Digital Readiness Unit Template

Created By: Jenna Melton and Kara Darety	Topic: Ecosystems/Food Webs/Invasive Species	Grade Level: 3-5
Digital Readiness Standards: 3.CCP.3: Identify and determine the purpose of a variable and the data that it stores in an algorithm. 4.CCP.4: Construct an algorithm to solve a problem that includes control structures such as loops, event handlers, and conditionals collaboratively with or without a computing device. 5.CCP.3: Decompose (break down) complex real-world problems in multiple ways that use variables to develop a solution or procedure based on data.		
Tennessee Academic Standards for Science Connection		
Disciplinary Core Idea(s): 3.LS4.1 Explain the cause and effect relationship between a naturally changing environment and an organism's ability to survive. 4.LS2.3 Using information about the roles of organisms (producers, consumers, decomposers), evaluate how those roles in food chains are interconnected in a food web, and communicate how the organisms are continuously able to meet their needs in a stable food web.	Science & Engineering Practice(s): **-Constructing Explanations and Designing Solutions** to explain phenomena or solve problems **-Asking questions (for science) and defining problems (for engineering)** to determine what is known, what has yet to be satisfactorily explained, and what problems need to be solved. **-Engaging in Argument from Evidence** to identify strengths and weaknesses in a line of reasoning, to	Cross-Cutting Concept(s): **-Pattern observation** and explanation **-Systems and system models** with defined boundaries that can be investigated and characterized by the next three concepts **-Energy & Matter** conservation through transformations that flow or cycle into, out of, or within a system **-Cause & Effect** relationships that can be explained through a mechanism

	identify best explanations, to resolve problems, and to identify best solutions. **-Developing and using models** to develop explanations -A**nalyzing and interpreting data with appropriate data presentation** (graph, table, statistics, etc.), identifying sources of error **-Obtaining, evaluating, and communicating information** from scientific texts in order to derive meaning, evaluate the validity, and integrate information.	**-Stability and change of systems**

ELA Standards:

3.RI.KID.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.

4.RI.KID.3 Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in a text.

5.RI.KID.3 Explain the relationships and interactions among two or more individuals, events, and/or ideas in a text.

Math Standards:	
Additional Standards (Social Studies, Art, Physical Education):	
Lesson Summary: Write a few sentences describing this digital readiness unit. How do animals (and humans) interact with each other and their environment? Why do we need the sun? In this unit, students will explore these questions and the different roles each play in a balanced ecosystem. Students will construct arguments about the cause and effect relationship of natural phenomena on an ecosystem.	**Multi-Dimensional/Driving Question:** Think of a relevant problem with multiple solutions that will drive student learning. Why should we care about nature? What can we do to conserve it? Consider incorporating SOLE into this process.

Lesson Performance Expectations (Culminating Event)

***What product/verbs are students doing* that ensure they are demonstrating mastery of the standard.**

For example:

- **Develop a model** of a coding sequence demonstrating the impact of conditionals on different levels within a food web.
- **Design and test an algorithm or sequence of events by** constructing coding sequence demonstrating the effects of conditionals in a food web.

Engage (Warm Up)

Develop an introductory activity that will spark student interest and further questions.

The goals of this phase are to:

- Capture the students' attention and interest and help students focus on the overarching big idea/digital readiness skill.
- Engage students in making sense of the big idea using their own conceptual models.
- Create opportunities to informally determine misconceptions expressed by the students.

Food Chain Game (Appendix A):

-an outdoor tag game in which students simulate the transfer of energy between organisms.

-Students will

1. draw a simple food chain or web.
2. explain why energy is "lost" at each successive link in a food chain.
3. diagram how energy flows and how nutrients cycle in a food chain.

Exploring

The exploration activities provide concrete experiences to extend students' current understanding and demonstrate their abilities to make sense of topic/theme. Note: Students may need additional scaffolding to clearly discern between a food chain (single path showing a flow of energy) to a food web (a multi-path, model of energy transfers).

Gathering

- Students **develop a model/testable sequence**

  Weaving the Web (Appendix A)

  Students will tape one picture of a plant or animal to their chests and circle around the sun and introduce themselves as the plant or animal they represent.

  Questions to Guide Discussion:

  -Who in the circle could I give my energy to? (Who might I eat?)

  -Who in the circle could give me energy? (Whom could I eat?)

- Students **design and carry out an investigation**

  The student representing the sun holds the end of the string of yarn and passes a ball of yarn to a student representing a green plant. He or she catches the yarn, hold on to the yarn, and passes the ball of yarn onto another animal that could use their energy. This continues until the food chain reaches its top predator.

  Questions to continue investigation:

  -How can all these other plants and animals get the energy they need?

Return the ball of yarn to the sun and begin the process again to start another food chain. Repeat until all students are holding the yarn.

- Students **collect and organize data** (observations and measurements)

  Questions for discussion:

  -Have we made food chains?

  -What do all of our food chains together look like? (food web)

  -What is the difference between a food chain and a food web?

Reasoning

- Students **analyze data** sets

  Questions for discussion:

  -Who is holding the most pieces of yarn? (sun)

  -Why? (Because each food chain starts with the sun.)

  -Who else is part of many food chains? (green plants)

  -What would happen if all the green plants died? (Nothing else in the food web could survive.)

- Students **develop explanations** for

  -How could we show what could happen if one kind of plant, such as all the clover died? (The student representing the clover could pull out his or her pieces of yarn and sit down.)

  -If all the clover is gone, who may have trouble getting enough food? (Identify all the animals that were in food chains that included clover. Whoever had yarn pulled out of their hands might have trouble getting enough food without the clover.)

Communicating

- Students **make arguments** (claims) about

  Questions to guide discussion:

  -What happened to our food web? (It is much thinner, less complex, and less strong.)

  -Why should we be concerned about each kind of plant or animal? (Because other plants and animals in the food web may depend on it.)

Explaining

Students engage in performance activities to make sense of the big ideas featured in the engage and explore phase. The teacher directs students' attention to key aspects of the prior phases and first asks students for their explanations. Both the teacher and student formatively assess the learning progress.

Gathering

- Students **obtain information** (from a video or other source)

Students work in small groups to complete a search of online or print resources to explore and summarize information about wild rabbits. Students can also use the **Rabbit Predators** article in Appendix A or online at http://www.rabbitmatters.com/rabbit-predators.html

-Students use the information gathered to create a model that represents a rabbit's ecosystem. (Teacher/Student could choose to demonstrate this either as an art based drawing, digital flow chart, Google Drawing, etc.)

Provide the following scaffold:

-The rabbit's ecosystem includes producers and consumers discovered during research.

-Represent the most important components of the system.

-Represent the interactions in the system.

-Represent the flow of matter in the system.

- Students, working in groups, **decode/debug and interpret data**

Provide students with a copy of ***Invaders of Ecosystems* Graph** (Appendix A).

Have students identify patterns of change in the populations in this ecosystem.

Provide the following scaffold:

-Don't rush interpretation. Look closely, inspect and go beyond the obvious. Things to consider: How are each species dependent upon one another or not?

-You may write directly on the graph.

Class Discussion

Questions to initiate class discussion may include:

1. What patterns of change do you notice in the graph?

2. What causes that pattern?

3. What are the interactions that cause these changes?
4. How do these changes relate to the flow of matter in this ecosystem?

Reasoning

- Students **construct an explanation**, to explain causes

  Students will brainstorm possible explanations for the changes in the populations of the ecosystem.

Class Discussion

Questions to initiate class discussion may include:
1. What patterns of change do you notice in the graph?
2. What causes that pattern?
3. What are the interactions that cause these changes?
4. How do these changes relate to the flow of matter in this ecosystem?

Communicating

- Students **revise their original model/explanation**

  Students will write explanations supported by evidence from the graph to support their explanations.

Elaborating

Students are involved in learning experiences that extend, expand, and enrich the concepts and abilities developed in the prior phases. The intent is to facilitate the transfer of concepts and abilities to related, but new situations. In the elaboration phase, the teacher challenges students with new activities (plugged/unplugged) and encourages interactions among students and with other sources such as written material, databases, simulations, and web-based searches.

Extension Activities:

Conditionals with Cards Unplugged Activity from Code.org (Appendix B)

Students could also use Lesson 14 “If/Else with Bee” from Code.org if access to technology is available.

Evaluating

Throughout the lesson, students receive feedback on the adequacy of their explanations and abilities.

Informal, formative evaluations have been occurring from the initial phase of the instructional sequence. At the end of the lesson, information from the assessment becomes more formal. In the evaluate phase, the teacher should involve students in experiences that are understandable and consistent with those of prior phases and congruent with the explanations from prior phases.

Assessment of Student Learning

- **Evaluation phase prompt:**
    - Students develop a model/coding sequence of a food web/food chain based on the non-fiction narrative the student has completed using conditionals to influence the outcomes of their narrative and coding sequence.
        - Students will complete the coding sequence to represent the chosen conditional and the effects on the habitat and food web using the Conditional Cards and Food Web in Appendix B.

Appendix A - Materials

Food Chain Game

Weaving the Web

Rabbit Predators Article

Invaders in Ecosystems Graph

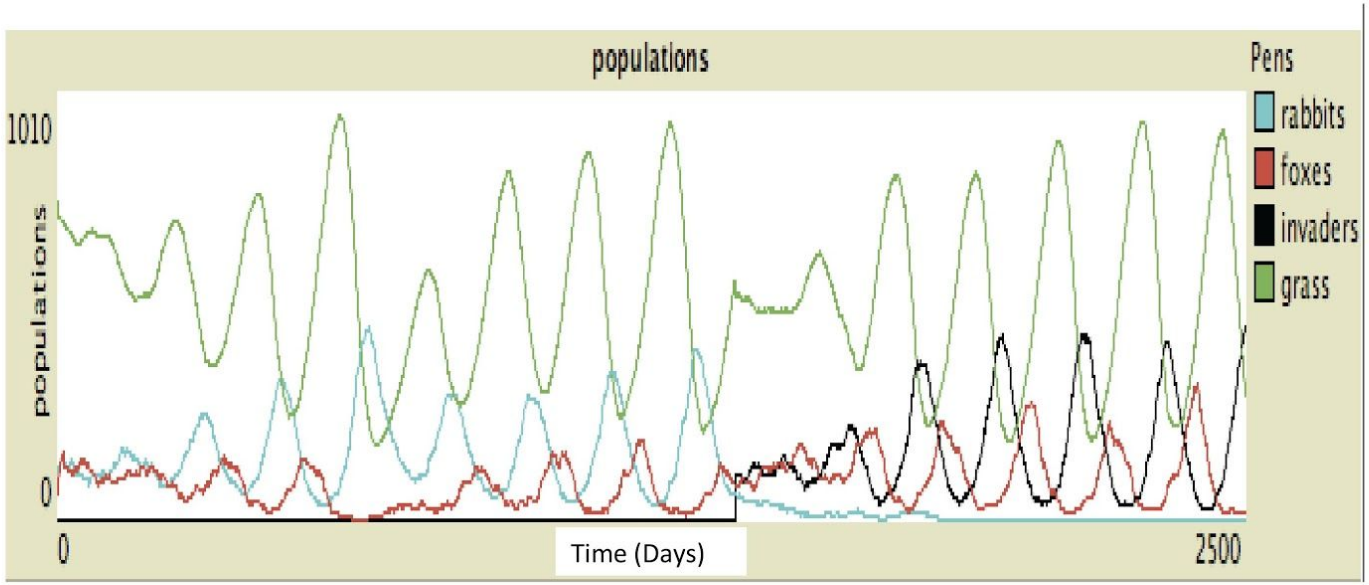
Appendix B

Conditional Cards

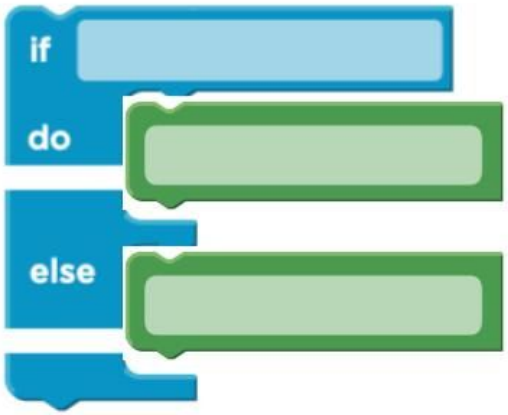
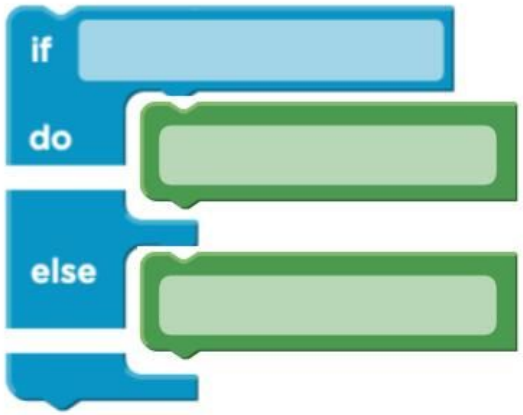
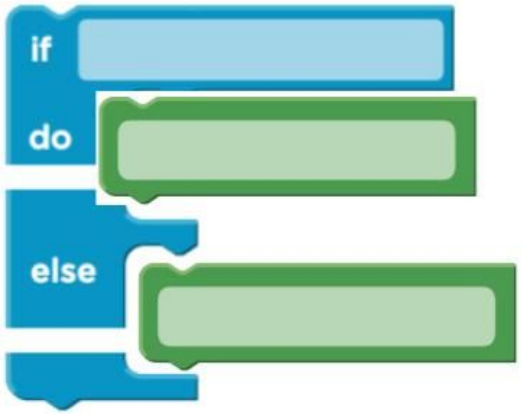
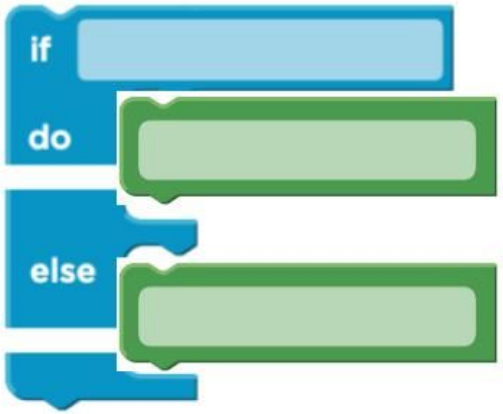
Food Web

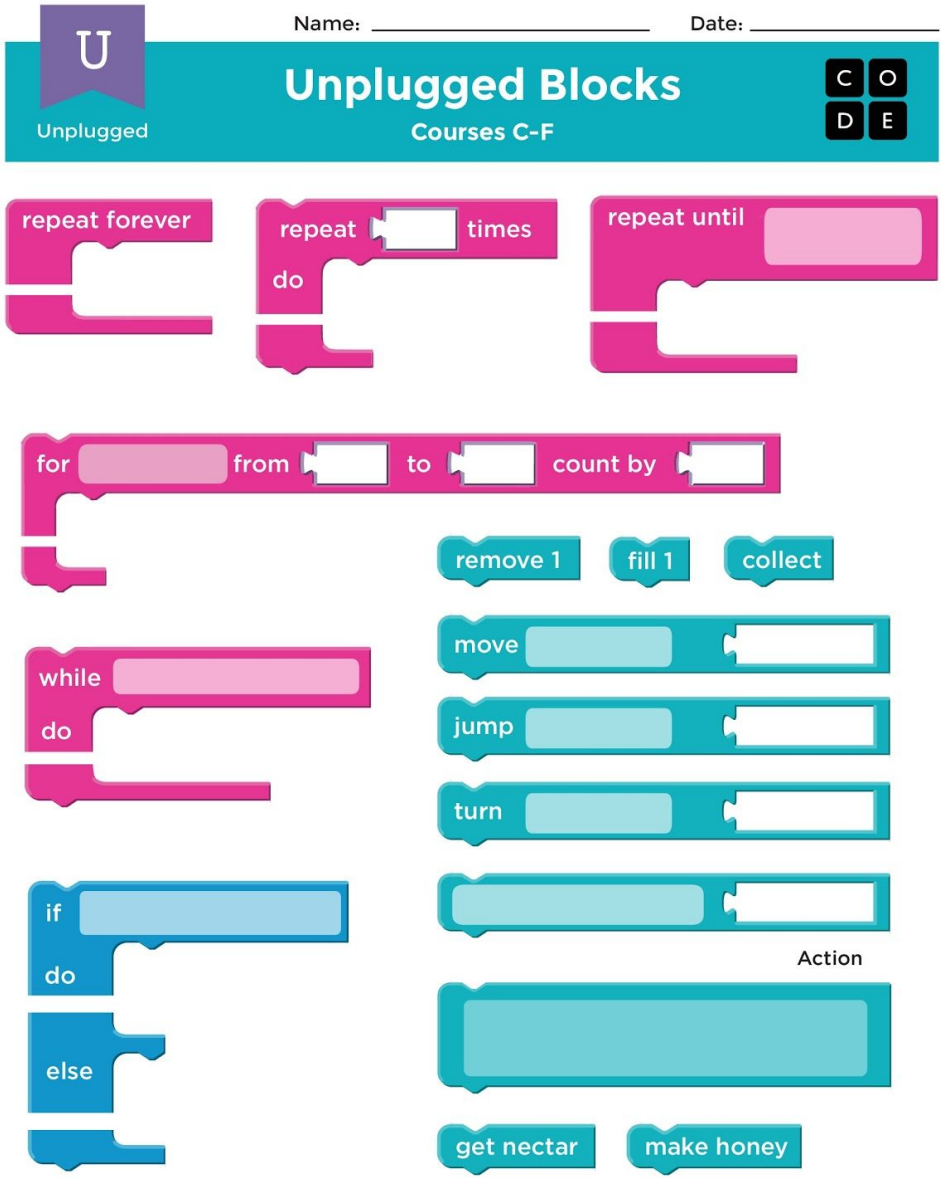
Conditional Coding Practice

Invaders in Ecosystems



From: IQWST Curriculum Materials by Brain Riser.

Conditional: **a flood** 	Conditional: **a drought** 
Conditional: primary consumer becomes extinct 	Conditional: secondary consumer becomes extinct 



TSIN 5 E Lesson Plan Template

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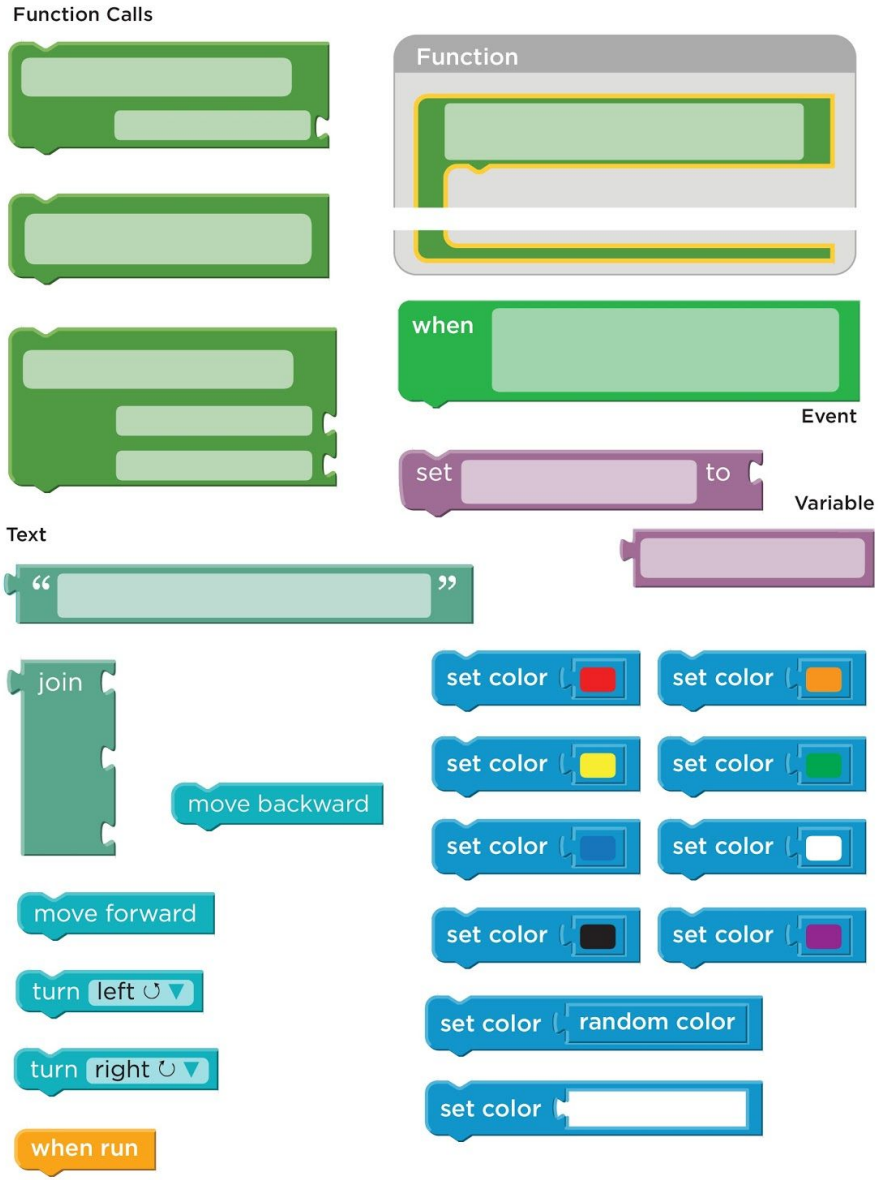

U

Unplugged

Name: _____ Date: _____

Conditionals with Cards

Assessment Activity

C O D E

Look at the program below.

The steps below show each team taking turns to play the Conditionals Game. See if you can figure out what happens for each draw. Write down the score during each round along the way. After three rounds, circle the winner.

```
If (CARD is lower than 5)
    If ( CARD is BLACK)
        Award YOUR team the same
        number of points on the card.

    Else
        Award OTHER team 1 point.

Else
    If ( CARD is HEARTS)
        Award YOUR team 1 point
```

Here's how the game went:

	TEAM #1	END OF ROUND SCORE	TEAM #2	END OF ROUND SCORE
		0		0
ROUND #1	3 ♠	___	7 ♥	___
ROUND #2	4 ♥	___	4 ♣	___
ROUND #3	9 ♣	___	5 ♦	___

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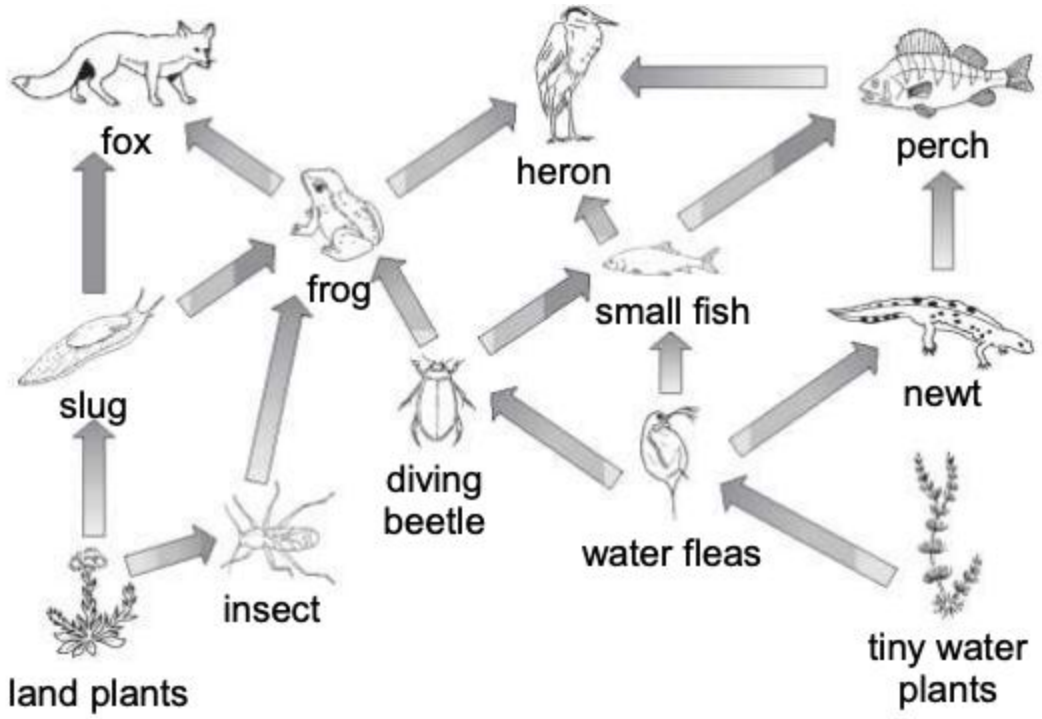
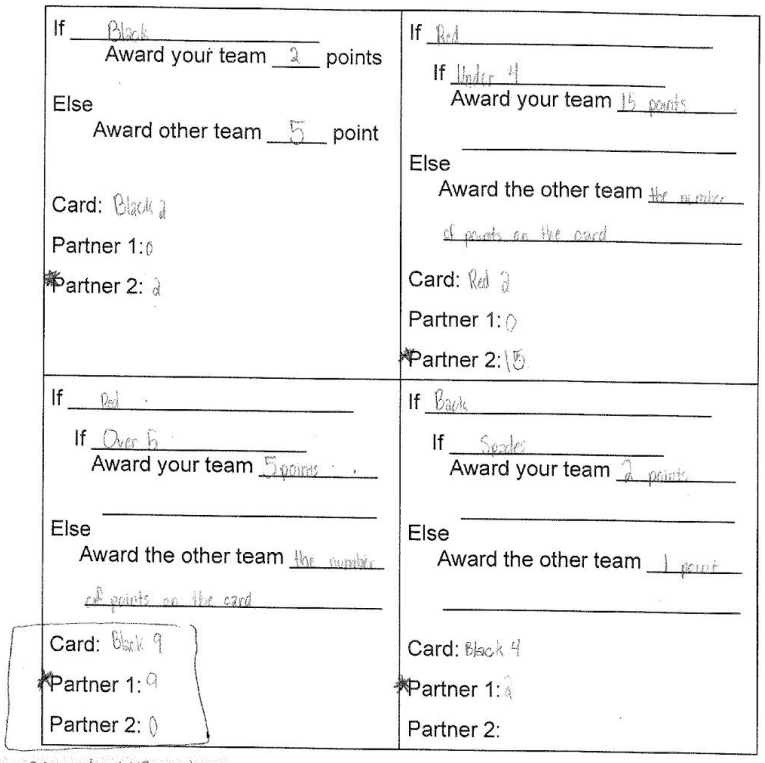
Food Web


fox
heron
perch
frog
small fish
slug
newt
diving beetle
water fleas
insect
tiny water plants
land plants



* Designates player who drew card.

This student demonstrated mastery of coding & Conditionals. One error in either awarding points or correctly designating which partner drew the card.

Team 2
17

Team 1
11

Seth 8

If black Award your team 5 points Else Award other team 2 point Card: black 4 Partner 1: 5 ☆ Partner 2: 0	If red If above 6 Award your team number of points on card Else Award the other team number of points on card Card: black 5 Partner 1: 5 Partner 2: 0
If red If above 7 Award your team 7 points Else Award the other team 7 points Card: black 6 ☆ Partner 1: 0 Partner 2: 7	If black If below 6 Award your team number of points on the card Else Award the other team number of points on card Card: red ace Partner 1: 0 Partner 2: 1

Mason 10-8 Seth

★ Designates player who drew the card.

This example shows student understands how code must be written & how conditionals affect a coding sequence.

Seth

If black Award your team 5 points Else Award other team 1 point Card: black 4 * Partner 1: 5 Partner 2: 0	If red If above 6 Award your team number of points on the card Else Award the other team number of points on the card Card: black 5 Partner 1: 5 * Partner 2: 0
If red If above (?) Award your team 7 points Else Award the other team 7 points Card: black 6 * Partner 1: 0 Partner 2: 7	If black If below 6 Award your team number of points of card Else Award the other team Same! Card: red ace Partner 1: 0 Partner 2: 1 *

Mason

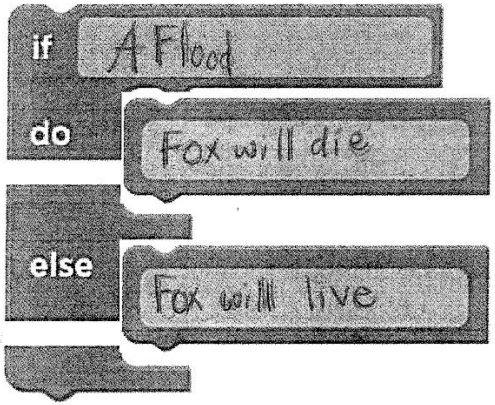
10-8

Partner 1 won

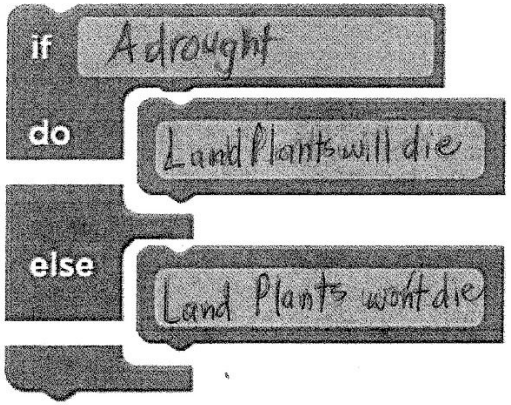
* Designates player who drew the car.

This example shows student lacks a clear understanding of exactly how code must be written. Student does understand how conditionals affect a coding sequence.

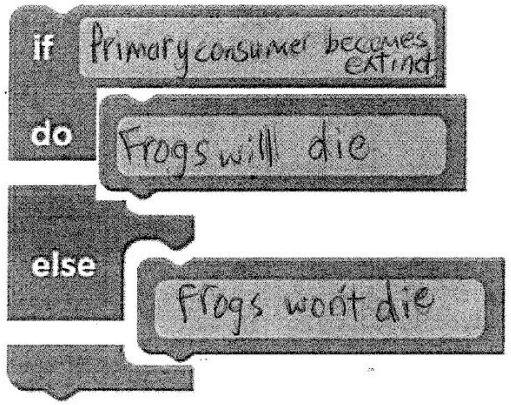
Conditional: a flood



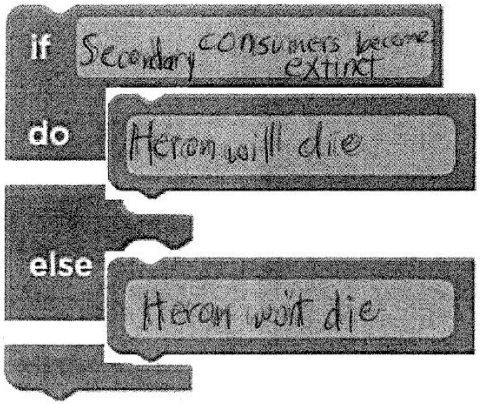
Conditional: a drought



Conditional: primary consumer becomes extinct



Conditional: secondary consumer becomes extinct



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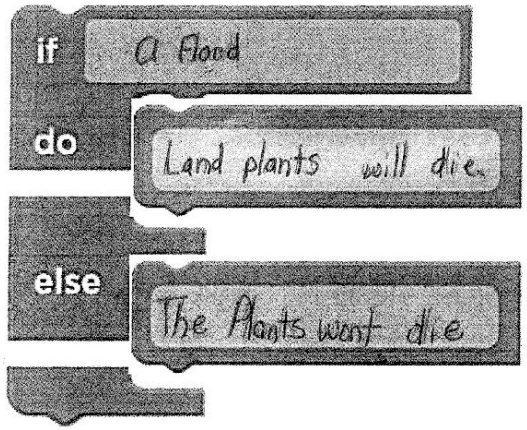

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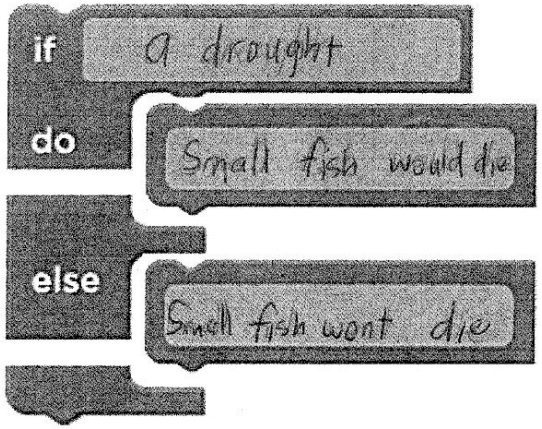

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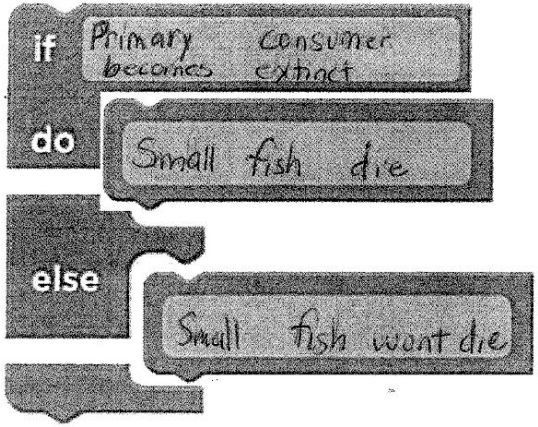

Conditional: secondary consumer becomes extinct