

## Elementary Lesson Plan #3

**GRADE(S):** 3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup>

**TOPIC:** Texas Water Use

**TITLE:** Use It Wisely

**OVERVIEW:** Although water is a renewable resource, it must be managed carefully and conserved so that there is enough for the future. During the Texas summers, there are periods when little precipitation falls. When this occurs, municipal water suppliers must take steps to have its consumers use less water. A first step in understanding water use is to calculate how much each individual uses on a daily basis.

### TEXAS ESSENTIAL KNOWLEDGE AND SKILLS:

#### Science, 3<sup>rd</sup> Grade

##### (b) Knowledge and Skills

(3.11) Science concepts. The student knows that the natural world includes earth materials and objects in the sky. The student is expected to:

(A) identify and describe the importance of earth materials including rocks, soil, water, and gases of the atmosphere in the local area and classify them as renewable, nonrenewable, or inexhaustible resources.

#### English Language Arts and Reading, 3<sup>rd</sup> Grade

##### (b) Knowledge and Skills

(3.12) Reading/inquiry/research. The student generates questions and conducts research using information from various sources. The student is expected to:

(D) use multiple sources, including print such as an encyclopedia, technology, and experts, to locate information that addresses questions (2-3)

(E) interpret and use graphic sources of information, including maps, charts, graphs, and diagrams (2-3)

#### Social Studies, 3<sup>rd</sup> Grade

##### (b) Knowledge and Skills

(3.16) Social studies skills. The student applies critical thinking skills to organize the use of information acquired from a variety of sources including electronic technology. The student is expected to:

(E) interpret and create visuals including graphs, charts, tables, timelines, illustrations, and maps

## **Mathematics, 3<sup>rd</sup> Grade**

### **(b) Knowledge and Skills**

(3.4) Number operation and quantitative reasoning. The student recognizes and solves problems in multiplication and division situations. The student is expected to:

(B) Solve and record multiplication problems (one-digit multiplier)

(3.12) Measurement. The student measures time and temperature. The student is expected to:

(A) tell and write time shown on traditional and digital clocks

(3.13) Measurement. The student applies measurement concepts. The student is expected to measure to solve problems involving length, area, temperature, and time.

(3.15) Underlying processes and mathematical tools. The student applies Grade 3 mathematics to solve problems connected to everyday experiences and activities in and outside of school. The student is expected to:

(A) identify the mathematics in everyday situations

(B) uses a problem-solving model that incorporates understanding the problem, making a plan, carrying out the plan, and evaluating the solution for reasonableness

(C) select or develop an appropriate problem-solving strategy, including drawing a picture, looking for a pattern, systematic guessing and checking, acting it out, making a table, working a simpler problem, or working backwards to solve a problem

## **Social Studies, 4<sup>th</sup> Grade**

### **(b) Knowledge and Skills**

(4.22) Social studies skills. The student applies critical-thinking skills to organize and use information acquired from a variety of sources including electronic technology. The student is expected to:

(B) analyze information by sequencing, categorizing, identifying cause-and-effect relationships, comparing, contrasting, finding the main idea, making generalizations and predictions, and drawing inferences and conclusions

(C) organize and interpret information in outlines, reports, databases, and visuals including graphs, charts, timelines, and maps

(F) use appropriate mathematical skills to interpret social studies information such as maps and graphs

## **English Language Arts and Reading, 4<sup>th</sup> Grade**

### **(b) Knowledge and Skills**

(4.13) Reading/inquiry/research. The student inquires and conducts research using a variety of sources. The student is expected to:

(D) interpret and uses graphic sources of information such as maps, graphs, timelines, tables, and diagrams to address research questions (4-5)

## **Mathematics, 4<sup>th</sup> Grade**

(b) Knowledge and Skills

(4.4) Number operation and quantitative reasoning. The student multiplies and divides to solve meaningful problems involving whole numbers. The student is expected to:

(D) use multiplication to solve two-digit numbers

(4.11) Measurement. The student selects and used appropriate units and procedures to measure weight and capacity. The student is expected to:

(B) estimate and measure capacity using standard units including milliliters, liters, cups, pints, quarts, and gallons

(4.12) Measurement. The student applies measurement concepts. The student is expected to solve problems involving length, including perimeter, time, temperature, and area.

(4.14) Underlying processes and mathematical tools. The student applies Grade 4 mathematics to solve problems connected to everyday experiences and activities in and outside of school. The student is expected to:

(A) identify the mathematics in everyday situations

(B) uses a problem-solving model that incorporates understanding the problem making a plan, carrying out the plan , and evaluating the solution for reasonableness

(C) select or develop an appropriate problem-solving strategy, including drawing a picture, looking for a pattern, systematic guessing and checking, acting it out, making a table, working a simpler problem, or working backwards to solve a problem

**Social Studies, 5<sup>th</sup> Grade**

(b) Knowledge and Skills

(5.25) Social studies skills. The student applies critical-thinking skills to organize and use information acquired from a variety of sources including electronic technology. The student is expected to:

(B) analyze information by sequencing, categorizing, identifying cause-and-effect relationships, comparing, contrasting, finding the main idea, making generalizations and predictions, and drawing inferences and conclusions

(C) organize and interpret information in outlines, reports, databases, and visuals including graphs, charts, timelines, and maps

(F) use appropriate mathematical skills to interpret social studies information such as maps and graphs

**English Language Arts and Reading, 5<sup>th</sup> Grade**

(b) Knowledge and Skills

(5.13) Reading/inquiry/research. The student inquires and conducts research using a variety of sources. The student is expected to:

(D) interpret and uses graphic sources of information such as maps, graphs, timelines, tables, and diagrams to address research questions (4-5)

## Mathematics, 5<sup>th</sup> Grade

### (b) Knowledge and Skills

(5.3) Number, operation and quantitative reasoning. The student adds, subtracts, multiplies, and divides to solve meaningful problems. The student is expected to:

(A) use addition and subtraction to solve problems using whole numbers and decimals

(B) use multiplication to solve problems using whole numbers (no more than three digits times two digits without technology).

(5.11) Measurement. The student applies measurement concepts. The student is expected to:

(A) measure to solve problems including length (including perimeter), weight, capacity, time, temperature, and area

(5.14) Underlying processes and mathematical tools. The student applies Grade 4 mathematics to solve problems connected to everyday experiences and activities in and outside of school. The student is expected to:

(A) identify the mathematics in everyday situations

(B) uses a problem-solving model that incorporates understanding the problem making a plan, carrying out the plan , and evaluating the solution for reasonableness

(C) select or develop an appropriate problem-solving strategy, including drawing a picture, looking for a pattern, systematic guessing and checking, acting it out, making a table, working a simpler problem, or working backwards to solve a problem

(5.15) Underlying processes and mathematical tools. The student communicates about Grade 5 mathematics using formal language. The student is expected to:

(A) explain and record observations using objects, words, pictures, numbers, and technology

(B) relate informal language to mathematical language and symbols

## DID YOU KNOW?

Water is measured in acre-feet. One acre-foot is equal to 325,851 gallons (an area about the size of a football field covered with one foot of water.)

Water use can be divided into the following six major categories:

Irrigation of crops

Municipal use by households and businesses, restaurants, public offices, sanitation, landscaping and fire protection

Manufacturing by industries

Steam and electric power generation

Livestock watering

Mining

## LEARNING EXPERIENCE:

**GENERAL TIME FRAME:** 45 minutes in class and additional time at home to calculate their water use.

**Materials:**

**Part I**

Measuring cup  
Toothbrush  
Toothpaste  
Paper and pencil

**Part II**

Pencil and paper  
Clock, timer, or stopwatch (for Part II only)

**Advanced Preparation:**

None

**Procedure:**

**Part I:** Students will measure how much water they use while brushing their teeth at home.

1. Plug drain in sink.
2. Brush teeth normally.
3. Spit in toilet or in a cup.
4. Measure water in sink at conclusion.
5. Record results.
6. Bring results to school to compile on chart on overhead or chalkboard.  
(Awards may be given for least amount used.)

**Part II:** Students will calculate water use in other areas of their homes.

1. Record number of times that they flush the toilet in one day.
2. Record number of times dishwasher is run each day.
3. Record number of times washing machine is run each day.
4. Record number of times shower or bath is used and how long in minutes each took.

Complete the calculations on the following chart

**DAILY WATER USE**

FIXTURE	# OF USES	FLOW RATE	TOTAL
Faucets	NA*	2 gal.	
Toilet		5 gal.	
Dishwasher		15 gal.	
Washing Machine		50 gal. per load	
Shower		2.75 gal. per min.	
Bath		50 gal. per bath	
		TOTAL	

\* not applicable, 10 gallons is a daily average.

Homes with older fixtures use about 75 gallons per person per day. Homes with water-saving fixtures use about 55 gallons per person per day.

**Teacher Talk:**

1. Texas water use can be divided into six major categories. Go over the definitions in the Did You Know? section.
2. Ask the class to give specific examples of what kinds of crops are irrigated, what kinds of manufacturing is done in your area that would use water, and other examples for the six categories.
3. Tell the students that for their assignment tonight (or over a weekend) they are to keep a record of their water use. Their use of water contributes to the figures in the municipal category as previously discussed.
4. When the students bring in their results from Part I, make a chart or graph on the board or overhead of the results. You may give awards to the person who brushed their teeth with the least amount of water. The conclusion should be made that the faucet should be turned off while the actual brushing is done; otherwise, a significant of water amount is wasted.
5. A graph or chart may also be made from the results of Part II. Further calculations can be done to determine total household use by multiplying the showering, bathing, flushing categories by the number of people in the household. A yearly total can be calculated by multiplying the daily total by 365 days.
6. Using a sample of a monthly water bill, calculate the cost per gallon of water.

Teacher Questions	Possible Replies
1. How do you use water indoors and outdoors?	1. Answers will vary.
2. What kinds of water saving fixtures are available?	2. Water-saving shower heads, toilets, dishwashers and washing machines are all available.
3. Are there additional ways to save water around the house?	3. Yes, in addition to turning off the water while tooth brushing the following can be accomplished without any additional set up expense. a. run the dishwasher only when there is a full load b. set the washing machine water level for the appropriate amount of clothes c. catch rain water to use for watering houseplants Students may brainstorm additional ways to conserve water. Make a list on the board.

**RESOURCES:**

Literature on water conservation by the Texas Water Development Board, and other water conservation materials such as bags to measure shower flow, toilet leak detection tablets, and drip gauges. View and order currently available materials at <http://www.twdb.state.tx.us/assistance/conservation/pubs.htm>, contact Patsy Waters at [patsy.waters@twdb.state.tx.us](mailto:patsy.waters@twdb.state.tx.us), fax the form to (512) 936-0812, call (512) 463-7955, or write to:

Conservation  
Texas Water Development Board  
P.O. Box 13231  
Austin, Texas 78711-3231

Maps of Texas River Basins, Aquifers, and Regional Reservoir Basin Maps are available on TWDB's website at <http://www.twdb.state.tx.us/mapping/index.htm>

**Texas Guide to Rainwater Harvesting**, Texas Water Development Board in cooperation with Center for Maximum Potential Building Systems, Austin, 1997.

Lesson plans and literature on water quality and using water wisely is also available from the Texas Commission on Environmental Quality at <http://www.tnrcc.state.tx.us/admin/topdoc/index.html>. Search for the following publications by

number on TCEQ's website.

Lesson Plans and Resources for Teaching Environmental Sciences- GI 268  
Water Education Team (WET) Instruction Handbook- GI 026

For additional information, call (512) 239-1000, or write to:

Texas Commission on Environmental Quality  
P.O. Box 13087  
Austin, Texas 78711-3087

**EXTENSIONS:**

1. Students may measure and calculate outdoor water use and list ways that water may be conserved in watering the yard and landscaping.
2. Students may conduct research to obtain a Texas annual precipitation map and determine if there are adequate supplies to meet their population needs.
3. Contact the local water utility for more information on ways to conserve more water both indoors and outdoors.