



## What Makes a Good Examination Question?

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First, one must understand what is meant by the term *psychometrics*. Simply put, psychometrics is the science of measuring mental processes and activities. It includes the theory underlying the development of sound measuring tools (i.e., tests), as well as the statistical analyses used to evaluate whether these tools are accurate and reliable.

CBNC exams use multiple-choice questions with four response options. All of the response options should be plausible, but only one of them will be the best answer. The questions are not meant to trick, but to elicit the candidate's knowledge on the topic.

Questions are received in all of the examination content areas as part of a global question drive held annually. In addition, item writing experts participate in workshops to craft items to address specific areas of need. Then CBNC's contracted psychometric testing professionals look for flaws of the following types as they do the initial review of the questions:

- Is the wording concise and straightforward?
- Does the question clearly pose a problem?
- Do the options provided flow logically from the question?
- Are all of the options parallel and structurally similar (i.e., do all the options appear to be logically related or do they force examinees to make "apples and oranges" comparisons)?
- Does the text of the question provide any clues to the correct answer?

Any flaws that cannot be corrected during the psychometric review are brought to the attention of the Examination Committee for resolution during the content expert review.

Since nuclear cardiologists typically must *apply* their knowledge, rather than simply *recall* definitions and basic concepts, items focus on testing examinees' knowledge in an applied fashion. That is, items test examinees in using their knowledge to analyze situations, draw conclusions from a set of information, solve problems, and/or determine the best course of action.

Questions are written at different cognitive ability levels to determine the level of knowledge or skill the candidate possesses. If a relatively sophisticated level of judgment in a particular area is required for competent practice of nuclear cardiology, items designed to assess knowledge of this area are written at higher cognitive levels. For the CBNC examinations, there are three cognitive levels: "Recall," "Application," and "Analysis and Synthesis."

### **Cognitive Level 1: Recall**

Cognitive Level 1 items require the examinee to recognize and comprehend specific information related to the knowledge area or task being tested. The examinee only needs to remember previously learned facts or recognize a concept or definition.

### **Cognitive Level 2: Application**

Cognitive Level 2 items require the examinee to apply principles from a general knowledge area to a specific situation or synthesize several different types of knowledge to form a solution to a problem. The examinee must first deduce what previously learned material is relevant to the situation and then must manipulate this knowledge to apply it to the circumstances presented in the question.

In contrast to the Cognitive Level 1 item which required the examinee simply to recall previously learned material, the Cognitive Level 2 item requires the examinee to demonstrate mastery by synthesizing and analyzing the information provided, judging its relevance, and then determining the best approach to the situation.

### **Cognitive Level 3: Analysis and Synthesis**

Cognitive level 3 items require the test-taker to synthesize information by distinguishing facts from assumptions and putting various knowledge parts together to form a new knowledge component or a solution to a problem. This includes the ability to judge the value of the knowledge for a given purpose.

During an Examination Assembly Review Meeting, content experts review the examination forms as they would be given to candidates. During this final analysis, the reviewers consider the following:

- Are there any remaining ambiguities or inconsistencies in the questions and if so, how can these be resolved?
- Is the marked key the correct answer?
- Are all of the incorrect options plausible, but clearly wrong?
- Is there any clueing? (A question shows clueing when it contains information that would help examinees answer another question on the examination.)
- Are there any redundant questions (i.e., questions which test the same concept)?

Questions which do not meet the grade are eliminated. They may be thrown out, or they may be held for revision at a later time, for use on a future examination.

See **Development of an Exam** to understand the processes involved in creation of an examination in nuclear cardiology.