

 Council on Licensure,
Enforcement and Regulation

Session Title:
**Technical Test Item
Development
Workshop**

Presenters:
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National Inspection Testing & Certification
PART II: Ray Talke
Minds in Action
Promoting Regulatory Excellence

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Standards

- Currency Standards
- Medical Standards
- Accounting Standards
- Safety Standards
- Military Standards

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Who decides?

“Standard-setting organizations (SSOs), private groups that collaboratively select and adopt uniform technical standards for goods and services, are a critical element of the modern economy.”

The University of Chicago Law Review, July 2003

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Goals - Part I 

- Gain...
 1. a brief overview the test development process.
 2. info on standard setting for test item writing.
 3. tips for writing good multiple choice items.
 4. an awareness of the most common mistakes.

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WHY TEST?

Possible reasons

- Measure knowledge and skills
- Survey opinions and attitudes
- Enhance a learning experience

Poorly worded questions can adversely affect the quality of the results.



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If you ever had the experience of...

- ...reading a test question and saying to yourself "huh?"
- ...finding the answer for one in another question
- ...being confused by pronouns. (Who is "they?")
- ...trying to sort out the real question from all the superfluous information (or the big words!)

...and you don't want to be the one responsible for creating such things, then you're in the right place.



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Do You Know?

Who sets the standard for writing test items?

A. ANSI (American National Standards Institute)?
 B. ISO (International Standards Organization)?
 C. the individual who writes the test item?
 D. *What? There's a standard for test item-writing?*



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Begin

...at the beginning

Are you testing for... 

- *educational events?*
 - Assess the purpose of the course. Create and use objectives.
- *licensing or certification?*
 - Analyze the content of the task or job. Test content should be based on this analysis.

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FOCUS Part 1: Design of multiple choice questions

When installing a set of three (3) lavatories, how many traps are required? } stem

answer -- A. 1 *
 distractor -- B. 2
 distractor -- C. 3
 distractor -- D. A trap is NOT required when installed as a set. } alternatives

STANDARD: the Scoring Office of Michigan State University
<http://www.msu.edu/dept/soweb/writitem.html>

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Tip 1

1. Keep stems and statements short. Use clear, concise language and avoid superfluous information.

The size of vent piping shall be determined from its length and the total number of fixture units connected thereto, therefore when aggregate cross-sectional area venting is used for venting, which of the following will properly vent a 4-inch building sewer?
.....HUH?

Using aggregate cross-sectional area calculations, which of the following will properly vent a 4-inch building sewer?
Oh...I see. OK!

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Tip 1

1. Keep stems and statements as short as possible.

In ____ a water heater shall be anchored or strapped within the upper and lower one-third of its vertical dimension ~~to resist horizontal displacement due to earthquake motion.~~

a) seismic design categories C, D, E, and F
b) seismic zones 3 and 4
c) seismic design categories A, B, C, and D
d) seismic zones 1, 2, 3, and 4



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Tip 1

1. Keep stems and statements as short as possible and use clear, concise language.

BETTER

In seismic ____ a water heater shall be anchored or strapped within the upper and lower one-third of its vertical dimension.

A. design categories A, B, C, and D
B. design categories C, D, E, and F
C. zones 1, 2, 3, and 4
D. zones 3 and 4



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Tip 1

1. Keep stems and statements as short as possible.

Benefits: 

- Turn one question into more than one.
- Avoid unnecessarily providing clues to another test question.

The purpose of anchoring or strapping a water heater in a seismic area is to resist horizontal displacement due to earthquake motion.

1. true
2. false

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Tip 2

2. For "sentence-completion" items, (A) the stem should end, and (B) the answers and distractors should complete the sentence.

A The US Department of the Treasury makes
The US Department of the Treasury makes:
The US Department of the Treasury makes _____.
The US Department of the Treasury makes _____.

B

- ✓ our paper currency and produces our coins.
- x overseeing human resources for the Federal Government's.
- x regulate the interest rates of savings institutions and National banks.

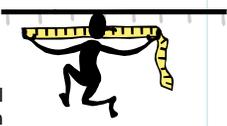
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Tip 2

2. For fill-in-the-blank style "sentence-completion" items, standardize the size of the space for all answer options.

In an antifreeze sprinkler system, the _____, followed by _____, discharges immediately from sprinklers opened by a fire.

A. antifreeze solution; water
B. water; antifreeze solution
C. antifreeze solution; dry chemical
D. dry chemical; antifreeze solution



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Tip 3

3. Use questions whenever possible (What, Who, When, Where, Why and How).

OK

In occupancies serving more than ____ people, separate toilet facilities shall be provided for each sex.

A. 10
B. 15
C. 20
D. 30

BETTER!

Separate toilet facilities shall be provided for each sex in occupancies serving more than **how many** people?

A. 10
B. 15
C. 20
D. 30



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Tip 4

What is wrong with this test item?

Each drainage stack serving 5 or more stories shall be served by an

A. drainage stack offset.
B. parallel vent stack.
C. parallel waste stack.
D. upper floor terminal cleanout.

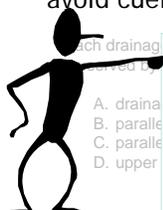
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Tip 4

3. Maintain grammatical consistency to avoid cueing.

Each drainage stack serving 5 or more stories shall be served by **a(an)**

A. drainage stack offset.
B. parallel vent stack.
C. parallel waste stack.
D. upper floor terminal cleanout.



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Tip 4

4. Maintain grammatical consistency to avoid cueing.

BETTER STILL
Each drainage stack serving 5 or more stories shall be served by a

- A. drainage stack offset .
- B. parallel vent stack.
- C. parallel waste stack.
- D. terminal cleanout on the uppermost floor.

BEST
(question form)

Which of the following is a requirement for each drainage stack serving 5 or more stories?

- A. drainage stack offset
- B. parallel vent stack
- C. parallel waste stack
- D. upper floor terminal cleanout

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Tip 4

4. Maintain grammatical consistency to avoid cueing.

Drive screws shall be used only in the horizontal position such as in the side of a beam, and only for supporting pipe sized _____ inch or smaller.

- A. 1
- B. 1-1/4
- C. 1-1/2
- D. 2

inch(es)

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Tip 5

5. Avoid negatives.

Which of the following piping materials may NOT receive the discharge of a fixture into which acid or corrosive chemicals have been placed?

- A. chemical resistant glass
- B. copper
- C. high silicon iron pipe
- D. unglazed vitrified clay

BETTER

All of the following piping materials may receive the discharge of a fixture into which acid or corrosive chemicals have been placed EXCEPT

- A. chemical resistant glass.
- B. copper.
- C. high silicon iron pipe.
- D. unglazed vitrified clay.



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Tip 5 

5. Avoid negatives, especially double negatives.

Which one of the following is **NOT** a safe driving practice on icy roads?

BETTER

All of the following are safe driving practices on icy roads **EXCEPT**

a) accelerating slowly
b) jamming on the brakes
c) holding the wheel firmly
d) slowing down gradually

...and always highlight or capitalize the words NOT and EXCEPT.

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Tip 5 

5. If possible, avoid negatives entirely.

The electrical demand rate for commercial enterprises can BEST be reduced by

A. ~~NOT starting all energy consuming device simultaneously.~~
avoiding the simultaneous start up of all energy consuming devices.

B. expanding power consumption without analysis.
C. operating equipment only during peak demand times.
D. shutting down operations all day for one day.

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Tip 6

What is wrong with this test item?

Before any portion of a combination waste and vent system is installed, the code requires that

A. the owner give his consent in writing. 
B. trap primers be installed for each trap.
C. plans & specifications be approved by the AHJ.
D. a separate connection be made to public sewer.

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Tip 6

6. Avoid pronouns which identify gender.

BETTER

Which of the following is a requirement before any portion of a combination waste and vent system is installed?

- A. The owner must give written consent.
- B. Trap primers must be installed for each trap.
- C. Plans & specifications must be approved by the AHJ.
- D. A separate connection must be made to public sewer.



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Tip 6

6. Avoid pronouns which identify gender.

Which of the following is a requirement before any portion of a combination waste and vent system is installed?

- A. **The** owner must give written consent.
- B. **Trap** primers must be installed for each trap.
- C. **Plans** & specifications must be approved by the AHJ.
- D. **A** separate connection must be made to public sewer.

NOTE: Answer options require CAPITAL letters only for the first word of a complete sentence, and for proper nouns.

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Tip 7



9. Avoid conflicting alternatives. Include only one single correct or most defensible answer.

Any sprinklers that have been painted outside of the factory shall be

- A. replaced.
- B. replaced with a new listed sprinkler.
- C. stripped of paint and cleaned before re-use.
- D. replaced before freezing weather each year.

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Tip 7

7. Avoid conflicting alternatives.

The way to a man's heart is through his

1. aorta.
2. stomach.
3. pulmonary veins.
4. pulmonary arteries.




Depending on your medical specialty, options 1, 2, and 3 might be true. Outside of the medical profession option 4 is true.

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Tip 8

8. Avoid providing clues to the answer of one question in another question.

#42. A compartment, for the purposes of this standard, shall be a space that is _____ enclosed by walls and a ceiling.

A.completely
B.intermittently
C.not
D.partially

#14. *same exam*
A compartment enclosure shall be permitted to have openings in walls, provided the openings have a minimum lintel depth of how many inches from the ceiling?

A. 4
B. 6
C. 8
D.12



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Tip 9

9. Standardize the order of distractors and list them in logical order.

Numeric
smallest to largest

A. 2
B. 3
C. 4
D. 6

A. 1/16
B. 1/8
C. 1/4
D. 1/2



Text
alphabetic
shortest to longest
true/false

A.completely
B.intermittently
C.not
D.partially

A.not
B.partially
C.completely
D.intermittently

A. true
B. false

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Tip 10

10. Avoid unnecessary repetition. Whenever possible, put repeating text in the stem.

For clothes washers in groups of three or more, which value is assigned to each machine for the purpose of common waste pipe sizing?

A. 2 fixture units
B. 3 fixture units
C. 4 fixture units
D. 6 fixture units

BETTER

For clothes washers in groups of three or more, which **fixture unit** value is assigned to each machine for the purpose of common waste pipe sizing?

A. 2
B. 3
C. 4
D. 6

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Tip 11

What is wrong with this test item?

ASSE 6000 is

- 1.a guide for consumers of medical care.
- 2.published by the National Fire Protection Association.
- 3.the principal reference guide for medical gas workers.
- 4.a guide for hospital medical personnel as well as medical gas workers.

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Tip 11

11. State the problem in the stem.



BETTER

ASSE 6000 is the principal reference guide for which of the following groups?

1. consumers
2. medical gas workers
3. members of the NFPA
4. hospital medical personnel

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Tip 12

12. Avoid syllogistic reasoning choices

Which of the following choices are characteristics of *well prepared multiple choice* questions?

Example

- i. Marking is objective.
- ii. The stem is phrased as a stand-alone question.
- iii. Distractors are similar in length and grammar to the correct response.
- iv. Stems are phrased in the negative.

- a) i and ii only
- b) ii and iii only
- c) i, ii and iv only
- d) i, ii, iii, and iv

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Tip 12

12. Avoid syllogistic reasoning choices (e.g. "both a and b are correct") unless absolutely necessary.

Which of the following choices are characteristics of *well prepared multiple choice* questions?

Example

Ask yourself: "Does the question test the knowledge or skills intended or rather the application of logic or reading skills?"

- d) i, ii, iii, and iv

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Other common errors to avoid

1. The longest option is usually the correct one
2. Vague pronouns (e.g. it, they)
3. Jargon and textbook language
4. Conscious efforts to randomize your answer key
5. Inconsistency (order of distractors; abbreviations; acronyms)
6. Beware of "all of the above" and "none of the above."
7. Incorrect grammar and punctuation. ... *For example...*



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Common errors to avoid 

Incorrect **grammar** ...

Farther shows a relation to physical distance..
 □ Our car drove farther than I thought it would on a tank of gas.

Further relates metaphorical distance, time, degree, or quantity.
 □ I hope that gas prices drop further before our road trip vacation.

Lineal (adjective)
 □ Derived from or relating to a line of descent; hereditary.

Linear (adjective)
 □ Of, relating to, or resembling a line; straight.

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Common errors to avoid 

Incorrect **punctuation**...

An exposed and readily accessible tubular brass trap may be used to receive urinal waste if

1. cast aluminum.
2. cast iron.
3. chrome-plated.
4. ferrous iron.

A. Verily I tell you today, you will be with me in paradise.
 B. Verily I tell you, today you will be with me in paradise.

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Common error 

Avoid "textbook" language

Lead acid batteries for diesel engine starting have been shipped to the job dry. Which is the correct installation method?

- A. Add electrolyte to the batteries, hook-up to the cables, and start the engine.
- B. Add water to the batteries, charge for 24 hours, and hook-up to the engine cables.
- C. Charge for 24 hours, hook up the cables, and start the engine.
- D. *Electrolyte shall be added at the time the engine is put in service and the battery is given a conditioning charge.*

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Hopefully you have gained...



- an overview the test development process.
- knowledge of standard-setting for test items.
- an awareness of the most common mistakes
- tips for writing good multiple choice items.

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Item-writing standards

- Many item-writing standards are found online :
 - the Scoring Office of Michigan State University
<http://www.msu.edu/dept/soweb/writitem.html>
 - The National Board of Medical Examiners
"Constructing Written Test Questions For the Basic and Clinical Sciences"
<http://www.uab.edu/uasomume/cdm/test.htm>
- More item-writing resources here:
 - http://cte.umdj.edu/student_evaluation/evaluation_constructing.cfm

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Presenters:
Ray Talke
Minds in Action, Inc.

Promoting Regulatory Excellence

**Item Development
Workshop**
Part II: Creating Test
Items to Evaluate
Advanced Cognitive
and Performance
Levels

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Premise

- Purpose of Professional Certification/Licensure
 - Validate Standards for competent *practice* in a profession, occupation, role or skill
- Knowledge alone is not sufficient to determine successful performance on the job
 - Knowledge does not necessarily imply competent practice
 - "Paper Credentials"
 - Competent practitioners may have internalized knowledge components but have difficulty articulating knowledge

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The Emerging Environment

- Almost all information is available on demand
- Success = Ability to access information as required
 - Not necessarily the memorization of information
- Success = Ability to *apply* information to achieve results

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The Memorization/Regurgitation Conundrum

Yet many professional certification and licensure examinations persist in evaluating the memorization of declarative knowledge while minimizing or ignoring how that knowledge is used in the job environment!

- Resulting in the critical and:
 - the Superfluous
 - the Trivial
 - the Irrelevant

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The Solution

- Begin with a Strong Foundation
 - Job Role Description
 - Standards
- Assess at Different and Advanced Cognitive and Performance Levels
 - Declarative
 - Procedural
 - Performance

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Job Role Description

- Defines the Characteristics of a Credentialed Individual
- Provides a Common Understanding of:
 - Responsibilities
 - Tasks
 - Industries/Geographies
 - Level of Competence
- Used by:
 - Candidates
 - Test Item Writers
 - Consumers/Stakeholders



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Job Role Description

- Name/Title of the Job Role
- Typical Industries/Environments Employing Individuals in the Job Role
- Geographic Reach
- Primary Job Responsibilities
- Overall Level of Competence



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Levels of Competence

- 1 The individual possesses a **basic familiarity** with the conditions and terminology used on the job.
- 2 The individual is able to **describe** the characteristics of the job and explain the processes involved in completing tasks on the job.
- 3 The individual is able to **perform** the tasks of the job with **some assistance** from others.
- 4 The individual is able to **perform** the tasks of the job with **minimal assistance** from others.
- 5 The individual is able to **perform** the tasks of the job with **no assistance** from others.
- 6 The individual is able to perform the tasks of the job with no assistance from others and is considered to be an **expert in the field**. This individual mentors and advises other members of the profession.

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Licenses Hangnail Specialist Job Role Description

A Licensed Hangnail Specialist is an individual who treats diseases and abnormalities related to hangnails in North American hospitals, clinics and private practices. The Hangnail Specialist is responsible for promoting hand and finger health, identifying hangnail risk factors, diagnosing and treating hangnail-related diseases and performing hangnail surgery. Hangnail Specialists are expected to perform the tasks of their profession with minimal assistance from others.

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<h3>Job Role Description Self Assessment</h3>		
<ul style="list-style-type: none"> • Does Your Credential have a Published Job Role Description? • Does it Include: <ul style="list-style-type: none"> - Name/Title of the Job Role - Typical Industries/Environments Employing Individuals in the Job Role - Geographic Reach - Primary Job Responsibilities - Overall Level of Competence 		

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<h3>Test Standards</h3>		
<p>Why are Standards Important?</p> <ul style="list-style-type: none"> • Define Tasks or Competencies of Individuals in the Credentialed Job Role • Used to Describe Purpose/Significance/Value of the Credential <ul style="list-style-type: none"> - Define criteria assessed by the certification / licensure examination - Let stakeholders know the significance/value of the credential • Used to Anchor Individual Test Items • Create a Consistent Understanding of the Job Role and Performance Requirements • Serve as Validity Benchmarks 		

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<h3>Test Standards</h3>		
<p>Should:</p> <ul style="list-style-type: none"> • Clearly Detail Competencies Mastered by Credentialed Individuals <ul style="list-style-type: none"> - Tasks performed on the job - Knowledge, Skills and Attitudes - Environments/Situations in which Tasks/Competencies are used - Required level of performance • Be Measurable • Be Clear and Specific • Be Published and Easily Accessible to Candidates, Employers and other Stakeholders 		

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Types of Test Standards

Weak



Strong

- No standards
- Content domains
- Task listings
- Terminal objectives
- Enabling objectives (K,S,A's)
- Combination of Terminal and Enabling Objectives
- Competency / Cognitive levels

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Content Domains

- Listing of Subjects or Topics Assessed on the Credentialing Examination
- Standards Often State the Relative Weight of Each Topic Area on the Examination

I.	Promotion of healthy lifestyle - 6% of test content
a)	At risk populations
b)	Risk factors
c)	Effects of hangnails
d)	Preventative strategies
e)	Hand and finger sanitation
f)	Nutrition
II.	Screening and Early Detection - 10% of test content
a)	Hangnail risk factors
b)	Screening
c)	Early detection
d)	Early symptoms
III.	Diagnosis - 8% of test content
a)	Hangnail symptoms
b)	Physical examination techniques
c)	Diagnostic tests

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Advantages of Content Domains

- Easy to construct
- Clearly organized into categories of knowledge
- Grants item writers significant latitude

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Limitations of Content Domains

- Context of Subjects or Topics not Defined
 - Ambiguous
- Relevance to Job Responsibilities not Established
- Level of Mastery not Defined
 - No Measurement Criteria
- Subjects or Topics are Often Broadly Defined
 - Lack of Specificity
- Tend to Emphasize Memorization of Knowledge
 - Not Application of Skills



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Task Listings

- Inventory of Activities Performed on the Job
 - Observable
 - Consist of two or more steps
 - Result in a product, service or decision
- Documented with an Active Verb and Subject
 - May sometimes include a modifier
- Some Task Listings include Subtasks
 - Steps in the process

I.	Promote Hand and Finger Health (6% of test content)
II.	Screen for Hangnail Risk Factors (12% of test content)
III.	Detect Early Hangnail Symptoms (12% of test content)
IV.	Diagnose Finger Diseases (15% of test content)
V.	Collect Patient Histories (3% of test content)
VI.	Treat Hangnails (Outpatient) (20% of test content)
VII.	Perform Hangnail Surgery (12% of test content)
VIII.	Complete Insurance Paperwork (7% of test content)
IX.	Assemble Surgical Staff (13% of test content)

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Advantages of Task Listings

- Congruent to the job
- Clearly define specific activities performed by credentialed individuals
 - Emphasize application of skills
- Provide job context to test item writers
 - Improve validity of test items

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Limitations of Task Listings

- **Specific knowledge and skill requirements are not defined**
 - Test item writers have little guidance of the content of test items.
 - Candidates may interpret knowledge and skill requirements differently than test item writers.
- **Level of mastery or completion criteria for task is not defined**
 - True competence of credentialed individuals is not known.
 - Test items may be written to inappropriate difficulty levels.
 - Test items may address job environments foreign to the target audience.
- **Knowledge and skill requirements may overlap different tasks**
 - Duplication of content on tests.

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Terminal Objectives

- **Declarative Statements Detailing:**
 - Environment or conditions under which a task is performed,
 - Description of the task, and
 - Criteria used to validate successful completion or mastery of the task.

<ol style="list-style-type: none"> I. Given a patient complaining of finger problems, screen the patient for hangnail risk factors so that all conditions that may affect digit health are identified. (10% of examination) II. Given a live patient or photograph of a patient's hand, identify all of the symptoms on the patient's hand that may indicate the early development of hangnails. (17% of examination) III. Given a patient complaining of finger problems, document the patient's symptoms and accurately diagnose the disease affecting the patient's finger. (20% of examination) IV. Given a patient wanting a finger examination, collect the patient's medical history so that all of the information required by the American Hangnail Association standard 10.24(a) is documented. (5% of examination)

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Advantages of Terminal Objectives

- Strong congruence to the job
- Clearly define specific activities
- Clearly define context in which the tasks are performed
 - Job environment
- Clearly define mastery criteria
 - Establishes difficulty level



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Limitations of Terminal Objectives

- More difficult to construct
 - Job context must be fully understood
- Standards are still broadly defined
 - Specific knowledge and skill requirements are not defined
 - Test item writers have limited guidance of the content of test items
 - Interpretation of scope of required knowledge and skills may differ between individuals
- Content may overlap terminal objectives

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Enabling Objectives

- Declarative Statements Defining Mastery Requirements for:
 - Knowledge - facts, details, information
 - Skills - psychomotor components of activities
 - Attitudes - values, feelings, appreciations
- Lend Themselves to Objective Assessment
 - Measurable Verbs

1. List the risk factors for hangnails. (K)
2. Describe the conditions that may affect digit health. (K)
3. Diagnose the type of hangnail on a patient exhibiting symptoms. (S)
4. Commit to maintaining a non-judgmental attitude when examining patients with hangnail symptoms. (A)
5. State the cause of paronychia and describe its symptoms. (K)

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Advantages of Enabling Objectives

- Strong Congruence to Job
- Provide Very Detailed Description of Specific Mastery Requirements
 - Provide specific information as to what is being assessed
 - Provide specific guidance to test item writers
 - Consistent expectations/understanding among all stakeholders
- Address Major Components of Performance
 - Knowledge
 - Skills
 - Attitudes

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Limitations of Enabling Objectives

- Balance between knowledge, skill and attitudinal-based objectives may not reflect relative importance of use on the job
- May lose job context if enabling objectives are not linked to task statements or terminal objectives
- Attitudinal objectives may be difficult to objectively assess
- Item writer flexibility is severely restricted
 - Requires true subject matter experts and experienced job professionals

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Combining Terminal and Enabling Objectives

- I. Given a patient complaining of finger problems, screen the patient for hangnail risk factors so that all conditions that may affect digit health are identified. (10% of examination)
 1. List the risk factors for hangnails. (K)
 2. Describe the conditions that may affect digit health. (K)
 3. List the steps performed when screening a patient for hangnail risk factors. (K)
 4. Commit to maintaining a non-judgmental attitude when examining patients with hangnail symptoms. (A)
 5. Screen a patient for hangnail risk factors. (S)
 6. On a patient exhibiting symptoms, identify conditions that may affect digit health. (S)

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Combining Terminal and Enabling Objectives

- Terminal Objectives and Associated Enabling Objectives are Published as Test Standards
- Provides Clear Description of Criteria Used to Award Certification or Licensing Credential
- Provides Clear Focus and Direction to Test Item Writers
 - Test items are written to specific enabling objectives in support of overall terminal objective
- Test Items are Congruent to Actual Job Responsibilities
- Level of Mastery and Assessment Criteria Clearly Documented
- Appropriate Mix between Declarative, Procedural and Performance Test Items

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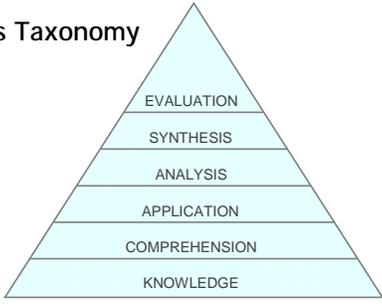
Cognitive/Performance Levels

- Hierarchy of thought and/or performance levels.
- Usually based on a cognitive/performance taxonomy.
 - Bloom's taxonomy
 - Anderson-Krathwohl variation
 - Simple taxonomy
 - Merrill Variation
 - Others

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Cognitive/Performance Levels

- Bloom's Taxonomy



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Cognitive/Performance Levels

- Rarely used alone.
- Supplement other anchor types.

1. List the risk factors for hangnails. (K-Remember)
2. Describe the conditions that may affect digit health. (K-Understand)
3. Diagnose the type of hangnail on a patient exhibiting symptoms. (S-Evaluate)
4. Commit to maintaining a non-judgmental attitude when examining patients with hangnail symptoms. (A)
5. State the cause of paronychia and describe its symptoms. (K-Understand)

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<h3 style="margin: 0;">Advantages of Cognitive/Performance Levels</h3> <ul style="list-style-type: none"> • Very detailed definition of mastery requirements • Test items very focused • Items address full span of the cognitive/performance domain <ul style="list-style-type: none"> - Ensures assessment of higher cognitive/performance levels • Difficulty clearly defined by cognitive/performance level 		

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<h3 style="margin: 0;">Limitations of Cognitive/Performance Levels</h3> <ul style="list-style-type: none"> • Severely restricts test item writer's flexibility. • Relevance to job dependent upon linked anchor types. • Doesn't lend itself to attitudinal objectives. 		

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<h3 style="margin: 0;">Comparison of Standards Types</h3> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr style="background-color: #e0f2f1;"> <th style="width: 33%;"></th> <th style="width: 33%;">Job Relevance</th> <th style="width: 33%;">Granularity</th> </tr> </thead> <tbody> <tr> <td style="background-color: #fff9c4;">Content Domains</td> <td>Poor</td> <td>Poor to good</td> </tr> <tr> <td style="background-color: #fff9c4;">Task Listings</td> <td>Good</td> <td>Fair</td> </tr> <tr> <td style="background-color: #fff9c4;">Terminal Objectives</td> <td>Excellent</td> <td>Good</td> </tr> <tr> <td style="background-color: #fff9c4;">Enabling Objectives</td> <td>Fair to excellent</td> <td>Excellent</td> </tr> <tr> <td style="background-color: #fff9c4;">Cognitive/ Performance Levels</td> <td>Varies</td> <td>Fair to very good</td> </tr> </tbody> </table>				Job Relevance	Granularity	Content Domains	Poor	Poor to good	Task Listings	Good	Fair	Terminal Objectives	Excellent	Good	Enabling Objectives	Fair to excellent	Excellent	Cognitive/ Performance Levels	Varies	Fair to very good
	Job Relevance	Granularity																		
Content Domains	Poor	Poor to good																		
Task Listings	Good	Fair																		
Terminal Objectives	Excellent	Good																		
Enabling Objectives	Fair to excellent	Excellent																		
Cognitive/ Performance Levels	Varies	Fair to very good																		

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Standards Self Assessment

- Which standards types anchor the test items of your credentialing program?
 - No standards
 - Content domains
 - Task listings
 - Terminal objectives
 - Enabling objectives (K,S,A's)
 - Combination of Terminal and Enabling Objectives
 - Competency / Cognitive levels

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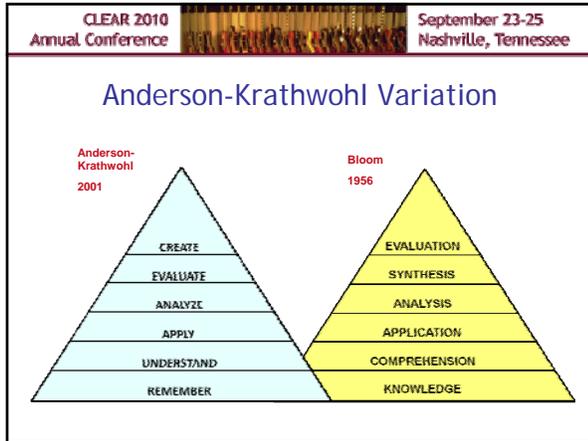
Creating Test Items to Assess True Professional Competences

- Assess at Different and Advanced Cognitive Levels
- Choose a Taxonomy

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Benjamin Bloom's Taxonomy

DESCRIPTION		TYPICAL VERBS
Using information, critically judging the value of materials or methods as they relate to a specific situation	EVALUATION	Accept, appraise, assess, arbitrate, criticize, defend, estimate, evaluate, grade, judge, prioritize, rate, recommend, support.
Combining different concepts and ideas to create something new.	SYNTHESIS	Assemble, blend, build, compose, construct, create, design, develop, formulate, plan, predict, produce, propose.
Breaking down information into its component parts; recognition of relationships.	ANALYSIS	Analyze, appraise, arrange, categorize, compare, contrast, differentiate, distinguish, outline.
Using facts and rules to solve problems.	APPLICATION	Apply, calculate, choose, construct, demonstrate, illustrate, operate, solve, sort.
Understanding and interpreting information.	COMPREHENSION	Classify, describe, discuss, explain, group, identify, interpret, locate, paraphrase, summarize, translate.
Recalling or recognizing information.	KNOWLEDGE	Define, describe, identify, label, list, match, name, recall, select, state.



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Simple Taxonomy

DESCRIPTION		TYPICAL VERBS
Performing, Building, Calculating Psychomotor – Perform the task	PERFORMANCE	Apply, build, calculate, configure, construct, compute, operate, perform, solve, use.
Analysis, Interpretation, Evaluation, Planning Describe how to complete the task.	PROCEDURAL	Analyze, appraise, arrange, categorize, choose, demonstrate, design, develop, determine, diagram, evaluate, formulate, outline, plan, predict.
Facts, Concepts, Information, Process Knowledge What should individuals know?	DECLARATIVE	Classify, define, describe, explain, identify, label, list, match, name, recall, restate, select, state, summarize.

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M. David Merrill Variation (Declarative Levels)

DECLARATIVE (Static)	TYPICAL VERBS
4. Describe the processes that are involved in the performance of the task and explain the rationale for each.	Demonstrate, describe, discuss, dissect, explain, illustrate, outline.
3. Describe the sequence of steps that are taken when performing the task, the conditions under which certain steps are taken, and issues to consider when performing the task.	Arrange, choose, describe, diagram, discuss, explain, outline.
2. Define task-related concepts and their interrelationships.	Classify, compare, contrast, define, differentiate, group, match, summarize.
1. State facts related to the task (recall information).	Explain, identify, label, list, name, recall, select, state.

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<h3 style="color: #4F81BD;">Multiple-Choice Item Types</h3> <p>Declarative Test Items - Examples:</p> <ul style="list-style-type: none"> • <i>What is the capital of Massachusetts?</i> • <i>What steps are involved in calculating call load?</i> • <i>Why must the Gunnison pin be installed before securing the Wagner shaft?</i> 		

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<h3 style="color: #4F81BD;">Multiple-Choice Item Types</h3> <p>Procedural Test Items</p> <ul style="list-style-type: none"> • Evaluate ability to describe the performance of given activities under certain conditions • Comprehension, analysis, application, synthesis and evaluation of information may be required to correctly answer question • Correct response is dependent upon environmental variables <ul style="list-style-type: none"> - If the test item scenario changes, the correct response will also change 		

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<h3 style="color: #4F81BD;">Multiple-Choice Item Types</h3> <p>Procedural Test Items - Examples:</p> <ul style="list-style-type: none"> • <i>The Bailey Gauge displays a value of -17. What does this signify?</i> • <i>Pressure on the Worthington Meter is displayed as 35 lbs. per square inch, and the flow rate is 38 cc. per second. What must be done before opening the primary flow valve?</i> • <i>You are planning to build a 3,600 sq. ft., two-level house on a lot containing sandy loam soil. What type of foundation is indicated in this situation?</i> 		

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Multiple-Choice Item Types

Performance Test Items

- Evaluate ability to actually perform given activities under certain conditions
- Evaluate psychomotor processes
 - Performance, calculation, composition, design, production
- Correct response is dependent upon environmental variables
- Limitations of the multiple-choice format
 - Evaluation of motor processes is often relegated to procedural test items

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Multiple-Choice Item Types

Performance Test Items - Examples:

- Enter the following 36 data records into the "Yearly Ledger" database. You have 20 minutes to do so, and must maintain a 98% or greater accuracy rate.*
- Based upon the following chart listing last year's sales, calculate the number of Finnegan pins that must be stocked in your warehouse each month to ensure a 96% in-stock fulfillment rate. Assume a demand growth of 7% from year to year.*

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Steps Involved in Creating Test Items to Evaluate Advanced Cognitive/Performance Levels

- Choose a taxonomy.
- Map current test standards (anchor objectives) to their cognitive/performance levels.
- Assess current standards (anchor objectives) to ensure they address required cognitive/performance levels.
- Create and/or elevate standards (anchor objectives) as required.
- Create test items.
- Review congruence of test items to standards (anchor objectives) and tasks.

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Example

Task: Diagnose Symptoms
Terminal Objective: Given a patient presenting a series of symptoms, use this information, coupled with a physical examination, to accurately diagnose the illness or injury.
Enabling Objective: List the symptoms of Grave's Disease.
Cognitive Levels:

- **Bloom's Taxonomy:** Knowledge
- **Anderson-Krathwohl Variation:** Remember
- **Merrill Variation:** Level 1: State facts related to the task (recall information)
- **Simple Taxonomy:** Declarative

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Typical Declarative Test Item

Which is a symptom indicating that a patient may have Grave's Disease?

- A. constipation*
- B. buzzing in ears*
- C. sensitivity to cold temperatures*
- D. swelling of tissues around the eyes*

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What's Missing?

We validated that a physician can memorize symptoms of a particular disease....

But What Have We Missed?

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<h3>Elevating the Anchor Objective (Standard)</h3>		
<p>Task: Diagnose Symptoms</p>		
<p>Terminal Objective: Given a patient presenting a series of symptoms, use this information, coupled with a physical examination, to accurately diagnose the illness or injury.</p>		
<p>Enabling Objective: <i>Given a list of symptoms presented by a patient, diagnose the patient's illness or injury.</i></p>		
<p>Cognitive Levels:</p>		
<ul style="list-style-type: none"> • Bloom's Taxonomy: Analysis • Anderson-Krathwohl Variation: Analyze • Merrill Variation: Level 6: Given data, evaluate the current conditions and environment prior to performing a task • Simple Taxonomy: Procedural 		

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<h3>Procedural Test Item Example</h3>		
<p><i>A patient arrives, complaining of chronic fatigue and muscle weakness, loss of appetite and weight loss. Upon further questioning, you find that the patient has experienced nausea and vomiting. Your physical examination has determined that the patient suffers from low blood pressure, which falls further when the patient stands.</i></p>		
<p><i>These symptoms are indicative of which disease?</i></p>		
<ul style="list-style-type: none"> A. Lyme disease B. Addison's disease. C. West Nile disease. D. Tay-Sachs disease. 		

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<h3>Elevating the Anchor Objective (Standard) Part II</h3>		
<p>Task: Diagnose Symptoms</p>		
<p>Terminal Objective: Given a patient presenting a series of symptoms, use this information, coupled with a physical examination, to accurately diagnose the illness or injury.</p>		
<p>Enabling Objective: <i>Given a list of symptoms presented by a patient, determine the appropriate physical examination procedures required to diagnose the illness or injury.</i></p>		
<p>Cognitive Levels:</p>		
<ul style="list-style-type: none"> • Bloom's Taxonomy: Application • Anderson-Krathwohl Variation: Apply • Merrill Variation: Level 9: Determine the appropriate next step, given a task scenario • Simple Taxonomy: Procedural 		

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<h3>Procedural Test Item Example</h3>		
<p><i>A patient arrives, complaining of chronic fatigue and muscle weakness, loss of appetite and weight loss. Upon further questioning, you find that the patient has experienced nausea and vomiting.</i></p>		
<p><i>Based upon this information, what procedure would you next perform?</i></p>		
<ul style="list-style-type: none"> <i>A. Order an EKG for the patient.</i> <i>B. Take the patient's temperature.</i> <i>C. Take the patient's blood pressure.</i> <i>D. Order a chest X-ray for the patient.</i> 		

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<h3>Hints for Developing/Elevating Anchor Objectives (Standards)</h3>		
<ul style="list-style-type: none"> • Examine the task and required performance criteria. • Choose a cognitive taxonomy. • Examine each level of the cognitive taxonomy. • Create test objectives for cognitive/performance levels applicable to the task. • Use the verb lists for guidance on creating anchor objectives. • Be specific! Use measurable verbs in your objectives. 		

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<h3>Hints for Developing Test Items for Higher Cognitive/Performance Levels</h3>		
<ul style="list-style-type: none"> • Evaluate how information is used on the job - not merely the recall of information <ul style="list-style-type: none"> - Why do examinees need to know this information? - What should an individual be able to do with this information on the job? • Create the test item to focus on how the knowledge is applied on the job. 		

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Hints for Developing Test Items for Higher Cognitive/Performance Levels		
<ul style="list-style-type: none"> • Use “real-world” scenarios/case studies as the foundation of test item stems. <ul style="list-style-type: none"> - Problems encountered on the job - Processes performed on the job - Analysis/decisions/judgments made on the job - Deliverables produced on the job • Focus on the critical, not the trivial • Key several test items to the same scenario/case study <ul style="list-style-type: none"> - Avoid “hinging” 		

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Hints for Developing Test Items for Higher Cognitive/Performance Levels		
<p>Within the scenario/case study:</p> <ul style="list-style-type: none"> • Focus on a specific cognitive/performance level • Be concise <ul style="list-style-type: none"> - Avoid superfluous information - Avoid “red herrings” - But provide all of the required information • Use situations relevant to the test-taking population • Ensure the vocabulary level and jargon is appropriate to the job <ul style="list-style-type: none"> - Avoid “textbook” scenarios/definitions 		

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Hints for Developing Test Items for Higher Cognitive/Performance Levels		
<ul style="list-style-type: none"> • Use information sets or exhibits <ul style="list-style-type: none"> - <i>Statements and information, separate from the item stem, that contain information about the job environment.</i> • Information sets and exhibits can be used to elevate declarative test items to higher cognitive/performance levels 		

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Example

Declarative test item:

Which groups are protected by Title VII of the Civil Rights Act of 1964 (as amended in 1972)?

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Example of Exhibit Use

Procedural Test Item

Acme Corporation Departmental Roster – Information Services

Name	Age	Race	Gender	Years of Service	Military Status
B. Bowen	45	Caucasian	F	15	None
G. Hernandez	32	Hispanic	M	7	Gulf War Veteran
L. Huffins	67	African American	M	32	Vietnam Era Veteran
G. Martin	40	Caucasian	F	3	Active Reserves

Using the exhibit displayed above, how many of Acme Corporation's Information Services employees belong to protected groups, as defined in Title VII of the Civil Rights Act of 1964 (as amended in 1972)?

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Hints for Developing Test Items for Higher Cognitive/Performance Levels

After creating the test item:

- Validate its congruence to its anchor test standard (objective)
- Validate its congruence/relevance to the task
- Validate its congruence to the job
- Ensure that proper item writing practices have been observed

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<p>Developing Test Items to Assess Advanced Cognitive/Performance Levels Self Assessment</p>		
<ul style="list-style-type: none"> • How are your test items distributed? <ul style="list-style-type: none"> - Declarative % - Procedural % - Performance % • Are your test items relevant to “real world” job responsibilities? <ul style="list-style-type: none"> - Congruent to their anchor standards/objectives - Assessing appropriate cognitive/performance level 		

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<p>Summary</p>		
<ul style="list-style-type: none"> • Ensure universal consensus on the target of the credential with a clear and concise job role description • Create and publish specific and measurable test standards (objectives) • Anchor your test items to specific test standards (objectives) 		

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<p>Summary</p>		
<ul style="list-style-type: none"> • Limit questions requiring the recall of knowledge to situations in which it is essential that the information be recalled instantly on the job • Evaluate the application of information in “real-world” job situations • Choose a cognitive/performance taxonomy appropriate to your environment 		

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<h3>Summary</h3>		
<ul style="list-style-type: none">• Map standards (anchor objectives) to their cognitive/performance levels• Create/elevate standards (anchor objectives) to address cognitive/performance gaps<ul style="list-style-type: none">- Specific and measurable standards (anchor objectives) yield superior, more congruent test items• Use “real-world” situations, scenarios and information sets as the basis for test items• Validate congruence to the anchor objectives, task and job		

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<h3>Presenter</h3>		
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