**Science/Engineering & Technology**

**Instructional Design Lesson Planning Template**

**Grade/Course: ­­­­­\_\_6\_\_Lesson: \_\_BCI v Tippecanoe/Humboldt Park Date: \_\_8/12\_\_\_\_**

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| --- | --- | --- | --- | --- |
| **Science and Engineering Practices** | | | | |
| 1. Asking questions (for science) and defining problems (for engineering)  3. Planning and carrying out investigations 4. Analyzing and interpreting data  5. Using mathematics and computational thinking 6. Constructing explanations (for science) and designing  transfer solutions (for engineering) 7. Engaging in argument from evidence 8. Obtaining, evaluating, and communicating information | | | | |
| **Cross Cutting Concepts are bolded in the Component Ideas and Grade Band Endpoints** | | | | |
| **Core Idea** | | **Core Idea Question** | | |
| LS 2: Ecosystems: Interactions, energy, and dynamics LS 4: Biological evolution: Unity and diversity | | **CORE IDEA LS2: ECOSYSTEMS: INTERACTIONS, ENERGY, AND DYNAMICS**  *How and why do organisms interact with their environment, and what are the effects of these interactions?*  **IDEA LS4: BIOLOGICAL EVOLUTION: UNITY AND DIVERSITY**  *How can there be so many similarities among organisms yet so many different kinds of plants, animals, and microorganisms? How does biodiversity affect humans?* | | |
| **Component Ideas** | | **Component Idea Questions** | | |
| 1. Patterns 2. Cause and effect: Mechanism and explanation 3. Scale, proportion, and quantity 4. Systems and system models 5. Energy and matter: Flows, cycles, and conservation 6. Structure and function 7. Stability and change | | **LS2.A: Interdependent Relationships in Ecosystems**  *How do organisms interact with the living and nonliving environment to obtain matter and energy?*  **LS2.D: Social Interactions and Group Behavior**  *How do organisms interact in groups so as to benefit individuals?*  **LS4.B: Natural Selection**  *How does genetic variation among organisms affect survival and reproduction?* | | |
| **Grade Band Endpoints (Learning Intentions)** | | | | |
| **LS2.A: Interdependent Relationships in Ecosystems**  *How do organisms interact with the living and nonliving environment to obtain matter and energy?*  Organisms and populations of organisms are dependent on their environmental interactions both with other living things and with nonliving factors. Growth of organisms and population increases are limited by access to resources. In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction. Similarly, predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving, are shared.  **LS2.C: Ecosystem Dynamics, Functioning, and Resilience**  *What happens to ecosystems when the environment changes?*  Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations.  Biodiversity describes the variety of species found in Earth’s terrestrial and oceanic ecosystems. The completeness or integrity of an ecosystem’s biodiversity is often used as a measure of its health.  **LS2.D: Social Interactions and Group Behavior**  *How do organisms interact in groups so as to benefit individuals?*  Groups may form because of genetic relatedness, physical proximity, or other recognition mechanisms (which may be species-specific). They engage in a variety of signaling behaviors to maintain the group’s integrity or to warn of threats. Groups often dissolve if they no longer function to meet individuals’ needs, if dominant members lose their place, or if other key members are removed from the group through death, predation, or exclusion by other members.  **LS4.B: Natural Selection**  *How does genetic variation among organisms affect survival and reproduction?*  Genetic variations among individuals in a population give some individuals an advantage in surviving and reproducing in their environment. This is known as natural selection. It leads to the predominance of certain traits in a population and the suppression of others. In *artificial* selection, humans have the capacity to influence certain characteristics of organisms by selective breeding. One can choose desired parental traits determined by genes, which are then passed on to offspring. | | | | |
| **Success Criteria** | | | | |
| 1. Students will be successful if they are able to observe and record a detailed account of each sample plot from the Barro Colorado noticing plants, fungus, and animals and two examples of plants and fungus in their lab notebook. 2. Students will be successful if they are able to create a detailed diagram with colored pencils, fine-tip Sharpies, or markers of their favorite rainforest plot in their lab notebook. 3. Students will be successful if they are able to identify and explain the differences in the two micro-ecosystems they are comparing in their lab notebook. 4. Students will be successful if their lab write-ups include explanations from the Summative Assessment Section below.   \*\*\*\* Students will have a guideline sheet with the Success Criteria. | | | | |
| **Formative Assessment** | | | **Summative Assessment** | |
| *Students will be asked to explain what each part of the scientific process is and why it is important.*  *Students will be asked to explain what they know about the deciduous forest ecosystem and grassland prairie ecosystem of Milwaukee and then the rainforest ecosystem of Panama*  *Students will use their measurement skills while constructing their frame.* | | | *Students will use their scientific knowledge and lab notebook to explain each step of our research process. See more specifics on the attached pages.*  *The students will be expected to explain how the living and nonliving things in the ecosystem affect each other, how the limitations affect the living things- including the variety of species, and what happens when the availability to resources are so different.*  *The students will be expected to explain how the species variety has a connection to the healthiness of each ecosystem and then determine which one type of micro-ecosystem is healthier.*  *The students will also need to explain the how the species interact within each ecosystem and then compare the interaction in each of the ecosystems.*  *Students will need to explain the difference between the physical space in the rainforest versus the areas around Tippecanoe School and Humboldt Park with regard to natural selection and artificial selection.* | |
| **Integration** | | | | |
| **Mathematics: Students will create a duct tape square frame measuring 50cm x 50cm on the inside of the tape that is marked off in increments of 10cm. Students will also need to make sure each corner is a 90°.** | | | | |
| **Language Arts: Students will need to log their predictions, hypothesis, research plan, step-by-step procedure, materials, observations, conclusions/results, and further questions/concluding questions in complete sentences/paragraphs in their lab notebooks.** | | | | |
| **Art: Students will create a detailed drawing with colored pencil, fine-tip Sharpies, and/or markers of the rainforest samples and their three regional plots at and near school.** | | | | |
| **Accommodations for Differentiated Instruction (see Curriculum Guides for suggestions)** | | | | |
| **Special Needs**   * *Allowing for shorter written explanations* * *Having a partner or group member be the recorder* * *Being in a group that has more adult interaction* * *Having the guideline sheet with space between each section so the student can write the info right below each section, rather than in the lab notebook (attach the written part in the notebook when completed)* * *Collect the student’s work in smaller parts to help with organization* * *Allow them to express their ideas in a form other than writing or in a different type of writing style* | **English Language Learners**   * *Have a peer buddy that the student feels comfortable working with* * *Provide the assignment in both English and their native language* * *If possible, have the key academic vocabulary in on a bilingual subject dictionary the student has been creating* * *If possible, have the student in a group with students who speak the ELL’s native language to help them translate* * *Have them give oral responses* * *Allow them to write in both English and their native language and then use Google Translator for the parts written in their native tongue* * *Any of the accommodations for students with special needs* * *Allow them to express their ideas in a form other than writing or in a different type of writing style* | | | **Gifted & Talented**   * *Encourage more detailed explanations* * *Have them in a group with more adult interaction so they can be challenged with higher level questioning* * *Have then create a written document that they could use to teach younger/lower level students about the topic* * *Allow them to express their ideas in a form other than writing or in a different type of writing style* * *Have them be the leader of their group* * *Group several gifted and talented students together, along with regular level learners, so they challenge each other to work to the higher level* |
| **Materials Needed and Additional Notes** | | | | |
| * **250 cm of duct tape per group** * **Science lab notebook** * **Guideline sheet** * **3 different green space areas near your school** * **Permission slips for students to go off school grounds** * **Meter sticks** * **Centimeter rulers for leaf measurement** * **Protractors** * **Projector** * **Photos and videos from Panama that are connected with this project** * **Digital cameras- 1 per group if possible** * **Markers** * **Scissors** * **Thin Tip Sharpies** * **Colored Pencils** * **White paper squares 50mm x 50mm for each of the drawings** | | | | |
| **Approximate Time Needed:** | | | | |
| *1 class period for the observation overview*  *1 class period to build the square frame, complete the pre-lab, and pass out the permission slips*  *1 class period to observe and collect data from the green space on school grounds*  *2 hours in a row to observe and collect data from the other two sites*  *1 class period to finish their detailed observations based on the photos from their plots*  *1 class period for the introduction and videos of the project in Panama and for the observing and diagramming the photos from the rainforest*  *2 class periods to connect research to scientific content*  *1 class period to review, analyze, interpret and compare data to formulate conclusions and concluding questions and for sharing group data with the class and reviewing any data that students still had questions on*  *1 class period for students complete the assessment and come up with a list of questions for further study related to the rainforest or interactions of different species in different environment. Encourage them to come up with a list of at least 3 questions* | | | | |

**Launch Explore Summarize Apply (LESA) with the 7 Es Instructional Design**

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| **LAUNCH** | Notes/reflection |
| **ELICIT**  **Day 1**   1. *Ask students to write down what they saw on the way to school.* 2. *Ask the students to determine and record why the skill of observation is so important in general and then specifically in science.* 3. *Have them share what they saw with their neighbors and then record the results on the board.* 4. *Then ask how the rainforest might look.* 5. *Have them record their thoughts and then share what they know.* 6. *Then ask them how they think the forest floor would look and record the information Remind them that there is no right or wrong answer since it is just an open brainstorm.* 7. *Have the students share their thoughts on the forest floor.* 8. *Then finish the class period by giving them an overview of the activity.* |  |
| **ENGAGE**  **Day 2**   1. *Tell the students that they are going to go on a fieldtrip to practice the important skill of observing with plots of their own in the courtyard, the Humboldt Park big playground, and the Humboldt Park pond.* 2. *Demonstrate how to make the 50cm X 50cm duct tape square frame.* 3. *Have the students create their frames and practice observing within the square around the classroom. Make sure they write their names on their frame.* 4. *Have the students answer the following questions in their lab notebook: What surprised you? What would you like to know more about? What would you do if you could use your sense of touch to observe the plot further?* 5. *Collect the frames to use when you go to the courtyard/green space on school grounds.* |  |
| **EXPLORE** |  |
| **EXPLORE**  **Day 3**   1. *Review the rules for going outside with supplies. Remind the students to bring their lab notebooks, pencils, duct tape frame, and digital camera if this is available (5 minutes).* 2. *Walk to the courtyard and have the students spread out to different areas (5 minutes).* 3. *Have them place their frame on the ground and then start recording their observations. (15-20 minutes).* 4. *Have them create their detailed sketch. Make sure it is labeled (15-20 minutes) Remind them to take their time and focus on neatness since they will be able to look at a photo of their plot to finish. They’ll need to finish this part for homework when you can get them a copy of the photo. If they have access to e-mail, you could just e-mail it to them as well.* 5. *Return to class, collect the supplies, and debrief. Have the students share what they observed in their plots with members from other groups (5 minutes).*   **Day 4**   1. *Repeat steps 1-5 on the field trip to the park (2 hours).* 2. *Complete the Conclusion Page of the Observation Packet.* 3. *Discuss any similarities or differences between their plots.*   **Day 5**   1. *Give the students time to work on adding detail to their sketches while looking at the bird’s eye view photos.* 2. *Have them add color to their sketches*. |  |
| **SUMMARIZE** |  |
| **EXPLAIN**  **Day 6**   1. *Show the students the YouTube Video about Barro Colorado Island.* 2. *Then show the students the videos from my plot collection on BCI.* 3. *Have the students look closely at rainforest plot photos and write their observations (allow for 5-10 minutes to study each plot). Students should write between 3-5 sentences for each photo.* 4. *Have each student pick one of the pictures from each plot to start creating a detailed sketch of that site- make sure to label the diagram on the top of the drawing (allow 10 minutes to work)* 5. *Repeat steps 3-4 three times.* 6. *Have the students pick which photo they’d like to work on for the detailed sketch. Then allow the students to work on it for the rest of the hour. If students do not finish the sketches, then have take the photo home to finish and collect it the next day. Provide colored pencils to each group.*   **Day 7 and Day 8**  *Provide the students access to materials that explain the following scientific concepts:*   1. *The living and nonliving things in the ecosystem affect each other. Limitations affect the living things- including the variety of species, and what happens when the availability to resources are so different.* 2. *Species variety is connected to the healthiness of each. Some ecosystems are healthier and more sustainable than others. How and why?* 3. *Species interact within each ecosystem. How do they interact? Give specific examples.* 4. *Natural selection and artificial selection have a major role in different ecosystems. What are they and how does the selection affect the rest of the ecosystem.*   *Give the students time to research the information in small groups (One class period)*  *Switch the groups so at least one person from each topic is in the group. Have the students fill in the chart as each of them shares information from their research with each other. Make sure you have these groups prearranged- students with special needs will need to be paired up with another classmate so they can share their information together (5 minutes for each person to share).*  *Ask students to share their information as a whole class. This should be time for students to ask clarifying questions and complete their charts if they didn’t finish in the small groups.*  *Collect their charts at the end of class.* |  |
| **ELABORATE**  ***Day 9***  *Have the students connect their content information to answer the following questions in the conclusion section of their lab write-up:*   1. *What are the similarities and differences between each of ecosystems in the rainforest?* 2. *What are the similarities and differences between each of the ecosystems in Milwaukee?* 3. *Which one is healthier and why?* 4. *Describe the interactions you see in the rainforest photos.* 5. *Describe the interactions you see in the Milwaukee ecosystems.* 6. *Why might the interactions be different in the rainforest?* 7. *How many species did you view in each of the rainforest pictures?* 8. *How many species did you observe in each of the Milwaukee plots?* 9. *Why is there a wider variety of species in the rainforest compared to Milwaukee?* 10. *What does this difference tell you about the importance of variation?*   *After the students use their to complete the concluding questions, have them review their data/photos and use their checklists to make sure their observations/conclusions do the following things:*   1. *Describe what they saw or touched.* 2. *Include objective measurements, not subjective ones (“15cm” instead of “long”).* 3. *People not participating in the lab will be able to understand the observations.* 4. *The observations ARE NOT inferences.* 5. *The observations can be used to make inferences and conclusions.* 6. *The observations are not judgments about the process of the lab; rather they focus on the observation.* 7. *The student will be able to understand the data in a few weeks or months.* 8. *The student paid attention to all observations.* 9. *The student didn’t deliberately ignore any observations because they didn’t support the student’s ideas.* 10. *The data isn’t written haphazardly. It is organized to show the main points of the investigation.* |  |
| **APPLY** |  |
| **EVALUATE**  **Day 10**   1. *Students will explain their data analysis and conclusion to their peers.* 2. *After reviewing their lab notebook and correcting final revisions, they will share their information as a group to the rest of the class.* 3. *The group will need to pose at least one question for the class and they will need to answer at least one question about their research or observations.* 4. *Once all of the groups have shared their plots, students will chat in small groups to formulate a list of any questions about the research process or scientific topic aspect of the project that we could possibly look into.*   **Day 11**  *Have the students reflect on the whole process individually, with their peers, and as a whole class by answering the following questions:*   * *What was your favorite part of this activity? (2 points)* * *What was the most difficult part of this activity?(2 points)* * *Explain three things that you didn’t know before you completed this lab regarding the scientific process. (6 points)* * *Explain one thing about ecosystems.(2 points)* * *Explain one thing about the way species interact.(2 points)* * *Explain the difference between artificial and natural selection.(2 points)* * *Explain what changes you would make if you were to do this lab again- this can be something the teacher should change or something you would do differently.(2 points)* * *Summarize what you did during this long experiment in a paragraph. (7 points)* |  |
| **EXTEND**  *If possible, I will have a UWM student who is going back to Barro Colorado Island go to the same spots that I sampled and take pictures again with the square frame so they can observe the differences between the rainy season (when I was there) and the dry season (February).*  *If possible, I will have the students go back to the same spots at Tippecanoe School and Humboldt Park to do the Scientific Applications Skills in different seasons- in November (fall), early April (spring), and the last week of school in June (summer) so they can make comparisons about their plots over the year.* |  |

**Practices for K-12 Science Classrooms (From the *Next Generation Science Framework*)**

1. Asking questions (for science) and defining problems (for engineering) 2. Developing and using models  
3. Planning and carrying out investigations  
4. Analyzing and interpreting data

5. Using mathematics, information and computer technology, and computational thinking 6. Constructing explanations (for science) and designing solutions (for engineering)  
7. Engaging in argument from evidence

8. Obtaining, evaluating, and communicating information

**Practice 1: Asking Questions and Defining Problems**

Questions are the engine that drive science and engineering. Science asks:

* •  What exists and what happens?
* •  Why does it happen?
* •  How does one know?

Engineering asks:

* •  What can be done to address a particular human need or want?
* •  How can the need be better specified?
* •  What tools and technologies are available, or could be developed, for addressing this

need?

Both science and engineering ask:

• How does one communicate phenomena, evidence, explanations, and design

solutions?

**Goals**

By grade 12 students should be able to:

* •  Ask questions about the natural and human-built worlds—for example: Why are there

seasons? What do bees do? Why did that structure collapse? How is electric power

generated?

* •  Distinguish a scientific question (e.g., Why do helium balloons rise?) from a

nonscientific question (Which of these colored balloons is the prettiest?).

* •  Formulate and refine questions that can be answered empirically in a science

classroom and use them to design an inquiry or construct a pragmatic solution.

* •  Ask probing questions that seek to identify the premises of an argument, request

further elaboration, refine a research question or engineering problem, or challenge the interpretation of a data set—for example: How do you know? What evidence supports that argument?

* •  Note features, patterns, or contradictions in observations and ask questions about them.
* •  For engineering, ask questions about the need or desire to be met in order to define constraints and specifications for a solution.

**Practice 2: Developing and Using Models**

**Goals**

By grade 12, students should be able to:

* •  Construct drawings or diagrams as representations of events or systems—for

example, to draw a picture of an insect with labeled features, to represent what happens to the water in a puddle as it is warmed by the sun, or to represent a simple physical model of a real-world object and use it as the basis of an explanation or to make predictions about how the system will behave in specified circumstances.

* •  Represent and explain phenomena with multiple types of models—for example, represent molecules with 3-D models or with bond diagrams—and move flexibly between model types when different ones are most useful for different purposes.
* •  Discuss the limitations and precision of a model as the representation of a system, process, or design and suggest ways in which the model might be improved to better fit available evidence or better reflect a design’s specifications. Refine a model in light of empirical evidence or criticism to improve its quality and explanatory power.
* •  Use (provided) computer simulations or simulations developed with simple simulation tools as a tool for understanding and investigating aspects of a system, particularly those not readily visible to the naked eye.
* •  Make and use a model to test a design, or aspects of a design, and to compare the effectiveness of different design solutions.

**Practice 3: Planning and Carrying Out Investigations**

Scientists and engineers investigate and observe the world with essentially two goals: (1) to systematically describe the world and (2) to develop and test theories and explanations of how the world works.

**Goals**

By grade 12, students should be able to:

* •  Formulate a question that can be investigated within the scope of the classroom,

school laboratory, or field with available resources and, when appropriate, frame a

hypothesis for an expected outcome based on a model or theory.

* •  Decide what data are to be gathered, what tools are needed to do the gathering, and

how measurements will be recorded.

* •  Decide how much data are needed to produce reliable measurements and consider any

limitations on the precision of the data.

* •  Plan experimental or field-research procedures, identifying relevant independent and

dependent variables and, when appropriate, the need for controls.

* •  Consider possible confounding variables or effects and ensure that the investigation’s

design has controlled for them.

**Practice 4: Analyzing and Interpreting Data**

**Goals**

By grade 12, students should be able to:

* •  Analyze data systematically, either to look for salient patterns or to test whether the

data are consistent with an initial hypothesis.

* •  Recognize when the data are in conflict with expectations and consider what revisions

in the initial model are needed.

* •  Use spreadsheets, databases, tables, charts, graphs, statistics, mathematics, and

information technology to collate, summarize, and display data and to explore

relationships between variables, especially those representing input and output.

* •  Evaluate the strength of a conclusion that can be inferred from any data set, using

appropriate grade-level mathematical and statistical techniques.

* •  Recognize patterns in data that suggest relationships worth investigating further.

Distinguish between causal and correlational relationships.

* •  Collect data from physical models and analyze the performance of a design under a

range of conditions.

**Practice 5: Using Mathematics, Information and Computer Technology, and Computational Thinking**

**Goals**

By grade 12, students should be able to:

* •  Recognize dimensional quantities and use appropriate units in scientific applications

of mathematical formulas and graphs.

* •  Express relationships and quantities in appropriate mathematical or algorithmic forms

for scientific modeling and investigations.

* •  Recognize that computer simulations are built on mathematical models that

incorporate underlying assumptions about the phenomena or systems being studied.

* •  Use simple test cases of mathematical expressions, computer programs, or

simulations—that is, compare their outcomes with what is known about the real

world—to see if they “make sense.”

* •  Use grade-level appropriate understanding of mathematics and statistics in analyzing

data.

**Practice 6: Constructing Explanations and Designing Solutions**

**Goals**

By grade 12, students should be able to:

* •  Construct their own explanations of phenomena using their knowledge of accepted

scientific theory and linking it to models and evidence.

* •  Use primary or secondary scientific evidence and models to support or refute an

explanatory account of a phenomenon.

* •  Offer causal explanations appropriate to their level of scientific knowledge.
* •  Identify gaps or weaknesses in explanatory accounts (their own or those of others).

In their experience of engineering, students should have the opportunity to:

* + •  Solve design problems by appropriately applying their scientific knowledge.
  + •  Undertake design projects, engaging in all steps of the design cycle and producing a plan

that meets specific design criteria.

* + •  Construct a device or implement a design solution.
  + •  Evaluate and critique competing design solutions based on jointly developed and agreed-

on design criteria.

**Practice 7: Engaging in Argument from Evidence**

**Goals**

By grade 12, students should be able to:

* •  Construct a scientific argument showing how the data support the claim.
* •  Identify possible weaknesses in scientific arguments, appropriate to the students’ level of

knowledge, and discuss them using reasoning and evidence.

* •  Identify flaws in their own arguments and modify and improve them in response to

criticism.

* •  Recognize that the major features of scientific arguments are claims, data, and reasons

and distinguish these elements in examples.

* •  Explain the nature of the controversy in the development of a given scientific idea,

describe the debate that surrounded its inception, and indicate why one particular theory

succeeded.

* •  Explain how claims to knowledge are judged by the scientific community today and

articulate the merits and limitations of peer review and the need for independent

replication of critical investigations.

* •  Read media reports of science or technology in a critical manner so as to identify their

strengths and weaknesses.

**Practice 8: Obtaining, Evaluating, and Communicating Information**

**Goals**

By grade 12, students should be able to:

* •  Use words, tables, diagrams, and graphs (whether in hard copy or electronic), as well

as mathematical expressions, to communicate their understanding or to ask questions

about a system under study.

* •  Read scientific and engineering text, including tables, diagrams, and graphs,

commensurate with their scientific knowledge and explain the key ideas being

communicated.

* •  Recognize the major features of scientific and engineering writing and speaking and

be able to produce written and illustrated text or oral presentations that communicate

their own ideas and accomplishments.

* •  Engage in a critical reading of primary scientific literature (adapted for classroom

use) or of media reports of science and discuss the validity and reliability of the data, hypotheses, and conclusions.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Humboldt Park Observation Lab

Name (5 points)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 180 points total

Date (5 points)

Make sure to use your checklist while you complete each section of the lab.

Pre-lab Hypothesis:

If our group places the 50cm x 50cm square frame in the courtyard of the school, then we will see the following things on the ground: (List as many things that you think you will see) (5 points)

If our group places the 50cm x 50cm square frame near the playground at Humboldt Park, then we will see the following things on the ground: (List as many things that you think you will see) (5 points)

If our group places the 50cm x 50cm square frame near the big pond at Humboldt Park, then we will see the following things on the ground: (List as many things that you think you will see) (5 points)

Finish the rest of the sentence: (5 points)

If we compare the 3 plots that we observe in Milwaukee, Wisconsin, then they will look

because

Observations:

Use your sense of sight and touch and then describe what you see in the Courtyard Plot. (5 points)

List as least 5 different things you see in the plot, measure the length and width in cm for each item, and then record them in the chart. (15 points)

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| Item in the Courtyard Plot | Item’s Length in cm | Item’s Width in cm |
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Courtyard Plot Sketch (20 points)

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Observations:

Use your sense of sight and touch and then describe what you see in the Playground Plot. (5 points)

List as least 5 different things you see in the plot, measure the length and width in cm for each item, and then record them in the chart. (15 points)

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| Item in the Playground Plot | Item’s Length in cm | Item’s Width in cm |
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Playground Plot Sketch (20 points)

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Observations:

Use your sense of sight and touch and then describe what you see in the Near the Pond Plot. (5 points)

List as least 5 different things you see in the plot, measure the length and width in cm for each item, and then record them in the chart. (15 points)

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| Item in the Near the Pond Plot | Item’s Length in cm | Item’s Width in cm |
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Near the Pond Plot Sketch (20 points)

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Conclusion:

What surprised you in the Courtyard Plot? Stating “nothing” will earn you negative 5 points. (If nothing was surprising, you weren’t looking hard enough!) (5 points)

What surprised you in the Playground Plot? Stating “nothing” will earn you negative 5 points. (If nothing was surprising, you weren’t looking hard enough!) (5 points)

What surprised you in the Near the Pond Plot? Stating “nothing” will earn you negative 5 points. (If nothing was surprising, you weren’t looking hard enough!) (5 points)

Did each of the plots you observed in Milwaukee, Wisconsin look similar or different? Why or why not? Explain your thoughts and give examples. (5 points)

How do you think 3 plots spaced about the same distance apart would look on Barro Colorado Island, Panama (in the rainforest)? (5 points)

Would the plots on Barro Colorado Island look the same or different than the plots in Milwaukee, Wisconsin? Explain your reasoning. (5 points)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Do You Have the Mind of a Scientist?

Name

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

Date

Directions: Use this list to double-check your data collection. Check off each task as you review it.

Observation Section:

* I described what I saw and touched.
* I used a ruler on the centimeter side to make my measurements.
* I recorded measurements with numbers and labels.
* Someone who didn’t complete this lab would be able to understand my observation section.
* I only recorded observations based on my senses, not on my inferences.
* I will use my observations to make inferences and conclusions during the next phase of our project.
* I did not make any judgments in my observation sections.

Lab Write-Up Overview

* My data is clear enough so I will be able to understand what I did in two weeks.
* I observed to the best of my ability and paid attention while observing.
* I didn’t ignore any observations because they didn’t support my ideas.
* My lab write-up is written in an organized manner that is easy to follow.
* My lab write-up has complete sentences (capital letters at the beginning of every sentence and punctuation at the end of every sentence)
* I believe that I included enough detail to explain my conclusions.

Adapted from “Using metacognition to develop understanding of the role of evidence in science” by Erin Peters Burton from *Science Scope*, Summer 2012, Volume 35, Number 9

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Ecosystems, Interactions, and Natural Selection (40 points)

Name

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

Date

Directions: After researching your topic, place the key information in the appropriate section. After learning about the other topics with your second group, fill in the key information in the other sections. Use the back if necessary.

|  |  |
| --- | --- |
| Explain how living and nonliving things in an ecosystem affect each other. (10 points) | How and why are some ecosystems healthier than others? How does species variation affect how healthy an ecosystem is? (5 points for each question) |
|  |  |
| How do different species interact in an ecosystem? Give three examples- animal/animal, plant/plant, and animal/plant. (10 points) | What is the difference between natural selection and artificial selection? How does each type of selection affect the rest of an ecosystem? (5 points for each question) |
|  |  |

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ BCI vs. Humboldt Park Observation Activity Summary

Name

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

Date

Answer the following questions in complete sentences. This reflection is worth 25 points.

1. What was your favorite part of this activity? (2 points)
2. What was the most difficult part of this activity? (2 points)
3. Explain three things that you didn’t know before you completed this lab regarding the scientific process. (6 points)
4. Explain one thing about ecosystems. (2 points)
5. Explain one thing about the way species interact. (2 points)

1. Explain the difference between artificial and natural selection. (2 points)
2. Explain what changes you would make if you were to do this lab again- this can be something the teacher should change or something you would do differently. (2 points)
3. Summarize what you did during this long experiment in a paragraph. (7 points)