Operation Think Tank

Instructions and Questions for an Interactive Game to Teach the Importance, Sources, Uses, and Protection of Water

Developed by the Penn State Master Watershed Stewards Program and the Penn State Pesticide Education Program

Operation Think Tank

Background: Operation Think Tank is a project developed by the Penn State Master Wastershed Stewards Program. The goal was to create an interactive game that could teach youth and adults about the importance of water and what can be done to help protect our water sources. The Penn State Pesticide Education Program joined efforts with the Watershed Stewards to assist in the development of this resource.

Learning Objective: Operation Think Tank was designed to teach youth and adults about the importance of water, water uses, water sources, and protecting water. The questions are divided into beginner, moderate, and advanced categories. While the original resource was developed as an interactive tabletop game, the questions could be used in a variety of delivery methods, such as part of a classroom bulletin board or an in-depth educational exhibit.

Materials Needed:

- Operation Think Tank Questions and Answers
- Tabletop Display (Display Board, Foam Sheets or Felt, Velcro or Adhesives, Fish and Water Cutouts)

Instructions for Assembling a Tabletop Display:

The design of your tabletop display is really at the discretion of your time, creativity, and resources! The main goal is to create a backdrop that looks like water in which to display the fish, as participants will select a fish and then answer a question. Two tabletop display examples are shown in this handout. In Photo 1, the display was created using blue and green felt to emulate waves. Velcro was attached the fish; the fish could then be stuck on the felt. For an added feature, cutouts and props were placed in front of the display. In Photo 2, the display was created using foam sheets. The backdrop featured different water formations, including waves, a lake, and a stream on each portion of the display board. Velcro was placed on the foam and fish.

Photo 1: Display Board Example

The fish in the display board examples were bulletin board pieces that were purchased, but colorful fish could be made from paper, markers, or other supplies.

Photo 2: Another Display Board Example

Instructions for Assembling a Tabletop Display (continued):

Our instructions are just two suggested ways to assemble your tabletop display. Multiple variations are possible, such as using different materials for the backdrop, determining alternative ways to attach the fish, or even using different aquatic creatures besides the fish. For a more portable or one time use display, a cardboard three-sided backdrop could be used. Velcro or another adhesive surface allows participants to pull the fish off the board. However, another option would be to just have participants point to the fish and not have them actually remove it from the board. Again, multiple possibilities are available depending on audience and use. Remember the main objective is to have a backdrop that looks like water in which the fish or other aquatic creatures are displayed.

Game Facilitation:

Be sure to have the Operation Think Tank questions and answers accessible, whether having an actual hard copy or viewing them from a smartphone or tablet device. Please note that you can add additional questions as you see appropriate for your learners. Participants will select a fish and then answer a corresponding question in order to learn about water. The instructions are that simple-have the participants engage with the board by selecting a fish and then asking them a question, which can be done multiple ways. Questions can be randomly selected by the participant. You could ask the participants from which group of questions that they would like to answer – difficulty level or topic. You could number the fish, with certain questions corresponding with certain numbered fish. You could even use different colored fish and develop a corresponding key to be placed on the backdrop, such as "Yellow Fish-Beginner, Green Fish-Moderate, and Blue Fish-Advanced" or by topic so that participants can choose which question level or subject matter they want to answer. As you can see, there are multiple ways to facilitate this game!

With the Operation Think Tank questions and answers, you can even make adaptations for very young participants. Instead of asking one of the Beginner questions and listing the possible answers, ask the question in an open-ended format, such as "Can you tell me something that needs water?" or "Do you know why water is important?" As the facilitator, please feel free to adapt the questions based on the participant's age or knowledge level.

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Questions

BEGINNER

*Please Note: For the Beginner questions, please feel free to adjust based on participant level. For example, for very young participants, you could ask open ended questions like "Can you tell me something that needs water?" or "Do you know why water is important?"

Water is Important

Which of the following couldn't exist without water?

a. Humans
b. Cacti
c. Fish
d. All of the above

About 97% of the Earths water is salt water. Where is salt water found?

a. In rivers and streams
b. **Oceans**
c. Ponds

Streams and rivers are fresh water that provide habitat for all of the following animals except:

a. Beavers
b. Frogs
c. Sharks
d. Fish

Why is clean water important?

a. People and animals need clean water to drink
b. We need clean water to bath
c. Fish can't survive in polluted water
d. All of the above

How can you conserve water?

a. Take shorter showers
b. Turn off the water while brushing your teeth
c. Water your lawn only when needed
d. All the above

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Questions

BEGINNER

Water Uses and Water Sources

Where does the water we drink come from?

a. Streams and rivers
b. Underground
c. The ocean
d. Both A and B

What is the process where water is continually running around the earth?

a. Water wheel
b. Water world
c. Water cycle

What is evaporation?

a. When water disappears
b. When water changes from a liquid to a solid
c. **When water changes from a liquid to a gas**

What is precipitation?

a. What happens when you sweat
b. **Any form of water that falls from the sky**
c. Fear of swimming

Protecting Water

What can you do to protect water?

a. Reduce or eliminate fertilizer use
b. Prevent chemicals from leaking
c. Pick up trash/animal waste
d. All of the above

How can water get polluted?

a. Chemicals spilled near a well
b. Dog poop that is not cleaned up
c. Overuse of fertilizer on lawns
d. All of the above

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Questions

MODERATE

Water is Important

Of all the water on earth, what percentage can be used for drinking?

a. 99%
b. 1%
c. 75%
d. 20%

How can you conserve water?

a. Take shorter showers
b. Keep the faucet running while brushing your teeth
c. Run a sprinkler on the grass while it's raining
d. Wash cars, bicycles, and other items every week

Water Uses and Water Sources

All of the following are steps in the water cycle EXCEPT for:

a. Precipitation – rain, snow, hail
b. Evaporation
c. Swimming
d. Transpiration

What is a water table?

a. The altitude (below ground) of the water-saturated part of the ground
b. A table that holds water coolers
c. A stream bank

What is stormwater?

a. Water from rainfall and snowmelt that runs off the land
b. Water that overflows from the river after a storm
c. Precipitation that occurs only when we have tornado

What is groundwater?

a. Muddy water
b. Water found underground in the cracks and spaces in soil & rock
c. Water found above the ground in streams, rivers, and lakes

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Questions

MODERATE

Protecting Water

What is point source pollution?

a. Pollution from a less identifiable source, mobilized by rainfall or snowmelt, and often spread over an area
b. **Pollution from a specific and identifiable source**

Which of the following is an example of point source pollution?

a. Fertilizer in the garden
b. Factory waste from a pipe
c. Dog waste in the yard
d. Pesticides applied to the lawn

What is nonpoint source pollution?

a. Pollution from a less identifiable source, mobilized by rainfall or snowmelt, and often spread over an area
b. Pollution from a specific and identifiable source

Which of the following is an example of nonpoint source pollution?

a. Waste water treatment plant outfall
b. Discharge from a factory
c. Motor oil residue on roads

What can you do to protect water?

a. Reduce or eliminate fertilizer use
b. Prevent chemicals from leaking
c. Pick up trash/animal waste
d. All of the above

What would be a good practice to prevent water contamination from pesticides?

a. Apply products according to the label directions
b. Apply pesticides right before a rainfall
c. Dump excess pesticides down the storm sewer

Pesticide leaching can occur when a pesticide moves through the soil to reach the groundwater. Which soil texture is more likely to experience pesticide leaching?

a. Coarse soil, like sand, that has large soil particles.
b. Smooth soil, like clay or silt, that has smaller soil particles.

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Questions

ADVANCED

Water is Important

The average American household uses how many gallons of water per day?

a. 50 gallons
b. 80 gallons
c. **320 gallons**
d. 530 gallons

What percent of PA residents rely on groundwater?

a. 37 %
b. 21%
c. 50%
d. 75%

Water Uses and Water Sources

What is an aquifer?

a. A rock formation in the ground that holds water
b. A storage facility designed to clean water
c. A cave filled with water
d. Wet soils that feed into natural springs

Which definition best describes a watershed?

a. A shed that stores water
b. An area in where water covers the soil
c. An area that drains to a common waterway

Where does a river's water come from if it's not raining?

a. Groundwater
b. Pipes
c. The ocean
d. Arctic ice

Which of the following is a better landscape for groundwater recharge?

a. Forest
b. Parking lot with ample storm drains
c. Lawn

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Questions

ADVANCED

Protecting Water

Which of the following is a benefit of a rain garden?

a. Reduced stormwater runoff that could pollute surface water
b. Reduced erosion
c. Helps to increase the groundwater supply
d. All of the above

All of the following are effective methods for preventing groundwater contamination EXCEPT:

a. Make sure there are no cracks in the well casing to allow surface water to enter the well
b. Drill new wells downhill from a septic tank
c. Reduce farm runoff of pesticides and manure utilizing Best Management Practices (BMPs)
d. Fit a vermin-proof sanitary well cap on top of the well

Which of the following could effect a pesticide's ability to leach into our groundwater?

a. High Solubility, meaning the pesticide can easily move in water
b. Low adsorption, meaning the pesticide does not easily bind to the soil particles
c. Persistence, in which the pesticide does not easily break down in the environment
d. Soil properties and environmental conditions
e. All the above

Which of the following is an example of point source pollution from pesticides?

a. Dumping excess pesticide products down a storm sewer
b. Repeated spilling pesticides at the same mixing and loading site
c. Improperly handling pesticide leaks or spills at a pesticide storage site
d. All the above

Which of the following is NOT a best practice to help prevent surface and groundwater contamination from pesticides?

a. Identify areas with sandy soil, shallow groundwater, wells, streams, and pond to avoid pesticide application
b. Read and follow all pesticide label directions to ensure proper application and awareness of any potential environmental hazards, leaching warnings, or groundwater statements
c. Dump excess pesticides near sinkholes and wells or down a storm sewer
d. Be conscious of the weather forecast to avoid pesticide runoff due to precipitation

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