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|  | Biologists use microscopes and the tools of biochemistry to study cells  In a **light microscope** **(LM)**, visible light passes through the \_\_\_\_\_\_\_\_\_\_ and then through glass \_\_\_\_\_\_\_.  Microscopes vary in:  *Magnification*    *Resolution*  *Contrast*  To resolve smaller structures, scientists use an **\_\_\_\_\_\_\_\_\_\_\_ microscope (EM)**, which focuses a beam of electrons through the specimen or onto its surface. |
| Prokaryotic and eukaryotic cells differ in size and complexity.  Organisms of the domains \_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_ consist of prokaryotic cells. Protists, fungi, animals, and plants consist of eukaryotic cells.  All cells have: |
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|  | Major differences between prokaryotic and eukaryotic cells…. |
| The logistics of carrying out cellular \_\_\_\_\_\_\_\_\_\_\_\_\_\_ set limits on cell size.  As a cell increases in size, its volume increases \_\_\_\_\_\_\_\_\_\_\_\_\_ than its surface area. Smaller objects have a \_\_\_\_\_\_\_\_\_\_ ratio of surface area to volume.  The plasma membrane functions as:    Rates of chemical \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ across the plasma membrane may be inadequate to maintain a cell with a very large cytoplasm.    Which cells in the human body have a high surface to volume ratio? Why? |
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|  | Internal membranes compartmentalize the functions of a eukaryotic cell.  A eukaryotic cell has extensive and elaborate internal membranes, which:    The general structure of a biological membrane: |
| ***Animal and Plant Cells*** |
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|  | The eukaryotic cell’s genetic instructions are housed in the \_\_\_\_\_\_\_\_ and carried out by the \_\_\_\_\_\_\_\_\_\_\_.  The **nucleus** contains most of the genes in a eukaryotic cell.  Additional genes are located in:  The nucleus is separated from the cytoplasm by:    The nuclear side of the envelope is lined by the **\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_**, a network of protein filaments that maintains the shape of the nucleus.  Within the nucleus, the \_\_\_\_\_\_\_\_\_\_ and associated \_\_\_\_\_\_\_\_\_\_\_\_ are organized into discrete units called **chromosomes**, structures that carry the genetic information.  Each eukaryotic species has a characteristic number of chromosomes.  A typical human cell has \_\_\_\_ chromosomes.  A human sex cell (egg or sperm) has only \_\_\_\_\_ chromosomes.  In the nucleus is a region of densely stained fibers and granules adjoining chromatin, the **nucleolus**.  In the nucleolus, *\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ RNA* (rRNA) is synthesized and assembled with proteins from the cytoplasm to form large and small ribosomal subunits.  The nucleus directs protein synthesis by synthesizing \_\_\_\_\_\_\_\_\_\_\_\_ RNA (mRNA).  How does the mRNA get to the cytoplasm? What happens when it gets there? |
| ***Ribosomes are protein factories.***  **Ribosomes**, containing \_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_, are the cellular components that carry out protein synthesis.  *Free* *ribosomes or Bound* ribosomes? |
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|  | The \_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ manufactures  membranes and performs many other biosynthetic functions.  The **endoplasmic reticulum (ER)** accounts for more than half of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ in a eukaryotic cell.  Draw the ER  There are two connected regions of ER that differ in structure and function.       **Smooth ER**:  Rich in enzymes and plays a role in a variety of metabolic processes, including:    Enzymes of smooth ER synthesize:  In the smooth ER of the liver, enzymes help to:  Smooth ER stores \_\_\_\_\_\_\_\_\_\_\_ ions. Why?  **Rough ER:**  Especially abundant in cells that \_\_\_\_\_\_\_ proteins.  As a polypeptide chain grows from a bound ribosome, it is threaded into the ER \_\_\_\_\_\_\_ through a pore formed by a protein complex in the ER membrane.  Most secretory polypeptides are **\_\_\_\_\_\_\_\_\_\_\_\_\_**, proteins to which a carbohydrate is covalently bonded.  Secretory proteins are packaged in **\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_** that bud from a specialized region called transitional ER. |
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|  | The \_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_ is the shipping and receiving center for cell products.  Many transport vesicles from the ER travel to the **Golgi apparatus** for:  .  The Golgi apparatus is especially extensive in cells specialized for \_\_\_\_\_\_\_\_\_\_\_\_\_.  The Golgi apparatus consists of flattened membranous sacs called:  The Golgi apparatus is a dynamic structure. |
|  | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are digestive compartments.  A **lysosome** is a membrane-bound sac of hydrolytic enzymes that an animal cell uses to digest macromolecules.  Lysosomal enzymes work best at \_\_\_\_\_\_\_\_\_ pH.  Lysosomal enzymes and membranes are synthesized by \_\_\_\_\_\_\_\_\_\_ and then transferred to the Golgi apparatus for further modification.  Phagocytosis:  Autophagy:  Vesicles and \_\_\_\_\_\_\_\_\_\_\_\_ (larger versions) are membrane-bound sacs with varied functions. |
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