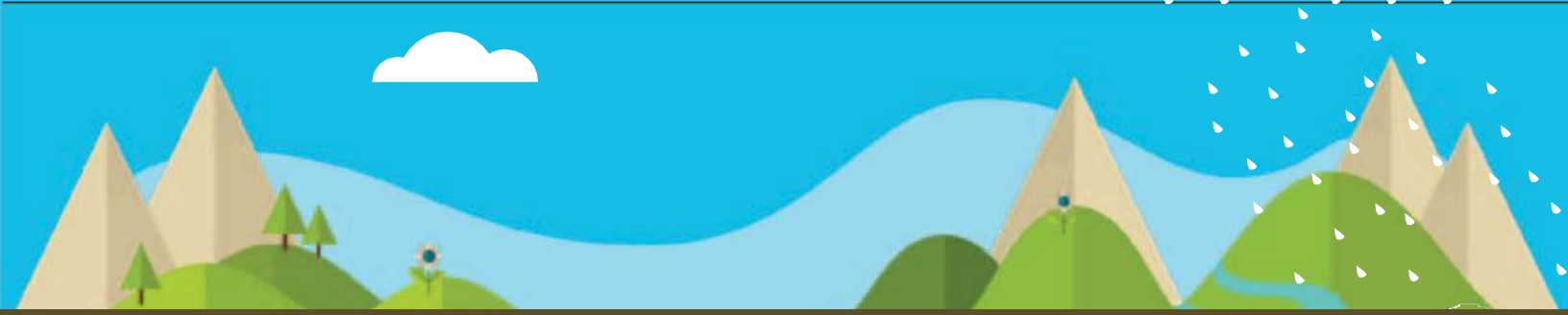




**CAL WATER**  
**H<sub>2</sub>O**  
**CHALLENGE**

**Handbook for 6th Grade**  
**2019-2020**





# Handbook

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## Foreword

The **Cal Water H<sub>2</sub>O Challenge** is a whole-class project-based, environmentally-focused competition for grade 4-6 students. The **Cal Water H<sub>2</sub>O Challenge** offers a unique opportunity for teachers to facilitate their students' learning of standards-based content, while developing the core understanding of environmental principles necessary to becoming science-literate citizens. Research indicates that interactive, collaborative, student-centered learning provides a meaningful way to make STEM come alive for students.

The program emphasizes Common Core State Standards-ELA (CCSS-ELA) and Mathematics (CCSS-M) and the Next Generation Science Standards (NGSS). It incorporates 21st century skills including the ability to identify problems connected with human activity, propose solutions based on research and evidence, and apply science in a local context to help solve both local and global concerns. As such the **Cal Water H<sub>2</sub>O Challenge** is a unique way to blend science, technology, engineering and mathematics (STEM) with English Language Arts and the Visual and Performing Arts.

## Learning Goals

The **Cal Water H<sub>2</sub>O Challenge** has three student goals. These goals are for students to:

1. Identify and focus on **one** water issue in their local area, learn about and investigate ways to address the issue, and develop and take action to improve the issue. This water issue must focus on caring for water (water conservation, water quality, protecting the water supply, etc.) in the local context.
2. Develop content understanding, through project-based learning, that align with CaCCSS in English-language arts, mathematics (and literacy in science and history/social science), science in the California Next Generation Science Standards (CaNGSS), and visual and performing arts.
3. Develop confidence and self esteem in developing and completing a long-term project as informed problem solvers and decision makers.

The following CaCCSS, CaNGSS, and Visual and Performing Arts standards are strongly suggested as a starting point for identifying grade 4-6 student learning goals for the **Cal Water H<sub>2</sub>O Challenge**:

- Science: Life, Earth and space, physical science and engineering performance expectations
- Mathematics: mathematical practices, number and quantity, statistics and probability, represent and interpret data, graphing

- English-Language Arts: writing, reading, speaking, and listening
- Visual and Performing Arts--creative expression and web-based technology

Some examples of possible Cal Water H<sub>2</sub>O Challenges include:

- Organize a water conservation program, which will continue in the future.
- Develop a way to protect the water quality in the community, your school or in your local area.
- Develop a water conservation program for families to use at home.
- Start a native plant garden, designed to be drought resistant, at your school to encourage schools, families and businesses to plant drought resistant plants.



## Using the Cal Water H<sub>2</sub>O Challenge Handbook

The Cal Water H<sub>2</sub>O Challenge is a **student-driven project** in which the student's role is to plan, design, implement, publicize, and evaluate the impact of their Cal Water H<sub>2</sub>O Challenge. Your role as the teacher is to facilitate the Challenge process. The **Cal Water H<sub>2</sub>O Challenge Handbook** provides Teacher Outlines to facilitate the Challenge Process and Student Pages to guide student thinking, planning, activities and evaluation.

### Challenge Process Flow

The following Teacher Outlines and Student Pages are suggested as a guide to complete The **Cal Water H<sub>2</sub>O Challenge**. The actual time for each part will vary depending on the topic and the complexity of the question the students are investigating:

#### Part 1 Brainstorm Topics

Students brainstorm possible topics for the Cal Water H<sub>2</sub>O Challenge. Students will refine their Cal Water H<sub>2</sub>O Challenge and questions after further content input in Part 2 and additional research in Part 3.

Estimated Teaching Time: 1 class period

#### Part 2 Do Some Science

When students have selected a preliminary topic, the teacher selects appropriate science standards to address as a foundation for students to begin their challenge. For example, if the Cal Water H<sub>2</sub>O Challenge is about water quality, the students should understand the specific grade science content standards that address water quality.

In addition, if the students are doing an Engineering Problem, the teacher should select science concepts that are related to the problem. For example, if students will solve a problem about getting water out of a well, students should experience concepts from physical science (e.g., energy) in addition to concepts from life, earth or physical science that support understanding water quality.

It is important for students to understand science concepts before engaging on engineering problems.

Estimated Teaching Time: 1-3 class periods

#### Part 3 Select Topic and Refine Questions

Students use their knowledge from Part 2, their ideas from Part 1, and further investigation to refine their topic and the Cal Water H<sub>2</sub>O Challenge's investigation questions.

Estimated Teaching Time: 2-5 class periods spread over a couple of weeks

## Part 4 Write Goals and Action Plan

With a refined topic and questions, students now determine the actual goal(s) of their Cal Water H<sub>2</sub>O Challenge and describe their action plan to reach these goals.

Estimated Teaching Time: 1-3 class periods

## Part 5 Conduct Research

During this part, students use many means of “research” to gather information about their Cal Water H<sub>2</sub>O Challenge. This includes reading, internet searches, conducting interviews, having guest speakers, etc. It also includes learning about special components of the Cal Water H<sub>2</sub>O Challenge. For example, if students are making community booklets, they would investigate how to design, print, and distribute the booklets.

Estimated Teaching Time: Many class periods spread over a few weeks depending on the complexity of the Cal Water H<sub>2</sub>O Challenge

## Part 6 Conduct Science Experiment

If the Cal Water H<sub>2</sub>O Challenge lends itself to scientific experimentation where students can discover cause-and-effect relationships, Part 6 helps students learn the skills to conduct an experiment with controls and variables.

Not all Cal Water H<sub>2</sub>O Challenges have a testable question for experimentation.

However, Cal Water H<sub>2</sub>O Challenges with an experimental component are desirable.

Estimated Teaching Time: Several to many class periods depending on the complexity of the experiment(s)

## Part 7 Do Engineering

Engaging in an Engineering Problem offers students the opportunity to engage in the Engineering Design Process and solve a real world problem.

Estimated Teaching Time: 1-3 class periods

## Part 8 Synthesize Learning and Reflect on the Process

Students have been involved in many activities and investigations. Part 8 helps students summarize their findings and make conclusions about the effectiveness of their actions. This part also allows students to reflect on their efforts.

Estimated Teaching Time: 3-8 class periods spread over several weeks

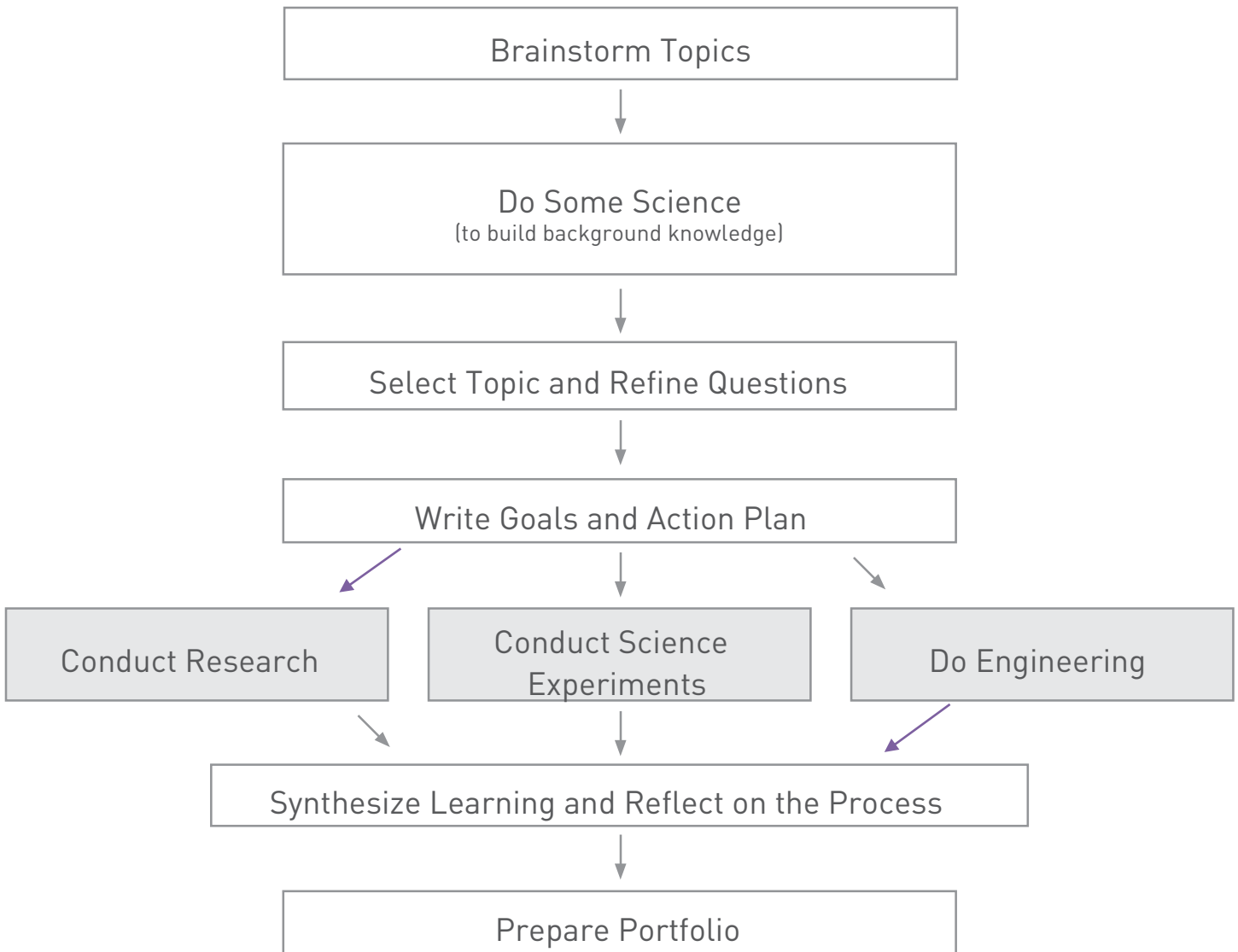
## Part 9 Prepare Portfolio

The Cal Water H<sub>2</sub>O Challenge is complete when it is displayed in a portfolio and submitted to the Cal Water H<sub>2</sub>O Challenge. This part helps students think creatively about the best way to display their question(s), action plan, and findings as well as their hard work.

Estimated Teaching Time: 4-6 class periods spread over several weeks

## Cal Water H<sub>2</sub>O Challenge Flow

The Handbook provides a suggested “flow” of activities for students to complete their Cal Water H<sub>2</sub>O Challenge. This graphic represents that flow. One of the three grey-scaled boxes must be part of the Cal Water H<sub>2</sub>O Challenge. If possible, incorporate all three.



## Part 1: Brainstorm Topics

**Teacher Role:** Facilitate student brainstorm of local water environmental issues (e.g., water usage, water conversation) as possible topics to research for the Cal Water H<sub>2</sub>O Challenge.

**Student Outcome:** Students will select a preliminary topic to research for the Cal Water H<sub>2</sub>O Challenge

**Time:** 40-60 minutes

**Standards:** CCSS ELA that help students clarify and support spoken ideas with evidence and examples.

**Advance Preparation:** Have students gather information about local water issues (e.g., newspaper, state agencies, local agencies, discuss with parents)

### Outline

- Explain the Cal Water H<sub>2</sub>O Challenge
- Ask students to discuss what is meant by an environmental issue, and then think about environmental issues that involve water.
- Divide the class into small working groups. Use **Student Page** for students to brainstorm their ideas and then star their top two choices. Ask groups to share their top two choices with the whole class. Tally student choices.
- Tally choices and have class vote for their top choice.
- Discuss how class might gather more information about the topic: Who can be called to come and give a talk? What local agencies should be contacted? Who might be an expert in this area? What books might be helpful?
- Make a class list of the suggestions.
- For homework, direct students to share the topic with their parents and get suggestions from them regarding a possible Cal Water H<sub>2</sub>O Challenge project, information needed, and possible contacts. Add these suggestions to the class list.

**Teacher Note:** Retain the list of suggestions to use in Part 3





# TOPIC LIST

When choosing a topic for your Cal Water H<sub>2</sub>O Challenge, you may decide on any local water issue for your class project, focusing around caring for water and studying water as a local and global resource. To help you brainstorm ideas, you can find a list of possible topics with sample project ideas below. You are by no means limited to this list, and may choose to tackle any local water issue even if it is not listed below.

- *Water Conservation*
  - Implementation of School/Community Wide Water Conservation Practices
- *Water Quality*
  - Drain Labeling
  - Informing Community About Safe Oil Disposal
  - Composting Instead of Usage of Garbage Disposals
  - Water Quality Testing as Research into Reclamation of Local Body of Water
- *Water Reliability*
  - Installing School/Community Water Catchment and Low Flow Devices for Water Preservation
  - Installation of a Tank Banks (Bricks or Bottles in Toilet Tanks to Reduce Water Usage) in School/Community Toilets
- *Alternative Water Sources*
  - Outreach on Waterless Car Washing
  - Outreach on Drought Tolerant and Xeriscape Planting
  - Replacement of Traditional Gardens with Drought Tolerant/Native Gardens
- *Water Cleanup*
  - Water Quality Testing as Research into Reclamation of Local Body of Water
  - Community Education around Where Drain Water Goes
  - Shore Clean Up of Water Body
  - Creation of a Water Garden in and around a Wetland Area
- *Protecting the Watershed*
  - Education and Outreach on Watershed Issues
  - Creation of Water Gardens in and around a Wetland Area
- *Other*
  - Any local issue involving caring for water within your community



Student Page

## Brainstorming your Cal Water H<sub>2</sub>O Challenge

What water topics would you like to investigate? In a brainstorm, list all your ideas. Remember, in brainstorming, all ideas are IMPORTANT.

Think of as many as you can...

\*STAR your top 2 ideas to share with the class!

## Part 2: Do Some Science

**Teacher Role:** Facilitate student learning of the science behind the topics they are thinking about for their Cal Water H<sub>2</sub>O Challenge.

**Student Outcome:** Students will understand the science behind their water issue.

**Teacher Note:** In the Appendix is a sample science lesson that a teacher might use to build science background for students before they get too far into the Cal Water H<sub>2</sub>O Challenge. The actual lesson(s) will depend on the topic the students select, the NGSS the teacher has selected, and the amount of science background students will need to refine their Cal Water H<sub>2</sub>O Challenge and questions in Part 3.

**We provide one example of a background science lesson; however, it may be necessary to provide additional background science lessons to help students to fully understand the science learning to be gained through the Cal Water H<sub>2</sub>O Challenge.**

## Part 3: Select Topic and Refine Questions

**Teacher Role:** Using student knowledge of science and their ideas from Part 1, facilitate students' discussions to refine their topic and the Cal Water H<sub>2</sub>O Challenge's investigation questions.

**Student Outcome:** Students will select a topic to research for the Cal Water H<sub>2</sub>O Challenge

**Time:** 40-60 minutes

**Standards:** CCSS-ELA

Speaking and Listening: Clarify and support spoken ideas with evidence and examples.

**Reading Comprehension:** Discern main ideas and concepts presented in texts; identify and assess evidence that supports those ideas. Draw inferences, conclusions, or generalizations about text and support them with textual evidence and prior knowledge.

**Writing Strategies:** Use argumentative or informational writing. Establish a topic, important ideas, or events in chronological order. Provide details and transitional expressions that link one paragraph to another in a clear line of thought. Offer a concluding paragraph that summarizes important ideas and details.

NGSS, CCSS-Mathematics and History Social Science

Depends on the content of the research

**Advance Preparation:** Determine who can be called to give a talk, what local agencies should be contacted who might be an expert in this area, what books might be helpful. Schedule speakers and gather materials.

### Outline

- Have students refer to the topics that were brainstormed in Part 1.
- Of those topics, which ones might be useful or helpful for the community or school?
- Facilitate a discussion with the following questions: What could be the goal for the project? How will the project impact the community or school?
- Choose the topic for the Cal Water H<sub>2</sub>O Challenge.

- Make a KWL chart and have students discuss what they know about the selected topic.
- Have groups research and report on possible questions they could address in the Cal Water H<sub>2</sub>O Challenge.
- Have students record class questions on the Student Page.
- Share questions and select the most appropriate questions for the Cal Water H<sub>2</sub>O Challenge. Write the questions in the “W” part of the KWL chart.
- Have students record the final questions in the next section of the Student Page.
- Have speakers address the students and questions in the KWL chart.
- Have students research questions generated in the “W” part of the KWL chart and share their findings. Fill in the “L” part of the KWL chart.
- Have students record their findings in the last section of the Student Page, “Here is what we found out”.



## Student Page

# Selecting Questions for our Cal Water H<sub>2</sub>O Challenge

Do your RESEARCH and use your imagination to determine questions you would like to INVESTIGATE.

Here are our questions:

These are the questions our class decided to investigate:

Here is what we found out:

## Part 4: Write Goals and Action Plan

**Teacher Role:** With a refined topic and questions, facilitate students to determine the actual goal(s) of their Cal Water H<sub>2</sub>O Challenge, develop an action plan and a timeline that includes sustainability beyond the school year.

**Student Outcome:** Students will determine goals and develop an action plan

**Time:** 40-60 minutes

**Standards:** CCSS ELA that help students clarify and support spoken ideas with evidence and examples.

**Advance Preparation:** Determine resources necessary for doing the challenge and secure those resources and materials, pre-think some specific project goals to help guide the students (if necessary), consider ways to share the Cal Water H<sub>2</sub>O Challenge with the community, plan for student reflections throughout the Cal Water H<sub>2</sub>O Challenge.

### Outline

- Help students determine the goals for the challenge. Make sure the goal is realistic and meaningful to the students.
- Facilitate discussion to determine goal(s).
- Have students record the goal(s) under number one on Student Page #1,
- Determine ways to analyze the impact of the challenge. How will we know our project did what we intended? How will this project impact the issue we selected?
- Have students record the evidence they will use to see if their project is successful under number two on Student Page #1.
- Have students complete prompts 3 & 4 on Student Page #1
- Provide tools and resources for students to plan and conduct their project. Facilitate a discussion of needs for completion of the project and use Student Page #2 to help facilitate discussion and have students record ideas.
- Form student action committees such as publicity, funding, research, historian, materials and artwork.
- Help students develop an action plan (who/ does what/ bywhen): things to do, resources to use, people to contact, other. Use Student Page #3, and have students fill in as discussion proceeds.
- Make a large class chart of Student Page #4. As a class, determine what needs to be done and by when, the timeline. Have students fill in Student page #4 individually.

# Student Page #1

## Our Goal



1. Our Water quality or water conservation goal(s) is...

2. The evidence we will use to know that we met our goal is...

3. Our goal is important because...

4. Explain how meeting this goal can make a difference and last over time.



# Student Page #2

## Planning the Cal Water H<sub>2</sub>O Challenge



Things to do:

---

Resources to use:

---

Equipment:

---

People to contact:

---

Other:

---

Student Page #3  
Planning the Cal Water H<sub>2</sub>O Challenge



Activity	Persons Responsible	Materials Needed	Due Date

Student Page #4  
Planning the Cal Water H<sub>2</sub>O Challenge  
Personal, Group or Class Timeline



Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday

## Part 5: Conduct Research

**Teacher Role:** Facilitate students conducting additional research on the selected topic/issue.

**Student Outcome:** Students will read, research, and record information related to the Cal Water H<sub>2</sub>O Challenge; they will implement the action plan

**Time:** Over multiple class periods

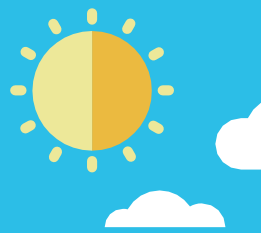
**Standards:** Review standards for English-language arts, science, social studies and mathematics to align with actions for this part of the Cal Water H<sub>2</sub>O Challenge.

### Advance Preparation:

- Help students gather reliable sources (e.g., books, Internet, newspapers/magazines, field trips, interviews, local, state, and federal agencies).
- Consider having different groups monitor different activities, or completing a large class chart of the activities

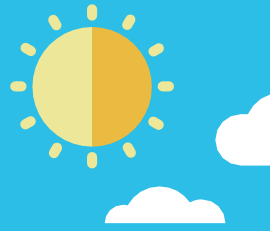
### Outline

- Review goals and action plan from Part 4 and remind students to record activities as they do them on Student Page Activity Record Log.
- Explain that students will be spending several class periods conducting additional research on their Cal Water H<sub>2</sub>O Challenge and implementing their action plan.
- Have students conduct a pre-project observation to collect base-line data. Encourage students to sketch/write about the issue before it is addressed in the Cal Water H<sub>2</sub>O Challenge. Have students record on Student Page: Pre-Project Observations
- Display collected resources for students to use, determine the best ways to divide the information for student to research and have students record their notes on the Student Page.
- Help students decide on work groups (e.g. tour leaders, publicity committee, letter writing)
- Periodically provide time for students or groups to share information with the class.
- Display information for others to see and to have available during the course of implementing the Cal Water H<sub>2</sub>O Challenge.



# Student Page Activity Record Log

Activity	Projected Outcome	Actual Outcome



## Student Page (Pre-Project Observations)

- \* Pre-project observations (include sketches)  
Explain the problem and use diagrams to help with your explanation



Student Page  
(Information you want to REMEMBER!!!)

\* This is a place to keep your notes from your Cal Water H<sub>2</sub>O Challenge RESEARCH, SURVEYS, ETC...

## Part 6 Conduct Science Experiment

**Teacher Note.** One of the activities related to the Cal Water H<sub>2</sub>O Challenge may include an experiment with variables and controls. If so, use Part 6

**Teacher Role:** Provide a series of activities to help students understand and apply each stage of the experimental design process to the Cal Water H<sub>2</sub>O Challenge question(s).

**Student Outcome:** Conduct an experiment related to their Cal Water H<sub>2</sub>O Challenge

**Time:** Several days.

**Standards:** NGSS Science and Engineering Practices

**Advance Preparation:** Collect all hands-on materials related to investigation.

### Outline

- Review the Challenge questions. Discuss which could be answered by conducting an experiment. Choose those that are testable and indicate a cause-and-effect relationship.
- Discuss controls and variables. Have them identify possible manipulated (independent) and responding (dependent) variables.
- Ask students to develop a testable question by completing this prompt: “How will changing (the type of soil) affect (the amount of soil and water run-off)?” and record the question on the Student Page.
- Help students develop a hypothesis (a cause-and-effect relationship) by changing their testable question into an “if/then” statement.
- Help students plan (develop a procedure for the experiment) and carry out the investigation
- Help students graphically display their data, then analyze and interpret it on the Student Page
- Help students construct a scientific explanation that includes a claim (answer to the question being investigated), evidence that is appropriate and sufficient to supports the claim and scientific reasoning that backs up the evidence and record it on the Student Page
- Have students add their findings to the K-W-L chart AND the Activity Log.







Student Page  
Conducting Water-Related Experiments (A)

Testable Question:

Observations:

Construct a data table and enter your data



Student Page

## Conducting Water-Related Experiments (b)



Construct a graph to display the data from your experiment.

Use the data from the experiment to make a claims and evidence statement.

I claim \_\_\_\_\_

My evidence is:

## Part 7 Do Engineering

**Teacher Role:** Facilitate students engaging in the Engineering Design Process on a solution related to their Cal Water H<sub>2</sub>O Challenge.

**Student Outcome:** Students will understand how engineers solve problems

**Teacher Note:** In the Appendix is a sample engineering lesson that a teacher might use. The actual lesson(s) will depend on the topic the students select, the NGSS the teacher has selected, and how the engineering problem relates to or builds on the science the students learned in Part 2.

## Part 8: Synthesize Learning and Reflect on the Process

**Teacher Role:** Facilitate student discussions to summarize the findings from the Cal Water H<sub>2</sub>O Challenge and reflect and evaluate the Cal Water H<sub>2</sub>O Challenge's impact-and long-term benefit

**Student Outcome:** Students will summarize their findings and reflect and evaluate the goals at the completion of Cal Water H<sub>2</sub>O Challenge

**Time:** Several class periods over a couple of weeks Part

I: Drawing Conclusions

Part II: Evaluating Impact

**Standards:** Review standards for English-language arts, science, social studies and mathematics to align with actions for this part of the Cal Water H<sub>2</sub>O Challenge.

**Advance Preparation:** Have students gather their explanations (e.g., comments/learning from all parts), as well as from their Activity Logs, previous reflections, and any other prompts that were used to synthesize information.

### Outline

#### Part I: Drawing Conclusions:

- Congratulate student for their hard work and perseverance. Explain the next step is to synthesize what they learned and reflect on the Cal Water H<sub>2</sub>O Challenge.
- Help students review and organize their data from the Cal Water H<sub>2</sub>O Challenge in a manner others can understand.
- Help students document their results (e.g., amount of water saved, how the water was saved, or potential water savings over time), using the Activity Logs, notes from research, preliminary conclusion sentence strips, reflections etc. Record on the Student Page.
- When the class has had an opportunity to review the information from all groups, divide the class into small groups (preferably that worked on different parts of the Challenge) and ask them to brainstorm 3-5 major things they learned that they think others would want to know.
- Have each group share their ideas, then build consensus for the 3-5 major findings that will be used in the portfolio. Record on the Student Page.

## Part II Evaluating the Impact of the Cal Water H<sub>2</sub>O Challenge

- Have students reflect on their learning. One way to do this is to have small groups of students discuss the following prompts, and then have them complete their individual reflection (Student Page).
  - What was the overall effect of the Cal Water H<sub>2</sub>O Challenge?
  - What were some of the issues and successes observed through this Cal Water H<sub>2</sub>O Challenge?
  - What were some of the educational benefits of doing this Cal Water H<sub>2</sub>O Challenge?
  - What is the long-term water environmental benefit for students, parents, and/or the community as result of doing this Cal Water H<sub>2</sub>O Challenge?
  - How have students grown/changed as a result of their participation? What responsible actions did they do, will continue to do now?
  - What are some possible next steps?
- Ask students how they would like to publicize their results to the school and to the community.

Teacher Note: spread the word about your Cal Water H<sub>2</sub>O Challenge! Invite the local press and the media to share your class's accomplishments. Involve the entire school, family members, friends and the community. Consider sharing your Cal Water H<sub>2</sub>O Challenge with another school, at a board meeting, or other district professional development events.

## Evaluate the Cal Water H<sub>2</sub>O Challenge Group Reflection






Work in groups to review all your data, notes, and research.  
Compare and contrast your Cal Water H<sub>2</sub>O Challenge pre-observations with your post observations.

Evaluate your work:

- What are the 3-5 major things you learned that you think others would want to know?
- Brainstorm ideas with your group and list them on this page.
- Why was this Cal Water H<sub>2</sub>O Challenge important?





## Teacher Page Teacher Reflection

Write a 1-2 page reflection on the project. Include the following:

- Describe the Cal Water H<sub>2</sub>O Challenge project goal(s) and the overall EFFECTS.
- What were some of the CHALLENGES and SUCCESSES that you observed through your project?
- What were the educational benefits of the Cal Water H<sub>2</sub>O Challenge for the students?
- What are some possible “next steps” for continuation of the Cal Water H<sub>2</sub>O Challenge project?
- How has your Cal Water H<sub>2</sub>O Challenge project impacted your targeted audience?



## Part 9: Prepare Portfolio

**Teacher Role:** To facilitate and guide students in putting the class portfolio together; to generate other ideas for sharing their Cal Water H<sub>2</sub>O Challenge.

**Student Outcome:** Students will compile artifacts and information to produce a completed portfolio.

**Time:** 4-6 Class periods over a period of several weeks.

**Standards:** Review standards for English-language arts and visual and performing arts to align with actions for this part of the Cal Water H<sub>2</sub>O Challenge.

### Advance Preparation:

- Collect all pictures and artifacts taken/created during the Cal Water H<sub>2</sub>O Challenge.
- Complete Student Reflections and Teacher Reflection
- Make copies of the rubric (in Appendix) for each work group of students.

**Teacher Note:** The Cal Water H<sub>2</sub>O Challenge judges are classroom teachers, selected individuals from the different environmental agencies, and science professional development providers. They are trained to use the rubric to objectively score the Cal Water H<sub>2</sub>O Challenges. Thus it is important to help your students follow the rubric in assembling their portfolio.

**Keep in mind that you and your students know your work best. Help your students tell their story clearly and concisely by making sure that all information included in the portfolio is linked to the Challenge’s goals and action plan.**

### Outline

- Explain to students it is time for the whole class to put together a portfolio that shows the work that has been accomplished. Explain that they will work in groups to create the portfolio.
- Facilitate students selecting a work group: Who will do the “write-up” and explanation of how the Cal Water H<sub>2</sub>O Challenge was selected? Who will do the goal and what did the class hoped to accomplish? Who will summarize the findings?
- Review the Portfolio Checklist (Student Page).

- Distribute the copy of the rubric to each work group. Ask students to review and discuss in their group what they think needs to be included for a high score. Make sure their discussion includes what photos, articles, and student communications would be important to include?
- As students work, make sure students are aware of the guiding questions for their portion and make sure those questions are addressed in their information.
- Have each work group share the information they have gathered and explain how each piece is important to be included in the portfolio.
- Ask students how they want to address the rubric for the portfolio presentation Chart students' ideas and have them decide how the portfolio is going to be finalized.
- Have work groups work on their portion of the portfolio and then assemble the whole portfolio. As a class, re-check the checklist to make sure that the portfolio is complete.
- Make copies. Hard copy portfolios will not be returned. Scan or take photographs of your portfolio for your records.
- Submit your portfolio to Cal Water by the deadline.



## Student Page

# Portfolio Checklist

Be sure to review this list prior to submitting your portfolio to Cal Water H<sub>2</sub>O Challenge. Projects must be submitted or delivered by – **Saturday, February 21, 2020**

### Portfolio basics

Every project concludes with the creation and submission of a portfolio. In that portfolio the competing classroom's students must explain the following:

- The Goals of Cal Water H<sub>2</sub>O Challenge Project
- Their Research
- Their Science and/or Engineering Experimentation/Application
- Their Actions to Solve a Local Water Issue
- Their Public/Community Outreach Efforts

### Cal Water H<sub>2</sub>O Challenge Portfolio Specifications

- Must be created in Google, PowerPoint, Keynote, Presenter, or Prezi software (see the Cal Water H<sub>2</sub>O Challenge website for version details).
- Digital Portfolio must be no more than 16 pages.
- Digital Pages must be at PowerPoint standard 10" x 7.5" in dimension.
- Hard Copy Portfolio may be no more than 16 pages, 8 pages front and back.
- Hard Copy pages may be no larger than 11" x 17".
- Must include 5-10 student reflections and a teacher reflection (student and teacher reflections are not counted as part of the 16 pages).
- The cover pages must be included and are not counted as part of the 16 pages. (Points will be docked if any of the documentation is missing).
- May include no more than 5 minutes of video.
- May include links but to no more than one class-created website.
- May include as many photographs as fit within the page constraints.

Your classroom portfolio should provide a clear description of your Cal Water H<sub>2</sub>O Challenge. When creating your portfolio, be sure to think through the following criteria our judges will be looking for:

- How was your Cal Water H<sub>2</sub>O Challenge project selected?
- What was the project goal and what did the class hope to accomplish?
- How was the Cal Water H<sub>2</sub>O Challenge project implemented?
- Why was this Cal Water H<sub>2</sub>O Challenge important?
- Evaluation of the Cal Water H<sub>2</sub>O Challenge's impact?

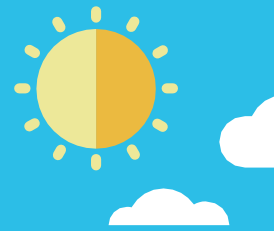
Be sure to review [the scoring rubric](#) and judging criteria for detailed information on how your Cal Water H<sub>2</sub>O Challenge portfolio will be evaluated and to understand the scoring process. The rubric can be found at the back of this handbook or on the Cal Water H<sub>2</sub>O Challenge website.

Email Portfolios or Fileshare links to your portfolio to [CalWaterChallenge@gmail.com](mailto:CalWaterChallenge@gmail.com)

Hard Copy Portfolios can be mailed to:

Cal Water H<sub>2</sub>O Challenge  
ATTN: Conservation Department  
2632 West 237th Street  
Torrance, CA 90505

2019-2020  
Cal Water H<sub>2</sub>O Challenge Cover Sheet  
PAGE 1



School Name: \_\_\_\_\_

District: \_\_\_\_\_ County: \_\_\_\_\_

School Mailing Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_ Phone: \_\_\_\_\_

Teacher's Name: \_\_\_\_\_ Best Time to Call: \_\_\_\_\_

Teacher's e-mail: \_\_\_\_\_ Class Grade Level: \_\_\_\_\_

Number of Students in Class: \_\_\_\_\_ Last Day of School \_\_\_\_\_

Principal's Name: \_\_\_\_\_ Spring Break Dates: \_\_\_\_\_

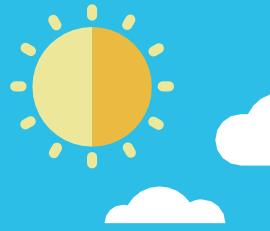
Did you reach out to your entire school?  Yes  No

Number of Community members reached by the Cal Water H<sub>2</sub>O Challenge: \_\_\_\_\_

Cal Water H<sub>2</sub>O Challenge Title: \_\_\_\_\_

Cal Water H<sub>2</sub>O Challenge Summary:

2019-2020  
Cal Water H<sub>2</sub>O Challenge Cover Sheet  
PAGE 2

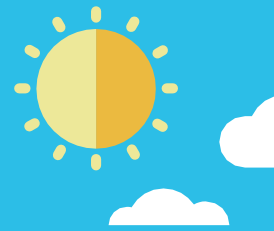


Project Goal(s):

Explain the significance, impact, or benefit of your Cal Water H<sub>2</sub>O Challenge:

Unique school characteristics:

# 2019-2020 Cal Water H<sub>2</sub>O Challenge Cover Sheet



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Please list your class roster below with t-shirt sizes for yourself and each student:

## Appendices

Appendix A Science Lesson Appendix B Engineering Lesson

Appendix C 8-Week Project Timeline

Appendix D Submission Guidelines

Appendix E Rubric

## Appendix A

### 6th Grade Vignette

#### An Example of How a Cal Water H<sub>2</sub>O Challenge Might Unfold

Sandy Waters, a 6th grade teacher in District USA, was excited about providing her students with a project-based learning experience that would integrate CCSS and NGSS and allow her students to use their creativity to demonstrate their learning. She read about the Cal Water H<sub>2</sub>O Challenge, decided it was the perfect opportunity to meet her learning goals, and meet her and her students interest in water quality and conversation! She was unsure of exactly where to begin.

She knew that project-based learning takes time and she knew the importance of planning for student learning over time. So she decided to get a “jump start” by doing a little investigation of her own. Sandy realized that if she knew more about common water issues in her community, she would be able to help his students become more aware of local environmental issues. Sandy consulted the Cal Water H<sub>2</sub>O Challenge web site <https://www.calwater.com/conservation/conservation-resources/> to get a list of agencies and organizations that address water-related environmental issues.

Sandy reviewed the California CCSS for ELA and Mathematics CCSS ELA - <http://www.cde.ca.gov/be/st/ss/documents/finalelaccsstandards.pdf> and Math - <http://www.cde.ca.gov/be/st/ss/documents/ccssmathstandardaug2013.pdf>, and CaNGSS <http://www.cde.ca.gov/pd/ca/sc/ngssintrod.asp> that she thought might best be addressed in a project-based learning experience. She knew that this kind of learning would require English language arts (reading, writing, speaking and listening), mathematical practices as well as scientific and engineering practices. She knew the topic her students selected should resonate with one of the NGSS performance expectations for her grade level. Sandy also recognized that she could incorporate the Visual and Performing Arts standards in how her students decided to design and display their portfolio. She consulted the Cal Water H<sub>2</sub>O Challenge Handbook for handy hints on how to manage the Cal Water H<sub>2</sub>O Challenge.

Sandy was now ready to prepare for teaching and facilitating the students’ thinking and selection of a topic for their Cal Water H<sub>2</sub>O Challenge. She used Part 1 to help students brainstorm possible topics. The students selected the broad topic of Plant and Animal Needs for Water.

With the students’ topic as a foundation, Sandy identified the appropriate Next Generation Science Standards and developed a conceptual flow. This is Sandy’s conceptual flow. The grey-shaded boxes represent the science content embedded in the students’ topic. The language arts, math, and science and engineering practices will be addressed throughout the Cal Water H<sub>2</sub>O Challenge.



Earth's surface is made up of interconnected systems.



Within the interconnected systems, Earth processes are the result of energy flowing and matter cycling.



Water is essential to the dynamics of Earth systems and humans can impact earth systems.



Drought is an extended period when a region has a deficiency in its water supply, i.e., precipitation or groundwater.



Avoiding water runoff is a way to conserve water.



Water continually cycles among land, ocean, and atmosphere, propelled by sunlight and gravity.

Ocean circulation is driven by the global ocean convection cycle.

Humans can offset the impact of drought by conserving water.

Engineers improve existing technologies or develop new ones.

Science and Engineering Practices: 1) Asking questions and defining problems; 2) Developing and using models; 3) Planning and carrying out investigations; 4) Analyzing and interpreting data; 6) Constructing explanations and designing solutions; 7) Engaging in argument from evidence; 8) Obtaining, evaluating, and communicating information

Knowing what science concepts have to be reviewed or explored, Sandy is ready for Part 2 (which may be many lessons, depending on the science concepts necessary to build student understanding). The summation of understanding that “the movement of water on Earth is driven by unequal heating of oceans and gravity” are addressed as an outcome of the entire Cal Water H<sub>2</sub>O Challenge. Part 2 addresses water continually cycles among land, ocean, and atmosphere, propelled by sunlight and gravity from Sandy’s conceptual flow.

Sandy continues to facilitate her class as they use their language arts skills and understanding to research and refine their questions in Part 3. Sandy’s class found out that human impact and water use during California’s current drought was something they could address at their school. They refined their questions to include: How does the community waste water by not repairing broken lawn sprinklers and poorly positioned lawn sprinklers.

In Part 4, Sandy’s class determines their Cal Water H<sub>2</sub>O Challenge goals and action plan. The class wants to inform.

In Parts 5 and 6 students combine their science and engineering practices, mathematical practices, and language skills as they investigate their selected Cal Water H<sub>2</sub>O Challenge through research and experimentation. Sandy’s class used the library, Internet and local environmental agencies to determine the impact. Students worked with the local water district. The students charted and graphed the data, comparing it with other data released by the agency.

The class invited a local building inspector and someone from the planning department to share their work in regards to rain or moisture sensors in the local parks. They even had a councilman explain how the city council was trying to be careful in their planning for the placement sprinklers in parks to avoid water runoff

Through their research, students realized that California is in a drought and the State Water Resources Control Board had declared that public agencies, as well as individuals and businesses, can be fined \$500 per day for certain water waste. Sandy’s students learned that the categories include: using a hose to wash off sidewalks and driveways; watering landscaping so much that water runs off into streets or gutters; washing cars using a hose without a shutoff nozzle. To help their community with water runoff they would have to use engineering to solve the problem of water runoff.

In Part 7, the students use the engineering design process (ask, imagine, plan, create, improve) to solve the problem of water runoff.

In Part 8 and 9 the students synthesize their learning and think about ways in which to communicate what they have learned. Sandy’s class prepared their findings, backed with evidence from their research and experimentation, and made a portfolio to submit as their Cal Water H<sub>2</sub>O Challenge project. They practiced their presentation, and shared their learning with other classes and at a PTA meeting. Sandy made sure that they also sent a copy of their findings to the city council. And, lastly, they celebrated their hard work!

## Part 2:

### Background Science Lesson(s) Based on Learning Goals

**Teacher Note:** This is a sample lesson that a teacher might use to build science background for students before they get too far into the Cal Water H<sub>2</sub>O Challenge. The actual lesson(s) will be dependent on the topic the students select, the NGSS the teacher has selected, and the amount of science background students will need to refine their Cal Water H<sub>2</sub>O Challenge and questions in Part 3.

We provide one example of a background science lesson; however, it may be necessary to provide additional background science lessons to help students to fully understand the science learning to be gained through the Cal Water H<sub>2</sub>O Challenge.

This example is based on sandy Water's vignette. Sandy's students selected water movement driven by unequal heating of the ocean and gravity as their topic. Sandy then selected the NGSS (Ms-Ess2-6) that addressed the importance of unequal heating of atmospheric and oceanic circulation that determine regional climates.

**Outcome:** To provide a learning experience that helps students understand how convection drives the ocean and atmospheric currents.

**Time:** 50 minutes

#### Materials:

- 1 10-gallon large clear plastic tub or aquarium
- 2 baby food jars with lids
- 1 small bottle of blue food coloring
- 1 small bottle of red food coloring
- 1 hot plate or microwave to heat water
- 1 thermos-type container for the hot water
- 1 thermos-type container for the cold water
- 1 250mL beaker or Pyrex-type measuring cup
- Water to fill tub and baby food jars
- 1 awl to pierce baby food jar lids
- 1 roll of masking tape
- 2 thermometers
- Science notebooks (one per student)

**Standards:** **Ms-Ess2-6** Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.

**DCI Ess2.C** – Variations in density due to variations in temperature and salinity drive a global pattern of interconnected ocean currents.

### Advance Preparation:

Pierce each baby food jar lid with the awl. Cover holes with masking tape.

Heat enough water to fill one baby food jar. Place several drops of red food coloring in the water. Keep the water warm in thermos-type container.

1. Fill the other baby food jar with cold water. Place several drops of blue food coloring the water. Keep the water warm in thermos-type container.
2. Fill the tube with room temperature water.

### Procedure:

1. Ask student to think-pair-share what they know about the water cycle. Facilitate a conversation about how the water changes state as it cycles among land, ocean, and the atmosphere.
2. Explain that in this demonstration lesson students will engage in a model of what is happening in the oceans.
3. Ask students to think about the temperature of ocean water. Where is it coldest? Where is it warmest?
4. Display the large tub of water (representing the ocean). Have a volunteer from the class take the temperature of the water. Have students record the temperature in their science notebooks.
5. Display the baby food jar filled with red (hot) water. Have a volunteer from the class take the temperature of the water. Have students record the temperature in their science notebooks.
6. Display the baby food jar filled with blue (cold) water. Have a volunteer from the class take the temperature of the water. Have students record the temperature in their science notebooks.
7. Ask students to compare the three water temperatures.
8. Explain to students that in this demonstration lesson you are going to place each jar in adjacent corners of the large tub of water. Further explain that when the jars are in position on the bottom of the tub, you will remove the tape from each lid.
9. Ask students to make a diagram of the large tub with the baby food jars in position. Have students include labels, i.e., tub, room temperature water, hot water, cold water, etc.
10. Have students make a prediction about what will happen once the masking tape is removed from the jars. Ask students to write their predictions in their science notebooks. Have students share and compare their predictions.
11. Place both baby food jars in the large tub of water. Remove the tape form the jars.
12. Have students make observations of what is happening to the water from each baby food jar. (The hot water will rise to the top of the large tub of water and the cold water will sink to the bottom.) Have students add their observations to their diagram in their science notebooks. Be sure to have students label their observations.
13. Have students compare the hot water and the cold water. Have students write a statement about what happens when water of different temperatures is placed in the tub.
14. Have students relate this demonstration to the water in the ocean, to air in the atmosphere.
15. Have students use what they have learned about unequal heating of the ocean to the atmosphere. Have students draw another diagram to model what they think is happening in the atmosphere.

16. Help students make the connection between the Earth's ocean and atmosphere. Water is essential to dynamic Earth systems (specifically climate and the drought in California).
17. Ask: How do these ideas relate to their topic for the Challenge? Chart student ideas. Save the chart to begin Part 3.

Teacher Note: Sandy Waters also considered another activity with stream tables to show the effect of gravity on the movement of water.

Lastly, Sandy did a science Lesson on climate that included the interactions that influence weather and climate, i.e., sunlight, the ocean, atmosphere, ice, landforms and living things.

She now felt that students had science background on which she could build to help them narrow their topic and refine their questions in Part 3.

## Part 7:

### Engineering Lesson(s) based on Learning Goals

Teacher Note: This is a sample lesson that a teacher might use to build engineering background for students. The actual lesson(s) is dependent on the topic the students select, the NGSS that supports those concepts, and the amount of science background students need to investigate their Cal Water H<sub>2</sub>O Challenge.

In Part 2, students learned about how water is essential to the dynamics of Earth systems (specifically climate). In Parts 3-5 students refined their Cal Water H<sub>2</sub>O Challenge, identified goals and an action plan and conducted research. Through those efforts, the students realized that they could use engineering to solve a problem.

The Engineering Problem is: if the school is wasting water by not repairing broken sprinklers and repositioning those sprinklers that spray water on the concrete, how could the runoff from these sprinklers be diverted to water the school garden located on the lower campus. The problem is how to get the water to the lower campus! Students wanted to design channels and water collection devices from recycled materials to stop wasting the water.

Ms. Waters added a few lessons to address science concepts about movement of water so that her students could proceed with their engineering design to a way to move runoff water to the lower campus.

Purpose: To test various materials to be used in solving an engineering design challenge.

Outcome: Students will describe the properties of various materials and test them for possible use in the engineering design challenge.

Time: 2 class periods

#### Materials:

Materials for making runoff channel models (1 per group of six)

- Stream tables
- Watering Cans with water
- A variety of waterproof materials for each group, e.g., recycled plastic water bottles, foam trays, aluminum foil, plastic drinking straws, plastic cups, etc.
- Masking tape
- Science notebooks (1 per student)
- Chart paper
- Markers

Standards: Common Core Language Arts Standards that help students clarify and support spoken ideas with evidence and examples.

**MS-ESS3-3.** Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

6-8 NGSS Engineering Standards:

**MS-ETS1-1.** Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

**MS-ETS1-2.** Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

**MS-ETS1-3.** Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

**MS-ETS1-4.** Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

**Advance Preparation:** 1. Review R1 Engineering Design Process

**Procedure:** Part 1 Testing Materials

1. Have students think about their answer to the following prompt: “How are we going to lessen the amount of wasted runoff water on our campus due to broken or poorly positioned sprinkler-heads?” Have students share their response with a partner. Have partner groups share their responses with the entire class. Chart student responses. Facilitate a discussion to help students think about the issue and what might be some ways to resolve their problem. Allow 10 minutes.

Teacher Note: Possible student responses may include: fix the sprinklers, collect the water, channel the water to the lower campus and the school garden.

1. Brainstorm some specific ideas of ways to solve the problem:
  - Have students do a think-pair-share of possible ways to get water to the lower campus and the garden.
  - Ask students to do a quick-write on a possible way to get runoff water to the lower campus and the garden. Ask students to include a rationale for their choice.
2. Remind students about the lesson with the stream tables. Ask students to recall how the water in the stream table was diverted as it headed downhill. Inform students that one way to get water to the lower campus may come from what they know about water flowing downhill.
3. Share the engineering design process with the students.
4. Explain to students that today they will be testing the properties of different materials they might be able to use to move runoff water to the lower campus and the garden.
5. Display the waterproof materials, e.g., recycled plastic water bottles, foam trays, aluminum foil, plastic drinking straws, plastic cups, etc.
6. Distribute chart paper and markers to each group of students. Have groups brainstorm the ways each of the different materials could be used to divert water. Have students make the following chart:

## Materials and their Properties

Material	Properties for Diverting Water
Recycled plastic water bottles Foam trays Aluminum foil Plastic drinking straws Plastic cups	

7. Have stream tables set up in the classroom (without sand).
8. Distribute baggies of the waterproof materials to each group. Have students test each material in the stream table to determine its usefulness in diverting water.
9. Ask, which properties do you think will be important when making a water channel? Why?
10. As students design a channel and test it in the stream table.
11. Explain that in the next session, students will use their knowledge of materials and their properties to design a channel for diverting runoff water to the lower campus and the garden

### Part 2

12. Ask students, in a think-pair-share to recall what they remember about the properties of the materials that would be helpful for diverting water. Chart responses.
13. Explain to students that their challenge is to make channels will divert water without leaking (water).

Teacher Note: The Engineering Design Process has five major components (see R1 for details)- Ask, Imagine, Plan, Create, Improve.



14. ASK! – What questions do you have before we start? Chart all the students’ questions. Facilitate the discussion with students by prompting so they ask questions like:
  - What materials can we use to make our channels?
  - How much time do we have to build the channels?
  - How will we know if our channel works?
15. Explain the “criteria” for a successful channel, i.e., one that does not leak. Students may use any materials that they tested. Give the students a set amount of time for brainstorming their channels and for testing (suggestion 20-30 minutes).
16. IMAGINE! - Have students work in pairs to brainstorm and design channels.
17. PLAN! - Students should draw pictures of their channels, label the parts, and list the materials they will use.
18. CREATE! – Students build their channels.
19. First, ask students to test the windmill blades without any weights in the small paper cup. If the rotor successfully spins, then add weights, one at a time, to see how many weights the windmill can lift. Keep a chart of student names and how many weights their windmill blades lifted.
20. After everyone has tested their windmill blades, direct the class to discuss testing results. Which windmill blades lifted the most weights
21. Review and compare the channel designs – why do you think this design did not leak What materials were used? What is the shape of the channel? Why do you think this design worked well?
22. IMPROVE! – Have students write on a piece of paper or in their notebooks how they would improve their channel designs and explain why this improvement would be better than their original design.

# Teacher Resource

## Engineering Design Processes Notes

Engineering designs are usually documented in a formal report that details the process. Often, the report makes references to “raw” notes that were kept in an engineering log. Although the steps of engineering design process are not necessarily sequential, the report is usually written with these components:

Process	Activity
Ask	What’s the problem? What have others done? What are the constraints?
Imagine	What could be some solutions? Brainstorm ideas. Choose the best idea
Plan	Draw diagrams. Make a list of needed materials.
Create	Follow your plan and create it. Test it out.
Improve	Make your design even better.

# CAL WATER H<sub>2</sub>O CHALLENGE

## 8-WEEK PROJECT TIMELINE



The following timeline uses an 8-week schedule but can be compressed into 4 weeks or expanded into 16 weeks or more at your discretion.

### **Week 1: Choose a Topic**

Students brainstorm possible water-related topics for the class project.

### **Week 1-2: Background Science Lessons, & Project Selection**

Select and teach appropriate science standards to support chosen water-related topic. Students can refine their selected topic and draft investigative questions.

### **Week 2-3: Develop Project Goals and Plan**

Students draft project goals and a plan to meet those goals.

### **Week 3-6: Conduct Research and implement Plan**

Students research their selected project using various sources and methods and take action based on their plan.

### **Week 5-6: Conduct an Experiment**

If applicable, students conduct an experiment around their water-related issue.

### **Week 6-7: Reflections**

The classroom, both students and teachers, summarize findings and reflect upon their project actions and outcomes.

### **Week 7-8: Create Portfolio**

Students design and develop their portfolio to best illustrate the questions, plan, and findings of the water-related project.

<https://challenge.calwater.com>



# Submissions Guidelines

## Overview

You've finished your project and now you're ready to submit it to the Cal Water H<sub>2</sub>O Challenge! Congratulations! Follow our guide below to find out what your submission must entail, how to package your files, and how to submit your project to the competition. You will also find our contact information; in case you have any trouble with the submission process. All documents referenced can be found at: <https://challenge.calwater.com/resources.htm> Remember that final submissions must be submitted or postmarked by 11:59 PM PST, February 21, 2020.

We hope that you have fun creating your portfolio, and we look forward to reading your classroom's submission.

## Step-by-Step

- 1. Review the Checklist:** Before getting started, please review the Cal Water H<sub>2</sub>O Challenge Portfolio Checklist. This PDF explains the basic subject matter covered by a portfolio and its specifications.
- 2. Review the Rubric:** This document provides detailed information on how your Cal Water H<sub>2</sub>O Challenge portfolio will be evaluated.
- 3. Create Your Portfolio:** Students should create the classroom portfolio to the specifications found in the Portfolio Checklist. For an example of how you might format your portfolio, please see the Portfolio Sample.
- 4. Save Your Portfolio:** If you created your portfolio digitally in PowerPoint, Keynote, Presenter, or Prezi, you need to save it as the proper file type. We accept native files for the programs listed below. If you have an older version of the software, please save the file as a PDF or contact us at [CalWaterChallenge@gmail.com](mailto:CalWaterChallenge@gmail.com) if you are having trouble saving as an accepted format.
  - a. Microsoft PowerPoint: Version 12+
  - b. Keynote: Version 5+
  - c. Adobe Presenter: Version 8+
  - d. Prezi: Export as PDF.
- 5. Save / Submit Your Supplementary Materials:** With your portfolio submission you must include:
  - a. Coversheet (pages 1-3)
  - b. Teacher reflection
  - c. 5-10 student reflections

If working digitally, these files may be saved within your portfolio or as separate PDF files. If submitting a hard copy, these documents should be attached to your portfolio, and will not count against your page count.

**6. Submit Your Files:** Final submissions must be submitted or delivered by 11:59 PM PST, February 21, 2020.

Digital Submission

- a. Either attach all files to an email or a fileshare program of your choice (such as DropBox). They should include:
  - i. Portfolio file or PDF (if this includes your supplementary materials, it will be the only file)
  - ii. Cover Sheet PDF (pages 1 & 2)
  - iii. Teacher Reflection PDF
  - iv. 5-10 Student Reflections PDFs

Note: No additional files may be included in your submission package -- all supporting media (photos, videos, articles, etc.) must be included within the portfolio itself or the one allowed, class-created website. The link to any supporting website must also be contained within the portfolio.

- b. Email Cal Water the files and/or a link to the fileshare where we can download the files. Send all emails to [CalWaterChallenge@gmail.com](mailto:CalWaterChallenge@gmail.com)
- c. If you have trouble uploading your files, email us [CalWaterChallenge@gmail.com](mailto:CalWaterChallenge@gmail.com) and we will help you with your submission.

Hard Copy Submission

- a. Check that all required documents are included.
  - i. Portfolio
  - ii. Cover Sheet (pages 1 & 2)
  - iii. Teacher Reflection
  - iv. 5-10 Student Reflections Note: No additional files may be included in your submission package -- all supporting media (photos, videos, articles, etc.) must be included within the portfolio itself or the one allowed, class-created website. The link to any supporting website must also be contained within the portfolio.
- b. Mail the documents to the following address with a postmark no later than February 21, 2020.  
Cal Water H<sub>2</sub>O Challenge  
ATTN: Conservation Department  
2632 West 237th Street  
Torrance, CA 90505

**7. Follow-Up:** We will contact you after we receive your submission. If you do not hear from us within two business days please contact us at [CalWaterChallenge@gmail.com](mailto:CalWaterChallenge@gmail.com).

**8. Having Trouble:** If you are having trouble with any portion of this submission process, please reach out using the contact information above. We are happy to help.



# Cal Water H2O Challenge Rubric



School Name	School District	Grade Level	Evaluator Name and Number
Teacher Name	Cal WaterH2O Challenge Project Name	Total Score	

	POSSIBLE POINTS	SCORE
<b>1. Cal Water H2O Challenge Impact (40 Points)</b>		
A. Importance of Cal Water H2O Challenge Topic	15	
B. Action Plan	10	
C. Long Term Environmental Impact	15	
<b>2. Impact ON STUDENT Learning (45 Points)</b>		
A. Integral to Student Learning	15	
B. Student Participation	15	
C. Student Reflection	15	
<b>3. Presentation (10 Points)</b>		
A. Overall Quality of the Presentation of the Portfolio	10	
<b>4. Impact ON Teacher Practice (5 Points)</b>		
A. Teacher Reflection	5	
<b>Grand Total</b>		





# COMPONENT #1: Cal Water H2O Challenge Impact

(Total possible points: 40)

## A. Importance of Cal Water H2O Challenge Topic

(Total possible points: 15)



### Guiding Questions:

- ♦ Why did the class choose to do this Cal Water H2O Challenge?
- ♦ Why would this Cal Water H2O Challenge be important to the school and community?

#### 15 Points

Cal Water H2O Challenge **FULLY DEMONSTRATES** student understanding of **ONE** key water issue or concern in the school AND local community based on science concepts with evidence that the topic of the Cal Water H2O Challenge is important to the community and school and addresses California's water supply.

#### 10 Points

Cal Water H2O Challenge **FULLY DEMONSTRATES** student understanding of **ONE** key water issue or concern in school OR local community based on science concepts with limited evidence that the topic of the Cal Water H2O Challenge is important to the community OR school and addresses California's water supply.

#### 5 Points

Cal Water H2O Challenge **DEMONSTRATES LIMITED** student understanding of **ONE** key water issue or concern in school and/or local community based on science concepts with some or little evidence that the topic of the Cal Water H2O Challenge is important to the community/school and may or may not address California's water supply.

#### 1 Point

Cal Water H2O Challenge includes **MORE THAN ONE** key water issue with multiple activities that may or may not connect to one another with some or little evidence that the topic of the Cal Water H2O Challenge is important to the community/school and may or may not address California's water supply.

Use specific evidence from the portfolio to support your score.

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POINTS





# COMPONENT #1: Cal Water H2O Challenge Impact

(Total possible points: 40)

## B. Action Plan

(Total possible points: 10)



### Guiding Questions:

- ♦ What is the relationship between the goals, action plan and outcomes?
- ♦ How were results communicated to the school and community?

#### 10 Points

There is a **Clear LINK** from the goals to the action plan and to the outcomes to address the identified water issue

and

Actions/activities of the Cal Water H2O Challenge **Are Based** on sound scientific principles related to the topic

and

Findings and applications from actions/activities **are Communicated** to school and community

#### 5 Points

There is a **Clear OR Moderate LINK** from the goals to the action plan and to the outcomes to address the identified water issue

and

Actions/activities of the Cal Water H2O Challenge **Are Based** on sound scientific principles related to the topic

and

Findings and applications from actions/activities **May or May NOT BE Communicated** to school

#### 1 Point

There is a **Moderate OR NO LINK** from the goals to the action plan and to the outcomes to address the identified water issue

and

Actions/activities of Cal Water H2O Challenge **May OR May NOT BE Based** on sound scientific principles related to the topic

and

Findings and applications from actions/activities **May OR May NOT BE Communicated** to school and/or community

OR

There is a **Clear OR Moderate LINK** from the goals to the action plan and to the outcomes to address the identified water issue

BUT

The Cal Water H2O Challenge Action Plan was **NOT COMPLETED**

Use specific evidence from the portfolio to support your score.

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POINTS







# COMPONENT #1: Cal Water H2O Challenge Impact

(Total possible points: 40)

## C. Long Term Environmental Impact

(Total possible points: 15)



### Guiding Questions:

- ♦ How was this Cal Water H2O Challenge important to students, the school and/or community?
- ♦ Will we see the effects of this Challenge in 5 years? What is (are) the enduring aspect(s) of this Cal Water H2O Challenge?

15 Points	10 Points	5 Points	1 Point
<p>There is <b>Clear EVIDENCE</b> that the Cal Water H2O Challenge resulted in a change in student thinking about short- and long-term responsible actions related to the goal(s) of the Cal Water H2O Challenge.</p> <p>and</p> <p><b>Potential LONG-TERM</b> impact of the Cal Water H2O Challenge on water conservation within the school AND community are <b>Clearly EVIDENT</b>.</p>	<p>There is <b>Clear EVIDENCE</b> that the Cal Water H2O Challenge resulted in a change in student thinking about short- and long-term responsible actions related to the goal(s) of the Cal Water H2O Challenge.</p> <p>and</p> <p><b>Potential LONG-TERM</b> impact of the Cal Water H2O Challenge on water conservation within the school OR community is <b>Clearly EVIDENT</b>.</p>	<p>There is <b>Clear OR SOME EVIDENCE</b> that the Cal Water H2O Challenge resulted in a change in student thinking about short- and long-term responsible actions related to the goal(s) of the Cal Water H2O Challenge</p> <p>and</p> <p><b>Potential LONG-TERM</b> impact of the Cal Water H2O Challenge on water conservation within the school or community is <b>Somewhat EVIDENT</b>.</p>	<p>A change in student thinking that may lead to short- and long-term responsible actions related to the goal(s) of the Cal Water H2O Challenge <b>IS NOT EVIDENT</b>.</p> <p>OR</p> <p>Only <b>SHORT-TERM</b> impact is <b>EVIDENT</b>.</p>

Use specific evidence from the portfolio to support your score.

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POINTS





## COMPONENT #2: Impact on Student Learning

(Total possible points: 45)

### A. Integral to Student Learning

(Total possible points: 15)



#### Guiding Questions:

- ◆ How did this Cal Water H<sub>2</sub>O Challenge improve upon or enhance student learning beyond the regular classroom curriculum?
- ◆ In what ways did the Cal Water H<sub>2</sub>O Challenge help students use science and engineering practices, mathematical practices and English language arts skills to understand the issues and work collaboratively to address the issues?

#### 15 Points

Student work from the Cal Water H<sub>2</sub>O Challenge Clearly **Demonstrates it** is an integral part of the regular classroom curriculum as defined by the NGSS and CCSS with an emphasis on students using the practices to build understanding.

and

CLEARLY connects classroom learning with real world applications

#### 10 Points

Student work from the Cal Water H<sub>2</sub>O Challenge Clearly **Demonstrates it** is an integral part of the regular classroom curriculum as defined by the NGSS and CCSS with an emphasis on students using the practices to build understanding.

and

SOMEWHAT connects classroom learning with real world applications

#### 5 Points

Student work from the Cal Water H<sub>2</sub>O Challenge Clearly **Demonstrates it** is an integral part of the regular classroom curriculum.

and

HAS LIMITED OR NO connections with real world applications

#### 1 Point

Student work from the Cal Water H<sub>2</sub>O Challenge **DOES NOT Indicate That IT IS an Integral Part** of the regular classroom curriculum.

and

HAS LIMITED OR NO connections with real world applications

Use specific evidence from the portfolio to support your score.

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POINTS





## COMPONENT #2: Impact on Student Learning

(Total possible points: 45)

### B. Student Participation

(Total possible points: 15)



#### Guiding Questions:

- In what ways were students actively involved in the selection, research, investigation and evaluation of the Cal Water H<sub>2</sub>O Challenge?
- In what ways did student thinking change because of their direct involvement in the Cal Water H<sub>2</sub>O Challenge?

#### 15 Points

Student work from the Cal Water H<sub>2</sub>O Challenge demonstrates **Clear EVIDENCE** that students were involved in **all** of the following: inquiry, design, research, implementation, evaluation and documentation.

#### 10 Points

Student work from the Cal Water H<sub>2</sub>O Challenge demonstrates **SOME EVIDENCE** that students were involved in **all** of the following: inquiry, design, research, implementation, evaluation and documentation.

#### 5 Points

Student work from the Cal Water H<sub>2</sub>O Challenge demonstrates **SOME EVIDENCE** that students were involved in **SOME** of the following: inquiry, design, research, implementation, evaluation and documentation.

#### 1 Point

Student work from the Cal Water H<sub>2</sub>O Challenge demonstrates that students were involved in **FEW OR NONE** of the following: inquiry, design, research, implementation, evaluation and documentation.

Use specific evidence from the portfolio to support your score.

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POINTS





## COMPONENT #2: Impact on Student Learning

(Total possible points: 45)

### C. Student Reflection

(Total possible points: 15)



#### Guiding Questions:

- ◆ What evidence of student learning do I have? How will that learning be sustained?
- ◆ How did students move from awareness, to stewardship and possible long-term, responsible action?
- ◆ In what ways did the Cal Water H<sub>2</sub>O Challenge help students use critical thinking skills to evaluate water issues and make informed decisions to address those issues?

#### 15 Points

Student reflection indicates:

**Quality Learning** (i.e., multiple opportunities to develop and demonstrate critical thinking to evaluate WATER ISSUES addressed in the Cal Water H<sub>2</sub>O Challenge and make informed decisions)

and

**Quality Learning** (i.e., multiple opportunities to develop and demonstrate skills and knowledge) **about OTHER aspects** of the Cal Water H<sub>2</sub>O Challenge (e.g., using technology, writing, art, working as a team, etc.)

and

Identifies appropriate personal action to sustain **BOTH** learnings.

#### 10 Points

Student reflection indicates:

**Quality Learning** (i.e., multiple opportunities to develop and demonstrate critical thinking to evaluate WATER ISSUES addressed in the Cal Water H<sub>2</sub>O Challenge and make informed decisions)

and **Quality**

**Learning** (i.e., multiple opportunities to develop and demonstrate skills and knowledge) **about OTHER aspects** of the Cal Water H<sub>2</sub>O Challenge (e.g., using technology, writing, art, working as a team, etc.)

and

Identifies appropriate personal action to sustain **EITHER** learning.

#### 5 Points

Student reflection indicates:

**Quality Learning** (i.e., multiple opportunities to develop and demonstrate critical thinking to evaluate WATER ISSUES addressed in the Cal Water H<sub>2</sub>O Challenge and make informed decisions)

OR

**Quality Learning** (i.e., multiple opportunities to develop and demonstrate skills and knowledge) **about OTHER aspects** of the Cal Water H<sub>2</sub>O Challenge (e.g., using technology, writing, art, working as a team, etc.)

and

**May OR May NOT** identify appropriate personal action to sustain **EITHER** learning.

#### 1 Point

Student reflection indicates **LITTLE OR NO** meaningful learning or personal action.

Use specific evidence from the portfolio to support your score.

POINTS





## COMPONENT #3: Presentation

(Total possible points: 10)

### A. Overall Quality of the Presentation of the Portfolio

(Total possible points: 10)



#### Guiding Questions:

- Can the reader understand the goals and outcomes of Cal Water H<sub>2</sub>O Challenge from the presentation?
- How does the presentation demonstrate originality and creative efforts by the students and teacher?
- How were students involved in completing the presentation of the Challenge?

#### 10 Points

Portfolio **IS COMPLETE** and displays all Challenge components, linking goals with Cal Water H<sub>2</sub>O Challenge activities.

and

Overall presentation of Cal Water H<sub>2</sub>O Challenge is original, creative, and artistic, showing **Sustained EFFORT** and **Quality attention** to detail.

and

There is **Clear EVIDENCE** that students were involved in the preparation of the portfolio.

#### 5 Points

Portfolio **IS COMPLETE** and displays all Cal Water H<sub>2</sub>O Challenge components, linking goals with Cal Water H<sub>2</sub>O Challenge activities.

and

Overall presentation of Cal Water H<sub>2</sub>O Challenge is **Moderately creative**, showing **SOME EFFORT** and attention to detail.

and

There is **Clear EVIDENCE** that students were involved in the preparation of the portfolio.

#### 1 Point

Portfolio **IS NOT COMPLETE**.

and/or

Overall presentation of Cal Water H<sub>2</sub>O Challenge shows **LITTLE EFFORT** and attention to detail.

and/or

There is **SOME OR LITTLE EVIDENCE** that students were involved in the preparation of the portfolio.

Use specific evidence from the portfolio to support your score.

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POINTS



## COMPONENT #4: Impact On Teacher Practice

(Total possible points: 5)

### A. Teacher Reflection

(Total possible points: 5)



#### Guiding Questions:

- How do I know this Cal Water H<sub>2</sub>O Challenge was successful and is making a difference?
- What evidence of student learning do I have? How will that learning be sustained?
- How did this Cal Water H<sub>2</sub>O Challenge change my teaching practices to engage all students in meaningful learning experiences?
- How did this Cal Water H<sub>2</sub>O Challenge improve upon or enhance student learning beyond the regular classroom curriculum?

#### 5 Points

Teacher Reflection indicates **IN DEPTH REFLECTION** on topics such as: challenges and success; educational benefits such as changes in student learning, interactions, and classroom culture; next steps for sustainability; social responsibility for water conservation.

#### 1 Point

No teacher reflection included with Cal Water H<sub>2</sub>O Challenge.

**OR**

Teacher Reflection **Overall Lacks DEPTH** of reflection on topics such as: challenges and success; educational benefits such as changes in student learning, interactions, and classroom culture; next steps for sustainability; social responsibility for water conservation.

Use specific evidence from the portfolio to support your score.

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POINTS

