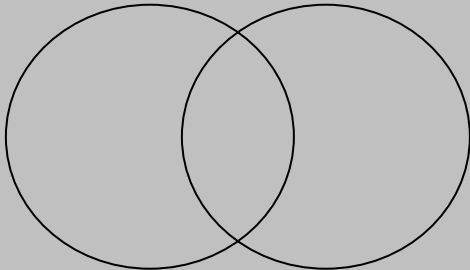


I. Identification	
Lesson title:	Space Vehicles, Ho!
Teaching unit:	Space Agriculture in the Classroom
Lesson number in this unit:	2 of 7
Module Correlation:	<i>Growing Space, Volume 2</i> (pp. 2-3)
National Standards:	Science: C, D, E, F, G Math: Algebra, Data Analysis, Connections English: 1, 4, 5, 7, 12 Visual Arts: 8.3

II. Specific Instructional Objective(s)	
Students will be able to:	
1.	Differentiate between urbanization and habitation (<i>Analysis domain</i>).
2.	Identify problems facing agriculturists, both currently and in the past (<i>Knowledge domain</i>).
3.	Hypothesize potential agricultural solutions related to Mars habitation (<i>Application domain</i>).

III. Equipment, materials, supplies, books, resources needed for this lesson (attach handouts):	
<ul style="list-style-type: none"> ◆ Classroom set of <i>GS2</i> (1 per student) ◆ Flip charts (1 per group) ◆ Props for students to act out roles (optional) 	

IV. Teaching Presentation:	
Set/Interest approach (suggested):	Ask students to relate what they think of when considering a family vacation across the United States – three weeks, in a car, together!
Stated objective(s) (suggested):	Today, we will focus on challenges that early pioneers faced when settling the west, how agriculture is affected by people, and then use that knowledge to put ourselves in the place of astronauts looking to travel to, and live on, Mars!
Purpose (suggested):	As we move closer to the target date of <i>planetary habitation</i> (living on Mars) by the year 2030, we have to consider what has happened in the past so that we don't make

<p>Presentation: Objective 1</p> <ul style="list-style-type: none"> Engage students in reading pp 2-3 of the reading module (“Space Vehicles, Ho!” section only) Ask students to consider the difference between <i>urbanization</i> and <i>habitation</i>. Pairs articulate differences and similarities 	<p>those same mistakes in the future.</p> <p>Teaching methods</p> <ul style="list-style-type: none"> Method is teacher’s choice – aloud (only if student ability supports this method), silently, in reading support groups, and others. As students read, encourage them to use the glossary in the back of the module (pp. 14-15). Teacher should write vocabulary words on the board and say them for the students. Think-Pair-Share Teacher captures thoughts via chalk-talk
<p>Check for understanding: Objective 1</p> <p>Major points may include:</p> <p><u>Urbanization</u></p> <ul style="list-style-type: none"> - changing from rural to urban area - usually unplanned - covers valuable agricultural land - occurs rapidly - - - <p><u>Habitation</u></p> <ul style="list-style-type: none"> - changing from a natural environment to human-friendly - generally planned - preserves productive agricultural land - more systematic and structured - - - <p><u>Both</u></p> <ul style="list-style-type: none"> - human survival - hospitable land - water source - provides living and working conditions - - 	<ul style="list-style-type: none"> Have students use a Venn diagram to capture the differences and similarities of <i>urbanization</i> and <i>habitation</i>. <p>Venn Diagram</p> <p>Urbanization Habitation</p> 

-	
Model: Simulation model (Joyce, Weil & Calhoun, 2004)	
<p>Objective 2</p> <ul style="list-style-type: none"> • To better understand what the early pioneers faced, and what current agriculturists face, students will participate in a simulation exercise. • Half of the students will assume the roles of early pioneers moving west toward new land and new opportunity. • The other half of the students will assume the roles of current agriculturists producing food in an urban encroachment situation. 	<ul style="list-style-type: none"> • Simulation – Phase 1 & 2 (see accompanying teacher information) • Present the concepts to be incorporated into the simulation • Explain the simulation concept, rules and expectations. • Ask for volunteers to practice/ demonstrate. • Use flip charts and props, if desired. • Phase 3 – Simulation operations • Conduct the activity and teacher provides coaching to groups. • Provide feedback and evaluation as needed. • Clarify misconceptions/stereotypes as needed. <ul style="list-style-type: none"> - Potential areas may include views of agriculturists an uneducated, environmentally irresponsible, strictly minority, focused solely on manual labor aspect. • Continue simulation.
<p>Check for understanding: Objective 2</p>	<ul style="list-style-type: none"> • Phase 4 – Participant debriefing • Summarize the difficulties that the students faced: both in their roles, and in conducting the simulation. • Relate the activity back to the reading module section.

<p>Objective 3</p> <ul style="list-style-type: none"> • Engage students in reading p. 3 of the reading module (“To Infinity... and Mars!”) • Repeat simulation with established groups, but use the concept of preparing to travel to the planetary surface and the concept of what will have to happen once the travelers arrive on the planetary surface. 	<ul style="list-style-type: none"> • Similar or alternative reading strategy as above. • Repeat phase 3 – conducting the activity. • All students should assume the roles of astronauts, NASA researchers, and USDA agriculturists.
<p>Check for understanding: Objective 3</p>	<ul style="list-style-type: none"> • Repeat phase 4 – Participant debriefing • Potential topics that may emerge: <ul style="list-style-type: none"> - Appropriate preparation - Resource concerns (breathable air, water, fertile growing media) - Time concerns - Living conditions • Summarize the difficulties that the students faced: both in their roles, and in conducting the simulation. • Relate the activity back to the reading module section.
<p>Independent practice (suggested):</p>	<ul style="list-style-type: none"> • Ask students to hypothesize what will be different on Mars if careful planning is given for <i>habitation</i> to avoid the challenges of <i>urbanization</i>. • Possible suggestions may include: <ul style="list-style-type: none"> - Careful preservation of water sources - Housing located away from central agricultural resources - More sustainable agricultural practices - Education about agriculture and food production from the onset - Others

Closure (suggested):	As we thought about mistakes made in the past, we looked toward the future in agricultural production. We heard new words like: regeneration, revitalization, resource recovery, and systems integration. Over the next several days, we will look at each of those concepts and develop a better picture of what space travel might one day entail for us.
-----------------------------	---

<p>V. Extension/Quest activities (optional, if time permits):</p> <ul style="list-style-type: none"> • Students can play the “Oregon Trail” computer game to better orient them to what the early pioneers faced. • Ask students to create a “Mars Trail” board or computer game; similar to “Oregon Trail” to simulate what traveling to Mars might be like.
--

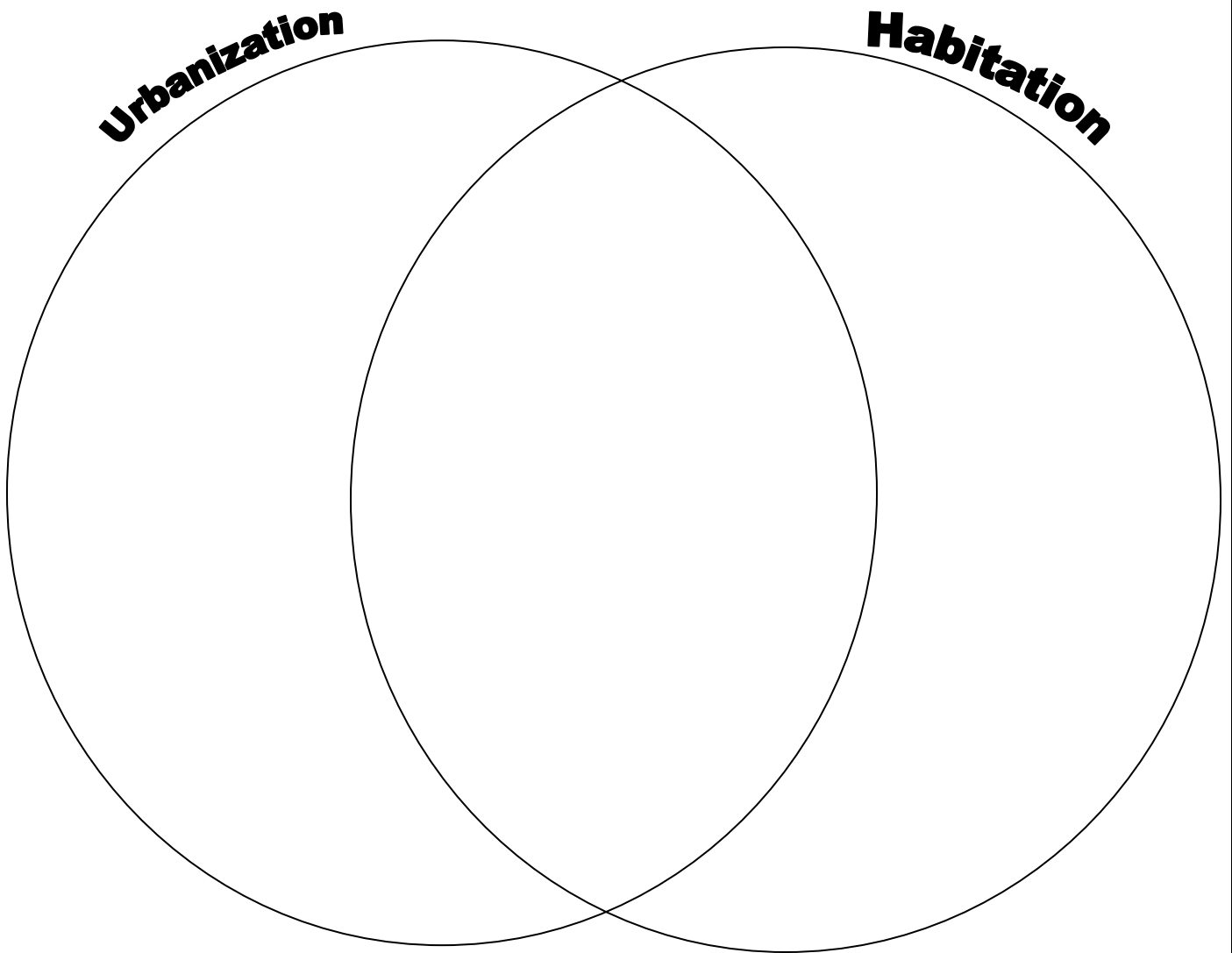
<p>VI. Assessment</p> <p>Student participation in the simulation activities will serve as an assessment for this portion of the unit.</p>
--

<p>VII. Teacher resources & background information</p> <p>Urbanization information: http://www.gsfc.nasa.gov/topstory/2004/0202cityland.html</p> <p>Water information: http://www.ars.usda.gov/research/programs/programs.htm?NP_CODE=201 http://nssdc.gsfc.nasa.gov/planetary/news/mars_water_pr_20000622.html</p> <p>NASA Mars information: http://www.nasa.gov/missions/solarsystem/explore_main.html</p> <p>Oregon Trail information: http://www.isu.edu/~trinmich/Oregontrail.html http://www.ukans.edu/heritage/trails/othist.html</p> <p>Simulation Model of Teaching information: http://hagar.up.ac.za/catts/learner/cooplrn/b3.html#Simulation</p> <p>Space Agriculture in the Classroom information: www.spaceag.org</p>
--

Name: _____
Date: _____

Urbanization vs. Habitation

Directions: Use the Venn diagram below to describe what is unique to urbanization and to habitation under the respective headings. Use the overlapping portion of the diagram to describe any shared characteristics.



The Simulation Model of Teaching

Joyce, B., Weil, M., & Calhoun, E. (2004). *Models of teaching* (7th ed.). Boston: Allyn and Bacon.

The Teacher's Role

Even though the teacher spends significant time in designing and preparing the simulation activity, the temptation to “sit back and watch” should be avoided. Students will be sensory invested in carrying out the simulation, so they may not be aware of what they are learning as they move through the experience. It is at this time that the teacher assumes the role of facilitator to raise students' level of consciousness about the concepts and principles underpinning the simulation. In addition to facilitating the learning and helping students to articulate their own reactions, the teacher assumes a managerial role to ensure student understanding of the simulation's goals and objectives. There are four specific roles identified by Joyce, Weil, & Calhoun (2004):

Explaining

“To learn from a simulation, the players need to understand the rules sufficiently to carry out most of the activities. However, it is *not* essential that the students have a complete understanding of the simulation at the start. As in real life, many of the rules become relevant only as the activities proceed.”

Refereeing

“Simulations used in the classroom are designed to provide educational benefits. The teacher should control student participation in the game to ensure that these benefits are realized. Before the game is played, the teacher must assign students to teams (if the game involves teamwork), matching individual capabilities with the roles in the simulation to assure active participation by all students. Shy and assertive students, for example, should be mixed on teams. One pitfall the teacher should avoid is assigning the apparently more “difficult” roles to brighter students and the more passive roles to less academically talented students.

“The teacher should recognize in advance that simulations are active learning situations and thus call for more freedom of movement and more talk among students than do other classroom activities. The teacher should act as a referee who sees that the rules are followed but who does his or her best not to interfere in the game activities.”

Coaching

“The teacher should act as coach when necessary, giving players advice that enables them to play better – that is, to exploit the possibilities of the simulation more fully. As a coach, the teacher should be a supportive advisor, not a preacher or a disciplinarian. In a simulation, players have the opportunity to make mistakes and take consequences – and learn.”

Discussing

“After a session there needs to be a discussion about how closely the game simulates the real world, what difficulties and insights the students had, and what relationships can be discovered between the simulation and the subject matter being explored.”

Simulation Model Syntax

“The simulation model had four phases: orientation, participant training, the simulation itself, and debriefing. In the orientation (phase one), the teacher presents the topic to be explored, the concepts embedded in the actual simulation, an explanation of the simulation if this is the students’ first experience with it, and an overview of the game itself. This first part should not be lengthy but can be an important context for the remainder of the learning activity.

“In phase two the students begin to get into the simulation. At this point the teacher sets the scenario by introducing the students to the rules, roles, procedures, scoring, types of decisions to be made, and goals of the simulation. He or she organizes the students into the various roles and conducts an abbreviated practice session to ensure that students have understood all the directions and can carry out their roles.

“Phase three is the participation in the simulation. The students participate in the game or simulation, and the teacher functions in his or her role as referee and coach. Periodically the game simulation may be stopped so that the students receive feedback, evaluate their performances and decisions, and clarify any misconceptions.

“Finally, phase four consists of participant debriefing. Depending on the outcomes, the teacher may help the students focus on: 1) describing the events and their other perceptions and reactions, 2) analyzing the process, 3) comparing the simulation to the real world, 4) relating the activity to course content, and 5) appraising and redesigning the simulation.”

Table 1: Syntax of simulation model

Phase One: Orientation	Phase Two: Participant Training
Present the broad topic of the simulation and the concepts to be incorporated into the simulation activity at hand/ Explain simulation and gaming. Give overview of the simulation.	Set up the scenario (rules, roles, procedures, scoring, types of decisions to be made, goals). Assign roles. Hold abbreviated practice session.
Phase Three: Simulation Operations	Phase Four: Participant Debriefing (Any or all of the following activities)
Conduct simulation and administration. Obtain feedback and evaluation (of performance and effects of decisions). Clarify misconceptions. Continue simulation.	Summarize events and perceptions. Summarize difficulties and insights. Analyze process. Compare simulation activity to the real world. Relate simulation activity to course content. Appraise and redesign the simulation.

* *Editorial Note:* The Simulation Model developers use the word “game” throughout the model explanation. From an academic standpoint, curriculum users are encouraged to refer to this, and similar educational methods, as “activities” to establish an appropriate educational framework.