

# Thermoregulation of Body Temperature

## *Cold Nose, Warm Ears*

### Driving Question

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How does temperature vary on different parts of your body?

### Materials and Equipment

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*For each student or group:*

- Data collection system
- Chair (for ankle temperature reading)
- Fast-response temperature sensor

### Safety

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Add this important safety precaution to your normal laboratory procedures:

- This sensor should be placed only on those areas specified in this activity.

### Thinking about the Question

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Discuss with your lab group members why the temperature varies on different parts of your body. Be prepared to share your thoughts with the class.

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## Thermoregulation of Body Temperature

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### Sequencing Challenge

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The steps below are part of the Procedure for this lab activity. They are not in the right order. Determine the proper order and write numbers in the circles that put the steps in the correct sequence.

				
Determine if there is a pattern of the temperature measurements you have taken.	Make sure each lab group member is aware of safety rules and procedures for this lab.	Set up the data collection system with the fast-response temperature sensor.	Take temperature measurements of your earlobe, nose, fingertip, and ankle.	After taking the various body temperatures, take the temperature that will be used as your core body temperature.

### Investigating the Question

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**Note:** When you see the symbol "♦" with a superscripted number following a step, refer to the numbered Tech Tips listed in the Tech Tips appendix that corresponds to your PASCO data collection system. There you will find detailed technical instructions for performing that step. Your teacher will provide you with a copy of the instructions for these operations.

#### Part 1 – Making predictions

1.  Predict which location will be the warmest: earlobe, tip of the index finger, nose, or ankle.

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2.  Why do you think different parts of your body are at different temperatures?

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#### Part 2 – Measuring temperatures around the body

3.  Start a new experiment on the data collection system. ♦<sup>(1.2)</sup>
4.  Connect a fast-response temperature sensor to the data collection system. ♦<sup>(2.1)</sup>
5.  Display temperature in a digits display. ♦<sup>(7.3.1)</sup>

6.  Change the sample rate to one sample per second. ♦(5.1)

**Note:** You will be using the sensor to make several measurements. Avoid placing your fingers on the sensor. Doing so could affect the accuracy of the measurements.

7.  Monitor live data without recording. ♦(6.1)
8.  Carefully place the end of the temperature sensor on the front of your earlobe.
9.  After holding it in place for 30 seconds, record the temperature in Table 1.
10.  Repeat these two measurement steps for the tip of your index finger, your nose, and ankle. After holding the temperature sensor at each location for 30 seconds, record each temperature in Table 1.

**Note:** Sit in a chair before taking the ankle measurement.



### Part 3 – Measuring your core temperature

11.  Carefully place the end of the temperature sensor under your armpit, below your shirt or blouse and directly on the skin.

**Note:** Although this temperature is not as close to your core temperature measurements as other areas might be, the temperature in your armpit will be considered the core temperature of your body for this experiment.

12.  Why do you need to obtain your core temperature?

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13.  Hold the sensor in place by pressing your arm against your side.
14.  After holding the sensor in place for 30 seconds, record the temperature in Table 1.
15.  Clean up according to your teacher's instructions.

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Table 1: Body temperature at different locations

Body Area	Temperature (°C)
Earlobe	
Tip of index finger	
Nose	
Ankle	
Armpit	

### Answering the Question

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#### Analysis

1. How did your predictions of temperatures around your body compare to their actual temperature values?

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2. Explain any differences in your body temperature as taken at different locations. Be prepared to share your answer with the class.

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3. Do you think your body regulates its temperature? If so, how?

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**Multiple Choice**

Circle the best answer or completion to each of the questions or incomplete statements below.

1. What is the typical human body temperature measured orally?
  - A. 98.6 °C
  - B. 50 °C
  - C. 37 °C
  
2. The \_\_\_\_\_ is the temperature of the blood flowing through internal organs of the body.
  - A. Regulated temperature
  - B. Constant temperature
  - C. Core temperature
  
3. Which part of the body is responsible for controlling body temperature?
  - A. The spinal column
  - B. The hypothalamus
  - C. The circulatory system
  
4. The condition in which body temperature drops below normal is known as:
  - A. Hypothermia
  - B. Heat stroke
  - C. Dilation

## Thermoregulation of Body Temperature

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### Key Term Challenge

Fill in the blanks from the randomly ordered words below.

thermoregulation	hypothalamus	temperature	environment
core	thyroid	homeostasis	hypothermia
fever	heatstroke	thermometer	earlobe

1. \_\_\_\_\_ is a type of balance between an animal's internal conditions and its surroundings.
2. Hunger, body temperature, anger, thirst, and fatigue are all regulated by the \_\_\_\_\_.
3. An organism's ability to maintain its body temperature, even when the temperature of its surroundings varies greatly, is known as \_\_\_\_\_.
4. An organism's \_\_\_\_\_ includes such things as climate, soil, and other living things in its surroundings.