Biology

L.O

Grade 1

Semester 1

Biology (Grade 1, Semester 1)

Cell Biology

Weeks: Week 01 - Week 01

BI.1.01:

HSS-BI 1.01

Analyze the factors of diseases eradication:
1) Explain the factors of spreading, controlling and transmitting of each disease;
2) Classify disease as infectious or non-infectious;
3) Study Malaria and sickle cell anemia;
4) Explain how the disease affects cells.

Concepts	Skills
1. Cell Theory Disease. a. Infectious or noninfectious and factors b. Vectors c. Non-infectious factors 2. Relation between diseases and economic development • case study: Malaria (from SEPUP only)	1. Describe trends and relationships in data 2. Develop and support conclusions based on evidence 3. Use the microscope to differentiate between healthy and unhealthy cells

Essential Question(s): What threatens life?

Big Idea:

Cells are the basic unit of structure and function in organisms. They act as indicators of being healthy. Changes may occur according to the external and internal effects of the environment.

Comments:

Studying diseases in this learning outcome is considered an introduction, thislearning Outcome is the thread which ties the unit together. It begins by discussing the importance of disease. In order to understand disease

and disease interventions students need to know about the healthy cell - its structures, how they function normally and how they are changed by disease. Students return to this LO after studying the whole unit. In WEEK14 they design possible interventions for a disease prevalent in Egypt. They present their work to the class, arguing from evidence about the justification of their interventions and benefit versus trade-offs involved.

Textbook and Resource Materials:

1- SEPUP Book, unit 3 Cell Biology
Activity 2 teacher SEPUP page 259: 271 student SEPUP 161 : 170
Links:
http://www.cdc.gov/

Evidence of Learning:

1. Students use sheets of SEPUP that are mentioned in the Activity teacher guide unit 3 - Act 02 - SS2.1
2. Students create a poster about the diseases
3. Exit tickets

Capstone Connection:

The student should to take into consideration what makes an environment healthy during their capstone design.

Other subject connections:

- Chemistry- CH.1.01
- Geology- ES.1.0.1
- Physics- PH.3.01
- Arabic – ask to write an article or research paper about biology topics
- English- reading, speaking, writing and listening skills
- French- parts of the body and good nutrition
- French- reading, speaking and writing.
- German- reading, speaking and writing
- Social studies and citizen ship- 1.0.1medicine in the pharaonic era.
- Computer science-1.0.6 number system
- Home economy – module 1 healthy habits.
- P.E- module 1- public health

Weeks: Week 02 - Week 04

BI.1.02

HSS-BI.1.01, HSS-BI.1.02

Compare and contrast the structures within the cells of plants, animals, Protista and bacteria which function to enable the cell to live.

Concepts	Skills
1. Compare and contrast eukaryotes and prokaryotes a. size b. internal structures (membranes, DNA, ribosomes) c. Example organisms 2. Eukaryotic cell structure and function to include: a. Cell membrane b. Endomembrane system (and its function as a transport and packaging system) c. Mitochondria and Chloroplast (and its function as energy conversions) d. Nucleus (and its function as storage of genetic material) e. ribosome (and its function as protein synthesis) f. smooth endoplasmic reticulum (and its function as lipid synthesis) 3. plant vs. animal cell structures • TB as a case study from SEPUP	1. Use a microscope to make observations of general eukaryotic cell structures. 2. Make scientific drawings 3. Make conclusions based on evidence 4. Make accurate inferences using text materials 5. Use the tools to prepare slides for plant and animal cells

Essential Question(s): How does structure influence function?

Big Idea:

Cells are the basic unit of structure and function in organisms. Diseases may have a cellular basis. Environmental factors may impact cells.

Comments:

This unit includes many laboratory experiences which is particularly good for these first-year students who may never have handled laboratory equipment before. These initial labs have them using the microscope and learning to draw in a scientific way as they study cells.

Textbook and Resource Materials:

SEPUP Materials -Unit 3 Cell Biology
Activity 3 teacher SEPUP page 272: 283 student SEPUP 171 : 179
Activity 4 teacher SEPUP page 284 : 289 student SEPUP page. 180 : 183
http://SEPUPlhs.org/high/sgi/teachers/cell_sim.html
http://www.molbiolcel1.0rg/content/21/22/3786.full

Activity 5 teacher SEPUP P. 290 :293 student SEPUP P. 184 : 185
http://SEPUPlhs.org/high/sgi/teachers/special_cell_sim.html

Activity 6 teacher SEPUP P. 294 : 299 student SEPUP 186 : 190

- Simulation
http://sumanasinc.com/webcontent/animations/content/diffusion.html

- Links
https://www.youtube.com/watch?v=svAAiKsJa-Y
https://www.youtube.com/watch?v=prfMUwjobo8
https://www.youtube.com/watch?v=Ao9cVhwPg84
https://www.youtube.com/watch?v=URUJD5NEXC8

Evidence of Learning:

-Using SEPUP analysis questions
Unit 3 - Act 03 - Drawings of cells in science notebook
Unit 3 - Act 03 - Venn diagram showing structures cells have in common
Unit 3 - Act 04 - SS 4.1
Unit 3 - Act 05 - SS 5.1
Unit 3 - Act 06 - Analysis Questions
- exit ticket

Capstone Connection:

Students should be able to discuss how form and function are related in their capstone projects.

Other subject connection:

- Chemistry CH.1.0.1; CH.1.0.2
- Geology ES.1.02
- Math – MA.1.04
- Arabic – ask to write an article or research paper about biology topics
- English- reading, speaking, writing and listening skills
- French-reading, speaking and writing.
- German- reading, speaking and writing
- Art AR.1.01 how to draw
- Computer science- CS.1.04 presentation
- Home economy-module 2 nutrition needs
- P.E- module 2 teamwork
- Library- LI.1.05; LI.1.01 library type
- Music- MU.1.01; MU.1.02; MU.1.03; MU.1..4

Weeks: Week 05 - Week 06

BI.1.03:

HSS-BI.1.02

Connect the structure of a healthy cell membrane to the functions it performs:
1) develop an explanation of the structure of the cell membrane to include how the structure enables the processes of diffusion and osmosis to occur.

2) Describe the nature of phospholipids.

Concepts	Skills
1. Cell membrane-	1. Make and record laboratory data. 2. Analyze laboratory data to infer nature of features of

a. barrier function b. phospholipids and proteins. c. fluid structure d. membrane models for study of function 2. Cell membrane and diffusion a. diffusion. b. osmosis. c. selective permeability d. protein channels and facilitated diffusion. e. concentration gradients, f. transport proteins and active transport Diabetes as a case study (from SEPUP)	membranes 3. Make accurate inferences from text materials

Essential Question(s): How does structure determine function?

Big Idea:

Cells are the basic unit of structure and function in organisms. Diseases may have a cellular basis. Environmental factors may impact cells.

Comments:

These activities include two laboratories which explore the nature of membranes and lay the groundwork for the more detailed explanation of how and why a cell membrane works as it does. Doing these laboratories in advance will make learning the details more meaningful to students and leads to deeper understanding and higher retention.

Textbook and Resource Materials:

1- SEPUP Materials in Unit 3 - Cell Biology
Act. 07 teacher SEPUP P. 300 : 308 student SEPUP P. 191 : 197
Act 07 - TR 7.1; TR 7.2
Act 07 - SS 2.1 to use for diabetes reading
Act 08 teacher SEPUP P. 310 : 319 student SEPUP P. 198 : 205
Act 08 - SS 2.1 to use for HIV reading
Act 09 teacher SEPUP P. 321 :329 student SEPUP P. 206 : 212
Act 09 - TR 9.1

-Optional Simulations
http://sumanasinc.com/webcontent/animations/content/carrier_proteins.html
http://sumanasinc.com/webcontent/animations/content/synapse.html
http://sumanasinc.com/webcontent/animations/content/polyribosomes2.html
http://sumanasinc.com/webcontent/animations/content/actionpotential.html
http://sumanasinc.com/webcontent/animations/content/vesiclebudding.html
http://sumanasinc.com/webcontent/animations/content/diffusion.html

2- Links
https://www.youtube.com/watch?v=svAAiKsJa-Y&list=PL6vdue9DFN3LKD9mz_h_cDYv8z1H1egQs
https://www.youtube.com/watch?v=p5zFgT4aofA
https://www.youtube.com/watch?v=SdUUP2pMmQ4

Evidence of Learning:

1- Use of the Analysis questions for each Activity
2- Students' successful use of lab materials in Act 7 & 8
3-Analysis question 6 for Act 9 as an assessment

Capstone Connection:

Again, students should relate form to function within their Capstone project.

Other subject connection:

- CH.1.08; ES.1.03; PH.1.08
- Arabic – ask to write an article or research paper about biology topics
- English- reading, speaking, writing and listening skills
- French-reading, speaking and writing.
- German- reading, speaking and writing
- Home economy -module 5 healthy cooking
- Library- LI.1.03 internationally labelling- search engine.
- Music- MU.1.17

Genetics

Weeks: Week 07 - Week 07

BI.1.04:

HSS-BI.1.01, HSS-BI.2.01

Create a model which shows the structure of DNA and RNA as a genetic material only:
1) the differences between DNA and RNA structure
2) complementary base pairing

Concepts	Skills
Modeling DNA structure: 1. Deoxyribonucleic acid (DNA). 2. Nucleotide subunits. 3. nitrogenous bases 4. sugar–phosphate backbone 5. Complementary strands 6. Double helix. RNA structure	Compare and contrast.

Essential Question(s): How is genetic information recorded?

Big Idea:

Cells are the basic unit of structure and function in organisms. They act as indicators of being healthy. Changes may occur according to the external and internal effects of the environment.

Comments:

This activity models the structure of DNA. It is used in this grade to teach the structure of DNA and then briefly used in Grade 2 to review it. The Grade 1 and Grade 2 teachers are aware of this.

Textbook and Resource Materials:

Unite 4 Genetics - Act.10 Modeling DNA Structure (Teacher SEPUP 505-513 -S.SEPUP 228-333)

Unit 4 Genetics - Act 10 - TR (10.1+10.2+10.3+10.4)

http://www.nobelprize.org/educational/medicine/dna_double_helix/readmore.html
1- Links
https://www.youtube.com/watch?v=qy8dk5iS1f0
https://www.youtube.com/watch?v=_POdWsii7AI
https://www.youtube.com/watch?v=5wMqHOf692E

Evidence of Learning:

- Record of lab work in science notebook
- Exit ticket
-Answer Analysis Questions

Other subject connection

- CH.1.05; MA.1.02
- Arabic – ask to write an article or research paper about biology topics
- English- reading, speaking, writing and listening skills
- French-reading, speaking and writing.
- German- reading, speaking and writing
- Computer science- CS.1.03 three D design-

Weeks: Week 08 - Week 09

BI.1.05:

HSS-BI.1.01

Investigate the functions of different classes of proteins and the factors affecting their performance:
1) know the structure, classes and functions of proteins;
2) know the mechanism of an enzyme function as a catalyst and the factors that effect on it.

Concepts	Skills
1. Functions of Proteins in cells a. Proteins in cells b. Protein classification c. Enzyme structure, functions and factors affecting rates.	Correlate (identify the relationship between) structure and function.

Essential Question(s): What are proteins and why are they important?

Big Idea:

Cells are the basic unit of structure and function in organisms. They act as indicators of being healthy. Changes may occur according to the external and internal effects of the environment.

Comments:

Again, there is a very important lab in this section (Act 11). In this lab students actually design their own experiment with a testable hypothesis. This is their first opportunity to practice this extremely important skill in science.

Textbook and Resource Materials:

Cell Biology- Unit 3 - Act.10 Functions of Proteins in Cells(Teacher .SEPUP 330-338 - S.SEPUP 213-215)
Unit 3 - Act 10 - TR 10.1; SS 10.1

Cell Biology- Unit 3 - Act.11 Investigating Enzyme Function (Teacher .SEPUP 339-346 -S.SEPUP 216-218)
Unit 3- Act 11 - TR 11.1

Links
https://www.youtube.com/watch?v=M568QP1K3sM
https://www.youtube.com/watch?v=5wMqHOf692E
https://www.youtube.com/watch?v=h5mJbP23Buo

Evidence of Learning:

Use of all Analysis Questions
Unit 3 - Act 10 - SS 10.1
Unit 3 - Act 11 - Entries in science notebooks of hypothesis, procedure, data collected, etc.
Unit 4 - Act 16 - SS 16.1

Capstone Connection:

A healthy environment includes good temperature control and clean water for the human body to function optimally.

Cell Biology (part 2)

Weeks: Week 10 - Week 10

BI.1.06:

HSS-BI.1.03

Create a model which outlines the cell cycle in controlled and uncontrolled cell divisions, including uncontrolled cell division resulting in cancer.

Concepts	Skills
The Cell Cycle: 1. Cell growth and division. 2. Phases sequence (G1, S, G2, M) 3. Normal and abnormal rates and processes 4. Rate differentiation based on cell type 5. Cancer as case study (from SEPUP only)	Record observations and identify trends in data

Essential Question(s): How does life maintain itself?

Big Idea:

Cells are the basic unit of structure and function in organisms. They act as indicators of being healthy. Changes may occur according to the external and internal effects of the environment.

Comments:

Activity 13 which is used to teach this Learning Outcome does not go into the phases of mitosis. The phases of mitosis are taught in Grade 2. The Cell Cycle at this point is generalized. We'd need to be careful that students don't get confused by the use of the word phases both in the sense of the cell cycle phases and then in the sense of mitotic phases. I would recommend leaving the teaching of the mitotic phases to Grade 2 At this point they only need to realize that body cells replicate at different rates for different reasons. All the details can be left to Grade 2 where they'll need more detail in order to understand mutation.

Textbook and Resource Materials:

Unit 3 Cell Biology Act.13 The Cell Cycle (Teacher: SEPUP 360-370; Student: SEPUP 229-235)

2- Links
https://www.youtube.com/watch?v=JcZQkmooyPk
https://www.youtube.com/watch?v=lpAa4TWjHQ4
https://www.youtube.com/watch?v=jjfYQMW_nek
https://www.youtube.com/watch?v=vKIRWY-LMYc
https://www.youtube.com/watch?v=8LhQllh46yI

Evidence of Learning:

- Unit 3 - Act 13 - SS 13.1
- Exit ticket
- Group presentations
- Solve Analysis questions

Other subject connections:

- Arabic – ask to write an article or research paper about biology topics
- English- reading, speaking, writing and listening skills
- French-reading, speaking and writing.
- German- reading, speaking and writing
- Computer science – 1.0.7 chart

Weeks: Week 11 - Week 12

BI.1.07:

HSS-BI.1.03

Evaluate stem cells as possible cures for some diseases:
1) cell differentiation; and
2) stem cells as a cure for disease.

Concepts	Skills
1. STEM cells types according to differentiation a. Totipotent	1. Distinguish scientific questions from ethical questions 2. Investigate through modelling and developing

b. Pluripotent c. Multipoint 2. Types of STEM cells according to its presence a. Embryonic b. Adults (somatic 3. Layers of embryo a. Ectoderm b. Endoderm c. Mesoderm 4. STEM cells as a treatment a. Treatment for leukemia b. Umbilical cord blood STEM cells therapy c. Bone marrow transplant 5. New researches treatment for diabetes 6. The STEM cells debate.	explanations

Essential Question(s): Can stem cells be used to cure diseases?

Big Idea:

Cells are the basic unit of structure and function in organisms. They act as indicators of being healthy. Changes may occur according to the external and internal effects of the environment.

Comments:

Material from the Genetics unit (Unit 4) has been added here to explain the mechanism of stem cell differentiation in greater depth. This material is not being used by Grade 2 and it is logical to include it here.

Textbook and Resource Materials:

Unit 4 Genetics - Act 17 Cell Differentiation and Gene Expression (Teacher: SEPUP 572: 581 Students: SEPUP 376 : 381) Parts A & B only

Act 17 - SS 17.1

Unit 3 Cell biology Act 14 Stem Cell Differentiation (Te. SEPUP 371 : 375) S.SEPUP 236 :239)
Unit 3 Cell Biology Act 15 - Stem cell research (Te SEPUP 176-180 S. SEPUP 240-243)
Act 15 Read and discuss Analysis Questions. Do not do KWL activity.

-Simulations
http://sumanasinc.com/webcontent/animations/content/stemcells.html

-Links
https://www.youtube.com/watch?v=rXVdSajL08E
https://www.youtube.com/watch?v=8JTw2RpDo9o
https://www.youtube.com/watch?v=_hbgeQzmU9U

Evidence of Learning:

- SEPUP students' sheet - unit 4 - Act 17 - SS 17.1
- Solving Analysis Questions

Other subject connections:

- Arabic – ask to write an article or research paper about biology topics
- English- reading, speaking, writing and listening skills
- French-reading, speaking and writing.
- German- reading, speaking and writing
- Home economy – module 7 techniques
- Music- MU.1.08- programming
- P.E- module 6 scout
- Art – module 2 models

Weeks: Week 13 - Week 13

BI.1.08:

Create a simulation to show how viruses infect a cell:
1) know organelles of healthy cells;
2) explain why a virus can`t replicate by itself and must use the cell's organelles; and
3) identify which organelles are used by the virus.

Concepts	Skills
HIV/AIDS: Virus and cell organelles: 1. the relationship between cell protein and viral protein 2. Receptor proteins and enzymes 3. Protein manufacture of virus utilizing cell organelles. 4. HIV virus mechanism of infection and replication. 5.HIV as a case study (from SEPUP) a. disease symptoms	1. Explain and interpret data 2. Design and prepare a simulation

Essential Question(s): Is a virus a living thing?

Big Idea:

Cells are the basic unit of structure and function in organisms. They act as indicators of being healthy. Changes may occur according to the external and internal effects of the environment.

Comments:

By the end of the first semester students will study six diseases (Malaria, sickle cell anemia, TB, diabetes, cancer, and HIV from SEPUP information only) and these diseases will be included in the exam. The student will choose any other disease rather than these six diseases to do it as a project related to his learning outcomes.

Week 14 circles back to disease and interventions as students give their presentations. This will conclude Learning Outcome 1.

Textbook and Resource Materials:

Unit 3 - Act.16 HIV/AIDS Infection and Cell Organelles (Teacher: SEPUP 381-388; Student: SEPUP 244-249)

Act 16 SS 16.1; SS 2.1

Simulation:
http://sumanasinc.com/webcontent/animations/content/lifecyclehiv.html

Links
https://www.youtube.com/watch?v=ng22Ucr33aw

Evidence of Learning:

Make Simulation
Unit 3 - Act 16 - SS 16.1

Other subject connections:

- Arabic – ask to write an article or research paper about biology topics
- English- reading, speaking, writing and listening skills
- French-reading, speaking and writing.
- German- reading, speaking and writing
- Library- search engines- simple and complex researches

Biology: Grade 1, Semester 2

Energy Force and Power

Big Idea: A sustainable ecosystem depends on the flow of energy from the main source which is plant through all other living systems.

BI.1.09 - Relate the structure of specialized plant structures to their function within the plant and within the process of photosynthesis.

- Examine and draw cross section of dicot leaf.
- Include structures of mesophyll cells, stomata, xylem, phloem, and chloroplast
- Include plant structures listed under concepts section (Week 01 - Week 01)

Essential Questions: How are plants the foundation of life?

Skills:

- Use of microscope
- Making detailed observations and records
- Deduce cell processes from structure and function of cell parts
- Scientific Drawing from Microscope section.

Concepts:

1. Plant tissues: meristematic and permanent.
2. Meristematic.
3. Epical.,
4. vascular cambium.
5. cork cambium.
6. Permanent tissues.
7. Parenchyma.,
8. Collenchyma.
9. Sclerenchyma.
10. Chlorenchyma.
11. Complex permanent tissues.
12. Vascular.,
13. Dermal.
14. ground tissues
15. Plant tissue adaptation
16. Transpiration and capillary action.

Evidence :

Quiz (Laboratory Practical Quiz?)
Drawings of microscope slides
Writings in science notebooks comparing slides and identifying them according to their characteristics
exit ticket -H. W

Texts & References: Dynamics. 23.1 - 23.2p. from 605 to 618
Modern Ch.29 from p.583 to p.603

Capstone Connection: Structures and functions of plant parts can inform building design from materials to function to structure to help understand heat flow.

Grand Challenge Connections: Improve the use of alternative energies to reduce our reliance on extracted fuel sources

Topic: Plant structure and function

BI.1.10 - Compare and contrast the processes of photosynthesis and respiration

- Process of photosynthesis (light dependent and independent)
- Process of respiration (with oxygen and without oxygen)
- Factors that affect respiration and photosynthesis. (Week 02 - Week 03)

Essential Questions: Could a plant be a photochemical cell?

Skills:

Make accurate inferences and conclusions using text materials.

Concepts:

- A. Photosynthesis - definition
- B. Cellular respiration - definition
- C. Light
- D. Chloroplasts & chlorophyll
- E. Producers
- F. Mitochondria and cytoplasm
- G. Oxygen-dependent cellular respiration
- H. Photosynthesis - process
- I. Cellular respiration - process
- J. Adenosine triphosphate (ATP)

Evidence:

Answer the Analysis questions
Comparison between light and chemical reactions.

Texts & References: SEPUP Ecology Unit
Act.9 - Photosynthesis and Cellular Respiration Shuffle Te 158-163; S 100-102

SEPUP Cell Biology Unit
Act.12 - Photosynthesis and Cellular Respiration Te 347-359; S 219-228

Some Links

1- *Photosynthesis*

https://www.youtube.com/watch?v=joZ1EsA5_NY
https://www.youtube.com/watch?v=YeD9idmcX0w
https://www.youtube.com/watch?v=hj_WKgnL6MI

2- *Respiration*

https://www.youtube.com/watch?v=-Gb2EzF_XqA

Capstone Connection: Energy conversion in a plant can be compared and contrasted to energy conversion in a dwelling.

Grand Challenge Connections: Improve the use of alternative energies to reduce our reliance on extracted fuel sources

Needed Prior Knowledge: CH.1.05,
Applications: CH.3.19

Topic: photosynthesis and respiration

BI.1.11 - Create your own experiment to investigate a factor that affects photosynthesis and/or respiration

Use the steps of experimental design (Week 04 - Week 06)

Essential Questions: Can we influence the capture and release of energy?

Skills:

- Design and conduct investigations
- Make and record observations and measurements
- Develop conclusions based on evidence
- Make predictions

Concepts:

- 1. Experimental design
- 2. reproducible procedures
- 3. independent variable to be manipulated
- 4. Cellular respiration in plants
- 5. Energy release
- 6. Photosynthesis
- 7. Capture of energy and production of carbon dioxide.
- 8. Impact of variables on photosynthesis and cellular respiration
- 9. temperature
- 10.amount of light
- 11.Chemical indicators

Evidence:

Make predictions
Take measurements, collect and record data
Quality of student experimental designs
Entries in science notebooks - procedure, data, analysis and conclusions based on their real data.

Texts & References: SEPUP Ecology Unit
Act.10 - Respiring Beans Te 164-170; S 103-106
Act.11 - Respiration and Photosynthesis in Plants Te 171-178; S 107-110
Act.12 - Too Much Life Te 179-186; S 111-115

Capstone Connection: Experimental design can be compared and contrasted with the designing a test plan for the Capstone prototype.

Grand Challenge Connections: Improve the use of alternative energies to reduce our reliance on extracted fuel sources

Needed Prior Knowledge: MA.1.05,

Topic: experimental design: photosynthesis and respiration

BI.1.12 - Create a model that shows the interdependence of living organisms within an ecosystem
Describe energy loss between trophic levels and its relation to the number of trophic levels
Explain the roles of producers and consumers in a food web
Consider factors which can disrupt ecosystems (Week 07 - Week 08)

Essential Questions: Is energy neither created nor destroyed within an ecosystem?

Skills:

- Use microscopes to make and record observations
- Analyze data
- Make predictions
- Identify and describe trade-offs involved in ecosystem changes
- Use case studies to make accurate interpretations, inferences and conclusions from text

Concepts:

1. Ecological biodiversity
2. Habitat variety
3. Micro to macro constituents of food web.
4. Producers and consumers.
5. Food as energy source.
6. Varieties of consumers
7. herbivores

- 8. carnivores
- 9. omnivores
- 10. decomposers
- 11. Food web diagram
- 12. Energy flow and pyramid
- 13. Consumers levels
- 14. primary
- 15. secondary
- 16. tertiary consumers
- 17. Ecosystem's diversity, disruption and collapse

Evidence:

Complete all activity sheets from SEPUP - SS 6.1; SS 7.1
Quiz - Draw food web and answer questions
Use dichotomous key to identify name of specimens
Answer some of the Analysis questions at the end of each activity

Texts & References: SEPUP Ecology Unit
Act.6 Producers and Consumers Te p. 134-142 S p. 85-89
Act.7 Energy Flow Through an Ecosystem Te p. 143-151 S p. 90-95

Capstone Connection: Apply understanding of energy use and flow to varied alternative energy processes.

Grand Challenge Connections: Reduce pollution fouling our air water and grounds.

Needed Prior Knowledge: MA.1.08.

Topic: interdependence in ecosystems

BI.1.13 - Connect the cycling of carbon to global climate change

- Matter is conserved within nature
- Forms of carbon within the carbon cycle.
- Processes that contribute to the carbon cycle.
- Connection between the water cycle and the carbon cycle
- Effect of human activities on the carbon cycle (Week 09 - Week 09)

Essential Questions: How does non-living matter cycle?

Skills:

Make predictions using evidence

Concepts:

- A. Carbon cycle
- B. Carbon reservoirs
- C. Quantity of carbon - fixed
- D. Reservoir quantity - fluctuates
- E. Forms of carbon (carbohydrate, organic compounds)
- F. Human impact on reservoirs

Evidence:

SS 8.1
Flow chart connecting water and carbon cycles
Exit ticket

Texts & References: SEPUP - Ecology Unit
Activity 8 - Carbon Cycle Te p. 152-157 S p. 96-99

Capstone Connection: A dwelling's carbon footprint is connected to our contribution to the carbon cycle.

Grand Challenge Connections: Improve the use of alternative energies to reduce our reliance on extracted fuel sources, Improve Sources of Clean Water.

Applications: es.1.11

Topic: carbon cycle and global climate change

BI.1.14 - Analyze how natural and human caused events can unbalance populations within an ecosystem and make a judgment about the ways to rebalance the ecosystem

- Describe natural disasters which cause unbalancing of ecosystems.
- Describe human caused events which unbalance ecosystems
- Explain the impact of invasive species.
- Debate ways of sustainable management around the world (Week 10 - Week 11)

Essential Questions: How is balance achieved?

Skills:

- Graph and analyze data
- Identify and describe trends in data
- Communicate and defend a scientific argument
- Identify evidence
- Identify and weigh trade-offs when making a decision

Concepts:

- A. Ecosystem services
- B. Management of resources
- C. Theoretical vs. actual situations
- D. Natural and human-caused disturbances
- E. Ecosystem disturbance: minor to catastrophic
- F. Recover and succession
- G. Primary succession
- H. Secondary succession
- I. Ecosystem resilience
- J. Sustainable decisions
- K. Invasive species
- L. Ecosystem resistance
- M. Cost-benefit ratio of management
- N. Indicators for management decisions

Evidence:

Oral presentations
Group created food webs
Quiz - Problem solution based on pictures
18.1; 19.1; 19.2

Texts & References: SEPUP - Ecology unit: ACt.4, 5, 16,17 ,18,19
Teacher pdf of other sources
Act. 18 Fishery Case Studies Te p. 224-232 S p. 139-144
Act.19 Making Sustainable Fishery Decisions Te p.233-242 S p.145-147

Capstone Connection: Consider ecosystem impact of the Capstone design

Grand Challenge Connections: Improve the use of alternative energies to reduce our reliance on extracted fuel sources

Applications: MA.1.06,

Topic: Ecosystems: unbalanced populations

BI.1.15 - Analyze an ecosystem in Egypt that has become unbalanced and suggest effective interventions (Week 12 - Week 12)

Essential Questions: What is the relationship between balance, unbalance and rebalance?