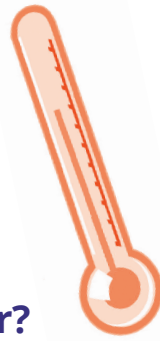


# Hot Water



## What Is This Activity?

### What happens when heat meets water?

Families explore how heat causes water to dry up faster, a process called evaporation that can help animals, including humans, cool down.

### Learning Goals

#### Big Science Idea:

- When water dries up, or evaporates, it carries away hot air, making things cooler. Heat speeds up that process.

#### Skills kids will use to investigate it:

- Model how the amount of heat energy present determines the temperature
- Observe and communicate how evaporation cools things off by removing heat energy
- Observe, compare, and measure the temperatures of different surfaces to conclude that heat causes water to evaporate faster

### How Do You Get Ready?

- Scout out three spaces: one with sunny and shady sections of pavement; one with sunny and shady patches of grass; and one with human-made materials (such as metal fencing and plastic or rubber playground equipment, etc.) near natural materials (such as grass, trees, wood chips, wooden benches, etc.).
- Identify and mark each of the three locations with a ribbon so families know where to go next to measure temperature (see handout). At the first location, set out cups of water and paintbrushes.
- Troubleshoot any safety concerns (traffic, poison ivy, sharp objects, etc.).
- Print out one copy per family of the “Hot Water” handout.
- If you don’t plan to show the “Cook an Egg!” video that is paired with this activity on the website, watch it ahead of time and jot down concepts to share with families during the activity.



[pbskids.org/plumlanding/parents](https://pbskids.org/plumlanding/parents)

### Curriculum Topics

weather, water cycle, evaporation

### Activity Type

outdoor (sunny or cloudy day, warmer temperatures work best)

### Group Size

whole group, small groups

### Activity Time

40–60 minutes

### Materials

- Toy eyeglasses, or large red or yellow construction paper circles with safety pins, or other objects to symbolize “heat” (enough for half of your group)
- 2 hand towels
- 3 pencils or pens
- One- or two-liter bottle of water (depending on group size)
- 5 plastic or paper cups
- Paintbrushes (5 to share or 1 per kid)
- 3 short pieces of ribbon or other place markers
- Optional: Thermometers (1 per family)
- “Hot Water” handout (one per family)
- Optional: “Explore Weather Around You” and “Explore Water Around You” handouts

### Next Generation Science Standards

#### Disciplinary Core Ideas

LS1.A: Structure and Function  
PS1.A: Structure and Properties of Matter  
PS3.A: Definitions of Energy  
PS3.B: Conservation of Energy and Energy Transfer

#### Science and Engineering Practices

Asking Questions and Defining Problems  
Using Mathematics and Computational Thinking  
Planning and Carrying Out Investigations  
Obtaining, Evaluating, and Communicating Information

#### Crosscutting Concepts

Patterns  
Cause and Effect: Mechanism and Prediction

## Warm-up (5-10 minutes)

(Science Skills: Model how the amount of heat energy present determines the temperature)

### Running Hot and Cold

1. In this three-way version of Snake's Tail tag, **two teams compete to steal "heat" from a third team.**
2. **Put half the group on a "Red Hot" team** and give each person a "heat" identifier: Toy eyeglasses or a red paper circle attached to clothes with a safety pin.
3. **Split the other half into two "Stone Cold" teams.** Give the leader of each team a hand towel.
4. Have each team **form a chain by holding hands.**
5. On your signal, the leader of **the Red Hot team runs as fast as possible** while the two Stone Cold leaders try to tag the last person in the Red Hot chain with the hand towel. Each team's players must hold hands at all times as they follow their leaders around.
6. **Tagged Red Hot players join the end of the Stone Cold chain** that tagged them. They can be tagged again, and stolen, by the other Stone Cold team.
7. **The game ends when time is up.** The team with the most heat—the most Red Hot players—is the winner. Point out that heat is a form of energy. When something feels hot, it has a lot of heat energy. When it feels cold, it has less heat energy.

## Activity

(Science Skills: Observe and communicate how evaporation cools things off by removing heat energy; Observe, compare, and measure the temperatures of different surfaces)

### Hot Water (40 minutes)

1. Did families work up a sweat during the warm-up? If not, **have them play another game of "Running Hot and Cold,"** with switched roles for the players.
2. **Ask families to blow on their sweaty arm** or use their hand to fan their sweaty faces. If there's a breeze, ask how the wind makes them feel. Explain that when sweat dries up, you feel cooler. Wind makes sweat dry up faster, so you cool off more quickly. When a liquid dries up, that's called evaporation.
3. **Wonder aloud:** *Does heat make water dry up faster or slower?*  
**For older or more mature children:** Wonder aloud whether it's possible to predict *exactly* how long it would take a puddle to evaporate. *What information about the puddle would you need to know?*
4. **Pass out the "Hot Water" handout and review the directions with families.**
5. **Give each family a pencil and a thermometer and a copy of the handout.** They can use the handout for recording their results.

### Evaporation

Water that evaporates doesn't disappear. It changes into an invisible gas called water vapor. The water vapor drifts away, taking hot air with it.

handout  
**Hot Water**

**What Is This Activity?**  
What happens when heat energy leaves? You will explore how heat energy makes things dry up faster or slower that makes animals, including humans, cool down. **How does heat energy make water dry up faster or slower?** You will explore how heat energy makes things dry up faster or slower. You will explore how heat energy makes things dry up faster or slower.

**Sun vs. Shade on Pavement**  
Touch or measure the temperature of the two pavement areas.  
What is warm? \_\_\_\_\_ at the different spot or spot?  
What is cool? \_\_\_\_\_ at the different spot or spot?  
What is the difference between the two pavement areas?  
What is the difference between the two pavement areas?

**Sun vs. Shade on Grass**  
Touch or measure the temperature of the two grass areas.  
What is warm? \_\_\_\_\_ at the different spot or spot?  
What is cool? \_\_\_\_\_ at the different spot or spot?  
What is the difference between the two grass areas?  
What is the difference between the two grass areas?

**Human-made vs. Natural Surfaces**  
Touch or measure the temperature of the two surfaces.  
What is warm? \_\_\_\_\_ at the different spot or spot?  
What is cool? \_\_\_\_\_ at the different spot or spot?  
What is the difference between the two surfaces?  
What is the difference between the two surfaces?

- 6. Divide families into three groups**, one for each location. After five minutes, tell groups to rotate to the next location, and then repeat for the third location.
- 7. Gather as a group and compare results.** *Which was the hottest surface you touched or measured? The coolest?* (Families might notice a large difference between sun and shade on pavement, less so between sun and shade on grass. Human-made objects might be hotter than natural ones, depending on materials.)
- 8. Check the water drawings. Ask:** *What happened? Were your predictions right?* (Water in the sun dries up more quickly than water in the shade.)

## Wrap-up (10 minutes)

(Science Skills: Use observations and data to conclude that heat causes water to dry up faster)

- Ask:** *Which location had the biggest difference in temperature? Any surprises?*
- Discuss:** *If you wanted water to dry up as fast as possible, what would you do?* (Put it on the hottest surface you can find. Heat speeds up evaporation. Kids might also mention wind and spreading the water around as factors.)
- Encourage families to take home the “Hot Water” handout** to repeat the activity in their neighborhoods and point out the “Explore Some More” activities. If you wish, **give them the “Explore Water Around You” and “Explore Weather Around You” handouts** to provide them with more ideas on how to continue investigating water and weather together.

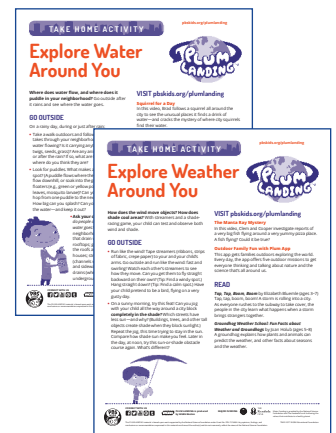
## Explore Some More

### Race for Cover

Have kids race around your outdoor area to see who can find the most spots for animals to find relief from the heat. Remind them that insects, spiders, and other small critters are animals, too—and so are humans! Guiding questions:

- Where can animals go? What might they do to cool off?* (Get wet and let the water evaporate; seek shade under trees, bushes, and objects; pant out hot air in their breath; burrow underground, drink from a puddle or a fountain in the park, etc. Besides sweating, people might have an icy drink, go for a swim, turn on air conditioning or a fan, or wear light clothing.)

**VISIT [pbskids.org/plumlanding/parents](http://pbskids.org/plumlanding/parents) to find more activities, games, and videos.**



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# handout

# Hot Water



Exploring your world,  
one mission at a time  
[pbskids.org/plumlanding](http://pbskids.org/plumlanding)

## What Is This Activity?

**What happens when heat meets water?** You will explore how heat causes water to dry up faster, a process that makes animals, including humans, cool down.

**Big Science Idea:** When water dries up, or evaporates, it carries away hot air, making things cooler. Heat speeds up that process.



### Activity Time

15 minutes

### Materials

- Pencil or pen
- Plastic or paper cup full of water
- Paintbrush
- Optional: Digital thermometer

## Sun vs. Shade on Pavement

**Touch or measure the temperature of the two pavement areas.**

Which is warmer? \_\_\_\_\_ Is the difference big or small? \_\_\_\_\_

Predict: Where will water on pavement dry up faster? Sun or Shade (circle one)

**Make identical water drawings on sunny and on shaded pavement.**

Draw your initials or a simple design with the brush and water. You will check them later.

## Sun vs. Shade on Grass

**Touch or measure the temperature of the two grass areas.**

Which is warmer? \_\_\_\_\_ Is the difference big or small? \_\_\_\_\_

## Human-made vs. Natural Surfaces

Touch human-made and natural materials that are in the sun. List them in order from hottest to coolest, on the back of this paper.

### Human-made materials:

Concrete or metal streetlight  
Chain link fence  
Metal playground slide  
Plastic swing seat

### Natural materials:

Tree trunk  
Hedges or bushes  
Wood chips  
Wooden bench

# Explore Some More

## Clay Pot Cooler

People in remote dry areas use two clay pots and some sand to create a refrigerator that cools without electricity. Search online for “pot-in-pot refrigerator,” “clay pot cooler,” or “zeer pot” to see how this simple device works. Hint: Evaporation is what keeps food cool.

If you live in a dry area, you can build a clay pot cooler using inexpensive materials and plans on the internet. The cooler doesn’t work in humid areas because water doesn’t evaporate fast enough.

## Outdoor Family Fun with Plum App

This app gets families outdoors exploring the world. Every day, the app offers five outdoor missions to get everyone thinking and talking about nature and the science that’s all around us.

Find the app and more fun resources on [pbskids.org/plumlanding](http://pbskids.org/plumlanding).



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# hoja para repartir

# Agua caliente



Exploramos tu mundo,  
una misión a la vez  
[pbskids.org/plumlanding](http://pbskids.org/plumlanding)

## ¿De qué trata esta actividad?

¿Qué pasa cuando el calor y el agua se encuentran? Explorarán cómo el calor seca el agua más rápidamente, un proceso que les permite a los animales, incluidos los seres humanos, enfriarse.

**Megaconcepto científico:** Cuando el agua se seca o evapora, se lleva consigo el aire caliente, con lo cual enfría las cosas. El calor acelera ese proceso.



### Duración de la actividad

15 minutos

### Materiales

- Lápiz o bolígrafo
- Taza de plástico o cartón, con agua
- Pincel
- Opcional: Termómetro digital

## Sol o sombra en el pavimento

**Tocar ambas áreas pavimentadas o medirles la temperatura.**

¿Cuál está más caliente? \_\_\_\_\_ ¿Es mucha o poca la diferencia? \_\_\_\_\_

Predicción: ¿Dónde se secará más rápido el agua? ¿Al sol o a la sombra? (marca con un círculo)

**Hagan dibujos idénticos con agua en pavimento con sol y pavimento con sombra.**

Dibuja tus iniciales o cualquier imagen sencilla con el pincel y agua. Las revisarás más tarde.

## Sol o sombra en el césped

**Tocar ambas superficies o medirles la temperatura a dos áreas con césped.**

¿Cuál está más caliente? \_\_\_\_\_ ¿Es mucha o poca la diferencia? \_\_\_\_\_

## Superficies artificiales o naturales

Tocar materiales artificiales o naturales que están al sol. Al dorso de esta hoja, ponlos en una lista, desde los más calientes hasta los más fríos:

### Materiales artificiales:

Poste de la luz de concreto o metal  
Alambrada de tela metálica  
Tobogán metálico en el parque  
Silla plástica de un columpio

### Materiales naturales:

Tronco de un árbol  
Setos o arbustos  
Virutas de madera  
Banca de madera

# Exploremos más

## Enfriador en vasijas de arcilla

La gente en regiones remotas y secas usa arena y dos vasijas de arcilla para crear un refrigerador que enfría sin usar electricidad. Busquen en internet “refrigerador de vasija en vasija”, “refrigerador de vasija de arcilla”, o “vasija zeer” para ver la sencillez con que funciona este dispositivo. PISTA: Lo que mantiene fría la comida es la evaporación.

Si viven en una región seca, pueden armar un enfriador en vasijas de arcilla con materiales de poco costo y los planos que se detallan en internet. El enfriador no funciona en regiones de mucha humedad debido a que el agua no se evapora con suficiente rapidez.

## Diversiones familiares al aire libre con el app de Plum

Este app invita a las familias a explorar el mundo. Cada día, el app ofrece cinco misiones al aire libre que ponen a todos a pensar y a hablar sobre la naturaleza y la ciencias que tenemos a nuestro alrededor. Disponible en inglés solamente.

Encuentre el app y más recursos divertidos en [pbskids.org/plumlanding](http://pbskids.org/plumlanding).



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