
PERFORMANCE TASK : Civil Engineer: Water Treatment

BIG IDEA:

- The health of all living things is directly related to the quality of the environment.
- People acting individually and/or as groups influence the environment.
- Some attributes of objects are measurable.

ESSENTIAL QUESTIONS:

- How does the quality of the environment affect the health of all living things within it?
- How do humans influence the environment?
- How can attributes of an object be measured and represented using different units?

OVERVIEW:

Communities and society create a tremendous amount of waste that is carried, either directly or indirectly, by water. Wastewater treatment facilities can be found in most countries. However, in many poor countries they do not exist, or the ones that do exist are not up-to-date and as such, do not provide the necessary treatment. The ability of these facilities to adequately treat wastewater can have an impact on the environment and on human health. These facilities cost money to build, run and maintain. Economics is one of the primary reasons that these facilities are not found in some countries or are not up-to-date. During your meeting with the national government, be sure to address each of these concerns. It will also be important to educate the citizens of the countries on the potential impact of water treatment.

GOAL:

The World Health Organization (WHO) is very concerned about water-related diseases affecting a small African country. This country is very poor and diseases of epidemic proportion are very possible. Such an outbreak would make many people sick and could cause a large number of fatalities. The WHO is presenting to the national government of this country in an attempt to encourage the government to build a water treatment facility within the country.

ROLE:

You are a civil engineer who has been sent by the World Health Organization to a small African country to present to the national government. Your task is to present information regarding the value of building a water treatment facility within that country. The government does not understand how such a facility works or how it can be beneficial to human health. Additionally, they are very concerned about the cost of the facility.

AUDIENCE:

The audience is a team of government officials, including the prime minister, minister of finance, and minister of health. They will need to be convinced that a water treatment facility will benefit the people of the country.

SITUATION:

Communities and society create a tremendous amount of waste that is carried, either directly or indirectly, by water. Wastewater treatment facilities can be found in most countries. However, in many poor countries they do not exist, or the ones that do exist are not up-to-date. The ability of these facilities to adequately treat wastewater can have an impact on the environment and on human health. These facilities cost money to build, run, and maintain. During your meeting with government officials you will need to address all of these concerns. Cost is one of the primary reasons that these facilities are non-existent or are not up-to-date, so government officials will need compelling reasons to spend money on this project. It will also be important to educate the citizens on the potential impact a water treatment facility will have on their health and the health of the environment.

PRODUCTS:

Blueprint/Diagram

- Construct a blueprint of a water treatment plant that might be built in the area. Include with your diagram specific measurements, such as length of the pipes, the overall size of the building, and any areas around the building including parking spaces and outdoor recreational areas. (length, width, height, area).

Demonstration

- After conducting research on how these water treatment plants work, develop a demonstration using household products that shows people how the water treatment process removes various pollutants from the water. Be sure to include the removal of solids and other treatment processes that are critical. Be prepared to explain how each step in the process works and why the whole process is important to the health of the people and the environment.

Informational Brochure

- Create an informational brochure to be distributed to the people of the country. This should be simple to read and should highlight the human health benefits and potential environmental benefits a water treatment plant could bring to the community. To illustrate the treatment process, construct a linear diagram that shows the water entering the plant, the various forms of treatment, and how it reenters the ecosystem. Be sure to explain the importance of each step. This brochure can be done by hand, through the use software, or through a web-based tool.

Oral Presentation

- Develop an oral presentation using information gathered throughout your research. The presentation should be between 3-5 minutes and should be directed to government officials in charge of making decisions regarding the water treatment plant. You should use technology, such as PowerPoint to display important points, diagrams, and photographs that will enhance your presentation. The purpose of the presentation is to convince officials that building the water treatment facility will be beneficial to the citizens and the environment.

RUBRICS:

Blueprint/Diagram - Civil Engineer: Water Treatment

Weights	1	2	3	4
Drawing - details (x1)	Fewer than 85% of the assigned details are present OR most details are difficult to identify.	Almost all assigned details (at least 85%) have been added. A few details are difficult to identify.	Almost all assigned details (at least 85%) have been added. The details are clear and easy to identify.	All assigned details have been added. The details are clear and easy to identify.
Labels (x1)	Less than 75% of the items that are identified have labels. Labeling not clear.	Most items (75-89%) identified have labels. Labeling is clear and appropriate.	Almost all items (90%) identified have labels. Labeling is clear and appropriate.	Every item that needs to be identified has a label. Labeling is clear and appropriate.
Measurement Conversion (x1)	Minimal understanding demonstrated of the characteristics of the design process	Minimal understanding demonstrated of the characteristics of the design process and the considerations needed to be successful	Some understanding demonstrated of the characteristics of the design process and the considerations needed to be successful	Strong understanding demonstrated of the characteristics of the design process and the considerations needed to be successful
Spelling (x1)	Fewer than 80% of the words are spelled correctly in the title, labels, and description.	75% of the words are spelled correctly in the title, labels, and description.	All common words are spelled correctly in the title, labels and description. 1-2 scientific words may be misspelled.	All words are spelled correctly in the title, labels and caption/description.
Science and Society (x1)	Demonstrates minimal understanding of the impact of water treatment	Demonstrates some understanding of the impact of water treatment	Demonstrates some understanding of the impact of water treatment on society	Strongly demonstrates understanding of the impact of water treatment on society
Engineering Design (x1)	Product provides minimal evidence of the ability to convert different measurement units	Product provides minimal evidence of the ability to demonstrate solutions to problems through the conversion of different measurement units	Product provides some evidence of the ability to demonstrate solutions to problems through the conversion of different measurement units	Product provides strong evidence of the ability to demonstrate solutions to problems through the conversion of different measurement units
General Formatting (x1)	Lined paper is used and/or computer graphic tool is not used for design. The drawing is too large or too small to be clear. There is a no figure caption.	Almost all assigned details (at least 85%) have been added. A few details are difficult to identify.	Unlined paper is used and/or computer graphic tool is used for design. The drawing is large enough to be clear (about 1/2 of a page of typing paper). There is a figure caption that describes the drawing.	Unlined paper is used and/or computer graphic tool is used for design. The drawing is large enough to be clear (about 1/2 of a page of typing paper). There is a figure caption that describes the drawing. The caption includes information about the graphic design, when appropriate.

Informational Brochure - Civil Engineer: Water Treatment

Weights	1	2	3	4
Mechanics (x1)	The product contains numerous spelling and grammar errors and issues with sentence structure.	The product contains some spelling and grammar errors with complete sentences that keep audience interest.	The product contains minimal spelling and grammar errors with complete sentences that keep audience interest.	The product is free of spelling and grammar errors with complete sentences that keep audience interest.
Content & Accuracy (x2)	The brochure provides few accurate facts and details providing the audience with limited information related to the topic and big idea.	The brochure provides some accurate facts and details providing the audience with pieces of information related to the topic and big idea.	The brochure provides many accurate facts and details providing the audience with important information related to the topic and big idea.	The brochure provides a large number of accurate facts and explicit details providing the audience with critical information related to the topic and big idea.
Creativity (x1)	The brochure does not use media to engage the audience and is unoriginal.	The brochure has some originality and uses minimal media to help engage the audience while providing some relevant knowledge related to the topic.	The brochure is original in design using some media to help engage the audience while providing relevant knowledge related to the topic.	The brochure is original in design and creatively crafted utilizing engaging media to maximize audience engagement while providing important knowledge related to the topic.
Engineering Design (x1)	Minimal understanding demonstrated of the characteristics of the design process	Minimal understanding demonstrated of the characteristics of the design process and the considerations needed to be successful	Some understanding demonstrated of the characteristics of the design process and the considerations needed to be successful	Strong understanding demonstrated of the characteristics of the design process and the considerations needed to be successful
Science and Society (x1)	Demonstrates minimal understanding of the impact of water treatment	Demonstrates some understanding of the impact of water treatment	Demonstrates some understanding of the impact of water treatment on society	Strongly demonstrates understanding of the impact of water treatment on society
Organization (x1)	The content is fragmented with a writing style providing little communication with the audience.	The content is fragmented with a writing style showing an effort to communicate with the audience.	The content is well organized flowing with a writing style showing appropriate tone, voice, and sense of audience.	The content is very well organized flowing from one point to the next utilizing a writing style that demonstrates sophisticated tone, voice, and sense of audience.

Oral Presentation - Civil Engineer: Water Treatment

Weights	1	2	3	4
Justification (x1)	Concepts and purpose are not supported with facts, data and citations.	Concepts and purpose are somewhat supported with very few facts, data and citations.	Concepts and purpose are somewhat supported with facts, data and citations.	Concepts and purpose are well supported with facts, data and citations.
Science and Society (x1)	Demonstrates minimal understanding of the impact of water treatment	Demonstrates some understanding of the impact of water treatment	Demonstrates some understanding of the impact of water treatment on society	Strongly demonstrates understanding of the impact of water treatment on society
Support Materials (x1)	Contains little to no alignment within presentation of information. Ideas not supported by facts and citations.	Contains little alignment within presentation of information. Few ideas supported by facts and citations.	Contains somewhat aligned information, concepts, ideas supported by facts, citations, figures, statistics, scenarios, and/or stories.	Contains aligned and clear information, concepts, ideas supported by facts, citations, figures, statistics, scenarios, and/or stories.
Focus (x1)	No attempt at outlining the purpose of the presentation – informational, persuasive, etc., and the area of focus for the presentation. Content of presentation was at not aligned with stated goals.	Attempt at outlining the purpose of the presentation – informational, persuasive, etc., and the area of focus for the presentation. Content of presentation was at times aligned with stated goals.	The purpose of the presentation – informational, persuasive, etc., the area of focus for the presentation, and any pertinent positions taken by the presenter are presented, but coherence could have been stronger. Content of presentation was somewhat aligned with stated goals.	The purpose of the presentation – informational, persuasive, etc., the area of focus for the presentation, and any pertinent positions taken by the presenter are outlined coherently within the introduction. Content of presentation are aligned with stated goals.
Technology (x1)	The technology applications utilized do not connect the presentation and topic. The graphics are unattractive and do not connect with the topic of the presentation.	The technology applications utilized connect the presentation and topic. Some graphics are attractive and connect with the topic of the presentation.	The technology applications utilized enhance the presentation and topic. Most graphics are attractive and support the topic of the presentation.	The technology applications utilized strongly enhance the presentation and topic. All graphics are attractive and support the topic of the presentation.

Sales Pitch Unveiling - Civil Engineer: Water Treatment

Weights	1	2	3	4
Properties and Investigation (x1)	The demonstration provides minimal evidence of understanding of carrying out an investigation	The demonstration provides minimal evidence of understanding of carrying out an investigation that helps identify the characteristics of materials and substances	The demonstration provides some evidence of understanding of carrying out an investigation that helps identify the characteristics of materials and substances	The demonstration provides strong evidence of understanding of carrying out an investigation that helps identify the characteristics of materials and substances
Additional Materials & Presentation Aids (x1)	Additional resources are poorly connected with the content of the presentation and they do not enhance understanding.	Additional resources are somewhat connected with the content and design process. The resources could be more user-friendly so as to maximize the learning opportunity.	Additional resources are connected with the information presented in the presentation. The resources enhance the understanding of the design process and the benefits to the final product.	Additional resources are closely connected with the information presented in the presentation. The resources strongly enhance the understanding of the design process and the benefits to the final product.
Science and Society (x1)	Demonstrates minimal understanding of the impact of water treatment	Demonstrates some understanding of the impact of water treatment	Demonstrates some understanding of the impact of water treatment on society	Strongly demonstrates understanding of the impact of water treatment on society
Information, Applications, & Organization Related to Content (x1)	Audience has difficulty following presentation because the presentation lacks clarity. Presentation does not make distinctions between what is most important and the reasons and benefits for the particular design.	The presentation provides information in a logical sequence which the audience can follow. Appropriate choices of what to include but the explanation of the design and the benefits are not presented to sufficient depth.	The presentation presents information in a logical, sequence which the audience can follow. Appropriate choice of what to include and the explanation of the design and benefits are presented adequately.	The presentation presents information in a logical, interesting sequence which the audience can follow. Excellent choice of what to include%u2014focuses on the design process and the benefits that this design possesses.
Voice, Eye Contact, and Body Language (x1)	Difficult to hear, mistakes in pronunciation, close to monotone. Information mostly read and lacking body language.	Difficult to hear. Good voice tone with some eye contact and frequent note checks. Some body language that enhances presentation.	Clear voice and good voice tone. Strong eye contact with frequent note checks. Hand gestures aid understanding.	Clear voice with helpful and varied voice inflection. Excellent eye contact, little use of notes. Body language enhances presentation.