



Name: \_\_\_\_\_ Date: \_\_\_\_\_

## Student Exploration: Homeostasis

**Vocabulary:** dehydration, heat stroke, homeostasis, hypothermia, thermoregulation

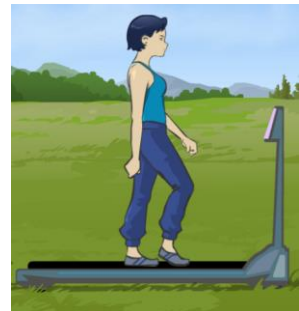
**Prior Knowledge Questions** (Do these BEFORE using the Gizmo.)

**Homeostasis** is the ability to maintain a stable environment inside the body. For example, your body does things to maintain constant blood sugar levels and body temperature.

1. What are some things you do to stay cool on a hot day? \_\_\_\_\_  
\_\_\_\_\_
2. What can you do to warm up on a cold day? \_\_\_\_\_  
\_\_\_\_\_
3. What things does your body do automatically to cool down or warm up? \_\_\_\_\_  
\_\_\_\_\_

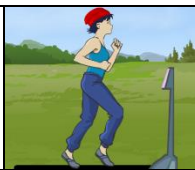
### Gizmo Warm-up

The *Homeostasis* Gizmo shows a person on a treadmill. Notice the **Air temperature** and **Body temperature** thermometers.



1. What are these temperatures? Air: \_\_\_\_\_ Body: \_\_\_\_\_
2. Click **Play** (▶) and wait for a while. What happens to the body temperature? \_\_\_\_\_
3. Click the **Run** button and wait for a while. How does exercise affect body temperature?  
\_\_\_\_\_
4. Set the **Sweat** slider to 5 L/hour (liters per hour). How does sweating affect body temperature? \_\_\_\_\_



<b>Activity A:</b> <b>Automatic sweating</b>	<u>Get the Gizmo ready:</u> <ul style="list-style-type: none"> <li>• Click <b>Reset</b> (↺).</li> <li>• Turn on the <b>Automatic sweating</b> checkbox.</li> </ul>	
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**Question: How does the body maintain a stable temperature?**

1. Form hypothesis: In normal conditions, a person can sweat to help maintain his body temperature. How do you think sweating will be affected by air temperature?

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2. Run Gizmo: Check that **Automatic sweating** is selected. Drag the **hat** and **sweatshirt** to the person. Click **Jog**. Press **Play** and observe. Once in a while, you will need to drag the **energy bar** or **water bottle** to him so he can eat or drink.

Click **Pause** (⏸) once per hour (simulated time). Each time, record the **Air temperature**, **Body temperature**, and **Sweat** level.

Time	Air temp. (°C)	Body temp. (°C)	Sweat (Liters/hour)
1 hour			
2 hours			
3 hours			

3. Analyze: Look at the values on the table.

A. How does the air temperature affect the sweat level? \_\_\_\_\_

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B. The ability to maintain a steady internal temperature is called **thermoregulation**. How well did thermoregulation work in this case? \_\_\_\_\_


4. Draw conclusions: How does sweating help with thermoregulation? \_\_\_\_\_

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5. Extend your thinking: Why do you need to drink water to stay cool on a hot day? \_\_\_\_\_

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<b>Activity B:</b> <b>Controlling your body temperature</b>	<u>Get the Gizmo ready:</u> <ul style="list-style-type: none"> <li>• Click <b>Reset</b>.</li> <li>• Turn off <b>Automatic sweating</b>.</li> </ul>	
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**Question: How well can you maintain constant internal conditions for the runner?**

1. Observe: The *Homeostasis* Gizmo allows you to control clothing, exercise, sweat, food, and drink. Use the Gizmo to explore what happens when things go wrong.
  - A. What is it called when body temperature goes below 30°C? \_\_\_\_\_
  - B. What is it called when body temperature goes above 41°C? \_\_\_\_\_
  - C. What is it called when you don't drink enough water? \_\_\_\_\_
2. Challenge: Click **Reset**. Then click **Play**. Try to maintain a constant body temperature as the air temperature goes up and down. Every hour, click **Pause** and record the data asked for in the table below. (Click **Reset** and try this more than once if you like.)

Time	Air temp. (°C)	Body temp. (°C)	Clothing	Exercise	Sweat (L/hour)
1 hour					
2 hours					
3 hours					
4 hours					

3. Analyze: Look at your data.
  - A. How good were you at thermoregulation? \_\_\_\_\_
  - B. What did you do to cool down when it was hot? \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_
  - C. What did you do to warm up when it was cold? \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

