Unit 1 - History and General Anatomy of Animals (Life Science)

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Title Section

Department of Curriculum and Instruction

Belleville Public Schools

Curriculum Guide

ZOOLOGY, GRADE 11-12

UNIT 1 - HISTORY AND GENERAL ANATOMY OF ANIMALS

Belleville Board of Education

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Unit Overview

Students will examine evolutionary micro and macro principles and will investigate the concepts of zoology and related careers. A review of general biological principles as they apply to zoology will prepare the students to understand the origins and evolution of animal life on planet Earth. Students will hone their laboratory techniques and skills by using microscopes to investigate cellular and tissue organization. The ethical issue of the use of animals in research will be investigated focusing on student debate and defense of student position on the topic.

Enduring Understanding

• Animals have evolved over time which has led to animal diversity.

• Scientists group animals based on shared characteristics.

• Every species has a specific fundamental or realized niche depending on its interactions with their community ecology.

• The hierarchal organization of complexity and body plans of species change over time during evolutionary descent.

Essential Questions

• What makes the animal kingdom diverse?

• How can the animal kingdom be organized for ease of study?

• Why should we study animals?

Exit Skills

By the end of Unit 1 Students will know:

Characteristics of animals
The modern system of classification
How animals impact each other
How animals interact with their environment
Careers related to zoology
Use of laboratory tools and safety procedures

New Jersey Student Learning Standards (NJSLS-S)

SCI.HS-LS1	From Molecules to Organisms: Structures and Processes
SCI.HS-LS1-1	Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.
	Constructing Explanations and Designing Solutions
	Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.
SCI.HS.LS1.A	Structure and Function
	Structure and Function
SCI.HS-LS1-2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
	Developing and Using Models
	Modeling in 9–12 builds on K–8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds.
SCI.HS.LS1.A	Structure and Function

	Systems and System Models
SCI.HS-LS1-3	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.
	Planning and Carrying Out Investigations
	Planning and carrying out in 9–12 builds on K–8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models.
SCI.HS.LS1.A	Structure and Function
	Stability and Change
SCI.HS-LS1-4	Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.
	Modeling in 9–12 builds on K–8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds.
SCI.HS.LS1.B	Growth and Development of Organisms
	Systems and System Models
	Constructing Explanations and Designing Solutions
	Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.
	Energy and Matter
	Modeling in 9–12 builds on K–8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds.
SCI.HS.LS1.C	Organization for Matter and Energy Flow in Organisms
SCI.HS-LS3	Heredity: Inheritance and Variation of Traits
SCI.HS-LS3-1	Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.
	Asking Questions and Defining Problems
	Asking questions and defining problems in 9–12 builds on K–8 experiences and progresses to formulating, refining, and evaluating empirically testable questions and design problems using models and simulations.
SCI.HS.LS1.A	Structure and Function
SCI.HS.LS3.A	Inheritance of Traits
	Cause and Effect
SCI.HS-LS3-2	Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.
	Engaging in Argument from Evidence
	Engaging in argument from evidence in 9–12 builds on K–8 experiences and progresses to using appropriate and sufficient evidence and scientific reasoning to defend and critique claims and explanations about the natural and designed world(s). Arguments may also come from current scientific or historical episodes in science.
SCI.HS.LS3.B	Variation of Traits
	Cause and Effect

SCI.HS-LS3-3	Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.
	Analyzing and Interpreting Data
	Analyzing data in 9–12 builds on K–8 experiences and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data.
SCI.HS.LS3.B	Variation of Traits
SCI.HS-LS4	Biological Evolution: Unity and Diversity
SCI.HS-LS4-1	Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.
	Obtaining, Evaluating, and Communicating Information
	Obtaining, evaluating, and communicating information in 9–12 builds on K–8 experiences and progresses to evaluating the validity and reliability of the claims, methods, and designs.
SCI.HS.LS4.A	Evidence of Common Ancestry and Diversity
	Patterns
SCI.HS-LS4-2	Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.
	Constructing Explanations and Designing Solutions
	Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.
SCI.HS.LS4.B	Natural Selection
SCI.HS.LS4.C	Adaptation
	Cause and Effect
SCI.HS-LS4-3	Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.
	Analyzing and Interpreting Data
	Analyzing data in 9–12 builds on K–8 experiences and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data.
SCI.HS.LS4.B	Natural Selection
SCI.HS.LS4.C	Adaptation
	Patterns
SCI.HS-LS4-4	Construct an explanation based on evidence for how natural selection leads to adaptation of populations.
	Constructing Explanations and Designing Solutions
	Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.
SCI.HS.LS4.C	Adaptation

	Cause and Effect
SCI.HS-LS4-5	Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.
	Engaging in Argument from Evidence
	Engaging in argument from evidence in 9–12 builds on K–8 experiences and progresses to using appropriate and sufficient evidence and scientific reasoning to defend and critique claims and explanations about the natural and designed world(s). Arguments may also come from current or historical episodes in science.
SCI.HS.LS4.C	Adaptation
	Cause and Effect
SCI.HS-LS4-6	Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.
	Using Mathematics and Computational Thinking
	Mathematical and computational thinking in 9–12 builds on K–8 experiences and progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions.
SCI.HS.LS4.C	Adaptation
SCI.HS.LS4.D	Biodiversity and Humans
SCI.HS.ETS1.B	Developing Possible Solutions
	Cause and Effect
SCI.HS-ESS3	Earth and Human Activity
SCI.HS-ESS3-1	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and climate change have influenced human activity.
	Constructing Explanations and Designing Solutions
	Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific knowledge, principles, and theories.
SCI.HS.ESS3.A	Natural Resources
SCI.HS.ESS3.B	Natural Hazards
	Cause and Effect
SCI.HS-ESS3-2	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
	Engaging in Argument from Evidence
	Engaging in argument from evidence in 9–12 builds on K–8 experiences and progresses to using appropriate and sufficient evidence and scientific reasoning to defend and critique claims and explanations about natural and designed world(s). Arguments may also come from current scientific or historical episodes in science.
SCI.HS-ESS3-3	Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.
	Using Mathematics and Computational Thinking
	Mathematical and computational thinking in 9–12 builds on K–8 experiences and

	progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions.
SCI.HS.ESS3.C	Human Impacts on Earth Systems
	Stability and Change
SCI.HS-ESS3-4	Evaluate or refine a technological solution that reduces impacts of human activities on climate change and other natural systems.
	Constructing Explanations and Designing Solutions
	Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific knowledge, principles, and theories.
SCI.HS.ESS3.C	Human Impacts on Earth Systems
SCI.HS.ETS1.B	Developing Possible Solutions
	Stability and Change
SCI.HS-ESS3-5	Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.
	Analyzing and Interpreting Data
	Analyzing data in 9–12 builds on K–8 experiences and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data.
SCI.HS.ESS3.D	Global Climate Change
	Stability and Change
SCI.HS-ESS3-6	Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity (i.e., climate change).
	Using Mathematics and Computational Thinking
	Mathematical and computational thinking in 9–12 builds on K–8 experiences and progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions.
SCI.HS.ESS2.D	Weather and Climate
SCI.HS.ESS3.D	Global Climate Change
	Systems and System Models
SCI.HS-ETS1	Engineering Design
	Asking Questions and Defining Problems
	Asking questions and defining problems in 9–12 builds on K–8 experiences and progresses to formulating, refining, and evaluating empirically testable questions and design problems using models and simulations.
SCI.HS.ETS1.A	Delimiting Engineering Problems
SCI.HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

	Constructing Explanations and Designing Solutions
	Constructing explanations and designing solutions 9–12 builds on K – experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles and theories.
SCI.HS.ETS1.C	Optimizing the Design Solution
SCI.HS-ETS1-3	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.
	Constructing Explanations and Designing Solutions
	Constructing explanations and designing solutions 9–12 builds on K – experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles and theories.
SCI.HS.ETS1.B	Developing Possible Solutions
SCI.HS-ETS1-4	Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.
	Using Mathematics and Computational Thinking
SCI.HS.ETS1.B	Developing Possible Solutions
	Systems and System Models

Interdisciplinary Connections

MA.S-ID.A	Summarize, represent, and interpret data on a single count or measurement variable
MA.S-ID.B	Summarize, represent, and interpret data on two categorical and quantitative variables
LA.RST.11-12.1	Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions.
LA.RST.11-12.2	Determine the central ideas, themes, or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
MA.S-IC.A	Understand and evaluate random processes underlying statistical experiments
LA.RST.11-12.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
LA.RST.11-12.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11-12 texts and topics.
MA.S-IC.B	Make inferences and justify conclusions from sample surveys, experiments, and observational studies
LA.RST.11-12.5	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
LA.RST.11-12.7	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
LA.RST.11-12.8	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text,

	verifying the data when possible and corroborating or challenging conclusions with other sources of information.
LA.RST.11-12.9	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
LA.WHST.11-12.1	Write arguments focused on discipline-specific content.
LA.WHST.11-12.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
LA.WHST.11-12.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LA.WHST.11-12.5	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
CS.9-12.8.2.12.ETW.1	Evaluate ethical considerations regarding the sustainability of environmental resources that are used for the design, creation, and maintenance of a chosen product.
CS.9-12.8.2.12.ETW.2	Synthesize and analyze data collected to monitor the effects of a technological product or system on the environment.
CS.9-12.8.2.12.ETW.3	Identify a complex, global environmental or climate change issue, develop a systemic plan of investigation, and propose an innovative sustainable solution.
CS.9-12.8.2.12.ITH.1	Analyze a product to determine the impact that economic, political, social, and/or cultural factors have had on its design, including its design constraints.
CS.9-12.8.2.12.ITH.2	Propose an innovation to meet future demands supported by an analysis of the potential costs, benefits, trade-offs, and risks related to the use of the innovation.
CS.9-12.8.2.12.ITH.3	Analyze the impact that globalization, social media, and access to open source technologies has had on innovation and on a society's economy, politics, and culture.
CS.9-12.ETW	Effects of Technology on the Natural World
CS.9-12.ITH	Interaction of Technology and Humans
	Decisions to develop new technology are driven by societal and cultural opinions and demands that differ from culture to culture.
	Development and modification of any technological system needs to take into account how the operation of the system will affect natural resources and ecosystems. Impacts of technological systems on the environment need to be monitored and must inform decision-making. Many technologies have been designed to have a positive impact on the environment and to monitor environmental change over time.
	Changes caused by the introduction and use of a new technology can range from gradual to rapid and from subtle to obvious, and can change over time. These changes may vary from society to society as a result of differences in a society's economy, politics, and culture.

Learning Objectives

Students will be able to...

• List and explain characteristics of animals

• Apply proper laboratory and handling techniques while interacting with specimens

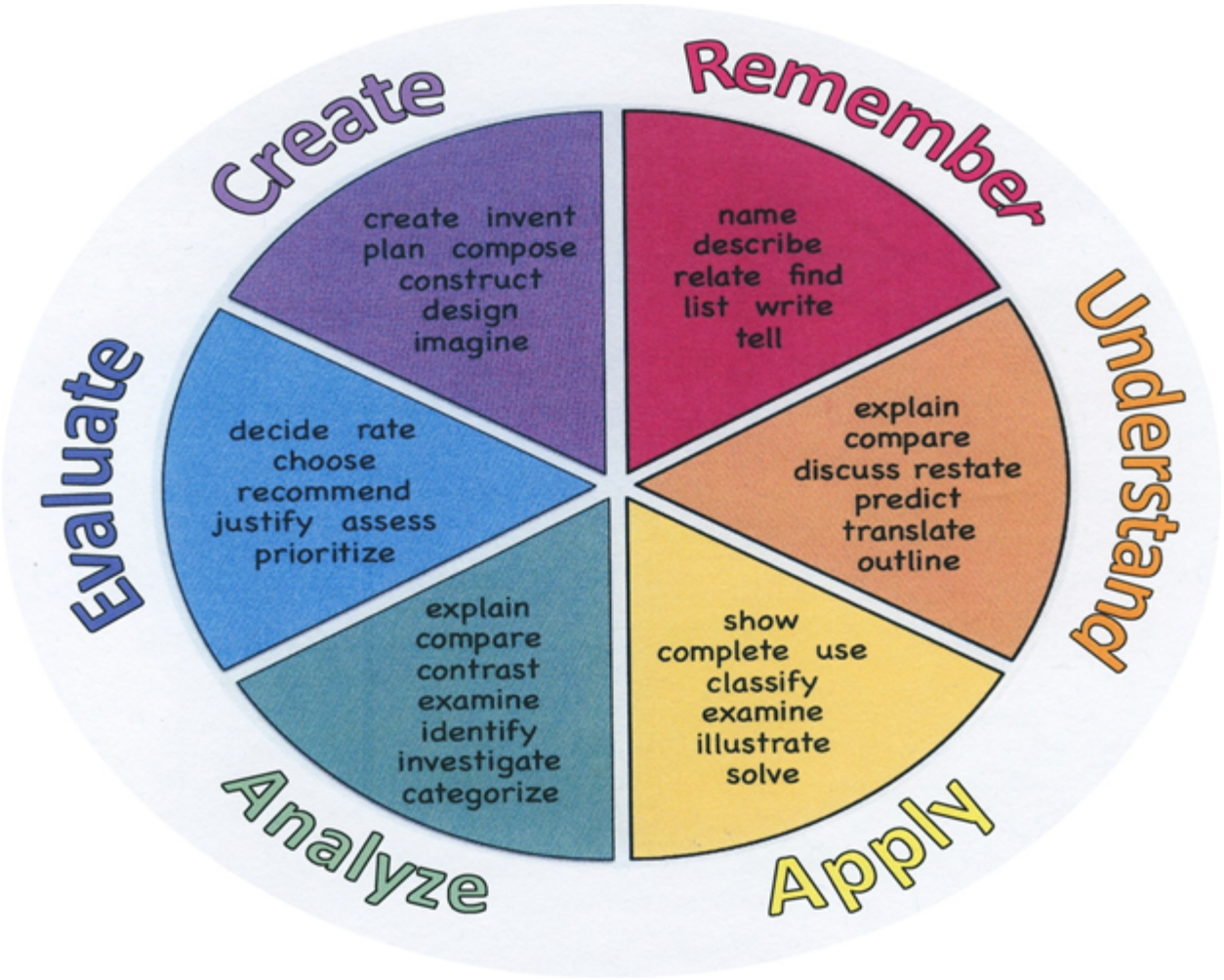
• Utilize microscopy and other lab techniques in the identification of animal specimens

• Apply the modern system of classification to the animal kingdom

• Defend positions on the ethical use of animals in research

Action Verbs: Below are examples of action verbs associated with each level of the Revised Bloom's Taxonomy.

Remember	Understand	Apply	Analyze	Evaluate	Create
Choose	Classify	Choose	Categorize	Appraise	Combine
Describe	Defend	Dramatize	Classify	Judge	Compose
Define	Demonstrate	Explain	Compare	Criticize	Construct
Label	Distinguish	Generalize	Differentiate	Defend	Design
List	Explain	Judge	Distinguish	Compare	Develop
Locate	Express	Organize	Identify	Assess	Formulate
Match	Extend	Paint	Infer	Conclude	Hypothesize
Memorize	Give Examples	Prepare	Point out	Contrast	Invent
Name	Illustrate	Produce	Select	Critique	Make
Omit	Indicate	Select	Subdivide	Determine	Originate
Recite	Interrelate	Show	Survey	Grade	Organize
Select	Interpret	Sketch	Arrange	Justify	Plan
State	Infer	Solve	Breakdown	Measure	Produce
Count	Match	Use	Combine	Rank	Role Play
Draw	Paraphrase	Add	Detect	Rate	Drive
Outline	Represent	Calculate	Diagram	Support	Devise
Point	Restate	Change	Discriminate	Test	Generate
Quote	Rewrite	Classify	Illustrate		Integrate
Recall	Select	Complete	Outline		Prescribe
Recognize	Show	Compute	Point out		Propose
Repeat	Summarize	Discover	Separate		Reconstruct
Reproduce	Tell	Divide			Revise
	Translate	Examine			Rewrite
	Associate	Graph			Transform
	Compute	Interpolate			
	Convert	Manipulate			
	Discuss	Modify			
	Estimate	Operate			
	Extrapolate	Subtract			
	Generalize				
	Predict				



Suggested Activities & Best Practices

- Lab safety video and associated questions
- Review parts and use of microscopes
- Observing Tissue Types - Microscope Lab
- Observation of Representative Animal Phyla Lab
- Understanding taxonomic principles, binomial nomenclature, and cladograms
- Dichotomous Key/Classification Lab
- Crash Course Videos with associated questions
- Introduce students to famous African American scientists
- Inform students that the burning of rainforests are affecting the diversity of life in various ecosystems
- Introduce students to noteworthy LGBTQ+ zoologists.

Assessment Evidence - Checking for Understanding (CFU)

Students will participate in a laboratory safety video, worksheet completion, and lab safety quiz to fulfill OSHA requirements and help protect students from harmful situations that may arise in a laboratory. (Formative)

Students will view Crash Course Video series in Biology/Zoology and complete video question sheets as an ancillary to the textbook to better inform students of the basic tenets of the discipline. (Summative)

Students will participate in a review of the microscope parts and its operation, then complete a laboratory exercise using the microscope to view animal cells and better understand the concept of the hierarchy of animal complexity (cell-tissue-organ-organ system) as it applies. (Formative))

Common, Department Quarterly Benchmarks (Benchmark)

Oncourse Assessment Tools (Formative)

Unit Test/Quiz (Summative)

"Do Now/Exit Ticket" Activity (Formative)

- Admit Tickets
- Compare & Contrast
- Crash Course Video Questions
- Define
- Describe
- Evaluate
- Evaluation rubrics
- Exit Tickets
- Explaining
- Illustration
- Journals
- KWL Chart
- Lab Safety Quiz

- Lab safety Worksheet
- Lab- Microscopic Observation of Animals
- Lab-Dichotomous Key
- Outline
- Quarterly Benchmarks
- Quickwrite
- Quizzes
- Self- assessments
- Study Guide
- Surveys
- Teacher Observation Checklist
- Think, Pair, Share
- Think, Write, Pair, Share
- Unit review/Test prep
- Unit tests
- Web-Based Assessments

Primary Resources & Materials

Textbook: *Biology*, Miller and Levine

Chromebook: Online access to textbook and digital resources from *Biology,* Miller and Levine

Ancillary Resources

YouTube videos - Crash Course series with associated question worksheets

Animal models

Diagram package

Compound light microscopes

Selection of prepared slides showing properties of tissue types

Dissection kits

Various preserved animal specimens

Technology Infusion

Student-issued Chromebooks will be used to access Pearson online course materials for use in the classroom and from home

Interactive digital content available through Pearson EasyBridge will serve as in class material, at home learning, and extension activities for differentiated use

YouTube videos for lesson enhancement and differentiation (Crash Course video series with associated question worksheets0

Google Classroom will be used to disseminate course information and better communicate with students and parents beyond the classroom walls

Google Suite will be used to help drive the Google Classroom experience and better integrate it into every-day use

Prezi will be used to serve as an alternative to Google Slides or MS PowerPoint to give students an option for presentation software

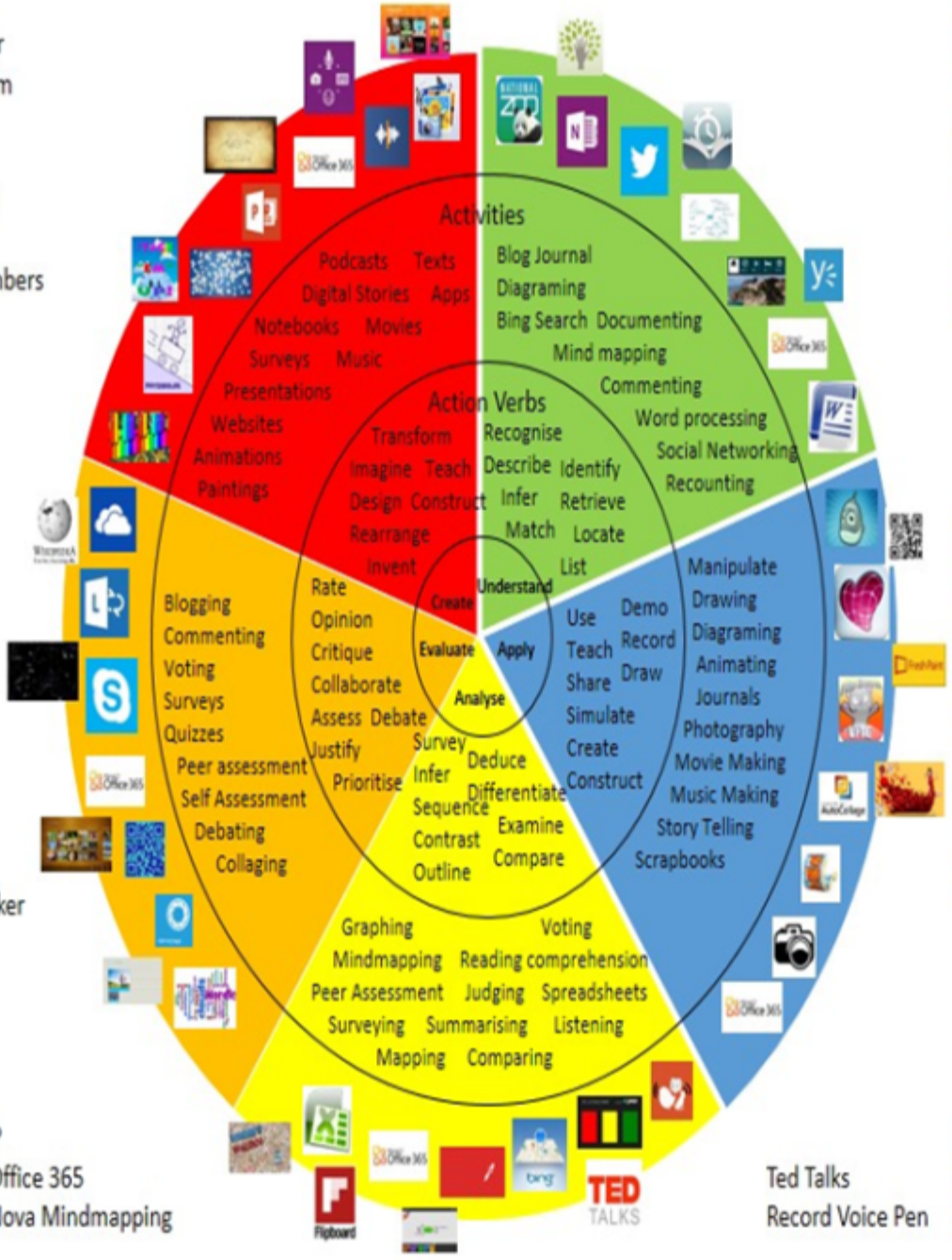
Subscription to Defined STEM website will help students make choices in their own educational journey by selecting topics they are interested in and collaborate with like-minded students in a group project

Use MS Word, Excel, PowerPoint, OneNote will help students become tech savvy as they prepare for their journey into adulthood

Win 8.1 Apps/Tools Pedagogy Wheel

Podcasts
Photostory 3
Kid Story Builder
Music Maker Jam
Paint A Story
Office 365
MS PowerPoint
Stack 'Em Up
NqSquared Numbers
Physamajig
Xylophone 8

Wikipedia
Skydrive
Lync
SkyMap
Skype
Office 365
Puzzle Touch
Easy QR
Memorylage
Life Moments
Word Cloud Maker



Where's Waldo?
MS Excel Office 365
Flipboard Nova Mindmapping

Ted Talks
Record Voice Pen

Originally taken from http://www.coetail.com/vzimmer/files/2013/02/iPadagogy-Wheel.001.jpg
And adapted for Windows 8.1 devices by Charlotte Beckhurst @CharBeckhurst

Alignment to 21st Century Skills & Technology

WRK.9.2.12.CAP	Career Awareness and Planning
WRK.9.2.12.CAP.2	Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs.
WRK.9.2.12.CAP.3	Investigate how continuing education contributes to one's career and personal growth.
TECH.9.4.12.CI	Creativity and Innovation
TECH.9.4.12.CI.2	Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).
TECH.9.4.12.CI.3	Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).
TECH.9.4.12.CT	Critical Thinking and Problem-solving
TECH.9.4.12.GCA.1	Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political. economic, cultural) may work better than others (e.g., SL.11-12.1., HS-ETS1-1, HS-ETS1-2, HS-ETS1-4, 6.3.12.GeoGI.1, 7.1.IH.IPERS.6, 7.1.IL.IPERS.7, 8.2.12.ETW.3).
	Innovative ideas or innovation can lead to career opportunities.

21st Century Skills/Interdisciplinary Themes

- Communication and Collaboration
- Creativity and Innovation
- Critical thinking and Problem Solving
- ICT (Information, Communications and Technology) Literacy
- Information Literacy
- Life and Career Skills
- Media Literacy

21st Century Skills

- Civic Literacy
- Environmental Literacy

- Global Awareness

Differentiation

Students will be arranged in groups based on results of multiple intelligence surveys and behavioral analysis to allow for collegial collaboration in the classroom.

Students will participate in review games each section using the Kahoot! platform and their Chromebboks to help solidify each section's learning activities.

Students will utilize the Pearson online module to have access to the digital textbook and the alternate versions of the textbook as needed to adjust to the students' current reading levels.

Differentiations:

- Small group instruction
- Small group assignments
- Extra time to complete assignments
- Pairing oral instruction with visuals
- Repeat directions
- Use manipulatives
- Study guides
- Teacher reads assessments allowed
- Rephrase written directions
- Multisensory approaches
- Additional time
- Preview vocabulary
- Preview content & concepts
- Behavior management plan
- Highlight text
- Student(s) work with assigned partner
- Visual presentation
- Small group setting

Hi-Prep Differentiations:

- Alternative formative and summative assessments
- Games and tournaments
- Group investigations
- Guided Reading
- Independent research and projects
- Leveled rubrics
- Multiple intelligence options
- Multiple texts
- Project-based learning
- Problem-based learning
- Tiered activities/assignments

- Varying organizers for instructions

Lo-Prep Differentiations

- Choice of books or activities
- Exploration by interest
- Flexible grouping
- Goal setting with students
- Mini workshops to re-teach or extend skills
- Open-ended activities
- Think-Pair-Share
- Varied supplemental materials

Special Education Learning (IEP's & 504's)

Students with IEP's or 504's will be granted the following accommodations (as examples, but not limited to additional accommodations as deemed necessary):

- additional time will be granted to students with special needs to refresh their knowledge and skill in operating a compound light microscope (in class support and before/after school sessions will be provided as necessary)

- standardized chapter/unit tests will be modified in OnCouse Connect to limit answer choices and simplify vocabulary as necessary for better understanding and facility of use

- in the Dichotomous Keys laboratory exercise, students with special needs will be offered an abbreviated procedure to accommodate the level of the exercise.

- printed copy of board work/notes provided
- additional time for skill mastery
- behavior management plan
- check work frequently for understanding
- computer or electronic device utilizes
- extended time on tests/ quizzes
- have student repeat directions to check for understanding
- highlighted text visual presentation
- modified assignment format
- modified test content
- modified test format
- modified test length
- multi-sensory presentation
- multiple test sessions
- preferential seating
- preview of content, concepts, and vocabulary

- Provide modifications as dictated in the student's IEP/504 plan
- reduced/shortened reading assignments
- Reduced/shortened written assignments
- secure attention before giving instruction/directions
- shortened assignments
- student working with an assigned partner
- teacher initiated weekly assignment sheet
- Use open book, study guides, test prototypes

English Language Learning (ELL)

To assist ELL students, the following are examples of modifications to instruction (including, but limited to):

-ELL students will be paired with students who are bilingual to assist in translation of English to the students' native language to ease the transition into the exclusive use of English in the classroom setting

-ELL students will be offered videos or illustrations of laboratory procedures to facilitate the understanding of those procedures (ex. pictures of the microscope with labels in two languages)

-ELL students will be offered the Biology textbook written in Spanish, if they are a native Spanish speaker, which aligns to the English-language version of the textbook to facilitate translations and understanding

- teaching key aspects of a topic. Eliminate nonessential information
- using videos, illustrations, pictures, and drawings to explain or clarif
- allowing products (projects, timelines, demonstrations, models, drawings, dioramas, poster boards, charts, graphs, slide shows, videos, etc.) to demonstrate student’s learning;
- allowing students to correct errors (looking for understanding)
- allowing the use of note cards or open-book during testing
- decreasing the amount of workpresented or required
- having peers take notes or providing a copy of the teacher’s notes
- modifying tests to reflect selected objectives
- providing study guides
- reducing or omitting lengthy outside reading assignments
- reducing the number of answer choices on a multiple choice test
- tutoring by peers
- using computer word processing spell check and grammar check features
- using true/false, matching, or fill in the blank tests in lieu of essay tests

At Risk

To assist At Risk students, the following are examples of modifications to instruction (including, but limited

to):

-At Risk students will be presented with a streamlined curriculum removing non-essential information for ease of understanding

-At Risk students will be provided with study guides at conclusion of the unit to facilitate understanding

-At Risk students will be allowed to take tests open book

- allowing students to correct errors (looking for understanding)
- teaching key aspects of a topic. Eliminate nonessential information
- allowing products (projects, timelines, demonstrations, models, drawings, dioramas, poster boards, charts, graphs, slide shows, videos, etc.) to demonstrate student's learning
- allowing students to select from given choices
- allowing the use of note cards or open-book during testing
- collaborating (general education teacher and specialist) to modify vocabulary, omit or modify items to reflect objectives for the student, eliminate sections of the test, and determine how the grade will be determined prior to giving the test.
- decreasing the amount of workpresented or required
- having peers take notes or providing a copy of the teacher's notes
- marking students' correct and acceptable work, not the mistakes
- modifying tests to reflect selected objectives
- providing study guides
- reducing or omitting lengthy outside reading assignments
- reducing the number of answer choices on a multiple choice test
- tutoring by peers
- using authentic assessments with real-life problem-solving
- using true/false, matching, or fill in the blank tests in lieu of essay tests
- using videos, illustrations, pictures, and drawings to explain or clarify

Talented and Gifted Learning (T&G)

To assist T&G students, the following are examples of modifications to instruction (including, but limited to):

-Students can research an extinct animal and determine the cause of said extinction.

-A more challenging classification lab can be offered

-An additional project (Designer Animals) can be assigned to deepen the knowledge of characteristics of animals

- Above grade level placement option for qualified students
- Advanced problem-solving
- Allow students to work at a faster pace
- Cluster grouping
- Complete activities aligned with above grade level text using Benchmark results
- Create a plan to solve an issue presented in the class or in a text
- Flexible skill grouping within a class or across grade level for rigor
- Higher order, critical & creative thinking skills, and discovery
- Multi-disciplinary unit and/or project
- Teacher-selected instructional strategies that are focused to provide challenge, engagement, and growth opportunities
- Utilize exploratory connections to higher-grade concepts
- Utilize project-based learning for greater depth of knowledge

Sample Lesson

Unit Name: History and General Anatomy of Animals

NJSLS: see Standards below

Interdisciplinary Connection: see Standards below

Statement of Objective: SWBAT distinguish between tissue types of simple versus complex animals by engaging in a small group laboratory activity with ≥80% accuracy.

Anticipatory Set/Do Now: Entrance ticket (MC&T/F): review of pre-lab activity, use of the microscope, and lab safety procedures

Learning Activity: group laboratory activity (using microscopes)

Student Assessment/CFU's: Entrance ticket, observation of lab techniques using teacher checklist, sketching microscopic views of tissue types or digital photography portfolio, lab questions

Materials: Chromebooks with Google Classroom, posted lab activity worksheet, posted Use of Microscope refresher, microscopes, various slides of muscle tissue, sketch paper, pencils

21st Century Themes and Skills: see list below

Differentiation/Modifications: see list below

Integration of Technology: Chromebooks, internet access, Google Classroom, microscopes

21st Century Themes and Skills:

- Small group setting and instruction
- Preview content and concepts
- Group investigations
- Multisensory approach
- Behavior management plans

- Project-based learning
- Open-ended activities

Differentiations:

- Small group instruction
- Small group assignments
- Extra time to complete assignments
- Pairing oral instruction with visuals
- Repeat directions
- Use manipulatives
- Teacher reads assessments allowed
- Rephrase written directions
- Multisensory approaches
- Additional time
- Preview vocabulary
- Preview content & concepts
- Behavior management plan
- Highlight text
- Student(s) work with assigned partner
- Small group setting

Hi-Prep Differentiations:

- Group investigations
- Independent research and projects
- Multiple intelligence options
- Project-based learning
- Tiered activities/assignments

Lo-Prep Differentiations

- Exploration by interest
- Flexible grouping
- Goal setting with students
- Open-ended activities

LA.RST.11-12.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
LA.RST.11-12.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11-12 texts and topics.
LA.RST.11-12.5	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
LA.WHST.11-12.1	Write arguments focused on discipline-specific content.

LA.WHST.11-12.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
LA.WHST.11-12.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
9-12.HS-LS1-2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
9-12.HS-LS1-2.2.1	Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system.
9-12.HS-LS1-2.4.1	Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions— including energy, matter, and information flows—within and between systems at different scales.
9-12.HS-LS1-1.LS1.A.1	Systems of specialized cells within organisms help them perform the essential functions of life.
9-12.HS-LS1-2.LS1.A.1	Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.