

Deeper dive: Developing quality multiple-choice questions

Presenter:

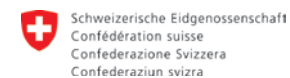
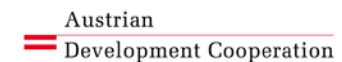
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STAREP EduCoP

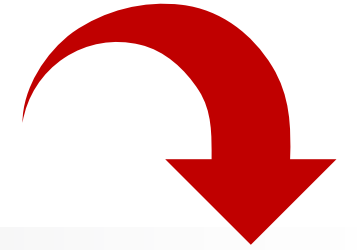


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Purpose of this session



Multiple choice questions are frequently used in assessments in accounting education, but MCQs are often poorly developed.

The purpose of this session is to:

- » illustrate what makes a quality MCQ, and
- » explore how MCQs should – and shouldn't – be used in assessments.

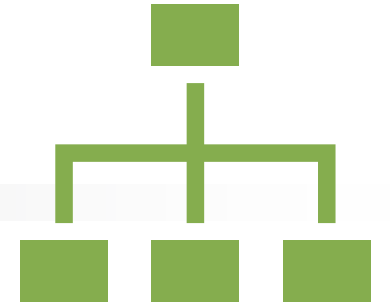
Learning Objectives for this session



Based on this session, you should be able to:

- » Explain the benefits and challenges of using MCQs as an assessment tool
- » Outline the elements of assessment quality as they pertain to MCQs
- » Explain techniques to develop high-quality MCQs and how quality can be measured
- » Compare various MCQ formats
- » Evaluate MCQ proficiency level and quality
- » Draft higher quality MCQs for use on assessments

Structure of this session



- I. Objectives of MCQs
- II. Developing quality MCQs
- III. Variations in format, level and competence type
- IV. Hands-on activities



I. Objectives of MCQs



Terminology

The architecture of MCQs

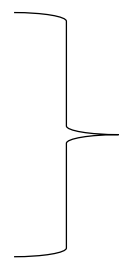
What are the incorrect options in a multiple-choice question called? ← Stem

1. Distractors ← (Correct) Answer

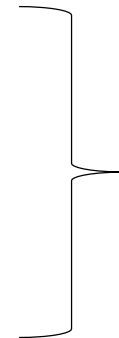
2. Choices

3. Guesses

4. Options



**Distractors
(Incorrect answers)**



Answer Choices



The Pros and Cons of MCQs

The Pros and Cons of MCQs

The Pros:

- » Relatively quick to develop (depending on the material)
- » Easy to mark manually
- » Able to be used with computer-based testing
- » Can cover a wide range of topics in a short time
- » Can take several formats for flexibility



Therefore, MCQs can be efficient and cost-effective, and assist with exam reliability and breadth.

The Pros and Cons of MCQs

The Cons:

- » Allow for guessing
- » “All or nothing” – no part marks for explanations
- » Can be difficult to generate enough plausible distractors
- » Harder to test higher cognitive levels (and more time consuming to develop those kinds of MCQs)
- » Often poorly developed



Therefore, it requires diligence and practice to create quality questions.



How is quality defined with respect to MCQs?

Key Characteristics of Quality Assessment

Recall from IES 6:

Assessment activities should be designed to have high levels of (para 9):

- » Reliability
- » Validity
- » Equity
- » Transparency
- » Sufficiency



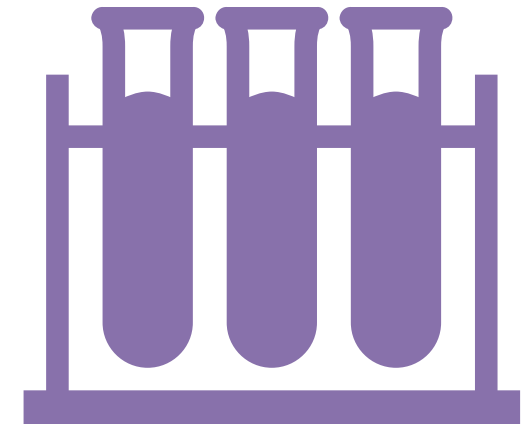
Key Characteristics of Quality Assessment

Reliability

» The assessment consistently produces the same result, given the same set of circumstances

For MCQs, this requires:

- » Competent developers and reviewers.
- » Clear, unambiguous language.
- » A single correct (or clearly best) answer.



Key Characteristics of Quality Assessment

Validity

» The assessment measures what it is intended to measure (e.g., The competence of a new or aspiring professional accountant).

For MCQs, this requires:

- » Questions that are relevant and realistic.
- » Respecting the inherent limitations of using MCQs as a question format.



Key Characteristics of Quality Assessment

Equity

» Assessment is fair and without bias

For MCQs, this requires:

» Avoiding jargon unless integral to the subject

» Avoiding slang or colloquial language

» Including a review for bias



Key Characteristics of Quality Assessment

Transparency

- » Details of the assessment, such as scope, performance expectations, and timing of the assessment are disclosed publicly.

For MCQs, this requires:

- » Clear instructions and information on time allowed
- » Disclosure of marking scheme (e.g., are wrong answers penalized?)
- » Specifications regarding weighting of subject matter (i.e., a Blueprint)
- » Sample/practice questions to be provided



Key Characteristics of a Quality Exam



Sufficiency

- » The assessment:
 - (a) has a balance of depth and breadth, knowledge and application, and
 - (b) combines material from different areas applied to a range of situations and contexts.

For MCQs, this requires:

- » Testing across a broad range of content
- » Developing questions that test higher cognitive levels and non-technical competencies
- » Recognizing when other question formats should be used

Key Characteristics of Quality Assessment

When developed well, MCQs can be particularly effective in increasing an exam's level of:

- » Reliability – by not putting too much weight on a single topic and offering more scoring opportunities
- » Sufficiency – by efficiently covering a broader range of content or “filling in gaps”





II. Developing quality MCQs



Techniques for developing quality MCQs

Techniques for developing quality MCQs

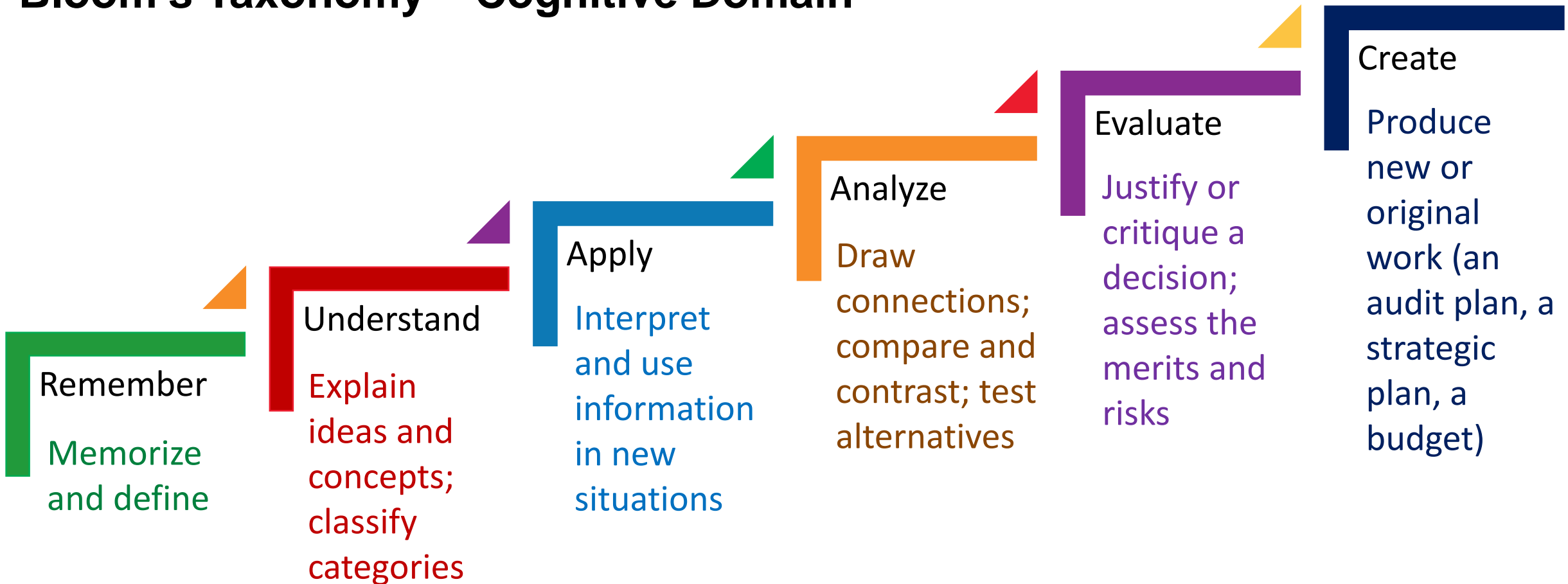
Start with the target in mind:

- » Determine the target competency/Learning Outcome/topic
- » Determine the expected Bloom's Level/Proficiency Level
- » Design your MCQ with these in mind
- » Have reviewers verify that the targets were achieved



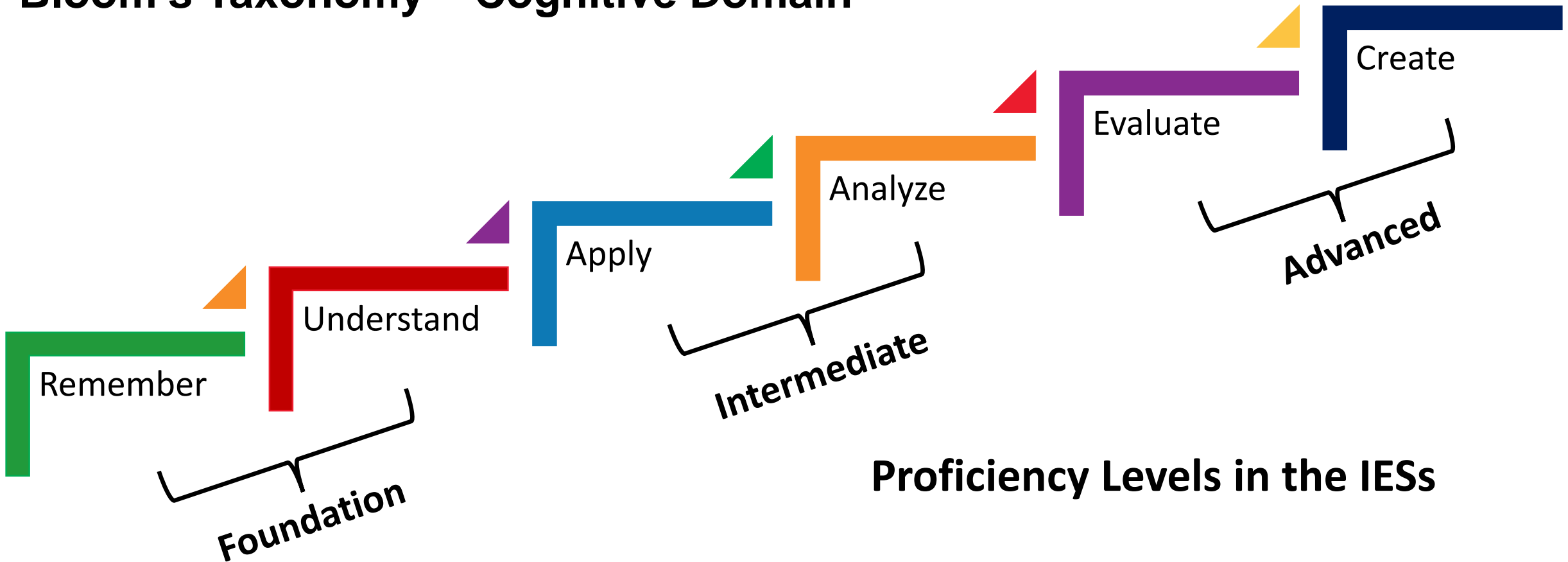
Cognitive levels

Bloom's Taxonomy – Cognitive Domain



Cognitive/proficiency levels

Bloom's Taxonomy – Cognitive Domain



Techniques for developing quality MCQs

When writing the stem:

- » Avoid ambiguity in language.
- » Make sure not to copy phrasing directly from the course materials – this encourages rote memorization.
- » Keep it concise, unless using scenarios.
- » Avoid irrelevant information, unless testing the ability to distinguish relevant from irrelevant.

... continued



Techniques for developing quality MCQs

When writing the stem:

- » Provide the context or role (“You are an auditor...”) or perspective (“From a shareholder’s perspective...”)
- » Do not “teach” by including definitions or explanations the students should be expected to know. (“The current ratio reflects a company’s liquidity. For which of the following...”)



Techniques for developing quality MCQs

When drafting the answer choices:

- » Avoid ambiguity in language.
- » Avoid double-negatives, unless testing the ability to work through them.
- » Write them in parallel structure.
- » Keep them roughly the same length.
- » Have at least 4 choices to reduce probability of correct guessing.
- » Be careful with mutually-exclusive or overlapping options.



Techniques for developing quality MCQs

To write effective and plausible distractors:

- » Avoid absolute terms (“always”, “never”) – these are usually easy to rule out. Instead, use “often”, “generally”, etc.
- » Ensure distractors are not so close to the correct answer that a competent candidate would be confused.
- » Base them on common student errors and misconceptions.
- » Include statements that are true, but not relevant to the question asked.
- » Present them in logical order (alphabetically, by size, by dollar value, etc.)

Techniques for developing quality MCQs

In a set of questions:

- » Plan the set based on competencies/learning outcomes/topics you want to cover.
- » Evenly distribute the correct answers.
- » Avoid cueing (where one question's stem provides the answer to a different question).
- » Determine (and disclose) whether wrong answers will be penalized through negative marking (this has generally lost favour as it has been found to reduce exam reliability).



Measuring quality through psychometric analysis

Measuring quality through psychometric analysis

Item discrimination index:

- » Measures the relationship between a test writer's performance on the given question (correct or incorrect) and their overall score on the exam.
- » **High discrimination score:** test-writers who performed well overall ("good" candidates) tended to get this particular question correct, while those who didn't score well overall ("poor" candidates) tended to get it wrong
- » **Negative discrimination score:** test-writers who performed well overall ("good" candidates) tended to get this particular question incorrect, while those who didn't score well overall ("poor" candidates) tended to get it correct
- » **Low discrimination score:** there is no strong relationship between how "good" candidates and "poor" candidates performed on the question



Measuring quality through psychometric analysis

Distractor analysis:

- » Evaluates the proportion of test writers who chose each answer choice.
- » Can be used to find errors in keying answers (i.e. if a particular distractor was more attractive than the supposedly “correct” answer).
- » Highlights distractors that are not plausible (i.e., they are too easy to rule out and are not being chosen at all, even by those who didn’t perform well on the exam overall).



Measuring quality through psychometric analysis

Using psychometric analysis:

- » Questions can be pre-tested, or can be tested on the exam.
- » Questions that fail to effectively discriminate should be fixed before using, or not counted if already used.
- » Problem distractors should be fixed or replaced.
- » Especially important in high-stakes exams and/or where a pool of questions is maintained.
- » Other types of psychometric tests are available for advanced analysis.



III. Variations in format, level and competence type



Variations in format

Variations in format



“Full question” format:

When posting a journal entry to record the purchase of supplies for cash, a bookkeeper debited supplies \$500, but forgot to post the \$500 credit to cash. Which of the following statements would be true with respect to the effect of this error on the trial balance?

1. The credit side of the trial balance would be \$1,000 higher than the debit side.
2. The credit side of the trial balance would be \$500 higher than the debit side.
3. The debit side of the trial balance would be \$1,000 higher than the credit side.
4. The debit side of the trial balance would be \$500 higher than the credit side.

Variations in format



Scenario format:

Theatre Co. is a live theatre company. Each summer, the company sells season's passes for \$200 which entitles the holder to attend the five live productions each year. The first play is performed in October and the final play in March. The company recognizes 20% of the revenue of the season's passes each time a play has been performed. Theatre Co.'s unearned season's passes account appeared as follows on December 31, 20X4:

Unearned revenues of season passes	
Debit	Credit
	52,000 Balance January 1, 20X4
140,000	136,000

Which of the following represents the dollar amount of season's passes sold in 20X4?

- a) \$136,000 b) \$140,000 c) \$188,000 d) \$192,000

Variations in format



Scenario format:

Theatre Co. is a live theatre company. Each summer, the company sells season's passes for \$200 which entitles the holder to attend the five live productions each year. The first play is performed in October and the final play in March. The company recognizes 1/5th of the revenue of the season's passes each time a play has been performed. Theatre Co.'s unearned season's passes account appeared as follows on December 31, 20X4:

Unearned revenues of season passes	
Debit	Credit
	52,000 Balance January 1, 20X4
140,000	136,000

Which of the following amounts represents the revenue earned in 20X4 from season's passes sold in 20X4?

- a) \$48,000 b) \$52,000 c) \$56,000 d) \$88,000

Variations in format



“Finish the statement” format:

A forecast can be best described as a document that

- a) is based on the auditor’s judgment of the most probable future economic conditions.
- b) presents a range of possible future economic conditions.
- c) presents possible future scenarios consistent with the purpose of the information.
- d) is based on management’s judgment of the most probable future economic conditions.

Variations in format



Not or Least:

Which of the following is *not* a tangible benefit for a new information system?

- a) Increased productivity
- b) Improved customer satisfaction
- c) Reduced facility costs
- d) Reduced rate of growth for expenses

Variations in format



Not or Least:

Which of the following is *least likely* to be a factor that increases the risk of misstatement in the financial statements of a small business?

- a) Unsophisticated employees making errors in recording transactions
- b) Accounting policies that are selected solely on the basis of their tax impact
- c) Management's significant concern about earnings targets and meeting analysts' expectations
- d) Economic dependence on major customers or suppliers

Variations in format



Not or Least:

You are considering starting up a business and are evaluating your options, in particular whether to launch the business on your own or with a friend. You believe that the business will take several years to become profitable. You therefore plan to continue working in a regular job, and work part-time in the new business while your friend takes the primary role in developing the new business. Based on the facts above and considering the related tax implications, which of the following forms of business would you be *least likely* to consider at this time?

- a) Sole proprietorships
- b) A corporation
- c) A joint venture
- d) A partnership

Variations in format



Multi-multi (or “complex” MCQ):

The internal audit activity should contribute to the organization’s governance process by evaluating the processes through which:

- I. Ethics and values are promoted.
- II. Effective organizational performance management and accountability are ensured.
- III. Risk and control information is communicated.
- IV. Activities of the external and internal auditors and management are coordinated.

- a. I only.
- b. IV only.
- c. II and III only.
- d. I, II, III, and IV.

Variations in format



All of the above or None of the above:

Which of the following would indicate that fraud may be taking place in a marketing department?

- a) There is no documentation for some large expenditures made to a new vendor.
- b) A manager appears to be living a lifestyle that is in excess of what could be provided by a marketing manager's salary.
- c) The control environment can best be described as "very loose." However, this attitude is justified by management because it is needed for creativity.
- d) All of the above.



**Testing across various
cognitive/proficiency levels**

Testing across cognitive/proficiency levels

What Bloom's level and Proficiency Level is this question testing?

Which of the following represents the assertions typically made by management regarding account balances and related disclosures at the period end?

- a) Rights & obligations; accuracy, valuation & allocation; completeness; compliance; presentation & disclosure
- b) Existence; completeness; rights & obligations; accuracy, valuation & allocation, classification; presentation
- c) Occurrence; completeness; ownership; accuracy; independence; cutoff
- d) Ownership; valuation & allocation; completeness; compliance; presentation & disclosure

Testing across cognitive/proficiency levels

What Bloom's level and Proficiency Level is this question testing?

An auditor is reviewing the aged list of accounts receivable of an audit client. Which of the following assertions is this procedure *most likely* used to gather evidence on?

- a) Valuation
- b) Completeness
- c) Presentation
- d) Existence



Testing across cognitive/proficiency levels

What Bloom's level and Proficiency Level is this question testing?

You are planning an audit of a XYZ Company. Which of the following assertions will you *most likely* test?

- a) Existence and Valuation of inventory
- b) Presentation and Completeness of accounts receivable
- c) Existence and Disclosure of accounts payable
- d) Completeness and Valuation of property, plant and equipment

Testing across cognitive/proficiency levels

What Bloom's level and Proficiency Level is this question testing?

You are auditing a small family-operated business that has no debt and has no need to attract additional investors. When auditing revenues, which of the following audit procedures would be *most* useful in this situation?

- a) Confirm accounts receivable to verify amounts recorded in the accounts receivable subledger.
- b) Scan the accounts receivable subledger for unusual amounts and trace them to customer accounts.
- c) Vouch amounts recorded in the sales journal to duplicate copies of sales invoices.
- d) Trace a sample of shipping documents into the sales journal.



Testing non-technical competencies



Testing non-technical competencies

- » Remember that a quality exam needs to assess across a broad range of *both* technical and non-technical competencies.
- » Non-technical competencies can be more challenging to develop MCQs for, but there are many opportunities to include them (e.g., ethics, leadership, change management, etc.).
- » As usual:
 - » Ensure question developers are experienced and skilled at developing questions.
 - » Ensure questions go through adequate review (to ensure the answer is non-disputed and that wording is unambiguous).

Testing non-technical competencies

Leadership and change management:

The head of internal audit for a company plans to make changes that may be perceived negatively by the audit staff. The best way to reduce resistance would be to:

- a) Develop the new approach fully before presenting it to the audit staff.
- b) Ask the CEO to approve the changes and have the CEO attend the departmental staff meeting when they are presented.
- c) Approach the staff with the general idea and involve them in the development of the changes.
- d) Get the internal audit activity's clients to support the changes.



Testing non-technical competencies

Ethics and professionalism:

While auditing a publicly-traded company, you suspect that a member of senior management has been bribing foreign government officials. Which of the following is the *most appropriate* action to take?

- a) Review the assumption of management's good faith.
- b) Inform the audit committee or equivalent.
- c) Resign immediately from the engagement.
- d) Inform the Securities Commission of the illegal act.

Testing non-technical competencies

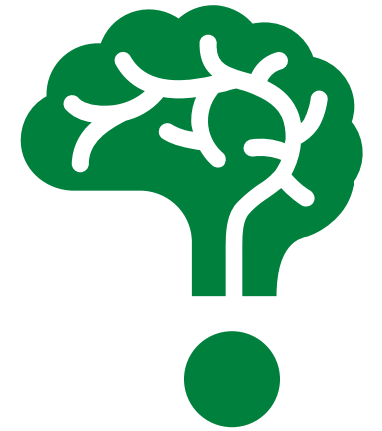
Interviewing techniques:

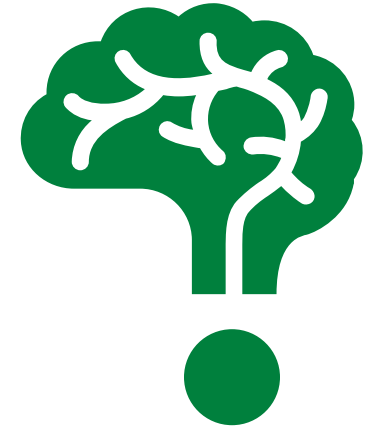
When interviewing an individual suspected of a fraud, the interviewer should:

- a) Ensure the suspect's supervisor is present during the interview.
- b) Lock the door to ensure the suspect's privacy.
- c) Pay particular attention to the wording choices of the suspect.
- d) Ask if the suspect committed the fraud.



IV. Hands-on Activities





A. Critique the following MCQs

Activity: Critique the following MCQs



For each of the questions presented:

- » Determine whether they are lower- (testing the “Remember/Understand” Blooms levels and “Foundation” proficiency) or higher-level (testing at least the “Apply” Blooms level and “Intermediate” proficiency)
- » Evaluate the positive aspects of the question
- » Evaluate the negative aspects of the question
- » Suggest ways to improve the question, if applicable

Activity: Critique #1



Which of the following observations by an auditor is **most** likely to indicate the existence of control weaknesses over safeguarding of assets?

- a) A service department location is not well suited to allow for adequate service to other units.
- b) Employees hired for sensitive positions are not subjected to background checks.
- c) Managers do not have access to reports that profile overall performance in relation to other benchmarked organizations.
- d) Management has not taken corrective action to resolve past engagement observations related to inventory controls.

Source: Adapted from CIA Exam Practice Questions, Internal Audit Foundation, 2017

Activity: Critique #2



A company has current assets of \$200,000, long-term assets of \$800,000, current liabilities of \$250,000, and long-term liabilities of \$150,000. What is the current ratio for this company?

- a) 0.25 : 1
- b) 0.50 : 1
- c) 0.80 : 1
- d) 1.25 : 1

Activity: Critique #3



Programmed threats are a type of security threat. They are named this because the attack consists of malicious program code developed by hackers or crackers. Which of the following is *not* a programmed threat?

- a) Trojan horse
- b) Virus
- c) Worm
- d) Distributed denial of service attack

Adapted from: Hunton, Bryant, Bagranoff (2004), *IT Networks and Telecommunications Risks*, Wiley

Activity: Critique #4



Which of the following would *most likely* support the inclusion of a going-concern note in the year end financial statements for a retail company?

- a) Some of the stores have been shut down by a prolonged labour strike. Management is in negotiation.
- b) Some potential events in the current year may cause significant loss; however, their extent is unknown at this time.
- c) There is significant doubt on the company's ability to raise financing for inventory purchases for an upcoming Holiday Sale.
- d) The industry as a whole for retailing is in an economic downturn.

Activity: Critique #5



You are the Corporate Treasurer of Axion Group, a multinational company focusing on commercial property development. You are reviewing the capital expense budgets for the following year. There are several large projects where net present values have been provided. Which of the following is *not* a basic principle in computing NPVs?

- a) Decisions are based on gross cash flows.
- b) Cash flows are based on opportunity costs.
- c) Cash flows are analyzed on an after-tax basis.
- d) Financing costs are reflected in the project's required rate of return.

Activity: Critique #6



X Ltd. and Y Ltd. operate in the same industry and are identical companies in every respect except that X uses straight-line depreciation, whereas Y uses double-declining-balance depreciation. Compared to Y, which of the following could be said about X?

- a) X has lower total assets.
- b) X has higher amortization expense.
- c) X has lower capital asset values.
- d) X has the same or higher total assets.

Activity: Critique #7



Which of the following *best* describes a familiarity threat to independence?

- a) It occurs when the auditor reviews work they have done for the client.
- b) It occurs when the auditor promotes the client's opinion or position.
- c) It occurs when the auditor becomes sympathetic to the client's interests.
- d) It occurs when the auditor benefits from an ownership interest in the client.

Activity: Critique #8



After year-end was finished, Gavin, CPA, left his position as CFO at a charity to open his own public practice. A few months later, he met the charity's CEO at a conference. The CEO indicated that the charity was cash-strapped, but that a new funder had been acquired, subject to the charity receiving an unqualified audit opinion on its most recent annual financial statements. Which of the following statements is **true**?

- a) Gavin cannot offer to perform the audit.
- b) Gavin can offer to perform the audit, with payment to be received once the charity obtains its new funding.
- c) Gavin can offer to perform the audit, as long as his fee is sufficient to ensure quality work.
- d) Gavin can offer to perform the audit for no fee, as long as he ensures quality work.

Activity: Critique #9



Working papers are used to document the work performed on an audit engagement. Which of the following is *not* a relevant conclusion on an external audit working paper that documents the testing of a control procedure?

- a) Based on the work performed, the control is working.
- b) Based on the work performed, the control is efficient.
- c) Based on the work performed, the control can be relied upon.
- d) Based on the work performed, the control is effective.

Activity: Critique #10



A group of significant shareholders of a publicly-traded company has decided to pursue taking the company private. Which of the following is *least likely* to be the reason for wanting to go private?

- a) Easier access to financing
- b) Lower risk of hostile takeover
- c) Fewer reporting requirements
- d) None of the above

Activity: Critique #11



Adam Inc. is considering closing its North division. Which one of the following would *not* be relevant?

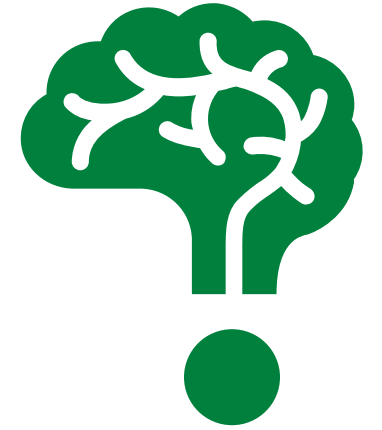
- a) All variable production costs
- b) Contribution margin on lost sales
- c) Site clean-up costs
- d) The salary of the branch manager to be transferred

Activity: Critique #12



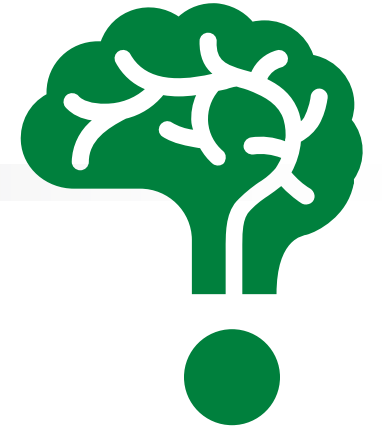
The operational objective often chosen for net working capital (NWC) management is to minimize the firm's investment in NWC, subject to having sufficient NWC to meet the firm's operational needs. Which of the following is *not* an example of these needs?

- a) Inventory sufficient to not exceed a maximum allowable probability of stocking out
- b) Trade terms competitive with the firm's industry rivals
- c) Sufficient cash to facilitate trade with customers and suppliers
- d) Sufficient cash to avoid the risk of running a cash deficit



B. Develop your own MCQ(s)

Activity: Develop your own MCQ(s)



1. Choose a partner at your table
2. Draft one or more MCQs on any topic that you and your partner are both knowledgeable about
3. Exchange questions with your partner
4. Critique each other's draft MCQ, including specific recommendations for improvement where appropriate
5. Debrief on what you learned



Questions?

The background is a low-poly, faceted orange pattern. The facets are irregular polygons of various sizes and orientations, creating a textured, crystalline appearance. The color is a warm, golden-orange, with subtle variations in tone across the facets, giving it a three-dimensional feel.

Thank you!