



# How About That Cold Shoulder

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## HOW ABOUT THAT COLD SHOULDER

**Purpose:** To understand the structure of the skin and its role in sensation and temperature regulation.

**Grade Level:** middle school or high school life sciences. Can be adapted for Anatomy and Physiology classes.

**Objectives:** Students will be able to:  
Identify the layers of skin  
Recognize the effect of environmental changes on internal body temperature.  
Understand and list the functions of the skin.

**Materials:** Students should work in small groups of 3-4. Each group will need:

- 1 oral thermometer
- 1 temperature strip (available at most drug stores)
- 1 pair scissors
- Source of warm water
- A thermometer to measure water temperature
- 1 5-lb. Bag of ice per class
- 2 large containers to hold water
- Ruler

### Preparation and Procedures:

It will be helpful for students to know the anatomy of skin, function of the skin, and the temperature, pressure, and pain receptors.

Discuss the functions of the integumentary system:

- 1) provides a barrier against infection and injury
- 2) helps in regulating body temperature

- 3) removes waste products from the body
- 4) protection against ultraviolet radiation from the sun
- 5) gateway through which sensations are transmitted to the nervous system (pressure, heat, cold, and pain)

Each group of students:

Have a student sit at a table with their arm resting on the surface and the palm of the hand turned upward. Student then closes their eyes. Separate the points of a pair of scissors about 1 millimeter; apply the tips gently to the tip of the index finger. Ask the subject how many distinct points he feels. If he says "two" close the points slightly and repeat. Continue to open and close until you find the distance between two points that always gives the sensation of feeling 2 objects everytime This is known as the **two point threshold point**.

### **Elaborate:**

In groups, students will design their own experiments to explore one of the following:

- 1) Does external temperature cause a change in internal temperature?
  - 2) Does external temperature effect your ability to feel sensations?
  - 3) Is the two point threshold point the same for all areas of the arm?
- Students need to have their protocol approved by the teacher
  - Each group will prepare and present a poster explaining their work to the class. The teacher and classmates will evaluate each group presentation.

**Name:**

## **Student Worksheet**

### **Prelab:**

There are different types of sensory receptors in the skin, more commonly known as cutaneous sense organs. Before you start your experimentation process please define the following terms:

Cutaneous:

Sensory receptors:

Pacinian corpuscle:

Meissner's corpuscle:

Diagram the structure of the shin. Include the epidermis, dermis, and subcutaneous tissue.

## **Lab Day**

Using the equipment you see in front of you, design your own experiment to explore one of the following:

1. Does external temperature cause a change in internal temperature?
2. Does external temperature effect your ability to feel sensations?
3. Is the two point threshold point the same for all areas of the arm?

### **Before you begin:**

Design your experiment, write down the specific steps you plan to use below. Have your protocol **approved by your teacher** before proceeding.

Teachers Initials : **APPROVAL**\_\_\_\_\_

### **Your Hypothesis:**

## **DATA:**

## **Conclusions:**

List your conclusions here. State how you came to these conclusions.  
Obtain a large piece of paper and markers from your teacher. Present your findings in a poster to your classmates.