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# WRITING STRONG MULTIPLE-CHOICE & ESSAY QUESTIONS

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# KEY TERMS

- Multiple-Choice Questions
  - **Stem**
  - **Alternatives**
  - **Distractors**

Susie Science has discovered a mutant form of insulin that lacks a signal peptide. What will be the final cellular destination of the mutant insulin? } Stem

Answer

Distractor

Distractor

Distractor

Distractor

Distractor

A. Cytosol

B. Endoplasmic reticulum

C. Extracellular space

D. Golgi apparatus

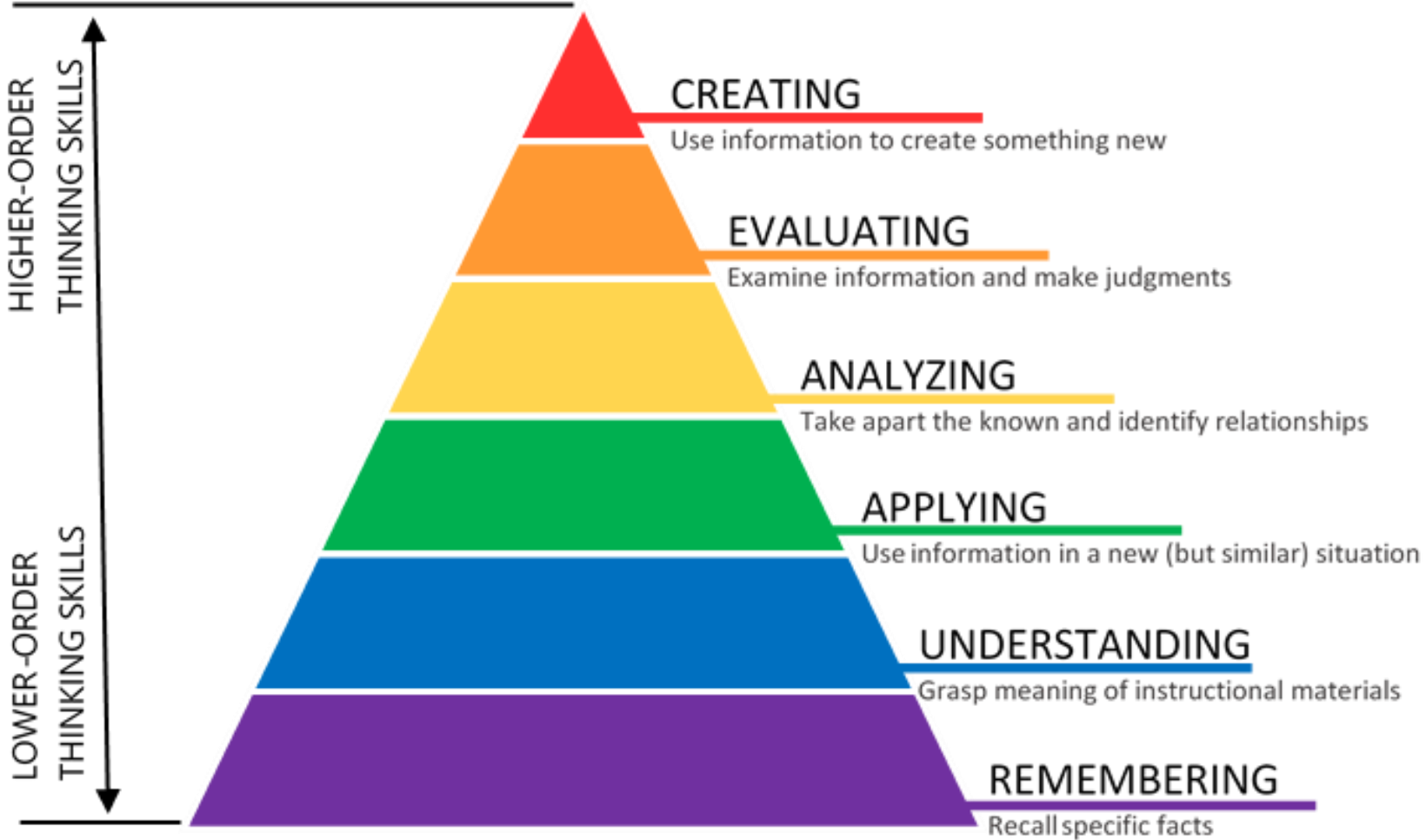
E. Peroxisome

F. Plasma membrane

} Alternatives

- **Directive Verbs:** indicate what thought processes and actions students must exhibit to provide evidence that learning has occurred; for example:
    - Identify
    - Explain
    - Describe
    - *See Appendix B of "Preparing Effective Essay Questions" (Reiner et al. 2002) for more examples*
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BLOOM'S TAXONOMY – COGNITIVE DOMAIN (2001)



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# WHAT SHOULD BE ON THE TEST?

- Create test items which reflect the intended learning outcomes of the course
  - Create test items while you prepare class lessons
  - Make note of questions that students ask frequently during class
  - Make note of common misconceptions students make during class or in homework
  - Invite students to submit items at the end of class or at other times
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# MULTIPLE-CHOICE OR ESSAY?

1. How critical are original and authentic student responses?

*If it is important to make students' thinking explicit, then original work is required.*

- Original and authentic = Essay Questions
- Not necessary that responses be original = Multiple-choice

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# MULTIPLE-CHOICE OR ESSAY?

2. Can students demonstrate the action and thinking processes indicated by the directive verb in the intended learning outcome by selecting answers from options and/or by constructing answers?
  - Selecting or constructing = Essay or Multiple-Choice
  - Selecting only = Multiple-Choice
  - Constructing only = Essay

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# MULTIPLE-CHOICE OR ESSAY?

3. If students can demonstrate the action and thinking processes related to the directive verb in the intended learning outcome in either an essay question or an objective item such as a multiple-choice question, then consider the following:
- Your skill in writing objective questions
  - Your resources and time available for grading
    - Low skill in writing objective questions and ample resources and time for grading = Essay Questions
    - High skill in writing objective questions and limited resources and time for grading = Multiple-choice

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# MULTIPLE-CHOICE QUESTIONS

- **Advantages**
    - Easy to grade objectively
    - Familiar to students
  - **Disadvantages**
    - Time-consuming to write high-quality questions
    - Not applicable for all course objectives / learning outcomes, or real-world scenarios
  - **High-quality multiple-choice questions:**
    - Prevent "good test takers" from guessing the right answer
    - Enable "bad test takers" to demonstrate their knowledge
    - Provide valid distinction between those who know the material and those who don't
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# WRITING STRONG MULTIPLE-CHOICE QUESTIONS

- All questions should address major objectives or learning goals (not focused on trivial information)
  - All alternatives should use similar grammar and be similar lengths
    - Free from grammatical clues
  - Avoid implausible or overly wordy alternatives
  - Ensure one question does not provide clues on the correct answer to another question
  - Balance the placement of the correct alternative (otherwise, usually B or C)
    - Test Blueprint
  - Avoid "all of the above" or "none of the above" alternatives
  - Avoid negative phrasing in stems; if unavoidable, highlight the negative term (bold, all caps, etc.)
  - Provide instructions! Best answer vs. Correct answer
    - Ensure there is only one correct alternative
  - Stem in question form or completion form
    - When using completion, blank should **NOT** be at the beginning or middle (end only)
  - Stem should be clear, such that student knows exactly what kind of information is being asked
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# TEST BLUEPRINT

Example: 40 item exam

	Topic A	Topic B	Topic C	Topic D	TOTAL
Knowledge	1	2	1	1	5 (12.5%)
Comprehension	2	1	2	2	7 (17.5%)
Application	4	4	3	4	15 (37.5%)
Analysis	3	2	3	2	10 (25%)
Synthesis		1		1	2 (5%)
Evaluation			1		1 (2.5%)
<b>TOTAL</b>	10 (25%)	10 (25%)	10 (25%)	10 (25%)	40

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# GET CREATIVE WITH MULTIPLE-CHOICE

- **Scenario-Based Questions:** tell a story, then ask questions

A college instructor wants to test the effect of unfair berating on exam performance. She administers an exam to both sections of a course. The overall performance of the two sections is essentially the same. The grades of one section are artificially lowered and the instructor berates the students for performing so badly. She then administers the same final exam to both sections and discovers that the performance of the unfairly berated section is worse. The hypothesis is confirmed, and the results are published.

**The act of berating students is a violation of which ethical consideration?**

- a. Voluntary Participation
- b. No Harm to Participants
- c. Anonymity and Confidentiality
- d. Deception
- e. Analysis and Reporting
- e. None (not an ethical violation)

- **Question and Rationale:** after the multiple-choice question, ask students to write a short essay explaining why they chose that answer / why it is correct

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# DEVELOPING MULTIPLE-CHOICE DISTRACTORS

- Incorporate common errors of students in distractors
  - Use familiar yet incorrect phrases
  - Use true statements that do not correctly answer the item
  - Greater similarity between alternatives increases the difficulty (*which may or may not be desirable*)
  - Distractors that are not chosen by any examinees should be replaced
  - When there are only two possible alternatives, consider creating a true-false item
  - When there are multiple related factors, consider creating a matching item
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# TESTING USING MULTIPLE-CHOICE QUESTIONS

- Students need approximately 1 minute per multiple-choice question
  - If the test is entirely or primarily multiple-choice, consider using a scantron sheet
    - Available for FREE in the front office
    - FREE scanning services in The Hub (224C, Assessment Technology)
      - This also produces helpful statistics about the difficulty of each item, used to improve testing in the future
  - If students sit close to each other, consider creating multiple versions of the test
    - Each version contains the same questions in a different order
    - You can also change the order of the alternatives
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# ESSAY QUESTIONS

- **Advantages**

- Assess higher-order learning
- Demonstrate depth of knowledge
- Provides students more opportunity for deep and original thinking

- **Disadvantages**

- Writing Ability Bias: May lead to grading writing skills more than course objectives / learning goals
    - Speed of writing (especially for hand-written)
  - Time-consuming to grade, more subjective
    - Rubrics can help!
  - Difficult to read student handwriting
  - Doesn't eliminate guessing, just changes the nature of it
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# WRITING ESSAY QUESTIONS

- Clearly define the specific learning outcome to be assessed by the item
  - Write a question using directive verbs that align with the learning outcome
  - Provide additional prompts to ensure all intended elements of the question are answered
    - Failure to focus / limit the scope of the question allows students to create their own boundaries, which may result in submissions outside the intended boundaries or that only provide a partial answer
  - Instructions should clearly state the point values for essay questions and how they will be graded
    - Will students be evaluated on accuracy, completeness, clarity, organization, spelling / grammar?
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# SCENARIO-BASED QUESTIONS

## Example:

Intended Learning Outcome:

Create a hypothesis concerning how a particular program may affect the quality of education for students

Problem  
Situation →

A national service entitled “Pick a Prof” makes teacher evaluation data public. “Pick a Prof” gives students the ability to take control of their education by using grade histories, student reviews and course schedules to choose a course and professor of their liking. Currently, professionals are uncertain about the effect of this service on the quality of education for students.

Essay  
Question →

Create a hypothesis about the effect the service may have on the quality of education for students using the service. Support your hypothesis with reasons and examples.