Science Lesson Planning Template

Context Issues of the Lesson

Unit or Lesson Title:	Crops: How much moisture is necessary to grow?
Grade Level	4th Grade
Topic/Theme/Nature of the Investigation:	How much soil moisture is essential to growing corn in Kansas?
NGSS Performance Expectation(s)	4-ESS2-2 Analyze and interpret data from maps to describe patterns of Earth's features. RI.4.7 Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears. RI.4.9 Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably MP.2 Reason abstractly and quantitatively
NGSS Dimension 1 component	**Planning and Carrying Out Investigations** Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions. • Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon. **Analyzing and Interpreting Data**

	Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used. • Analyze and interpret data to make sense of phenomena using logical reasoning. .
NGSS Dimension 2 component	**ESS2.A: Earth Materials and Systems** Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around.
NGSS Dimension 3 component	**Patterns** Patterns can be used as evidence to support an explanation. **Cause and Effect** Cause and effect relationships are routinely identified, tested, and used to explain change.
Duration:	1 week

Planning Stages Within the 5-E Inquiry Model

Engage (Day 1)
PURPOSE: • to convey the context of the lesson(s)/unit by conveying an important Key Question • to engage students in investigations that reveal their thinking to themselves and the teacher • to record the initial ideas of students • to engage their interest
What is the teacher doing? What are the students doing? **At the beginning of this mini lesson the teacher will project the video below.** **The link is in an attached word document.** **Before playing the video the teacher will ask the students to divide a piece of notebook paper in half. On one half they will label it I NOTICE…….. On the other half they will label it I WONDER…….** **The teacher will give the students 5 minutes to write 3 things that they notice and that they wonder about.** **Then there will be a class discussion about the things they noticed and wondered about. They teacher will record their answers on tablet paper on the board.** **The teacher will then explain that they are going to be doing some research about the soil moisture in Kansas, the amount of moisture that it takes to grow corn, and whether Kansas can naturally grow corn or if it needs the help of outside sources.**
Explore (Day 2-3)
PURPOSE: • to test ideas and develop knowledge using explorations, investigations, experiments

- to modify and record ideas as they change due to activities
- to develop new questions and testable hypotheses

Activities (list)	Driving Question
Procedure: **Day 2:** 1. The teacher will explain that for the next two days we will be using Data cubes to help us gather information about the moisture in Kansas soil and whether it is compatible to growing corn. If the class has never done a data cube before the teacher will need to model the steps using a data cube. If the class has background knowledge on data cubes they may move forward. 2. The teacher will divide the class into partners. 3. With their partner the students will gather the data literacy cube template and the data cube question sheet. https://mynasadata.larc.nasa.gov/sites/default/files/2019-10/Final%20MND%20data%20cube%20only.pdf 4. After the students put their cube together they will collect the following map form their teacher about the soil moisture in the United States.(link below) 5. The students will work through the questions using the map of soil moisture for the United States. The teacher will circulate and answer any necessary questions. 6. At the end of the class period the teachers and students will discuss their findings from the map. **Day 3:**	1. How can we determine if the soil in Kansas has enough moisture to grow corn? 2. Does Kansas need to use outside sources to grow corn? Materials: Data cube copies Chart paper Worksheets for data cube questions My Nasa data website Soil moisture maps

1. The teacher will review with the students the process and finding from the day before. **2.** The teacher will explain that today they will be looking at the graph and graphing data cube to learn about how much water is necessary for corn to grow. **3.** The students will put together their new graph cube. https://mynasadata.larc.nasa.gov/sites/default/files/2019-10/Final%20MND%20graph%20cube%20only.pdf **4.** They will need to gather their new graph from their teacher so they may work through the process of answering their questions **5.** The students will collect this graph to use: https://content.ces.ncsu.edu/soil-water-and-crop-characteristics-important-to-irrigation-scheduling#img_dialog_5733. Graph is also located at the end of this lesson. **6.** The teacher will be monitoring as the students are working together on their question set. If the teacher see that they are struggling they will work as a group to identify what the questions are asking and how to interpret the data. **7.** At the end of the class period the students and teacher will discuss their findings.	
Student Communication Product: (written report, oral presentation, poster, etc.) (consider showing "Models" of student products to help student identify characteristics of quality)	

The students will record their results on their data cube question worksheets.
(In above links)

The class will have a discussion of their findings from the data cubes.
The teacher will record group findings from the group discussion on the chart paper at the front of the room.

Explain

PURPOSE:

- to answer the Key Question through student explanations
- to provide students with relevant vocabulary, formal definitions and explanations of concepts

Content Media: (written material, video, teacher lecture, technology)

As a whole group the class will review their findings. The students will explain the process they went through to develop their findings. The teacher will have each group take 3-5 minutes to point out what major points they see on the map. In other words, they will discuss when and where they feel that they can grow corn the best in Kansas or if they can.

The teacher will pose both of the questions for the students:

1. How can we determine if the soil in Kansas has enough moisture to grow corn?

   The students will discuss the process and what their findings were. The teacher will ask if they think that every year is the same as the year pick to study. They will discuss why or why not. The teacher will also ask if the students feel that Kansas is the best possible place to grow corn based on soil moisture alone. As a group discuss possible places that would be better than Kansas to grow corn.

2. Does Kansas need to use outside sources to grow corn?

   The class will discuss that if Kansas wants to grow corn what are some other options for us to do so successfully. They will need to discuss the various types of corn possible to grow in Kansas and if one is better than the other.

Student Communication Product: (assessment, unit test, written report, oral presentation, poster, etc.**)**

The students will need to write a one page summary of the activity they just completed. They will need to make sure they include their thoughts on growing corn in Kansas.

Rubric for summary:

The rubric to grade the summaries is located at the end of this lesson.

The teacher will also evaluate the data cubes to check for individual understanding. If it seems that a students or group is off on their answers she/he will meet with those students/groups individually to discover what they do not understand.

Elaborate

PURPOSE:

- to extend students' conceptual understanding through application or practice in new settings

Activities:

Have the class brainstorm other crops they are interested in looking at.

Also could have students look at precipitation and whether it is the same as soil moisture and if that would make a difference in choosing to grow corn as a crop.

Content Media: (written material, video, teacher lecture, technology)

Guide students into choosing one of the above projects and guide them in find out their information.

Student Communication Product (assessment): (unit test, written report, oral presentation, poster, etc.)

The students will make persuasive posters on what crop they think is the best for growing in Kansas.

The rubric guide for the student posters is below.

Evaluate	
PURPOSE: To determine the amount of moisture in soil that will produce a successful crop.	
Skill/Reasoning Learning Objectives	**Assessment Instrument**
The students will: Determine if corn will be a successful crop to grow in Kansas.	Summary
Knowledge Learning Objectives	**Assessment Instrument**
The students will: **1.** Study maps and graphs.	Summary

2. Compare and summarize their findings.	posters

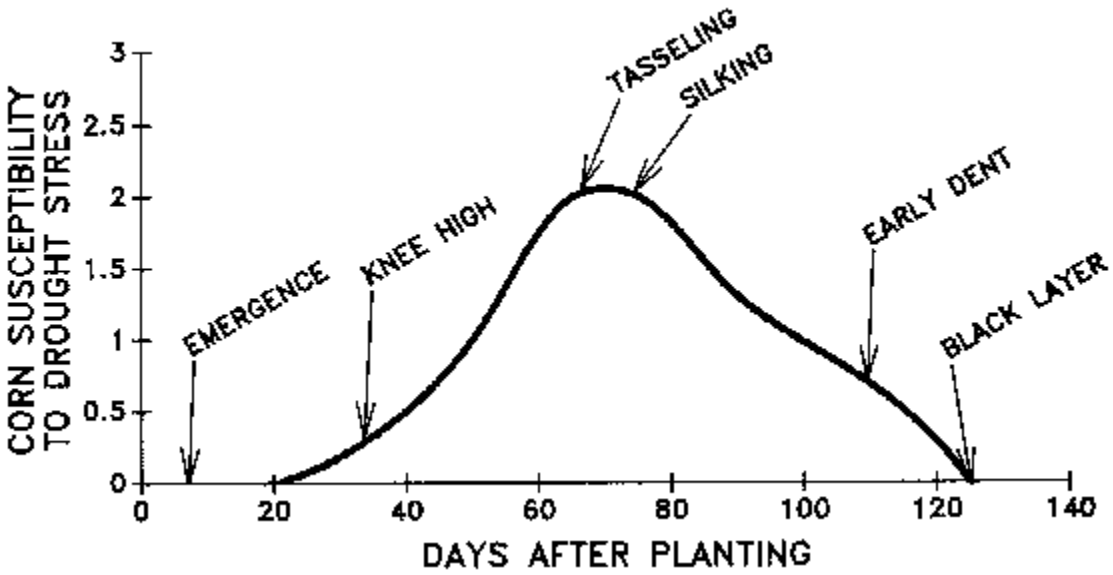
References:

Evans, R., Cassel, D., & Sneed, R. (n.d.). Soil, Water and Crop Characteristics Important to Irrigation Scheduling. Retrieved November 19, 2020, from https://content.ces.ncsu.edu/soil-water-and-crop-characteristics-important-to-irrigation-scheduling

My NASA Data. (n.d.). Retrieved November 19, 2020, from https://mynasadata.larc.nasa.gov/

My NASA Data. (n.d.). Retrieved November 19, 2020, from https://mynasadata.larc.nasa.gov/data-literacy-cubes-graphs-maps-and-data-tables

Next Generation Science Standards. (2020, November 06). Retrieved November 19, 2020, from http://www.nextgenscience.org/


CORN SUSCEPTIBILITY TO DROUGHT STRESS
3
2.5
2
1.5
1
0.5
0
0
20
40
60
80
100
120
140
DAYS AFTER PLANTING
EMERGENCE
KNEE HIGH
TASSELING
SILKING
EARLY DENT
BLACK LAYER

A **summary** is a shortened version of a longer reading that tells the main idea(s) of the reading and the supporting details. Summaries are short, write about the main idea(s), use your words and key words from the text by paraphrasing and do not include your feelings or opinions about a topic. The rubric below reflects how well you were able to demonstrate understanding of writing a summary.

	4 – Mastery	3 – Exemplar	2 – Proficient	1 - Emerging	0 – Absent
Main Idea	Correctly identifies the main idea in a clear, concise, and accurate manner.	Correctly identifies the main idea but lacks some clarity, conciseness, and/or accuracy.	Identifies an important idea but not the main idea. May not be clear, concise, or accurate.	Identifies a detail but not the main idea. Is not clear, concise, or accurate.	Main idea is not identified or is directly copied from the reading. Writer does not demonstrate ability to identify the main idea of a reading.
Supporting Details	Clearly states the supporting details of a text using writer's own words and/or statements.	Clearly states a supporting detail of a text, but leaves out others. Uses some of the writer's own words.	States a supporting detail of the reading but lacks clarity. Detail is copied from the text – not in the writer's own words.	Includes unnecessary details. Does not use the writer's own words.	No supporting details are included in the summary.
Conclusion	Writes a clear and specific concluding sentence. Provides a solid ending to the summary.	Writes an adequate concluding sentence. Provides an adequate ending to the summary.	Writes a weak concluding sentence. The summary ends somewhat abruptly.	Writes a weak concluding sentence. The summary ends abruptly.	Does not include a concluding sentence. Summary ends abruptly.
Mechanics and Grammar	Contains no spelling or grammatical errors.	Contains a few spelling and grammatical errors. However, errors do not interfere with comprehension.	Contains many spelling and grammatical errors. Errors are distracting to the reader.	Contains many spelling and grammatical errors that interfere with comprehension.	Spelling and grammatical errors so severe, the reader cannot comprehend summary.

Comments: **Total: _____/16 (_____%)**

Persuasive Poster Rubric

Students name: _____

	Very High Achievement	High achievement	Satisfactory	Unsatisfactory
Position Statement	Position is clearly stated and consistently maintained. Clear references to the issue(s) are stated.	Position is mostly clearly stated and maintained. References to the issue(s) at hand are seen.	Position is stated, but is not maintained consistently throughout work.	Statement of position cannot be determined.
Supports Information	Evidence clearly supports the position; evidence is appropriate and well presented.	Evidence supports the position; evidence is sufficient.	Argument is supported by a satisfactory level of evidence.	Evidence is inadequate, not present, and/or unrelated to argument.
Aesthetic Qualities	Thoroughly well organised poster layout is attractive, neat and thoughtfully presented.	Poster layout is well organised and effectively presented.	Poster layout contains the necessary elements. Elements could be presented in a more organised manner.	There is an overall lack of structure.
Sentence Structure	Sentence structure is very fluent, effective and thoughtfully articulated.	Sentence structure is fluent, effective and clearly articulated.	Text is structurally adequate with some grammatical errors.	Disorganised and poorly presented.
Punctuation and spelling	Excellent use of punctuation with no spelling errors.	Effective use of punctuation with minimal errors.	Adequate use of punctuation with only minor spelling and punctuation errors.	Poor punctuation with frequent punctuation and spelling errors.

Teacher Comments:

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