

Resource Guide for 7th Grade Comprehensive Science 2

South Cross Bayou Water Reclamation Facility

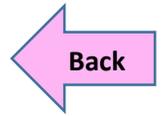
Teacher Resources

- [Resource Overview](#)
- [Standards & Learning Targets](#)
- [Teacher Guide for 20-50-80 Menu](#)
- [Teacher Guide for Activity Options](#)

Student Resources

- [All-Purpose Product Rubric](#)
- [20-50-80 Menu](#)
- [Product Criteria Cards](#)

7th Grade Comprehensive Science 2 Resource Overview



Choice! The following resources were designed to allow for teacher choice. Choice for teachers allows for customizing what students are expected to learn and differentiating how students are expected to demonstrate learning. By choosing the critical learning focus and the methods of demonstrating mastery, teachers design appropriate boundaries for students.

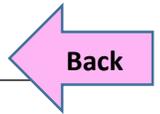
A tour of South Cross Bayou Wastewater Treatment Facility provides opportunities for your students to learn a tremendous amount of relevant information aligned to the Florida Standards for 7th grade Comprehensive Science 2. The Florida Standards have been provided and specific Learning Targets have been written to guide the learning expectations and outcomes. Teachers should review the [Florida Standards and Learning Targets](#) provided and choose which Learning Targets will be the critical focus for students.

A wide variety of Activity Options were developed to meet the needs and learning styles of diverse students. Activity Options have been grouped into three different point values based on the amount of student work associated with the activity. Teachers should review the [Activity Options](#) for the chosen Learning Targets and select a total of eleven Activity Options that are a good fit for their classroom and learners. (*Note: Students will only be expected to complete two of these eleven Activity Options*). To create a customized 20-50-80 Menu for their class, teachers should copy the eleven chosen Activity Options and paste them into the appropriate boxes of the template for the [20-50-80 Menu](#). This ensures that students will only see the eleven Activity Options that are predetermined by the teacher.

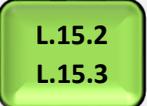
By establishing these boundaries, teachers can infuse *student* choice as well. Many teachers observe that if students have both choice and voice then there is an increase in motivation and desire to learn.

Students will preview the [20-50-80 Menu](#) before the SCB tour and predetermine *two* learning activities that best fit their interest, comfort and learning style. Students have many combinations to choose from to earn the necessary 100 points. Scaffolded supports for learning, as well as transparency of expectations, are provided through the descriptions on the [20-50-80 Menu](#), [Product Criteria Cards](#) and [All-Purpose Product Rubric](#). The desired effect of students knowing *how* they will use the information from the SCB tour is an increase in motivation and desire to learn.

7TH GRADE COMPREHENSIVE SCIENCE 2 STANDARDS & LEARNING TARGETS



Pinellas County Schools Mission Statement/ Florida Standards
<input type="checkbox"/> Learning Targets

PCS Mission: Educate and prepare each student for college, career, and life.		
<input type="checkbox"/> Identify and describe various careers available in wastewater treatment.		
<input type="checkbox"/> Determine required education, training, and skills necessary for a career in wastewater treatment.		
SC.7.N.3.2 Identify the benefits and limitations of the use of scientific models		
<input type="checkbox"/> Identify the various scientific models being used at SCB.		
<input type="checkbox"/> Describe the benefits and limitations in using scientific models at SCB in treating wastewater.		
SC.7.E.6.6 Identify the impact that humans have had on Earth, such as deforestation, urbanization, desertification, erosion, air and water quality, changing the flow of water.		
<input type="checkbox"/> Identify the impact that humans have on water quality and identify the need to treat wastewater.		
<input type="checkbox"/> Identify human sources of wastewater.		
<input type="checkbox"/> Identify the environmental impacts of improper waste management on water quality.		
<input type="checkbox"/> Identify the ways in which SCB is reducing human impacts on water quality.		
HE.7.C.1.3 Analyze how environmental factors affect personal health.		
<input type="checkbox"/> List and describe the impacts to human health of improper waste management.		
<input type="checkbox"/> Describe the role that the chlorine contact tank and the UV system play in protecting personal health.		
HE.7.C.1.8 Classify infectious agents and their modes of transmission to the human body.		
<input type="checkbox"/> Identify the different types of infectious agents that could affect the human body if wastewater is not treated properly.		
<input type="checkbox"/> Classify the infectious agents in the wastewater as bacterial, viral, or parasitic.		
<input type="checkbox"/> Identify the modes of transmission of the infectious agents to the human body if the wastewater is not treated properly.		
SC.7.L.15.2 Explore the scientific theory of evolution by recognizing and explaining ways in which genetic variation and environmental factors contributed to evolution by natural selection and diversity of organisms.		
SC.7.L.15.3 Explore the scientific theory of evolution by relating how the inability of a species to adapt within a changing environment may contribute to the extinction of that species.		
<input type="checkbox"/> Describe some of the environmental factors that could contribute to the evolution through Natural Selection of the bacterial populations in the anoxic tanks, aeration tanks, and digesters.		
<input type="checkbox"/> Describe some environmental conditions that could cause the microbial populations at SCB to die off at a rate quicker than they can adapt thereby causing extinction and resulting in the need to reseed the population.		

SC.7.L.17.1 Explain and illustrate the roles and relationships among producers, consumers, and decomposers in the process of energy transfer in a food web.

- Explain the role of the microorganisms present in the anoxic tank, aeration tank, and digesters as decomposers.
- Describe the relationship between the decomposers (bacteria), producers (plants fertilized by pellets), and consumers (animals that eat those plants), including the transfer of energy.

L.17.1

SC.7.P.10.1 Illustrate that the sun's energy arrives as radiation with a wide range of wavelengths, including infrared, visible, and ultraviolet, and that white light is made up of a spectrum of many different colors.

- Explain the type of light used in the UV system and describe where it fits in the electromagnetic spectrum.
- Explain why ultraviolet light is used at SCB.

P.10.1

SC.7.P.10.2 Observe and explain that light can be reflected, refracted, and/or absorbed.

- Explain if the light in the UV tank is being reflected, refracted and/or absorbed.

P.10.2

SC.7.P.11.1 Recognize that adding heat to or removing heat from a system may result in a temperature change and possibly a change of state.

- Describe how the addition of heat in the pelletizer results in a temperature change and change of state.

P.11.1

SC.7.P.11.2 Investigate and describe the transformation of energy from one form to another.

- Describe the transformation of energy occurring in the UV system.
- Describe the transformation of energy occurring in the digester.

P.11.2

7th Grade Comprehensive Science 2 Teacher Guide for 20-50-80 Menu



Learning Targets

Relevant [7th grade Comprehensive Science 2 Standards](#) are provided and specific [Learning Targets](#) have been developed. Teachers choose the [Learning Targets](#) and associated [Activity Options](#) that are a desired critical focus for their students.

Student Materials Needed for Activity Options

lined paper	glue/tape	markers	colored pencils	white paper
scissors	coat hanger (for mobile)		smartphone or tablet with video recording	

Special Notes

Since the [Activity Options](#) have either a 20, 50 or 80 point value, the [All-Purpose Product Rubric](#) must be customized by the students. When using the [All-Purpose Product Rubrics](#) have students circle the correct point value for the product (20, 50 or 80) and record the correct partial point values at the top of the full and half credit columns. Use the tables below for partial point values:

Full	Half	No
4	2	0
4	2	0
4	2	0
4	2	0
4	2	0
20 Points Possible		

Full	Half	No
10	5	0
10	5	0
10	5	0
10	5	0
10	5	0
50 Points Possible		

Full	Half	No
16	8	0
16	8	0
16	8	0
16	8	0
16	8	0
80 Points Possible		

Time Frame

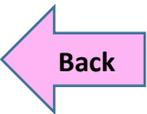
Allow one or two 50 minute class periods prior to your SCB visit to have students preview resources and predetermine two activities from the [20-50-80 Menu](#).

Allow two or three 50 minute class periods after your SCB visit to have students complete their two chosen activities from the [20-50-80 Menu](#).

Additional Forms

All-Purpose Product Rubrics (two per student)	Product Criteria Cards
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7th Grade Comprehensive Science 2 Teacher Guide for Activity Options



Teachers, below is the master list of suggested in-class activities for students to demonstrate mastery on the [Learning Targets](#). You will narrow down three 20 point options, four 50 point options and three 80 point options and place the eleven options on the [20-50-80 Menu template](#). Prior to the SCB tour, students will choose two activities (with a sum of 100 points) from the options you provide. Back in the classroom after the SCB tour, students will complete both activities they have selected.

20 Points Options *Teachers, place <u>three</u> options on the 20-50-80 Menu .	
N.3.2	Create a mobile that displays four examples of the use of scientific models within SCB. For each model description include the benefits and limitations of using that scientific model.
E.6.6	Develop a 5 page children’s book for second graders that explains and illustrates an answer to the question “Where does wastewater come from?” Think about the various pipes and pumping stations that deliver wastewater for treatment. Be sure to include at least 5 specific sources and or activities that generate the incoming wastewater.
L.15.2 L.15.3	Write and illustrate a comic strip to depict how the bacteria may evolve at SCB due to environmental factors (ex. Temperature, moisture, etc). Be sure use natural selection and genetic variation when discussing evolution. Leave the last cell(s) of the comic strip to depict how the environmental factor could change so extremely or rapidly to cause extinction of that species at SCB
P.10.2	Protective eyewear is a requirement when working around ultraviolet light. Create a safety sign to be posted near the UV tank at SCB. Be sure to illustrate the reflection and absorption of ultraviolet light within the tank. On the sign, include a safety statement that justifies why eyewear is needed.
P.11.1	Develop a 5 page children’s book, titled "From Flush to Fertilizer", for second graders that explains and illustrates the role of heat in the pelletizer process. Think about how adding heat to a system may result in a temperature change and possibly a change of state. The facts in the SCB tour resource may be helpful, but be sure to remember that your reader is a second grader.

50 Points Options *Teachers, place <u>four</u> options on the 20-50-80 Menu .	
E.6.6	Create an interactive map of SCB water reclamation facility. For every location on the map where a process is being used that results in reducing surface water pollution create a flap that when lifted up explains the method the wastewater is being treated and how that treatment results in the reduction of surface water pollution. Remember that the treated wastewater is eventually released as surface water.
HE.7.C.1.3	Write and record a 2-3 minute speech for a town hall meeting. Imagine that you have moved to a newly developed town where wastewater facilities cannot fully treat the high volume of wastewater generated by the residents. You plan to advocate for increased funding for the wastewater treatment facilities so that it can expand to properly treat the wastewater generated by the town. Explain one negative impact to the town residents’ health as your rationale for a plea to increase city taxes to fund expansion of the wastewater treatment facility.

HE.7.C.1.3	Write and record a 2-3 minute speech for a town hall meeting. There is a proposal to reduce wastewater treatment funding by specifically eliminating the chlorine contact tank and UV system. Because you oversee facility operations, your role at the town hall meeting is to speak as an expert in the purpose and processes involved in the chlorine contact tank and UV system at the town's water reclamation facility. In your speech provide a scientific explanation of the types of energy conversions involved throughout the facility as well as the role in protecting human health.
L.17.1	Create a Pinellas County Wastewater Specific Food Web poster to track energy transfers. View a generic food web to get a starting point, but then customize the decomposers to include the bacteria present at SCB, three producers to include local variety of plants fertilized by the pellets produced at SCB, and six consumers to include local varieties of herbivores, omnivores and carnivores.
P.10.1	Create an interactive diagram of the electromagnetic spectrum. Create flaps for each of the following: infrared, visible, and ultraviolet. When you lift the flap up, the underside should identify examples and uses of that energy type. When the flap is in the down position, you should see the appropriate range of wavelength.

80 Points Options *Teachers, place <u>three</u> options on the 20-50-80 Menu .	
HE.7.C.1.8	You are a healthcare worker for the international organization, Doctors Without Borders. You have been asked to speak at a local middle school for the Great American Teach-In. Research a specific region of a country that has experienced an outbreak of an illness due to the lack of proper wastewater treatment. Use your research to prepare a presentation that describes a recent visit to an overseas region that lacked proper wastewater treatment. During your presentation: identify and describe the town you worked in, identify an illness and associated symptoms related to contact with improperly treated wastewater, classify the infectious agent in the wastewater as either bacterial, viral or parasitic, and explain how the infectious agent is transmitted to the residents of that region.
P.11.2	Imagine that you are the SCB tour guide who is preparing for a visit of eager Fourth Grade students who have just finished learning all about the forms of energy, that energy is not created or destroyed, and that energy can be transformed from one form to another form. The Fourth Grade teacher has requested that the tour discuss the wastewater treatment process and emphasize the identification of energy forms and transformations. The teacher has already prepared his/her students by announcing that the digester and the UV system will model multiple energy forms and transformations that students learned during class time. As a SCB tour guide, you already have a wastewater treatment process script so all you need to do is script out 5 minutes worth of additional energy form and transformation information. In your script of energy form and transformation information, be sure to label which portion of the tour that this extra information will be added to. Be sure to practice speaking out the words in your energy form and transformation script so that you know that it is 5 minutes of additional information and that it sounds like something a tour guide at SCB would say to a group of Fourth Grade students learning about energy forms and transformations at SCB. In other words, the information should not seem like textbook information. It should all be directly referencing a process occurring as the wastewater is treated.
PCS Mission	Write and present to the class Three Facts & A Fib for each of three different careers that are present at SCB. You may use resources provided by SCB to help you identify careers and give you general information, but your 9 facts and 3 fibs must be information that was not included in the SCB resources. Conduct independent research on the three careers when writing your facts and fibs.
PCS Mission	You are an employee at SCB and have been asked to speak at a local high school for the Great American Teach-In. Prepare a presentation that describes your role within the treatment facility. Share with class about a situation (power outage to the city due to storms, infiltration/inflow of stormwater due to leaking pipes, sensor failure in the monitoring of water parameters, etc) when you had to problem solve a major crisis.

All-Purpose Product Rubric **Product:** _____ **20, 50, or 80 Point Option** **Name:** _____

Aspect	Full Credit <div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">Points</div>	Half Credit <div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">Points</div>	No Credit <div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">0 Points</div>	Peer Feedback	Self Evaluation
Content: Is the content of the product well chosen?	Content chosen represents the best choice for the product. Graphics are well chosen and related to content.	Information or graphics are related to content, but are not the best choice for the product.	Information or graphics presented do not appear to be related to topic or task.		
Completeness: Is everything included in the product?	All information needed is included. Product meets the product criteria and the criteria of the task as stated.	Some important information is missing. Product meets the product criteria and the criteria of the task as stated.	Most important information is missing. The product does not meet the task or does not meet the product criteria.		
Creativity: Is the product original?	Presentation of information is from a new perspective. Graphics are original. Product has elements of fun and interest.	Presentation of information is from a new perspective. Graphics are not original. Product includes an element of fun and interest.	There is no evidence of new thoughts or perspective in the product.		
Correctness: Is all of the information included correct?	All information presented in the product is correct and accurate.	N/A	Any portion of the information presented in the product is incorrect.		
Communication: Is the information in the product well communicated?	All information is neat and easy to read. Product is in appropriate format and shows significant effort. Oral presentations are easy to understand and presented with fluency.	Most of the product is neat and easy to read. Product is in appropriate format and shows significant effort. Oral presentations are easy to understand, with some fluency.	The product is not neat and easy to read or the product is not in the appropriate format. It does not show significant effort. Oral presentation was not fluent or easy to understand.		
Total Grade					

Name: _____

Date: _____

7th Grade Comprehensive Science 2 20-50-80 Menu

Student Directions: Choose two activities from the menu below. The activities must total 100 points. Place a checkmark next to each box to show which activities you will complete. All activities must be completed by _____.

20 Points	
<input type="checkbox"/>	
<input type="checkbox"/>	
<input type="checkbox"/>	

50 Points	
<input type="checkbox"/>	

80 Points	
<input type="checkbox"/>	
<input type="checkbox"/>	
<input type="checkbox"/>	

Students, attach the Product Criteria Cards for your two activities in the spaces below.

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7th Grade Comprehensive Science 2 Product Criteria Cards

Student Directions: The cards below convey additional criteria for various products. Cut out the two applicable product criteria cards and attach each to your 20-50-80 Menu.

<p style="text-align: center;">Children's Book</p> <ul style="list-style-type: none"> • Has a cover with book's title and student's name as author • Has 5+ pages • Each page has an illustration along with the content/story • Neatly written or typed 	<p style="text-align: center;">Mobile</p> <ul style="list-style-type: none"> • At least 10 pieces of related information • Includes color and pictures • 3+ layers of hanging material • Is balanced when hanging 	<p style="text-align: center;">Sign</p> <ul style="list-style-type: none"> • Is the <u>size</u> of standard poster • Includes at least five pieces of important information • Has a clear and concise message that is easy to recognize • Contains both words and images • Name and location of where to post is on the back
<p style="text-align: center;">Three Facts & A Fib</p> <ul style="list-style-type: none"> • Can be typed, written or on PPT • Contains exactly four statements: three true statements and one false statement • False statement should not be obvious • Paragraph should be included that explains why the fib is false 	<p style="text-align: center;">Comic Strip</p> <ul style="list-style-type: none"> • 8.5" x 11" or larger • On white paper • 6+ cells • Contains meaningful dialogue • Imagery is in color 	<p style="text-align: center;">Town Hall Speech</p> <ul style="list-style-type: none"> • Was videotaped or audio recorded • Script was written and provided to teacher • Begins with introduction and explains your credentials or authority to speak on the subject • Provides appropriate background knowledge and detail for the type of audience • States the purpose for speaking • Has a clear wrap-up that restates the purpose of the speech • Voice was loud and easy to understand
<p style="text-align: center;">Interactive Map or Diagram</p> <ul style="list-style-type: none"> • Has two or more layers that are viewable by lifting paper • Images are in color and are clear • Explanations are thorough and concise • Has a descriptive title 	<p style="text-align: center;">Poster</p> <ul style="list-style-type: none"> • Is the <u>size</u> of standard poster paper • Includes at least five pieces of important information • Has a clear title • Contains both words and pictures • Name is written on back 	<p style="text-align: center;">Tour Script</p> <ul style="list-style-type: none"> • Adheres to the required time length when read • Language is appropriate for target audience • Is engaging and interesting • Refers to actual locations at SCB as if you were actually on-site • Contains all required content • Can be neatly handwritten or typed

		<p>Presentation: Great American Teach-In</p> <ul style="list-style-type: none">• Take on the role of the SCB employee• Cover at least 5 important facts about the job of the employee• Should be 3-5 minutes in length• Script must be approved by teacher before information is presented• Must have props or some form of costume• Allow for questions at the end of presentation
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