

Study Guide — HBS Unit 2: Research Ready (End-of-Unit Test, Cumulative)

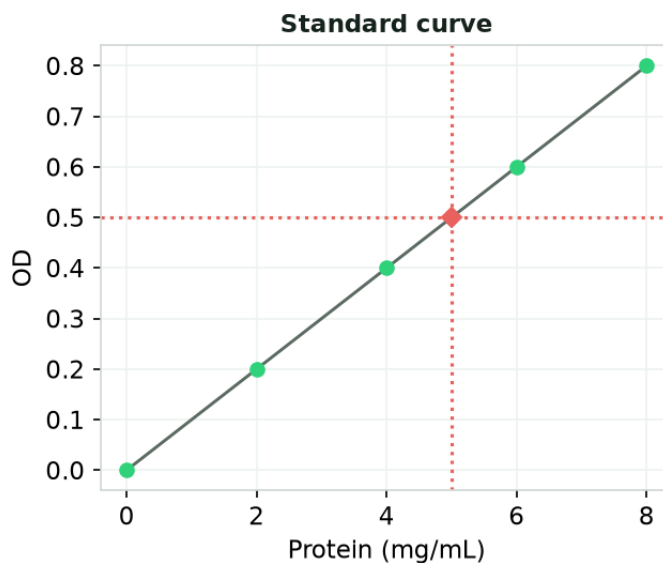
Human Body Systems · Unit 2 — Research Ready · Modeled on the PLTW Guided Review format

Vocabulary to know cold

Term	Definition
Four tissue types	Epithelial (covers/lines), connective (supports/binds), muscle (contracts), nervous (signals).
Epidermis / Dermis / Hypodermis	Skin layers from surface to deep: epidermis (barrier), dermis (vessels/nerves/glands), hypodermis (fat).
Keratin	Tough waterproofing protein of the epidermis, made by keratinocytes.
Melanin	UV-absorbing pigment made by melanocytes.
Thermoregulation	Control of body temperature; sweating + vasodilation cool, shivering + vasoconstriction warm.
Homeostasis	Maintaining a stable internal environment around a set point (e.g., ~37°C core temp).
Independent variable	The one factor the researcher changes on purpose.
Dependent variable	The factor measured as the response.
Control group	Untreated baseline group used for comparison.
Constant	A factor kept the same for all groups to keep the test fair.
Standard curve	Graph of known concentrations vs. signal, used to estimate an unknown's concentration.
Correlation	A relationship between two variables; positive (both rise) or negative (one rises as other falls).
derm/o, epi-, -cyte, hist/o	Word parts: skin, upon, cell, tissue.

Worked examples (follow the reasoning)

Example 1. Use a standard curve to find an unknown protein concentration. The curve passes through (0, 0.0) and (8, 0.8). An unknown reads OD 0.5. Estimate its concentration.



- Find the slope: OD rises 0.8 over 8 mg/mL, so 0.1 OD per mg/mL.
- Set up: $0.5 \text{ OD} \div 0.1 \text{ OD per mg/mL}$.
- Solve: $0.5 / 0.1 = 5 \text{ mg/mL}$.

Answer: About 5 mg/mL.

Example 2. Label the parts of a fair test: a class tests whether Lotion C raises skin moisture more than no lotion, keeping room temperature, skin area, and time the same. Identify the independent variable, dependent variable, control, and one constant.

- Independent variable = what is changed: the lotion (Lotion C vs. none).
- Dependent variable = what is measured: skin moisture.
- Control = the no-lotion baseline group.
- Constant = room temperature (also skin area and time).

Answer: IV = lotion; DV = skin moisture; control = no-lotion group; constant = room temperature.

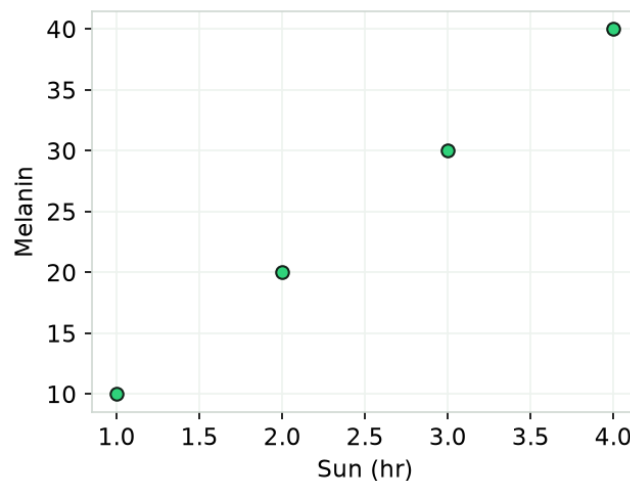
Practice questions (with reasoning)

1. When the body overheats, the skin cools it by:

- A. Shivering and vasoconstriction
- B. Sweating and vasodilation
- C. Making more keratin
- D. Stopping blood flow entirely

Answer: B. Sweating and vasodilation increase heat loss when overheated.

2. A scatter plot shows melanin rising as sun exposure rises. This is a:



- A. Negative correlation
- B. Positive correlation
- C. No correlation
- D. Error

Answer: B. Both variables increase together — a positive correlation.

3. SPIRAL (Unit 1): 'Distal' describes a structure that is:

- A. Closer to the trunk
- B. Farther from the point of attachment
- C. Toward the head
- D. Toward the midline

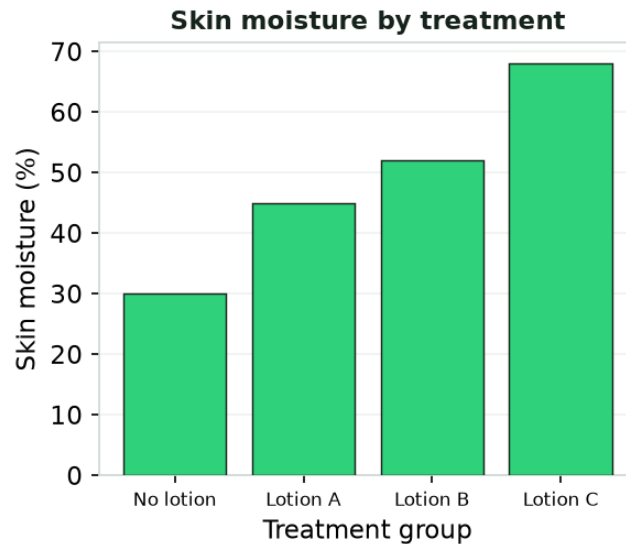
Answer: B. Distal means farther from the point of attachment (e.g., the hand is distal to the elbow).

4. Which word means inflammation of the skin?

- A. Dermatology
- B. Dermatitis
- C. Histology
- D. Melanocyte

Answer: B. dermat/o (skin) + -itis (inflammation) = dermatitis.

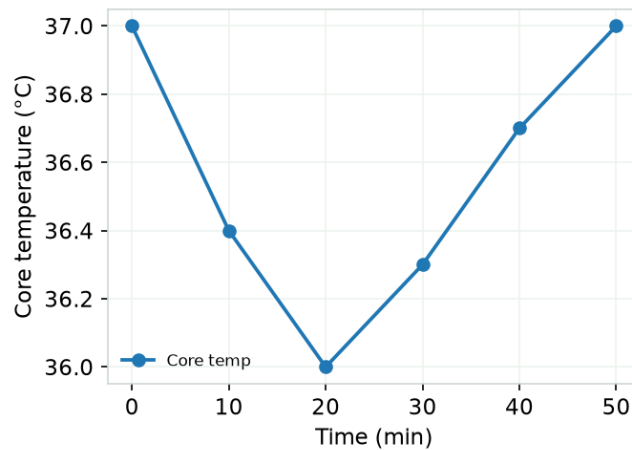
5. The bar graph shows mean skin moisture after one week for each treatment group. Which group is the control, and what does the comparison suggest?



- A. Lotion C is the control; lotions had no effect
- B. No lotion is the control; Lotion C raised moisture the most
- C. Lotion A is the control; all lotions lowered moisture
- D. There is no control; the groups cannot be compared

Answer: B. The untreated 'No lotion' group is the control baseline (30%); each lotion raised moisture above it, and Lotion C raised it the most (68%).

6. The line graph tracks core body temperature after a person enters a cold room. Which homeostatic response best explains the curve returning toward the set point?



- A. Sweating and vasodilation
- B. Shivering and vasoconstriction
- C. Increased keratin production
- D. Increased melanin production

Answer: B. After cooling, shivering generates heat and vasoconstriction reduces heat loss, returning core temperature toward the ~37°C set point.