

Subject: Zoology

Unit 1: Introduction to Zoology and Evolution

Grade Level: 11-12

Designed by: Maria O'Boyle

School District: Tunkhannock Area

School: High School

Brief Summary of Unit:

Zoology is the scientific study of animals. Over 600 million years of history demonstrates extensive and ongoing change, or evolution. All living things must evolve to survive.

Unit 1: Introduction to Zoology and Evolution

Section 1: Introduction to Zoology

BIO.B.4.2.1

Describe how energy flows through an ecosystem (e.g., food chains, food webs, energy pyramids).

[Materials & Resources](#)

BIO.B.4.2.2

Describe biotic interactions in an ecosystem (e.g., competition, predation, symbiosis).

3.1.10.A6.

Identify the advantages of multi-cellularity in organisms.

3.1.12.A2.

Evaluate how organisms must derive energy from their environment or their food in order to survive.

3.1.12.A5.

Analyze how structure is related to function at all levels of biological organization from molecules to organisms.

3.1.12.A6.

Analyze how cells in different tissues/organs are specialized to perform specific functions.

3.1.12.A8.

CHANGE AND CONSTANCY

Describe and interpret dynamic changes in stable systems.

Overarching Understanding:

- Animals are complex organisms that interact with biotic and abiotic parts of their ecosystems. In order to understand relationships among animals more clearly, one must understand the classification of animals.

Topical Understandings	Essential Questions
<ul style="list-style-type: none"> • Zoology is a field of science that studies the Animal Kingdom. • Members of the Animal Kingdom possess unique characteristics that are used to classify them. • Members of the Animal Kingdom are classified and grouped based on similarities. • Scientists name and classify organisms to avoid worldwide confusion. • Animals have evolved into complex organisms. 	<ul style="list-style-type: none"> • What is Zoology? • What are the characteristics of animals? • What is Taxonomy? • How are animals related to each other? • What is a dichotomous key and how is it used? • How do many types of animals live in one geographic area?
Knowledge	Skills
<ul style="list-style-type: none"> • Vocabulary: zoology, animal, niche, producer, consumer, decomposer, carnivore, herbivore, omnivore, predator, prey, symbiosis, trait, taxa, common name, scientific name, ecosystem, community, population. • List taxa in order from largest(most general) to smallest(most specific). • Explain why each niche in an ecosystem must be filled. • List some factors that lead to animals becoming threatened, endangered, and extinct. 	<ul style="list-style-type: none"> • Identify the characteristics of the Animal Kingdom. • Discuss animal behavior. • Investigate the different types of animal cells. • Discuss the importance of scientific names and explain why organisms are classified. • Discuss the classification system used by Zoologists. • Use and interpret a dichotomous key. • Draw a food web representative of a particular ecosystem.

Assessment

Evaluation Criteria	Evidence of Understanding
<ul style="list-style-type: none"> • Worksheets • Quizzes • Tests • In class activities • Cooperative work 	<ul style="list-style-type: none"> • When presented with taxonomy of various animals, determine which are most closely related. • Explain the need for scientific names. • Interpret various graphic data related to animals and animal populations.

Materials and Resources

Source	Description of Use
<ul style="list-style-type: none"> • “Animal Diversity, 4th Edition”, 	<ul style="list-style-type: none"> • Materials necessary to complete performance tasks.

- Hickman et al.
- Powerpoint
 - Preserved animal specimens
 - Videos
 - Video clips
 - Dissecting microscopes
 - Microslide viewers and slides
 - Paper
 - Crayons/markers/colored pencils
 - Laptop computers

Unit 1: Introduction to Zoology and Evolution

Section 2: Evolution and Variation

3.1.10.A6.

Identify the advantages of multi-cellularity in organisms.

3.1.12.A2.

Evaluate how organisms must derive energy from their environment or their food in order to survive.

3.1.12.A5.

Analyze how structure is related to function at all levels of biological organization from molecules to organisms.

3.1.12.A6.

Analyze how cells in different tissues/organs are specialized to perform specific functions.

3.1.10.C1.

Explain the mechanisms of biological evolution.

3.1.10.C2.

Explain the role of mutations and gene recombination in changing a population of organisms.

3.1.10.C3.

CONSTANCY AND CHANGE

Interpret data from fossil records, anatomy and physiology, and DNA studies relevant to the theory of evolution.

3.1.12.A8.

CHANGE AND CONSTANCY

Describe and interpret dynamic changes in stable systems.

Overarching Understanding:

- All living things evolve. Evolution and reproduction lead to variation. Variation promotes survival.

Topical Understandings	Essential Questions
<ul style="list-style-type: none"> • Evolution is change over time. • All living things evolve. • Animals utilize both asexual and reproduction. 	<ul style="list-style-type: none"> • Why is evolution constant? • How can new species of animals form? • Why was the beagle's journey so important to Darwin's thinking?
Knowledge	Skills
<ul style="list-style-type: none"> • Vocabulary: evolution, natural selection, speciation, gradualism, variation, inheritance, sexual reproduction, asexual reproduction, homology, analogy, symmetry, bilateral symmetry, radial symmetry, metamerism, cephalization. • Distinguish between asexual and sexual reproduction. • Distinguish between radial and bilateral symmetry. 	<ul style="list-style-type: none"> • List each of Darwin's 5 theories of evolution, and give an example of a different animal that applies to each one. • Interpret graphical data relative to speciation and changes in populations. • Label oral and aboral sides of radially symmetrical animal. • Label dorsal, ventral, anterior, posterior, lateral, medial, proximal, distal regions, and transverse, frontal, and sagittal planes of bilaterally symmetrical animal.

Assessment

Evaluation Criteria	Evidence of Understanding
<ul style="list-style-type: none"> • Worksheets • Quizzes • Tests • In class activities • Cooperative work 	<ul style="list-style-type: none"> • Explain how sexual reproduction promotes variation among a species more so than asexual reproduction does. • Use an animal other than peppered moths to explain natural selection.

Materials and Resources

Source	Description of Use
<ul style="list-style-type: none"> • "Animal Diversity, 4th Edition", Hickman et al. • Powerpoint • Preserved animal specimens • Videos • Video clips • Paper 	<ul style="list-style-type: none"> • Materials necessary to complete performance tasks.

- | | |
|--|--|
| <ul style="list-style-type: none">• Crayons/markers/colored pencils• Laptop computers | |
|--|--|

Subject: Zoology
Unit 2: Phylum Porifera

Grade Level: 11-12

Designed by: Maria O'Boyle

School District: Tunkhannock Area

School: High School

Brief Summary of Unit:

Poriferans are the simplest animals. They do not exhibit symmetry of any kind and demonstrate only the cellular level of organization.
--

Unit 2: Phylum Porifera

BIO.B.4.2.1

Describe how energy flows through an ecosystem (e.g., food chains, food webs, energy pyramids).

Materials & Resources

BIO.B.4.2.2

Describe biotic interactions in an ecosystem (e.g., competition, predation, symbiosis).

3.1.10.A6.

Identify the advantages of multi-cellularity in organisms.

3.1.12.A2.

Evaluate how organisms must derive energy from their environment or their food in order to survive.

3.1.12.A5.

Analyze how structure is related to function at all levels of biological organization from molecules to organisms.

3.1.12.A6.

Analyze how cells in different tissues/organs are specialized to perform specific functions.

3.1.12.A8.

CHANGE AND CONSTANCY

Describe and interpret dynamic changes in stable systems.

Overarching Understanding:

- Poriferans demonstrate the simplest, yet still complex, characteristics of the animal kingdom.

Topical Understandings	Essential Questions
<ul style="list-style-type: none"> • Poriferans are the simplest animals. • Poriferans have differentiated cells and cell layers that make up their anatomy. • Adult poriferans are sessile. 	<ul style="list-style-type: none"> • How can something like a sponge be considered an animal? • Why do poriferans exhibit such great regenerative powers? • Why are sponges called poriferans?
Knowledge	Skills
<ul style="list-style-type: none"> • Vocabulary: pore, ostium, osculum, pinococyte, mesohyl, choanocyte, spongocoel, porocyte, archaeocyte, filter feeding, gemmule, spicule, elastin, calcareous, sessile, motile. • Sponges can reproduce sexually and/or asexually, depending on the species. • Not all sponges are squishy. • 	<ul style="list-style-type: none"> • Identify the characteristics of the Phylum Porifera. • Investigate the anatomy and physiology of a sponge.

Assessment

Evaluation Criteria	Evidence of Understanding
<ul style="list-style-type: none"> • Worksheets • Quizzes • Tests • In class activities • Cooperative work 	<ul style="list-style-type: none"> • When presented with diagrams of various types of poriferans, label all parts indicated. • Explain how an animal may be motile in its larval form, but sessile in its adult form. • Discuss ways that sessile animals feed, protect themselves, and reproduce.

Materials and Resources

Source	Description of Use
<ul style="list-style-type: none"> • "Animal Diversity, 4th Edition", Hickman et al. • Powerpoint • Preserved animal specimens • Videos • Video clips • Dissecting microscopes 	<ul style="list-style-type: none"> • Materials necessary to complete performance tasks.

- Coloring worksheets
- Paper
- Crayons/markers/colored pencils
- Laptop computers

Subject: Zoology
Unit 3: Phylum Cnidaria

Grade Level: 11-12

Designed by: Maria O'Boyle

School District: Tunkhannock Area

School: High School

Brief Summary of Unit:

Cnidarians are simple animals that possess stinging cells.

Unit 3: Phylum Cnidaria

BIO.B.4.2.1

Describe how energy flows through an ecosystem (e.g., food chains, food webs, energy pyramids).

[Materials & Resources](#)

BIO.B.4.2.2

Describe biotic interactions in an ecosystem (e.g., competition, predation, symbiosis).

3.1.10.A6.

Identify the advantages of multi-cellularity in organisms.

3.1.12.A2.

Evaluate how organisms must derive energy from their environment or their food in order to survive.

3.1.12.A5.

Analyze how structure is related to function at all levels of biological organization from molecules to organisms.

3.1.12.A6.

Analyze how cells in different tissues/organs are specialized to perform specific functions.

3.1.12.A8.

CHANGE AND CONSTANCY

Describe and interpret dynamic changes in stable systems.

Overarching Understanding:

- Cnidarians exhibit the tissue level of biological organization, but are still very simple animals.

Topical Understandings	Essential Questions
<ul style="list-style-type: none">• Cnidarians have differentiated germ layers with a gelatinous layer in between.• All cnidarians possess at least one type of stinging cell.•	<ul style="list-style-type: none">• How does having two germ layers contribute to the complexity of an animal?• How are stinging cells used by cnidarians?
Knowledge	Skills
<ul style="list-style-type: none">• Vocabulary: germ layers, endoderm, gastrodermis, ectoderm, epidermis, mesoglea, gastrovascular cavity, tentacles, oral, aboral, polyp, medusa, diploblastic, nerve net, planula, cnidocyte, nematocyst.• Most cnidarians exhibit radial symmetry, although athozoans exhibit biradial symmetry.	<ul style="list-style-type: none">• Identify the characteristics of the Phylum Cnidaria.• Investigate the anatomy and physiology of a hydrozoan, a scyphozoan, and an anthozoan.• Differentiate between the polyp and medusa body forms.• Explain ramifications of coral bleaching.

Assessment

Evaluation Criteria	Evidence of Understanding
<ul style="list-style-type: none">• Worksheets• Quizzes• Tests• In class activities• Cooperative work	<ul style="list-style-type: none">• When presented with diagrams of various types of cnidarians, label all parts indicated.• Explain how stinging cells are used by cnidarians to feed, and to protect themselves.• Discuss ways 3 types of asexual reproduction seen in cnidarians.• Discuss differences among 3 classes of cnidarians learned in class in reference to body type, locomotion, feeding, and reproduction.• Explain how status of a coral reef is an indicator of a the health of that ecosystem.

Materials and Resources

Source	Description of Use
<ul style="list-style-type: none">• "Animal Diversity, 4th Edition", Hickman et al.	<ul style="list-style-type: none">• Materials necessary to complete performance tasks.

- Powerpoint
- Preserved animal specimens
- Dissectible animal specimens – metridium, Aurelia
- Live animal specimens – hydra and brine shrimp
- Videos
- Video clips
- Dissecting microscopes
- Coloring worksheets
- Paper
- Crayons/markers/colored pencils
- Laptop computers

Subject: Zoology
Unit 4: Simple Worms

Grade Level: 11-12

Designed by: Maria O'Boyle

School District: Tunkhannock Area

School: High School

Brief Summary of Unit:

The term “worm” has been loosely applied to elongated, bilateral invertebrates without appendages. There are many types of worms, and not all are worm-like; they may be free living or parasitic, aquatic, semi-aquatic, or terrestrial; they come in round, flat, and segmented forms.

Unit 4: Simple Worms

Section 1: Phylum Platyhelminthes

BIO.B.4.2.1

Describe how energy flows through an ecosystem (e.g., food chains, food webs, energy pyramids).

Materials & Resources

BIO.B.4.2.2

Describe biotic interactions in an ecosystem (e.g., competition, predation, symbiosis).

3.1.10.A6.

Identify the advantages of multi-cellularity in organisms.

3.1.12.A2.

Evaluate how organisms must derive energy from their environment or their food in order to survive.

3.1.12.A5.

Analyze how structure is related to function at all levels of biological organization from molecules to organisms.

3.1.12.A6.

Analyze how cells in different tissues/organs are specialized to perform specific functions.

3.1.12.A8.

CHANGE AND CONSTANCY

Describe and interpret dynamic changes in stable systems.

Overarching Understanding:

- Worms are the first animals we see that exhibit bilateral symmetry and the organ, and then system levels of biological organization.

Topical Understandings	Essential Questions
<ul style="list-style-type: none"> • Worms have 3 differentiated germ layers. • Flatworms and roundworms have reached the organ-system level of organization. 	<ul style="list-style-type: none"> • How does having 3 germ layers contribute to the complexity of an animal?
Knowledge	Skills
<ul style="list-style-type: none"> • Vocabulary: triploblastic, mesoderm, cephalization, ladder type nervous system, flame cells, rhabdites, endoparasite, ectoparasite, cyst, intermediate host, definitive host. • Turbellarians are free living flatworms; planaria is an example. • Trematodes are all parasitic flatworms; these are flukes. • Cestodes are all parasitic flatworms; these are tapeworms. 	<ul style="list-style-type: none"> • Identify the characteristics of the Phylum Platyhelminthes. • Investigate the anatomy, physiology, and behavior of a turbellarian. • Differentiate between an endoparasite and an ectoparasite. • Differentiate between an intermediate host and a definitive host.

Assessment

Evaluation Criteria	Evidence of Understanding
<ul style="list-style-type: none"> • Worksheets • Quizzes • Tests • In class activities 	<ul style="list-style-type: none"> • When presented with diagrams of various types of platyhelminthes, label all parts indicated. • Explain how specific parasitic flatworms move from host to host. • Explain how to prevent yourself from being infected with various types of parasitic

<ul style="list-style-type: none"> • Cooperative work 	flatworms.
--	------------

Materials and Resources

Source	Description of Use
<ul style="list-style-type: none"> • “Animal Diversity, 4th Edition”, Hickman et al. • Powerpoint • Preserved animal specimens • Live animal specimens – planaria • Videos • Video clips • Dissecting microscopes • Light microscopes • Slides - tapeworm • Coloring worksheets • Paper • Crayons/markers/colored pencils • Laptop computers 	<ul style="list-style-type: none"> • Materials necessary to complete performance tasks.

Unit 2: Simple Worms

Section 2: Phylum Nematoda

BIO.B.4.2.1

Describe how energy flows through an ecosystem (e.g., food chains, food webs, energy pyramids).

Materials & Resources

BIO.B.4.2.2

Describe biotic interactions in an ecosystem (e.g., competition, predation, symbiosis).

3.1.10.A6.

Identify the advantages of multi-cellularity in organisms.

3.1.12.A2.

Evaluate how organisms must derive energy from their environment or their food in order to survive.

3.1.12.A5.

Analyze how structure is related to function at all levels of biological organization from molecules to organisms.

3.1.12.A6.

Analyze how cells in different tissues/organs are specialized to perform specific functions.

3.1.12.A8.

CHANGE AND CONSTANCY

Describe and interpret dynamic changes in stable systems.

Overarching Understanding:

- Worms are the first animals we see that exhibit bilateral symmetry and the organ, and then system levels of biological organization.

Topical Understandings	Essential Questions
<ul style="list-style-type: none">• Worms have 3 differentiated germ layers.• Worms have reached the organ-system level of organization.• Roundworms have a one-way digestive system.	<ul style="list-style-type: none">• How does having a one-way digestive system contribute to the complexity of an animal?• Why don't all parasitic roundworms have intermediate hosts?
Knowledge	Skills
<ul style="list-style-type: none">• Vocabulary: hydrostatic skeleton, cuticle, longitudinal muscles, alimentary canal, pharynx.• Most nematodes are free living worms and are harmless to humans.	<ul style="list-style-type: none">• Identify the characteristics of the Phylum Nematoda.• Investigate the anatomy and physiology of a roundworm.• Differentiate between an endoparasite and an ectoparasite.

Assessment

Evaluation Criteria	Evidence of Understanding
<ul style="list-style-type: none">• Worksheets• Quizzes• Tests• In class activities• Cooperative work	<ul style="list-style-type: none">• When presented with diagrams of various types of nematodes, label all parts indicated.• Explain how specific parasitic roundworms invade humans.• Explain how to prevent yourself from being infected with various types of parasitic roundworms.• Explain why parasitic roundworms are more prevalent in underdeveloped countries than here in the United States.

Materials and Resources

Source	Description of Use
<ul style="list-style-type: none">• "Animal Diversity, 4th Edition", Hickman et al.• Powerpoint	<ul style="list-style-type: none">• Materials necessary to complete performance tasks.

- Preserved animal specimens
- Videos
- Video clips
- Dissecting microscopes
- Coloring worksheets
- Paper
- Crayons/markers/colored pencils
- Laptop computers

Subject: Zoology
Unit 4: Simple Worms

Grade Level: 11-12

Designed by: Maria O'Boyle

School District: Tunkhannock Area

School: High School

Brief Summary of Unit:

The term "worm" has been loosely applied to elongated, bilateral invertebrates without appendages. There are many types of worms, and not all are worm-like; they may be free living or parasitic, aquatic, semi-aquatic, or terrestrial; they come in round, flat, and segmented forms.

Unit 4: Simple Worms

Section 1: Phylum Platyhelminthes

BIO.B.4.2.1

Describe how energy flows through an ecosystem (e.g., food chains, food webs, energy pyramids).

[Materials & Resources](#)

BIO.B.4.2.2

Describe biotic interactions in an ecosystem (e.g., competition, predation, symbiosis).

3.1.10.A6.

Identify the advantages of multi-cellularity in organisms.

3.1.12.A2.

Evaluate how organisms must derive energy from their environment or their food in order to survive.

3.1.12.A5.

Analyze how structure is related to function at all levels of biological organization from molecules to organisms.

3.1.12.A6.

Analyze how cells in different tissues/organs are specialized to perform specific functions.

3.1.12.A8.

CHANGE AND CONSTANCY

Describe and interpret dynamic changes in stable systems.

Overarching Understanding:

- Worms are the first animals we see that exhibit bilateral symmetry and the organ, and then system levels of biological organization.

Topical Understandings	Essential Questions
<ul style="list-style-type: none"> • Worms have 3 differentiated germ layers. • Flatworms and roundworms have reached the organ-system level of organization. 	<ul style="list-style-type: none"> • How does having 3 germ layers contribute to the complexity of an animal?
Knowledge	Skills
<ul style="list-style-type: none"> • Vocabulary: triploblastic, mesoderm, cephalization, ladder type nervous system, flame cells, rhabdites, endoparasite, ectoparasite, cyst, intermediate host, definitive host. • Turbellarians are free living flatworms; planaria is an example. • Trematodes are all parasitic flatworms; these are flukes. • Cestodes are all parasitic flatworms; these are tapeworms. 	<ul style="list-style-type: none"> • Identify the characteristics of the Phylum Platyhelminthes. • Investigate the anatomy, physiology, and behavior of a turbellarian. • Differentiate between an endoparasite and an ectoparasite. • Differentiate between an intermediate host and a definitive host.

Assessment

Evaluation Criteria	Evidence of Understanding
<ul style="list-style-type: none"> • Worksheets • Quizzes • Tests • In class activities • Cooperative work 	<ul style="list-style-type: none"> • When presented with diagrams of various types of platyhelminthes, label all parts indicated. • Explain how specific parasitic flatworms move from host to host. • Explain how to prevent yourself from being infected with various types of parasitic flatworms.

Materials and Resources

Source	Description of Use
<ul style="list-style-type: none"> • “Animal Diversity, 4th Edition”, 	<ul style="list-style-type: none"> • Materials necessary to complete performance tasks.

<p>Hickman et al.</p> <ul style="list-style-type: none">• Powerpoint• Preserved animal specimens• Live animal specimens – planaria• Videos• Video clips• Dissecting microscopes• Light microscopes• Slides - tapeworm• Coloring worksheets• Paper• Crayons/markers/colored pencils• Laptop computers	
---	--

Unit 2: Simple Worms

Section 2: Phylum Nematoda

BIO.B.4.2.1

Describe how energy flows through an ecosystem (e.g., food chains, food webs, energy pyramids).

Materials & Resources

BIO.B.4.2.2

Describe biotic interactions in an ecosystem (e.g., competition, predation, symbiosis).

3.1.10.A6.

Identify the advantages of multi-cellularity in organisms.

3.1.12.A2.

Evaluate how organisms must derive energy from their environment or their food in order to survive.

3.1.12.A5.

Analyze how structure is related to function at all levels of biological organization from molecules to organisms.

3.1.12.A6.

Analyze how cells in different tissues/organs are specialized to perform specific functions.

3.1.12.A8.

CHANGE AND CONSTANCY

Describe and interpret dynamic changes in stable systems.

Overarching Understanding:

- Worms are the first animals we see that exhibit bilateral symmetry and the organ, and then system levels of biological organization.

Topical Understandings	Essential Questions
<ul style="list-style-type: none"> • Worms have 3 differentiated germ layers. • Worms have reached the organ-system level of organization. • Roundworms have a one-way digestive system. 	<ul style="list-style-type: none"> • How does having a one-way digestive system contribute to the complexity of an animal? • Why don't all parasitic roundworms have intermediate hosts?
Knowledge	Skills
<ul style="list-style-type: none"> • Vocabulary: hydrostatic skeleton, cuticle, longitudinal muscles, alimentary canal, pharynx. • Most nematodes are free living worms and are harmless to humans. 	<ul style="list-style-type: none"> • Identify the characteristics of the Phylum Nematoda. • Investigate the anatomy and physiology of a roundworm. • Differentiate between an endoparasite and an ectoparasite.

Assessment

Evaluation Criteria	Evidence of Understanding
<ul style="list-style-type: none"> • Worksheets • Quizzes • Tests • In class activities • Cooperative work 	<ul style="list-style-type: none"> • When presented with diagrams of various types of nematodes, label all parts indicated. • Explain how specific parasitic roundworms invade humans. • Explain how to prevent yourself from being infected with various types of parasitic roundworms. • Explain why parasitic roundworms are more prevalent in underdeveloped countries than here in the United States.

Materials and Resources

Source	Description of Use
<ul style="list-style-type: none"> • "Animal Diversity, 4th Edition", Hickman et al. • Powerpoint • Preserved animal specimens • Videos • Video clips • Dissecting microscopes • Coloring worksheets • Paper • Crayons/markers/colored pencils 	<ul style="list-style-type: none"> • Materials necessary to complete performance tasks.

- Laptop computers

Subject: Zoology
Unit 6: Phylum Arthropoda

Grade Level: 11-12

Designed by: Maria O'Boyle

School District: Tunkhannock Area

School: High School

Brief Summary of Unit:

Arthropods are the most numerous and most diverse of all the animal phyla.

Unit 6: Phylum Arthropoda

Section 1: Arthropod Traits

BIO.B.4.2.1

Describe how energy flows through an ecosystem (e.g., food chains, food webs, energy pyramids).

BIO.B.4.2.2

Describe biotic interactions in an ecosystem (e.g., competition, predation, symbiosis).

3.1.10.A6.

Identify the advantages of multi-cellularity in organisms.

3.1.12.A2.

Evaluate how organisms must derive energy from their environment or their food in order to survive.

3.1.12.A5.

Analyze how structure is related to function at all levels of biological organization from molecules to organisms.

3.1.12.A6.

Analyze how cells in different tissues/organs are specialized to perform specific functions.

3.1.12.A8.

CHANGE AND CONSTANCY

Describe and interpret dynamic changes in stable systems.

Overarching Understanding:

- Arthropods have an exoskeleton, jointed appendages, a metameric body, and highly adapted mouthparts.

Topical Understandings	Essential Questions
<ul style="list-style-type: none"> • All arthropods have a hard, chitinous exoskeleton that must be molted for the animal to grow. • All have at least 3 pairs of walking appendages. • All have a segmented body. • All are highly adapted. 	<ul style="list-style-type: none"> • Why must an arthropod molt its exoskeleton? • What are some ways arthropods communicate with each other?
Knowledge	Skills
<ul style="list-style-type: none"> • Vocabulary: exoskeleton, appendages, chitin, ecdysis(molting), segments, tagmata. 	<ul style="list-style-type: none"> • Identify the characteristics of the Phylum Arthropoda. • Investigate the anatomy and physiology of a various arthropods.

Assessment

Evaluation Criteria	Evidence of Understanding
<ul style="list-style-type: none"> • Worksheets • Quizzes • Tests • In class activities • Cooperative work 	<ul style="list-style-type: none"> • When presented with diagrams of various types of arthropods, label all parts indicated. • Explain how an arthropod grows. • Explain how certain characteristics of arthropods make them extremely successful as a group.

Materials and Resources

Source	Description of Use
<ul style="list-style-type: none"> • "Animal Diversity, 4th Edition", Hickman et al. • Powerpoint • Preserved animal specimens • Videos • Video clips • Dissecting microscopes • Coloring worksheets • Paper • Crayons/markers/colored pencils • Laptop computers 	<ul style="list-style-type: none"> • Materials necessary to complete performance tasks.

Section 2: Subphylum Chelicerata

Topical Understandings	Essential Questions
<ul style="list-style-type: none"> Chelicerates are an ancient group of arthropods that includes horseshoe crabs, ticks, mites, spiders, and scorpions, and others. Chelicerates do not have mandibles or antennae. 	<ul style="list-style-type: none"> What makes a spider different from an ant? What are some ways spiders find a mate? Do all spiders spin webs? How do some scorpions care for their young?
Knowledge	Skills
<ul style="list-style-type: none"> Vocabulary: cephalothorax, abdomen, pedicel, chelicerae, pedipalps, book lungs, simple eyes, sensory setae, silk glands, preabdomen, postabdomen, capitulum. 	<ul style="list-style-type: none"> Identify the characteristics of the Subphylum Chelicerata.. Investigate the anatomy and physiology of a various chelicerates. Differentiate among tagmata of spiders and scorpions.

Assessment

Evaluation Criteria	Evidence of Understanding
<ul style="list-style-type: none"> Worksheets Quizzes Tests In class activities Cooperative work 	<ul style="list-style-type: none"> When presented with diagrams of various types of chelicerates, label all parts indicated. Explain how chelicerates use their sensory setae. Explain how certain groups of spiders attract mates.

Materials and Resources

Source	Description of Use
<ul style="list-style-type: none"> “Animal Diversity, 4th Edition”, Hickman et al. Powerpoint Preserved animal specimens Videos Video clips Dissecting microscopes Coloring worksheets Paper Crayons/markers/colored pencils Laptop computers 	<ul style="list-style-type: none"> Materials necessary to complete performance tasks.

Section 3: Subphylum Crustacea

Topical Understandings	Essential Questions

<ul style="list-style-type: none"> Crustaceans are primarily aquatic, mainly marine, some freshwater, and some terrestrial species. Crustaceans have mandibles, 2 pairs of maxillae, and 2 pairs of antennae. Most tend to have between 16 and 20 body segments. 	<ul style="list-style-type: none"> What are the body sections of a crustacean? How many pairs of walking legs do they have?
Knowledge	Skills
<ul style="list-style-type: none"> Vocabulary: cephalothorax, abdomen, mandibles, maxillae, swimmerets, biramous, uniramous, maxillipeds, chelipeds, uropods. 	<ul style="list-style-type: none"> Identify the characteristics of the Subphylum Crustacea. Investigate the anatomy and physiology of a various crustaceans.

Assessment

Evaluation Criteria	Evidence of Understanding
<ul style="list-style-type: none"> Worksheets Quizzes Tests In class activities Cooperative work 	<ul style="list-style-type: none"> When presented with diagrams of a crayfish, label all parts indicated. Explain how crustaceans utilize their chelipeds.

Materials and Resources

Source	Description of Use
<ul style="list-style-type: none"> “Animal Diversity, 4th Edition”, Hickman et al. Powerpoint Preserved animal specimens Videos Video clips Dissecting microscopes Coloring worksheets Paper Crayons/markers/colored pencils Laptop computers 	<ul style="list-style-type: none"> Materials necessary to complete performance tasks.

Section 3: Subphylum Myriapoda

Topical Understandings	Essential Questions
-------------------------------	----------------------------

<ul style="list-style-type: none"> • Myriapods have evolved a pattern of a head and trunk with paired appendages on almost every trunk segment. • Myriapods include chilopods(centipedes) and diplopods(millipedes). 	<ul style="list-style-type: none"> • What are the body sections of a myriapod? • How many pairs of walking legs do chilopods per trunk segment? • How many pairs of walking legs do diplopods have per trunk segment?
Knowledge	Skills
<ul style="list-style-type: none"> • Vocabulary: mandibles, maxillae, uniramous, centipede, millipede. 	<ul style="list-style-type: none"> • Identify the characteristics of the Subphylum Myriapoda. • Investigate the anatomy and physiology of chilopods vs. diplopods. • Identify a chilopod and a diplopod.

Assessment

Evaluation Criteria	Evidence of Understanding
<ul style="list-style-type: none"> • Worksheets • Quizzes • Tests • In class activities • Cooperative work 	<ul style="list-style-type: none"> • When presented with myriapod specimens, differentiate between the chilopod and the diplopod. • Explain how centipedes and millipedes feed.

Materials and Resources

Source	Description of Use
<ul style="list-style-type: none"> • “Animal Diversity, 4th Edition”, Hickman et al. • Powerpoint • Preserved animal specimens • Videos • Video clips • Dissecting microscopes • Coloring worksheets • Paper • Crayons/markers/colored pencils • Laptop computers 	<ul style="list-style-type: none"> • Materials necessary to complete performance tasks.

Section 4: Class Insecta

Topical Understandings	Essential Questions
<ul style="list-style-type: none"> • Insects are the most numerous and the most diverse of all the arthropods. • Insects have a head, thorax and abdomen, one pair of antennae, and 3 pairs of walking legs. • If winged, there are 2 pairs of wings. • All appendages for locomotion are located on the thorax. 	<ul style="list-style-type: none"> • What are the body sections of an insect? • What is it about insects that allows them to be so successful and diverse? • Why are some types of insects termed “colonial”? • How do insects communicate with each other? • How are insects beneficial to humans?
Knowledge	Skills
<ul style="list-style-type: none"> • Vocabulary: mandibles, maxillae, head, thorax, abdomen, labrum, labium, hypopharynx, prothorax, mesothorax, metathorax, tracheae. • Insects have very distinct, highly adapted mouthparts that include biting and chewing mouthparts, sucking mouthparts, and piercing mouthparts. 	<ul style="list-style-type: none"> • Identify the characteristics of the Class Insecta. • Investigate the anatomy, physiology, and behavior of various arthropods.

Assessment

Evaluation Criteria	Evidence of Understanding
<ul style="list-style-type: none"> • Worksheets • Quizzes • Tests • In class activities • Cooperative work 	<ul style="list-style-type: none"> • When presented with models/diagrams of various insects, label all indicated parts. • Explain the hierarchy within a bee colony.

Materials and Resources

Source	Description of Use
<ul style="list-style-type: none"> • “Animal Diversity, 4th Edition”, Hickman et al. • Powerpoint • Preserved animal specimens • Videos • Video clips • Dissecting microscopes • Live pill bugs • Coloring worksheets 	<ul style="list-style-type: none"> • Materials necessary to complete performance tasks.

- | | |
|--|--|
| <ul style="list-style-type: none">• Paper• Crayons/markers/colored pencils• Laptop computers | |
|--|--|

Subject: Zoology

Unit 7: Introduction to Phylum Chordata

Grade Level: 11-12

Designed by: Maria O'Boyle

School District: Tunkhannock Area

School: High School

Brief Summary of Unit:

Chordates are the most advanced phylum of animals. All chordates possess 5 hallmark characteristics at some point in their lives.

Unit 7: Introduction to Phylum Chordata

BIO.B.4.2.1

Describe how energy flows through an ecosystem (e.g., food chains, food webs, energy pyramids).

BIO.B.4.2.2

Describe biotic interactions in an ecosystem (e.g., competition, predation, symbiosis).

3.1.10.A6.

Identify the advantages of multi-cellularity in organisms.

3.1.12.A2.

Evaluate how organisms must derive energy from their environment or their food in order to survive.

3.1.12.A5.

Analyze how structure is related to function at all levels of biological organization from molecules to organisms.

3.1.12.A6.

Analyze how cells in different tissues/organs are specialized to perform specific functions.

3.1.12.A8.

CHANGE AND CONSTANCY

Describe and interpret dynamic changes in stable systems.

Overarching Understanding:

- The 5 distinctive hallmark that, when taken together, set chordates apart from other phyla are: notochord; dorsal, tubular nerve cord; pharyngeal pouches or slits; endostyle; postanal tail.

Topical Understandings	Essential Questions
<ul style="list-style-type: none"> • Although all chordates have the 5 hallmarks, they are usually present only during embryonic development. • There are 2 invertebrate subphyla of chordates. • The largest subphylum in Phylum Chordata is Vertebrata, which includes animals that have a backbone – and some that don't. 	<ul style="list-style-type: none"> • What characteristics set chordates apart from other animals? • Are all chordates vertebrates? • Do all vertebrates have a backbone?
Knowledge	Skills
<ul style="list-style-type: none"> • Vocabulary: notochord, pharyngeal pouches/slits, endostyle, vertebrate, vertebra(e), endoskeleton, myomeres, integument. • Tunicates and amphioxus are examples of invertebrate chordates. • Vertebrates have a group of characteristics that make them a successful group. 	<ul style="list-style-type: none"> • Identify the characteristics of the Phylum Chordata. • Identify the characteristics of Subphylum Urochordata. • Identify the characteristics of Subphylum Cephalochordata. • Identify the characteristics of subphylum Vertebrata.

Assessment

Evaluation Criteria	Evidence of Understanding
<ul style="list-style-type: none"> • Worksheets • Quizzes • Tests • In class activities • Cooperative work 	<ul style="list-style-type: none"> • When presented with diagrams of a tunicate and an amphioxus, label all parts indicated. • Compare and contrast the characteristics of the adult urochordates and cephalochordates with respect to the 5 chordate hallmarks. • Give scientific evidence supporting the theory that vertebrates have 4 main characteristics that make them very successful. • Explain the development of jawed vertebrates.

Materials and Resources

Source	Description of Use
<ul style="list-style-type: none"> • "Animal Diversity, 4th Edition", Hickman et al. • Powerpoint • Preserved animal specimens of 	<ul style="list-style-type: none"> • Materials necessary to complete performance tasks.

<p>tunicates and amphioxus for lab activities</p> <ul style="list-style-type: none">• Videos• Video clips• Dissecting microscopes• Light microscopes• Coloring worksheets• Paper• Crayons/markers/colored pencils• Laptop computers	
--	--

Subject: Zoology

Unit 8: Fishes

Grade Level: 11-12

Designed by: Maria O'Boyle

School District: Tunkhannock Area

School: High School

Brief Summary of Unit:

Fish are the most diverse, highly adapted group of vertebrates.

Unit 8: Fishes

BIO.B.4.2.1

Describe how energy flows through an ecosystem (e.g., food chains, food webs, energy pyramids).

BIO.B.4.2.2

Describe biotic interactions in an ecosystem (e.g., competition, predation, symbiosis).

3.1.10.A6.

Identify the advantages of multi-cellularity in organisms.

3.1.12.A2.

Evaluate how organisms must derive energy from their environment or their food in order to survive.

3.1.12.A5.

Analyze how structure is related to function at all levels of biological organization from molecules to organisms.

3.1.12.A6.

Analyze how cells in different tissues/organs are specialized to perform specific functions.

3.1.12.A8.

CHANGE AND CONSTANCY

Describe and interpret dynamic changes in stable systems.

Overarching Understanding:

- Fish are aquatic, gill breathing vertebrates. All groups of fishes have unique characteristics that set them apart from other types of fishes.

Section 1: Jawless Fishes - Agnathans

Topical Understandings	Essential Questions
<ul style="list-style-type: none">• Jawless fishes are primitive.• Hagfishes and lampreys	<ul style="list-style-type: none">• What characteristics set agnathans apart from other fish?• How would you tell the difference between a hagfish and a lamprey?• Are all lampreys the same?
Knowledge	Skills
<ul style="list-style-type: none">• Vocabulary: gill apertures, sensory barbells• Hagfish and lampreys are examples of jawless fishes(agnathans).•	<ul style="list-style-type: none">• Identify the characteristics of Agnathans.• Identify the characteristics of hagfishes.• Identify the characteristics of lampreys.

Assessment

Evaluation Criteria	Evidence of Understanding
<ul style="list-style-type: none">• Worksheets• Quizzes• Tests• In class activities• Cooperative work	<ul style="list-style-type: none">• When presented with diagrams of a hagfish and a lamprey, label all parts indicated.• Compare and contrast the life cycles of parasitic and non-parasitic lampreys.• Explain the feeding behavior of hagfish.• Explain the reproductive behavior of hagfishes.

Materials and Resources

Source	Description of Use
<ul style="list-style-type: none"> • “Animal Diversity, 4th Edition”, Hickman et al. • Powerpoint • Preserved animal specimens • Lamprey model • Videos • Video clips • Dissecting microscopes • Light microscopes • Coloring worksheets • Paper • Crayons/markers/colored pencils • Laptop computers 	<ul style="list-style-type: none"> • Materials necessary to complete performance tasks.

Section 2: Cartilaginous Fishes - Chondrichthyes

Topical Understandings	Essential Questions
<ul style="list-style-type: none"> • Chondrichthyes have a cartilage endoskeleton. • Chondrichthyes have paired jaws and paired fins. 	<ul style="list-style-type: none"> • What characteristics set cartilage fishes apart from other fish? • How would you tell the difference between a shark and a ray? • How are cartilage fishes similar to jawless fishes?
Knowledge	Skills
<ul style="list-style-type: none"> • Vocabulary: gill apertures, heterocercal tail, placoid scales, lateral line system, ampullary organs of Lorenzini, claspers, spiracles, oviparous, ovoviviparous, viviparous. • Sharks and rays are representative examples of chondrichthyes. • There are distinct differences in the body shape and organization of sharks and rays. • Cartilage fish have specialized sense organs to help them locate prey. 	<ul style="list-style-type: none"> • Identify the characteristics of Chondrichthyes. • Identify the characteristics of sharks. • Identify the characteristics of rays and skates. • Identify the characteristics of chimaeras.

Assessment

Evaluation Criteria	Evidence of Understanding
<ul style="list-style-type: none"> • Worksheets 	<ul style="list-style-type: none"> • When presented with diagrams of a shark and a ray, label all parts indicated.

<ul style="list-style-type: none"> • Quizzes • Tests • In class activities • Cooperative work 	<ul style="list-style-type: none"> • Compare and contrast the body characteristics of sharks and rays. • Explain how chondrichthyes use the ampullary organs of Lorenzini. • What is the difference between oviparous, ovoviviparous, viviparous.
---	--

Materials and Resources

Source	Description of Use
<ul style="list-style-type: none"> • “Animal Diversity, 4th Edition”, Hickman et al. • Powerpoint • Preserved animal specimens • Dogfish shark specimens for dissection • Dissection implements • Videos • Video clips • Dissecting microscopes • Coloring worksheets • Paper • Crayons/markers/colored pencils • Laptop computers 	<ul style="list-style-type: none"> • Materials necessary to complete performance tasks.

Section 3: Bony Fishes - Osteichthyes

Topical Understandings	Essential Questions
<ul style="list-style-type: none"> • Bony fishes are the most numerous and diverse type of fish. • Bony fishes have a bone endoskeleton of endochondral origin. • They have paired and medial fins supported by dermal rays. 	<ul style="list-style-type: none"> • What characteristics set osteichthyes apart from other fish? • How would you tell the difference between bony fish and a cartilage fish? • What are actinopterygians? • What are sarcopterygians?
Knowledge	Skills
<ul style="list-style-type: none"> • Vocabulary: operculum, ganoid, cycloid, and ctenoid scales, homocercal tail, diphyercal tail, swim bladder, peduncle. • Bony fishes have an operculum, and most have a swim bladder for buoyancy. 	<ul style="list-style-type: none"> • Identify the characteristics of bony fishes. • Identify the characteristics of actinopterygians. • Identify the characteristics of sarcopterygians.

<ul style="list-style-type: none"> • There are 2 main classes of bony fishes. • Bony fishes have highly efficient respiration. • There are 2 forms of fish migration. 	<ul style="list-style-type: none"> • Explain the similarities and differences among the 3 types of lungfishes.
--	---

Assessment

Evaluation Criteria	Evidence of Understanding
<ul style="list-style-type: none"> • Worksheets • Quizzes • Tests • In class activities • Cooperative work 	<ul style="list-style-type: none"> • When presented with diagrams of a teleost, label all parts indicated. • Interpret graphical data of fish migratory patterns. • Explain the differences between chondrosteans, non-teleost neopterygians, and teleost nepterygians with regard to scale type and tail shape, and an example of each. • Discuss the theory that sarcopterygians are the forerunners of tetrapods such as amphibians. • Discuss the relevance of countercurrent flow in the respiratory and circulatory systems of bony fishes. • Explain how the eggs spawned by pelagic and benthic fish differ, and how these differences are relevant to their respective survivals.

Materials and Resources

Source	Description of Use
<ul style="list-style-type: none"> • “Animal Diversity, 4th Edition”, Hickman et al. • Powerpoint • Preserved animal specimens • Videos • Video clips • Dissecting microscopes • Coloring worksheets • Paper • Crayons/markers/colored pencils • Laptop computers 	<ul style="list-style-type: none"> • Materials necessary to complete performance tasks.

Subject: Zoology
Unit 9: Class Amphibia

Grade Level: 11-12

Designed by: Maria O'Boyle

Brief Summary of Unit:

Class amphibian includes animals that lay eggs in water or moist environments, and the young hatch into these environments. The adult amphibians can move some distance from water, but are still tied to water due to their porous skin.

Unit 9: Class Amphibia

BIO.B.4.2.1

Describe how energy flows through an ecosystem (e.g., food chains, food webs, energy pyramids).

BIO.B.4.2.2

Describe biotic interactions in an ecosystem (e.g., competition, predation, symbiosis).

3.1.10.A6.

Identify the advantages of multi-cellularity in organisms.

3.1.12.A2.

Evaluate how organisms must derive energy from their environment or their food in order to survive.

3.1.12.A5.

Analyze how structure is related to function at all levels of biological organization from molecules to organisms.

3.1.12.A6.

Analyze how cells in different tissues/organs are specialized to perform specific functions.

3.1.12.A8.

CHANGE AND CONSTANCY

Describe and interpret dynamic changes in stable systems.

Overarching Understanding:

- Amphibians are the first vertebrates to break away from water, and live at least part of the time on land.

Topical Understandings	Essential Questions
<ul style="list-style-type: none">• Even though most adult amphibians breathe with lungs, they	<ul style="list-style-type: none">• What characteristics set amphibians apart from other

<p>are still tied to water.</p> <ul style="list-style-type: none"> • Amphibians are the first true tetrapods. • There are tailed and tail-less amphibians. 	<p>vertebrates?</p> <ul style="list-style-type: none"> • Why do most amphibians undergo some type of metamorphosis? • Why are amphibians unable to completely break from water, and live solely on land?
Knowledge	Skills
<ul style="list-style-type: none"> • Vocabulary: tetrapod, sinus venosus, spermatophore, paedomorphosis, metamorphosis, amplexus. • Amphibian skin is porous and has many types of glands – mucous, poison. • Amphibian young and adults occupy different habitats and different niches within an ecosystem. • Some amphibians exhibit warning coloration. 	<ul style="list-style-type: none"> • Identify the characteristics of Amphibians. • Identify the characteristics of Order Gymnophiona. • Identify the characteristics of Order Urodela. • Identify the characteristics of Order Anura. • Describe amplexus. • Describe the mating behavior of a typical woodland salamander. • Describe the texture and number of amphibians' eggs.

Assessment

Evaluation Criteria	Evidence of Understanding
<ul style="list-style-type: none"> • Worksheets • Quizzes • Tests • In class activities • Cooperative work 	<ul style="list-style-type: none"> • When presented with diagrams of a salamander and a frog, label all parts indicated. • Discuss why some urodeles exhibit paedomorphosis. • Put the steps of frog reproduction in the correct order. • Discuss the importance of amphibian young and adults occupying different habitats and different niches within an ecosystem.

Materials and Resources

Source	Description of Use
<ul style="list-style-type: none"> • “Animal Diversity, 4th Edition”, Hickman et al. • Powerpoint • Preserved animal specimens • Dissected necturus specimen • Dissected bullfrog specimen • Preserved American bullfrogs for dissection • Dissection implements • Videos • Video clips • Dissecting microscopes 	<ul style="list-style-type: none"> • Materials necessary to complete performance tasks.

- | | |
|--|--|
| <ul style="list-style-type: none">• Light microscopes• Coloring worksheets• Paper• Crayons/markers/colored pencils• Laptop computers | |
|--|--|

Subject: Zoology
Unit 10: Class Reptilia

Grade Level: 11-12

Designed by: Maria O'Boyle

School District: Tunkhannock Area

School: High School

Brief Summary of Unit:

Class Reptilia includes the first completely terrestrial vertebrates. They have a few specific characteristics that set them apart from amphibians and live totally on land.
--

Unit 10: Class Reptilia

BIO.B.4.2.1

Describe how energy flows through an ecosystem (e.g., food chains, food webs, energy pyramids).

BIO.B.4.2.2

Describe biotic interactions in an ecosystem (e.g., competition, predation, symbiosis).

3.1.10.A6.

Identify the advantages of multi-cellularity in organisms.

3.1.12.A2.

Evaluate how organisms must derive energy from their environment or their food in order to survive.

3.1.12.A5.

Analyze how structure is related to function at all levels of biological organization from molecules to organisms.

3.1.12.A6.

Analyze how cells in different tissues/organs are specialized to perform specific functions.

3.1.12.A8.

CHANGE AND CONSTANCY

Describe and interpret dynamic changes in stable systems.

Overarching Understanding:

- Reptiles have amniotic eggs, scaly skin, and internal fertilization that allow them to be free of an aquatic habitat.

Topical Understandings	Essential Questions
<ul style="list-style-type: none">• All reptiles breathe with lungs, lay eggs on land, and have scaly skin.• As with all animals, reptiles are widely varied and adapted for various habitats and feeding methods.	<ul style="list-style-type: none">• What characteristics set reptiles apart from other vertebrates?• What is an amniotic egg?• What are some characteristics of reptiles that make them better suited for terrestrial living than amphibians are?
Knowledge	Skills
<ul style="list-style-type: none">• Vocabulary: amniote, amniotic egg, keratinized epidermal scales, occipital condyle, pulmonary circuit, systemic circuit, kinetic skull, Jacobson's organ, neurotoxin, hemorrhagin, hemipenis.• Reptiles have very specific traits that allow them to live on land, and separate them from amphibians.• Some reptiles have special sensory and nervous system adaptations that help them to find and track prey.	<ul style="list-style-type: none">• Identify the characteristics of Reptiles.• Identify 5 characteristics that distinguish reptile from amphibians.• Identify the characteristics of Order Testudines.• Identify the characteristics of Subclass Diapsida.• Identify the characteristics of Order Squamata, Suborder Sauria, and Suborder Serpentes.• Distinguish among the 3 different groups of snakes relative to their fang type and venom production.• Describe the function of Jacobson's organ

Assessment

Evaluation Criteria	Evidence of Understanding
<ul style="list-style-type: none">• Worksheets• Quizzes• Tests• In class activities• Cooperative work	<ul style="list-style-type: none">• When presented with diagrams turtle and a crocodilian, label all parts indicated.• Explain the significance of the membranes if an amniotic egg in allowing these eggs to be laid on land.• Discuss how nest incubation temperature can affect the sex of offspring in some testudines and crocodilians.• Explain why crocodilians can grow so much larger and have a higher metabolism than most other reptiles.

Materials and Resources

Source	Description of Use
<ul style="list-style-type: none">• “Animal Diversity, 4th Edition”, Hickman et al.• Powerpoint• Preserved animal specimens• Dissected garter snake specimen• Various testudine skulls and shells• Videos• Video clips• Dissecting microscopes• Coloring worksheets• Paper• Crayons/markers/colored pencils• Laptop computers	<ul style="list-style-type: none">• Materials necessary to complete performance tasks.

Subject: Zoology
Unit 11: Class Aves

Grade Level: 11-12

Designed by: Maria O'Boyle

School District: Tunkhannock Area

School: High School

Brief Summary of Unit:

Members of Class Aves are the most noticeable, the most melodious, and many think the most beautiful vertebrates. Feathers are the single unique feature that distinguishes birds from other living animals.

Unit 11: Class Aves

BIO.B.4.2.1
Describe how energy flows through an ecosystem (e.g., food chains, food webs, energy pyramids).

BIO.B.4.2.2
Describe biotic interactions in an ecosystem (e.g., competition, predation, symbiosis).

3.1.10.A6.

Identify the advantages of multi-cellularity in organisms.

3.1.12.A2.

Evaluate how organisms must derive energy from their environment or their food in order to survive.

3.1.12.A5.

Analyze how structure is related to function at all levels of biological organization from molecules to organisms.

3.1.12.A6.

Analyze how cells in different tissues/organs are specialized to perform specific functions.

3.1.12.A8.

CHANGE AND CONSTANCY

Describe and interpret dynamic changes in stable systems.

Overarching Understanding:

- A bird's entire anatomy is designed around flight.

Topical Understandings	Essential Questions
<ul style="list-style-type: none">• All birds have feathers, and they have different types of feathers for different jobs.• A bird's skeleton, muscular system, respiratory system and digestive system are built for flight.• Birds are highly adapted to the habitat and niche they occupy in their ecosystem.	<ul style="list-style-type: none">• What characteristics set birds apart from other vertebrates?• How does a bird egg differ from a reptile egg?• What are some obvious characteristics birds have for flight?•
Knowledge	Skills
<ul style="list-style-type: none">• Vocabulary: calcareous egg, air sacs, precocial, altricial, ratite, carinate, perching tendon, barb, vane, quill, barbules, shaft, keel, monogamy, polygamy.• Feathers, legs, beaks, and wings are highly specialized.	<ul style="list-style-type: none">• Identify the characteristics of Birds.• Identify 3 different types of bird feathers and list the function of each.• Why is monogamy more prevalent among birds than other animals?• Explain how a bird's egg differs from a reptile egg.

Assessment

Evaluation Criteria	Evidence of Understanding
<ul style="list-style-type: none">• Worksheets• Quizzes• Tests• In class activities• Cooperative work	<ul style="list-style-type: none">• When presented with a diagram of a bird, label all parts indicated.• Discuss how birds are similar to reptiles in morphology and behavior.• Explain how a bird's muscular-skeletal system is designed for flight.• Discuss specific adaptations of body systems that are for flight.• Design birds to fit specific habitats.• Discuss bird migration routes, stimulus for migration, and direction finding in migration.

Materials and Resources

Source	Description of Use
<ul style="list-style-type: none">• "Animal Diversity, 4th Edition", Hickman et al.• Powerpoint• Preserved animal specimens• Videos• Video clips• Dissecting microscopes• Coloring worksheets• Paper• Crayons/markers/colored pencils• Laptop computers	<ul style="list-style-type: none">• Materials necessary to complete performance tasks.

Subject: Zoology

Unit 12: Class Mammalia

Grade Level: 11-12

Designed by: Maria O'Boyle

School District: Tunkhannock Area

School: High School

Brief Summary of Unit:

Mammals, with their highly developed nervous system and numerous adaptations, occupy almost every environment on earth that supports life.

Unit 12: Class Mammalia

BIO.B.4.2.1

Describe how energy flows through an ecosystem (e.g., food chains, food webs, energy pyramids).

BIO.B.4.2.2

Describe biotic interactions in an ecosystem (e.g., competition, predation, symbiosis).

3.1.10.A6.

Identify the advantages of multi-cellularity in organisms.

3.1.12.A2.

Evaluate how organisms must derive energy from their environment or their food in order to survive.

3.1.12.A5.

Analyze how structure is related to function at all levels of biological organization from molecules to organisms.

3.1.12.A6.

Analyze how cells in different tissues/organs are specialized to perform specific functions.

3.1.12.A8.

CHANGE AND CONSTANCY

Describe and interpret dynamic changes in stable systems.

Overarching Understanding:

- All mammals have hair, nurse their young from mammary glands and are considered the most advanced of all animals.

Topical Understandings	Essential Questions
<ul style="list-style-type: none">• Mammals appear in the fossil record almost 150million years ago.• There are distinct skeletal and organ adaptations that separate mammals from other vertebrates.	<ul style="list-style-type: none">• What characteristics set mammals apart from other vertebrates?• How do mammals feed their young?• How can a skull tell you a mammal's niche in an ecosystem?• How can teeth be used to determine if an animal is an herbivore or carnivore?• What are the 3 groups of mammal by reproduction?
Knowledge	Skills

<ul style="list-style-type: none"> • Vocabulary: integument, dermis, epidermis, hair, keratin, pelage, guard hair, under hair, vibrissae, horns, antlers, sweat glands, sebaceous glands, mammary glands, ruminant, cecum, echolocation, estrous, monotreme, marsupial, placenta. • There are 3 groups of mammals based on reproduction. • The skeleton and teeth of a mammal can be used to determine its niche. 	<ul style="list-style-type: none"> • Identify the characteristics of Mammals. • Describe the functions of the various types of hair. • List and give the function of different types of glands. • Describe how mammals feed their young. • Identify various mammals as monotremes, marsupials, or placentals. • Identify predator-prey relationships.
--	---

Assessment

Evaluation Criteria	Evidence of Understanding
<ul style="list-style-type: none"> • Worksheets • Quizzes • Tests • In class activities • Cooperative work 	<ul style="list-style-type: none"> • When presented with a diagram of different mammals, label all parts indicated. • Use various skulls to determine a mammal's niche. • Describe an estrous cycle, and explain the significance of its timing in the year. • Use graphic data to analyze mammal populations. • Identify some organs common to all mammals.

Materials and Resources

Source	Description of Use
<ul style="list-style-type: none"> • "Animal Diversity, 4th Edition", Hickman et al. • Powerpoint • Preserved animal specimens • Preserved fetal pigs for dissection • Dissection implements • Various mammal skulls • Videos • Video clips • Dissecting microscopes • Coloring worksheets • Paper • Crayons/markers/colored pencils • Laptop computers 	<ul style="list-style-type: none"> • Materials necessary to complete performance tasks.