Integumentary & Skeletal Physiology — Student Worksheet

Name:	
Date:	
Group Members:	

Safety Considerations

- Use gentle pressure when touching your partner's skin. Do not press hard or cause discomfort.
- Do not test on broken, irritated, or sensitive skin.
- Stop any activity immediately if your partner feels pain or dizziness.
- Keep all materials clean and return them after use.
- Wash or sanitize hands before and after lab activities.

Purpose

The purpose of this lab is to investigate how the integumentary and skeletal systems contribute to homeostasis by:

- Examining how sensory receptors in the skin detect different stimuli,
- Modeling how bones regulate blood calcium levels using feedback systems

Pre-Lab Questions (Individual)

Answer in full sentences in your binder or in the space provided below.

Part A: Skin Sensation (Integumentary System)

1. Which parts of your body do you think are most and least sensitive to touch? Why?

3. How do you think having more or fewer sensory receptors affects sensation?

4. Give one example of how skin sensation helps protect you.

Part B: Calcium Regulation (Skeletal System)

5. What do you think calcium is used for in the body?

6. Where do you think most calcium is stored?

7. What might happen if blood calcium becomes too low or too high?

9. Why do you think the body needs to keep calcium levels stable?

Prediction Questions

10. Which body areas do you predict will be most sensitive and least sensitive in today's lab? Explain.

11. When blood calcium is low, do you predict calcium will move into bone or out of bone? Why?

Procedure (Group)
Part A: Sensory Reception Lab (Integumentary System)

Materials

- Paperclip (bent into “U” shape) or calipers
- Cotton swab
- Tuning fork or phone vibration
- Blindfold (optional)
- Partner

Procedure

A1. Two-Point Discrimination

1. Have your partner close their eyes.
2. Lightly touch their skin with either one point or two points.
3. Test: fingertip, forearm, and back of hand.
4. Gradually reduce distance between points.
5. Record the smallest distance felt as “two.”

A2. Touch and Hair Receptors

1. Gently brush a cotton swab across hairy and non-hairy skin.
2. Record when movement is detected.
3. Compare sensitivity.

A3. Vibration Detection

1. Activate tuning fork or phone vibration.
2. Place on bony and fleshy areas.
3. Record detection times.

Data Table: Sensory Reception

Two-Point Discrimination

Body Area	Minimum Distance
Fingertip	
Forearm	
Back of Hand	

Area:	
Area:	

Touch

Test Area	Detected Easily (Y/N)	Notes
Hairy Skin		
Non-Hairy		
Bony Area		
Fleshy Area		
Area:		
Area:		

Vibration

Test Area	Detected Easily (Y/N)	Notes
Hairy Skin		
Non-Hairy		
Bony Area		
Fleshy Area		
Area:		
Area:		

Part A Analysis

Which area was most sensitive? Why?

How does receptor density affect sensation?

How does sensation contribute to protection?

Part B: Calcium Homeostasis Simulation (Skeletal System)

Materials

Calcium tokens

Scenario cards

Procedure

1. Set starting calcium levels.
2. Complete low-calcium and high-calcium scenarios.
3. Move tokens based on hormone actions.
4. Record results.

Data Tables

Low Calcium (PTH Active)

Compartment	Start	End
Blood		
Bone		
Kidney/GI		

High Calcium (Calcitonin Active)

Compartment	Start	End
Blood		
Bone		
Kidney/GI		

Feedback System Identification

Low Calcium

Variable: _____

Sensor: _____

Control Center: _____

Effectors: _____

Response: _____

High Calcium

Variable: _____

Sensor: _____

Control Center: _____

Effectors: _____

Response: _____

Part B Analysis

How did PTH affect bone tissue?

Why is regulation of calcium important?

How could imbalance affect health?

Conclusions (Individual)
Answer in complete sentences.

What did you learn about skin sensation?

How does bone support homeostasis?

How do these systems work together?

One question I still have:

Submission Information
Upload to the assignment page by the due date. Submit ONE PDF containing:

☐ Completed worksheet

Creation and Copyright Information
Last updated: Feb 9, 2026
Last updated by: Heather Talbott

Resources used in the creation of this material:

- Grammarly. (2026). Grammarly (Version 14.1268.0) [Software]. *https://www.grammarly.com/*
- OpenAI. (2026). ChatGPT (GPT-5) [Large language model]. *https://chat.openai.com/*