**COURSE: Grade 11 Biology, University Preparation Level**

Unit Plan Completed by: Jessica Graham, Rosa Rossi and Khagen Dhakal

|  |  |  |
| --- | --- | --- |
| **Unit of Study:** The Diversity of Living Things | | |
| Curriculum: What will students learn? | **Unit Overview:**  Living things come in all shapes and sizes. In this unit students will look at the six kingdoms that are used to classify the diverse life on this planet. They will explore the world of bacteria to the world of animals. Despite the diversity, all life on this planet is interdependent on each other. Students will learn how changes brought on by human activity impact upon diversity. They will be challenged to investigate, report, analyze, and interpret human interventions and assess outcomes. | **Overall Expectations:**  B1. analyse the effects of various human activities on the diversity of living things;  B2. investigate, through laboratory and/or field activities or through simulations, the principles of  scientific classification, using appropriate sampling and classification techniques;  B3. demonstrate an understanding of the diversity of living organisms in terms of the principles of taxonomy and phylogeny.  **Key Questions:**   * What is biodiversity? Why is it so important? * How do scientists collect, identify and classify organisms on Earth? * How do humans impact the diversity of living things? |

Designing the Day

* One day is one 75 minute period
* Learning skills will be assessed through observation and student learning logs

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Topic | Day | Concept and Learning Goals | Teaching and Learning Strategies | Assessment (A) and Evaluation (E) | Expectations |
| Overview | 1 | Introduction to unit and first assignment. Defining the term biodiversity?  By the end of this lesson, students should be able to explain the term biodiversity and give some examples of why it is so important. | Students divided into teams and play Trivia game that highlights the meaning of biodiversity and why it is so important.  Lecture  Video: “Planet Earth – The Future” | A – Diagnostic: Biodiversity Trivia game  A – Brief class discussion/brainstorm after video to create a class definition of biodiversity.  Homework: Reading – 8 levels of classification and dichotomous names | B 2.1  B 1.1  B 2.1  B 3.5 |
| Goal Setting  Introduction to Classifying Life | 2 | Activate prior knowledge and set goals for unit.  By the end of this lesson, students will understand levels of classification by identifying the 6 kingdoms (binomial nomenclature) of living things. They will see how these kingdoms are subdivided into the 8 levels of classification (dichotomous names) based on features of organisms. | Through whole class discussion, create a KWL Chart and complete the “Know” and “Want to Learn” columns.  Classification Game: Sorting sports equipment  Lecture  Create 6 Kingdoms/8 Classification Levels Mneumonics and play mneumonic game  Snake or Lizard classification activity and discussion | A – Student responses/reasoning during classification game  A – (ongoing) contributions to KWL chart  A – Student responses to snake and Lizard classification activity  Homework: Text page 376, # 5, 6, 8, 10. Prokaryotic versus Eukaryotic Cells online reading and handout | B 2.1  B 2.2  B 3.1  B 3.3 |
| Cells & Bacteria | 3 | Introduction to prokaryotic versus eukaryotic cells. Evolution of cells.  By the end of this lesson, students will be able to identify the major differences in structure and function between prokaryotic and eukaryotic cells. They will describe characteristics and functions of bacteria. | Think-Pair-Share: Prokaryote versus Eukaryote homework.  Lecture and Lab preparation.  Anthrax Story: online reading and Youtube video.  Mini Cooperative Lab Activity: Grow a colony of bacteria. | A – Class Comparison chart of prokaryotes versus eukaryotes based on think-pair-share activity.  A – Summative: Proper identification of bacterial colonies grown by lab groups.  Homework: Reading and activity to prepare for lab tomorrow. | B 2.1  B 2.2  B 3.2  B 3.3  B 3.4 |
| Kingdoms | 4 | Investigate the characteristics of organisms that belong each kingdom.  By the end of this lesson, students will be able to describe the anatomy and physiology of organisms from each Kingdom. | Lab Preparation Smart board T or F based on homework assignment.  Eating the Way Through the Kingdoms lab activity  Domains Jigsaw Activity | A – Lab preparation answers  A – Eating the Way Through the Kingdoms Lab procedures and responses  A – Domain Jigsaw answers  Homework: Kingdoms online article search | B 2.1  B 2.2  B 3.3 |
| Protista, Fungi and Plantae | 5 | Use knowledge from yesterday’s lab to further investigate the characteristics and functions of protists, fungi and plants.  By the end of the lesson students describe and represent various organisms within each of the 6 Kingdoms. They will see how this knowledge applies to the biodiversity of ecosystems. | “Wide Reading” Activity for lesson topics (teacher resources and student resources from homework activity).  Create 5 “Fact or Fake” trivia cards based on readings.  Play “Fact or Fake” | A – “Fact or Fake” trivia cards.  A – Kingdoms online article search homework | B 2.1  B 2.2  B 3.3  B 3.5 |
| Dichotomous Keys | 6 | Define the term dichotomous key. Use dichotomous keys to identify organisms.  By the end of this lesson, students will understand how to create and use a dichotomous key. They will see how biologists use dichotomous keys to identify organisms. | Online introduction to dichotomous keys on Gizmos.  Lecture  Dichotomous Key Monster Activity: Create dichotomous key by sorting wacky monsters.  Introduction to Dichotomous Key Class Book assignment | A – Monster Dichotomous key  A – Gizmo activity  E – Dichotomous Key Class Book assignment | B 2.1  B 2.4 |
| Dichotomous Keys | 7 | Creation of Dichotomous Key Class Book.  By the end of this lesson, groups of students will create and test a dichotomous key for identifying a group of anatomically similar, local organisms. Keys will be placed into a class book to be used for identifying a variety of species in the nearby marsh ecosystem. | Lab/Dichotomous Key Creation preparation.  Collaborative Learning Task: Dichotomous Key Creation based on samples of groups of anatomically similar organisms.  Scientific Publishers (Cross-curricular connection – students from gr. 11 literacy class): Use of computer software to create class book. | A – (Summative) Dichotomous Keys for class book  A – (Summative) Application of class dichotomous key in the nearby marsh (Field Trip on day 17).  A – Lab procedures and responses | B 2.1  B 2.3  B 2.4 |
| Characteristics of life | 8 | Identify the characteristics of life. Introduction to viruses. Compare the structure and function of different viruses.  By the end of this lesson, students should be able to determine if something is living or non-living based on the characteristics of life. They will recognize the characteristics of various virus forms and identify ways in which viruses affect humans/animals. | Characteristics of Life Trivia Challenge.  Wiki Virus Investigation: Explore characteristics of viruses (i.e., classification, reproduction).  Small Group Debate: Is a virus living or non-living (based on findings from Wiki)  Lecture  Brainstorm and Concept map: Show differences and similarities among viruses.  Video: Flu attack on youtube. | A – (Diagnostic)  Quiz on characteristics of living things  E – Short answer questions and diagrams from Wiki Virus Investigation  A- Debate: peer feedback  A – Homework: Virus Gizmo activity and concept map | B 2.1  B 3.2  B 3.3 |
| Evolution of Organisms | 9 | Define the terms evolution and phylogeny. Introduction to phylogenic trees and natural and artificial selection.  By the end of the lesson, students will be able to use a set of criteria to create a phylogenic tree. They will understand how natural and artificial selection can affect the evolution of organisms. | Lecture: Compare phylogenic trees to the analogy of the human body.  “Name that Tune” Cooperative Activity: Create a phylogenic tree based on present/past musical genres and groups.  Gizmo Activity: Natural and artificial selection  Evolution video | E - Group discussion note about impacts of habitat degradation on diversity and the evolution process (video follow-up).  A: Gizmo Activity  A - Exit Card; Evolution Video  A - Homework: Phylogenic tree highlighting the ancestry of a species of interest (choose species from a given list). | B 1.1  B 1.2  B 2.1  B 3.1  B 3.4 |
| Evolution of Organisms (con’t) | 10 | Application of knowledge of artificial selection and natural selection by exploring variations within species.  By the end of this lesson, students will be able to distinguish between artificial and natural selection. | Inside/Outside Circle sharing of phylogenic trees (homework).    Brainstorm and Popcorn discussion: Why is there variation within the same species (i.e., pigeons, dogs, cats). How has both natural and artificial selection had roles in this variation?  Phylogenic Tree Scavenger Hunt (Q & A): Use a given phylogenic tree to determine the relationship between various organisms.  Video on genetically  modified food/ organisms. | E: Video Responses: The effects of technology on: natural selection process; public health; ecosystems; captive breeding and biodiversity conservation.  E: Phylogenic Tree Scavenger Hunt | B 1.1  B 2.1  B 3.1  B 3.4 |
| Open Book Review Test | 11 | Revisit KWL chart. Assess student knowledge in the form of a review test.  Students will review concepts learned to date in the form of a review test. Upon completion of the test, students will reflect upon their knowledge and skills by completing a self-assessment/reflection piece (i.e., what concepts are still confusing?). | Test will provide questions that target knowledge, thinking & inquiry, communication and application.  True and False  Multiple Choice  Short Answer  Matching | E – (Formative): Review  Test  A – Self-assessment/reflection | All expectations covered to date |
| Human Impacts on Biodiversity | 12 | In this lesson students will explore human impacts on biodiversity.  By the end of this lesson students will gain familiarity with the major threats to biodiversity including: habitat loss, invasive species, pollution, overexploitation, and climate change. | Video on climate change impacts on the environment.  Think-pair-share on impacts explored in video.  Lecture-habitat loss, invasive species, pollution, overexploitation, and climate change.  Activity: Using online resources, students will explore the potential effects of pesticides on aquatic life and wildlife using the *Summary of Relevant Toxicity and Environmental Data*.  Students will complete a short answers worksheet after comparing the concentrations of organochlorine in avian eggs to  Relevant Guidelines | A - Student exploration and ability to make connections between various levels of organochloride and the effects on avian eggs and fish tissue  A-(Summative)  Q & A Student worksheet | B 2.1  B 1.1  B 1.2  B 2.1 |
| Exploring Human Impacts on Biodiversity | 13 | In this lesson students will explore the protection of species in different nations. Students will explore ex-situ and in-situ conservation as stated by the Convention on Biological Diversity.  By the end of this lesson students will be able to state the 2 strategies for the conservation of species. Students will be able to describe the importance of protecting species in and beyond their habitats. | Through an investigative computer simulated activity, students will explore how the leafy spurge changed the face of cattle country in the Prairies.  Student Jigsaw for sharing responses to worksheet.  Cooperative Learning: Students will conduct a cost benefit analysis to determine how human interventions can positively or negatively impact biodiversity. | A - work sheet on leafy spurge investigation  A – Jigsaw activity responses  A-(Summative)  Cost benefit analysis sheet | B 2.1  B 1.1  B 1.2 |
| Biodiversity Synthesis | 14 | This lesson focuses on taking action to conserve biodiversity. Students will explore conservation efforts of specific species in various nations.  By the end of this lesson students will be able to describe conservation efforts in various nations and the effects of humans on a specific species. | Library Period/Cooperative Learning: Students will explore a species from a list of choices. These species will be either: extirpated, endangered, or extinct.  Research Presentation: Students will conduct research on an endangered, extinct, or extirpated species. Students will present their findings to the class in a short presentation using a method of their choice (i.e., Power Point). | A – Research skills  A - (Summative)  Application of research in a presentation (ability to include important facts, represent statistics and draw conclusions about the species). | B 2.1  B 3.5 |
| Culminating Task | 15 | No new concepts | RAFT | E – Culminating Task |  |
| Culminating Task | 16 | No new Concepts | RAFT | E – Culminating Task |  |
| Field Trip | 17 | Students will explore a marsh ecosystem where they will apply the class book dichotomous key to identify various organisms |  | E – Use of key and reflection on accuracy of key. | B 2.1  B 2.2  B 2.3 |
| Unit Test | 18 | Unit Test | Test will provide questions that target knowledge, thinking & inquiry, communication and application.  True and False  Multiple Choice  Short Answer  Matching | E - Test | All |

**Resources:**

Bowers, Ray, et al. 2002. *Biology 11.* Ontario, Canada: Pearson Education Canada Inc: Toronto, Ontario

Ellis, C., Muller, M.R., Panayiotou, H.E., Sharp, J.C., and Webb, P. 2011. *Pearson investigating science: Biology source 11*. Pearson Canada Inc.: Toronto, Ontario.

Fisher, D. (2010). [*Building Background Knowledge*](http://simplelink.library.utoronto.ca/url.cfm/110238)*.* The Science Teacher, 77(1), 23-26.

Groenke, S., Puckett, R. 2006. *Becoming environmentally literate citizens*. The Science Teacher. 22-27

Ontario Ministry of Education. 2007. *Unit 4: diversity of living things.* Ontario Educational Resource Bank.Retrieved July 9, 2012, from <https://resources.elearningontario.ca>

Ontario Ministry of Education. 2008. *Diversity of living things grade 11 university prep.* The Ontario Curriculum Grades 11 and 12. Retrieved July 9, 2012, from http://www.edu.gov.on.ca/eng/curriculum/secondary/2009science11\_12.pdf

**Term projects:** Visit the Virtual Zoo Moodle for our class and prepare a report by classifying the animals and plants, and prepare a phylogenic tree

**Culminating Task – Diversity of Living Things**

**Jessica Graham, Rosa Rossi, Khagen Dhakal**

You have been chosen by The World Association of Zoos and aquariums, WAZA, an online virtual zoo, to help create an educational exhibit that provides information to guests about organisms/species from the Animal Kingdom (vertebrate or invertebrate).

There will be many specialists working together to create this animal exhibit, and you may take on a specialist role that most interests you. Remember, your perspective and opinions about the exhibit may be different, depending on the role you choose.

The owners of the zoo have a set of criteria that they would like you to include in the exhibit. Your job is to review these criteria carefully and create a component of the exhibit that will help meet the demand of the zoo owners. You are very lucky that the zoo owners have given a very generous budget to work with, allowing you to let your creative and imaginary minds run wild! You will use the school library, Internet and classroom text to conduct your research.

**Choose a role – Who would you like to be?**

* Animal Protection Activist
* Zoologist who works at the zoo
* Scientist/Researcher
* Educator

**Choose an audience – Who is your contribution to the exhibit intended for?**

* High School Students
* General public

**Choose a format – How will you contribute to the exhibit?**

* Brochure
* Report/Article
* Display Board
* Website

**Choose a topic – What animal will you choose?**

* Visit the virtual zoo, WAZA, and choose your animal: <http://www.waza.org/en/zoo/>

**Criteria for your contribution to the exhibit:**

1. History of your species:
   1. Background Information: Photo, Scientific name, habitat, range, food sources (K, T/I)
   2. Ancestry – design and informative phylogenic tree that shows how your organism evolved (K, T/I)
2. Classification of your species:
   1. Morphology – Create a dichotomous key that highlights the structural features, both anatomical and physiological, of your species in comparison to one other similar species (i.e., snake versus lizard). Your audience should be able to use this key to identify your species. (K, T/I)
   2. Using a chart, show how your species progresses through each Taxonomic Category (Domain, Kingdom, Phylum, Class, Order, Family, Genus, Species) in relation to other species. Give some examples of other species in each Taxon group. You may use pictures (K, T/I)
3. Biodiversity and Human Impacts:
   1. Biodiversity - What role does your species have in maintaining biodiversity? For example, what are the implications of this species becoming endangered or extinct? What other species depend on this animal for survival? Are there any current threats to this species survival? (T/I, C, A)
   2. Human Impacts – How are humans impacting the survival of your species (positive and negative)? Create an action plan for maintaining the survival and health of your species. (C, A)
4. Resources: Be sure to include a list of the resources you used to complete your task.
5. Planning Booklet: Use this booklet as a way to plan your task and gather pertinent information.

**Extension:**

For the purpose of our course, give your opinion about the negative and positive implications of zoos. What are their affects on biodiversity? (C, A) (5 mrks)

**Diversity of Living Things:**

**Culminating Task: Planning Booklet**

**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Species: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**DAY 1**

**Role: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Audience: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Format: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Topic (Species): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**History of your species:**

Background Information (K, T/I)

* Photo: (resource)
* Scientific name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Habitat:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Range:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Food sources:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Ancestry – design and informative phylogenic tree that shows how your organism evolved (K, T/I)

Important facts: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Phylogenic Tree (rough draft)

**Classification of your species:**

Morphology – Create a Concept Map OR Venn Diagram to help organize characteristics of your species in comparison to another similar species. Use a blank piece of paper if you choose to create a concept map. (K, T/I) (10 mrks)

Venn Diagram:

**DAY 2**

Using the chart below, show how your species progresses through each Taxonomic Category (Domain, Kingdom, Phylum, Class, Order, Family, Genus, Species) in relation to other species. Give some examples of other species in each Taxon group. You may use pictures. (K, T/I)

|  |  |  |
| --- | --- | --- |
| **Rank** | **Taxon Name**  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_** | **Examples of Species in Taxon** |
| **Domain** |  |  |
| **Kingdom** |  |  |
| **Phylum** |  |  |
| **Class** |  |  |
| **Order** |  |  |
| **Family** |  |  |
| **Genus** |  |  |
| **Species** |  |  |

**Biodiversity** (T/I, C, A):

Biodiversity: Make notes regarding the following questions in relation to your species:

1. What role does your species have in maintaining biodiversity?
2. What are the implications of this species becoming endangered or extinct?
3. What other species depend this animal for survival?
4. Are there any current threats this species survival?

**Human Impacts** (C, A):

1. How are humans impacting the survival of your species (positive and negative)? Try to give about 4 or 5 examples.
2. Create an action plan for maintaining the survival and health of your species. Try to think about 4 or 5 ways to help protect your species.

**Resources:**

Keep track of all of your resources here:

**Day 3**

Use your information from your planning booklet to create your contribution to your zoo exhibit (i.e., the written format you chose: brochure, etc.).

Q: For the purpose of our course, give your opinion about the negative and positive implications of zoos. What are their affects on biodiversity? (C, A)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Diversity of Living Things: Culminating Task Rubric**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Level 1 | Level 2 | Level 3 | Level 4 |
| Knowledge and understanding | demonstrates  limited  knowledge  of facts and vocabulary from unit  demonstrates  limited  understanding  of key concepts and ideas from unit | demonstrates  some knowledge  of facts and vocabulary from unit  demonstrates  some understanding  of key concepts and ideas from unit | demonstrates  considerable  knowledge  of facts and vocabulary from unit  demonstrates  considerable understanding  of key concepts and ideas from unit | Demonstrates  thorough knowledge  of facts and vocabulary from unit  demonstrates a thorough  understanding  of key concepts and ideas from unit |
| Thinking and inquiry | uses planning booklet with limited  effectiveness  Uses a variety of research skills (library, online) to find relevant resources for species topic  with limited  effectiveness and within given timelines  Uses resources to meet the criteria of assignment with limited  effectiveness | uses planning booklet  with some  effectiveness  Uses research skills (library, online) to find relevant information for species topic  with some  effectiveness and within given timelines  uses resources to meet the criteria of assignment  with some  effectiveness | uses planning booklet  with considerable  effectiveness  Uses research skills (library, online) to find relevant information for species topic  with considerable  effectiveness and within given timelines  uses resources to meet the criteria of the assignment  with considerable  effectiveness | uses planning booklet  with a high degree of  effectiveness  Uses research skills (library, online) to find relevant information for species topic  with a high degree of  effectiveness and within given timelines  uses resources to meet the criteria of the assignment  with a high degree of  effectiveness |
| Communication | expresses and  organizes ideas  and information from planning booklet into chosen written format with limited  effectiveness  communicates for  intended audience  and purpose  with limited  effectiveness  uses conventions,  vocabulary, and  terminology from diversity of living things unit with limited effectiveness | expresses and  organizes ideas  and information from planning booklet into chosen written format with some  effectiveness  communicates for  intended audience  and purpose  with some  effectiveness  uses conventions,  vocabulary, and  terminology from diversity of living things unit with  some  effectiveness | expresses and  organizes ideas  and information from planning booklet into chosen written format with considerable  effectiveness  communicates for  intended audience  and purpose  with considerable  effectiveness  uses conventions,  vocabulary, and  terminology from diversity of living things unit with  considerable effectiveness | expresses and  organizes ideas  and information from planning booklet into chosen written format with a high degree of  effectiveness  communicates for  intended audience  and purpose  with a high degree of  effectiveness  uses conventions,  vocabulary, and  terminology from diversity of living things unit with  a high degree of effectiveness |
| Application | makes connections  between their species, biodiversity, humans and the zoo industry with limited  effectiveness  proposes an action plan for the survival and health of their species with limited  effectiveness | makes connections  between their species, biodiversity, human and the zoo industry with some  effectiveness  proposes an action plan for the survival and health of their species with some  effectiveness | makes connections  between their species, biodiversity, human and the zoo industry with considerable  effectiveness  proposes an action plan for the survival and health of their species with considerable  effectiveness | makes connections  between their species, biodiversity, human and the zoo industry with a high degree of  effectiveness  proposes an action plan for the survival and health of their species with a high degree of  effectiveness |

**Assessment Tools:**

Aside from using the 11-12 Ontario Science Curriculum rubric, this culminating activity will also include other assessment tools, such as the following:

1. Venn Diagram: Students can note the similarities and differences between their species and one other species using the Venn diagram to help them create the dichotomous key OR
2. Concept Map: Students can use the concept map as a method to note structural, physiological and anatomical features of the species.
3. Presentation: Creativity and originality of written format:
   1. Brochure
   2. Report/Article
   3. Display Board
   4. Website
4. Teacher observations: Are the students on task? Are they making use of their library and in-class work sessions? Teachers can make anecdotal notes on student progress.
5. Feedback Conferences: Teachers can set appointments with each student in order to map their work progress. Educators and students can track progress to date using a checklist.
6. Exhibit: students will exhibit their presentations in a gallery walk where other students will be able to assess one another (peer assessment)

Unit Test: Diversity of Living Things

Jessica, Rosa and Ken

**Multiple Choice (17 marks – 1 mark each)**

(answers displayed in bold print)

1. Viruses are not placed in any kingdom because:

a) they are too poorly understood

b) they are too small

c) their genetics cannot be determined

**d)** **they are not organisms**

2. A biology student pronounced the following scientific terms in the way as mentioned in the parentheses. Please select the answer that shows a term that is wrongly pronounced:

a) microscopic (my-kroh-skahp-ik)

b) primordial (pry-more-dee-al)

c) pterosaurs (ter-uh-sors)

**d) algae (al-gee)**

3. Prokaryotic cells:

a) are nucleated

**b) are devoid of distinct nucleus**

c) are advanced cells

d) are no different than eukaryotic cells

4. Which kingdom has species whose cells do not have cell wall?

**a) Animalia**

b) Bacteria

c) Plantae

d) Protista

5. Which term best describes an identification tool that uses a series of two-part choices?

a) Binomial nomenclature

**b) Dichotomous key**

c) Phylogenetic tree

d) Taxonomic key

Use the following table to answer questions 6 and 7

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Kingdom** | Animalia | Animalia | Animalia | Animalia |
| Phylum | Chordata | Chordata | Chordata | Chordata |
| Class | Mammalia | Mammalia | Mammalia | Mammalia |
| Order | Carnivora | Perissodactyla | Perissodactyla | Perissodactyla |
| Family | Phocidae | Rhinocerotidae | Equidae | Equidae |
| Genus | *Halichoerus* | *Diceros* | *Equus* | *Equus* |
| Species | *Halichoerus grypus* | *Diceros bicornis* | *Equus caballus* | *Equus grevyi* |
| Common Name | Grey seal | Rhinoceros | Horse | Zebra |

6. Which animal is the most distant relative to the others?

a) *E. grevyi*

**b) grey seal**

c) horse

d) rhinoceros

7. At which level does the rhinoceros split from the zebra?

a) class

b) genus

**c) family**

d) order

8. Choose the correct term that completes the following sentence. There are more species of \_\_\_\_\_\_\_\_\_\_\_\_\_than species of all other types of animals, combined.

a) Mammals

b) Birds

**c) Insects**

d. Amphibians

9. Which species concept focuses on the evolutionary relationships among organisms?

a) morphological species concept

b) biological species concept

**c) phylogenetic species concept**

d) hierarchical species concept

10. In which kingdom would you place an organism that is multi-cellular, has a cell wall made of cellulose, and is autotrophic?

a) Bacteria

b) Archaea

c) Protista

**d) Plantae**

11. Which statement about species diversity is false?

a) Sepcies diversity is the variety and abundance of species in a given area.

**b) Ecosystems with high species diversity have less resilience to disease or harsh environmental conditions than ecosystems with low species diversity.**

c) Pollution and climate change are possible threats to species diversity.

d) The introduction of non-native species to an ecosystem can lead to a decrease in species diversity.

12. What separates vertebrate animals from invertebrate animals?

**a) Vertebrate animals have a notochord, while invertebrates lack this structure.**

b) Vertebrate animals are heterotrophic, while some invertebrates are autotrophic.

c) All vertebrate animals are ectothermic, while all invertebrate animals are endothermic.

d) Vertebrate animals are all carnivores, while invertebrates are mostly herbivores.

13. Which step in the lytic cycle follows attachment of the virus and release of DNA into the host cell?

a) Production of new capsids

b) Synthesis of other viral components

c) Assembly of new virus particles

**d) Integration of viral DNA into host DNA**

14. Identify the most common shapes of bacteria and archaea.

a) Polyhedral, spherical, and cylindrical

b) Gametic, zygotic, and sporic

**c) Spherical, rod, and spiral**

d) Animal-like, fungus-like, and plant-like

15. Identify the organelle:

a) Golgi apparatus 

**b) Endoplasmic reticulum**

c) Mitochondria

d) Lysosome

16. Which of the following is also known as the Era of Mammals?

a) Pre-cambrian era

**b) Cenozoic era**

c) Paleozoic era

d) Mesozoic era

17. Which of the following is an example of organic compound?

**a) C-C (carbon-carbon) bond**

b) CO2

c) NH3

d) H2SO4

**Short Answer (18 marks)**

1. Use a T-chart to distinguish a virus from a cell by referring to their covering, organelles, and relative size. **(K/U) (4 marks)**

2. Organize the following species into three different phyla. **(K/U)**

**(3 marks)**

Cat Pigeon Octopus Canada goose human snail

3. Identify a single-celled fungus that reproduces asexually by budding. List two features that separate fungi from members of the plant kingdom. **(K/U) (3 marks)**

4. What are the three main groups of protists, based on their mode of obtaining nutrition? **(K/U) (3 marks)**

5. Explain why biodiversity is important in maintaining viable ecosystems? **(K/U) (5 marks)**

**Long Answer/Essay (15 marks)**

1. The statements below represent contradictory points of view held by members of the scientific community today. Which point of view do you support? Explain your reasoning. **(A) (5 marks)**

View 1: The rich variety of life on Earth has always had to adapt to a changing climate. The need to adapt to new patterns of temperature and rainfall has been a major influence on evolutionary changes that produced the plant and animal species we see today. Variation in the climate is compatible with the survival of ecosystems and their functions.

View 2: According to the Millennium Ecosystem Assessment (MA) that was published in 2006, climate change now poses one of the principal threats to the biological diversity of the plant, and is projected to become an increasingly important driver of change in the coming decades.

2. The clouded leopard is a medium-sized wildcat found in the forests of Asia. In a study comparing differences in clouded leopard coat patterns and coloration throughout the cat’s range, researchers concluded that individuals found on the islands of Borneo and Sumatra are markedly different from animals found on the Southeast Asian mainland. These observations have been supported by genetic testing. Based on this information, are the clouded leopards of Borneo and Sumatra the same species as those on the mainland, or are the two groups different species? Explain your reasoning. **(A) (5 marks)**

3. Biologists classify organisms in a way that is similar to our postal system in order to avoid redundancy in naming and classifying the organisms. Based on the knowledge you learned about the classification of living things, use a diagram or chart to explain how the taxonomic classification of living things (Domain, Kingdom, Phylym, Class, Order, Family, Genus, Species) is similar to the our postal system. You might want to use terms such as name, surname, house number, street name, city, province and country in your comparison. **(K/U, A) (5 marks)**

**TOTAL: \_\_\_\_\_/50**