below, alternative b includes alternative a. Therefore, if alternative b is correct, alternative a is also correct.

5. Poor Item

What is the operating time, in seconds, for the pressurization/compensation blow valve to roll from shut to open?

- a. 1 to 3
- b. 1 to 4

5. Improved Item

What is the operating time, in seconds, for the pressurization/compensation blow valve to roll from shut to open?

- a. 1 to 3
- b. 4 to 6

- c. 4 to 6
- d. 9 to 11

- c. 7 to 8
- d. 9 to 11

**Common error 6:**

If all of the alternatives are not plausible, the item becomes easier and a person guessing the answer has a better chance of getting the item correct. In the example below, the student can eliminate the last alternative and now has a 1 in 3 chance of selecting the correcting answer.

6. Poor Item

Which one of the following instruments uses a reed to make sounds?

- a. Oboe
- b. French horn
- c. Glockenspiel
- d. The conductor

6. Improved Item

Which one of the following instruments uses a reed to make sounds?

- a. Oboe
- b. French horn
- c. Glockenspiel
- d. Piccolo

**Common error 7:**

If the item is negatively stated, the negative word or phrase should be highlighted (in caps or underlined) so that the student will notice it and interpret the item correctly. Always use “except” instead of “not.” In the example below, “except” should be written as “EXCEPT,” “EXCEPT,” or “except.”

7. Poor Item

A specific torquing pattern and associated torque values can be found in the SINS technical manual for all the following assemblies or components except .....

- a. an azimuth synchro assembly mounted to the stem.
- b. a velocity meter mounted to the platform.
- c. a replacement gyroscope mounted to the stable platform.
- d. a platform stem mounted to the bedplate.

7. Improved Item

A specific torquing pattern and associated torque values can be found in the SINS technical manual for all the following assemblies or components EXCEPT .....

- a. an azimuth synchro assembly mounted to the stem.
- b. a velocity meter mounted to the platform.
- c. a replacement gyroscope mounted to the stable platform.
- d. a platform stem mounted to the bedplate.

**Common error 8:**

Do not use repetitive words. This allows for the stem and the alternatives to be more clearly stated.

8. Poor Item

Physics is .....

- a. the science that deals with the structure of matter.
- b. the science that deals with the composition, structures, and properties of substances.
- c. the science that is more concerned with the

8. Improved Item

Physics is the science that .....

- a. deals with the structure of matter.
- b. deals with the composition, structures and properties of substances.
- c. is more concerned with the solids than liquids.

solids than liquids.

**Common error 9:**

Do not use “not” in the stem and do not use double negatives. In the example below the use of “not” twice makes the MC item confusing. In this case the item is more difficult because the item cannot be interpreted correctly.

9. Poor Item

Which of the following is not an item format?

- a. Not Multiple-choice
- b. Not Essay questions
- c. Not Sentence completion
- d. Not Test-retest

9. Improved Item

All of the following are item formats EXCEPT

- .....
- a. Multiple-choice.
  - b. Essay questions.
  - c. Sentence completion.
  - d. Test-retest.

**How do I assign Item Status, Status on Compromise, and Randomize Answers?**

- [Item Status](#)
- [Status on Compromise](#)
- [Randomized Answers](#)
- [Last Used on Test](#)

**Item status**

Item status is used to identify the status of the item. Only items with a status of active or validation may be used on an exam. The five item statuses are active, inactive, validation, development, and review.

**Active** item status is used when an item has met the standard criteria of 100 samples and a minimum difficulty index of 0.4. **Validation** status is used when the item has been approved to be on exams, but has not met the active status criteria.

(Source: CNET. **Question Status**. Retrieved May 10, 2002 from [http://wwwnt.cnet.navy.mil/cetars/help/glossary/question\\_status.htm](http://wwwnt.cnet.navy.mil/cetars/help/glossary/question_status.htm), [http://wwwnt.cnet.navy.mil/cetars/help/glossary/active\\_test\\_question.htm](http://wwwnt.cnet.navy.mil/cetars/help/glossary/active_test_question.htm), <http://wwwnt.cnet.navy.mil/cetars/help/glossary/validation.htm>)

**Status on Compromise**

Status on Compromise pertains to test compromise. Test compromise is an unauthorized disclosure of a test and/or answers to a test. Compromised test questions create situations where unqualified students may pass knowledge tests. These students may then take performance tests without the basic knowledge of the equipment and may injure themselves, other personnel, and/or equipment.

Test compromise may be suspected when the difficulty index of an item changes drastically from the previous offerings of the course. For example, if the difficulty index of an item is usually 0.5 (1/2 of the students answer the item correctly) and on one test, all the students answer the item correctly (difficulty index (DIFF) = 1.00), compromise of the item may be suspected. If compromise is suspected, the MC item should be marked as “Suspected” for “Status on Compromise.”

Items that are suspected of being compromised should be taken out of the item pool when marked as suspected. These items can be replaced with different items. Retaining the suspected item ensures that a similar item will not be added to the active test bank.

You can reduce the possibility of compromise during test review by not reading missed items and answers verbatim. In addition, have alternate versions of the test. The rule of thumb to determine the number of versions is to have enough test versions so that two classes that are on board at the same time are administered two different versions.

### **Randomized Answers**

Randomized Answers is for changing the listed sequence of alternatives when an MC item list is generated. Randomizing answers allows the same multiple-choice item to vary across different tests, because the order of the alternatives varies. It is a good idea to randomize answers, but items should not be randomized when there is a numerical or sequential order to the alternatives.

Example:

What is the operating time, in seconds, for the pressurization/compensation blow valve to roll from shut to open?

- a. 1 to 3
- b. 4 to 6
- c. 7 to 8
- d. 9 to 11

In the example above, the alternatives are in a numerical or sequential order, as they should be.

Example:

What is the operating time, in seconds, for the pressurization/compensation blow valve to roll from shut to open?

- a. 7 to 8
- b. 1 to 3
- c. 9 to 11
- d. 4 to 6

In the example above, the alternatives are randomized and they should **not** be. They should be listed in sequential order.

### **Last Used on Test**

Last Used on Test is a textbox for noting when the item was last used on a test. This can be used when generating an item list. In some situations, it may not be useful to use the item without a time gap between uses. For instance, when generating a comprehensive test, do not use the same item that was used on a knowledge progress test.. Using the same item may increase the likelihood of item compromise. Secondly, students will be tested on their ability to memorize the answer to the items, and not on their learning.

### **How do I re-assign multiple-choice items from deleted objectives?**

When objectives are deleted from the course, the multiple-choice (MC) items for those objectives remain in "Charting a Course" until the MC items are deleted. This allows for the archiving of MC items and/or the reuse of MC items with other similar learning objectives in the course. With minor changes and editing, some MC items may be revised, assigned, and used with another learning objective. This decreases development time. For K2: Recall and K5: Synthesize, multiple-choice items may not be appropriate. Multiple-choice items cannot fully assess these K-levels.

When editing and re-assigning MC items it is important that:

- The new objective is similar to the old objective.
- The MC item assesses the information covered in its new learning objective.
- The K-levels of the MC item and the new learning objective are the same.
- The Item Status, Status on Compromise, and Randomize Answers, Last Used on Test are updated for the item.

Once the MC item is reassigned and edited, the item will appear on the View Item List for its new learning objective.

### **How do I align K-levels?**

K-levels (knowledge levels) indicate the different ways that knowledge is used on the job. The purpose of assigning K-levels to knowledge objectives is to facilitate the choice of appropriate instructional strategies and in the designing of appropriate MC items to measure the learning and mastery of these objectives.

**K-level alignment** is an evaluation process in which the K-level of the multiple-choice (MC) item is determined and compared with the K-level of the item's learning objective. Ideally, the K-level of the item should equal the K-level of its objective.

For instance, if the K-level of the objective is K4: Apply, a K1: Recognize MC item will not fully assess the objective because the students will be recognizing information and not applying information.

However, items with lower K-levels may be used to assess the learning objective if a series of items is used. For objectives with K-3, K-4, or K-5 levels, items written below the learning objective's K-level can be used to pinpoint where students may be having problems with the material.

For instance, if the K-level of the objective is K4: Apply, and the student is having problems applying the information, a K1: Recognize MC item may help you determine if the students could not apply the information, because the students could not remember the information.

However, under no circumstances should the K-level of the MC item be higher than the K-level of its objective.

For instance, if the K-level of the objective is K1: Recognize, and a K4: Apply MC item is used; the students will be assessed on information that is beyond the objective and not presented to them in the course.

If the K-level of the MC item is higher than the learning objective's K-level, the MC item may be testing material that was not covered and is not expected from the students. In order to prevent this from occurring, the MC items should be continuously checked for K-level alignment, especially if:

- The objective has been changed or edited
- The information presented for the objective has been changed
- The K-level of the objective has been changed
- New MC items have been added to the item bank

In order to **select the K-level for a MC item**, it is important to determine:

- What the item is asking the students to do in order to answer the item correctly.

- How the information will be presented to the students.

Use the following table to assist you when assigning K-levels.

<b>K- Level and Summary Definitions</b>	<b>When to Assign</b>
<b>K1: Recognize</b>  Knowing the “what is” by sight or sound	If the student is required to identify specific terms, facts, rules, methods, principles, and objects by sight or sound.
<b>K2: Recall</b>  Knowing and remembering the “what is”	If the student is required to remember specific terms, facts, and rules.  Multiple-choice items cannot be a K2: Recall, because selecting the answer from a list of alternatives automatically makes the item a K1: Recognize.
<b>K3: Comprehend</b>  Knowing and explaining the “whats,” “hows,” or “whys”	If the student is required to understand rather than simply memorize what was taught. In other words, the student must be able to interpret, explain, translate, or summarize information.
<b>K4: Apply</b>  Knowing and using the “how to”	If the student is required to use acquired knowledge in a situation not specifically demonstrated during instruction.
<b>K5: Analyze/Synthesize/Evaluate</b>  Knowing the “how they work”	Analyze: If the student is required to understanding the elements of data – and the relationships among data. In other words, the student demonstrates the ability to break a whole down into parts in order to arrive at a greater level of understanding.  Synthesize: If the student is required to put parts together to form new patterns, structures, or the big picture. Multiple-choice items cannot be a K5: Synthesize, because in synthesis, there is no one correct answer. By forcing the student to select the answer from a list of alternatives, the multiple-choice item then becomes a K-5: Analysis or K5: Evaluate. However, it still is a K5: Analyze/Synthesize/Evaluate.  Evaluate: If the student is required to make a value judgment based on given standards or criteria.

Here are some examples of MC items and their K-levels.

<b>Example MC Item</b>	<b>K-Level</b>	<b>Explanation</b>
Of the four stages of sea growth, which of the following would be the first stage? a. Grass b. Tubeworms c. Slime d. Barnacles	K1: Recognize	The student is being asked to recall the first stage of sea growth. However, since the student will be recalling the first stage from a list of alternatives, the student is not recalling, but recognizing.

Which of the following stages of sea growth is most likely to be found inside a sea chest of a ship taken from a dry dock and then set in port for a year? a. One b. Two c. Three d. Four	The K-level depends on the complexity of the information and how the information was presented. This item could be K1: Recognize, K4: Apply, or K5: Analyze/Synthesize/Evaluate	
	K1: Recognize	If the instructor explicitly presented this scenario to the class during the instruction, the students will just have to recognize the correct answer from the list of alternatives making this item K1: Recognize.
	K4: Apply	If during the course the instructor presents to the students a set of simple rules and procedures and the information is straightforward, the students will have to apply their knowledge of the rules and procedures making this item K4:Apply.
	K5: Analyze/Synthesize/Evaluate	If the information for the students is complex and requires a lot of analysis and application of different rules and procedures, the students must analyze the information in order to solve the problem. Thus, the K-level is K5: Analyze/Synthesize/Evaluate.

**A K-level Alignment Overview** results when all of the items for an objective have been assigned a K-level. The table lists the amount (quantity) of MC items that were rated at each K-level. If any item has been assigned a K-level above the K-level of the objective, a red exclamation point appears in the table and the list.

Ideally, the K-level of the item should equal the K-level of its objective, but items with lower K-levels may be used to assess the objective if a series of items are used. For objectives with K3: Comprehend, K4: Apply, or K5: Analyze/Synthesize/Evaluate levels, some items for an objective may be written below the objective's K-Level to discover where students may be having problems with the objective. However, under no circumstances should the K-level of the MC item be higher than the K-level of its objective.

Here is an example of a K-level Alignment Overview Table.

Example:

K-level	K1	K2	K3	K4	K5
Quantity	2		3	4	2

In the example table above, there are a total of 11 ( $2+3+4+2=11$ ) MC items for the learning objective. Two MC items are rated as K1: Recognize, three MC items for K3: Comprehend, four MC items for K4: Apply and two MC items for K5: Analyze/Synthesize/Evaluate. If the learning objective's K-level is K4: Apply, then the two items that were rated as a K5: Analyze/Synthesize/Evaluate should be reevaluated and/or edited to fit the K-level of the learning objective.

### **What are additional sources of information on multiple-choice item construction?**

The following is an additional non-Navy source of information on multiple-choice item construction:

Oosterhof, A. (2001). **Classroom applications of educational measurements, 3<sup>rd</sup> Ed.** Upper Saddle River, NJ: Merrill Prentice Hall, 87-251.