

Honors Physiology

Semester 1 Final

Interview Questions

Directions: For the semester 1 final, you will be participating in a **one-on-one interview** with your physiology teacher! Of the 10 questions provided (2 questions per unit), your teacher will ask you 5 at random - you are expected to carry out a conversation showing your understanding and competency of the material. We expect appropriate interview behavior and practices, such as speaking in a clear voice, making eye contact, being prepared/professional, etc. (See rubrics attached!) You are encouraged to prepare answers in advance, however you will **not be allowed notes** in your interview session.

Unit 1 - Intro to Anatomy & Physiology

1. Explain the difference between positive and negative feedback loops in regards to homeostatic imbalances in the human body. Be able to provide an accurate example of each.
2. Describe the Principle of Complementarity in the study of Anatomy and Physiology. Be able to provide specific examples of this principle in the human body!

Unit 2 - Histology

1. Explain the relationship between structure and function of **epithelial** tissues of the human body (include key distinguishing characteristics of this tissue, and examples!)
2. Explain the relationship between structure and function of **connective** tissues of the human body. (include key distinguishing characteristics of this tissue, and examples!)

Unit 3 - The Integumentary System

(To answer these questions, please refer to the Case Study on the back of this page!)

1. Briefly describe the extent of damage seen in first-degree burns, second-degree burns, and third-degree burns, including layers of the skin affected.
2. Describe the series of events that occur in any tissue (here, the skin) which is healing from severe damage such as Angela's.

Unit 4 - The Skeletal System

1. Part 1 - As an athlete 'would you rather' have a sprain (cartilage damage) or a break (bone damage) in terms of healing time and physical therapy/recovery? Why? Part 2 - Why is it important for babies to have cartilaginous epiphyseal ends to their long bones?
2. Part 1 - Describe the body's response to **low and high** levels of blood calcium, respectively. Please include the hormones and cells involved in facilitating this response. Part 2 - What long term effects can **low** calcium levels have on the body?

Unit 5 - The Muscular System

1. Tell the 'story' of Excitation-Contraction Coupling in a skeletal muscle cell. Be sure to include the 6 major steps, and any 'key players' found along the way.
2. Describe the body's process in creating ATP for skeletal muscle activity: including creatine phosphorylation, aerobic and anaerobic respiration. Why is it important for our body to have this stored energy reserve? How do these 3 processes differ in terms of short vs. long term energy usage?

Unit 3 Case Study

Patient Complaint: 8-year-old girl admitted for severe burns following her rescue from a burning house.

History:

Angela Creighton, an 8-year-old white female, was transported by ambulance to the emergency room after being rescued from her burning house. She was asleep at night when a spark from the family fireplace started a fire, leaving her trapped in her bedroom. By the time the fire rescue squad arrived, she had suffered severe burns and excessive smoke inhalation.

In the emergency room, Angela was unconscious. She had second-degree burns over 5% of her body and third-degree burns over 15% of her body -- both covering her thoracic and abdominal regions and her right elbow. Her vital signs were quite unstable: blood pressure = 55 / 35; heart rate = 210 beats / min.; and respiratory rate = 40 breaths / min. She was quickly deteriorating from circulatory failure. Two IVs were inserted and fluids were administered through each. Her vital signs stabilized and she was transported to the pediatric intensive care unit (ICU).

Angela regained consciousness the following morning, surprisingly complaining of only minor pain over her trunk. Following debridement of her burns and application of a broad-spectrum, topical antibiotic, a plastic epidermal graft was applied over the burned areas. Despite treatment with a broad-spectrum antibiotic, she developed a systemic staphylococcal infection, necessitating a switch to a different antibiotic.

Angela began a long, slow recovery. Her position in bed had to be changed every 2 hours to prevent the formation of decubitus ulcers (i.e. bedsores). She lost 9 pounds over the next 3 weeks, despite nasogastric tube feeding of 5000 calories ("Kcals") per day. After 9 weeks, sheets of cultured epidermal cells were grafted to her regenerating dermal layer. By the 15th week of her hospitalization, her epidermal graft was complete, and she was back on solid foods, her antibiotics were discontinued, and she was discharged from the hospital with a rehabilitation plan for both physical and occupational therapy at home, as well as twice-weekly visits by a nurse.