Unit 10: Post-AP Exam Research Proposal

Content Area: **Science**
Course(s): **AP Biology**
Time Period: **Semester 2**
Length: **3 weeks**
Status: **Published**

Standards

Lab assessments, Quizzes, Tests, Active Learning Questions

SCI.9-12.5.1.12	All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.
SCI.9-12.5.1.12.B.1	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
SCI.9-12.5.1.12.B.2	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
SCI.9-12.5.1.12.B.a	Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.
SCI.9-12.5.1.12.B.b	Mathematical tools and technology are used to gather, analyze, and communicate results.
SCI.9-12.5.1.12.B.c	Empirical evidence is used to construct and defend arguments.
SCI.9-12.5.1.12.B.d	Scientific reasoning is used to evaluate and interpret data patterns and scientific conclusions.
SCI.9-12.5.1.12.C	Scientific knowledge builds on itself over time.
SCI.9-12.5.1.12.C.a	Refinement of understandings, explanations, and models occurs as new evidence is incorporated.
SCI.9-12.5.1.12.D	The growth of scientific knowledge involves critique and communication, which are social practices that are governed by a core set of values and norms.
SCI.9-12.5.1.12.D.a	Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.
SCI.9-12.5.1.12.D.b	Science involves using language, both oral and written, as a tool for making thinking public.
SCI.9-12.5.1.12.D.c	Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.
SCI.9-12.5.3.12	All students will understand that life science principles are powerful conceptual tools for making sense of the complexity, diversity, and interconnectedness of life on Earth. Order in natural systems arises in accordance with rules that govern the physical world, and the order of natural systems can be modeled and predicted through the use of mathematics.
TECH.8.2.12.C.CS3	The role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.

College Board AP Biology Big Ideas

Big Idea 1: The process of evolution drives the diversity and unity of life.

Big Idea 2: Biological systems utilize free energy and molecular building blocks to grow, to reproduce, and to

maintain dynamic homeostasis.

Big Idea 3: Living systems store, retrieve, transmit, and respond to information essential to life processes.

Big Idea 4: Biological systems interact, and these interactions possess complex properties.

Enduring Understanding - AP Biology Science Practices

Science Practice 1: The student can use representations and models to communicate scientific phenomena and solve scientific problems.

1.1 The student can create representations and models of natural or man-made phenomena and systems in the domain.

1.2 The student can describe representations and models of natural or man-made phenomena and systems in the domain.

1.3 The student can refine representations and models of natural or man-made phenomena and systems in the domain.

1.4 The student can use representations and models to analyze situations or solve problems qualitatively and quantitatively.

1.5 The student can reexpress key elements of natural phenomena across multiple representations in the domain.

Science Practice 2: The student can use mathematics appropriately.

2.1 The student can justify the selection of a mathematical routine to solve problems.

2.2 The student can apply mathematical routines to quantities that describe natural phenomena.

2.3 The student can estimate numerically quantities that describe natural phenomena.

Science Practice 3: The student can engage in scientific questioning to extend thinking or to guide investigations within the context of the AP course.

3.1 The student can pose scientific questions.

3.2 The student can refine scientific questions.

3.3 The student can evaluate scientific questions.

Science Practice 4: The student can plan and implement data collection strategies appropriate to a particular scientific question.

4.1 The student can justify the selection of the kind of data needed to answer a particular scientific question.

4.2 The student can design a plan for collecting data to answer a particular scientific question.

4.3 The student can collect data to answer a particular scientific question.

4.4 The student can evaluate sources of data to answer a particular scientific question.

Science Practice 5: The student can perform data analysis and evaluation of evidence.

5.1 The student can analyze data to identify patterns or relationships.

5.2 The student can refine observations and measurements based on data analysis.

5.3 The student can evaluate the evidence provided by data sets in relation to a particular scientific question.

Science Practice 6: The student can work with scientific explanations and theories.

6.1 The student can justify claims with evidence.

6.2 The student can construct explanations of phenomena based on evidence produced through scientific practices.

6.3 The student can articulate the reasons that scientific explanations and theories are refined or replaced.

6.4 The student can make claims and predictions about natural phenomena based on scientific theories and models.

6.5 The student can evaluate alternative scientific explanations.

Science Practice 7: The student is able to connect and relate knowledge across various scales, concepts, and representations in and across domains.

7.1 The student can connect phenomena and models across spatial and temporal scales.

7.2 The student can connect concepts in and across domain(s) to generalize or extrapolate in and/or across enduring understandings and/or big ideas.

Essential Questions

How do scientists answer a research problem?

Knowledge and Skills

Essential knowledge 2.A.1: All living systems require constant input of free energy.

Essential knowledge 2.A.2: Organisms capture and store free energy for use in biological processes.

Essential knowledge 2.A.3: Organisms must exchange matter with the environment to grow, reproduce, and maintain organization.

Resources

http://grants.nih.gov/grants/grants_process.htm; laptops

Assessments

https://docs.google.com/document/d/1wR7bQF-8AQoRrt0g4C3hKja0yjwDjC9_BiAmONWbTcI/edit