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?

Skills:

- A. Research
- B. Analysis
- C. Presentation

Concepts:

- A. Restoration of ecosystems.

Evidence:

Students prepare a presentation which demonstrates their knowledge of ecosystems as it applies in Egypt.

Texts & References: Online links to make presentations (Self-study)

Capstone Connection: Dwellings and developments impact ecosystems.

Grand Challenge Connections: Address the exponential population growth and prepare for the impact, Improve the use of alternative energies to reduce our reliance on extracted fuel sources, reduce urban congestion and its impact, increase efficient use of our land through improved use of arid areas, reduce pollution fouling our air water and grounds.

Topic: Ecosystems: unbalanced populations in Egypt

BIOLOGY

GRADE 10

SEMESTER 2