

## Human Body FRQ

Answer the questions provided and write a clear and concise essay. Use the principals of answering the questions as an AP FRQ...essay form, in sequence with the question, addressing all parts of the question.

- Hormones play important roles in regulating the lives of many living organisms.
  - For TWO of the following physiological responses, **explain** how hormones cause the response in plants.
    - increase in height
    - adjustment to change in light
    - adjustment to lack of water
  - For TWO of the following physiological responses, **explain** how hormones cause the response in animals.
    - increase in height
    - adjustment to change in light
    - adjustment to lack of water
  - Describe** TWO different mechanisms by which hormones cause their effects at the cellular level.
- Feedback mechanisms are used by organisms to maintain the steady-state physiological condition known as homeostasis.

Choose **three** of the following and for each, describe the type of feedback mechanism used, and explain how feedback mechanisms maintain homeostasis.

  - Blood glucose concentration.
  - Calcium ion concentration in blood.
  - Body temperatures in mammals.
  - Osmolarity of the blood.
  - Pulse rate in mammals.
- The defenses of the human body to the entry and establishment of a pathogen (disease-causing organism) can be divided into nonspecific responses and specific responses.
  - Explain** how THREE types of nonspecific defenses can prevent the entry and/or establishment of a pathogen in a person's body.
  - Discuss** how the immune system responds to an initial pathogenic exposure, and how this initial exposure can lead to a quicker response following a second exposure to the same pathogen.
  - Explain** the biological mechanisms that lead to the rejection of transplanted organs
  - Explain** at least 1 similarity between immune response in plants and animals to pathogens.
- Why is it important for all organisms, including animals, to maintain their normal water-salt balance? Please answer using the concepts of water potential and osmoregulation.
- In higher eukaryotes, the chemical *ouabain* can impair the activity of the sodium-potassium pump ( $\text{Na}^+$ ,  $\text{K}^+$ , and ATPase). Impaired sodium pumping can, in turn, impair cellular processes that depend on a gradient of sodium ions across the cell membrane. In lower doses, *ouabain* can have therapeutic effects following cardiac arrest. Would they be the same? **Predict** the effects of *ouabain* on nerve cells from a giant squid and from a mouse. **Justify** your prediction.