

## Creating Effective Learning Objectives and Test Questions

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#### A. Writing Learning Objectives

Learning objectives ask for a specific behavior that demonstrates learning. Goals are broad outcomes that do not demonstrate a specific behavior.

Examples:

Goal – Understand type 2 diabetes.

Objective – Compare the pathologic outcomes of type 1 and type 2 diabetes.

To write a learning objective:

1. Refer to the taxonomy of learning to determine the level of learning desired.
2. Phrase the learning objective as an essay test question; if you could not answer the objective as an essay test question, start over.
3. Use trigger words in the objective, generally at the beginning:
  - A. Memorization level learning: Define, list, name, identify, describe, what
  - B. Higher Order Thinking Skills (HOTS): Compare, contrast, explain cause-and-effect relationship, give reason for similarities/differences, predict, what if, what else, what course of action and why

#### B. Generic Test Question Templates (convert to learning objectives)

1. How is \_\_\_\_\_ like \_\_\_\_\_ ?
2. How are \_\_\_\_\_ and \_\_\_\_\_ different?
3. Compare \_\_\_\_\_ before and after \_\_\_\_\_ .
4. What caused \_\_\_\_\_ ?
5. What is another possible cause of \_\_\_\_\_ ?
6. In what sequence did \_\_\_\_\_ happen?
7. Break \_\_\_\_\_ down into its component parts.
8. Give an example of \_\_\_\_\_ .
9. Into what groups can you organize the following?
10. What information is needed?
11. Is the following information relevant?
12. What is the relationship between \_\_\_\_\_ and \_\_\_\_\_ ?

#### C. NBME Question Templates<sup>1</sup>

##### Sample Templates For Learning Objectives And/Or Test Questions

- a. Make a simple paraphrased definition of [*terms*].
- b. What concepts are related to [*terms*]?
- c. List causes and/or effects of [*terms*].
- d. Compare or contrast [*terms*] with one or more [*terms*].
- e. Describe the relationship between [*terms*] and [*terms*].
- f. Explain the function of each step in (*a sequence or a process*).

- g. What do [*terms*] have in common and how are they different?
- h. What symptoms would be produced if (*process, structure, etc.*) were defective?

### Sample Item-Writing Templates and Lead-Ins

#### Gross Anatomy Items

- 1) Item Stem (Patient Vignette): (*Describe a patient with a problem*)
- 2) Lead-In: A defect is most likely to be present in which of the following structures/processes?
- 3) Options: (*List of structures/processes*)

Also the following are general problem set-ups:

- *Insert patient vignette describing a patient with a problem.* Which of the following is the most likely disorder of the knee?
- *Insert patient vignette describing a patient with a problem.* Which of the following is the vessel into which contrast medium should be injected during fluoroscopy to visualize the site of the abnormality?
- *Insert patient vignette describing a patient with a problem.* Which of the following gastrointestinal disorders is the most likely cause of these findings?

#### Histology/Cell Biology Items

*Insert description of "action".* Which of the following cellular organelles is most directly involved?

- A. Golgi complex
- B. Lysosome
- C. Peroxisome
- D. Mitochondria
- E. Nuclear envelope
- F. Secretory (zymogenic) granule
- G. Rough endoplasmic reticulum
- H. Smooth endoplasmic reticulum

#### Lab Vignette Example

Several contiguous cells are labeled with a fluorescent dye that cannot cross cell membranes. One cell is experimentally bleached with a light that destroys the dye but soon recovers dye fluorescence. This recovery is best explained by the presence of which of the following structures between the bleached cell and its fluorescent neighbors?

- A. Basal lamina
- B. Desmosomes (maculae adherentes)
- C. Gap junctions
- D. Glycosaminoglycans
- E. Tight junctions (zonulae occludentes)

### Template for Mechanisms

Item Stem (Patient Vignette): (*Describe a patient with a problem*)

1. Lead-In: Which of the following mechanisms is the most likely cause of the patient's findings?
2. Options: (List of mechanisms)

### Additional Templates

- A (*patient description*) has a (*type of injury and location*). Which of the following structures is most likely to be affected?
- A (*patient description*) has (*history findings*) and is taking (*medications*). Which of the following medications is the most likely cause of his (*one history, PE or lab finding*)?
- A (*patient description*) has (*abnormal findings*). Which [*additional*] finding would suggest/suggests a diagnosis of (*disease 1*) rather than (*disease 2*)?
- A (*patient description*) has (*symptoms and signs*). These observations suggest that the disease is a result of the (*absence or presence*) of which of the following (*enzymes, mechanisms*)?
- A (*patient description*) follows a (*specific dietary regime*). Which of the following conditions is most likely to occur?
- A (*patient description*) has (*symptoms, signs, or specific disease*) and is being treated with (*drug or drug class*). The drug acts by inhibiting which of the following (*functions, processes*)?
- A (*patient description*) has (*abnormal findings*). Which of the following (*positive laboratory results*) would be expected?
- (*time period*) after a (*event such as trip or meal with certain foods*), a (*patient or group description*) became ill with (*symptoms and signs*). Which of the following (*organisms, agents*) is most likely to be found on analysis of (*food*)?
- Following (*procedure*), a (*patient description*) develops (*symptoms and signs*). Laboratory findings show (*findings*). Which of the following is the most likely cause?
- A (*patient description*) dies of (*disease*). Which of the following is the most likely finding on autopsy?
- A patient has (*symptoms and signs*). Which of the following is the most likely explanation for the (*findings*)?
- A (*patient description*) has (*symptoms and signs*). Exposure to which of the (*toxic agents*) is the most likely cause?
- Which of the following is the most likely mechanism of the therapeutic effect of this (*drug class*) in patients with (*disease*)?
- A patient has (*abnormal findings*), but (*normal findings*). Which of the following is the most likely diagnosis?

<sup>1</sup> Used with permission, NBME Item Writers Guide, [www.nbme.org](http://www.nbme.org)