

LESSON PLAN I

MODULE TOPIC: Keep Calm and Maintain Homeostasis

STANDARD(S) & INDICATOR(S):

NGSS

HS-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

NJCCCS Math:

4.5.E.1: Create and use representations to organize, record, and communicate mathematical ideas.

4.5.E.3. Use representations to model and interpret physical, social, and mathematical phenomena.

OBJECTIVE(S): Students will be able to:

- Apply the Scientific Method to solve a problem.
- Describe the connection between the Jumping Jack activity to homeostasis, taking into consideration oxygen, sweat, and heart rate.

MATERIALS:

- Jumping Jack protocol sheet (See attached worksheet):
 - Stopwatch
 - Teacher created data sheet
- Lab notebook
- Lab report rubric & overview on how to write lab report (see attached)

LIST OF HANDOUTS (attach original copies of each handout - teacher & student edition)

- Jumping Jack protocol (See attached worksheet)
- Lab report rubric & overview on how to write lab report (see attached sheet)
- Scientific method note-taking guide

BACKGROUND INFORMATION:

- Note-taking guide: brief keynote on scientific method (see attached note-taking guide)
- Brief and open discussion on:
 - the usage and steps of the scientific method.
 - components of scientific method: research, hypothesis, procedure, data, analysis, and conclusion.
 - Compare and contrast:
 - independent and dependent variable.
 - control and experimental group.

CLASSROOM ACTIVITY DESCRIPTION

(LABORATORY/EXERCISES/PROBLEMS) including detailed procedures:

To engage students and attract their attention we have an open class discussion of application of scientific method to everyday situations. Quick presentation on Scientific method with teacher prepared note-taking guide, different types of graphs to report data and how to create lab report, students fill in note-taking guide.

Pair-share activity where students discuss different parts of the scientific method and any questions they may ask each other about class discussion. Present students with different cases they have to solve applying scientific method. In these specific cases students have to identify hypothesis, experimental and control group, independent and dependent variable.

Please see attached sheet for jumping jack lab activity. After lab activity students create a graph that helps represent their data and results (they select the type of graph they prefer to use to represent data). Students have to identify correctly independent and dependent variable. Students create lab report for experiment conducted during lab period.

End with an Exit ticket: informal assessment to help initiate next class discussion

3-2-1 reflection: What 3 things did you learn in class, 2 things you liked about the activity and 1 thing you still do not understand?

SAMPLE QUESTIONS TO ELICIT CLASS DISCUSSION: (Think-Pair-Share setting)

- Do now: Students create a focalized list on scientific method. After lesson students revise their focalized list.
- How can we apply scientific method to our every day life?
- Is this a skill for only scientist to use? Explain your response

HOMEWORK ACTIVITY/EXERCISES/PROBLEMS:

- Solve berry-berri worksheet applying the scientific method.
- Complete lab report
- Answer open response question as p

PARAMETERS TO EVALUATE STUDENT WORK PRODUCTS:

- Lab report rubric
- Open response question berry-berri worksheet 4-3-2-1 rubric:
 - 4-completely correct
 - 3-most of the response is correct
 - 2- few ideas are correct, but misses the main point or idea
 - 1-wrote something but idea is not connected to correct answer
- Open response homeostasis conclusion question #6 from jumping jack lab activity sheet, using the 4-3-2-1 rubric:
 - 4-completely correct

- 3-most of the response is correct
- 2- few ideas are correct, but misses the main point or idea
- 1-wrote something but idea is not connected to correct answer
- Exit ticket: informal assessment (this will not be graded, but it will help to initiate next class discussion)
 - 3-2-1 reflection:
What 3 things did you learn in class, 2 things you liked about the activity and 1 thing you still do not understand?

REFERENCES:

ACKNOWLEDGEMENT

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LESSON PLAN II

MODULE TOPIC: Keep Calm and Maintain Homeostasis

STANDARD(S) & INDICATOR(S):

NGSS:

HS-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

HS-LS1-6. Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.

NJCCCS Math:

4.5.E.1: Create and use representations to organize, record, and communicate mathematical ideas.

4.5.E.3. Use representations to model and interpret physical, social, and mathematical phenomena.

OBJECTIVE(S): Students will be able to:

- Compare and contrast carbohydrates, proteins, and lipids using a 3 circle Venn diagram
- Design an experiment to determine factors that affect enzyme activity.
- Analyze the data from the liver enzyme lab experiment
- Explain how these factors that affect enzymes relate to homeostasis in the human body.

MATERIALS:

- Biochemistry Note-taking guide
- Bioplastic protocol sheet (see attached):
 - DI water
 - Starch
 - pH paper
 - drying dish
 - digital vernier caliper
 - C-clamps
 - Spring scale
 - Micrometer
- 3 circle Venn diagram sheet for biomolecule comparison
- Lab notebook
- Lab report rubric & overview on how to write lab report (see attached)
- Who Took Juan's iPod protocol sheet or Enzyme kit protocol sheet (if available):
 - Enzyme kit
 - Thermometer

- Liver Enzyme protocol sheet
- Reading comprehension chart
- Journal rubric

LIST OF HANDOUTS (attach original copies of each handout - teacher & student edition)

- Biochemistry Note-taking guide
- Bioplastic protocol sheet (see attached)
- 3 circle Venn diagram sheet for biomolecule comparison
- Lab notebook
- Lab report rubric & overview on how to write lab report (see attached)
- Who Took Juan's iPod protocol sheet or Enzyme kit protocol sheet (if available)
- Liver Enzyme protocol sheet

BACKGROUND INFORMATION:

- Note-taking guide: brief keynote presentation on biochemistry (see attached note-taking guide)

CLASSROOM ACTIVITY DESCRIPTION

(LABORATORY/EXERCISES/PROBLEMS) including detailed procedures:

As an exploration phase of this lesson plan, students create a central idea graphic organizer to describe a typical meal they eat. They have to identify what biomolecules are present in each meal and a definition of the specific biomolecule.

Students will create a bioplastic film from renewable material like starch and use the tensile strength to determine the strength of the film.

Select an article on the importance of enzymes in our body, get teacher approval of article, and once approved read and complete close reading on selected article on the importance of enzymes in the body. Students fill out reading comprehension chart and create journal using their reading comprehension chart (scaffold).

Students complete enzyme lab experiment and evaluate factors that affect enzyme activity. After lab activity and class discussion on factors that affect enzymes students design protocol and complete experiment on other factors not tested in lab that affect enzyme activity.

After different class discussion on different types of macromolecules, students compare and contrast macromolecules using a Venn diagram or T chart. During a 4corner activity students will analyze nutritional facts and determine what macromolecule is mostly present and provides more energy and gravitate towards corner labeled with specific macromolecules.

They will conduct a lab experiment and learn how each biomolecule has a specific chemical indicator and protocol to follow and test for specific biomolecule.

Students create a weekly meal plan for themselves that will help maintain homeostasis taking into consideration everything learned in class about biomolecules, energy/calories, and homeostasis provided.

* Please see attached documents for detailed lab procedure.

SAMPLE QUESTIONS TO ELICIT CLASS DISCUSSION: (Think-Pair-Share setting)

- Do now: What does the proverb you are what you eat refer to?
 - show picture of a complete meal.
 - Break down the meal to its components at molecular level.
 - Explain the correlation of food, macromolecule and energy. (energy and food pyramid).
- Do now: review concept of polymers
 - Discuss my RET research experience in the laboratory creating films.

HOMEWORK ACTIVITY/EXERCISES/PROBLEMS:

- Concept map describing all groups of macromolecules discussed in class. (evaluated using graphic organizer rubric)
- Complete Lab report for Liver Enzyme lab activity
- Complete data and analysis sheet for bioplastic lab activity. (evaluate using 4-2-3-1 rubric system described in parameters below)

PARAMETERS TO EVALUATE STUDENT WORK PRODUCTS:

- Bioplastic biofilm data and analysis sheet evaluate open response questions:
 - 4-completely correct
 - 3-most of the response is correct
 - 2- few ideas are correct, but misses the main point or idea
 - 1-wrote something but idea is not connected to correct answer
- Lab report rubric on Liver enzyme lab activity (lab rubric attached with this folder)
- Open response question Enzyme & Homeostasis worksheet 4-3-2-1 rubric:
 - 4-completely correct
 - 3-most of the response is correct
 - 2- few ideas are correct, but misses the main point or idea
 - 1-wrote something but idea is not connected to correct answer
- 3 circle Venn diagram or T chart and graphic organizer explaining different macromolecules discussed in class using comparing and contrasting biomolecules.

- Exit ticket: muddiest point (what is still unclear about polymers, biomolecules, and homeostasis?) this will help open classroom discussion for the next day.

REFERENCES:

http://www.biologycorner.com/worksheets/scientific_method_action.html

http://serendip.brynmawr.edu/sci_edu/waldron/pdf/WhoTookJerellsIpod.pdf
(Teacher modified please see attached documents)

<http://www.uwstout.edu/soe/profdev/inspirationrubric.html>

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