PEER Life Science Cells Are Us Levels of Organization Notes Outline Key

**Introduction**

* A cell is the smallest unit of life.
* The human body is composed of trillions of cells. Their size and shape depends on their function.
* Name three functions of cells:
	+ Provide structure for the body
	+ Take in nutrients and convert them into energy
	+ Carry out specialized functions like reproduction
* Each cell contains the body’s hereditary material that is passed on to our offspring.

**Why It Matters**

* Each cell in our body has a role that helps our body stay well and survive.
	+ When our cells are healthy, our body is healthy/sick.
	+ When our cells are sick, our body is healthy/sick.
* Name four situations that can cause cells to lose or change their function.
	+ Disease/sickness
	+ Exposure to radiation
	+ Substance abuse
	+ Aging
	+ Natural causes
	+ New cells not replacing dying cells
	+ Cells replace themselves too much

**What We Know**

* The basic structural, functional, and biological unit of all living organisms is a cell.
	+ This is similar to a brick that makes up buildings in a city.
* A group of cells with similar functions joining together makes up tissues.
	+ This is similar to walls of buildings in a city.
* Groups of different tissues working together make up organs.
	+ This is similar to buildings in a city.
* Groups of organs working together for a shared function makes up organ systems.
	+ This is similar to a city district, like a medical district.
* Different organ systems work together to make up an entire organism.
	+ This level is like the entire city.
* Specialized structures that perform various jobs in cells are called organelles. They function within the cell similarly to how organs function in the body.
* Mitochondria are organelles that obtain usable energy for the cell. This is kind of like part of the digestive system in the body.
* The nucleus is a cellular organelle that stores DNA and is the command and control center of the cell. It’s similar to the brain in the body.
* The cell membrane is a barrier around the cell that controls what enters and leaves the cells and interacts with the world outside of the cell. It’s similar to the skin in the body.
* The cytoplasm is a gel-like fluid in which the cell’s organelles are suspended and that transports materials within the cell. It’s analogous to the circulatory system in the body.
* The endoplasmic reticulum transports materials from one part of the cell to another, like the circulatory system in the body.
* Ribosomes manufacture proteins and send them to parts of the cell where they are needed. They have similarities to the digestive system.
* The golgi body packages and sends out proteins similar to how the digestive system breaks down and repackages food for the body.
* Lysosomes break down cell parts and remove cellular waste. Vacuoles store waste, water, and necessary materials. They function similarly to the excretory system.
* Label the organelles in the diagram below.
* Cells can have many/few different structures. Cell shape and structure is determined by their function.
* Most cells are naturally transparent, but we can use stains to see the different parts.

**How We Know**

* Most cells are microscopic.
* To study cells and how they work, scientists often grow them as a culture. A cell culture is a growth of a large group of cells in the laboratory.
* Name two things that cell cultures can be used for.
	+ Diagnose infections
	+ Test new drugs
	+ Cell research
* In order for cells to stay alive in a culture they need:
	+ A sample of the type of cells needed that are healthy and can divide.
	+ A culture media that supplies the cells with energy, amino acids, and vitamins.
	+ Oxygen
	+ Warm temperature
	+ Removal of waste gas
* The warm temperature is provided by a machine called an incubator.
* When looking at a tissue cut from an organ under a microscope, that organ may have several types of cells. Each cell has even smaller structures called organelles.
* Organelles can be visualized with powerful microscopes like electron microscopes.

**Common Hazards**