"Quick Hit" Activity Using UIL Science Contests For Formative and Summative Assessments of Pre-AP and AP Biology Students

Activity Title: Quick Hit

Goal of Activity: To perform formative and summative assessments of mastery of Biology content.

Grade Level/Course: 9^{th} – 12^{th} grade – Pre-AP and AP Biology

TEKS Addressed:

The TEKS will vary based upon the unit being covered. The attached example focuses on TEKS §112.34. Biology, Beginning with School Year 2010-2011 (c)(4).

112.34. Biology, Beginning with School Year 2010-2011 (One Credit).

(c) Knowledge and skills.

(4) Science concepts. The student knows that cells are the basic structures of all living things with specialized parts that perform specific functions and that viruses are different from cells.

(5) Science concepts. The student knows how an organism grows and the importance of cell differentiation.

(6) Science concepts. The student knows the mechanisms of genetics, including the role of nucleic acids and the principles of Mendelian Genetics.

(7) Science concepts. The student knows evolutionary theory is a scientific explanation for the unity and diversity of life.

(8) Science concepts. The student knows that taxonomy is a branching classification based on the shared characteristics of organisms and can change as new discoveries are made.

(9) Science concepts. The student knows the significance of various molecules involved in metabolic processes and energy conversions that occur in living organisms.

(10) Science concepts. The student knows that biological systems are composed of multiple levels.

(11) Science concepts. The student knows that biological systems work to achieve and maintain balance.

(12) Science concepts. The student knows that interdependence and interactions occur within an environmental system.

Materials Needed:

- "Quick Hit" quizzes with UIL Science contest questions

Procedures:

The teacher will –

- At the beginning of a unit, prepare a short quiz that contains questions from UIL Science contests that are directly related to the unit. Typically 10 questions is sufficient. Using questions from Invitation A or B questions is probably best since these questions tend to be somewhat easier than the District, Regional or State tests.
- Have the students take the quiz in class.
- When finished, have the students work in small groups, comparing answers and trying to determine if their answers are correct. This often creates lively debate between students as they argue why they think their answer is correct.
- Go over the answers as a class, giving very brief explanations for why the answers are correct. This introduces vocabulary that will be used during the unit.
- These procedures can be easily modified to integrate technology using Powerpoint, CPS/Senteo units or Smartboards.

Assessment:

- At the end of the unit, give a similar quiz using 10 different questions from UIL Science contests to assess the student's assimilation of the material. Again, allow students to discuss their answer before going over the "Quick Hit" answers in class.
- Have the students compare their scores from the formative "Quick Hit" and the summative "Quick Hit" to see the improvement in their understanding.

Unit Introduction (Formative Assessment) Quick Hit
Teacher Key

1. Which of the following cellular structures is NOT surrounded by a membrane? (2004 – Invitational A) (TEKS – §112.34. Biology, Beginning with School Year 2010-2011 (c)(4))
    a. Chloroplast
    b. Mitochondrion
    c. Ribosome
    d. Vacuole
    e. Lysosome

2. In bacteria, DNA is found ____?____. (2004 – Invitational A) (TEKS – §112.34. Biology, Beginning with School Year 2010-2011 (c)(4)(B))
    a. Only in the nucleus.
    b. Only in the organelles.
    c. In both the nucleus and organelles.
    d. Attached to the cell wall as a single circular strand.
    e. As particles scattered throughout the entire cell.

3. Which of the following statements about viruses is TRUE? (2004 – Invitational A) (TEKS – §112.34. Biology, Beginning with School Year 2010-2011 (c)(4)(C))
    a. They were the first forms of life to evolve.
    b. They do not attack plants.
    c. They are able to reproduce without using other organisms.
    d. They are made of protein only.
    e. They include some forms that are able to attack bacteria.

4. Which of the following structures does not contain DNA? (2004 – Invitational B) (TEKS – §112.34. Biology, Beginning with School Year 2010-2011 (c)(4))
    a. Chromosome
    b. Ribosome
    c. Mitochondrion
    d. Chloroplast
    e. Nucleus

5. Most scientists do not consider viruses to be alive because _____?_____. (2004 – Invitational B) (TEKS – §112.34. Biology, Beginning with School Year 2010-2011 (c)(4)(C))
    a. They do not have any genes.
    b. They are unable to reproduce.
    c. They do not have any structural features that can be detected microscopically.
    d. The genetic material is sometimes RNA.
    e. They use a host cell's metabolic machinery because they lack any of their own.

6. Which of the following molecules form cell membranes? (2005 – Invitational A) (TEKS – §112.34. Biology, Beginning with School Year 2010-2011 (c)(4))
    a. Waxes
    b. Carbohydrates
    c. Steroids
    d. Fatty acids
    e. Phospholipids

7. Which of the following is NOT found in the nucleus? (2006 – Invitational A) (TEKS – §112.34. Biology, Beginning with School Year 2010-2011 (c)(4))
    a. Mitochondria
    b. DNA
    c. RNA
    d. Nucleolus
    e. Enzymes

8. All new membrane comes from _____. (2006 – Invitational A) (TEKS – §112.34. Biology, Beginning with School Year 2010-2011 (c)(4))
    a. The cell membrane.
    b. The cell wall.
    c. ER and the Golgi apparatus.
    d. Vesicles.
    e. The nucleus.

9. The hydrophobic tails of a phospholipid's bilayer are oriented toward _____. (2006 – Invitational B) (TEKS – §112.34. Biology, Beginning with School Year 2010-2011 (c)(4))
    a. Each other and the interior of the plasma membrane.
    b. The extracellular fluid surrounding the cell.
    c. The cytoplasm of the cell.
    d. The nucleus of the cell.
    e. None of the above.

10. All cells contain _____. (2007 – Invitational A) (TEKS – §112.34. Biology, Beginning with School Year 2010-2011 (c)(4) and (c)(4)(A))
    a. A nucleus.
    b. Mitochondria.
    c. Chloroplasts.
    d. A cell membrane.
    e. Endoplasmic reticulum.

Unit Introduction Quick Hit
Student Version

1. Which of the following cellular structures is NOT surrounded by a membrane?
    a. Chloroplast
    b. Mitochondrion
    c. Ribosome
    d. Vacuole
    e. Lysosome

2. In bacteria, DNA is found ____?____.
    a. Only in the nucleus.
    b. Only in the organelles.
    c. In both the nucleus and organelles.
    d. Attached to the cell wall as a single circular strand.
    e. As particles scattered throughout the entire cell.

3. Which of the following statements about viruses is TRUE?
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    d. They are made of protein only.
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    b. Ribosome
    c. Mitochondrion
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    c. RNA
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    e. Enzymes

8. All new membrane comes from _____.
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    b. The cell wall.
    c. ER and the Golgi apparatus.
    d. Vesicles.
    e. The nucleus.

9. The hydrophobic tails of a phospholipid's bilayer are oriented toward _____.
    a. Each other and the interior of the plasma membrane.
    b. The extracellular fluid surrounding the cell.
    c. The cytoplasm of the cell.
    d. The nucleus of the cell.
    e. None of the above.

10. All cells contain _____.
    a. A nucleus.
    b. Mitochondria.
    c. Chloroplasts.
    d. A cell membrane.
    e. Endoplasmic reticulum.

Unit Conclusion (Summative Assessment) Quick Hit
Teacher Key

11. Which of the following are the primary cellular assembly sites for proteins? (2004 – District 1) (TEKS – §112.34. Biology, Beginning with School Year 2010-2011 (c)(4))
    a. Golgi bodies
    b. Ribosomes
    c. Mitochondria
    d. Lysosomes
    e. Smooth endoplasmic reticulum

12. A virus is composed of a ___?____. (2004 – District 1) (TEKS – §112.34. Biology, Beginning with School Year 2010-2011 (c)(4)(C))
    a. Nucleic acid core enclosed in a lipid bilayer.
    b. Nucleic acid core surrounded by a protein/lipid membrane.
    c. Nucleic acid core encased in a protein capsid.
    d. Protein core enclosed in a lipid bilayer.
    e. Protein core encased in a protein capsid.

13. In an attempt to visualize the fluid mosaic of a cell membrane, we could describe the ___?___ as floating in a sea of _____?_____. (2004 – District 1) (TEKS – §112.34. Biology, Beginning with School Year 2010-2011 (c)(4))
    a. Lipids; proteins
    b. Phospholipids; carbohydrates
    c. Proteins; lipids
    d. Fats; water
    e. Glycolipids; sterols

14. Which of the following are the primary structures for the packaging of cellular secretions for export from the cell? (2004 – District 2) (TEKS – §112.34. Biology, Beginning with School Year 2010-2011 (c)(4))
    a. Golgi bodies
    b. Ribosomes
    c. Mitochondria
    d. Lysosomes
    e. Endoplasmic reticula

15. All viruses have _____?_____. (2004 – District 2) (TEKS – §112.34. Biology, Beginning with School Year 2010-2011 (c)(4)(C))
    a. DNA
    b. RNA
    c. Enzymes
    d. A protein coat
    e. An envelope

16. The cell wall _____?_____. (2004 – Regional) (TEKS – §112.34. Biology, Beginning with School Year 2010-2011 (c)(4))
    a. Provides structural support for plants.
    b. Controls what enters and leaves a cell.
    c. Replaces the plasma membrane of animal cells in plant cells.
    d. Is found in all eukaryotes.
    e. Serves no particular function; it simply surrounds a cell.

17. Which of the following would NOT be found inside the nucleus of a eukaryotic cell? (2005 – District 1) (TEKS – §112.34. Biology, Beginning with School Year 2010-2011 (c)(4)(A))
    a. RNA
    b. DNA
    c. Nucleolus
    d. Endoplasmic reticulum
    e. Nucleotides

18. During which of the following processes does a phage kill its host? (2005 – District 1) (TEKS – §112.34. Biology, Beginning with School Year 2010-2011 (c)(4)(C))
    a. Conjugation
    b. The lytic cycle
    c. Transcription
    d. The lysogenic cycle
    e. Translation

19. Cells can be described as having a "cytoskeleton" of internal structures that contribute to the shape, organization and movement of a cell. Which of the following is NOT part of the "cytoskeleton"? (2005 – State) (TEKS – §112.34. Biology, Beginning with School Year 2010-2011 (c)(4))
    a. Cell wall
    b. Microtubules
    c. Microfilaments
    d. Intermediate filaments
    e. Actin

20. Which of the following subcellular structures does NOT have any membranes? (2007 – District 1) (TEKS – §112.34. Biology, Beginning with School Year 2010-2011 (c)(4))
    a. Lysosome
    b. Golgi apparatus
    c. Chloroplast
    d. Ribosome
    e. Endoplasmic reticulum

Unit Conclusion Quick Hit
Student Key

1. Which of the following are the primary cellular assembly sites for proteins?
    a. Golgi bodies
    b. Ribosomes
    c. Mitochondria
    d. Lysosomes
    e. Smooth endoplasmic reticulum

2. A virus is composed of a ___?____.
    a. Nucleic acid core enclosed in a lipid bilayer.
    b. Nucleic acid core surrounded by a protein/lipid membrane.
    c. Nucleic acid core encased in a protein capsid.
    d. Protein core enclosed in a lipid bilayer.
    e. Protein core encased in a protein capsid.

3. In an attempt to visualize the fluid mosaic of a cell membrane, we could describe the ___?___ as floating in a sea of ____?_____.
    a. Lipids; proteins
    b. Phospholipids; carbohydrates
    c. Proteins; lipids
    d. Fats; water
    e. Glycolipids; sterols

4. Which of the following are the primary structures for the packaging of cellular secretions for export from the cell?
    a. Golgi bodies
    b. Ribosomes
    c. Mitochondria
    d. Lysosomes
    e. Endoplasmic reticula

5. All viruses have _____?_____.
    a. DNA
    b. RNA
    c. Enzymes
    d. A protein coat
    e. An envelope

6. The cell wall _____?_____.
    a. Provides structural support for plants.
    b. Controls what enters and leaves a cell.
    c. Replaces the plasma membrane of animal cells in plant cells.
    d. Is found in all eukaryotes.
    e. Serves no particular function; it simply surrounds a cell.

7. Which of the following would NOT be found inside the nucleus of a eukaryotic cell?
    a. RNA
    b. DNA
    c. Nucleolus
    d. Endoplasmic reticulum
    e. Nucleotides

8. During which of the following processes does a phage kill its host?
    a. Conjugation
    b. The lytic cycle
    c. Transcription
    d. The lysogenic cycle
    e. Translation

9. Cells can be described as having a "cytoskeleton" of internal structures that contribute to the shape, organization and movement of a cell. Which of the following is NOT part of the "cytoskeleton"?
    a. Cell wall
    b. Microtubules
    c. Microfilaments
    d. Intermediate filaments
    e. Actin

10. Which of the following subcellular structures does NOT have any membranes?
    a. Lysosome
    b. Golgi apparatus
    c. Chloroplast
    d. Ribosome
    e. Endoplasmic reticulum

Question Creation Activity Using UIL Science Contests to Teach Body Systems to Pre-AP and AP Biology Students

Activity Title: "You Write the Test"

Goal of Activity: To teach students body systems.

Grade Level/Course: 9th – 12th grade – Pre-AP and AP Biology

TEKS Addressed:

112.34. Biology, Beginning with School Year 2010-2011 (One Credit).

(c) Knowledge and skills.

(10) Science concepts. The student knows that biological systems are composed of multiple levels. The student is expected to:

(A) describe the interactions that occur among systems that perform the functions of regulation, nutrient absorption, reproduction, and defense from injury or illness in animals;

(B) describe the interactions that occur among systems that perform the functions of transport, reproduction, and response in plants; and

(C) analyze the levels of organization in biological systems and relate the levels to each other and to the whole system.

(11) Science concepts. The student knows that biological systems work to achieve and maintain balance. The student is expected to:

(A) describe the role of internal feedback mechanisms in the maintenance of homeostasis;

(B) investigate and analyze how organisms, populations, and communities respond to external factors;

(C) summarize the role of microorganisms in both maintaining and disrupting the health of both organisms and ecosystems; and

(D) describe how events and processes that occur during ecological succession can change populations and species diversity.

Materials Needed:

- UIL Science contest questions
- Notebook/paper for each student (to be supplied by students).

- Powerpoint

Procedures:

The teacher will –

- Break the students into groups of 2, 3 or 4.
- Give each group 1 or 2 questions that pertain to body systems from a UIL Science contest. These questions tend to be near the end of the Biology section.
- Ask the students to create 1 or 2 new questions that directly pertain to one or more of the 5 answer choices.
- Allow students to create a Powerpoint slide for each question. The slides from each group will be compiled into 1 Powerpoint that will be used by the class to study for quizzes and/or tests.

Assessment:

The teacher will view the finished Powerpoint presentation and determine if the question is well written and if the answer is correct.

Example

Question given to a group (from 2011 Invitational B test)

In spongy bone tissues, the spaces are filled with ___ .

A) air
B) cartilage
C) lymph
D) marrow
E) blood

Example questions created by a group

The ends of bones are covered with _____.

A) Air
B) Cartilage
C) Lymph
D) Marrow
E) Blood

The correct answer is B.

One of the primary functions of the skeletal system is the formation of _____.

A) Air
B) Cartilage
C) Lymph
D) Marrow
E) Blood

The correct answer is E.