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Co - Curricular Project Teaching Module 2024

THEME WATER CONSERVATION

EVERY DROP OF WATER COUNTS

BY KULTUM AFIFAH

Junior High School Teacher



Global Citizenship Education (GCED)

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**EVERY DROP OF WATER COUNTS
CO-CURRICULAR PROJECT TEACHING MODULE**

MODULE THEME:
WATER CONSERVATION

WRITTEN BY:
KULTUM AFIFAH

MODULE TARGETED SUBJECT:
FOR JUNIOR HIGH SCHOOL TEACHERS

COLLABORATIONS PROGRAM
**ASIA-PACIFIC CENTRE OF EDUCATION FOR INTERNATIONAL
UNDERSTANDING (APCEIU)**
AND
**DIRECTORATE GENERAL OF TEACHER AND EDUCATION PERSONNEL,
MINISTRY OF EDUCATION, CULTURE, RESEARCH AND TECHNOLOGY**
2024

Acknowledgment

Since 2016, the Asia-Pacific Centre of Education for International Understanding (APCEIU) has been working on the ***Global Citizenship Education (GCED) Curriculum Development and Integration (CDI) Project*** with several countries in the Asia-Pacific region. This initiative aims to incorporate Global Citizenship Education (GCED) into national curricula and share it worldwide.

APCEIU expresses great pleasure in welcoming Indonesia as a partner country for the 3rd Round of the GCED CDI Project. Indonesia's adherence to the philosophical principles of Pancasila, which resonate strongly with the values of GCED, underscores its commitment to global diversity, collaboration, and critical thinking. We anticipated with confidence the successful implementation of the GCED CDI Project in Indonesia, and we are delighted to witness Indonesia's proactive and enthusiastic execution of the project. This effort has significantly bolstered educators' skills and fostered the development of educational resources for GCED.

We are particularly pleased with the development of four modules focused on enhancing STEM (Science, Technology, Engineering, Mathematics) literacy and numeracy competencies. This development is significant, as proficiency in these areas is increasingly vital for the future, where knowledge and skills in these fields are highly sought after.

APCEIU extends sincere appreciation to the Directorate General of Teacher and Education Personnel, Ministry of Education, Culture, Research, and Technology (MoECRT), with special recognition for Prof. Dr. Nunuk Suryani, M.Pd., and Dr. Rachmadi Widdiharto. We also wish to express gratitude to the editors of this report: Sofie Dewayani, Arif Widiyatmoko, Sani Aryanto, Meliyanti, Nita Isaeni, and Ratna Nurlaila.

We commend all contributors involved in the publication of these modules, particularly Yuni Ifayati, Agnita Handayani, Kultum Afifah, and Novita Fatmasari, the teachers who authored the four modules. As well as our colleagues at APCEIU, who supported the development of this project and final report.

We hope that these materials, tailored to the Indonesian context, will serve as an effective tool and pedagogical guideline for teachers to implement the GCED Program, thereby helping students improve their problem-solving skills, practical and creative thinking, and communication abilities as inclusive and open-minded global citizens. We look forward to Indonesia's continued leadership and pivotal role in advancing GCED globally.

LIM Hyun Mook

Director, APCEIU



Acknowledgment

Praise be to God Almighty, because by His grace, we have completed the project/lesson plan module from the series of Global Citizenship Education (GCED) activities - Integrated Teaching Modules of Literacy And Numeracy For Primary Teachers In Indonesia And The Asia-Pacific Region. This project for Indonesia has been carried out in collaboration between APCEIU and the Directorate General of Teacher and Education Personnel, Ministry of Education, Culture, Research and Technology of the Republic of Indonesia (DGTEP) by Implementing an Arrangement (IA) between the Directorate General of Teachers and Education Personnel and the Asia-Pacific Centre of Education for International Understanding (APCEIU) under the auspices of UNESCO, dated 22 March 2023, No. APCEIU/C23/035 concerning GCED-Integrated Teaching Modules of Literacy and Numeracy for Primary Teachers in Indonesia and The Asia-Pacific Region.

In the Merdeka Curriculum developed in Indonesia, developing literacy and numeracy competencies is very important for improving the quality of students, so that they have a comprehensive understanding and meaningful learning. The curriculum in Indonesia also focuses on character development by strengthening the Pancasila Student Profile in the learning process. Pancasila is the philosophy of the Indonesian nation, where the characters that are developed include faith and devotion to God Almighty, Global Diversity, Cooperation, Independence, Critical Reasoning, and Creativity.

Collaboration between the Directorate General of Teachers and Education Personnel and the APCEIU is something that strengthens the competence of teachers and strengthens the competence of students in understanding GCED especially in terms of climate change. GCED values are already present in the school curriculum in Indonesia so that the development of teaching modules and project modules is very integrated.

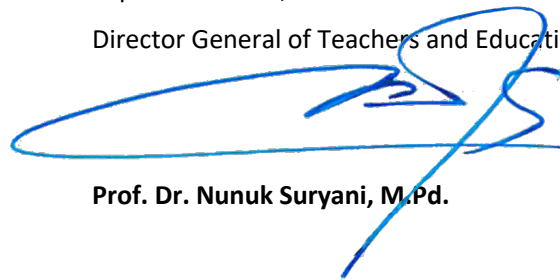
In this activity, there are four modules related to GCED that strengthen STEM (Science, Technology, Engineering, Mathematics) based literacy and numeracy competencies written by selected teachers, including Agnita Handayani, the module entitled "Zero Waste Hero In Action module: Dealing with Waste Through 4R (Refuse, Reduce, Reuse and Recycle) at SDN Cipinang Muara 14 Pagi, East Jakarta", Novita Fatmasari, the module entitled "Avoiding Food Waste, It's Time to Share" problematizes the issue of food waste in urban areas, Yuni Ifayati, implementing the project "Ecobrick: Beat the Plastic" at Fitrah Al Fikri Islamic Junior High School, and Kultum Afifah, the module entitled "Every Drop of Water Counts" which is aimed at raising students' awareness of the water crisis as a local and global problems.

In recognizing the achievement of the zero waste program at SDN Cipinang Muara 14 Pagi, we celebrate more than just a successful waste management initiative. We acknowledge a transformative movement towards sustainable living and environmental responsibility. In this way, the program's impact extends far beyond the school grounds, contributing to a broader movement towards a more sustainable and resilient future.

We would like to thank APCEIU for the collaboration that has been established. Furthermore, these modules can become a reference for teachers in Indonesia and Asia-Pacific, especially in the implementation of Global Citizenship Education which strengthens STEM-based literacy and numeracy competencies, and superior character as world citizens.

September 2024,

Director General of Teachers and Education Personnel,

A handwritten signature in blue ink, consisting of a large, sweeping horizontal stroke followed by several loops and a final downward stroke.

Prof. Dr. Nunuk Suryani, M.Pd.

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Introduction

Water is the source of life. We often hear earth referred to as the blue planet, because water covers the surface of the earth. 97% of all water on earth is sea water. This water is not drinkable. Then, 3% is fresh water. However, only 0.5% is potable because 2.5% of the freshwater is found in the atmosphere, soil, in the form of ice, glaciers, under the earth's surface or may be polluted and therefore cannot be consumed (Bureau of Reclamation, 2020).

Does this mean that we will never run out of water? The answer is yes and no. No, because although our earth has a limited amount of water, we are helped by the water cycle. Contrary to the previous point, the answer could be yes, because of climate change. Water and climate change are inseparable.

Water crisis is one of the many impacts of climate change. Worsening floods, rising sea levels, melting polar ice caps, and droughts are all impacts of climate change. Water is becoming scarcer, more unpredictable, more polluted or all three and this happens throughout the water cycle. If left unaddressed, it will threaten sustainable development, biodiversity, and people's access to water and sanitation will be severely limited (United Nations Water, 2023).

These things are also happening in Indonesia. To date, water pollution and flooding are serious unresolved problems in Indonesia. There are still many areas in Indonesia, especially in big cities, that regularly experience flooding and water pollution, such as Semarang City and Jakarta City. This is caused by domestic, industrial, and or agricultural waste. Jakarta where industrial and office activities are centralized, which is also the location of the author's school, often experiences flooding every year. According to data from the National Agency for Disaster Countermeasure, in 2020, there were 118 flood points in Jakarta with water levels reaching 2.5 meters and resulting in thousands of houses being submerged (Sectoral Statistics of the Special Capital Territory of Jakarta, 2020).

Water pollution is as unavoidable in Jakarta as flooding. This water pollution and flooding will have an impact on the quality of clean water. The majority of Jakarta residents still rely on groundwater or wells as a source of clean water. This is due to the limited supply of clean water from the *Perusahaan Air Minum* (PAM) water distribution system. Based on PAM Jaya data, the amount of clean water needed in Jakarta reaches nearly 32,000 liters/second and the water production capacity reaches 20,000 liters/second. Clean water supply in Jakarta is still constrained. Until the end of 2021, it was recorded that around 46% of water leaked in distribution and could not be utilized by residents (Kompas, 2023).

This is very dangerous, water pollution can occur through the process of infiltration of waste into groundwater, especially if the piping system is not properly sealed. The amount of groundwater affected by pollution results in poor quality clean water. Based on data from the Sectoral Statistics of the Special Capital Territory of Jakarta, water quality in Jakarta is divided into three criteria, namely 38% lightly polluted, 31% moderately polluted, and 31% heavily polluted. These criteria are based on the content of particles or chemicals contained in groundwater (Kompas, 2023).

In line with this, in Central Jakarta, there are 12 urban villages with heavily polluted water quality and 11 urban villages with lightly polluted water quality (Irawan, 2019). This problem is further compounded by Jakarta's land subsidence. The serious threat of Jakarta sinking has long been recognized. There are various factors that cause this, but the main factor is excessive groundwater extraction.

The solution to this problem has been listed in the Sustainable Development Goals (SDGs). The SDGs cover various aspects, including access to clean water and sanitation-SDG 6 and addressing climate change-SDG 13. One of the efforts that can be made is through water conservation. Water conservation is an effort to use and maintain water resources in a sustainable manner. This is very significant in the face of global climate change. Climate change, caused by human activities, affects the water cycle, including rainfall patterns, groundwater levels, and evaporation cycles.

Furthermore, in addition to the SDGs, there is also an approach in the field of education through Global Citizenship Education (GCED). GCED is an educational approach that empowers individuals. UNESCO in Kim (2021) explains that GCED learning topics and objectives are built on three learning domains, namely cognitive (knowledge and thinking skills), socio-emotional (values, attitudes, and social skills), then from these cognitive and socio-emotional domains will manifest behavior (performance, practical application, and engagement) to address global challenges, including climate change and water conservation.

Literacy and numeracy skills are fundamental components of education and play an important role in achieving GCED. Integrating climate change issues into literacy and numeracy in the Indonesian curriculum is important. An understanding of climate change allows students to recognize and analyze problems faced by local and global communities. This broadens their horizons on how complex global issues are. Through literacy skills, students are able to understand, analyze and interpret information about water conservation, climate change and related issues. In line with this, with numeracy skills, students will understand data and interpret relevant quantitative information. It is expected that students will be able to make informed decisions and actively participate in addressing global issues such as climate change and water conservation.

The implication of this module in the social-emotional GCED domain is that students are expected to become global citizens who are aware of the importance of maintaining the sustainability of water resources and pay attention to justice and inequality in access to water. Then for the behavioral domain, students are expected to be able to take concrete actions to reduce water consumption and protect the water environment. From a cognitive perspective, this module will provide students with an understanding of the importance of water conservation and its impact on the environment and daily life. This could include an explanation of the water cycle, the importance of maintaining water quality, and strategies to save and manage water wisely.

In addition to practical understanding, this module will introduce students to various local wisdom materials and technologies that can be used in water conservation. For example, making traditional and simple water purifiers using Science, Technology, Engineering, and Mathematics (STEM) based learning. Module activities will involve students in the real practice of using local wisdom and natural materials such as coconut shell charcoal, coconut fibers and/or palm fiber, as well as several other materials for water purifiers, designing the arrangement of materials, and assembling parts of water purifiers. Indirectly, students will also learn about the habits used by local communities in water management and internalize these values to encourage awareness of the importance of maintaining cultural heritage and traditional knowledge.

At the end of this module, there will be an evaluation of the actions that have been carried out, which will lead to the development of a sustainability strategy. There is also an evaluation of the water purifier that has been made to see their success in making a simple and traditional water purifier. On the other hand, for the cognitive domain, an evaluation will be held to see their understanding of the basic concepts and principles of hydrology, especially about the water cycle, water pollution, and water conservation.

Objectives, Procedures, and Targets

A. Objectives

This module consists of various activities that aim to:

1. Increase students' knowledge and awareness of global water issues that arise as a result of climate change by conserving water.
2. Students are able to show their concern and responsibility as global citizens towards water issues through various concrete actions.
3. Develop students' communication skills, cooperation, creativity, as well as practical skills needed to solve water problems around them using local wisdom materials and technology.

B. Procedures

This teaching module was prepared through several stages of the development process to produce a teaching module that is expected to provide inspiration for teachers. In the first stage, the author analyzed the literature study and field study, until finally an outline of the teaching module design was formed. In the second stage, the author designed teaching modules that integrate literacy and numeracy strategies. In the third stage, the author developed this teaching module by validating its feasibility including learning resources, student worksheets (known as *Lembar Kerja Peserta Didik* or LKPD), assessment sheets, reflection sheets, and assessment rubrics to expert lecturers. In the fourth stage, the finished teaching module was implemented in the classroom. In the fifth stage, the author evaluated and wrote a reflection on the implementation of the teaching module in the classroom. Then, in the final stage, the author disseminates the practices and experiences to colleagues and the teacher community.

C. Target

The target users of this module are junior high school teachers and the target students of this module are junior high school students, because some of the activities in this module require basic knowledge that students have learned while in elementary school. This module can be used as a support and reinforcement of intracurricular material for students.

How To Use The Module

1. This module is designed as a reinforcement, deepening, or enrichment of intracurricular material with an emphasis on a more real context.
2. This module includes learning resources, student worksheets, assessment rubrics, and assessment sheets. Teachers can use this module as a reference, so they can modify the activities, student worksheets, and assessments in it according to their needs.
3. The learning activities in this module are based on numeracy literacy with a STEM approach.
4. This module consists of 11 activities. Each activity is organized step by step as an effort to develop students' cognitive, social-emotional, and behavioral abilities towards the module topic. There are 5 stages: introduction, contextualization, action, assessment, and presentation.
5. The activities in this module are divided into several activities, including:
 - a. Train cognitive skills
 - 1) Let's Read
 - 2) Let's Watch
 - 3) Let's Discuss
 - 4) Let's Write
 - 5) Let's Practice
 - b. Train social-emotional skills
 - 1) Let's Share
 - c. Train behavioral skills
 - 1) Let's Research
 - 2) Let's Get Creative
6. The material in this module includes:
 - a. Climate change and its relationship to the water cycle, clean water availability, and water pollution
 - b. Water Conservation
 - c. Water Purification
7. The role of the teacher in this module is as a facilitator. Teachers must also ensure the readiness of school facilities and infrastructure for the implementation of the activities in this module. If not possible, alternative activities are also available as reference materials.

Project Stages Procedure

INTRODUCTION STAGE	
MEETING 1 (80 MINUTES)	MEETING 2 (80 MINUTES)
<p>WATER CYCLE</p> <ol style="list-style-type: none"> 1. Build knowledge about the water cycle through viewing activities. 2. Stimulate students to make connections between the water cycle and climate change. 	<p>ISSUE EXPLORATION</p> <ol style="list-style-type: none"> 1. Stimulate students with some pictures, then students identify and synthesize information on various problems that can arise related to water from different perspectives. 2. Students discuss in groups according to the topic of water issues they are interested in, for example: water pollution group, water crisis group, and water overuse group.
STAGES OF CONTEXTUALIZATION	
MEETING 3 (120 MINUTES)	
<p>MINI RESEARCH</p> <ol style="list-style-type: none"> 1. Students conduct investigation activities according to the group topic they have chosen, namely: <ol style="list-style-type: none"> a. Group 1: water pollution topic. Students conduct a scientific investigation on whether the water sources around them are polluted or not. b. Group 2: water crisis topic. Students conduct a literature review on the water crisis in their local area and in the world. c. Group 3: topic on excessive water use. Students research daily water use to understand water use and management issues from a scientific and technical perspective. 2. Students present the results. 	
MEETING 4 (80 MINUTES)	
<p>DISCUSSION & ACTION PLAN</p> <p>Students discuss to find solutions/ideas/action plans related to water conservation that can be done daily as a form of care, responsibility, and solidarity of global citizens.</p>	

MEETING 5 (1 WEEK)	
WATER CONSERVATION ACTION PLAN	
Students carry out concrete actions in accordance with the action plan that has been prepared at the previous meeting. Implementation of real action for 1 week in the form of independent assignments and involve family members and friends at school.	
STAGES OF ACTION	
MEETING 6 (120 MINUTES)	MEETING 7 (120 MINUTES)
WATER PURIFICATION Making a simple water purifier (using coconut shell, charcoal, coconut fibers, etc.).	REAL CAMPAIGN ACTION PLAN Creating campaign/socialization materials on the issue of water resources use and management as well as concrete water conservation actions that have been carried out as a form of concern and sharing among fellow global citizens.
STAGES OF ASSESSMENT	
MEETING 8 (80 MINUTES)	
<ol style="list-style-type: none"> Evaluation of concrete actions Students evaluate in the form of reflection on the action that has been carried out and develop the sustainability of the action. This activity can be done in an integrated manner in meeting 5. Evaluation of water purifier Students conduct a trial to see the success of the water purifier that has been made. This activity can be done in an integrated manner at meeting 6. Evaluation of understanding Students work on multiple choice, complex multiple choice, short fill-in and description questions that require literacy and numeracy skills, in addition to understanding concepts related to hydrology. 	
PRESENTATION STAGE	
MEETING 9 (80 MINUTES)	
<ol style="list-style-type: none"> Conducting campaigns or socialization and sharing good practices of water conservation that have been carried out. Demonstrating a water purifier as one of the solutions to water pollution problems. 	

A. Introduction

In the introduction stage, students are given reinforcement related to the basic concepts and principles of hydrology, especially about the water cycle, water pollution, and water conservation. Then, from these basic concepts, students will build their awareness and understanding of the relevance of the material to current global challenges, including climate change and water conservation.

1. Activity 1

TOPIC: WATER CYCLE (WHAT IS THE PROCESS OF RAIN?)		MEETING: 1
OBJECTIVE: 1. Students are able to identify the stages of the water cycle. 2. Students are able to analyze the factors that affect the water cycle. 3. Students are able to analyze human activities in daily life that affect the sustainability of the water cycle.	TIME: 80 minutes	PREPARATION 1. This activity will use video as a medium, so teachers must ensure the readiness of facilities and infrastructure to show the video. 2. The teacher prepares student worksheets.
	MEDIA: Video	
	TEACHER'S ROLE Source person, Facilitator	
LEARNING RESOURCES: 1. How does the water cycle move water around the earth? (https://www.youtube.com/watch?v=MWbudcboeg0) 2. Hydrological Cycle - Shoimatul Izza (https://www.youtube.com/watch?v=CQQimP4leRk) 3. Student Worksheet 1		
IMPLEMENTATION 1. The teacher opens the activity by asking questions: <ol style="list-style-type: none"> How important is water to your life? Where does the water on earth go? Does water availability depend on the climate and weather of an area? What is the process of rain? 2. The teacher introduces the learning topic and emphasizes the relevance of the material issue to climate change and current conditions. 3. Students create their learning groups. 4. Students carry out learning activities in accordance with student worksheets.		

<p>5. Students are asked to present the answers to the student worksheet. During this process, the teacher facilitates discussion and question and answer activities between groups.</p> <p>6. The teacher directs students to make conclusions.</p>	
<p>TIPS</p> <ol style="list-style-type: none"> Two videos are available. One video is in English and one video is in Indonesian. If you use video number one, you should help translate the video to make it easier for students to understand. If using the resources from video number two, it is better to show the video from minute 1:05 to minute 5:20. Student worksheets can be done independently or in groups. As an alternative activity besides working on student worksheets, students can be directed to create explanatory texts / illustrated stories / role playing and so on. 	
TASK -	ENRICHMENT -

2. Activity 2

TOPIC: IS THERE ENOUGH WATER TO MEET HUMAN NEEDS?		MEETING: 2
<p>OBJECTIVE:</p> <ol style="list-style-type: none"> Students are able to explain the various water problems faced by the citizens of the world. Students are able to explain the causes and impacts of water problems on the lives of world citizens. 	<p>TIME: 80 minutes</p>	<p>PREPARATION</p> <ol style="list-style-type: none"> The teacher prepares the student worksheet. Teacher prepares a photocard. This activity will use video as a medium, so teachers must ensure the readiness of facilities and infrastructure to show the video.
	<p>MEDIA: Photocard</p>	
	<p>TEACHER'S ROLE Facilitator</p>	
<p>LEARNING RESOURCES:</p> <ol style="list-style-type: none"> A video on the water crisis that can be accessed via https://www.youtube.com/watch?v=JyzvcrZluf0 Student Worksheet 2 		

IMPLEMENTATION

1. The teacher opens the activity by asking a question:
 - a. What activities require water?
 - b. Where and when do you use water the most?
 - c. Why is there a tremendous water shortage around the world?
 - d. Are humans responsible for the water shortage?
2. Students are given worksheets.
3. Students look at some pictures that have been provided.
4. Students are given a case related to all the water problems faced by citizens of the world to discuss with their group members.
5. Students make connections between water shortages and their daily lives.
6. Students present the results of their case discussions and research. During this process, the teacher facilitates questions and answers with other groups.
7. The teacher directs students to elaborate their understanding based on the students' knowledge.
8. Students are directed by the teacher to make conclusions.

TIPS

The videos provided in the student worksheet are in English. The teacher can act as a translator to help students understand the context of the video.

TASK -**ENRICHMENT -**

B. Contextualization

In the contextualization stage, problems in the surrounding environment related to the topic of discussion are presented as part of the learning activities. Topics include water pollution, climate change, water crisis, and its impacts such as land subsidence. This will give students a better understanding by using illustrations or examples.

1. Activity 1

TOPIC: MINI RESEARCH		MEETING: 3
OBJECTIVE: 1. Students are able to investigate water in the surrounding environment. 2. Students are able to detail daily water usage at home and at school. 3. Students are able to conduct a self-assessment of water use behavior to reduce the water crisis. 4. Students identify global issues related to human activities and the impact of climate change.	TIME: 120 minutes	PREPARATION 1. The teacher prepares student worksheets. 2. The teacher prepares a universal pH indicator. 3. The teacher prepares the facilities and infrastructure to show the animation video. 4. The teacher prepares three water sources (can be from a water tap, from a river, from a rainwater reservoir, etc.) for practicum then labeled A, B, and C so that students do not know the materials used. 5. Students are grouped into 3 groups according to their topic of interest. Group 1 with the topic of water pollution, group 2 with the topic of water crisis, and group 3 with the topic of excessive water use. 6. The teacher determines the students who act as group leaders to assist the teacher in supervising the learning activities carried out.
	MEDIA: Audio-visual	
	TEACHER'S ROLE Facilitator	
LEARNING RESOURCES: 1. Video on how to measure the pH of water with a universal pH indicator that can be accessed via: https://www.youtube.com/watch?v=3YVYFCsglX4 (starts from minute 1:21 - 2:36) 2. Groundwater videos are available in English and Indonesian. The video can be accessed via: https://www.youtube.com/watch?v=oNWAerr_xEE&list=RDQMla59n2TSgVw&start_radio=1 & https://www.youtube.com/watch?v=2Wln1bg7SWI		

3. Video about the use of water in everyday life that can be accessed through <https://www.youtube.com/watch?v=38aYXZou4uc>
4. Student Worksheet 3.1 for group 1.
5. Student Worksheet 3.2 for group 2.
6. Student Worksheet 3.3 for group 3.

IMPLEMENTATION

1. The teacher opens the activity by asking some eliciting questions:
 - a. Is the water you use everyday clean and safe to use? And how do you know?
 - b. Do you think it's possible that the area where you live could potentially run out of water?
 - c. What would happen if our city ran out of water? Are we prepared if that happens?
 - d. What can we do to protect ourselves and the consequences?
2. Students observe illustrations related to water problems in daily water use.
3. Students carry out learning activities according to the topics they are interested in and choose. There are three student worksheets, namely student worksheets with the topic of water pollution, the topic of water crisis, and the topic of excessive water use. Group 1; water pollution topic. students conduct a scientific investigation whether the water sources around them are polluted or not. Group 2; water crisis topic. students conduct a literature study review related to the water crisis in their local area and in the world. Group 3; topic of excessive water use. students research daily water use to understand water use and management issues from a scientific and technical perspective.
4. Representatives from each topic group (water pollution, water crisis, excessive water use) present their work. During this process, the teacher will help students elaborate their understanding through discussion and questions and answers with other students.
5. The teacher directs students to reflect and make conclusions.

TIPS

1. The learning activities at this meeting use a cooperative learning model with the jigsaw type.
2. Animated videos are used as an addition to reinforce students' concepts.
3. Teachers can adjust to students' interests and learning styles for group formation.
4. If there is no universal pH indicator, it can be replaced by using litmus paper.
5. If the amount of universal pH indicator paper / litmus paper is limited, the pH / litmus paper can be cut into small pieces so that there is enough for a number of students.
6. If there is no universal pH indicator or litmus paper, you can use natural ingredients such as turmeric, purple cabbage, hibiscus, etc.

7. The teacher can direct the students to use white paper as a background to make the observation of water clarity easier.
8. To make it easier, the teacher can direct students to agree to use non-standard units, for example using gallons which are equivalent to 19 liters.
9. The teacher can provide an example of a water usage graph so that students can imagine how to make a graph based on the data they already have.
10. Teachers can choose the activity for students whether it is just reading the article or along with watching the video.

TASK -	ENRICHMENT (OPTIONAL) The teacher directs students to fill in the reflection sheet. The aim is to find out whether students are able to conduct a self-assessment about their attitude towards activities that can cause and reduce water pollution, water crisis, and excessive water use.
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2. Activity 2

TOPIC: LET'S MAKE AN ACTION PLAN!		MEETING: 4
OBJECTIVE: Students are able to propose various creative ideas as an effort to conserve water.	TIME: 80 minutes	PREPARATION 1. The teacher prepares student worksheets. 2. Students are grouped into several groups to discuss. 3. The teacher prepares the BINGO game sheet.
	MEDIA: BINGO game sheet	
	TEACHER'S ROLE Facilitator	
LEARNING RESOURCES: Student Worksheet 4		
IMPLEMENTATION		
<ol style="list-style-type: none"> 1. The teacher opens the activity by inviting students to remember the learning activities in the previous meeting through several questions: <ol style="list-style-type: none"> a. How do you prioritize the use of water? b. What actions can you take as a responsible individual to stop wasting water? c. What actions can the government take to stop wasting water and help people to survive in areas that lack water? 2. Students discuss how to answer the eliciting questions. The teacher clarifies and checks students' assumptions. 		

3. Students discuss to develop an action plan that they can take as a solution to the local-global problem shown on the student worksheet.
4. Group representatives present the results of their discussion.
5. Students play a BINGO game to increase their knowledge of water conservation.
6. Teacher directs students to make a conclusion.

TIPS

The teacher can give students an example of elicitation, such as conducting a tree-planting action plan.

TASK

Students implement the action plan they have devised during this meeting. The concrete actions are carried out over one week.

ENRICHMENT (OPTIONAL)

The teacher directs the students to fill in the reflection sheet by completing the sentence:

"I am ..."

"I think ..."

"I feel ..."

"I will do ..."

The goal is to build awareness and self-management of students to better understand their role as a global citizen who contributes to solving global problems.

3. Activity 3

TOPIC: LET'S DO SOMETHING TO CONSERVE THE WATER! IT'S HERO TIME		MEETING: 5
OBJECTIVE: Students are able to take real action as a solution to local-global problems that can be applied in everyday life as a form of responsibility and solidarity of global citizens.	TIME: 1 Week	PREPARATION The teacher prepares the student worksheet
	MEDIA: -	
	TEACHER'S ROLE Facilitator	
LEARNING RESOURCES: Student Worksheet 5		

IMPLEMENTATION

1. The teacher opens the activity by inviting students to remember the learning activities in the previous meeting through several questions:
 - a. How many concrete actions have you taken based on your action plan in the previous meeting?
 - b. What are the obstacles you encountered during the implementation of the real action?
2. Students discuss how to answer the eliciting questions. The teacher clarifies and checks students' assumptions.
3. Group representatives present the results of the implementation of real actions that have been carried out along with documentary evidence.
4. The teacher monitors and facilitates students to evaluate the real action that has been carried out.
5. Students plan follow-up related to the results of the evaluation and real action feedback obtained from peers and teachers.

TIPS

Teachers can monitor the implementation of students' concrete actions through the WhatsApp group.

TASK -**ENRICHMENT**

The teacher directs the students to make the next follow-up plan as a result of monitoring and evaluating the implementation of the real action.

C. Action

At this stage, students are asked to take real action based on the knowledge and skills they have learned previously. Students are given the opportunity to design, implement real action plans, involve others and measure the impact of the actions that have been taken. In addition, one of the activities at this stage uses a STEM approach with elements of local wisdom. This is done as an effort to improve literacy and numeracy skills that can later be used in dealing with the focus of the problem presented in the Indonesian context.

1. Activity 1

TOPIC: MAKING A SIMPLE WATER PURIFIER		MEETING: 6
OBJECTIVE: Students are able to make a simple water purifier according to the potential available in the surrounding environment.	TIME: 120 minutes	PREPARATION 1. The teacher prepares the student worksheet. 2. Students are grouped into several groups.
	MEDIA: Tools and materials according to Student Worksheet 6 to make a water purification device.	
	TEACHER'S ROLE Facilitator	
LEARNING RESOURCES: Student Worksheet 6		
IMPLEMENTATION 1. The teacher opens the activity and relates it to the previous material. For example: <i>"In the previous meeting we learned about water pollution. If the water sources in your neighborhood are polluted, what can you do? How will you wash your clothes/dishes and bathe if you have little access to water? Did you know that you can purify water so that you can use the water. How do you do that?"</i> 2. Students read the article on the worksheet and discuss how to solve the questions on the worksheet. 3. Students conduct experiments to make water purification equipment according to the instructions contained in the worksheet. 4. Students test the purifier that has been made. 5. Students conduct discussions related to the results of their experiments and answer questions contained in the worksheet. 6. The teacher conducts evaluation and feedback for the students' water purifiers. 7. The teacher directs students to make conclusions.		
TIPS The teacher reminds the students to bring the tools and materials that will be used to make the water purifier.		
TASK -		ENRICHMENT -

2. Activity 2

TOPIC: LET'S MAKE A CAMPAIGN!		MEETING: 7
OBJECTIVE: Students are able to create campaign materials based on real actions that have been taken as a form of concern and sharing among fellow citizens of the world.	TIME: 120 Minutes	PREPARATION 1. The teacher prepares student worksheets. 2. Students are grouped into several groups.
	MEDIA: Tools and materials to create campaign materials (posters, videos, etc.)	
	TEACHER'S ROLE Facilitator	
LEARNING RESOURCES: Student Worksheet 7		
IMPLEMENTATION 1. The teacher opens the activity by linking to the previous activity. For example: <ol style="list-style-type: none"> Have you ever done a campaign to encourage others to do something good? What things need to be prepared to do the campaign? 2. Students make an outline of the good practices that they will campaign for. 3. Students together with their group mates make campaign materials.		
TIPS 1. The teacher reminds the students to bring the equipment needed to make the campaign materials. 2. As an alternative activity, the teacher can ask students to create a moral story related to their daily water use habits and the good things they have done related to water conservation.		
TASK Students create campaign materials about concrete actions that have been taken related to water conservation efforts.		ENRICHMENT -

D. Assessment/Reflection

This stage is designed to help evaluate the understanding, skills and experiences that students have made during the learning process. The form of comprehension evaluation is in the form of multiple choice, complex multiple choice, short form and description questions that require literacy and numeracy skills, in addition to concept understanding. Then, the implementation of this

comprehension evaluation is separate from the implementation of action evaluation and tool evaluation. In addition, students are also given the opportunity to reflect on how the understanding they have gained can be applied in everyday life.

TOPIC: COMPREHENSION EVALUATION		MEETING: 8
OBJECTIVE: Measure students' understanding of the learning activities that have been carried out based on real actions that have been taken as a form of concern and sharing among fellow citizens of the world.	TIME: 80 Minutes	PREPARATION The teacher prepares question and answer sheets for evaluation.
	MEDIA: Answer sheet paper	
	TEACHER'S ROLE Facilitator	
LEARNING RESOURCES: -		
IMPLEMENTATION <ol style="list-style-type: none"> 1. The teacher opens the activity by explaining the purpose of this activity. For example: <i>"In the previous activity we learned about some basic concepts of hydrology, such as the water cycle, water pollution, and water conservation. Today, you will ask some questions to see how you understand the material."</i> 2. The teacher gives the question sheet and answer sheet. Students work on evaluation questions individually. 3. The teacher collects the students' answer sheets. 4. The teacher gives feedback to the students. 		
TIPS The teacher can customize the media for conducting evaluations as needed, whether using online applications or using pencil and paper.		
TASK -		ENRICHMENT -

E. Presentation

This stage provides an opportunity for students to share their learning outcomes including good practices with their peers at school. The presentation of learning outcomes is an important stage in the learning process, as it is an opportunity to communicate their understanding, skills and experiences. In addition, it can be used to celebrate students' achievements and can inspire others to get involved in water conservation efforts. Presentation activities should be held at a specific time to be effective, for example, during the school's literacy and numeracy habituation program.

TOPIC: WATER CONSERVATION GOOD PRACTICE CAMPAIGN		MEETING: 9
OBJECTIVE: Students are able to communicate the good practices that have been done.	TIME: 80 Minutes	PREPARATION 1. Teachers prepare facilities and infrastructure for the implementation of good practice campaign activities. 2. Teachers communicate with the school management team to implement the good practice activity campaign.
	MEDIA: Microphone, speakers, poster board, impraboard, demonstration table, campaign media, and the water purifier that has been made.	
	TEACHER'S ROLE: Facilitator	
LEARNING RESOURCES: -		
IMPLEMENTATION 1. The teacher opens the activity by inviting students to recall previous learning activities and linking them to the learning objectives. For example: <i>"In the previous activity, we have planned and implemented good practices for water conservation, so how can we get others involved in the good practices that you have done? In today's activity, we will present these good practices and the water purifier that we have made so that others will be moved to participate in doing the things we have done."</i> 2. Learner representatives present local-global issues. 3. Students conduct a demonstration of water purification equipment. 4. Students together with their groups campaign for good practices that have been carried out as a form of water conservation efforts. 5. The teacher closes the presentation activity.		
TIPS The teacher reminds the students to bring the campaign materials and the water purifier that will be displayed.		
TASK -		ENRICHMENT -

Teacher Reflection Attachment

DAILY REFLECTION JOURNAL

Day/Date:

1. Which student caught my attention today? Why?

(Write down the names of students - one or several - who are making significant progress, or behaving uncharacteristically, who need guidance while doing the activity, etc.). This list of student names becomes a record for the teacher to provide assistance, special assignments in the next activity, etc.

.....

2. What activities are not working effectively? What is the cause?

(Write down activities that did not go according to plan and estimate the causes)

.....

3. What activities do my students like/enjoy the most?

(Write down the activities that students do most enthusiastically)

.....

4. What do I need to do in the next activity?

(Write down the modification plan, additional reinforcement activities etc., carried out in the next activity with reference to today's activity)

.....

5. One sentence or statement that describes today.

.....

Students Worksheet

A. Student Worksheet 1: What is the Process of Rain?

LEARNING OBJECTIVES:

Through this activity, you are expected to be able to:

1. Explain the stages of the water cycle.
2. Explain the factors that affect the water cycle.
3. Explain examples of human activities in daily life that affect the sustainability of the water cycle.

1. Let's Watch!

Water is the source of life for all living things on earth including plants and animals. Water covers two-thirds of the earth's surface, giving the earth its nickname as the blue planet. Most of the water on the earth's surface is salt water in the oceans and only three percent is freshwater. However, the earth has a water cycle that makes the water on earth never run out so that it can be used to meet the needs of living things. What are the stages of the water cycle? Let's take a look at this video about the water cycle!

Click on the link to play a video about the water cycle on the side.



How does the water cycle move water around the earth? ⋮

English language video

<https://www.youtube.com/watch?v=MWbudcboeg0>

Click on the link below to play a video about the water cycle on the side.



Siklus Hidrologi - Shoimatul Izza ⋮

Indonesian language video:

<https://www.youtube.com/watch?v=CQQimP4leRk>

(starts from minute 1:05 - 5:20)

2. Let's Write!

Let's write down the names of the stages of the water cycle and their explanations as you have learned from the video about the water cycle above!

.....

.....

3. Let's Practice!

After watching the video about the water cycle, let's do the following practice questions carefully!

1. Complete the following table with the names of the appropriate stages of the water cycle!

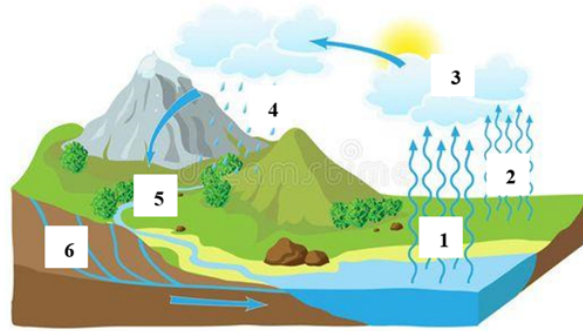


Image source: <https://id.pinterest.com/pin/373376625367430635/>

1.
2.
3.
4.
5.
6.

Evaporation	Transpiration	Condensation
Precipitation	Infiltration	Run-off

2. Match the names of the stages of the water cycle with their definitions!

NO.	STAGE NAME			DEFINITION
1.	Evaporation	■	■	The process of water falling from clouds in the form of rain and snow.
2.	Transpiration	■	■	The process of water flowing over the land surface from higher to lower ground.
3.	Condensation	■	■	The process of water evaporating from plants through the mouths of leaves (stomata).
4.	Precipitation	■	■	The process of water evaporating from seas, rivers and lakes due to heat from sunlight.

5.	Infiltration	■	■	The process of water vapor in the air condensing into clouds.
6.	Run-off	■	■	The process of water seeping into the soil through the pores of the soil.

4. Let's Discuss!

Take a look at the following picture carefully!

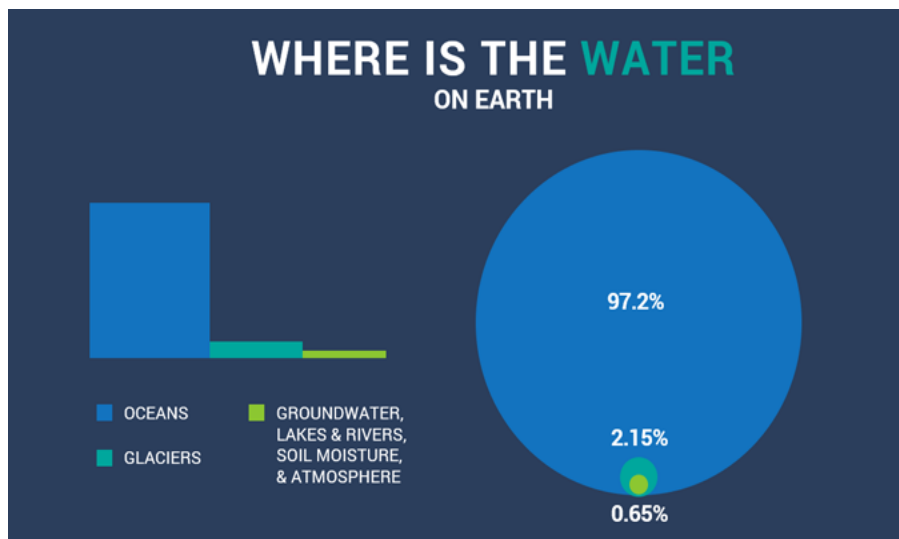


Image source: <https://earthhow.com/how-much-water-is-on-earth/>

On earth, we can find water in three forms, namely liquid, solid and gas. Liquid water can be found in the sea, lakes, rivers and in the ground. Solid water can be found in poles, glaciers and eternal snow. Meanwhile, water in the form of gas can be found in the earth's atmosphere.

1. Based on the information in the figure above, where is most of the water on earth located? What is the percentage?
.....
2. Water in liquid form can be found in the sea. Can we drink sea water? Why is that?
.....
3. Earth has many water sources, but why do we still lack clean water?
.....

5. Let's Read!

Read the following text carefully!

BENEFITS OF THE WATER CYCLE FOR LIFE

Did you know that the water cycle has many benefits for life? The water cycle plays an important role in providing clean water, which is very limited because most of the water on earth is salt water. The water cycle keeps the water on earth from diminishing or running out so that it can continue to be used to meet the needs of living things. The water cycle also plays an important role in distributing water to the entire surface of the earth through rainwater, runoff, river flow, and springs that are filled by rainwater. In addition, the water cycle also plays a role in driving the biogeochemical cycle so that the flow of nutrients and minerals in nature can continue, maintaining weather and climate patterns through evaporation that occurs in the water cycle, cleaning the earth's surface, and maintaining the earth's temperature by trapping the sun's heat.

Adapted from: <https://www.kompas.com/skola/read/2023/01/05/190356369/manfaat-siklus-air-bagi-kehidupn>

B. Student Worksheet 2: Is There Enough Water to Meet Human Needs?

LEARNING OBJECTIVES:

By doing this activity, you are expected to be able to:

7. Describe the various water issues faced by global citizens.
8. Explain the causes and impacts of water problems on the lives of world citizens.

1. Let's Watch!





Nowadays, people around the world are vulnerable to clean water crises. The water crisis is not only caused by a lack of water supply, but also by a decline in water quality. On the other hand, often the available water is not used carefully and is often wasted. This certainly does not show our empathy and solidarity as global citizens who are responsible for water issues. Therefore, let's find out more about the water crisis so that we can understand what preventive and mitigating actions we can take through the following video.

Click on the link below to play this video about the water crisis.

<https://www.youtube.com/watch?v=JyzvcrZluf0>

2. Let's Discuss!

Did you know that one of Africa's largest cities is experiencing a severe water drought due to climate change? The city is called Cape Town in South Africa. Residents in the city are vulnerable to day zero because all water sources have been used up to meet the needs of the population there. Let's find out more about the water problems experienced by global citizens and can even happen in your neighborhood today.

NO.	ILLUSTRATION OF WATER PROBLEMS	CAUSES OF WATER PROBLEMS	IMPACT OF WATER PROBLEMS
1.	 <p>Image source: https://www.indonesiawaterportal.com</p>		
2.	 <p>Image source: https://edition.cnn.com</p>		
3.	 <p>Image source: https://www.atmago.com</p>		
4.	 <p>Image source: https://news.detik.com</p>		

5.	 <p data-bbox="419 551 823 575">Image source: https://www.kompas.com</p>		
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a. SHARE

As an empathetic global citizen, you need to be sensitive to water issues in your surroundings. Work in groups, then find and record various water problems that you find in your surrounding environment in the form of photos or videos. Also determine the causes and impacts on human life and other living things.

b. ACT

After you and your group of friends have documented various water problems found in the surrounding environment, share the documentation on your social media to increase public awareness and sensitivity to these problems.

C. Student Worksheet 3.1: What Is Clean Water? - Become a Clean Water Detective

TOPIC: WATER POLLUTION
LEARNING OBJECTIVES:
<p><i>By doing this activity, you are expected to be able to:</i></p> <ol style="list-style-type: none"> 1. Describe the characteristics of clean water. 2. Investigate clean water in the neighborhood. 3. Reflect on past actions to pollute water.

1. Let's Read!

Read the following text carefully!

CHARACTERISTICS OF CLEAN WATER

Do you know about the characteristics of clean water? There are several parameters that can be used to determine whether water is clean or not, namely:

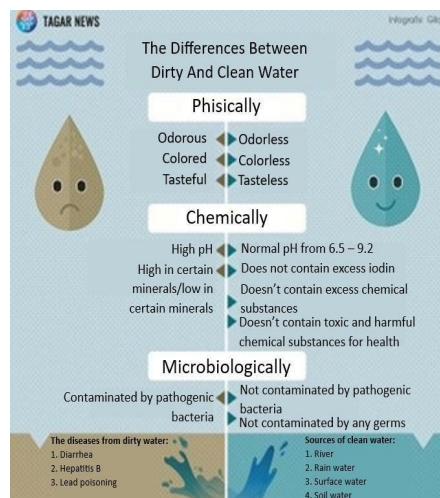


Image source: <https://www.tagar.id/Asset/uploads/345581-air.jpeg>

1. Parameters of physical clean water include odor, turbidity, and taste.
2. Parameters of chemical clean water include acidity (pH) and mineral content.
3. Parameters of biological clean water include the presence of pathogenic bacteria, such as *Escherichia coli*.

If one or more of the above parameters are not met, then the water can be said to be polluted because it has undergone physical, chemical, and biological changes.

2. Let's Discuss!

Before drinking, Danu has to make sure his drinking water is suitable for drinking. Danu has two glasses of water, glass A and glass B.



Image source: personal documentation

Observe the state of the water in the two glasses, then help Danu to fill in the following table.

CHARACTERISTICS OF WATER	GLASS A		GLASS B	
	AVAILABLE	NONE	AVAILABLE	NONE
Color				
Turbidity				

Notes:

Place a check mark (v) in the "glass A" and "glass B" columns in the appropriate section.

Which glass of water do you think Danu should drink?

.....

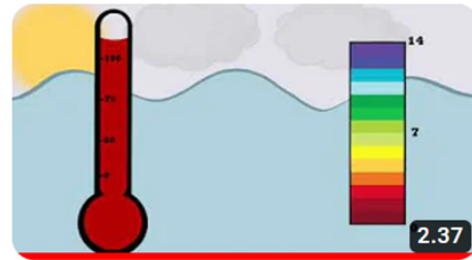
.....

3. Let's Research!

In this meeting, you are assigned to be a water detective on a mission to find clean water. This mission aims to investigate whether the water sources in your school environment are polluted or not. Therefore, find water sources such as tap water, well water, river water, rain water, and others in your school environment.



Image source: <https://www.freepik.com>



Water Quality: pH test

Click on the link below to play a video on how to measure the pH of water with a universal pH indicator.
<https://www.youtube.com/watch?v=3YVYFCsglX4> (starts from minute 1:21 - 2:36)

Then, examine the color, odor, pH, and turbidity to determine whether the water source is polluted or not! Let's follow these water observation steps carefully.

1. To measure the pH of water, dip a piece of universal pH indicator paper into the solution being tested. Compare the color that appears with the scale on the universal pH indicator, then determine the pH of the solution. Record your results in the table below.
2. To determine the color, odor, and pH of water, observe the water conditions carefully, then describe your observations in the following table.

NO.	WATER SOURCE	DESCRIPTION OF WATER CONDITION				WATER CONDITION		POLLUTING SUBSTANCES
		COLOR	ODOR	PH - SOLUTION PROPERTIES	TURBIDITY	POLLUTED	NOT POLLUTED	
1.								
2.								
3.								

Notes:

- The "water source" column can be filled in with the source of water, such as tap water, well water, river water, rainwater, and others.
- The pH column can be filled with a number and the nature of the solution, for example 7 - *neutral*.
- Place a check mark (v) in the "water condition" column in the appropriate section.

Question

- Based on the test results, which solution is contaminated?
.....

- Why is the solution polluted?
.....

4. Let's Discuss!

- Have you ever done anything that could pollute water? Write down at least one action that you have done!
.....
.....

- What solutions have you used to address water pollution?
.....
.....

5. Let's Read!

Read the following text carefully!

VARIOUS ACID-BASE INDICATORS & HOW TO USE THEM

Did you know that universal indicators are not the only acid-base indicators? There are 4 kinds of acid-base indicators, namely universal indicators, natural indicators, litmus paper, and pH meters.

1. Universal Indicator

Universal indicators are a mixture of various indicators that indicate the pH of a solution based on its color change. Acidic solutions have a $\text{pH} < 7$, neutral solutions have a $\text{pH} = 7$, and basic solutions have a $\text{pH} > 7$.

2. Natural Indicators

Natural indicators are indicators that are made using plant extracts, such as flowers, bulbs, fruit peels, or colored leaves. Some examples of natural indicators that you can use everyday include red cabbage, hibiscus, roses, red spinach, turmeric, and geranium. Here is an example of the color change in natural indicators when tested with acidic and basic solutions.

Plant Extract	Original Color	Color Changing in Acid Solution	Color Changing in Base Solution
Red Cabbage	Purple	Pink	Green
Hibiscus	Dark Red	Red	Yellow
Rose	Pink	Pink	Green
Red Spinach	Red	Pink	Yellow
Turmeric	Orange	Yellow	Red
Geranium	Red	Orange	Yellow

3. Litmus Paper

Litmus paper is often used to test the acidity and basicity of a solution. How to use it is quite easy, namely by dipping the paper in the solution you want to test. If the solution is acidic, the litmus paper will turn red. Instead, if the solution is alkaline, the litmus paper will turn blue.

4. pH Meter

pH meter is an electronic device that can be used to measure the pH of a solution quickly. pH meters have special glass electrode sensors that function to measure the pH of semi-solid materials. The way to use a pH meter is to dip it into the solution you want to test. Next, on the pH meter, a scale number will appear indicating the pH of the solution.

Adapted from: <https://www.ruangguru.com/blog/cara-menentukan-indikator-asam-basa>

D. Student Worksheet 3.2: The Fastest City Sinking in the World

TOPIC: WATER CRISIS

LEARNING OBJECTIVES:

Through this activity, you are expected to be able to:

1. Identify global issues related to human activities and climate change impacts.
2. Reflect on behaviors that trigger climate change impacts.

1. Let's Discuss!



Image source: <https://mammothmemory.net>

Did you know that some areas of the world, including Indonesia, still experience clean water crisis to this day? Java, Bali and Nusa Tenggara are the areas in Indonesia that most often experience clean water crisis. However, there are also many other areas in Indonesia that experience drought, causing a clean water crisis.

Residents there, especially women and girls, are forced to walk to collect clean water, the source of which is far from their homes.

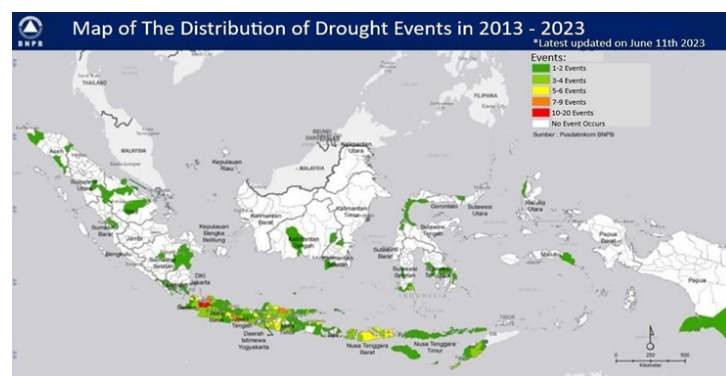


Image source: <https://www.bbc.com/indonesia/articles/cydgj76p626o>

This crisis has had a major impact on their lives, such as the loss of educational opportunities for children, domestic violence against women and girls, and increasing conflicts over clean water.

1. How do you feel after knowing this fact?

.....

2. Does your neighborhood have the potential to experience the same thing?

.....

3. What do you think are some of the causes of the water crisis around the world?

.....

2. Let's Watch!

Have you ever heard of groundwater? Did you know that one of the sources of clean water in urban areas is groundwater? When river water, lake water, and other freshwater sources are polluted by various human activities, the potential of groundwater is increasingly being looked at to meet clean water needs. The use of groundwater to meet human needs continues to increase from year to year along with the increase in the world's population. Currently, groundwater is still the solution to overcome the clean water crisis in urban areas because it has good quality and is easily accessible to the community. However, in the future, the struggle for groundwater as a source of clean water may become increasingly fierce. Let's find out more about what groundwater is and how it is formed.

Click on the link below to play a video about groundwater.



What Is Groundwater? :

English language video

https://www.youtube.com/watch?v=oNWAerr_xEE&list=RDQMla59n2TSgVw&start_radio=1

Click on the link below to play a video about groundwater.



Selamatkan Air Tanah Mulai dari Kita :

Indonesian language video:

<https://www.youtube.com/watch?v=2Wln1bg7SWI>
(starts from minute 1:05 - 5:20)

3. Let's Write!

Let's write down the things you learned from the video about groundwater, including the definition of groundwater, the impact of excessive use of groundwater, and how to maintain the availability of groundwater!

.....

.....

.....

4. Let's Read!

Read the following article carefully!

SEMARANG AND JAKARTA ARE AMONG THE FASTEST SINKING CITIES IN THE WORLD

According to a study published by Geophysical Research Letters, Semarang and Jakarta are among the fastest-sinking cities in the world. Jakarta is in the third place after Tianjin and Semarang in the list of the fastest sinking cities in the world. The study revealed that the average land subsidence in Tianjin reached 5.22 cm per year from 2015-2020. Semarang is second with an average land subsidence of 3.96 cm per year, while the average land subsidence in Jakarta is 3.44 cm per year.

Researchers say that the biggest factor contributing to land subsidence in cities around the world is the massive use of groundwater. In addition, these city areas generally have large populations or are used as industrial areas. There is also the cause of climate change, which is responsible for rising sea levels. In addition, poor urban planning can also increase the risk of land subsidence in these areas. While these cities cannot raise the ground level again, they can reduce the rate of subsidence by improving their urban planning and groundwater use.

Adapted from: <https://inet.detik.com/science/d-6629061/semarang-dan-jakarta-masuk-daftar-kota-paling-cepat-tenggelam-di-dunia>

5. Let's Discuss!

1. According to research published in Geophysical Research Letters, Semarang and Jakarta are among the fastest-sinking cities in the world. What causes this phenomenon?

.....

.....

2. What do you think are the impacts of land subsidence in these cities?

.....

3. Is there a solution that we can apply to overcome this phenomenon?

.....

6. Let's Practice!

According to a study published in Geophysical Research Letters, there are 10 fastest-sinking cities in the world. Let's find the names of these cities in the search box below!

Tianjin - Semarang - Jakarta - Shanghai - Ho Chi Minh - Hanoi - Chittagong - Kobe - Kerala – Houston

H	H	S	G	N	O	G	A	T	T	I	H	C	A
T	N	M	J	A	K	A	R	T	A	N	T	I	A
E	I	A	N	M	H	N	I	M	I	H	C	O	H
B	A	A	S	H	A	N	G	H	A	I	N	N	O
O	H	H	N	O	A	O	G	I	G	N	N	T	U
K	O	A	N	J	I	H	A	B	G	I	H	O	H
G	U	O	O	H	I	H	O	H	N	H	T	I	R
H	S	G	E	A	T	N	M	I	A	E	S	N	H
O	T	G	N	A	R	A	M	E	S	I	J	A	T
H	O	H	T	H	H	K	A	I	H	A	L	U	H
O	N	A	I	N	A	E	A	A	N	A	I	G	O
O	I	O	R	I	N	O	N	E	R	M	H	K	A
H	A	A	A	T	O	I	G	E	O	O	I	K	N
M	S	A	O	A	I	A	K	N	J	H	K	N	J

Click on the link or scan the barcode below to do it online.

<https://thewordsearch.com/puzzle/5773277/10-kota-paling-cepat-tenggelam-di-dunia/>

7. Let's Discuss!

Are there any of your behaviors that can trigger land subsidence where you live? Write down at least two such behaviors!

.....

E. Student Worksheet 3.3: How Much Water Do We Really Use Everyday?

TOPIC: WATER OVERUSE
LEARNING OBJECTIVES:
<p><i>Through this activity, you are expected to be able to:</i></p> <ol style="list-style-type: none"> 1. Outline daily water usage at home and at school. 2. Chart your own water usage at home. 3. Conduct a self-assessment of water use behavior to reduce the water crisis (climate change impacts).

1. Let's Watch!

Look at the following illustration carefully!



Image source: <https://foto.bisnis.com/view/20201005/1300774/warga-pamekasan-jawa-timur-berebut-air-bersih-akibat-dilanda-kekeringan>

a. How do you feel after seeing the illustration above?

.....

.....

b. What if similar conditions occur in your neighborhood?

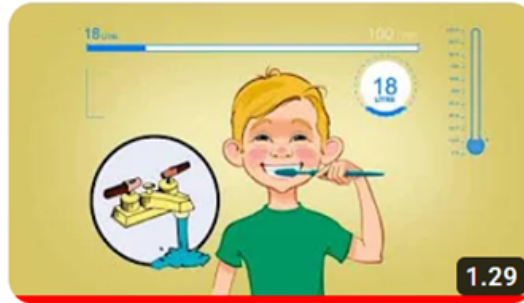
.....

.....

2. Let's Watch!

Do you know how much water you should use to fulfill your daily needs? Let's find out through this video.

Click on the link below to play a video about water use in everyday life.



How much water do we waste in our daily lives?

Source: <https://www.youtube.com/watch?v=38aYXZou4uc>

3. Let's Research!

Have you ever calculated the amount of water you use on a daily basis? By knowing how much water you use, you can take a closer look at whether or not you are being water efficient. Let's start your first step as a water hero by recording your water usage both at school and at home.

1. Describe your water usage at school and the amount in gallons!

No.	Water Usage	Quantity (Gallons)
1.		
2.		
3.		
4.		
5.		
Total		...

Notes:

- a. The "water use" column is filled in with the name of the activity that uses water, such as drinking, bathing, washing, and others.
- b. The gallon used as a unit is a gallon of mineral water which is equivalent to 19 liters of water.

2. Work in groups, then describe your and your friends' water usage at home and the amount in gallons!

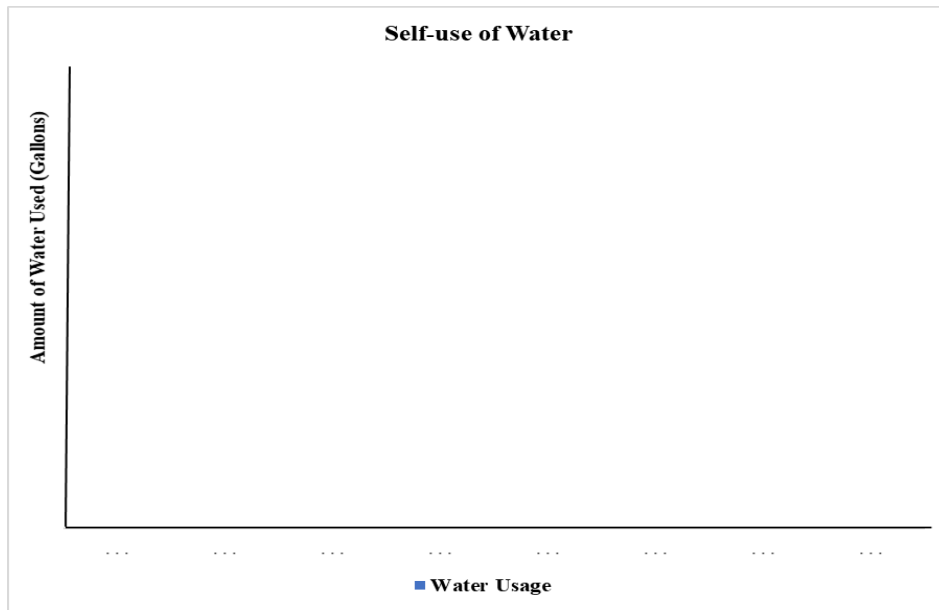
No.	Water Usage	Learner Name					Total ⁽¹⁾
		
		(gallons)	(gallons)	(gallons)	(gallons)	(gallons)	
1.							...
2.							...
3.							...
4.							...
5.							...
6.							...
7.							...
8.							...
9.							...
10.							...
	Total⁽²⁾	

Notes:

- The "water use" column is filled in with the name of the activity that uses water, such as drinking, bathing, washing, and others.
- The "students' names" column is filled in with the names of you and your friends.
- Total⁽¹⁾ is the amount of water used for each activity.
- Total⁽²⁾ is the amount of water used by each learner.
- The gallon used as a unit is a gallon of mineral water which is equivalent to 19 liters of water.

4. Let's Practice!

In the previous activity, you have started your first step as a water hero by recording your water usage. Use the water usage data at home (only your own water usage, not your friends) to create a graph so that you can more easily compare water usage in each activity. The graph is a bar graph with "water use" as the X-axis and "amount of water used" as the Y-axis!



After practicing making graphs, you can present the results in front of the class. You can draw your graph on a piece of cardboard or A3 paper to make it more visible.

5. Let's Discuss!

1. How much water do you use at home? What activities use the most water?
.....
2. What do you think is the condition of the water in your house? Why is this?
.....
3. What will you do to limit water use for your most water-intensive activities?
.....

6. Let's Practice!

Do you know where the water you use to fulfill your daily needs comes from? Let's complete the names of the various sources of clean water below carefully!



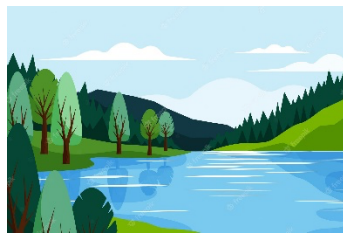
O _ _ _ N



R _ _ N



G _ _ U _ _



L _ K _



R _ _ _ R

Image source: <https://www.freepik.com>

7. Let's Read!

Read the following article carefully!

DO YOU KNOW HOW MUCH WATER WE SHOULD IDEALLY DRINK PER DAY?

Did you know that everyone's water needs are different? This need is influenced by various factors, including age, gender, activity level, environmental conditions, and nutritional status (normal, overweight, or obese). In general, adults need about 8 glasses of 230 ml per day or about 2 liters. Meanwhile, for children in Indonesia, it is recommended to drink 1,900 ml (1.9 liters) of water for children aged 7 - 9 years and 1,800 ml (1.8 liters) for children aged 10 - 12 years.

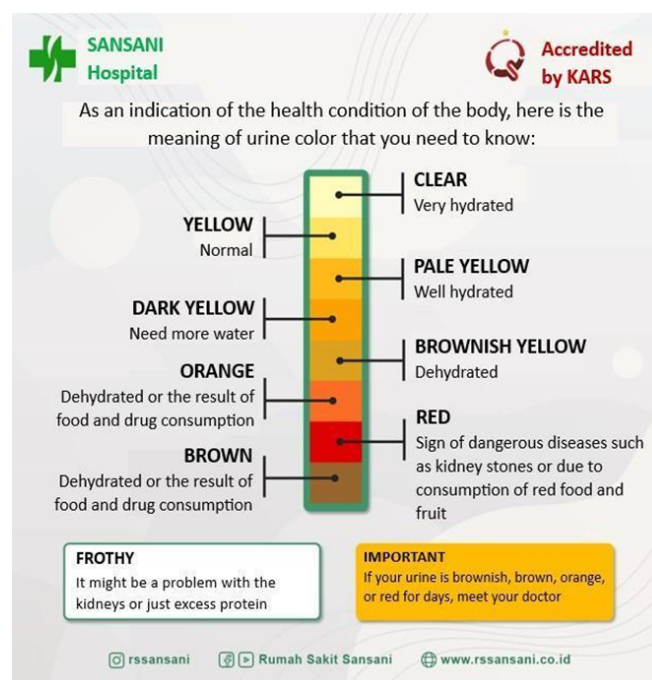


Image source: <https://rssansani.co.id/kenali-arti-warna-urine/>

If a person experiences a lack of fluids due to not drinking enough water, then their body will be prone to dehydration. Dehydration is a condition where a person's body is deprived of fluids so that he has difficulty concentrating, fainting, or even death. The early symptoms of dehydration experienced by a person can be seen through yellow-brown urine. Apart from drinks, food can also provide fluid intake to the body, which is around 20%. Fluids from food are mainly obtained from fruits and vegetables, such as spinach and watermelon, which contain 90% water.

Adapted from: https://yankes.kemkes.go.id/view_artikel/579/tahukah-kamu-berapa-idealnya-jumlah-air-putih-yang-kita-minum-perhari



F. Student Worksheet 4: Let's Make an Action Plan!


LEARNING OBJECTIVE:

Through this activity, you are expected to be able to propose various creative ideas as an effort to conserve water.

1. Let's Share!

Water is one of the natural resources that can be renewed because the earth has a water cycle. However, the availability of clean water that can be used by humans to fulfill their daily needs is very limited. Therefore, we must be careful in using water so that we can avoid a clean water crisis and at the same time save on water bills. Let's come up with your creative ideas on what can be done at home, at school, and in public places as an effort to conserve water!

<p style="text-align: center;">Things to do at home</p> <div style="text-align: center;">  </div> <p style="text-align: center;">Image source: https://www.freepik.com</p>	
<p style="text-align: center;">Things to do at school</p> <div style="text-align: center;">  </div> <p style="text-align: center;">Image source: https://www.freepik.com</p>	

<p>Things to do in public places</p>  <p>Image source: https://www.freepik.com</p>	
--	--

2. Let's Practice!

Play in groups and shout BINGO if you can mark the words in the box quickly and correctly!

W	A	T	E	R
harvest rainwater	make biopore infiltration holes	eliminate plastic use	use water-saving household appliances	use a faucet aerator
wash clothes in large quantities	use soap and detergent sufficiently	turn off the water tap after use	make a water filter	check water pipes or leaks regularly
stop dumping waste into river	install a water filter	FREE	replace tap with a bucket	check water bills
establish groundwater protected areas	make a schedule for watering plants	use a ladle to water	plant trees in river watersheds	boil enough water
make a dam	take a shower quickly	dig absorption wells	use water efficiently	reuse waste water



make a schedule for watering plants	use a faucet aerator	check water pipes or leaks regularly	harvest rainwater	make a water filter
check water bills	make biopore infiltration holes	boil enough water	install a water filter	wash clothes in large quantities
establish groundwater protected areas	use soap and detergent sufficiently	plant trees in river watersheds	replace tap with a bucket	stop dumping waste into river
use water-saving household appliances	take a shower quickly	turn off the water tap after use	dig absorption wells	use a ladle to water
use water efficiently	reuse waste water	eliminate plastic use	make a dam	

3. Let's Write!

After you have implemented various action plans to conserve limited water resources, let's do some self-reflection by filling in the following table.

I am ...	
I think ...	
I feel ...	
I will do ...	

4. Let's Read!

Read the following article carefully!

LET'S TAKE ACTION WITH UNICEF!



Image source: <https://www.unicef.org/indonesia/id/ureport>

Have you ever heard of UNICEF? UNICEF stands for *United Nations Children's Fund*. UNICEF is an international organization that focuses on the development of children around the world, including Indonesia. UNICEF is also committed to realizing the 17 *Sustainable Development Goals (SDGs)*, one of which is to ensure access to clean water and sanitation for all. As a student, you can do your part as a child warrior by making an occasional or monthly donation to UNICEF. You can also voice your opinions and take action on issues that matter to you through U-Report, UNICEF Indonesia's communication platform for and from young people. This way, you can be directly involved in making a difference in the lives of disadvantaged children in Indonesia.

G. Student Worksheet 5: Let's Do Something to Conserve the Water!

IT'S HERO TIME!

LEARNING OBJECTIVE:

Through this activity, you are expected to be able to take concrete actions as solutions to local-global problems that can be applied in everyday life as a form of responsibility and solidarity of global citizens.

1. Let's Share!

Clean water that can be used by humans to fulfill their daily needs is limited. Therefore, an effort is needed to maintain the existence and sustainability of water resources through water resources conservation activities. This conservation activity must start from ourselves, and involve family members and friends at school. Let's come up with an action plan to conserve the limited water resources and document its implementation!

No.	Activities Water Conservation	Applicability		Implementation		Obstacles Encountered	Documentation Evidence
		Implemented	Not Implemented	On Your Own	Done With Others		
1.							
2.							
3.							
4.							
5.							

6.							
7.							
8.							
9.							
10.							

Notes: Place a check mark (v) in the "applicability" and "implementation" columns in the appropriate section.

H. Student Worksheet 6: Water Purification Device

LET'S MAKE YOUR OWN WATER PURIFIER

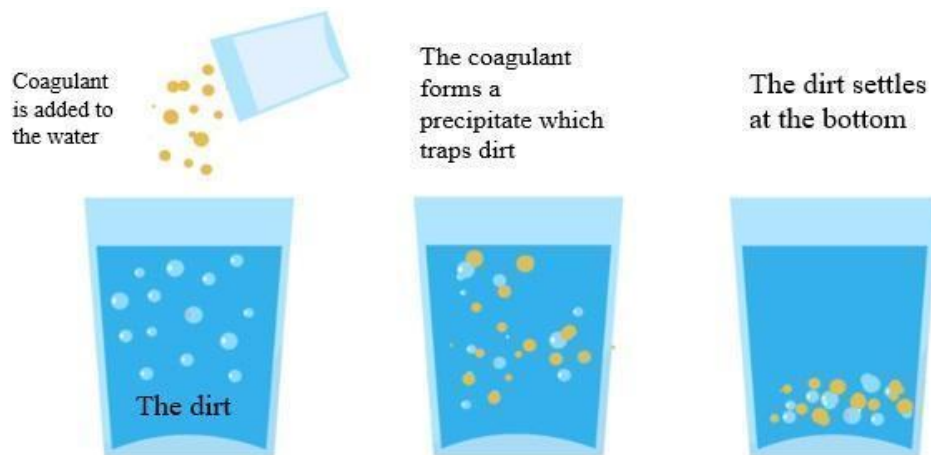
LEARNING OBJECTIVE:
Through this activity, you are expected to be able to make a water purifier by utilizing the potential of local natural resources.

1. Let's Read!

Read the following article carefully!

WATCH OUT! THE DANGERS OF ALUM AS A WATER PURIFIER

Have you heard about the benefits of alum as a water purifier? Alum is a white chemical compound that can be used to purify water. Alum can agglomerate solids dissolved in water so that the water becomes clearer. Compared to the coagulation method which is done by storing water in a closed container for several days, the use of alum is considered much more effective because it is able to precipitate very small particles.



However, did you know that excessive use of alum has a negative impact? This is because alum contains aluminum sulfate $Al_2(SO_4)_3$ one of the heavy metals which in ionic form is highly toxic. Research shows that consumption of aluminum sulfate in animals can result in liver and kidney damage.

Adapted from: <https://siagaairbersih.com/blog/2020/12/30/awas-hati-hati-menggunakan-tawas-untuk-menjernihkan-air/>

2. Let's Get Creative!

HOW TO MAKE A SIMPLE WATER PURIFIER?

The water purification process has a number of benefits, including removing odor, color, and taste in water. The water purification process can be done with several methods, one of which is the gravity fed filtering system water purification method. This method combines two water purification methods, namely the water purification method with slow sand at the bottom and the water purification method with fast sand at the top. The slow sand water purification method uses a layer of sand at the top, then a layer of gravel underneath. Meanwhile, the quick sand water purification method uses a layer of gravel at the top, then a layer of sand underneath. Let's make your own water purifier with the gravity fed filtering system water purification method which is more environmentally friendly than the chemical water purification method using alum.

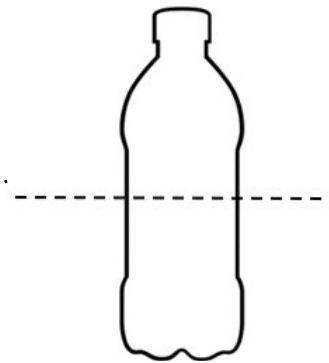
Objective: Making a water purifier by utilizing the potential of local natural resources.

Tools and Materials:

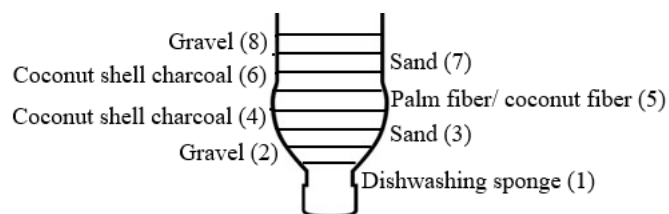
NO	TOOLS AND MATERIALS	TOTAL
1.	Used 1.5 liter mineral water bottle	1 piece
2.	Dishwashing sponge	To taste
3.	Gravel	To taste
4.	Sand	To taste
5.	Coconut shell charcoal	To taste
6.	Palm fiber or coconut fiber	To taste
7.	Dirty water sample	To taste

Directions:

- Clean water bottles, dishwashing sponges, gravel, sand, coconut shell charcoal, and coconut fiber.
- Cut an old mineral water bottle into two equal parts, then make small holes in the bottle cap.



- Insert a piece of dishwashing sponge at the very bottom (near the bottle cap) with a thickness of 2 cm.



- Add gravel, sand, coconut shell charcoal, and coconut fiber each with a thickness of 2 cm.
- Pile it back with coconut shell charcoal, sand, and gravel each with a thickness of 2 cm.
- Join the two halves of the bottle by inserting the bottle cap into the bottom piece of the bottle.



7. Pour the bottled water sample into the water purifier that has been made and observe the condition of the filtered water.

Question:

1. Is there any change in the sample water before and after filtering with the water purifier?
.....
2. What do you think is the quality of the filtered water if one of the components of the water purifier is missing?
.....
3. What do you think would be the quality of the filtered water if you changed the arrangement of the components of the water purifier (not the arrangement in the directions)?
.....

Conclusion:

Write down the conclusion of the experiment to make a simple water purifier that you have done!

.....

I. Student Worksheet 7: Let's Make a Campaign!

LEARNING OBJECTIVES:
Through this activity, you are expected to be able to create campaign materials based on real actions that have been carried out as a form of concern and sharing among fellow citizens of the world.

1. Let's Share!

Do you realize that we can all be water heroes? Water heroes have a very noble mission, which is to save water and conserve water resources. In the previous meeting, you have compiled and carried out concrete actions to realize this mission. However, water heroes do not move alone, but invite their

families, friends, and people around them to participate in doing good in order to produce greater changes. In today's digital era, water heroes can reach out and invite more people through social media, such as Youtube, Instagram, and TikTok. Let's create a campaign material (can be in the form of posters, videos, etc.) in groups that contain positive messages and invitations to save water and conserve water resources, then upload it to social media as a form of campaign to others! First make a sketch (if you are making a poster) or storyline (if you are making a video) that you will include in your campaign content in the box below. You can also go around the class and approach other groups to get more ideas from your classmates.

Write down a moral value or your unique experience in saving or conserving water in this box!

Draw a sketch (if you're making a poster) or storyline (if you're making a video) in this box!

Comprehension Evaluation

Name :

Class :

Instructions

1. In this activity, you will be working on problems. Before doing so, first check the number of questions available in the text. This script has 10 comprehension evaluation questions consisting of multiple choice, complex multiple choice, short form and description questions.
2. Write your identity (name and class) and answers on the question sheet using a pen.
3. You have 40 minutes to complete it.

Read the following article carefully to answer questions 1-2!

WHY EARTH'S WATER NEVER RUNS OUT DESPITE CONSTANT USE

Water is the primary need of living things, whether humans, animals or plants. Every day, water is used continuously, even without stopping. Humans often use water for activities and to fulfill their needs, such as drinking, bathing, cooking, and so on. As for animals and plants, water is used to clean the body, drink, and as a place to live. However, do you know why water on earth never runs out even though it is used continuously?

According to Sarintan Efratani Damanik in the book *Forestry Development Planning (2019)*, water is one of the most widely utilized renewable energies. In practice, water can be used freely and can be renewed. The amount of water is also unlimited so that living things can utilize water to meet their needs. As one of the renewable energies, water is also utilized for other purposes, including being processed into a source of electrical energy.

Cited from the book *Environmental Engineering (2021)* by Rina Marina Masri and Iskandar Muda Purwaamijaya, the water cycle is the rotation of water from the earth to the atmosphere which takes place continuously and goes through a number of stages. Some of the benefits of the water cycle are maintaining the availability of water on earth, regulating environmental temperature, creating rain, and maintaining the balance of the ecosystem. Reported from the book *Ecosystems: Inquiry Module Based on Potential and Local Wisdom (2020)* by Umami Nur Afinni Dwi Jayanti, the water cycle occurs through a series of processes that do not stop. If the water cycle does not occur, the ecosystem will not function and life cannot be maintained because water is needed in the ecosystem and by living things.

Adapted from: <https://www.kompas.com/skola/read/2022/04/05/080000669/alasan-air-di-bumi-tidak-pernah-habis-walau-digunakan-terus-menerus?page=all>

1. Based on the article above, the reason water on earth never runs out is...

	Water is one of the renewable energies that is unlimited in quantity.
	Water can be processed into a source of electrical energy.
	There is a continuous water cycle.
	Water is needed in ecosystems and by living things.

Note: please check (v) in the box provided and there can be more than one answer.

2. In the first sentence of the third paragraph of the article above there is a sentence that reads: "*Cited from the book Environmental Engineering (2021) by Rina Marina Masri and Iskandar Muda Purwaamijaya, the water cycle or water cycle is the rotation of water from the earth to the atmosphere which takes place continuously and goes through a number of stages*". The stages of the water cycle referred to in order are

- Evaporation → condensation → infiltration → precipitation
- Evaporation → condensation → precipitation → infiltration
- Condensation → evaporation → infiltration → precipitation
- Condensation → evaporation → precipitation → infiltration

Read the following discourse carefully to answer questions 3-5!

Budi was assigned by his teacher to record his water usage in one day. The results of his recording are shown in the following table.

NO.	ACTIVITY TYPE	NUMBER OF GALLONS OF WATER USED
1.	Drinking and cooking instant noodles	0.2
2.	Bathing and toilet needs	10
3.	Washing clothes	5
4.	Washing dishes and cookware	2
5.	Cleaning the house	3
6.	Watering the plants	2.5
7.	Bathing and cleaning pet cages	2

3. Based on the data in the table above, rank the activities that use the most water to the least!

.....

4. What activities use the most water?

.....

5. How much water does Budi need in one day?

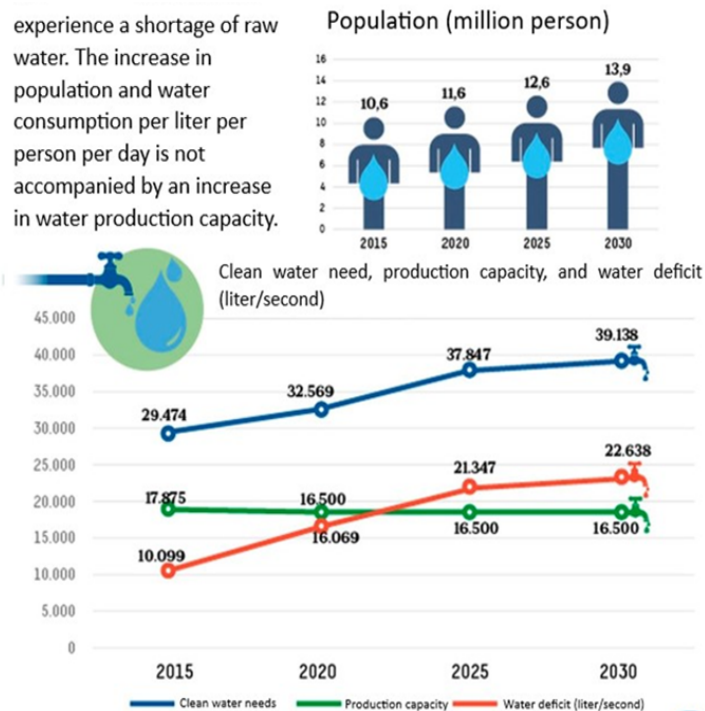
.....

Read the following article carefully to answer questions 6-8!

UNACKNOWLEDGED JAKARTA’S CLEAN WATER CRISIS

A number of residents in West Jakarta have complained about PAM water in their homes that often does not flow. This condition has forced residents to buy jerrycan water or take groundwater to meet their clean water needs. In addition, residents also complained about the quality of PAM water that looks slimy, yellow like tea, and itchy when used for bathing so residents do not dare to use it as drinking water. These complaints about the lack of clean water quantity and quality indicate that water security in the capital is experiencing a deficit.

The Estimation of the Special Capital Territory of Jakarta’s Clean Water Needs



Sumber: Litbang Kompas/PUT, diolah dari Dinas Tata Air DKI Jakarta

INFOGRAFIE: WANTO

Based on data from the Water Management Agency of the Special Capital Territory of Jakarta displayed in the form of the graph above, in 2015, Jakarta had a population of 10.6 million people and required clean water of around 29,500 liters per second. However, the piped water production capacity was only 17,875 liters per second, resulting in a water shortage of 10,099 liters per second. The data also shows that until 2030, Jakarta will continue to experience raw water shortages. This is due to the increase in population and water consumption per liter per person per day which is not followed by additional water production capacity. Thus, it is not surprising that PAM can only meet the needs of around 62.08 percent of the Special Capital Territory of Jakarta residents.

Adapted from: <https://www.kompas.id/baca/riset/2018/01/16/krisis-air-bersih-jakarta-yang-tak-disadari>

6. Based on the article and graph above, determine whether the following statements are true or false.

STATEMENT	TRUE	FALSE
The demand for clean water in the Special Capital Territory of Jakarta continues to increase from year to year.		
The Special Capital Territory of Jakarta government is only able to meet the clean water needs of its citizens until 2030.		
Water production capacity by PAM in the Special Capital Territory of Jakarta is able to keep up with the increase in population water consumption.		
The shortage of water production by PAM in the Special Capital Territory of Jakarta continues to increase along with the increase in population.		

7. In the second sentence of the first paragraph of the article above, it is stated that "*this condition has forced residents to buy jerrycan water or take groundwater to meet their clean water needs*". What do you think is the impact of taking groundwater on a large scale to fulfill clean water needs?

.....

8. The clean water crisis experienced by residents in the Special Capital Territory of Jakarta certainly has a huge impact on their lives. Various complaints about the lack of quantity and quality of clean water experienced by residents indicate the low water security in the capital city. The problems experienced by residents in the Special Capital Territory of Jakarta can also be experienced by global citizens around the world. As empathetic global citizens, the efforts we can make to help reduce the water crisis are
- Open the water tap to the maximum when it is in use
 - Creating rain barrels as an alternative water source
 - Cutting down trees that live in the watershed area
 - Dumping household waste and garbage into waterways

Read the following article carefully to answer questions 9-10!

LIPi'S COMMITMENT TO 'HONORING' THE CITARUM RIVER

The Indonesian Institute of Sciences (known as *Lembaga Ilmu Pengetahuan Indonesia* or LIPI) is committed to participating in the restoration of the longest river in West Java Province, the Citarum River, through the Clean Technology Research Institute (known as *Loka Penelitian Teknologi Bersih* or LPTB). Head of LPTB LIPI, Sri Priatni, said that the biggest pollutant in the Citarum River is household waste, which accounts for around 60 to 70 percent of the existing pollutant load. "Waste from untreated toilets and household garbage is exacerbated by the addition of livestock manure waste which amounts to thousands around the Citarum zero point," she said at LPTB LIPI Bandung, Bandung City. Furthermore, Sri said that other pollutants are industrial waste, most of which are hazardous waste that is difficult to decompose naturally. Sri also explained that the handling of the Citarum river in the upstream area, especially in Bandung Raya area, is LIPI's main point of concern because there are eight tributaries that mostly flow through dense settlements in Bandung Raya and hold a five percent portion of the overall Citarum domestic pollutants.

Adapted from: <https://www.jurnaljabar.id/bewara/komitmen-lipi-mengharumkan-sungai-citarum-b1XcW9Mq>

9. In the article above, the Head of LPTB LIPI said that the biggest pollutant in the Citarum River comes from household waste. The household waste in question is
- Water used to wash clothes
 - Remaining medicines
 - Fabric dye discharge water
 - Dry leaves

10. The Citarum River is one of the most polluted rivers and needs to be restored immediately. If this condition continues, the people who are accustomed to utilizing water from the Citarum River may experience a clean water crisis. The impact of the clean water crisis that may be experienced by them is
- a. Improved living standards of citizens
 - b. Increased land for farming
 - c. Decreased spread of skin diseases
 - d. Outbreak of conflict over clean water

Answer Key and Assessment Rubric

A. Student Worksheet 1: What is the Process of Rain?

LEARNING OBJECTIVES:

Through this activity, you are expected to be able to:

1. Explain the stages of the water cycle.
2. Explain the factors that affect the water cycle.
3. Explain examples of human activities in daily life that affect the sustainability of the water cycle.

1. Let's Watch!

Water is the source of life for all living things on earth including plants and animals. Water covers two-thirds of the earth's surface, giving the earth its nickname as the blue planet. Most of the water on the earth's surface is salt water in the oceans and only three percent is freshwater. However, the earth has a water cycle that makes the water on earth never run out so that it can be used to meet the needs of living things. What are the stages of the water cycle? Let's take a look at this video about the water cycle!

Click on the link to play a video about the water cycle on the side.



How does the water cycle move water around the earth? ⋮

English language video

<https://www.youtube.com/watch?v=MWbudcboeg0>

Click on the link below to play a video about the water cycle on the side.



Siklus Hidrologi - Shoimatul Izza ⋮

Indonesian language video:

<https://www.youtube.com/watch?v=CQQimP4leRk>

(starts from minute 1:05 - 5:20)

2. Let's Write!

Let's write down the names of the stages of the water cycle and their explanations as you have learned from the video about the water cycle above!

In this section, students write the names of the stages of the water cycle consisting of the stages of evaporation, transpiration, condensation, precipitation, infiltration, and run-off along with an explanation.

3. Let's Practice!

After watching the video about the water cycle, let's do the following practice questions carefully!

1. Complete the following table with the names of the appropriate stages of the water cycle!

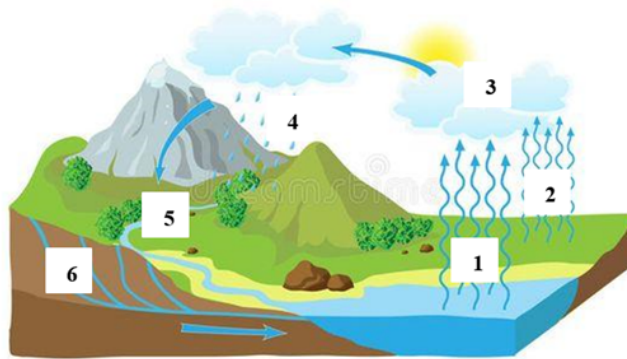


Image source: <https://id.pinterest.com/pin/373376625367430635/>

1.	<i>Evaporation</i>
2.	<i>Transpiration</i>
3.	<i>Condensation</i>
4.	<i>Precipitation</i>
5.	<i>Run-off</i>
6.	<i>Infiltration</i>

Evaporation	Transpiration	Condensation
Precipitation	Infiltration	Run-off

2. Match the names of the stages of the water cycle with their definitions!

No.	Stage Name			Definition
1.	Evaporation	■	■	The process of water falling from clouds in the form of rain and snow.
2.	Transpiration	■	■	The process of water flowing over the land surface from higher to lower ground.
3.	Condensation	■	■	The process of water evaporating from plants through the mouths of leaves (stomata).
4.	Precipitation	■	■	The process of water evaporating from seas, rivers and lakes due to heat from sunlight.
5.	Infiltration	■	■	The process of water vapor in the air condensing into clouds.
6.	Run-off	■	■	The process of water seeping into the soil through the pores of the soil.

4. Let's Discuss!

Take a look at the following picture carefully!

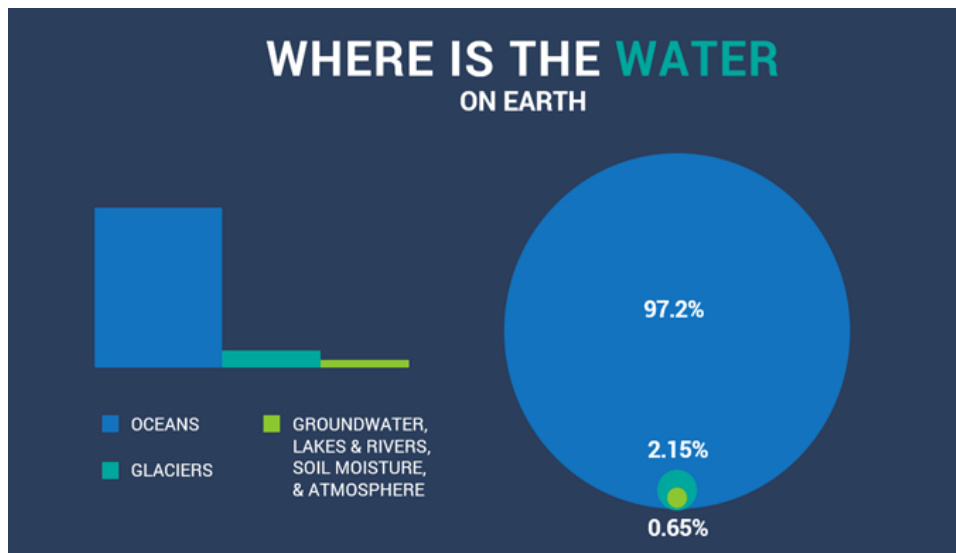


Image source: <https://earthhow.com/how-much-water-is-on-earth/>

On earth, we can find water in three forms, namely liquid, solid and gas. Liquid water can be found in the sea, lakes, rivers and in the ground. Solid water can be found in poles, glaciers and eternal snow. Meanwhile, water in the form of gas can be found in the earth's atmosphere.

1. Based on the information in the figure above, where is most of the water on earth located? What is the percentage?

Alternative answer:

Most of the water is in the sea. The percentage is 97.2%.

2. Water in liquid form can be found in the sea. Can we drink sea water? Why is that?

Alternative answer:

We cannot drink seawater. Seawater contains a lot of salt which can cause us to lose body fluids (dehydration), kidney damage, digestive problems (such as abdominal pain and diarrhea), increased blood pressure, and psychological disorders.

3. Earth has many water sources, but why do we still lack clean water?

Alternative answer:

Earth has many water sources, but we still lack clean water due to climate change that causes droughts and floods, human activities that can pollute water (such as throwing garbage or waste into water sources), and excessive water use.

5. Let's Read!

Read the following text carefully!

BENEFITS OF THE WATER CYCLE FOR LIFE

Did you know that the water cycle has many benefits for life? The water cycle plays an important role in providing clean water, which is very limited because most of the water on earth is salt water. The water cycle keeps the water on earth from diminishing or running out so that it can continue to be used to meet the needs of living things. The water cycle also plays an important role in distributing water to the entire surface of the earth through rainwater, runoff, river flow, and springs that are filled by rainwater. In addition, the water cycle also plays a role in driving the biogeochemical cycle so that the flow of nutrients and minerals in nature can continue, maintaining weather and climate patterns through evaporation that occurs in the water cycle, cleaning the earth's surface, and maintaining the earth's temperature by trapping the sun's heat.

Adapted from: <https://www.kompas.com/skola/read/2023/01/05/190356369/manfaat-siklus-air-bagi-kehidupn>

6. Student Worksheet Assessment Rubric

What is the process of rain?

QUESTION NUMBER	SCORE				
	4	3	2	1	0
LET'S PRACTICE!					
1	Write down 5 - 6 stages of the water cycle correctly.	Write down 3 - 4 stages of the water cycle correctly.	Write down 2 stages of the water cycle correctly.	Write down 1 stage of the water cycle correctly.	Did not write down any answers.
2	Correctly match 5-6 names of water cycle stages with their definitions.	Match 3 - 4 names of water cycle stages with their definitions correctly.	Match 2 names of water cycle stages with their definitions correctly.	Match 1 name of a water cycle stage with its definition correctly.	Did not write down any answers.
LET'S DISCUSS!					
1	Write down the location of most of the water on earth and the percentage correctly.	Write the location of most of the water on earth correctly, but the percentage is wrong.	Write the location of most of the water on earth correctly, but the percentage was not written.	Write the answer, but it is not correct.	Did not write down any answers.
2	Write the answer and reason correctly.	Write the answer correctly, but the reasoning was wrong.	Write the answer correctly, but without reasoning.	Write the answer, but it was not correct.	Did not write down any answers.
3	Write the answer and reason correctly.	Write the answer correctly, but the reasoning was wrong.	Write the answer correctly, but without reasoning.	Write the answer, but it was not correct.	Did not write down any answers.

B. Student Worksheet 2: Is There Enough Water to Meet Human Needs?

LEARNING OBJECTIVES:

By doing this activity, you are expected to be able to:

1. Describe the various water issues faced by global citizens.
2. Explain the causes and impacts of water problems on the lives of world citizens

1. Let's Watch!




Nowadays, people around the world are vulnerable to clean water crises. The water crisis is not only caused by a lack of water supply, but also by a decline in water quality. On the other hand, often the available water is not used carefully and is often wasted. This certainly does not show our empathy and solidarity as global citizens who are responsible for water issues. Therefore, let's find out more about the water crisis so that we can understand what preventive and mitigating actions we can take through the following video.



Click on the link below to play this video about the water crisis.

<https://www.youtube.com/watch?v=JyzvcrZluf0>

2. Let's Discuss!

Did you know that one of Africa's largest cities is experiencing a severe water drought due to climate change? The city is called Cape Town in South Africa. Residents in the city are vulnerable to day zero because all water sources have been used up to meet the needs of the population there. Let's find out more about the water problems experienced by global citizens and can even happen in your neighborhood today.

NO.	ILLUSTRATION OF WATER PROBLEMS	CAUSES OF WATER PROBLEMS	IMPACT OF WATER PROBLEMS
1.	 <p>Image source: https://www.indonesiawaterportal.com</p>	<p><u>Example of alternative answers:</u></p> <ol style="list-style-type: none"> 1. Industrial waste 2. Household waste 3. Agricultural waste 4. Livestock waste 	<p><u>Example of alternative answers:</u></p> <ol style="list-style-type: none"> 1. Disruption of aquatic life 2. Declining water quality 3. Increased disease transmission 4. It creates a bad odor.
2.	 <p>Image source: https://edition.cnn.com</p>	<p><u>Example of alternative answers:</u></p> <ol style="list-style-type: none"> 1. Long drought and low rainfall 2. Geographical location of a region 3. Water wastage 4. Global warming. 	<p><u>Example of alternative answers:</u></p> <ol style="list-style-type: none"> 1. Declining clean water sources 2. Leads to conflict over clean water sources 3. Causes the death of many plants 4. Increased air pollution
3.	 <p>Image source: https://www.atmago.com</p>	<p><u>Example of alternative answers:</u></p> <ol style="list-style-type: none"> 1. Blockage in the pipe 2. Large water pressure in the pipe 3. Corrosion of the pipe 4. Poor pipe installation 	<p><u>Example of alternative answers:</u></p> <ol style="list-style-type: none"> 1. Decreased water supply to people's homes 2. Leads to wasted water 3. Causes water arriving at people's homes to be potentially cloudy 4. Increased water arrears

4.	 <p>Image source: https://news.detik.com</p>	<p><u>Example of alternative answers:</u></p> <ol style="list-style-type: none"> 1. <i>The habit of littering</i> 2. <i>The occurrence of heavy rain for several consecutive days</i> 3. <i>Deforestation</i> 4. <i>Lack of water</i> 5. <i>catchment areas</i> 	<p><u>Example of alternative answers:</u></p> <ol style="list-style-type: none"> 1. <i>Difficult to find clean water</i> 2. <i>Causes health problems</i> 3. <i>Causing economic losses and casualties</i> 4. <i>Causes damage to agricultural land</i>
5.	 <p>Image source: https://www.kompas.com</p>	<p><u>Example of alternative answers:</u></p> <ol style="list-style-type: none"> 1. <i>Excessive use of groundwater</i> 2. <i>Global warming</i> 3. <i>Melting of glaciers</i> 	<p><u>Example of alternative answers:</u></p> <ol style="list-style-type: none"> 1. <i>Causes cracks in building infrastructure</i> 2. <i>Causes drainage problems</i> 3. <i>Leads to expansion of flood areas</i> 4. <i>Occurrence of tidal inundation</i>

a. SHARE

As an empathetic global citizen, you need to be sensitive to water issues in your surroundings. Work in groups, then find and record various water problems that you find in your surrounding environment in the form of photos or videos. Also determine the causes and impacts on human life and other living things.

b. ACT

After you and your group of friends have documented various water problems found in the surrounding environment, share the documentation on your social media to increase public awareness and sensitivity to these problems.

3. Student Worksheet Assessment Rubric

Is there enough water to meet human needs?

QUESTION NUMBER	SCORE				
	4	3	2	1	0
LET'S DISCUSS!					
1	Write down 4 - 5 causes and effects of water problems.	Write down 3 causes and effects of water problems.	Write down 2 causes and effects of water problems.	Write down 1 cause and effect of water problems.	Did not write down any answers.

C. Student Worksheet 3.1: What Is Clean Water? - Become a Clean Water Detective

TOPIC: WATER POLLUTION
LEARNING OBJECTIVES:
<p><i>By doing this activity, you are expected to be able to:</i></p> <ol style="list-style-type: none"> Describe the characteristics of clean water. Investigate clean water in the neighborhood. Reflect on past actions to pollute water.

1. Let's Read!

Read the following text carefully!

CHARACTERISTICS OF CLEAN WATER

Do you know about the characteristics of clean water? There are several parameters that can be used to determine whether water is clean or not, namely:

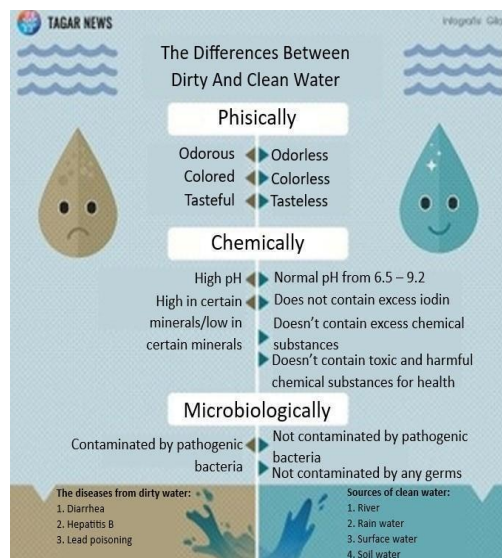


Image source: <https://www.tagar.id/Asset/uploads/345581-air.jpeg>

- Parameters of physical clean water include odor, turbidity, and taste.
- Parameters of chemical clean water include acidity (pH) and mineral content.
- Parameters of biological clean water include the presence of pathogenic bacteria, such as *Escherichia coli*.

If one or more of the above parameters are not met, then the water can be said to be polluted because it has undergone physical, chemical, and biological changes.

2. Let's Discuss!

Before drinking, Danu has to make sure his drinking water is suitable for drinking. Danu has two glasses of water, glass A and glass B.



Image source: personal documentation

Observe the state of the water in the two glasses, then help Danu to fill in the following table.

CHARACTERISTICS OF WATER	GLASS A		GLASS B	
	AVAILABLE	NONE	AVAILABLE	NONE
Color		v	v	
Turbidity		v	v	

Notes:

Place a check mark (v) in the "glass A" and "glass B" columns in the appropriate section.

Which glass of water do you think Danu should drink?

Alternative answer:

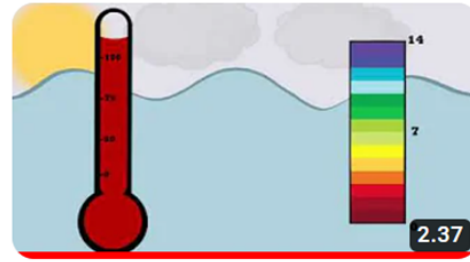
Water in glass A.

3. Let's Research!

In this meeting, you are assigned to be a water detective on a mission to find clean water. This mission aims to investigate whether the water sources in your school environment are polluted or not. Therefore, find water sources such as tap water, well water, river water, rain water, and others in your school environment.



Image source: <https://www.freepik.com>



Water Quality: pH test



Then, examine the color, odor, pH, and turbidity to determine whether the water source is polluted or not! Let's follow these water observation steps carefully.

1. To measure the pH of water, dip a piece of universal pH indicator paper into the solution being tested. Compare the color that appears with the scale on the universal pH indicator, then determine the pH of the solution. Record your results in the table below.
2. To determine the color, odor, and pH of water, observe the water conditions carefully, then describe your observations in the following table.

NO.	WATER SOURCE	DESCRIPTION OF WATER CONDITION				WATER CONDITION		POLLUTING SUBSTANCES
		COLOR	ODOR	PH - SOLUTION PROPERTIES	TURBIDITY	POLLUTED	NOT POLLUTED	
1.								
2.								
3.								

Notes:

- a. The "water source" column can be filled in with the source of water, such as tap water, well water, river water, rainwater, and others.
- b. The pH column can be filled with a number and the nature of the solution, for example 7 - neutral.
- c. Place a check mark (v) in the "water condition" column in the appropriate section.

Question

1. Based on the test results, which solution is contaminated?

Alternative answer:

Filled in based on the test results that have been carried out.

2. Why is the solution polluted?

Alternative answer:

Filled in based on the test results that have been carried out.

4. Let's Discuss!

1. Have you ever done anything that could pollute water? Write down at least one action that you have done!

Alternative answer:

Yes. Actions I have taken include throwing garbage into water sources, overusing detergents, and using single-use plastic packaging.

2. What solutions have you used to address water pollution?

Alternative answer:

Solutions that I have done to overcome water pollution include using water as needed, not throwing garbage into water sources, and reducing the use of detergents.

5. Let's Read!

Read the following text carefully!

VARIOUS ACID-BASE INDICATORS & HOW TO USE THEM

Did you know that universal indicators are not the only acid-base indicators? There are 4 kinds of acid-base indicators, namely universal indicators, natural indicators, litmus paper, and pH meters.

1. Universal Indicator

Universal indicators are a mixture of various indicators that indicate the pH of a solution based on its color change. Acidic solutions have a $\text{pH} < 7$, neutral solutions have a $\text{pH} = 7$, and basic solutions have a $\text{pH} > 7$.

2. Natural Indicators

Natural indicators are indicators that are made using plant extracts, such as flowers, bulbs, fruit peels, or colored leaves. Some examples of natural indicators that you can use everyday include red cabbage, hibiscus, roses, red spinach, turmeric, and geranium. Here is an example of the color change in natural indicators when tested with acidic and basic solutions.

Plant Extract	Original Color	Color Changing in Acid Solution	Color Changing in Base Solution
Red Cabbage	Purple	Pink	Green
Hibiscus	Dark Red	Red	Yellow
Rose	Pink	Pink	Green
Red Spinach	Red	Pink	Yellow
Turmeric	Orange	Yellow	Red
Geranium	Red	Orange	Yellow

3. Litmus Paper

Litmus paper is often used to test the acidity and basicity of a solution. How to use it is quite easy, namely by dipping the paper in the solution you want to test. If the solution is acidic, the litmus paper will turn red. Instead, if the solution is alkaline, the litmus paper will turn blue.

4. pH Meter

pH meter is an electronic device that can be used to measure the pH of a solution quickly. pH meters have special glass electrode sensors that function to measure the pH of semi-solid materials. The way to use a pH meter is to dip it into the solution you want to test. Next, on the pH meter, a scale number will appear indicating the pH of the solution.

Adapted from: <https://www.ruangguru.com/blog/cara-menentukan-indikator-asam-basa>

6. Student Worksheet Assessment Rubric

TOPIC: WATER POLLUTION

Question Number	Score				
	4	3	2	1	0
LET'S DISCUSS!					
Table	Describe all the features in both glasses correctly.	Describe all the features in one of the glasses correctly.	Describe some of the features in one or both glasses correctly.	Write the answer, but it is not correct.	Did not write down any answers.

7. Practicum Skill Assessment Rubric

TOPIC : WATER POLLUTION

ASSESSED ASPECT	SCORE		
	1	2	3
LET'S RESEARCH!			
Ability to use tools and materials	Not able to use the universal pH indicator paper correctly.	Able to use universal pH indicator paper correctly with teacher assistance.	Able to use universal pH indicator paper correctly independently.
Observation ability	Unable to compare the color that appears with the scale on the universal pH indicator.	Able to compare the color that appears with the scale on the universal pH indicator with teacher assistance.	Able to compare the color that appears with the scale on the universal pH indicator independently.
Ability to record data	Write down the water condition description data from one solution completely and correctly.	Write down the water condition description data of the two solutions completely and correctly.	Write down the water condition description data of three solutions completely and correctly.

Ability to interpret data	Determined which solution was polluted, but not precisely.	Determine which solution is polluted correctly with the help of the teacher.	Determine which solution is polluted correctly independently.
Ability to analyze data	Determined the cause of the polluted solution, but not precisely.	Determined the cause of the polluted solution correctly, but only one solution.	Determine the cause of all contaminated solutions correctly.

8. Student Worksheet Assessment Rubric

TOPIC : WATER POLLUTION

QUESTION NUMBER	SCORE				
	4	3	2	1	0
LET'S DISCUSS!					
1	Write ≥ 3 actions that can pollute water correctly.	Write down 2 actions that can pollute water correctly.	Write down 1 action that can pollute water correctly.	Write the answer, but it is not correct.	Did not write down any answers.
2	Write ≥ 3 solutions to overcome water pollution correctly.	Write down 2 solutions to solve water pollution correctly.	Write down 1 solution to overcome water pollution correctly.	Write the answer, but it is not correct.	Did not write down any answers.

D. Student Worksheet 3.2: The Fastest City Sinking in the World

TOPIC: WATER CRISIS

LEARNING OBJECTIVES:

Through this activity, you are expected to be able to:

1. Identify global issues related to human activities and climate change impacts.
2. Reflect on behaviors that trigger climate change impacts.

1. Let's Discuss!



Image source: <https://mammothmemory.net>

Did you know that some areas of the world, including Indonesia, still experience clean water crisis to this day? Java, Bali and Nusa Tenggara are the areas in Indonesia that most often experience clean water crisis. However, there are also many other areas in Indonesia that experience drought, causing a clean water crisis.

Residents there, especially women and girls, are forced to walk to collect clean water, the source of which is far from their homes.

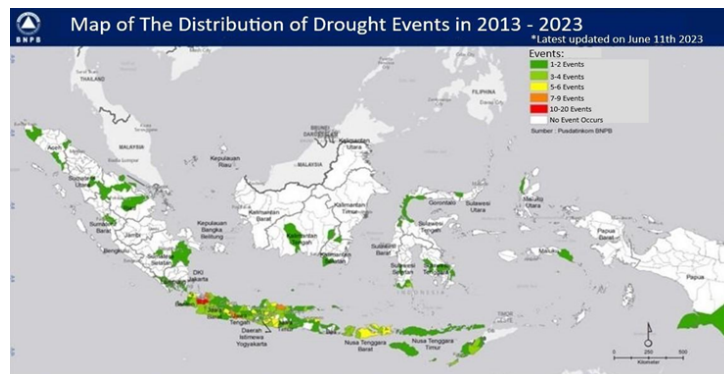


Image source: <https://www.bbc.com/indonesia/articles/cydgj76p626o>

This crisis has had a major impact on their lives, such as the loss of educational opportunities for children, domestic violence against women and girls, and increasing conflicts over clean water.

1. How do you feel after knowing this fact?

Alternative answer:

Students should express feelings of sadness or sympathy after learning the facts about the water crisis.

2. Does your neighborhood have the potential to experience the same thing?

Alternative answer:

Students are expected to write answers that are relevant to their living conditions.

3. What do you think are some of the causes of the water crisis around the world?

Alternative answer:

Factors that can cause a clean water crisis include groundwater depletion due to mass tree cutting, water pollution by factory waste and household waste, significant population growth that is not matched by clean water supply, and climate change that can cause droughts and floods.

2. Let's Watch!

Have you ever heard of groundwater? Did you know that one of the sources of clean water in urban areas is groundwater? When river water, lake water, and other freshwater sources are polluted by various human activities, the potential of groundwater is increasingly being looked at to meet clean water needs. The use of groundwater to meet human needs continues to increase from year to year along with the increase in the world's population. Currently, groundwater is still the solution to overcome the clean water crisis in urban areas because it has good quality and is easily accessible to the community. However, in the future, the struggle for groundwater as a source of clean water may become increasingly fierce. Let's find out more about what groundwater is and how it is formed.

Click on the link below to play a video about groundwater.



What Is Groundwater?

English language video

https://www.youtube.com/watch?v=oNWAerr_xEE&list=RDQMla59n2TSgVw&start_radio=1

Click on the link below to play a video about groundwater.



Selamatkan Air Tanah Mulai dari Kita

Indonesian language video:

<https://www.youtube.com/watch?v=2Wln1bg7SWI>
(starts from minute 1:05 - 5:20)

3. Let's Write!

Let's write down the things you learned from the video about groundwater, including the definition of groundwater, the impact of excessive use of groundwater, and how to maintain the availability of groundwater!

In this section, students write the definition of groundwater, the impact of overusing groundwater, and how to maintain the availability of groundwater.

4. Let's Read!

Read the following article carefully!

SEMARANG AND JAKARTA ARE AMONG THE FASTEST SINKING CITIES IN THE WORLD

According to a study published by Geophysical Research Letters, Semarang and Jakarta are among the fastest-sinking cities in the world. Jakarta is in the third place after Tianjin and Semarang in the list of the fastest sinking cities in the world. The study revealed that the average land subsidence in Tianjin reached 5.22 cm per year from 2015-2020. Semarang is second with an average land subsidence of 3.96 cm per year, while the average land subsidence in Jakarta is 3.44 cm per year.

Researchers say that the biggest factor contributing to land subsidence in cities around the world is the massive use of groundwater. In addition, these city areas generally have large populations or are used as industrial areas. There is also the cause of climate change, which is responsible for rising sea levels. In addition, poor urban planning can also increase the risk of land subsidence in these areas.

While these cities cannot raise the ground level again, they can reduce the rate of subsidence by improving their urban planning and groundwater use.

Adapted from: <https://inet.detik.com/science/d-6629061/semarang-dan-jakarta-masuk-daftar-kota-paling-cepat-tenggelam-di-dunia>

5. Let's Discuss!

1. According to research published in Geophysical Research Letters, Semarang and Jakarta are among the fastest-sinking cities in the world. What causes this phenomenon?

Alternative answer:

The causes of the phenomenon are massive groundwater use, large populations or industrialized areas, and climate change.

2. What do you think are the impacts of land subsidence in these cities?

Alternative answer:

The impacts of land subsidence in these cities include flooding, damage to buildings and city infrastructure, gas pipeline explosions, and reduced quality of life for people and the environment.

3. Is there a solution that we can apply to overcome this phenomenon?

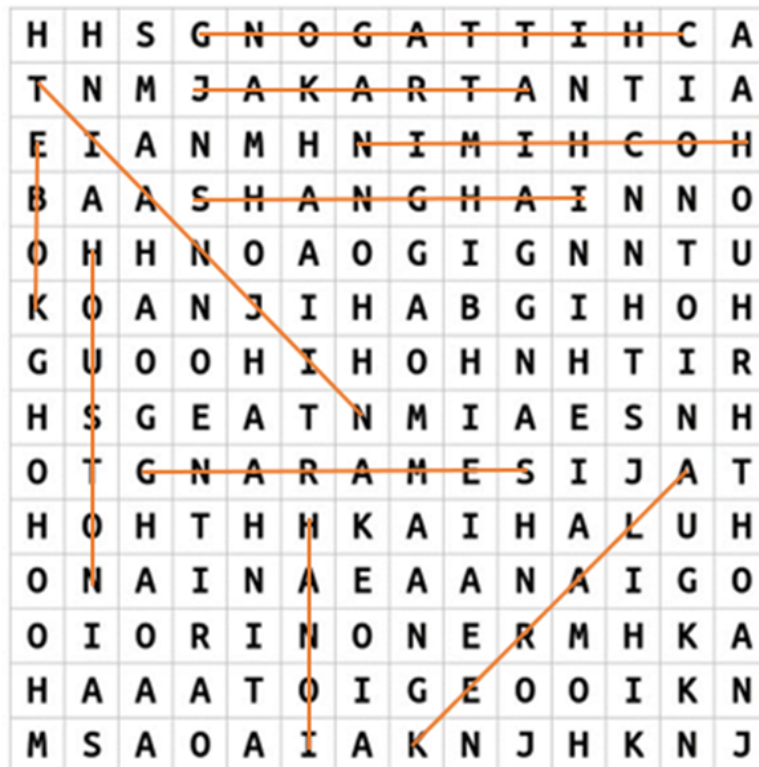
Alternative answer:

Solutions that we can apply to overcome this phenomenon are limiting the use of groundwater, finding other water sources besides groundwater, and building sea walls.

6. Let's Practice!

According to a study published in Geophysical Research Letters, there are 10 fastest-sinking cities in the world. Let's find the names of these cities in the search box below!

Tianjin - Semarang - Jakarta - Shanghai - Ho Chi Minh - Hanoi - Chittagong - Kobe - Kerala – Houston



Click on the link or scan the barcode below to do it online.:

<https://thewordsearch.com/puzzle/5773277/10-kota-paling-cepat-tenggelam-di-dunia/>

7. Let's Discuss!

Are there any of your behaviors that can trigger land subsidence where you live? Write down at least two such behaviors!

Alternative answer:

Yes. Behaviors that I have engaged in include overusing water and not closing the tap after use.

8. Student Worksheet Assessment Rubric

TOPIC: WATER CRISIS

QUESTION NUMBER	SCORE				
	4	3	2	1	0
LET'S DISCUSS!					
1	Showing feelings of sympathy after learning the facts about the water crisis.	-	-	Showing an unsympathetic feeling after learning the facts about the water crisis.	Did not write down any answers.
2	Write answers that are relevant to the conditions of the neighborhood.	-	-	Writes the answer, but it is not correct.	Did not write down any answers.
3	Write down ≥ 3 factors that cause the clean water crisis correctly.	Write down 2 factors that cause the clean water crisis correctly.	Write down 1 factor that causes the clean water crisis correctly.	Write the answer, but it is not correct.	Did not write down any answers.
LET'S DISCUSS!					
1	Write down 3 causes of the city sinking correctly based on the article.	Write down 2 causes of the city sinking correctly based on the article.	Write down 1 cause of the city sinking correctly based on the article.	Write the answer, but it is not correct.	Did not write down any answers.

2	Write down ≥ 3 impacts that can result from the sinking of the city correctly.	Write down 2 impacts that can result from the sinking of the city correctly.	Write down 1 impact that can be caused by the sinking of the city correctly.	Write the answer, but it is not correct.	Did not write down any answers.
3	Write ≥ 3 solutions that can be applied to overcome the phenomenon of city sinking correctly.	Write down 2 solutions that can be applied to overcome the phenomenon of city sinking correctly.	Write down 1 solution that can be applied to overcome the phenomenon of city sinking correctly.	Write the answer, but it is not correct.	Did not write down any answers.
LET'S PRACTICE!					
	Found 9 - 10 city names in the search box.	Found 7 - 8 city names in the search box.	Found 4 - 6 city names in the search box.	Found 1 - 3 city names in the search box.	Did not write down any answer.
LET'S DISCUSS!					
	Write down ≥ 3 behaviors that can trigger land subsidence.	Write down 2 behaviors that can trigger land subsidence.	Write down one behavior that can trigger land subsidence.	Write the answer, but it is not correct.	Did not write down any answers

E. Student Worksheet 3.3: How Much Water Do We Really Use Everyday?

TOPIC: WATER OVERUSE
LEARNING OBJECTIVES:
<p><i>Through this activity, you are expected to be able to:</i></p> <ol style="list-style-type: none"> 1. Outline daily water usage at home and at school. 2. Chart your own water usage at home. 3. Conduct a self-assessment of water use behavior to reduce the water crisis (climate change impacts).

1. Let's Watch!

Look at the following illustration carefully!



Image source: <https://foto.bisnis.com/view/20201005/1300774/warga-pamekasan-jawa-timur-berebut-air-bersih-akibat-dilanda-kekeringan>

1. How do you feel after seeing the illustration above?

In the illustration, people are seen gathering to fight for clean water due to drought. As fellow citizens of the world, students are expected to be able to show empathy towards the conditions that are being experienced by them.

2. What if similar conditions occur in your neighborhood?

Students can express their personal opinions or feelings if similar conditions occur in their neighborhood. Students can express their feelings of sadness, anxiety, fear, or optimism about similar conditions that they may be experiencing now or in the future.

2. Let's Watch!

Do you know how much water you should use to fulfill your daily needs? Let's find out through this video.

Click on the link below to play a video about water use in everyday life.



How much water do we waste in our daily lives? ⋮

Source: <https://www.youtube.com/watch?v=38aYXZou4uc>

3. Let's Research!

Have you ever calculated the amount of water you use on a daily basis? By knowing how much water you use, you can take a closer look at whether or not you are being water efficient. Let's start your first step as a water hero by recording your water usage both at school and at home.

1. Describe your water usage at school and the amount in gallons!

NO.	WATER USAGE	QUANTITY (GALLONS)
1.		
2.		
3.		
4.		
5.		
Total		...

Notes:

- a. The "water use" column is filled in with the name of the activity that uses water, such as drinking, bathing, washing, and others.
- b. The gallon used as a unit is a gallon of mineral water which is equivalent to 19 liters of water.

2. Work in groups, then describe your and your friends' water usage at home and the amount in gallons!

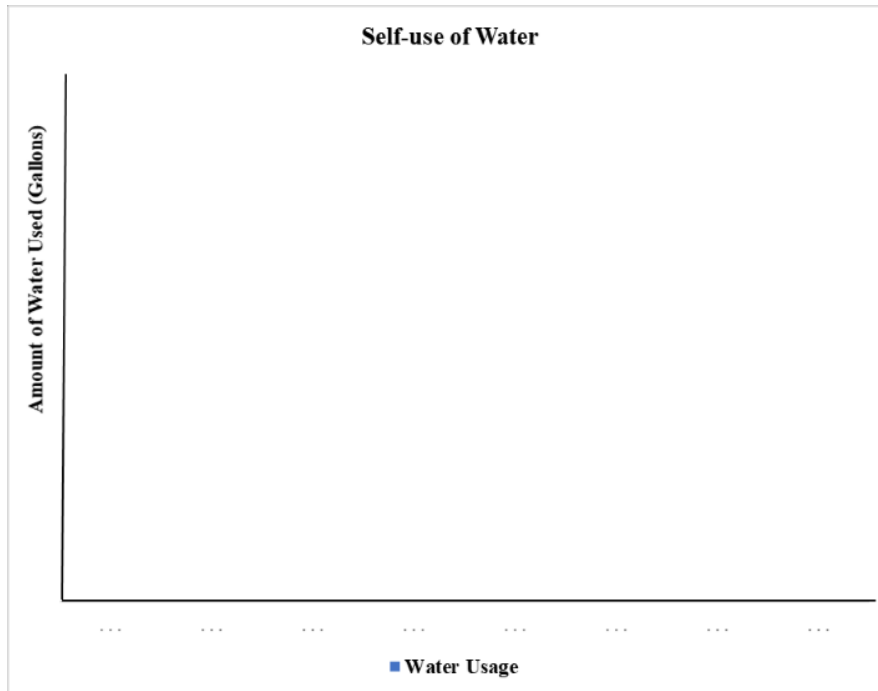
No.	Water Usage	Learner Name					Total ⁽¹⁾
		
		(gallons)	(gallons)	(gallons)	(gallons)	(gallons)	
1.							...
2.							...
3.							...
4.							...
5.							...
6.							...
7.							...
8.							...
9.							...
10.							...
	Total⁽²⁾	

Notes:

- The "water use" column is filled in with the name of the activity that uses water, such as drinking, bathing, washing, and others.
- The "students' names" column is filled in with the names of you and your friends.
- Total⁽¹⁾ is the amount of water used for each activity.
- Total⁽²⁾ is the amount of water used by each learner.
- The gallon used as a unit is a gallon of mineral water which is equivalent to 19 liters of water.

4. Let's Practice!

In the previous activity, you have started your first step as a water hero by recording your water usage. Use the water usage data at home (only your own water usage, not your friends) to create a graph so that you can more easily compare water usage in each activity. The graph is a bar graph with "water use" as the X-axis and "amount of water used" as the Y-axis!



After practicing making graphs, you can present the results in front of the class. You can draw your graph on a piece of cardboard or A3 paper to make it more visible.

5. Let's Discuss!

1. How much water do you use at home? What activities use the most water?

Alternative answer:

Filled in based on the results of the observations that have been made.

2. What do you think is the condition of the water in your house? Why is this?

Alternative answer:

Filled in based on the results of the observations that have been made.

3. What will you do to limit water use for your most water-intensive activities?

Alternative answer:

Fill in based on the results of the evaluation of water use that has been carried out, such as using water as needed, turning off the water tap when not in use, and making a schedule for watering plants and cleaning vehicles.

6. Let's Practice!

Do you know where the water you use to fulfill your daily needs comes from? Let's complete the names of the various sources of clean water below carefully!



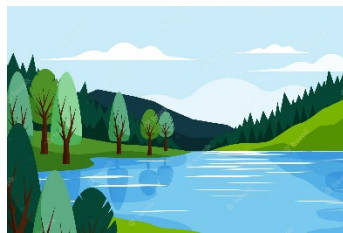
OCEAN



RAIN



GROUND



LAKE



RIVER

Image source: <https://www.freepik.com>

7. Let's Read!

Read the following article carefully!

DO YOU KNOW HOW MUCH WATER WE SHOULD IDEALLY DRINK PER DAY?

Did you know that everyone's water needs are different? This need is influenced by various factors, including age, gender, activity level, environmental conditions, and nutritional status (normal, overweight, or obese). In general, adults need about 8 glasses of 230 ml per day or about 2 liters. Meanwhile, for children in Indonesia, it is recommended to drink 1,900 ml (1.9 liters) of water for children aged 7 - 9 years and 1,800 ml (1.8 liters) for children aged 10 - 12 years.

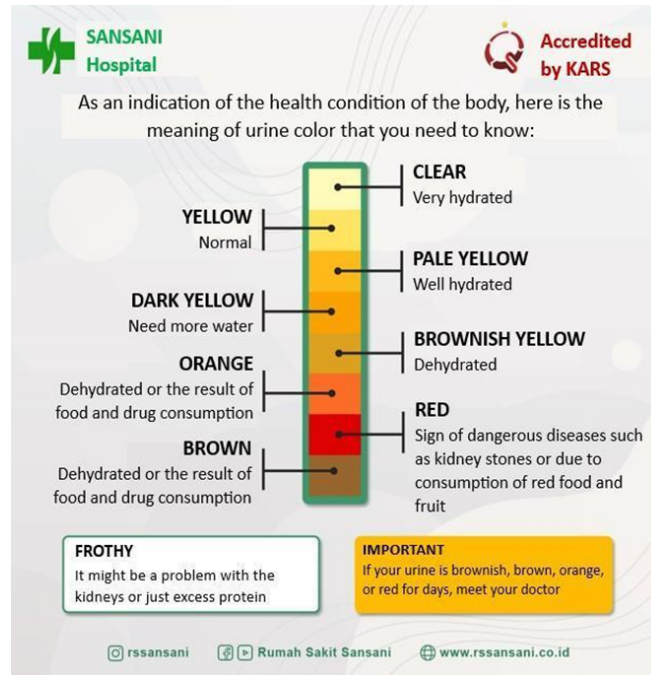


Image source: <https://rssansani.co.id/kenali-arti-warna-urine/>

If a person experiences a lack of fluids due to not drinking enough water, then their body will be prone to dehydration. Dehydration is a condition where a person's body is deprived of fluids so that he has difficulty concentrating, fainting, or even death. The early symptoms of dehydration experienced by a person can be seen through yellow-brown urine. Apart from drinks, food can also provide fluid intake to the body, which is around 20%. Fluids from food are mainly obtained from fruits and vegetables, such as spinach and watermelon, which contain 90% water.

Adapted from: https://yankes.kemkes.go.id/view_artikel/579/tahukah-kamu-berapa-idealnya-jumlah-air-putih-yang-kita-minum-perhari

8. Student Worksheet Assessment Rubric

TOPIC : WATER OVERUSE

ASSESSED ABILITY	SCORE				
	4	3	2	1	0
LET'S PRACTICE!					
ABILITY TO MAKE GRAPHS					
Ability to select relevant forms of data representation	Displays a bar graph representation of data that is able to show a comparison of the amount of water used by each family member across activities.	Displays a bar graph representation of data that is able to show a comparison of the amount of water used by each family member in several activities.	Displays a mathematical form of data representation, but not a bar graph.	Displays a non-mathematical or non-visual forms of data representation.	Did not write down any answers.
Ability to place a scale on a graph	Displays a graph with a scale caption and consistently place the scale according to the interval.	Displays a graph with a scale caption, but does not consistently place the scale according to the interval.	Displays a graph with a scale description, but does not pay attention to the intervals at all.	Displays a graph without a scale caption.	Did not write down any answers.

LET'S DISCUSS!					
1	Write down how much water is used at home and what activities use the most water based on the data obtained.	Write down how much water is used at home or what activities use the most water based on the data obtained.	Write down how much water is used at home and/or what activities use the most water, but not based on the data obtained.	Write the answer, but it is not correct.	Did not write down any answers.
2	Describes the condition of the water at home based on the data obtained and accompanied by the reason.	Describes the condition of the water at home based on the data obtained, but does not provide reasons.	Describes water conditions at home, but not based on data.	Write the answer, but it is not correct.	Did not write down any answers.
3	Write down ≥ 3 things done to limit water usage.	Write down 2 things you do to limit water usage.	Write down one thing you do to limit water usage.	Write the answer, but it is not correct.	Did not write down any answers.
LET'S PRACTICE!					
	Write down 5 answers correctly.	Write down 4 answers correctly.	Write down 3 answers correctly.	Write 1 - 2 answers correctly.	Did not write down any answers.




F. Student Worksheet 4: Let's Make an Action Plan!

LEARNING OBJECTIVE:

Through this activity, you are expected to be able to propose various creative ideas as an effort to conserve water.

1. Let's Share!

Water is one of the natural resources that can be renewed because the earth has a water cycle. However, the availability of clean water that can be used by humans to fulfill their daily needs is very limited. Therefore, we must be careful in using water so that we can avoid a clean water crisis and at the same time save on water bills. Let's come up with your creative ideas on what can be done at home, at school, and in public places as an effort to conserve water!

<p>Things to do at home</p>  <p>Image source: https://www.freepik.com</p>	<p><u>Example of alternative answers:</u></p> <ol style="list-style-type: none"> <i>Purchase of packaged water.</i> <i>Creating a garden to help soil absorb water.</i> <i>Make biopore channels in the home yard.</i>
<p>Things to do at school</p>  <p>Image source: https://www.freepik.com</p>	<p><u>Example of alternative answers:</u></p> <ol style="list-style-type: none"> <i>Bring drinking water from Home.</i> <i>Planting plants in the school environment.</i> <i>Turning off water taps that have been not used.</i>
<p>Things to do in public places</p>  <p>Image source: https://www.freepik.com</p>	<p><u>Example of alternative answers:</u></p> <ol style="list-style-type: none"> <i>Planting trees around the area where the river flows.</i> <i>Make infiltration wells.</i> <i>Make savings and water resources management wisely.</i>

2. Let's Practice!

Play in groups and shout BINGO if you can mark the words in the box quickly and correctly!

W	A	T	E	R
harvest rainwater	make biopore infiltration holes	eliminate plastic use	use water-saving household appliances	use a faucet aerator
wash clothes in large quantities	use soap and detergent sufficiently	turn off the water tap after use	make a water filter	check water pipes or leaks regularly
stop dumping waste into river	install a water filter	FREE	replace tap with a bucket	check water bills
establish groundwater protected areas	make a schedule for watering plants	use a ladle to water	plant trees in river watersheds	boil enough water
make a dam	take a shower quickly	dig absorption wells	use water efficiently	reuse waste water



make a schedule for watering plants	use a faucet aerator	check water pipes or leaks regularly	harvest rainwater	make a water filter
check water bills	make biopore infiltration holes	boil enough water	install a water filter	wash clothes in large quantities
establish groundwater protected areas	use soap and detergent sufficiently	plant trees in river watersheds	replace tap with a bucket	stop dumping waste into river
use water-saving household appliances	take a shower quickly	turn off the water tap after use	dig absorption wells	use a ladle to water
use water efficiently	reuse waste water	eliminate plastic use	make a dam	

3. Let's Write!

After you have implemented various action plans to conserve limited water resources, let's do some self-reflection by filling in the following table.

I am ...	<i>students can fill in this section by explaining that they are part of global citizens who take responsibility and contribute to solving global problems.</i>
I think ...	<i>students can fill in this section by explaining the cognitive aspects of themselves gained through experience when implementing the action plan, such as stating that water resources conservation activities are important to do or other statements relevant to water conservation activities that have been carried out.</i>
I feel ...	<i>students can fill in this section by expressing the emotional aspects of themselves obtained through experiences when implementing the action plan, such as feeling happy because they have successfully carried out water resources conservation activities or other statements relevant to the water conservation activities that have been carried out.</i>
I will do ...	<i>students can fill in this section by explaining that they are part of global citizens who take responsibility and contribute to solving global problems.</i>

4. Let's Read!

Read the following article carefully!

LET'S TAKE ACTION WITH UNICEF!



Image source: <https://www.unicef.org/indonesia/id/ureport>

Have you ever heard of UNICEF? UNICEF stands for *United Nations Children's Fund*. UNICEF is an international organization that focuses on the development of children around the world, including Indonesia. UNICEF is also committed to realizing the 17 *Sustainable Development Goals (SDGs)*, one of which is to ensure access to clean water and sanitation for all. As a student, you can do your part as a child warrior by making an occasional or monthly donation to UNICEF. You can also voice your opinions and take action on issues that matter to you through U-Report, UNICEF Indonesia's communication platform for and from young people. This way, you can be directly involved in making a difference in the lives of disadvantaged children in Indonesia.

5. Student Worksheet Assessment Rubric

LET'S MAKE AN ACTION PLAN!

QUESTION NUMBER	SCORE				
	4	3	2	1	0
LET'S SHARE!					
	Writes 13 - 15 or more creative ideas to conserve water correctly.	Write down 9 - 12 creative ideas to conserve water correctly.	Writes 5 - 8 creative ideas to conserve water correctly.	Wrote down 1 - 4 creative ideas to conserve water correctly.	Did not write down any answers.

G. Student Worksheet 5: Let's Do Something to Conserve The Water!

IT'S HERO TIME!

LEARNING OBJECTIVE:

Through this activity, you are expected to be able to take concrete actions as solutions to local-global problems that can be applied in everyday life as a form of responsibility and solidarity of global citizens.

1. Let's Share!

Clean water that can be used by humans to fulfill their daily needs is limited. Therefore, an effort is needed to maintain the existence and sustainability of water resources through water resources conservation activities. This conservation activity must start from ourselves, and involve family members and friends at school. Let's come up with an action plan to conserve the limited water resources and document its implementation!

No.	Activities Water Conservation	Applicability		Implementation		Obstacles Encountered	Documentation Evidence
		Imple- mented	Not Imple- mented	On Your Own	Done With Others		
1.	<u>Example of alternative answers:</u> Close the faucet after use.	v			v	There are family members who sometimes do not close the faucet tightly after use.	Attach documentary evidence in the form of photos or video links if the action plan is successfully implemented
2.	<u>Example of alternative answers:</u> Collecting rainwater to help fulfill water needs at home.		v			There was no rain at the time of the action plan.	Attach documentary evidence in the form of photos or video links if the action plan is successfully implemented

3.	<i>Example of alternative answers: Planting trees in the neighborhood around the school</i>	v				<i>No obstacles whatsoever</i>	<i>Attach documentary evidence in the form of photos or video links if the action plan is successfully implemented</i>
4.							
5.							
6.							
7.							
8.							
9.							
10.							

Notes: Place a check mark (v) in the "applicability" and "implementation" columns in the appropriate section.

2. Student Worksheet Assessment Rubric

IT'S HERO TIME!

QUESTION NUMBER	SCORE				
	4	3	2	1	0
LET'S SHARE!					
	Write down 9 - 10 action plans with documentary evidence.	Found 7 - 8 action plans with documentary evidence.	Found 4 - 6 action plans with documentary evidence.	Found 1 - 3 action plans with documentary evidence.	Did not write down any answers.

H. Student Worksheet 6: Water Purification Device

LET'S MAKE YOUR OWN WATER PURIFIER

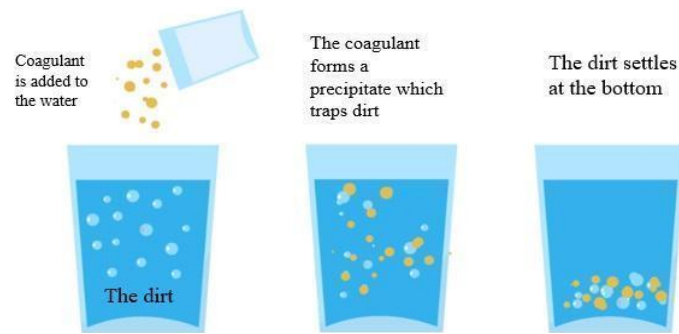
LEARNING OBJECTIVE:
Through this activity, you are expected to be able to make a water purifier by utilizing the potential of local natural resources.

1. Let's Read!

Read the following article carefully!

WATCH OUT! THE DANGERS OF ALUM AS A WATER PURIFIER

Have you heard about the benefits of alum as a water purifier? Alum is a white chemical compound that can be used to purify water. Alum can agglomerate solids dissolved in water so that the water becomes clearer. Compared to the coagulation method which is done by storing water in a closed container for several days, the use of alum is considered much more effective because it is able to precipitate very small particles.



However, did you know that excessive use of alum has a negative impact? This is because alum contains aluminum sulfate $Al_2(SO_4)_3$ one of the heavy metals which in ionic form is highly toxic. Research shows that consumption of aluminum sulfate in animals can result in liver and kidney damage.

Adapted from:

<https://siagaairbersih.com/blog/2020/12/30/awas-hati-hati-menggunakan-tawas-untuk-menjernihkan-air/>

2. Let's Get Creative!

HOW TO MAKE A SIMPLE WATER PURIFIER?

The water purification process has a number of benefits, including removing odor, color, and taste in water. The water purification process can be done with several methods, one of which is the gravity fed filtering system water purification method. This method combines two water purification methods, namely the water purification method with slow sand at the bottom and the water purification method with fast sand at the top. The slow sand water purification method uses a layer of sand at the top, then a layer of gravel underneath. Meanwhile, the quick sand water purification method uses a layer of gravel at the top, then a layer of sand underneath. Let's make your own water purifier with the gravity fed filtering system water purification method which is more environmentally friendly than the chemical water purification method using alum.

Objective:

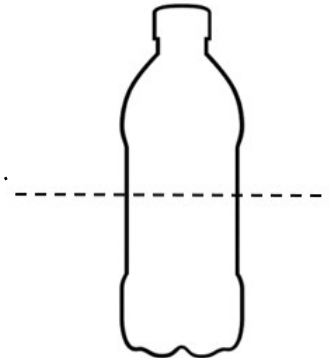
Making a water purifier by utilizing the potential of local natural resources.

Tools and Materials:

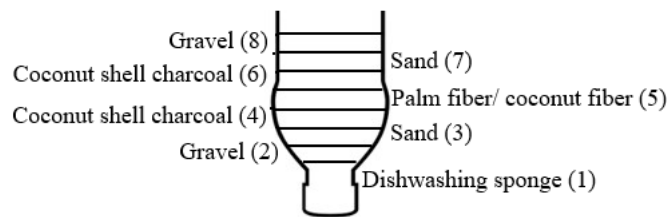
NO	TOOLS AND MATERIALS	TOTAL
1.	Used 1.5 liter mineral water bottle	1 piece
2.	Dishwashing sponge	To taste
3.	Gravel	To taste
4.	Sand	To taste
5.	Coconut shell charcoal	To taste
6.	Palm fiber or coconut fiber	To taste
7.	Dirty water sample	To taste

Directions:

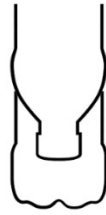
1. Clean water bottles, dishwashing sponges, gravel, sand, coconut shell charcoal, and coconut fiber.
2. Cut an old mineral water bottle into two equal parts, then make small holes in the bottle cap.



3. Insert a piece of dishwashing sponge at the very bottom (near the bottle cap) with a thickness of 2 cm.



4. Add gravel, sand, coconut shell charcoal, and coconut fiber each with a thickness of 2 cm.
5. Pile it back with coconut shell charcoal, sand, and gravel each with a thickness of 2 cm.
6. Join the two halves of the bottle by inserting the bottle cap into the bottom piece of the bottle.



7. Pour the bottled water sample into the water purifier that has been made and observe the condition of the filtered water.

Question:

1. Is there any change in the sample water before and after filtering with the water purifier?

Alternative answer:

Yes, there were changes in the sample water before and after filtering with the water purifier. Before filtering, the sample water appeared brownish, cloudy, and smelly. After filtering, the sample water appears clear, less cloudy, and less smelly.

2. What do you think is the quality of the filtered water if one of the components of the water purifier is missing?

Alternative answer:

If one of the components of the water purifier is missing, this will affect the quality of the filtered water. Gravel, sand, and dish sponges serve to filter out large impurities in the sample water, such as leaves or small animals. If these components are not present, the filtered water will still contain large impurities. Meanwhile, coconut shell charcoal and coconut fiber serve to filter out small-sized impurities and reduce odors in the sample water. If these components are not present, the filtered water will still contain small-sized impurities and odor.

3. What do you think would be the quality of the filtered water if you changed the arrangement of the components of the water purifier (not the arrangement in the directions)?

Alternative answer:

If the arrangement of the water purifier components is changed (the arrangement is not as in the directions), this will not affect the quality of the filtered water. This is because the sample water will still undergo the entire filtration process if the water purifier components are complete.

Conclusion:

Write down the conclusion of the experiment to make a simple water purifier that you have done!

Alternative answer:

Various potential local natural resources, such as coconut shell charcoal and coconut fiber, can be used to make simple water purifiers. This water purifier is able to reduce or remove impurities in water so that water becomes suitable for use to meet daily needs.

3. Practicum Skill Assessment Rubric

WATER PURIFIER

LET'S MAKE YOUR OWN WATER PURIFIER

ASSESSED ASPECT	SCORE		
	1	2	3
LET'S GET CREATIVE!			
Ability to select or bring tools and materials	Unable to choose or not bring the components that make up the water purification layer as stated in the student worksheet.	Able to choose or bring some of the components that make up the water purification layer as stated in the student worksheet.	Able to choose or bring all the components that make up the water purification layer as stated in the student worksheet.
Ability to use tools and materials	Unable to arrange the layers of the water purifier in the order listed in the directions.	Able to arrange the layers of the water purifier according to the sequence listed in the directions with the help of the teacher.	Able to assemble the water purification layer according to the sequence stated in the directions independently.
Filtered water quality	The filtered water does not change color when compared to the sample water.	The filtered water has a slight color change (still looks cloudy) when compared to the sample water.	The filtered water changes color (becomes clear) when compared to the sample water.

Aesthetics of the water purifier	The components that make up the water purification layer are not arranged at all.	The components that make up the water purification layer are not neatly arranged and are not the same thickness for each layer.	The components that make up the water purification layer are arranged neatly and with the same or almost the same thickness for each layer.
QUESTION			
1	Writes the answer, but it is not correct.	States that there are changes or differences in the sample water before and after filtering with a water purifier, but is not described in detail.	State the changes or differences in the sample water before and after filtering with a water purifier and describe them clearly / in detail.
2	Writes the answer, but it is not correct.	Describe the quality of filtered water if one of the components of the water purifier is missing, but not accompanied by an explanation of the function of each component.	Describe the quality of filtered water if one of the components of the water purifier is missing, along with an explanation of the function of each component.
3	Writes the answer, but it is not correct.	Describe the quality of the filtered water if the arrangement of the components of the water purifier is changed, but without justification.	Describe the quality of the filtered water if the arrangement of the components of the water purifier is changed and provide reasons.
SUMMARY			
	Writes a conclusion, but it is imprecise or not fit for purpose.	Write conclusions in accordance with the objectives, but do not explain the success of the water purifier made.	Write a conclusion in accordance with the objectives and explain the success of the water purifier made.

I. Student Worksheet 7: Let's Make a Campaign!

LEARNING OBJECTIVE:

Through this activity, you are expected to be able to create campaign materials based on real actions that have been carried out as a form of concern and sharing among fellow citizens of the world.

1. Let's Share!

Do you realize that we can all be water heroes? Water heroes have a very noble mission, which is to save water and conserve water resources. In the previous meeting, you have compiled and carried out concrete actions to realize this mission. However, water heroes do not move alone, but invite their families, friends, and people around them to participate in doing good in order to produce greater changes. In today's digital era, water heroes can reach out and invite more people through social media, such as Youtube, Instagram, and TikTok. Let's create a campaign material (can be in the form of posters, videos, etc.) in groups that contain positive messages and invitations to save water and conserve water resources, then upload it to social media as a form of campaign to others! First make a sketch (if you are making a poster) or storyline (if you are making a video) that you will include in your campaign content in the box below. You can also go around the class and approach other groups to get more ideas from your classmates.

Write down a moral value or your unique experience in saving or conserving water in this box!

Draw a sketch (if you're making a poster) or storyline (if you're making a video) in this box!



2. Student Worksheet Assessment Rubric

LET'S MAKE A CAMPAIGN!

QUESTION NUMBER	SCORE				
	4	3	2	1	0
LET'S SHARE!					
Content/text	The information on the poster or video is short, concise and clearly legible.	Two of the three criteria are met.	One of the three criteria is met.	None of the criteria were met.	Did not write down any answers.
Design	The colors used are attractive, the ornamental or additional components are proportional, and the message to be conveyed takes center stage.	Two of the three criteria are met.	One of the three criteria is met.	None of the criteria are met.	Did not write down any answers.
Image	The images used are original, interesting and meaningful as a medium for conveying messages.	Two of the three criteria are met.	One of the three criteria is met.	None of the criteria are met.	Did not write down any answers.
Ability to deliver the message	The message conveyed is easily captured by the reader.	The message conveyed is quite easy for the reader to grasp.	The message is difficult for the reader to grasp.	The message conveyed cannot be captured by the reader.	Did not write down any answers.

Comprehension Evaluation

Name :

Class :

Instructions

1. In this activity, you will be working on problems. Before doing so, first check the number of questions available in the text. This script has 10 comprehension evaluation questions consisting of multiple choice, complex multiple choice, short form and description questions.
2. Write your identity (name and class) and answers on the question sheet using a pen.
3. You have 40 minutes to complete it.

Read the following article carefully to answer questions 1-2!

WHY EARTH'S WATER NEVER RUNS OUT DESPITE CONSTANT USE

Water is the primary need of living things, whether humans, animals or plants. Every day, water is used continuously, even without stopping. Humans often use water for activities and to fulfill their needs, such as drinking, bathing, cooking, and so on. As for animals and plants, water is used to clean the body, drink, and as a place to live. However, do you know why water on earth never runs out even though it is used continuously?

According to Sarintan Efratani Damanik in the book *Forestry Development Planning (2019)*, water is one of the most widely utilized renewable energies. In practice, water can be used freely and can be renewed. The amount of water is also unlimited so that living things can utilize water to meet their needs. As one of the renewable energies, water is also utilized for other purposes, including being processed into a source of electrical energy.

Cited from the book *Environmental Engineering (2021)* by Rina Marina Masri and Iskandar Muda Purwaamijaya, the water cycle is the rotation of water from the earth to the atmosphere which takes place continuously and goes through a number of stages. Some of the benefits of the water cycle are maintaining the availability of water on earth, regulating environmental temperature, creating rain, and maintaining the balance of the ecosystem. Reported from the book *Ecosystems: Inquiry Module Based on Potential and Local Wisdom (2020)* by Umami Nur Afinni Dwi Jayanti, the water cycle occurs through a series of processes that do not stop. If the water cycle does not occur, the ecosystem will not function and life cannot be maintained because water is needed in the ecosystem and by living things.

Adapted from:

<https://www.kompas.com/skola/read/2022/04/05/080000669/alasan-air-di-bumi-tidak-pernah-habis-walau-digunakan-terus-menerus?page=all>

1. Based on the article above, the reason water on earth never runs out is...

	Water is one of the renewable energies that is unlimited in quantity.
✓	Water can be processed into a source of electrical energy.
	There is a continuous water cycle.
✓	Water is needed in ecosystems and by living things.

Note: please check (✓) in the box provided and there can be more than one answer.

2. In the first sentence of the third paragraph of the article above there is a sentence that reads: "*Cited from the book Environmental Engineering (2021) by Rina Marina Masri and Iskandar Muda Purwaamijaya, the water cycle or water cycle is the rotation of water from the earth to the atmosphere which takes place continuously and goes through a number of stages*". The stages of the water cycle referred to in order are
- Evaporation → condensation → infiltration → precipitation
 - Evaporation → condensation → precipitation → infiltration**
 - Condensation → evaporation → infiltration → precipitation
 - Condensation → evaporation → precipitation → infiltration

Read the following discourse carefully to answer questions 3-5!

Budi was assigned by his teacher to record his water usage in one day. The results of his recording are shown in the following table.

NO.	ACTIVITY TYPE	NUMBER OF GALLONS OF WATER USED
1.	Drinking and cooking instant noodles	0.2
2.	Bathing and toilet needs	10
3.	Washing clothes	5
4.	Washing dishes and cookware	2
5.	Cleaning the house	3
6.	Watering the plants	2.5
7.	Bathing and cleaning pet cages	2

3. Based on the data in the table above, rank the activities that use the most water to the least!

Alternative answer:

- 1. Shower and toilet use (10 gallons)**
 - 2. Washing clothes (5 gallons)**
 - 3. House cleaning (3 gallons)**
 - 4. Watering plants (2.5 gallons)**
 - 5. Washing dishes and cookware (2 gallons)**
 - 6. Bathing and cleaning pet cages (2 gallons)**
 - 7. Drinking and cooking instant noodles (0.2 gallon)**
4. What activities use the most water?

Alternative answer:

Bathing and toilet use, which is 10 gallons.

5. How much water does Budi need in one day?

Alternative answer:

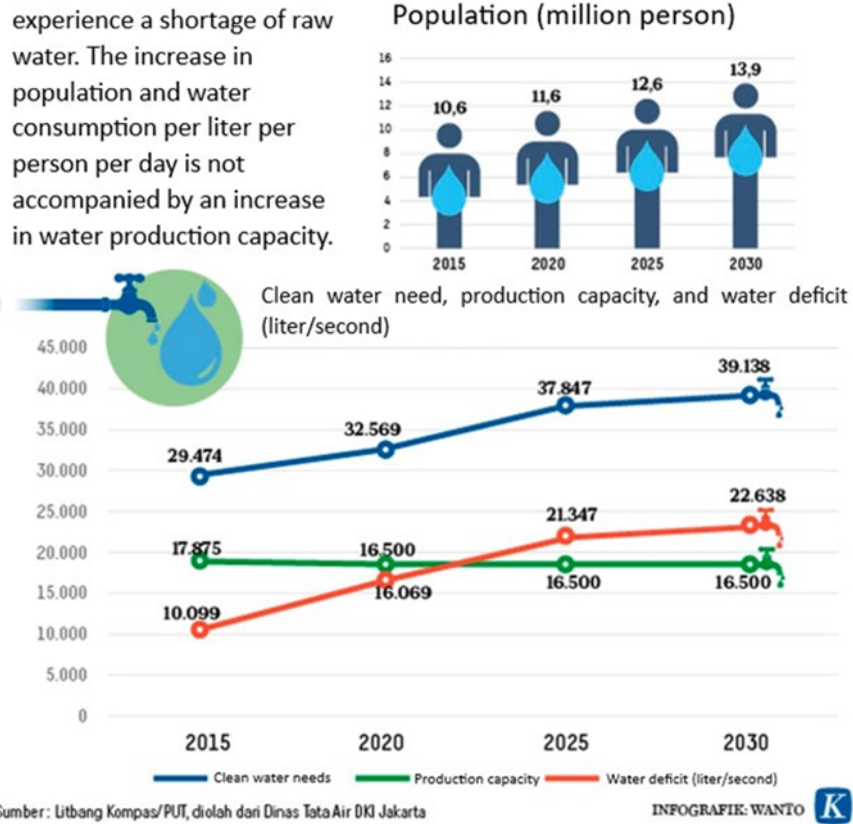
Budi needs 24.7 gallons of water a day.

Read the following article carefully to answer questions 6-8!

UNACKNOWLEDGED JAKARTA'S CLEAN WATER CRISIS

A number of residents in West Jakarta have complained about PAM water in their homes that often does not flow. This condition has forced residents to buy jerrycan water or take groundwater to meet their clean water needs. In addition, residents also complained about the quality of PAM water that looks slimy, yellow like tea, and itchy when used for bathing so residents do not dare to use it as drinking water. These complaints about the lack of clean water quantity and quality indicate that water security in the capital is experiencing a deficit.

The Estimation of the Special Capital Territory of Jakarta's Clean Water Needs



Based on data from the Water Management Agency of the Special Capital Territory of Jakarta displayed in the form of the graph above, in 2015, Jakarta had a population of 10.6 million people and required clean water of around 29,500 liters per second. However, the piped water production capacity was only 17,875 liters per second, resulting in a water shortage of 10,099 liters per second. The data also shows that until 2030, Jakarta will continue to experience raw water shortages. This is due to the increase in population and water consumption per liter per person per day which is not followed by additional water production capacity. Thus, it is not surprising that PAM can only meet the needs of around 62.08 percent of the Special Capital Territory of Jakarta residents.

Adapted from: <https://www.kompas.id/baca/riset/2018/01/16/krisis-air-bersih-jakarta-yang-tak-disadari>

6. Based on the article and graph above, determine whether the following statements are true or false.

STATEMENT	TRUE	FALSE
The demand for clean water in the Special Capital Territory of Jakarta continues to increase from year to year.	✓	
The Special Capital Territory of Jakarta government is only able to meet the clean water needs of its citizens until 2030.		✓
Water production capacity by PAM in the Special Capital Territory of Jakarta is able to keep up with the increase in population water consumption.		✓
The shortage of water production by PAM in the Special Capital Territory of Jakarta continues to increase along with the increase in population.	✓	

7. In the second sentence of the first paragraph of the article above, it is stated that "*this condition has forced residents to buy jerrycan water or take groundwater to meet their clean water needs*". What do you think is the impact of taking groundwater on a large scale to fulfill clean water needs?

Alternative answer:

The impacts of massive groundwater withdrawal to meet clean water needs include a decrease in the amount of water discharge, a decrease in groundwater levels, seawater intrusion, and a decrease in groundwater quality.

8. The clean water crisis experienced by residents in the Special Capital Territory of Jakarta certainly has a huge impact on their lives. Various complaints about the lack of quantity and quality of clean water experienced by residents indicate the low water security in the capital city. The problems experienced by residents in the Special Capital Territory of Jakarta can also be experienced by global citizens around the world. As empathetic global citizens, the efforts we can make to help reduce the water crisis are

- a. Open the water tap to the maximum when it is in use
- b. **Creating rain barrels as an alternative water source**
- c. Cutting down trees that live in the watershed area
- d. Dumping household waste and garbage into waterways

Read the following article carefully to answer questions 9-10!

LIPI'S COMMITMENT TO 'HONORING' THE CITARUM RIVER

The Indonesian Institute of Sciences (known as *Lembaga Ilmu Pengetahuan Indonesia* or LIPI) is committed to participating in the restoration of the longest river in West Java Province, the Citarum River, through the Clean Technology Research Institute (known as *Loka Penelitian Teknologi Bersih* or LPTB). Head of LPTB LIPI, Sri Priatni, said that the biggest pollutant in the Citarum River is household waste, which accounts for around 60 to 70 percent of the existing pollutant load. "Waste from untreated toilets and household garbage is exacerbated by the addition of livestock manure waste which amounts to thousands around the Citarum zero point," she said at LPTB LIPI Bandung, Bandung City. Furthermore, Sri said that other pollutants are industrial waste, most of which are hazardous waste that is difficult to decompose naturally. Sri also explained that the handling of the Citarum river in the upstream area, especially in Bandung Raya area, is LIPI's main point of concern because there are eight tributaries that mostly flow through dense settlements in Bandung Raya and hold a five percent portion of the overall Citarum domestic pollutants.

Adapted from:

<https://www.jurnaljabar.id/bewara/komitmen-lipi-mengharumkan-sungai-citarum-b1XcW9Mq>

9. In the article above, the Head of LPTB LIPI said that the biggest pollutant in the Citarum River comes from household waste. The household waste in question is
- Water used to wash clothes**
 - Remaining medicines
 - Fabric dye discharge water
 - Dry leaves
10. The Citarum River is one of the most polluted rivers and needs to be restored immediately. If this condition continues, the people who are accustomed to utilizing water from the Citarum River may experience a clean water crisis. The impact of the clean water crisis that may be experienced by them is
- Improved living standards of citizens
 - Increased land for farming
 - Decreased spread of skin diseases
 - Outbreak of conflict over clean water**

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