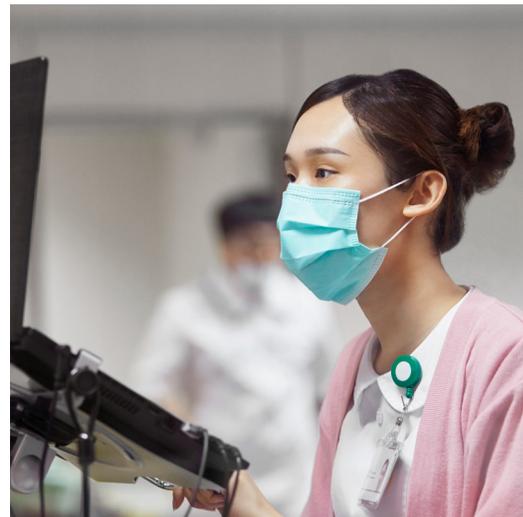


JCNDE JOINT COMMISSION
ON NATIONAL
DENTAL EXAMINATIONS



JCNDE Test Item Development Guide



The Joint Commission on National Dental Examinations (JCNDE)
Test Item Development Guide

National Board Dental Examinations (NBDE Part I and NBDE Part II)
National Board Dental Hygiene Examination (NBDHE)

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INTRODUCTION

This publication of the Joint Commission on National Dental Examinations (Joint Commission) provides item development guidelines to new and current Test Construction Team (TCT) volunteers. The use of the item development guidelines should increase the chances that items submitted to the Department of Testing Services (DTS) will be accepted. This exercise affords an opportunity to participate in a professional activity associated with dentistry. This Test Item Development Guide serves the following functions:

- helps Test Constructors construct high quality examination items in support of the Joint Commission's examination programs.
- informs dental and academic communities of interest concerning the item development process for the National Board Dental Examinations (NBDE Part I and NBDE Part II) and National Board Dental Examination (NBDHE).
- encourages participation in the Joint Commission's item development and review activities.
- broadens the Joint Commission's base of item writers, item reviewers, and future Test Constructors.
- provides a foundation for development efforts as TCTs work to replenish the Joint Commission's item pool with current knowledge.

Important Note on Copyright Agreement / Confidentiality

All Joint Commission Test Constructors are expected to complete the Department of Testing Services (DTS) Contributor Agreement Form. This form can be found in Appendix A. Test security is critical, as the items written by TCT volunteers appear in examinations that are used to inform licensure decisions.

EXAMINATION SPECIFICATIONS

The National Board Dental Examinations (NBDE Part I and NBDE Part II) and the National Board Dental Hygiene Examination (NBDHE) specifications describe the structure of each examination as well as the content. A practice analysis is conducted to glean information on the knowledge and skills essential to the practice of dentistry and dental hygiene from experts in the field. The examination specifications derive from the practice analysis and outline the knowledge required for professional practice. The examination specifications determine the structure of the examination, i.e., the percent of items in each discipline, test length, case-independent (standalone) and case-dependent item formats, etc. Essentially, the examination specifications communicate what is considered important, and, therefore, what to measure. With content comes process - the methods to measure content (item formats), and the methods to process knowledge (cognitive tasks).

For information regarding submitting cases for the National Board Dental Hygiene Examination (NBDHE), please visit this page of the ADA.org website:

https://www.ada.org/~media/JCNDE/pdfs/nbdhe_case_guide.pdf?la=en

If you are interested in submitting cases for the National Board Dental Examination (NBDE) Part II, please contact the ADA Department of Testing Services:

The Joint Commission on National Dental Examinations
211 E. Chicago Ave.
Chicago, IL 60611
800.232.1694
nbexams@ada.org

GENERAL ITEM WRITING PRINCIPLES

To assist you in the item development process, it is first necessary to discuss some key considerations in writing high quality items for a high stakes examination such as the NBDE examinations and the NBDHE examination. In essence, it is important to present questions in a consistent, standard format that has been informed by research to facilitate accurate and precise measurement of candidate dental skills. With this goal in mind, the discussion will now turn to general item writing principles, focusing on the following topics:

- Writing effective item stems
- Writing effective item response options
- Applying editorial guidelines appropriately
- Considering fairness and sensitivity issues when writing items

Item writing principles provide information concerning how to approach the creation of items. There are a variety of item formats used in both large and small scale assessments. In general, the array of item formats available is conducive to a wide spectrum of cognitive tasks, from information retrieval to critical thinking and problem solving.

Traditional multiple-choice items are considered by experts to be the most versatile and useful of objective test items. They are effective in measuring not only a candidate's knowledge and understanding, but also more complex cognitive processes such as application, analysis, synthesis, and evaluation. In order to be effective, items must be written well. The NBDE and NBDHE examinations rely exclusively on multiple-choice items, some of which are presented in isolation (standalone items) while others are presented together in groups that are accompanied by a common set of stimuli (testlets; case materials including radiographic images; etc.).

There are a few essential parts to the multiple-choice item. The **stem** is the introductory question or partial statement that the examinee must answer or complete. The stem is typically followed by four response options marked by the letters A, B, C, and D. One of the response options—the **key**—is the correct (or best) response to the stem. The incorrect or inferior response options are known as **distractors**. In many cases, common misconceptions and observed mistakes make excellent distractors. In general, the effective performance of a test item is directly related to the discriminating quality of the distractors.

WRITING STEMS

The stem of a multiple-choice item provides the examinee with a prompt that requires a response. Before reading any of the response options, examinees should have a strong understanding of what is being asked and, depending on candidate skill levels, possible response alternatives. Examinees should not have to read the response options in order to understand the stem. In most cases this can be accomplished by:

1. setting up a problem or set of circumstances within the stem or through reference to stimulus materials.
2. making sure the stem contains at least one verb.

Questions and Incomplete Statements

Although some research indicates that stems written in the form of a question are more effective than those written as partial statements, both are acceptable for multiple-choice items. The argument for the question-form stem lies in the belief that a question communicates more completely the problem or circumstances of the item. Seeing the stem in question form helps examinees conceptualize the item's context.

The following is an example of an item written in a poorly formed incomplete sentence.

Trigeminal neuralgia (tic douloureux)

- A. can be in the form of prolonged episodes of pain in one side of the face.
- B. is a dull pain when pressure is applied over the affected area.
- C. is characterized by sharp pain when light pressure is applied to the affected area.
- D. manifests as uncontrollable twitching of one eye.

Because the stem lacks a verb, it communicates no context to the examinees. The stem is unfocused, and response options leading from unfocused stems are often heterogeneous. If the candidate covers the distractors, he or she will not know what is being asked.

Below is the same question, which has been rephrased to include a verb to provide an indication of what specific concept the candidate will be expected to know.

Trigeminal neuralgia (tic douloureux) is characterized by

- A. dull pain when pressure is applied over the affected area.
- B. prolonged episodes of pain in one side of the face.
- C. sharp pain when light pressure is applied to the affected area.
- D. uncontrollable twitching of one eye.

An even more effective item construct is to write the stem in the form of a complete question, as follows:

Which symptom best characterizes trigeminal neuralgia (tic douloureux)?

- A. Dull pain when pressure is applied over the affected area
- B. Prolonged episodes of pain in one side of the face
- C. Sharp pain when light pressure is applied to the affected area
- D. Uncontrollable twitching of one eye

Keeping It Simple

The stem should be as brief as possible, including only the information needed to solve the problem. In many cases irrelevant material, or “window dressing,” should be omitted because it adds to an examinee’s reading time. The extra time it takes a candidate to answer a question may reduce the number of items the candidate has time to answer, which is used to evaluate performance. Below is an example of an item containing more information than is necessary to answer it:

Bruxism, the rhythmic grinding of teeth in other than chewing movements of the mandible, can result in overdevelopment of a muscle of mastication. Which muscle might be overdeveloped in a patient with bruxism?

- A. Buccinator
- B. Glossopharyngeal
- C. Lateral pterygoid
- D. Masseter

Below is the same item with the unnecessary information omitted from the stem:

When a patient bruxes the teeth, which muscles might become overdeveloped?

- A. Buccinator
- B. Glossopharyngeal
- C. Lateral pterygoid
- D. Masseter

The additional information included in the first example, known as “teaching,” may also inadvertently clue another item later on.

An exception to this rule would be situations where providing additional details increases the correspondence between the content of the question and how the dentist or dental hygienist would encounter the situation in practice. Including these details can sometimes help with clinical relevance, because in the clinic dentists and dental hygienists must be able to quickly distinguish between 1) information that is directly relevant to the patient’s condition, and 2) information that might appear relevant on the surface but is simply not germane. Good examinations and test questions appropriately balance these two competing interests.

Generally, statements of a controversial nature do not make good objective items, though there are instances when knowledge of different viewpoints on controversial issues may be important. When this is the case, the item should clearly state whose opinion or what authority is to be used as the basis for answering.

Positively- and Negatively-Worded Item Stems

Generally, stems that are worded positively are more effective than those worded negatively. However, it is sometimes appropriate to ask examinees to distinguish the one incorrect response among several correct alternatives. In these cases, *exceptions* may be used. Generally speaking, these items should be used sparingly and only when a concept cannot be addressed by using a positively-stated stem.

Each of the following is a part of the initial periodontal treatment plan EXCEPT one. Which is the EXCEPTION?

- A. Eliminating surgical pockets
- B. Extracting hopeless teeth
- C. Performing occlusal adjustment
- D. Providing home-care instructions

Note that the words “EXCEPT” and “EXCEPTION” have been capitalized. This helps the examinee to understand that the item has been worded negatively.

Making Stems Inclusive

Avoid repeating the same word or phrase in multiple response options. Where possible, this information should appear in the stem. For example, consider rewriting the item below to remove the word “tissue” from the options and including it in the stem instead.

Histologically, the normal dental pulp most closely resembles

- A. dense connective tissue.
- B. endothelial tissue.
- C. granulomatous tissue.
- D. loose connective tissue.

The following is an example of a rewrite of the item to include the word “tissue” in the stem while removing it from the response options.

Histologically, the normal dental pulp most closely resembles which tissue?

- A. Dense connective
- B. Endothelial
- C. Granulomatous
- D. Loose connective

WRITING RESPONSE OPTIONS

Correct Responses and Best Responses

A multiple-choice item can ask for either the *correct* response or the *best* response. While both formats are appropriate, requiring examinees to choose the best alternative obliges them to make finer distinctions than that between correct and incorrect. “Best response” items can therefore assess higher levels of learning. For this format to assess at higher levels, it is particularly important that the distractors be at least plausible. The following is an example of a “correct response” item.

Which antibiotic shows an incidence of approximately 8% cross-allergenicity with penicillin?

- A. Bacitracin
- B. Cephalixin
- C. Tetracycline
- D. Vancomycin

The following is an example of a “best response” item.

Which statement best describes the purpose of potassium sulfate in a mix of irreversible hydrocolloid?

- A. It controls consistency of the mix.
- B. It helps produce a hard, dense stone cast surface.
- C. It keeps the mix from separating.
- D. It retards the setting of the hydrocolloid.

Response options, both the key and the distractors, can be in the form of words, phrases, sentences, numbers, equations, images, or symbols.

Keeping Response Options Similar

One of the greatest challenges for item writers involves assembling three or more homogeneous response options. Writing distractors that bear superficial resemblance to the correct response (key) gives minimal clues to examinees and helps to ensure a more reliable item. The following is an item whose response options might alert less knowledgeable, but savvy, examinees to the correct response:

When does sensitivity to percussion occur in acute pulpitis?

- A. At the onset
- B. Before there is any pain
- C. Only rarely
- D. When the inflammation involves the periodontal ligament space

Response option D is cued as it stands out as the longest and most specific/detailed of the options. While an examinee might not be sure of the particulars, the context of the response options may tip him or her off. The following is an item written more effectively because of its homogeneous response options:

Which local anesthetic is subject to inactivation by plasma esterases?

- A. Bupivacaine
- B. Lidocaine
- C. Mepivacaine
- D. Procaine

It is important to avoid writing a correct response and one distractor that are opposites of each other (paired), thus, canceling each other out and eliminating the other distractors in examinees' minds. In the following example, alternatives A and B cancel each other out:

Which best determines the mechanical and physical properties of any restorative material?

- A. Bonding strength
- B. External structure
- C. Internal structure
- D. Resistance to shear

However, an item with two pairs of alternatives can be an effective testing tool. In the following item, options A and B, and options D and E make plausible pairs without cueing the poorly-prepared examinee:

If a susceptible person were given tetanus antitoxin, what kind of immunity would result?

- A. Artificial active
- B. Artificial passive
- C. Natural active
- D. Natural passive

Avoiding Overlapping Alternatives

Each response option in an item must be distinct from the others. Ranges should be mutually exclusive and should not overlap. Ranges that overlap can potentially cause more than one response to be at least partially correct.

Numbers and ranges should be listed chronologically. Ranges should be equal or similar to one another in interval, or should be based on groupings that are meaningful given the item content and the concept to be evaluated.

The following is an item written with overlapping responses (e.g., C and D overlap with regard to 3 years). Additionally, the responses are not in numerical order and have inconsistent time intervals.

During which age range should a child be brought to a dentist for a first visit?

- A. 0 to 1 year
- B. 2 to 3 years
- C. 3 to 5 years
- D. 5 to 7 years

This item is rewritten to eliminate overlap as follows:

During which age range should a child be brought to a dentist for a first visit?

- A. 1 to 2 years
- B. 3 to 4 years
- C. 5 to 6 years
- D. 7 to 8 years

Making Response Options Specific

In order for distractors to be effective, they must include specific options and solutions. The distractors “All of the above” and “None of the above” are not used on the NBDE Part I or Part II, or on the NBDHE.

Writing Plausible Distractors

Because distractors are designed to tempt poorly-prepared examinees, they should be plausible, though incorrect (or less correct) possibilities. Distractors are effective when they represent commonly held misconceptions about a subject. Implausible or humorous distractors do nothing to distinguish differences

between prepared and unprepared examinees. The following is an item that tests an esoteric concept (“factoid”), and has inappropriate distractors:

Who is the patron saint of dentistry, recognized as the patroness of patients with toothaches?

- A. Eva Marie Saint.
- B. Sault Sainte Marie.
- C. St. Apollonia.
- D. St. Joan of Arc.

The following item tests a more important concept and includes more plausible distractors:

Which legally protects health professionals who provide emergency treatment at the scene of an accident?

- A. Americans with Disabilities Act
- B. Good Samaritan Act
- C. Health Professional Protection Act
- D. Occupational Safety and Health Act

EDITORIAL GUIDELINES

Avoiding the Use of Absolute Terms

Just as there are few absolutes in life, there are few absolutes in dentistry. Terms such as “always,” “never,” “all,” and “none” should be used sparingly and only to make very specific points. These terms have the potential to provide cues to the poorly-prepared, but savvy, examinee.

Avoiding Repetition of Key Terms

Repeating a key word from the stem and in the correct response, known as “echoing,” will tip off or “cue” unprepared examinees. The following is an item with a key word repeated.

Pulp testers used for evaluating a tooth’s sensitivity to pain stimulate which receptors?

- A. Cold
- B. Heat
- C. Pain
- D. Pressure

The item can be improved as follows by removing the cued word, “pain,” from the stem:

Pulp testers evaluate a tooth’s sensitivity to which receptors?

- A. Cold
- B. Heat
- C. Pain
- D. Pressure

Consistent Grammar

Grammar and word use should be correct and consistent in all response options. The following item contains a grammatical error that alerts examinees to the correct response:

A widening of the periodontal ligament space seen along one side of a tooth represents the radiographic manifestation of an

- A. fibrous dysplasia.
- B. metastatic breast carcinoma.
- C. multiple myeloma.
- D. osteosarcoma.

The item is improved easily by changing the indefinite article (“an”) in the stem.

A widening of the periodontal ligament space seen along one side of a tooth represents the radiographic manifestation of a/an

- A. fibrous dysplasia.
- B. metastatic breast carcinoma.
- C. multiple myeloma.
- D. osteosarcoma.

Consistent Construction

Response options should be similar in construction and of approximately equal length. The following is an ineffective item since the correct response stands out as the longest, most specific response:

Which best describes the purpose of potassium sulfate in a mix of irreversible hydrocolloid?

- A. Controls consistency of the mix
- B. Helps produce a hard, dense stone cast surface
- C. Reactor
- D. Retarder

This item has been improved in the example below by ensuring the response options, including the key, are of a similar length and construction.

Which best describes the purpose of potassium sulfate in a mix of irreversible hydrocolloid?

- A. Controls the consistency of the mix
- B. Helps produce a hard, dense stone cast surface
- C. Provides a dense stone cast surface
- D. Retards the setting of the hydrocolloid

FAIRNESS AND SENSITIVITY CONSIDERATIONS

In developing item stems and response options, it is critical to present the information in a manner that treats examinees fairly and allows examinees' skills to be accurately assessed. To write valid items that appropriately address fairness considerations, Test Constructors are encouraged to read the 2014 Educational Testing Service (ETS) report entitled "ETS Standards for Quality and Fairness" located at the following URL: (<https://www.ets.org/s/about/pdf/standards.pdf>). Material appearing below is largely derived from that source.

The following highlights the core issues involved in building fair and valid examination content. Before proceeding, it is first necessary to define a few key terms in order to properly understand the concept of fairness as it relates to testing.

Test Purpose

All tests are developed to fulfill a purpose. This purpose helps establish what content should be included in the test, what constructs will be measured, and how those constructs should be defined.

Constructs

Constructs represent specific Knowledge, Skills, Abilities, or Other characteristics (KSAOs), or sets of related KSAOs, that a test has been designed to measure. Tests are designed to yield scores on constructs of interest relative to the stated test purpose.

Variance

Variance refers to variability or differences among test scores. If all test takers receive the same score, the variance is zero. Systematic variance in scores that occurs due to individual differences in the intended, target construct is termed construct relevant variance. Testing professionals seek to maximize this source of variance. Systematic variance in scores that is unrelated to the target construct is termed construct irrelevant variance. This type of variance serves to bias outcomes, and thus testing professionals seek to minimize the factors that account for this source of variance.

Validity

Validity involves an evaluation of the available evidence that is in place to support the interpretation and use of examination scores to fulfill the purpose to which examination scores are targeted. When accumulated evidence is complete and provides coherent and plausible explanations, the corresponding validity argument in favor of test usage is strengthened.

Fairness

Fairness is a social concept that has been defined in different ways, some of which can lead to contradictory conclusions. For present purposes, tests that are regarded as fair are those that are equally valid for different groups. Efforts to improve test fairness involve working to reduce or eliminate bias due to variability in test scores that is unrelated to the construct that is the target of measurement (i.e., reducing bias due to construct irrelevant variance). Practices that reduce construct irrelevant variance help to increase the purity of construct measurement. This in turn enhances validity. It should be noted that the presence of group differences in test scores does not necessarily indicate that bias is present, unless those differences can be attributed to construct irrelevant variance.

In summary, test scores are used to make inferences about the Knowledge, Skills, Abilities, or Other characteristics (KSAOs) of test takers. In a fair and valid test, variability in test scores would only be

caused by differences in the *construct-related* KSAOs of test takers. If, however, a test inadvertently measures construct-irrelevant factors, these factors can bias scores and potentially compromise the validity of the test. Since the purpose of the test helps define what construct(s) should be measured, this purpose can be used to ascertain which factors contribute variance relevant to the construct(s), and which could contribute construct-irrelevant variance.

Overarching Fairness Review Directive

As established by the purpose of the respective examination, TCTs should create items that avoid all three sources of construct-irrelevant variance: cognitive, affective, and physical.

Cognitive Construct-Irrelevant Variance

When knowledge or skill not related to the construct is required or provides an advantage to correctly answer an item.

Example: Literary terminology in a basic science item may interfere with a test-taker's ability to answer the item correctly, even if they have the KSAOs necessary to interpret the actual basic science content. The required comprehension of the literary terminology by the test taker introduces construct-irrelevant variance to the measurement of basic science knowledge. Conversely, if an item were intended to measure reading comprehension of a literary passage discussing a basic science, the inclusion of literary terminology could be appropriate.

Affective Construct-Irrelevant Variance

When test content evokes strong emotions that interfere with the test-taker's ability to answer an item.

Example: Violent content in a case scenario or reading passage may alter the test-taker's emotional state, thereby interfering with concentration and the ability to correctly answer corresponding test items. The test-taker's exposure to the questionable content introduces construct-irrelevant variance to the measurement of case interpretation or reading comprehension skills. Conversely, if an item were intended to measure comprehension involving traumatic case scenarios, the inclusion of violent explanatory content could be appropriate.

Physical Construct-Irrelevant Variance:

When certain aspects of a test interfere with the test taker's physical ability to answer an item.

Example: Visually-impaired test takers may have difficulty fully comprehending a graph with labels in a small font, even if they have the KSAOs necessary to interpret the actual content of the graph. The test-taker's inability to read the small font introduces construct-irrelevant variance to the measurement of graph interpretation skills. Conversely, if an item were intended to measure visual discrimination skills, the inclusion of small but meaningful details within the graph could be appropriate.

Appendix B provides a Fairness Review Checklist for use by Test Constructors to assist in the development of fair examination items.

ITEM INFORMATION AND CLASSIFICATION DECISIONS

NBDE and NBDHE items are stored in the Joint Commission's item banks. Item banks serve as a repository for examination items, and include a tremendous amount of information concerning each item. The Joint Commission's item bank for the NBDE and NBDHE include the following information for each item:

- Unique item identifier
- Item stem
- Item response options, including the key and distractors
- Concept tested by the item/rationale
- Cognitive level associated with the item
- References to associated stimulus materials
- Item performance information (e.g., item difficulty, item discrimination)
- Changes to the item over time

COGNITIVE LEVEL

A cognitive level is assigned to each item to gauge the thought processes and level of cognition required to respond. Cognitive levels reflect the manner in which knowledge is being assessed, rather than the empirical difficulty of the content. The cognitive level is based on the tasks required of the examinee. Items are classified according to the following three cognitive levels:

Level 1 – Understanding/Recall

Understanding/Recall items elicit knowledge of specific facts, terminology, sequences, methodology, principles, theories, and structures in a different context.

Identifiers: acquire, define, identify, recall, recognize

Level 2 – Application.

Application items elicit the application of specific facts, terminology, sequences, methodology, principles, theories, and structures in a complex manner. Candidates must interpret information and apply acquired knowledge.

Identifiers: apply, choose, classify, develop, relate, organize, differentiate

Level 3 – Reasoning/Analysis.

Reasoning items elicit understanding or the ability to identify and interpret specific data, terminology, sequences, methodology, principles, theories, and structures. Candidates must apply acquired knowledge and reason through to determine next steps.

Identifiers: analyze, synthesize, interpret, evaluate, prioritize

In assigning a cognitive level to an item, the item writer has to consider the cognitive skills of an entry-level dentist or dental hygienist. Mislevy (1993) cautions that item writers, as experts, use different cognitive strategies in responding to a problem or circumstance than a novice. An expert works from an extensive knowledge base and processes information in a less complex manner (e.g., recognition of problem elements and recall of a solution, as opposed to complex analysis to derive the solution). In turn, the novice uses more complex cognitive operations to address a problem. In item development, the item writer should be sensitive to the cognitive skills of the entry-level professional, and should code the cognitive level accordingly.

ITEM PRESENTATION CONSIDERATIONS INVOLVING CONTENT

In writing NBDE and NBDHE items, the following general principles apply:

- Consider the appropriate amount of information to present to the candidate to evaluate the concept to be tested. Do not include too much additional information that is irrelevant to the concept being tested.
- Conversely, additional information may be warranted to develop a typical clinical scenario, and to avoid inadvertently providing clues to a candidate concerning the correct response. An example of the latter would involve including information about patient blood pressure only for items where the correct response relies heavily on knowledge of patient blood pressure. The presence of blood pressure information in an item would alert candidates to the fact that blood pressure was important to identifying the correct response. Sometimes providing additional information can help to evaluate whether a candidate can “detect the signal from the noise.”
- When making decisions concerning content, bear in mind that examinees will typically have one minute or less to read, comprehend, and respond to an item.
 - Note: The first item in an ItemSet, Testlet, or Case, which includes a patient history (see: [Patient Box](#), page 17) and/or image(s) associated with a number of items, is a noteworthy exception to this rule.
- Avoid terminology that may not be consistently understood by examinees. Language should be simple, universally recognized, and concise. Avoid the use of regionalisms or slang. This examination is intended to measure dental cognitive skills, not language skills.
- For technical terms outside the scope of dentistry (e.g., psychological/behavioral science terms), avoid using the technical term if possible, and describe the concept instead.
- Focus each item on one concept to be tested. If an item looks complicated and contains multiple concepts, consider simplifying it or splitting it into multiple items. For example, if an item asks about both diagnosis and treatment, consider restructuring to ask about either the diagnosis or treatment. If an item asks about medication options and dosages, consider restructuring it to ask about either the medication or the dosage.
- Response options are alphabetized or listed in chronological order by default, but should appear in a logical sequence.
- In items where each response option builds on the previous one, the shortest response option should appear first, and each subsequent addition should be presented next. For example:
 - A. Diagnose only
 - B. Treat only
 - C. Diagnose and treat only
 - D. Diagnose, treat, and manage
 - Note: “Only” was added to A, B, and C to keep this options distinct. See “[Avoiding Overlapping Alternatives](#),” page 10.
- Refer to a tooth as “tooth 27” as opposed to “tooth #27.”
- NBDE and NBDHE Items should be constructed so as to measure the KSAOs judged necessary for safe, entry-level practice.

THE PATIENT BOX

The Joint Commission has introduced a new tool, the **Patient Box**, which has a tremendous impact on how items involving patients are presented to test takers. Below is an example of a Patient Box, followed by a description of the information to be provided in each area of the Patient Box. The Patient Box provides the patient history.

Patient
Female, 28 years old
Chief Complaint
"I haven't been able to open my mouth for two days."
Background and/or Patient History
Left mandibular third molar extraction three days prior.
Current Findings
Maximum opening: 10 mm

Description of Patient Box Information

Data	Description	Format / Value	Example
Patient	<p>Gender and age of the patient.</p> <p>Ethnicity (optional)</p>	<p><u>This section is required.</u></p> <p>Male or Female, ## years old.</p> <p>Ethnicity may also be included, if relevant.</p> <p>If a caregiver, parent, or guardian is accompanying the patient, this information may be included in this section.</p>	<p>Female, 28 years old</p>
Chief Complaint	<p>Complaint in the patient's (or guardian's) own words describing the main symptom or reason the patient is seeking dental care.</p> <p>After analysis, this may or may not turn out to be a symptom of the most urgent or critical issue.</p> <p>The diagnosis or treatment plan is not included in the complaint.</p>	<p><u>This section is required.</u></p> <p>One or more symptoms and the duration of those symptoms.</p> <p>The chief complaint should be quoted directly from the patient or the person speaking on the patient's behalf, enclosed in quotation marks and worded in the first person.</p> <p>If someone is speaking for the patient, attribute the information to that person (e.g., parent, caregiver, son, etc.)</p>	<p>"I've been unable to open my mouth for two days."</p>
Background and/or Patient History	<p>History of medical conditions</p> <p>Current medications. Other treatments.</p> <p>History of dental diagnoses and treatment</p> <p>Allergies</p> <p>Social history, such as tobacco use, occupation, living arrangements (e.g., for a geriatric patient)</p>	<p><u>This section may be left blank.</u></p> <p>The information is assumed to be provided by the treating dentist and be factual.</p> <p>If the information is provided from another source, identify the source.</p> <p>Put data in the sequence listed when it is provided.</p> <p>List each condition and medication on a new line</p>	<p>Three days prior, left mandibular third molar extraction.</p>
Current Findings	<p>Data provided by dental professionals during the current visit, including:</p> <ul style="list-style-type: none"> • Height and Weight • Vital signs (e.g., blood pressure, glucose level) • Results of diagnostic tests • Assessment of patient condition (e.g., swelling or lack of swelling, sites of bleeding, maximum opening) 	<p><u>This section may be left blank.</u></p> <p>Height and weight may be included if relevant (optional).</p> <p>Vital signs and diagnostic tests may be summarized as "Stable" or "Within normal limits."</p>	<p>Maximum opening is 10 mm</p>

The Patient Box has a number of key benefits:

- Permits the candidate to focus on the content of the question, as opposed to how items are worded.
- Simplifies the item writing process for item writers, allowing them to focus on the concept being tested.
- Reduces bias and is fairer to examinees by lowering language requirements and providing a purer, more valid assessment of dental skills.
- Presents concepts to be tested within the context of an actual patient, thereby increasing the correspondence between test content and the actual experiences of practicing entry-level dentists.

The Patient Box facilitates development by providing a platform for asking question that greatly simplifies the process, incorporating elements that facilitate the direct assessment of examinee skill levels, avoiding unnecessary verbiage. The Patient Box can be used for both standalone items and for itemSets/Cases. Examinees will be instructed to always consider the Patient Box in their responses, and a tutorial provided at the beginning of the examination will instruct examinees on how to appropriately interpret information provided in the Patient Box. Similarly, pre-examination materials will also include information concerning the Patient Box.

The following principles apply when using the Patient Box:

- Items involving a patient should include a Patient Box. However, item writers are discouraged from including a patient where doing so would simply add unnecessary verbiage to an item that is already clinically relevant. Omit the Patient Box if a patient scenario is unnecessary.
- When utilized, the Patient Box should contain as much information about the patient and treatment situation as possible. Do not duplicate Patient Box information in the stem and distractors.
- The Patient Box should occupy roughly the same size on a test administration screen for all questions. However, there may be exceptions.
- Put the components of the Patient Box in the same sequence listed in the [Description of Patient Box Information](#) above. For example, under *Background and/or Patient History*, consistently sequence medical history and medications prior to presenting history of dental diagnoses and treatment.
- It is not necessary to include all components in the Patient Box. Please refer to the [Description of Patient Box Information](#) above to help determine which information must be included and what may be left out as you develop a Patient Box.
- Begin new information in the Patient Box on a new line and with a capital letter, with the exception of medications.
- Refer to medications with both generic and trade names (if applicable). Generic names are listed first and are not capitalized. Brand/trade names follow the generic name and are placed in parentheses, capitalized, and with the registered trademark symbol (®). For example: acetaminophen (Tylenol®).
- Do not include the trade name for brands that are no longer on the market. In these instances, use the generic name only.
- Exclude dosage information for medications unless the dosage is relevant for an item associated with the Patient Box. Exceptions to this rule would include specific medications that have a typical dosage that is dependent upon a condition, and where it is important to distinguish which dosage level is used. This includes aspirin.

- Use verbiage that is most likely to be used by a patient in the Chief Complaint area, as this should be stated in the patient's/guardian's own words. For example, this will often be the trade name for medications because patients are likely to be more familiar with these names:
 - Chief Complaint: "I am wondering if my Coumadin prescription is causing my mouth to bleed."
 - Patient Background: Medications: warfarin (Coumadin®)
- Use currently-prescribed medications that candidates would be expected to be familiar with.
- Verify that the situation and item are relevant to a general dentist, occur in common practice, and are within the dental scope of practice. The touchstone is **clinical relevance**.
- Language used in the Patient Box should be consistent with what is heard and used in practice in real world clinical settings.
- If the patient appearing in the Patient Box has diabetes, please include the type: type 1 or type 2.
- Abbreviate BP and Temp. These are common abbreviations and there is little risk that they will be misinterpreted in this context. For Height/Weight, use this format: 6' 1", 230 lbs. It is not necessary to spell out 6 feet, 1 inch, 230 pounds.
- Verify that information in the Patient Box is consistent with the item stem, stimulus material, distractors, and the correct answer.

Examples:

- If the patient has an allergy to a medication, consider that the correct answer for the item may be impacted.
 - If a distractor recommends that the patient stop smoking, the Patient Box should mention that the patient is a smoker.
 - If a photograph shows a bearded patient, the patient should be presented as Male.
- For ItemSets and Cases, be aware that the Patient Box will be shared by all items in the group. The Patient Box should therefore include information that is pertinent to all of the items in the ItemSet/Case, and should be consistent with all of the associated items. If additional information needs to be provided for an item in the group, it can be provided in the stem.
 - Verify that enough information is provided in the Patient Box and/or stimulus materials to diagnose and treat the patient. Enough information should be provided so the examinee can provide a correct response to the item.
 - Do not refer to "this patient" in the wording of the stem. Examinees should **always** consider data in the Patient Box, just as they should always consider the context of the patient in practice.
 - The fact that the Patient Box is standardized means that any changes from what is typically presented will become very salient to the examinee, and may signal to the examinee the importance of the new information (thereby inadvertently providing clues to how to respond to the item). For this reason, it is necessary to sometimes include extraneous information in the Patient Box. For example, an item that requires the examinee to recognize an emergency blood pressure issue will stand out if it is the only item on the exam that includes information concerning patient blood pressure.

ITEMSETS, CASES, AND TESTLETS

In addition to standalone items, the NBDE and NBDHE also relies on items that are presented together in groups, which are accompanied by a common set of stimuli (case materials including radiographic images, photographs, charts, etc.), referred to as “cases.” **Cases** on the NBDE Part II and the NBDHE are defined as a number of items associated with the stimulus materials listed below:

- Patient history
- Photographs
- Radiographs
- Charts

There are generally ten items associated with each NBDE Part II or NBDHE case.

An ItemSet consists of some form of stimulus material presented with a set of associated test items. ItemSets are alternately known as Testlets. The stimulus material can be a patient problem, scenario or vignette, a photograph, radiograph, lab report, chart, study design, or drawing. The associated set of test items can range in number from 2 to 10 items. One example of an ItemSet is found in the community health area of the NBDHE Component A (Testlet). A sample Testlet with its associated items can be found below:

SAMPLE NBDHE TESTLET: Community health

A dental hygienist employed at a public health clinic in a rural county of the United States is assigned the project of developing a preventive dental health program for a subgroup of the population.

COMMUNITY PROFILE: The primary employers in this county have been coal mining companies. The unemployment rate in the county has increased by 32% since the closing of the coal mine companies.

The median age of the population is 46. There are five general dentists in the county, three dental hygienists, and one public health-centered dental clinic. The clinic employs a full-time dentist and dental hygienist. The public health clinic sees low-income children and senior citizens on a sliding fee schedule.

The dental hygienist employed by the public health clinic conducts the dental screenings for the kindergarten students each year. The mean deft scores for the kindergarten students, for the last three years, are: d = 1.02, e = 0.87, f = 4.22.

The community does not have water fluoridation because of multiple water sources. The state funds a 0.2%-sodium fluoride rinse program in grades K-5. The state mandates that a dentist or a dental hygienist perform deft/dmft/DMFT and GI indices on all students in grades 1, 2, 3, 5, 7, and 10. On a yearly basis, all pathology is brought to the parent's attention and referred to a dental professional.

1. Which population group is dentally underserved in this community?
 - A. Early childhood age
 - B. Elementary school age
 - C. Adolescent age
 - D. Adult age

2. What can be stated about the deft scores of the kindergarten students?
 - A. Early exfoliation
 - B. High decay rate
 - C. Late eruption pattern
 - D. Treatment needs are being met

3. Each of the following is perceived as a barrier to dental care for this community EXCEPT one. Which is the EXCEPTION?
 - A. Lack of water fluoridation
 - B. Loss of income and insurance
 - C. Maldistribution of providers
 - D. Services are not affordable

SAMPLE NBDE PART II ITEMSET: Patient Box with associated items

Patient
Male, 65 years old
Chief Complaint
"I lost the filling in my back tooth over a year ago. I'm here to have it replaced."
Background and/or Patient History
Hypertension Hypercholesterolemia Medications: hydrochlorothiazide (Microzide®) atorvastatin (Lipitor®) low dose aspirin Patient lost filling for tooth 19 over one year ago. Last saw primary healthcare provider two years ago. Father died of a heart attack at age 52. Smoker (pipe) - one daily for past 25 years
Current Findings
Height: 5' 9" Weight: 240 lbs BP: 170/100 Missing occlusal restoration and fractured mesiolingual cusp, tooth 19 Patient reports tooth is not sensitive. Mild actinic damage of vermilion border of lower lip.

1. Which syndrome does the patient have?
 - A. Ehlers-Danlos
 - B. Marfan
 - C. Metabolic
 - D. Trisomy 21
2. This patient requires an immediate referral to his primary healthcare provider for
 - A. nutritional counseling.
 - B. smoking cessation.
 - C. uncontrolled hypertension.
 - D. weight control.

3. The patient initially resists accepting the need for referral to his primary healthcare provider and requests that the dentist proceed to address his chief complaint. Which ethical principles are in conflict?
- A. Autonomy and justice
 - B. Autonomy and nonmaleficence
 - C. Beneficence and nonmaleficence
 - D. Beneficence and veracity
4. Each of the following represents a potential mechanism of action for the medication used to treat the patient's cardiovascular disorder EXCEPT one. Which is the EXCEPTION?
- A. Decreased osmolarity in the filtrate
 - B. Impaired Na^+ reabsorption in the proximal tubule
 - C. Inhibition of $\text{Na}^+\text{-Cl}^+$ symporter in the distal tubule
 - D. Prevention of aldosterone from entering the principal cells in the late distal tubule
5. Which would be the most likely consequence of the patient's delay in having the lost restoration replaced?
- A. Loss of canine disclusion
 - B. Loss of vertical dimension
 - C. Mesial drift of tooth 18
 - D. supraeruption of tooth 14
6. A periapical radiograph of the affected tooth shows a radiolucency at the apex of the mesial root. A biopsy of the radiolucency reveals a granuloma. Which would be the predominant cell type?
- A. Eosinophils
 - B. Macrophages
 - C. Mast cells
 - D. Neutrophils
7. The patient calls the day following the endodontic procedure complaining of pain at the local anesthesia injection site and inability to open fully. Which is the most likely cause?
- A. Damage to the facial nerve during the injection
 - B. Injection into the medial pterygoid muscle
 - C. Spasm of the temporalis muscle
 - D. Trauma to the inferior alveolar nerve
8. A 6 mm x 5 mm focus of induration is noted on the lower lip right of the midline at a routine recall appointment two years later. Which is the most likely diagnosis?
- A. Carcinoma
 - B. Lymphoma
 - C. Melanoma
 - D. Sarcoma

IMAGES

With respect to the submission of case materials, the JCND E now accepts single images from submitters in addition to accepting full sets of case materials for the NBDE Part II and the NBDHE via the Image Portal. The link to the Image Portal appears below:

<https://www.ada.org/en/jcnde/examinations/test-construction/image-portal>

Images can vary with respect to the information they are capable of providing. In constructing items, the fundamental question to ask for each item is as follows:

Would an entry-level candidate who possesses the necessary knowledge be able to answer this question correctly, given the quality of the image presented?

Images appearing on the Joint Commission's examinations should be of sufficient quality to enable examination results to properly reflect candidate skill levels. Image quality and acceptability involves numerous factors, including the following:

- Resolution
- Size
- Clarity/sharpness
- Contrast
- Color accuracy

Other factors to consider when providing images:

- The presentation of dental charts and notations should be consistent with what is used in current dental practice and at dental schools (e.g., a missing tooth is typically blanked out, not marked out with a "X").
- Do not number teeth in photographs and radiographs.
- Provide "Right" and "Left" indicators on radiographs.
- Radiographs and other stimulus materials must be of diagnostic quality.
- Radiographs and other stimulus materials cannot be used without copyright permission. Test Constructors are responsible for verifying, obtaining permission for, and obtaining copyright for any images used.
- Radiographs and other stimulus materials that may identify a patient require the patient's permission for use on the NBDE and NBDHE examinations. The dentist is responsible for obtaining patient authorization for the use of images.
- PNG, TIF, and JPG formats for images are accepted, though PNG and TIF image formats are preferred.
- Images should be submitted individually via the Image Portal, and not embedded in a Word document or PowerPoint presentation. The link to the Image Portal appears below:
<https://www.ada.org/en/jcnde/examinations/test-construction/image-portal>

In viewing images on screen during item development, TCTs should bear in mind that candidates do not have the same level of control when working with images during test administration sessions. For example, candidates have no ability to adjust image contrast or lighting in the test center, and candidates do not have the ability to change image size (e.g., zoom). This must be considered when writing items involving images.

ITEM SHELLS

An item shell is a template used to generate a number of similar items. Since each shell represents a good item structure, a number of high quality items can potentially be generated from a small number of item shells. This process helps to accelerate item writing, though not all types of content or cognitive tasks are amenable to this type of item development. This method of item development is particularly convenient and appropriate for the novice item writer.

Haladyna (2015) suggests the following steps in developing an item shell:

- Step 1: Identify the stem of a good performance item.
- Step 2: Underline the key words or phrases representing the content of the item.
- Step 3: Identify variations for each word or phrase.
- Step 4: From each list generated, select an alternative word or phrase.
- Step 5: Write the new stem, correct answer, and distractors.

An example of these steps is presented below.

Steps 1 and 2:

A 6-year-old child is brought to the hospital with contusions over the abdomen and chest as a result of an automobile accident. What should be the initial treatment?

Steps 3 and 4:

Infant abrasion bicycle

Step 5

An infant is brought to the hospital with severe abrasions following a bicycle accident involving the mother. What should be the initial treatment?

- A. Administer a pain medication to calm the infant.
- B. Clean the wounds with an antiseptic.
- C. Conduct a visual examination.
- D. Treat for infection.

Additional item shell examples:

- A patient presents with [patient complaint]. What is the most likely [treatment/cause/diagnosis]?
- A [patient description] has [symptoms/disease] and is being treated with [drug]. Which best describes the [disorder/disease/drug effect]?
- Which is the most common [cause/complication/symptom/consequence] of [a procedure/disorder/action]?
- Which is the most common [cause/symptom] of [patient problem]?

STAGES OF ITEM DEVELOPMENT

The following stages describe the progression of a test item from item construction, review, and revision to test administration, data collection, and analysis.

Stage 1 – Item Writing

An Item Writing Orientation is presented to Test Construction Teams (TCTs) on item development guidelines. Department of Testing Services (DTS) staff provides the TCT with the examination test specifications and guides the item writing process.

Stage 2 – Item Review

DTS staff organizes newly-written items for TCT review. The items are edited to internal style and are presented to the TCTs for review to determine whether the items are ready for pretest administration. Test Constructors review the items, and are asked to

- verify the items are stated clearly,
- verify the right answer, and that there is only one correct answer,
- verify the content is important to test on the examination,
- verify the items are fair (sensitivity check),
- verify the items are at an appropriate level of difficulty (entry level),
- verify that any images are clear and diagnostic,
- provide metadata for each item: references, rationale, cognitive level, etc., and
- revise items, if needed.

Stage 3 – Pretest of Item

New items that are accepted as “pretest ready” by the TCTs are embedded in examinations to gather statistics (“pretested”) to determine whether they are perform well. Items that do not perform well are returned to the TCTs for further review, and those that do perform well go on to become “scored” items that will count towards a candidate’s score (see Stage 4).

Stage 4 – Analysis of Item Performance

DTS staff reviews the item performance data to see if the item behaves in an acceptable manner. Pretest performance information is entered in the item bank and the item is refined and retested accordingly. Pretested items within acceptable limits enhance the quality of the examination and item bank, as well as the reliability of scores.

Stage 5 – National Examination Administration

TCTs draft operational examinations and include a number of pretest items, according to the test specifications. The examination receives a final review by DTS staff and a Consultant Review Test Construction Team.

Stage 6 – Analysis of Item Performance

The examination is administered and scored, and item performance (difficulty, discrimination, and response frequency) data are reviewed. A decision is made to keep the item, revise and retest the item, or retire the item. On average, each item has an estimated value of \$1,000-\$3,000 as it passes through the item development process.

VOLUNTEER TEST CONSTRUCTOR POOL

If you would like to contribute to the NBDE or NBDHE Item Development process as a Volunteer Test Constructor, please complete an application, which can be completed online at the link below:

<https://www.ada.org/en/education-careers/admission-tests-and-dental-exams/test-construction-information>

Applications may be submitted throughout the year. The JCNDE reviews applications on an annual basis.

REFERENCES

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Mislevy, R.J. (1993). Foundations of a New Test Theory. In N. Frederiksen, R. J. Mislevy, & I. Bejar (Eds.) *Test theory for a new generation of tests* (pp. 19-39). Hillsdale, NJ: Lawrence Erlbaum Associates

APPENDIX A: DTS CONTRIBUTOR FORM

DEPARTMENT OF TESTING SERVICES



CONTRIBUTOR AGREEMENT FORM DEPARTMENT OF TESTING SERVICES

The Department of Testing Services is a shared service of the American Dental Association that implements high-stakes admissions and licensure examination programs. The table below lists the governing bodies the Department serves, and the examination programs that are overseen by each governing body.

Joint Commission on National Dental Examinations (JCNDE)	ADA Council on Dental Education and Licensure (CDEL)
<ul style="list-style-type: none"> National Board Dental Examination (NBDE) Part I and Part II^a Integrated National Board Dental Examination (INBDE)^a National Board Dental Hygiene Examination (NBDHE)^a 	<ul style="list-style-type: none"> Dental Admission Test (DAT)^b Advanced Dental Admission Test (ADAT)^b
ADA Board of Trustees, Dental Licensure Objective Structured Clinical Examination (DLOSCE) Steering Committee	Association of Schools and Colleges of Optometry (ASCO)
<ul style="list-style-type: none"> Dental Licensure Objective Structured Clinical Examination (DLOSCE)^a 	<ul style="list-style-type: none"> Optometry Admission Test (OAT)^b

^aLicensure (dental or dental hygiene); ^bAdmissions (dental or optometry)

In working with the Department of Testing Services, you may be asked to contribute to one or more of the examination programs listed above, based on your qualifications, experience, and the requirements of the corresponding governing bodies. Contributions can be made in a variety of ways. Key activities and roles include – but are not limited to – Member of the Joint Commission, Test Constructor, Steering Committee Member, Consultant, and *ad hoc* Committee Member.

High stakes examination programs require the presence of high levels of security to help ensure examinations continue to operate as intended. This agreement form describes requirements related to confidentiality, intellectual property, and conflicts of interest. Individuals must abide by all of the terms indicated in working with the Department of Testing Services. Certain terms and agreements (e.g., confidentiality) extend beyond the time in which the individual is an active contributor working with DTS. The information contained in this form has important implications for the security and integrity of the examination programs the Department of Testing Services implements. Please read the following pages carefully. Questions about this form can be forwarded to Alexis Curtis, Manager of Volunteers and Meetings, Department of Testing Services, curtisa@ada.org.



CONFIDENTIALITY AGREEMENT

I am aware that, in my work with the American Dental Association's (ADA's) Department of Testing Services (DTS), I will have access to information that must remain confidential. I understand this requirement and agree to maintain the confidentiality of any materials, recommendations and discussions before, during and after any meetings or activities in which I serve. I further understand that I may be removed from my role in working with the ADA and/or DTS if I fail to keep confidential any exclusive information protected by secrecy that becomes known to me by reason of the performance of my duties.

Volunteer Initials _____

COPYRIGHT AGREEMENT

I am aware that, in working with the American Dental Association's (ADA's) Department of Testing Services (DTS), I may have access to, work with, or develop copyrighted or copyrightable materials. I acknowledge and agree, individually and collectively, that all such materials belong solely to the ADA and that the ADA holds any and all rights to obtain and retain ownership of copyrights for such materials in its own name. I acknowledge and agree that any and all contributions I make to such materials will be original works, not copies in whole or in part of works of third parties. I acknowledge and agree that the ADA is the sole owner of such materials, and that I have no ownership rights whatsoever in such materials, the ADA has all rights to obtain copyrights for such materials, and such materials constitute "work made for hire" under copyright laws. I assign any and all ownership rights I may have to the ADA, and I agree that I will execute any additional documents necessary to effect this assignment to the ADA upon request.

Volunteer Initials _____



CONFLICT OF INTEREST STATEMENT

When indicating conflicts of interest, please consider each of the examination programs implemented by the Department of Testing Services (DTS). You may be asked to contribute to more than one examination program.

I declare that I have no proprietary, financial or other personal interest of any nature or kind in any product, service and/or company that will be considered during my term as a volunteer, except the following:

Volunteer Initials _____

I declare that I have no proprietary, financial or other personal or professional interest or obligation of any nature or kind in any firm or organization beneficially associated with any product and/or service that will be considered during my term as a volunteer, except the following:

Volunteer Initials _____



I declare that I have no past or present financial interest, consulting position or other involvement of any nature or kind related to any of the examination programs the Department of Testing Services implements that could give rise to even a suspicion of a conflict of interest, except the following:

Volunteer Initials _____

I am aware that, in working with the American Dental Association's (ADA's) Department of Testing Services (DTS), I may be asked to contribute to one or more of the examination programs implemented by DTS. I am willing to serve as a volunteer for all of the examination programs, except for the program(s) indicated below.

Programs to which I do NOT wish to contribute: _____

Volunteer Initials _____

I understand and agree that as a condition of working with the Department of Testing Services (DTS), I will exercise particular care that no detriment to DTS and/or the governing bodies DTS serves will result from conflicts between my interests and those of any of the examination programs DTS implements.

Volunteer Initials _____



I understand that I must refrain from conflicts of interest in the areas indicated above, throughout my entire tenure in working with the Department of Testing Services (DTS), and will inform DTS immediately if a change occurs relative to these conflicts of interest.

Volunteer Initials _____

In signing below, I agree to abide by all terms and agreements set forth in this agreement.

Signature

Date

Name (Print Legibly)

APPENDIX B: FAIRNESS REVIEW CHECKLIST

The following checklist can be used to develop fair examination items.

A. Avoid Cognitive Construct-Irrelevant Variance:

1. Does the item assume knowledge in subject areas not relevant to the focal construct?

For example: Post-collegiate-level vocabulary in a quantitative reasoning item
 Geometric formula in a biology item
 Geographic knowledge in a reading passage
 Chemical compounds in an anatomy item

2. Does the item contain language, concepts, or objects familiar only to test takers from a certain geographical region, ethnic group, or religious affiliation?

For example: Political jurisdictions: borough, province, county, parish
 Food: bouillabaisse, potage, gumbo, goulash
 Weather: snowflakes, pack ice, riptide,
 Sports: hockey, jet ski, grand slam, triple play

3. Does the item contain specialized, vocational or professional language or terminology not relevant to the focal construct? Note: if the focal construct involves use of this language, it would be appropriate to include it.

For example: Farming: combine, thresher
 Finance: arbitrage, hedge fund
 Medicine: prophylaxis, amyloidosis
 Optometry: astigmatism, emmetropia

4. Does the item employ literary devices?

For example: Humor
 Irony or satire
 Double entendre

If so, these should be present only to test understanding of such devices and when it is important for valid measurement (as in some literature tests).

B. Avoid Affective Construct-Irrelevant Variance:

1. Does the item contain subject matter (images or language) that might evoke strong emotions?

For example: Accidents, illnesses, or natural disasters
 Death and dying
 Advocacy of religious or political agenda
 Children in peril
 Cruelty to animals

2. Does the item reference potentially offensive, controversial, or sensitive topics?

For example: Particular holidays or activities surrounding holidays
 Tobacco, drug, or alcohol use
 Music, dancing, social dating

3. Does the item describe or refer to individuals using any of the following attributes?

For example: Age
 Disability
 Ethnicity
 Gender
 National or regional origin
 Native language
 Race
 Religion
 Sexual orientation
 Socioeconomic status

If so, and the description or reference is necessary, use correct, specific terminology.

For example: Use White or Black people, instead of “Whites” or “Blacks”
 Use the phrase “sexual orientation” rather than “sexual preference.”

4. Does the item state or imply the superiority of one group over another?

For example: Culturally-deprived group: implies that the majority culture is superior and
 that any differences from it constitute deprivation.

5. Does the item depict social situations unfamiliar to any groups?

For example: Experiencing luxuries
 Frivolous spending
 International travel

6. Does the item/test depict stereotypes (either positive or negative) or repeated representations of certain societal roles (either positive or negative)?

For example: Phrases such as “women’s work” or “a man-sized job.”
 Repeated depictions of men or women in certain occupations
 Assumed characteristics of certain categories of individuals:
 Boys like to play with trucks
 Asian people are smart
 Native American people are in tune with nature

C. Avoid Physical Construct-Irrelevant Variance

1. Does the item contain content or utilize stimulus material (images, graphs, etc.) that may not be easily interpreted by all groups?

For example: Small print in labeling of a graph
Small print of superscripted mathematical symbols
Blurred radiograph