**Disney Homeostasis**

**Scenario #1 – Ursula is Drying Out:** *Ursula is an evil seawitch. She was banished and exiled from Atlantica by King Triton. Atlantica had a low salinity level compared to Ursula’s new habitat. Ursula spends all of her time under the sea and the high salinity concentration of the water in her new habitat is drying out her body. How can you save Ursula?*

* Name two body systems that are not in homeostasis in Ursula’s body.
* How do Ursula’s “insides” remain distinct from Ursula’s “outsides”? Explain how this applies to Ursula’s whole body and how it applies to her cells?
* Which part of your body protects your internal organs from desiccation (drying out), from bacteria, from heat, and from chemical substances?
* Which **necessary life function** is described in this scenario?
* How would you edit this major motion picture to bring Ursula’s body back to a state of homeostasis? Explain.

**Scenario #2 – Kristoff Has to Urinate and Defecate:** *Elsa has trapped the kingdom of Arendelle in an eternal winter. Anna teams up with rugged mountain man Kristoff and his reindeer sidekick Sven. The three start out on an epic journey to try to save the kingdom. Unfortunately, Kristofff forgot to “try before he left on the journey” and he now needs to urinate and defecate. Potty breaks are not in the script. Kristoff is going to have to “hold it.” How can you save Kristoff?*

* Name two body system(s) are not in homeostasis in Kristoff’s body.
* Kristoff is not able to rid his body of excreta? What is excreta? Are there different types of excreta?
* Is excreta consider a useable or unusable substance in Kristoff’s body? Why is it not a good idea for Kristoff to “hold it?”
* Which **necessary life function** is described in this scenario?
* How would you edit this major motion picture to bring Kristoff’s body back to a state of homeostasis? Explain.

**Scenario #3 – Kristoff Dreams of Being an Ice Harvester:** *Kristoff was a free-spirited young boy and loved to explore the wilderness around him. He was fascinated by the ice harvesters and spent a lot of time observing the methods and behaviors of the ice harvesters. Ice harvesting is hard work and the ice harvesters get “worn out”. Muscles do not always pull properly on the bones due to overuse, blood flow can be limited to the extremities due to the extreme cold temperatures, and the ice harvesters would might not have enough energy if food was not properly moved through the gastrointestinal tract. How can you save the ice harvesters?*

* Name two body systems that are not in homeostasis in the ice harvesters’ bodies.
* The ice harvesters are not able to propel their bodies or substance in their bodies from one part of the body to another part of the body. What are other words you could use for propel?
* Explain how the following substances are propelled through the body: blood, food, and urine.
* Which **necessary life function** is described in this scenario?
* How would you edit this major motion picture to bring the ice harvesters’ bodies back to homeostasis? Explain.

**Scenario #4 – Mulan Has a Difficult Time Sensing Change in the Environment:** *Mulan’s father, Fa Zhou, is ordered to fight in battle to help defeat the Hun army. Mulan does not believe he will survive due to his age and his already injured leg, so she decides to cut her hair short, disguise herself as a man, and take his place. She has to have quick reflexes and agile movements to be a successful soldier. On the first day of training camp, Mulan’s inexperience causes a camp-wide brawl. Mulan is then presented with the task of climbing a wooden pole with heavy weights attached to her arms. She is uncertain how she will complete this task. How can you help Mulan sense change in her environment?*

* Name two body systems that are not in homeostasis in Mulan’s body when she experiences slower than typical reflexes.
* Describe stimuli Mulan might be slow to respond to when participating in the training camp.
* Mulan’s breathing became shallower when she was asked to climb the wooden pole while wearing the heavy arm weights. What did this do to the level of CO2 in her blood? Should Mulan increase or decrease her breathing rate to bring the level of CO2 in her blood back to a normal level?
* Which **necessary life function** is described in this scenario?
* How would you edit this major motion picture to bring Mulan’s body back to homeostasis? Explain.

**Scenario #5 – Mushu Stops Getting Bigger:** *Mushu, Mulan’s closest companion, is a tiny, scrawny, red-orange Chinese dragon with a larger-than-life personaility. Mushu is very sensitive about his size and Mulan suspects a hormone imbalance might have affected Mushu’s ability to get bigger. How can you help save Mushu?*

* Name two body systems that are not in homeostasis in Mushu’s body when he stops getting bigger.
* What does it mean that Mushu’s “ability to increase in size was stunted?”
* Mushu stopped getting bigger and remains the same size. Do you think the number of cells in Mushu’s body is: increasing and decreasing at the same rate, increasing faster than they are being destroyed, or being destroyed faster than they are increasing? Please explain.
* Which **necessary life function** is described in this scenario?
* How would you edit this major motion picture to bring Mushu’s body back to homeostasis and to restart the process of getting bigger? Explain.

**Scenario #6 – Belle & Beast Eat Breakfast:** *Belle & Beast sit down at the breakfast table and to eat piping hot bowls of oatmeal. Belle takes her time but Beast gulps his oatmeal and eats way too fast. Beast soon experiences stomach pain, excessive gas, and a general feeling of discomfort because he ate way to fast and did not give his body ample time to break down the food. How can you help save Beast?*

* Name two body systems that were affected when Beast ate too fast.
* Did Beast not give his body enough time to “make larger molecules smaller” or “make smaller molecules larger”? Please explain.
* If Beast “eats way too fast”, how will this affect his blood’s delivery of nutrients to his cells?
* Which **necessary life function** is described in this scenario?
* How would you edit this major motion picture to bring Beast’s body back to homeostasis? Explain.

**Scenario #7 – Belle & Beast Want to Have a Baby:** *After the curse is broken and Beast turns back into a prince, he and Belle share a romantic dance at the ball. Belle & Beast live happily ever after and eventually decide to they want to have a baby. Can you answer questions about the scientific aspects of Belle & Beast’s decision to have a baby?*

* Name the body system that is most directly involved when Belle & Beast have a baby. What are major differences between Belle’s system and Beast’s system?
* What is the cell that Belle needs to produce to have a baby? What is the cell that Beast produces to have a baby? Is mitosis or meiosis used to create these cells?
* What is it called when these cells come together and a zygote is formed? Is mitosis or meiosis taking place when the zygote continues to divide and increase in size during fetal development?
* Which **necessary life function** is described in this scenario?
* Let’s assume that Belle & Beast are unable to have a baby due to fertility issues. What possible interventions could be taken to help Belle & Beast successfully reproduce? Explain.

**Scenario #8 – Flynn Ryder’s Dad Bod:** *Flynn is a true hero.* *He helped Rapunzel reunite with her parents and reclaim her lost throne. The two fall in love and live happily ever after. Flynn Ryder is in such a state of bliss that he stops watching what he eats and stops exercising. After a period of time, Flynn Ryder starts packing on the pounds and increased the reserves in his body. Age and lack of physical activity caused this essential process to slow way down in Flynn Ryder’s body. How can you help save Flynn Ryder?*

* Name two body systems that that were affected when Flynn stopped watching his diet and decreased his level of physical activity.
* Did Flynn’s choices increase or decrease the rate at which his cells broke down and processed the food he consumed? How do you know?
* What does it mean that Flynn “increased the reserves in his body”? What do you think is stored in these reserves? What could Flynn do to decrease the size of the cells that make up these reserves?
* Which **necessary life function** is described in this scenario?
* How would you edit this major motion picture to bring Flynn Ryder’s body back to homeostasis? Explain.

**Survival Needs Scenarios**

**Scenario #9 – Merida Turns Queen Elinor Into a Bear:** *Merida is frustrated with her mother, Queen Elinor, because she is trying to force her ideals and beliefs on her. Merida feels like Queen Elinor is trying to quell her free spiritedness and spunk. Merida turns Queen Elinor into a bear. Queen Elinor needs to learn how to survive in her new role and one of her biggest challenges is finding a proper diet to fuel her body. How can you help save Queen Elinor?*

* Name two body systems that are not in homeostasis when Queen Elinor has a difficult time finding food.
* Queen Elinor eats “blackberries.” These “blackberries” are really nightshade berries, which are poisonous. How could these toxins disrupt homeostasis in Queen Elinor’s body?
* What would eventually happen to Queen Elinor’s ability to produce new cells, create useable energy (ATP) for her body, and transport oxygen if she does not adequately fuel them with food?
* Which **survival need** is described in this scenario?
* How would you edit this major motion picture to bring Queen Elinor’s body back to homeostasis? Explain.

**Scenario #10 – Merida & Queen Elinor (As a Bear) Have Very Different Hydration Needs:** *Merida turned Queen Elinor into a bear. By doing so, she potentially created very different hydration needs for herself and her mother. As a bear, Queen Elinor could go for up to 100 days without hydrating if she is in hibernation mode. Merida feels so guilty about turning her mother into a bear that she decides to hibernate right along with her. She starts the process by intentionally decreasing her hydration level. How can you help save Merida?*

* Name two body systems that are not in homeostasis when Meirda intentionally decreases her hydration level.
* What are some of the physical symptoms Merida will start to experience if she chooses to decrease her hydration level? What would eventually happen to Merida’s body if she did not bring her hydration level back to a normal level?
* Why do you think it is possible for bears to hibernate for 100 days but humans are unable to do so?
* Which **survival need** is described in this scenario?
* Let’s assume that Merida did intentionally decrease her hydration level in the major motion picture. How would you edit this major motion picture to bring Merida’s body back to homeostasis? Explain.

**Scenario #11 – Snow White Is Chilly:** *The wicked Queen is jealous of the beautiful Snow White. She orders the Huntsman to take Snow White into the woods, kill her, and bring her heart back as proof that he followed her orders. The Huntsman is unable to bring himself to kill Snow White and instead tells her to flee into the woods and never look back. The woods are a dark, cold, and lonely place. Eventually, Snow White stumbles across a cottage deep in the woods. She is freezing cold and exhausted. She falls asleep across three beds and is shivering as she closes her eyes. How can you help save Snow White?*

* Name two body systems that are not in homeostasis when Snow White is shivering.
* What is the set point for Snow White’s body temperature? When Snow White reaches the cottage, is her body temperature above or below the set point?
* What happens to metabolic processes in Snow White’s body as a result of spending significant time in the cold, dark woods? Did these processes speed up or slow down? Please explain.
* Which **survival need** is described in this scenario?
* How would you edit this major motion picture to bring Snow White’s body back to homeostasis as fast as possible? Explain.

**Scenario #12 – Maleficent Wants to Drop Aurora Off at the Top of a Mountain:** *Maleficent is miffed that she was not invited to Aurora’s christening and curses her that she will die on her 16th birthday by pricking her finger on the spindle of a spinning wheel. Maleificent originally thought that leaving “sweet baby Aurora” on the top of the highest mountain peak in all the land would be a better way to kill her. She knew she would be caught if she did this so she decided to curse Aurora instead. Let’s assume that Maleficent carried out her original plan and left baby Aurora on the top of the highest mountain peak in all the land. How could you have saved baby Aurora?*

* Name two body systems that would not have been in homeostasis if baby Aurora were left at the top of a mountain peak.
* The air pressure is lower at the top of a mountain peak. While the atmospheric concentration of oxygen is the same at higher elevations, the lower air pressure makes it more difficult for oxygen to enter the vascular system. How would these conditions affect the amount of oxygen delivered to baby Aurora’s tissues?
* Why would baby Aurora’s chances of survival increase if Maleficent stopped for several days at a time as she climbed the highest mountain peak in all the land?
* Which **two** **survival needs** are described in this scenario?
* Let’s assume that Maleficent rushed baby Aurora up the highest mountain peak in all the land. You stumble across baby Aurora when you climb the mountain. She is still alive but it not doing well at all. What actions would you take to help save baby Aurora’s life? Explain.

**Quick Reference**

**Body Systems**

* Cardiovascular
* Digestive
* Endocrine
* Integumentary
* Lymphatic
* Muscular
* Nervous
* Reproductive
* Respiratory
* Skeletal
* Urinary

**Necessary Life Functions**

* **Maintaining boundaries**: “insides” remain distinct from the “outside” (cellular level, organism level)
* **Movement**: propel ourselves (muscular/skeletal system), propelling food, blood, urine in body
* **Responsiveness:** ability to sense change in the environment and then react to this change
* **Digestion:** breaking down ingested food into simpler molecules that can be absorbed by the blood
* **Metabolism:** all chemical reactions within the body cells
* **Reproduction:** production of offspring (cellular and organismal levels)
* **Excretion:** process of removing wastes from the body, get rid of unusable substances produced during digestion and metabolism
* **Growth:** increase in the size of an organism

**Survival Needs**

* **Nutrients:** food is needed for survival (fuel body cells, cellular building), vitamins and minerals are used for chemical reactions and O2 transport
* **Oxygen:** O2 is needed to release energy from foods, a person can only survive a few minutes without O2
* **Water:** need a fluid base for secretions and excretions, source is ingested foods and liquids
* **Normal Body Temperature:** set point 98.6°F, lower means that metabolic reactions slow down and can stop, higher means that metabolic reactions can occur too quickly and proteins can break down
* **Atmospheric Pressure:** breathing and exchange of O2 and CO2 in lungs depends on atmospheric pressure (the force exerted on the body by the weight of the air)

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