Presented By

The Metropolitan Water District of Southern California

2026 Workbook

Welcome to Water Engineering 4 Good 2026

This year's program begins with a bit of an apology. Because we're starting in February rather than our usual October launch, we simply don't have the time that past classes enjoyed. Normally, students would have months to design, prototype, test, and refine a fully functioning water-saving device. With the shortened schedule, attempting that same scope would force us to rush the work, cut corners, and lose the thoughtful engineering process that makes this program special.

Rather than compromise the quality of your learning experience, we've redesigned the program to focus on the *core* of real engineering: **creative design, mathematical modeling, systems thinking, and proof-of-concept testing**. These are the skills that professional engineers use every day, and they're the heart of what makes this field exciting.

- Even with the compressed timeline, you'll still engage in a full engineering challenge—just in a more streamlined form.
- You'll create a detailed, well-reasoned design for a water-saving device. This includes a CAD drawing, and a clear explanation of the problem your device solves.
- Instead of building a full prototype, you'll build a model that predicts how your device performs under different conditions. For example, you might explore flow rates, pressure changes, and water-savings scenarios—just like real engineers.
- You'll construct a small-scale element of your design such as a flow restrictor, filter layer, or water capture device to demonstrate the underlying principle your device relies on.

This approach preserves the creativity, and problem-solving intent of the original program while fitting into our shorter schedule.

Even though we're starting late, we're adding something new—something powerful. Throughout the program, you'll be using **AI tools** to help brainstorm ideas, analyze data, run simulations, and communicate results. These tools won't do the thinking for you, but they *will* help you work faster, explore more possibilities, and learn how modern engineers use AI in real projects.

By the end of this course, you won't just understand water-saving systems—you'll also have hands-on experience using AI as a creative and problem solving partner. That's a skill that will serve you well long after this program ends.

A Few Words About Integrating AI into Engineering Design

To begin, I believe that a few words about AI usage in general are needed. It is our belief that students who wish to use generative AI to solve engineering problems need to be aware of the problems that may result in its overuse. Solving engineering (or any) problems by asking an AI agent to solve them for you is like learning to play the guitar by watching someone else play the guitar. Unfortunately, you can watch as much as you want, but you'll never be able to play the song unless at some point you pick up the guitar, learn the basics, and play the song yourself. Then play it again, and again, and again. Eventually you may be able to play the song as good as the original. The process is long and hard, but in the end the music will be much sweeter. Use AI for guidance, then learn to play the song (or solve the engineering problem) yourself.

In this year's competition we will use artificial intelligence as a tool to enhance creativity, decision-making, and problem-solving skills. Our goal is for you to use AI to strengthen your ideas, not create them from a few prompts. Original thinking, curiosity, and collaboration remain at the heart of our program. The end result, a hand built scale model of your idea, is still the focus of the program. No AI agent can do that for you.

By the end of the competition, students will not only have a functioning hand made water conservation proof-of-concept prototype, but also some first hand experience in using generative AI in a responsible way, which they can then use in future science, engineering, and academic projects.

Lastly, part of modern engineering is understanding how to use AI responsibly. This includes:

- Respecting intellectual property
- Giving proper credit when AI helps you generate content
- Being transparent about when and how you used AI in your work.

Teams will be asked to reflect on the ethical use of AI in their final presentations. The amount of AI that you use throughout this competition will be guided by your individual teacher. We believe that they are the best ones to establish guidelines, and help you strike the balance between original and AI generated work.

We have designed WE4G this year within the LAUSD guidelines for using Generative AI in the classroom. Our goal is to have students use available AI tools in a responsible and ethical way, while taking advantage of the ways that AI tools can be used in the engineering process. While some of the activities require the use of AI for completion, it is ultimately up to the individual teachers for each team to determine the level at which AI is used during this program.

Program Feedback

Because of the introduction of AI, there are many changes to this year's WE4G Program and workbook. We hope that you agree that introducing AI into the program adds a valuable element to the program and provides real value to your students. However we want to make sure that we are truly adding value, and we hope that you will help us with this effort.

After each worksheet is submitted, you will receive an email from us. These emails will ask a few basic questions about the AI content of that particular worksheet. These emails will be short and to the point, and should only take about five minutes of your time to answer. Answering these emails is strictly voluntary, and will not change your score in any way. Don't worry about criticizing us, we can take it. We all want the program to improve, and hopefully we will all become better at using AI.

An example email might look something like this:

Dear Students and Teachers,

You recently submitted the "**Drought Investigation Worksheet"**. Please take a few minutes to answer a few questions about this worksheet:

1. Was AI a help with this worksheet, or was it unnecessary?
2. Did AI make this worksheet easier or harder to fill out than it has been in previous years?
3. Should we remove the AI element for this particular worksheet in the future?
4. Do you have any recommendations for us on how to apply AI to this worksheet?

Thanks for your assistance,

Any additional questions or items of business should be managed with an email to Omar at: **ourquieta@mwdh2o.com**.

WE4G Learning Objectives

Water Engineering 4 Good has four main objectives. The objectives focus on using STEAM-based engineering principles to develop a new water conservation device or system that will help Southern California adapt to a changing climate.

1. Learn about the impact that AI data centers have on our environment.
2. Learn and use AI assisted engineering problem-solving techniques to design and develop a physical model of their solution.
3. Learn to work as a team to solve the problem. Working with a diverse team is different from trying to solve a problem by yourself. Success comes through recognizing and using the skills and talents of each team member.
4. Learn several marketable skills to aid students in their career development. These include
   - learning how to make a 3D model of a physical object,
   - using a Monte-Carlo Simulation to predict the effectiveness of your design,
   - learning how to use AI to make a video, and
   - learning how to present a project to professionals.

These are skills that students can put on a resume and can be used wherever their future endeavors take them.

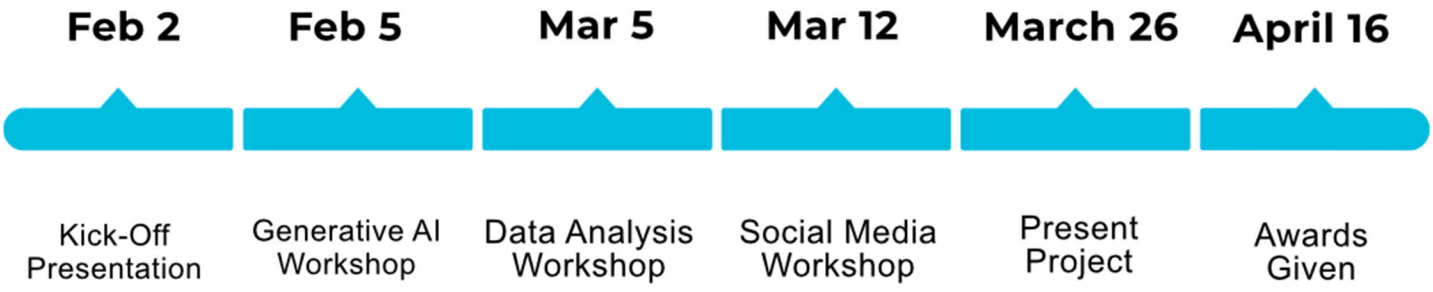
Timeline

The timeline for the Water Engineering 4 Good competition starts with a ZOOM kickoff meeting on **February 2, 2026** *and concludes with a ZOOM presentation on* ***March 26*****, 2026.** The awards ceremony will be held sometime in **April 2026**, **either in a ZOOM meeting or at the in-person workshop.**

There will be several worksheets that must be submitted along with a physical model of the team's invention. The team will collect and analyze some data. The team will also create social media posts and a multimedia presentation to share their knowledge and approach with others.

Throughout the competition we will have live Zoom office hours every **Thursday at 4:00 PM**. These office hours are strictly voluntary, and teachers and students can attend whenever you need help on any subject.

We will also hold several Zoom workshops on AI, CAD drawing, and social media campaigns to assist you along the way. The Zoom events, dates and times are shown in the timeline graphic below:



Deliverables (what we expect from you)

In addition to building a real working model of your water conservation device, you will also have to submit several other documents to show how you applied engineering principles to design and build your model.

Part	Deliverable	Description	Due Date
	Attend WE4G Team Workshop & Kickoff	Online Team Workshop & Kickoff	February 2, 2026
1	AI Water Consumption	AI assisted research	February 13, 2026
2	Our Idea Worksheet	Explain your idea for a water conservation device to us, and show the sources you used during your research	February 20, 2026
3	3D CAD Model	AI Generated CAD Model	February 27
4	Bench top Demo	Proof of concept model and data	During final presentation
5	Final Presentation Outline	Provide an outline of your final presentation	March 20, 2026
	Social Media Files	Show your social media post – Do not post it online.	March 25, 2026
	Zoom presentation to MWD Panel	Multimedia presentation to share your project and what you learned. (This is your chance to impress the MWD engineers with your project!)	March 26, 2026
	Award Ceremony	Announcing awards by division	April 16, 2026

Submission Guidelines:

Please observe the following guidelines when submitting your worksheets and outlines. Please note that if you send an email with your submission as an attachment it may not be graded in a timely manner, and it may get lost in the process.

Also, make sure your school and team number are in the TITLE as suggested in item 4 below. It makes it much easier for us to keep track of the submissions.

1. Each team will have their own One Drive folder that only their captain/teacher, Omar, Chuck and Daiva will have access to. An email will be sent to you describing how to access this folder.

2. Copy your instructor on all emails. - Team members will email their deliverables/assignments to their captain/teacher, who will check them before putting them into the team's One Drive folder.

3. Deliverable/assignment files must only be in one of the following formats: Word Doc, JPEG., or PDF.

4. All deliverable/assignment files will be named as follows:
   1) Template: School Name_Team Number_Assignment Title
   2) Example: Roosevelt High_Team 3_Formal Project Proposal

5. You can expect to know your deliverable/assignment/worksheet score within a week of the submission deadline.

Please make sure you have the first and last names of all the students that worked on the item on the title page of your submission.

Scoring

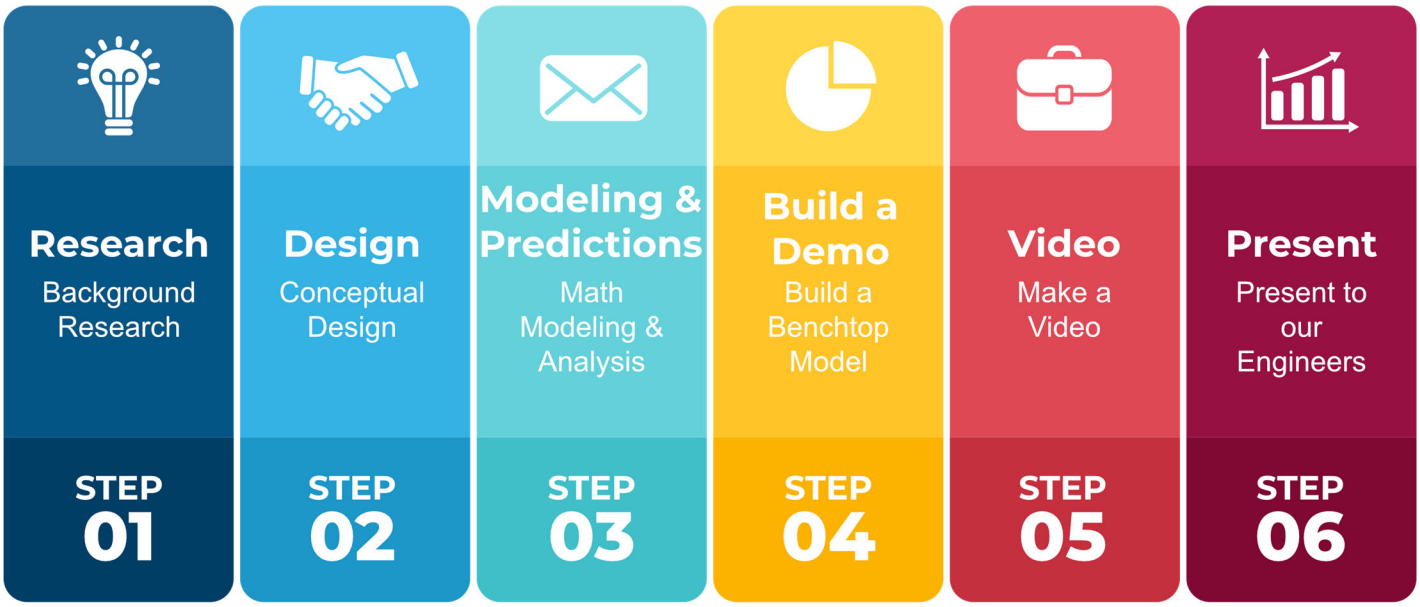
We will score each section using a separate grading rubric. The winner of the competition will be the team with the highest total of all of the separate parts added together. The grading rubrics for each section are shown in Appendix A. It's a good idea to look over the different rubrics to get an idea of what is expected of your submissions. The separate categories and possible points for each category are as follows:

Item	Turned in On Time? (No = deduct 10 pts.)	Max Score	Your Score
Understanding AI Water Usage		100	
Our Idea Worksheet		100	
3D CAD Model		100	
Monte-Carlo Simulation		100	
Bench Top Demo		200	
Video		100	
Final Presentation Outline		50	
Zoom presentation to MWD Panel		250	
TOTAL		**1000**	

The grading rubrics, and an explanation of how your scores are computed, are shown in Appendix A.

The Engineering Challenge

The project, and this document, are organized into five basic sections. They are separated and color-coded as shown below:



At the beginning of each section, you will see the goals for that section and a list of the items which must be submitted for scoring. Checking off each item as you go will ensure that you don't miss any deadlines.

While it would be great if every team completed the entire workbook, don't worry if you cannot complete all of it. Let us know if you need extra time to complete any of the tasks. Better to turn the worksheets in a bit late than not at all. Even a partially completed project will afford students some valuable skills.

All teams have the same challenge: to design a water conservation device to help Southern California adapt to a changing climate and better manage our water supplies. Your design options are not limited in any way by what we might suggest. You may have an idea from something you have seen in your community. Do some research, have some discussions, and come up with a device that suits your goals and your team's skills and interests. Most of all, have fun and be careful, you just might learn a few things along the way!

Step 1 – Research AI Water Usage in California

To begin, we will explore a bit about how water is used in Southern California to quench the thirst of the AI data centers in our state. This is different than in past programs, but it will give you a chance to sharpen your AI skills before getting into the heart of the program.

Here is what you'll do in this section:

1. You will be using AI to explore AI water usage in Southern California.
2. Use AI to generate data
3. Use AI to generate a graph or table of data
4. There is an optional AI prompt engineering workshop on February 5.

Here is what you will turn in for a score:

1. AI assisted AI water usage summary.
2. There is an additional optional AI related worksheet that you can complete to score 25 bonus points. **Note that the OPTIONAL worksheet does not have to be submitted now, it can be submitted at any time up until the end of the program.**

Check the scoring rubrics in Appendix A to see how we will score your submissions.

How to Submit Work:

1. **Follow the submission guidelines given on Page 7**

Optional Prompt Engineering Zoom Workshop – **February 5, 2026**

We will begin the engineering process by learning about Prompt Engineering. By learning about how to make better prompts, all of the following lessons in this Workbook will become much easier and more time efficient. Please note that this live Zoom workshop will be on **February 5, 2026 at 4:00.**

During this presentation we will provide some guidance on the latest best practices of prompt engineering. However, you are free to use whichever prompting method you feel is best. When we grade your submission, we will take your particular prompting style into account. Please note that attendance is not mandatory, so if you are an experienced user of AI feel free to skip this session. However, by attending you will get a good feeling for what we are looking for in your responses. **Hints and examples will be given for all of the AI assisted worksheets which must be submitted for the competition.**

Students will:

- Understand how prompt structure affects AI output
- Practice refining prompts for clarity, depth, and relevance
- Apply prompt engineering to explore drought-related challenges
- Reflect on how AI can support environmental problem-solving

Understanding AI Water Consumption – Submit For a Score

This will be our first chance to use an AI agent to help us to gain insight into how much water is used in California to cool down AI Data Centers. In this assignment, you will use what you have learned about Prompt Engineering during the Zoom workshop to analyze AI water usage. **Please submit this assignment for a score, and limit your time to ~1 hour.**

Artificial intelligence feels invisible to the user, but every prompt you send triggers real physical processes in a data center somewhere. One of the biggest hidden costs is water, used to cool the powerful computers running AI models in data centers. A recent analysis by *The Washington Post and UC Riverside* came up with this statistic:

100 words of AI prompts ≈ 1 bottle of water (0.5 liters)

Use your favorite AI engine to answer the following question: "**How does AI water usage in California Schools compare to all other water usages by the entire California population?"**

Your answer should include all of the assumptions you made (i.e. # of students, how many prompts/day etc). List them all and say how they were investigated using AI. Present at least one AI generated graph or table to support your answer.

Initial Prompt	
Final Prompt	
Water usage analysis 1. **Including assumptions made** 2. **Include enough data to justify your results** 3. **Include at least 1 AI generated chart, graph, or table** 4. **State Results**	

Optional AI Research for 25 bonus points - AI Hallucinations

As we all know, AI can sometimes give results which are misleading, prejudiced, or just plain wrong. These are called AI hallucinations, and they are a major problem when working with any AI engine. The purpose of this exercise is to find the hallucination in the following list.

Recently I gave one of the AI engines the following prompt: *"Please give me 10 numerical facts about the drought in southern California"*. Which one of the results shown below is a hallucination?

1. 21.3 million California residents currently live in areas affected by drought, according to the U.S. Drought Monitor.
2. 0.29 inches of precipitation fell across California in August 2025, making it the 41st wettest August on record since 1895.
3. From January to August 2025, California received 11.45 inches of total precipitation, which is 3.15 inches below normal.
4. Three drought intensity levels—D1 (Moderate), D2 (Severe), and D3 (Extreme)—are currently present across Southern California.
5. Lake Oroville, one of California's major reservoirs, dropped to 28% of its capacity during the peak of the 2022 drought.
6. Southern California receives 80% of its water from local rainfall.
7. Over 500,000 acres of farmland were left fallow in California during the 2021 drought year.
8. Urban water use restrictions were implemented in over 90% of Southern California municipalities during the 2022 drought.
9. The average household in Southern California reduced water usage by 18% during mandatory conservation periods in 2022.
10. Agricultural losses due to drought in California were estimated at $1.1 billion in 2022.

Step 2 – Conceptual Design

This first phase of the project invites you to think like an engineer long before anything is built. Even though our shortened schedule means we won't be fabricating a full device this year, the heart of engineering begins right here: identifying a real water-use problem, imagining a practical solution, and expressing that idea clearly through sketches, diagrams, and reasoning. In this stage, you'll develop a thoughtful, well-supported concept for a water-saving device—one that could be built if we had the time, but that stands on its own as a strong piece of engineering thinking.

Here is what you'll do in this section:

1. Use an AI engine to come up with a water saving device to build which could be used in homes, agriculture, or industry.
2. Use an AI engine to make a 3D drawing of your device

Here is what you will turn in for a score:

1. Our Idea worksheet
2. 3D model of your device

Check the scoring rubrics in Appendix A to see how we will score your submissions.

How to Submit Work:

1. **Follow the submission guidelines given on Page 7**

Conceptual Design of a Possible Water Saving Device

Begin to gather the information and data you need to state the problem, develop a concept and design your device. There are multiple resources on the Internet for your research. AI can be a big help here. **Be sure to tell the AI engine about the strengths of your team members and any areas of interest you may have.** It might also be a good idea to tell it about your timeline and budget. We will demonstrate one possible approach during our Zoom Prompting Seminar.

Brainstorm and Plan Possible Solutions

At this point, you should have some idea of the scope of the problem and have developed some design goals for your water saving device. Now it's time to start thinking about some specific solutions.

Please Note: In this year's program you will not actually build a working model, only a "proof of concept" demo to represent your model. Please keep this in mind, and tell the AI Engine, when choosing a device.

1. As a team, decide on a clear problem statement.
2. The brainstorm to come up with a water saving device to solve the problem.
3. Use AI to help with clarifying your goals.
4. **Use AI to help pick a project that you can represent with a simple desktop demo.**
5. Which of your ideas have already been done? Can you improve on it?
6. All ideas should be considered. Change, modify, and brainstorm many different solutions.

   (Think of this as "blue sky" or "green light" thinking – no boundaries!)
7. This session should not last longer than an hour.
8. In the end, you will provide a water saving device, and a description of the bench-top-demo

   you will do to provide a proof of concept.

Our Idea Worksheet – Submit for a score

With a clear problem statement and successful brainstorming, the team will have at least one good idea for the project. Now it's time to formalize the team's best idea and justify why you chose it.

Our Idea	
What is your idea for a water saving device?	
How did AI help you choose this project?	
How does your device help to conserve water?	
Describe your desk top demo that will represent your device.	
List of research sources. These sources should be provided by the AI engine you use.	1) 2) 3) 4)

Draw it with CAD (Submit a CAD Drawing for a score) **Example on Next Page**

At the end of this section, you must submit an AI generated CAD drawing of your device. This year we will use an AI engine called ***text-to-Cad Zoo*** to generate the drawing. We usually have a webinar to give some instructions on using CAD tools, but because of our shortened schedule this year we suggest that at your convenience you watch some YouTube videos instead. This way you won't have to wait for our seminar date.

If you would like to use any other AI engine to generate your drawing, please feel free to do so. The advantage of using *text-to-CAD Zoo* is that it will allow you to put the AI generated drawing into an edit window so that you can clean up / finish the drawing. Don't worry about spending a lot of time learning the edit window, just do the best you can and we will score it very generously.

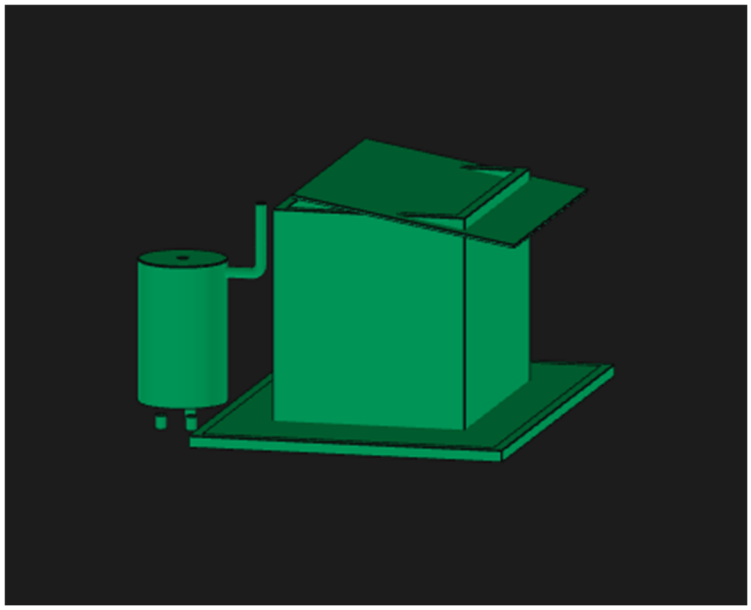
Submit your 3D model by any means that is convenient. Be sure to include:

1) The AI engine you used
2) The initial prompt you used
3) The final prompt you used
4) The 3D model, in your choice of formats

Example of an AI Generated CAD Drawing – text-to-cad.zoo.dev/dashboard

Zoo Works gives you 1205 free credits per month, so make sure your prompts are as concise as possible. Each credit equals 1 second of computer time. Note that the drawing below used about 60 seconds of compute time. Don't hesitate to set up an individual account for each one of your team members to maximize the amount of free credits you get each month.

Prompt used to generate the 3D drawing below: "Please create a drawing of a large rain water collection enclosure, with a downspout leading to a large collection barrel." (The AI Engine doesn't seem to understand how a roof is built, or that water runs downhill)



This is the first pass at the text-to-CAD process. The drawing could obviously been refined to give better results. Challenge the AI engine, and yourself, to modify and improve your design until it represents your device as truly as possible. I suggest that you spend some time refining your drawing using the tools they provide, as submitting a drawing like this will result in a very poor score.

It's time to have your design reviewed by the MWD WE4G team.

It's time to have the MWD Team review your design idea. If possible, schedule the design review at one of our Thursday afternoon Zoom sessions. It is good to have as many team members participate as possible. If you cannot make it on a Thursday, let us know a good time to meet and we will do our best to accommodate you. **There are a few tips on the next page that might help.**

Why are we asking to review your design?

- **We want your team to be successful on this project**. We have found that teams sometimes do not fully understand the task at hand. The design review helps to make sure that you do not go too far down the wrong path.

- **Materials are sometimes a problem.** We want to make sure the lack of a few materials does not prevent you from building your design idea. If you need some materials, let's discuss it and we will do our best to help get you what you need (within reason).

- Presenting your idea to a team of people who are in the business of delivering and conserving water **might result in some good feedback** which could improve your design.

During the design review, you may provide a verbal description of your project and present any documentation, pictures, graphs, or charts to support it. Make sure you include your team's problem statement and present enough information so we can fully understand what you are trying to do.

Some tips for your design review:

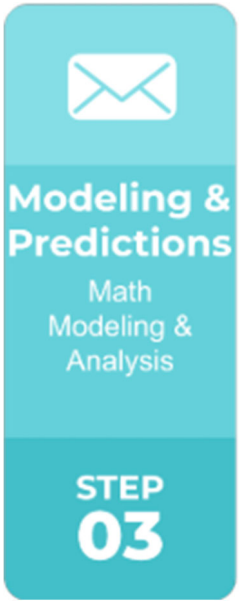
Be prepared:

- Be prepared and on time. Present your proposal in the manner which best suits your team.
- Don't be afraid of making mistakes, we're here to help you with your designl.
- Practice at least once beforehand. You might discover some weaknesses which you need to address.
- Expect some questions. We want to know how you decided on your project and why it is important to your team.

Schedule Your Design Review

- To schedule a review, send an email to Omar at **ourquieta@mwdh2o.com**; copy your instructor on all emails. Remember, our regular Thursday Office Hour at 4:00 PM works best.
- Tell us the date and time you would like to present. It is good to have as many team members participate as possible.
- We will get back to you with a confirmation email within a few days.
- The MWD WE4G team will be available to answer any questions you may have.

Step 3 – Modeling & Prediction



In this phase, you'll shift from imagining your device to understanding how it would actually perform in the real world. Engineers rely on mathematical models to predict behavior long before anything is built, and you'll do the same. By estimating flow rates, pressure changes, and daily usage patterns, you'll create a model that shows how much water your design could save under different conditions. This step turns your idea into something measurable, testable, and grounded in evidence.

A Note on Monte-Carlo Simulation

To make your predictions even more realistic, you'll use a simple Monte-Carlo simulation—a method engineers use to test many possible futures when conditions aren't perfectly predictable. **Despite the fancy name, it's not nearly as hard as you might think**. You'll use dice to model uncertainty and see how your device performs across a range of scenarios. This gives you a clearer picture of best-case, worst-case, and most-likely outcomes, helping you design with confidence even when the real world is messy.

Here is what you'll do in this section:

- Perform a sample Monte-Carlo simulation
- Apply a Monte-Carlo simulation to your own model

Here is what you will turn in for a score:

- Your Monte-Carlo worksheet

Make sure to refer to Appendix B for an example Monte-Carlo simulation

Check the scoring rubrics in Appendix A to see how we will score your submissions.

How to Submit Work:

1. **Follow the submission guidelines given on Page 7**

Monte-Carlo Simulation: Predicting Water Savings with Uncertainty

Engineers rarely know exact numbers. Instead, they test many *possible* futures to see what usually happens. This is called a **Monte-Carlo simulation**. Today, you'll use dice to model uncertainty in how well your water-saving device performs. Note that this example is very basic. In a real engineering project you would probably use some very sophisticated computer programs to model and simulate your system.

To begin, we will do a short Monte-Carlo simulation using a single dice to show you how the process works. After you do the dice simulation, you will apply this technique to your own model to predict its water savings.

Practice Initial Assumption: *Your device results in water savings by somewhere between 10% and 30%, depending on conditions. (this will probably be different for your model)*

We will use a die to represent this uncertainty.

Die Roll	Flow Reduction
1–2	10%
3–4	20%
5–6	30%

The simulation:

- **Step 1 — Roll the die 20 times -** Record each roll **and the corresponding flow reduction**.
- **Step 2 — Calculate water saved -** Use your device model:
  - Water Saved=Flow Reduction×Uses per Day
  - Pick a reasonable number of daily uses (5–20), depending on your device.
- **Step 3 — Analyze your results –** Compute:
  - How often each savings level occurred
  - Average water saved
  - Best case
  - Worst case

That's the entire process, easy isn't it? **(Hopefully you used Appendix B for help)**

Now apply the same technique to your own water saving device using your own assumptions. In the submission form below, please show all your work. The better your explanation, the better your score. And as usual, if you have questions, please email us or come to one of our Thursday office hours.

Monte Carlo Simulation: - Submit a form similar to this for scoring

Set up and assumptions:	
Data Collection:	
Calculations & Summary:	
Interpretation:	
Make sure to include these elements: 1. An introduction to the Monte-Carlo method 2. Why do engineers test many possible futures instead of just one? 3. How would your results change if you rolled 100 times instead of 20? 1000 times? 4. What does this tell you about designing a device that works in many conditions? 5. Conclusions	

Step 4 – Building a Bench Top Demo

In this step, you'll bring a model of your design to life—not a full device, but a focused, hands-on demonstration of the key principle your idea relies on. Think of it as building a tiny **"proof of concept"** that shows your engineering thinking in action.

With our shortened schedule, this scaled-down approach lets you test how water actually moves, flows, filters, or responds to your design choices without the time and complexity of full fabrication. It's a quick, creative way to validate the science behind your concept and gather real evidence to support your final engineering justification. Please ask about this if you need some clarification.

Here is what you'll do in this section:

- Build a proof-of-concept model of your device
- Collect some data to verify its effectiveness
- Analyze your data using the AI engine of your choice

Here is what you will turn in for a score:

- YOUR DESK TOP DEMO WILL BE PART OF YOUR FINAL PRESENTATION

Check the scoring rubrics in Appendix A to see how we will score your submissions.

How to Submit Work:

1. **Follow the submission guidelines given on Page 7**

Build a Bench Top Demo

Now it's finally time to move from the planning to the implementation stage. By now you should have a good idea of what you will build. Keep in mind that your goal is to not only build a working desktop proof of concept demo, but to also take data and analyze it using AI.

Don't be afraid to change your mind during this part of the process. Sometimes during the building process, you will get ideas about how to make your design better. Don't hesitate to incorporate these changes. However, a word of advice:

Guidance

- Your desktop proof of concept demo should be built from simple materials that cost only $20 or less. **It is far better to build a very simple model that will give some data, rather than a more complicated model that won't give any data.**

- If possible, it should be a working model that represents at least a part of your water saving device. Try to come up with a way to take real data, or at least come up with some plausible data to analyze.

- From the scoring rubric on page 45 you can see that the scoring is weighted somewhat on the quality of this model and the data you take. Here is where you should spend a significant amount of time and effort. If you do it right, it will also be the most fun part of the competition!

Some Engineering Tips to Keep in Mind

Designing and building a new device is never easy, but there are a few things to keep in mind as you go through the engineering process.

1. **You have probably heard of the KISS concept "**Keep it Simple Stupid". This principle states that any systems/Devices will work best if you keep it simple rather than complicated. Make your model as simple as possible, while making sure that it performs as you anticipate.

2. Limit the number of parts, especially moving parts. The more parts your model has, the more chance there is that part will fail or not work properly. Your goal should be to use as few parts as necessary and still have a working model.

3. Use prebuilt components when necessary. Don't reinvent the wheel. Scrounge parts from other projects or models you might have on hand. See what you can repurpose. Your score will reflect your team's skill in reusing existing parts.

4. Don't be afraid to make changes to your model as new materials and ideas come about. Your first design is usually not the best. And sometimes the final product is not even remotely like the original design ideas.

5. Don't be afraid to make mistakes. Some of your best ideas will probably come from lessons learned from trying things that did not turn out as you intended. Build on your successes and your missteps and be ready to share that information. It is invaluable to other engineers that want to learn from your work.

6. Involve the entire team in the project, the more engineers the better. Different team members have different strengths and look at problems from slightly different angles. Sometimes the team members who have no engineering experience at all come up with the best ideas.

Data Analysis Using AI

There will be an "Analyzing Data Using AI" workshop on **March 5, 2026 at 4:00**. This workshop is strictly voluntary, however those who attend will see a few examples of what we expect of you. **Please note that you will not submit this worksheet separately, it will be part of your final presentation to the panel of MWD engineers.**

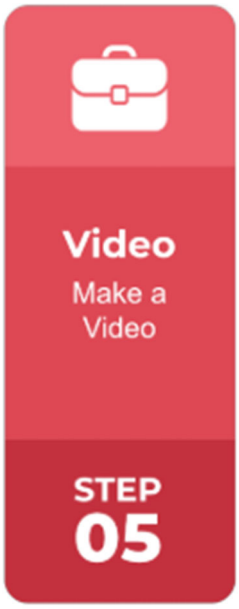
In this section you are asked to generate and use AI to analyze some data that you have generated while testing your model. The type of data you collect will be totally up to your team to choose, and particular to your model. Use the AI engine of your choice to generate some nice tables and graphs, along with a description of your data collection process. Please don't be tempted to make up data instead of taking actual measurements of some sort. As usual, we will be very forgiving in this process, as long as you make an honest effort.

If your team is a bit uncertain about this process, please come to one of our **Thursday 4 pm "Office Hours"**. We have lots of experience collecting data, and can surely give you some ideas that will help.

Show these things in your final presentation:

- The AI prompts you used:
- Briefly describe your data collection process.
- **Results:** (include text and all graphs and pictures)

Step 5 – Use an AI Engine to Create a Social Media Video



Now it's time to make a Social Media video showing your water saving device. Because of our short timeline this year, we will use an AI engine to make the video. This should allow you to be more creative in the use of visual effects, locations, and story telling without the limitations you might have if you did the video yourself.

However, keep in mind that your video should still tell a story, and have some sort of call to action.

Here is what you'll do in this section:

- **Use an AI engine to create visuals and narrative for your video.**

Here is what you will turn in for a score:

- Your AI generated video clip about 2 minutes long.
- Your video can be uploaded any time before the final presentation on March 26th.

Check the scoring rubrics in Appendix A to see how we will score your submissions.

How to Submit Work:

1. **Follow the submission guidelines given on Page 7**

Use of AI in Generating Your Video

This year we will use an AI engine to generate our video. This is a bit of a departure from years past. However because of our shortened timeline this year we believe it will allow all teams to complete the program.

In our Zoom workshop on **March 12, 2026**, we will demonstrate this process using the AI engine called **Zora by OpenAI**. However, you can use whichever engine you care to use. The AI engines are all changing rapidly, and it is hard to keep up with which tools are best at any given time.

The style of your video may vary greatly depending on the AI engine you use. The length may also be a problem, as some of the engines limit the length of the video you can make for free.

Here are some guidelines:

1. Don't worry about watermarks. Some of the free engines put a watermark on your video. Ignore them and we will too.
2. Don't worry about length. As long as you can get your story told in the style you want, the length should not matter. Different AI engines put different restrictions on video length. However, don't make it too long, 2 minutes should be the max.
3. If you have to stitch two or more short videos together to get the length you want, no problem. Just submit them all and show all files during your presentation.
4. Make sure to tell us which AI engine you used, **and the prompt you used to generate your video.**
5. AI generated videos may give disappointing results, even with a good prompt. We are all new at this AI stuff. Don't be discouraged, just do the best you can. If you are not happy with the results, please ask for help.
6. We will be very forgiving in the grading of your video. A good effort and a good prompt will be rewarded.

Decide how you will communicate your research and solution to the general public. Each team gets to choose how they will present their research, solution, and model, explaining its capabilities. The goal is to present your project on the social media platform of your choice.

On **March 12, 2026** we will have a Zoom session on making a social media campaign. This session is not mandatory, but by attending you will pick up a few ideas which may help create your campaign.

Here are a few tips to keep in mind when putting together your campaign:

- Tell a story, with a beginning, middle and ending.
- Create a storyboard to go step by step. The storyboard should have both short text and images.
- Don't just show unrelated scenes or facts but try to weave them together into a meaningful story the audience can relate to.
- Make sure you know your target audience and tailor your campaign accordingly. The goal is to keep your audience engaged, and that is very difficult if the material you present is either too simple or too complicated.
- Don't necessarily pick your favorite social media platform. Choose the platform where your message will have the most impact. Be ready to justify your choice.
- Make your presentation engaging and entertaining. The more fun you have making the campaign, the more fun the audience will have watching it.
- **As you begin putting together your campaign, keep these things in mind:There must be a call to action.** A call to action is something that you want the audience to do after they see your post. Ask them to be part of the solution to climate change.

Charts and graphs usually add to any presentation. However, make them simple to read and don't have too many of them, or the audience will be overwhelmed with data and tune you out.

Social Media Campaign Visuals

Launch your Social Media Campaign.

As we said above, **we do not want you to actually post your social media campaign on the Internet**. Instead, submit your files to us for scoring off-line. Use the submission guidelines shown on Page 7. If you have any problems uploading your files, please contact us immediately and we will figure out a way for you to upload your files.

Step 6 –Present Your Project to a Panel of MWD Engineers

It's finally time to show us what you have accomplished. In this step, you will be required to prepare a multimedia presentation and present it to a panel of MWD judges in a Zoom meeting. Keep in mind that the score of your presentation is weighted heavier for this assignment. Refer to the grading rubric on page 44 to make sure you understand how you will be scored.

Here is what you'll do in this section:

- Outline your presentation.
- Go over the checklist on the next page to make sure you haven't forgotten any important elements.
- Coordinate your team on who will present what parts.
- Rehearse your presentation to make sure it fits the time requirement (5-6 minutes).

Material to turn in for evaluation:

- The presentation outline.
- The final presentation – **This will be a Zoom meeting on March 26, 2026.**

Check the scoring rubrics in Appendix A to see how we will score your submissions. This is very important!!

How to Submit Work:

1. **Follow the submission guidelines given on Page 7**

Presentation of your project to an MWD Engineering Panel

The final step in the WE4G competition is to present your project to a panel of MWD judges on **March 26, 2026** in a Zoom meeting. This panel will consist of engineers and resource experts who daily work on water resource planning, water supply engineering and conservation. They will ask questions, give you instant feedback and provide encouragement.

- This presentation should be about 5-6 minutes long and involve as many of your team members as is necessary to present your project.

The form and style of your presentation are totally up to you.

- Make sure to rehearse your presentation multiple times until the group is relaxed and each person is familiar with their part.
- Don't worry if you go over or under time just a bit. However, points will be deducted if your presentation goes way too long or too short.
- **Make sure to include:**
    - **Your video**
    - **Your desktop demo in action**
    - **The data you collected and how you analyzed it**
    - **How AI assisted in the engineering process.**
    - **A discussions of AI ethics**

Outline of your presentation to the panel **(Submit this worksheet for a score)**

A good outline is crucial to putting together a quality presentation. Being in front of a camera (Zoom camera in this case) without an outline or a script of some sort is not a good idea. Even if your presentation is a PowerPoint presentation, a script will keep the presentation flowing smoothly.

Use the space below to outline what you will present. You can use whatever format you feel is appropriate. Use additional pages if necessary.

Cover Sheet

If you have made it this far you should have everything you need to complete the project. Please include the following Information Sheet as a cover page for your submission.

Water Engineering 4 Good – Project Summary

School/Team Name_____

Contact Name _____

Contact email _____

Instructor's Name _____

Number of students on team_____

T-Shirt Sizes ____ Large _____Medium _____Small (indicate quantity for each size)

A summary of your project:

Congratulations!

You've completed the entire Water Engineering 4 Good Engineering Workbook. We hope you have learned a lot about water conservation and climate adaptation, and how engineers use an engineering process to solve problems.

Now might be a good time to go back to the very beginning and revise the last column of the KWL chart. It will give you a real sense of accomplishment to see how far you have come and how much you have learned. You can re-submit it if you want to increase your score.

Appendix A: Scoring Rubrics

The following pages show the scoring rubrics for each individual worksheet. Each one is different, and the number of scoring criteria in each rubric is different. Here is a short example of how your score is computed for each worksheet, we will use the “Understanding AI Water Consumption” as an example:

On page 8 we show that the worksheet is worth 100 points. If you look at the scoring rubric for this worksheet on the next page, you will see that there are 6 scoring criteria worth a total of 60 points. For the sake of simplicity, let’s pretend that you were given 9 points out of 10 for each criterion. Your score would be computed as follows:

1. Maximum score for this worksheet as shown on page 8 = **100 points**
2. Total possible points for this worksheet in the rubric = **60 points**
3. Your points given for this worksheet = (6 x 9) = **54 points**
4. Your score = (54/60) x 100 = **90 points**

The score entered in our master Excel Scoring file would be 90.

Understanding AI Water Consumption (Page 12)

Team	Criteria				
Understanding AI Water Usage		**10 Points -** Clear, accurate, insightful	**9-8 Points -** Mostly accurate	**7-5 Points** - Basic understanding	**4-1 Points -** Incomplete or inaccurate
Initial Prompt		**10 Points -** Clear and relevant	**9-8 Points -** Mostly clear	**7-5 Points -** Vague or unfocused	**4-1 Points -** Missing or off-topic
Optimized Prompt		**10 Points -** Fully structured, thoughtful	**9-8 Points -** Some structure	**7-5 Points -** Minimal improvement	**4-1 Points -** Not optimized
Data Analysis		**10 Points -** Data properly presented and analyzed	**9-8 Points -** Some data given and somewhat analyzed	**7-5 Points -** Incomplete data and analysis	**4-1 Points -** Not data shown
AI Response Comparison		**10 Points -** Deep analysis, clear insights	**9-8 Points -** Some comparison	**7-5 Points -** Basic reflection	**4-1 Points -** No comparison
Grammar & Clarity		**10 Points -** Well-written, easy to follow	**9-8 Points -** Minor errors	**7-5 Points -** Several errors	**4-1 Points -** Hard to understand

AI Hallucinations (Page 13)

Team	Criteria			
Identify the incorrect statement	**10 Points** – Yes, correctly identified the incorrect statement.	**0 Points –** did not correctly identify the incorrect statement		
Explain why it is incorrect	**10 Points** – The explanation is totally correct	**8 Points –** mostly correct	**6 points –** somewhat correct	**2-4 Points –** missed the mark
Provide a modified corrected statement with a source.	**10 Points** – new statement is 100 correct with a solid source	**8 Points** – Statement is mostly correct and the reference is solid	**6 Points** – Statement is only somewhat correct, or the source is invalid.	**2-4 Points** – missed the mark
Reflect on how misinformation can influence water decisions.	**10 Points** – Solid reflection with a well thought out and detailed response	**8 Points** – Valid reflection, but not much detail	**6 Points** – OK idea, but not much of a reflection	**4 Points** – Weak and short ideas

A note about the bonus points:

The maximum score for the competition is 1000 points. Even if you score the maximum 25 points on the bonus question your score will not be greater than 1000 points. The bonus points will be added to any scores you receive that are less than the maximum for that worksheet, until the entire 25 (or whatever points you earn) points are used up.

Our Idea Worksheet Rubric (Page 16)

Team	Criteria				
Is the idea original?		**10 Points** – Yes, never seen anything like it.	**8 Points** – Looks to be original.	**6 Points** – Hard to say, but it looks somewhat familiar.	**4 Points** – The idea looks like it was copied from the Internet.
AI Contribution		**20 Points** – Showed a good understanding of AI practices	**16 Points** – Showed some knowledge of AI practices	**12 Points** – Used AI, but not much	**8 Points** – Almost no use of AI
Does this idea utilize the skills of the team members?		**10 Points** – Yes, it is designed specifically for this team.	**8 Points** – Yes, this team can pull it off	**6 Points** – Yes, but the team will struggle	**4 Points** – Not much, good luck.
How many research sources?		**10 Points** – more than 5 verifiable sources used. All the sources had So Cal -specific information.	**7 Points** – 4 to 5 verifiable sources used. Most of the sources had So Cal -specific information.	**5 Points** – 2 to 3 verifiable sources used. Not all sources had So Cal -specific information.	**2 Points** – 1 verifiable source used. No reliable information on So Cal.
Are the sources valid?		**10 Points** – Yes, they appear to be knowledgeable on the topic and age-appropriate.	**7 Points** – Yes, some are off-topic or too generic.	**5 Points** – The sources cited had little to do with water or conservation.	**2 Points** - Sources not valid.

CAD Model – Page 17

Team	Criteria				
Drawing Quality		**10-9 Points** – The drawing showed effort. Was the best possible depiction of the model.	**8-6 Points** – The drawing was very good but lacked a few minor things	**5-3 Points** – The drawing had some serious problems and needs work. Looks rushed or last minute.	**2-0 Points** – The drawing bore no similarity to what the model is supposed to be.	
Quality of Prompting		**10-9 Points** – Excellent, showed creativity	**8-6 Points** – OK, but a bit more work would have been worth the effort	**5-3 Points** – Needs some work	**2-0 Points** – Barely tried	
Does the drawing represent the idea?		**10-9 Points** – Exactly what I expected from the idea worksheet	**8-6 Points** – Mostly matches the idea worksheet	**5-3 Points** – Sort of looks like what is described in the idea worksheet	**2-0 Points** – The idea worksheet and the 3D model are totally different.	

Monte-Carlo Simulation – Page 22

Team	Criteria				
Data Collection		**10 Points -** 20 rolls recorded with correct savings values	**8 Points -** Mostly accurate rolls and values	**5 Points -** Some errors or missing data	**2 Points -** Major errors or incomplete
Model Application		**10 Points -** Correctly applies water-savings formula to all trials	**8 Points -** Minor calculation errors	**5 Points -** Several incorrect calculations	**2 Points -** Does not apply model correctly
Analysis & Interpretation		**10 Points -** Clear explanation of average, best/worst case, and patterns	**8 Points -** Adequate explanation with minor gaps	**5 Points -** Limited interpretation	**2 Points -** Little or no analysis
Engineering Insight		**10 Points -** Strong explanation of why uncertainty matters for design	**8 Points -** Good explanation with some depth	**5 Points -** Basic explanation	**2 Points -** Minimal or incorrect reasoning
Conclusion		**10 Points** – Show a very good understanding of the process.	**8 Points** - Show a good understanding of the process	**5 Points –** Missed some key elements of the process	**2 Points** – Little understanding of the process

Social Media Visuals (AI Generated Video or Stills) (Page 34)

Team	Criteria				
Message Clarity		**10-9 Points** – Social media visuals provided very strong connection to the theme. Very strong visuals (video/social media) and audio (video). Narrative was very concise and to the point.	**8-6 Points** - Social media visuals provided a clear connection to the theme. Good visuals (video/social media) and audio (video). Narrative was understandable and reasonably to the point.	**5-3 Points** - Social media visuals provided some connection to the theme. Project had some visual references (video/social media) and clear audio (video). Narrative was acceptable but inconsistent.	**2-0 Points** - Social media visuals provided little or no connection to the theme. Minimal or no visuals (video/social media) nor helpful audio (video). Narrative was hard to follow and vague.
Knowing your audience		**3 Points** – Social media visuals provided a strong reference for the target audience. Provoked a strong reaction from the viewer.	**2 Points** – Social media visuals provided an acceptable reference for the target audience. Provoked a specific reaction from the viewer.	**1 Point** – Social media visuals had little or no reference for the target audience. Provoked minimal or no reaction from the viewer.	
Creativity & Originality		**8-7 Points** Very unique and compelling. Used very unusual design elements (visual and/or audio) and provided a very strong takeaway message.	**6-5 Points** - Clearly unique and compelling. Used some unusual design elements (visual and/or audio) and provided a clear takeaway message.	**4-2 Points** - Adequately unique and compelling. Used a few unusual design elements (visual and/or audio) and provided a so-so takeaway message.	**1-0 Points** – Neither unique nor compelling. **2-0** Used no unusual design elements (visual and/or audio) and provided a weak/confusing takeaway message.
Use of AI		**10-9 Points** – Use of AI is evident and complete. Great prompting used.	**8-6 Points –** AI is used, but results are somewhat incomplete or confusing. Good prompting skills shown	**5-3 Points –** Use of AI is sloppy and incoherent. Prompts lack details and cohesion.	**2-0 Points –** Very minimal effort put into the video. Prompts are very poorly constructed.

Final Presentation Outline Rubric (Page 37)

Team	Criteria				
Quality of the outline.		**10-9 Points** – Excellent job. You can tell that a lot of time went into this. Few factual, spelling and grammar errors.	**8-6 Points** – OK but needed just a bit more work. Had some factual, spelling and grammar errors but didn't hinder the reader.	**5-3 Points** – Thrown together to fill the requirement. Too many factual, spelling and grammar errors. Reader was confused.	**2-0 Points** – Not much effort at all.
Are all of the required elements included?		**10 Points** - Yes	**5 Points** – missing one	**0 Points** – Missing more than one	

Final Presentation to MWD Engineers Rubric

Team	Criteria				
Accuracy of Information Presented		**10-9 Points** – Information presented was very accurate	**8-7 Points –** Information was mostly good, with only minor problems	**5-3 Points –** Information was poor, with multiple problems	**2-0 Points –** Information was very poor and not well presented.
Data Analysis and Accuracy		**10-9 Points** – Final presentation had data and interpretations that were very accurate.	**8-7 Points** – Final presentation had data and interpretations that were mostly accurate, with very few issues.	**6-4 Points** – Final presentation had data and interpretations that were somewhat accurate, with more than a few issues.	**2-0 Points** – Final presentation had data and interpretations that were not accurate, with too many issues to list.
Use of AI		**10-9 Points** – AI was used very effectively and ethically.	**8-6 Points** – AI used a lot, but could be better. Ethics were strong	**5-3 Points** – AI used, but not really much. Ethics were not mentioned	**2-0 Points** – No evidence of AI, or the ethics of AI
Presentation Visuals		**10-9 Points** – Presentation had excellent visuals that helped viewers understand the concepts being presented.	**8-7 Points** – Presentation had good visuals that helped viewers understand the concepts being presented.	**6-4 Points** – Presentation had acceptable, but inconsistent visuals.	**2-0 Points** – Presentation had inconsistent and confusing visuals.
Desktop Demo		**200-190 Points** – The demo was very well done	**180-150 Points** – The model was well done, but had a few minor problems	**150-100 Points** – The model was very shaky and needed work.	**100-0 Points** – The model appeared ready to fall apart.

Appendix B.

Below is an example of how your Monte Carlo Simulation might go. Use it as a guide to run your own simulation. Be sure to adapt your final answer to your own saving model and daily usage.

While I expect a part of your answer to be similar to this example, please do not simply cut and paste these results into your answer or your score will suffer greatly.

Simulated 20 rolls of the die

Assume:

- Rolls 1–2 → 10% savings
- Rolls 3–4 → 20% savings
- Rolls 5–6 → 30% savings
- Assume 10 uses per day

Trial	Die Roll	Flow Reduction	Water Saved per Day (in "units")
1	4	20%	0.20×10=2.0
2	2	10%	0.10×10=1.0
3	6	30%	0.30×10=3.0
4	5	30%	3.0
5	3	20%	2.0
6	1	10%	1.0
7	4	20%	2.0
8	6	30%	3.0
9	2	10%	1.0
10	3	20%	2.0

Trial	Die Roll	Flow Reduction	Water Saved per Day (in "units")
11	5	30%	3.0
12	1	10%	1.0
13	4	20%	2.0
14	6	30%	3.0
15	3	20%	2.0
16	2	10%	1.0
17	5	30%	3.0
18	4	20%	2.0
19	6	30%	3.0
20	3	20%	2.0

Resultant Counts:

- 10% savings (1.0 units): 5 times
- 20% savings (2.0 units): 8 times
- 30% savings (3.0 units): 7 times

Total water saved over 20 trials: $(5\times1.0)+(8\times2.0)+(7\times3.0)=5+16+21 = 42$ units

Average water saved per day (across simulations): 42 / 20 = 2.1 units per day

Best case: 3.0 units/day (30% savings) **Worst case:** 1.0 unit/day (10% savings)