**Answer Key.**

The organelle cards and their corresponding answer cards are as follows:

**Cell Membrane:**
- Barrier that encloses the cell.
- Regulates the passage of materials into and out of the cell.
- This structural organelle consists of proteins and a phospholipid bilayer.
- Peripheral proteins may be found on both the inner and outer surface of this organelle.
- May contain carbohydrates on the outer surface, which are involved in cell recognition and cell joining.
- Integral proteins in this organelle are involved in structure, support, and cellular transport.
- The "fluid-mosaic model" is used to describe this organelle.
- Picture of cell membrane

**Nucleus:**
- Controls the cell’s activities.
- Storage site of DNA and genetic information.
- Contains one or more nucleoli and all of the chromosomes of a eukaryotic cell.
- This organelle contains a nucleolus, which is responsible for manufacturing ribosomal subunits.
- The site where RNA is copied from DNA to direct protein synthesis.
- Picture of nucleus.

**Mitochondrion:**
- The “powerhouse” of the cell.
- Site of cellular respiration.
- Transfers the energy stored in organic compounds (glucose) to molecules of ATP.
- These organelles are very numerous in cells that have high-energy requirements. (Example: liver and muscle cells may contain 2,500 of this organelle.)
- Inner membrane is folded into “cristae” to increase the functional surface area.
- The “matrix” of this organelle contains many enzymes, DNA and ribosomes.
- One of two organelles of the cell that contain their own DNA and ribosomes, and can carry out their own replication.
- Picture of mitochondrion.

**Ribosome:**
- Site of protein synthesis.
- Translates the message of mRNA and carries out the building of proteins.
- May be found loose in the cytoplasm or attached to the endoplasmic reticulum.
- Consists of two subunits – a large subunit and a small subunit. Not a membrane-bound organelle.
- The parts of this organelle are manufactured by the nucleolus in the nucleus.
- The most numerous organelles in most cells.
- This organelle is composed of ribosomal RNA (rRNA) and proteins.
- Found in tissues that have a high rate of protein synthesis. A pancreatic cell contains a few million of these.
- Picture of ribosome.
Endoplasmic Reticulum (ER):
- A system of membranous tubules and sacs that extend from the nuclear membrane to the cell membrane.
- An intracellular highway along which molecules can move from one part of the cell to another.
- Consists of two types: Rough and smooth
- May or may not have attached ribosomes.
- Receives polypeptides (proteins) from ribosomes to prepare proteins for export or for insertion into membranes.
- Manufactures the lipid components of cell membranes (smooth ER).
- Helps to regulate calcium levels in the cell.
- Breaks down toxins and poisons.
- This organelle consists of such an extensive network of membranes that it accounts for more than half the total membrane in many cells.
- The sacs of this organelle are called cisternae.
- Picture of ER.

Golgi Apparatus:
- Processes and packages substances for export from the cell.
- A collection of smooth, membrane-bound sacs isolated from the endoplasmic reticulum.
- Works closely with the ER in preparing materials for release from the cell.
- Materials enter on the cis side and exit on the trans side.
- Completes final modifications of proteins.
- Ships proteins off to their final destinations.
- Transport vesicles arrive at this organelle carrying proteins from the ER.
- Picture of Golgi.

Lysosome:
- Contains strong enzymes used for the digestion of proteins, carbohydrates, lipids, and nucleic acids.
- Can digest old organelles and foreign substances such as viruses and bacteria.
- Functions in “programmed cell death” to rid an organism of damaged or dead cells.
- These organelles may be produced by budding from the trans face of the Golgi.

Cytoskeleton:
- Consists of microtubules, microfilaments, and intermediate fibers.
- A network of protein fibers extending throughout the cytoplasm.
- Involved in cell division; helps to push and pull chromatids during mitosis and meiosis.
- Heavily involved in cell structure and support by providing a framework within the cell.
- Helps to move materials around the inside of the cell.
- Gives mechanical support to the cell and maintains its shape.
- Involved in the contraction of muscle cells.
- Picture of cytoskeleton.
Cilia:
- Short, hair-like structures used to propel a cell through the environment.
- Found along the respiratory tract to sweep foreign particles out of the body.
- One of two organelles that are composed of a “9 + 2” arrangement of microtubules.
- Picture of cilia.

Flagella:
- Long, whip-like structures used to propel a cell through the environment.
- One of two organelles that are composed of a “9 + 2” arrangement of microtubules.
- Picture of flagella.

Cell Wall:
- Rigid structure used for support in plants, algae, fungi, and many prokaryotes.
- Found outside of the cell membrane in plants; much thicker than a cell membrane.
- Composed of cellulose in plant cells.
- Composed of chitin in fungi.
- Composed of peptidoglycans in the bacteria.
- Picture of cell wall.

Vacuole:
- A storage area found inside both plant and animal cells.
- May store food, water or the metabolic wastes of the cell.
- The source of turgor pressure within a plant cell.
- One type, found in unicellular organisms, can contract to expel excess water.
- Picture of vacuole.

Plastids:
- Types include chloroplasts, chromoplasts and leukoplasts.
- Found only in plant cells; may store pigments or food.

Chloroplast:
- One of two organelles of the cell that contain their own DNA and ribosomes, and can carry out their own replication.
- Contains the green pigment, chlorophyll.
- Converts the energy of the sun into the chemical energy contained in molecules of glucose.
- Contains thylakoids, which are flattened sacs that increase the functional surface area.
- Large stacks of flattened membranous sacs are called grana.
- Contains “stroma”, which contains many enzymes, DNA and ribosomes.
- Site of photosynthesis.
- Picture of chloroplast.
Chromoplast:
- Contain pigments of colors other than green.
- Give fruits and flowers their color.
- Helps to attract insects to flowers for pollination.
- Helps to attract animals to fruits for seed dispersal.

Leukoplast:
- Colorless organelles that serve as storage areas for starch in plant cells.

Peroxisome:
- This organelle transfers hydrogen to oxygen to produce hydrogen peroxide, and then breaks down the poisonous hydrogen peroxide into water and oxygen.
- Contains the enzyme called catalase.
- Breaks down fatty acids into smaller molecules that can be transported to the mitochondria for cellular respiration.

Centrosomes/ Centrioles:
- Organizes microtubules in the building of the mitotic spindle.

Extracellular Matrix (ECM):
- The most abundant part of this cell structure is collagen, which forms strong fibers outside the cell.
- Found in between animal cells for structural support.
- Serves as connective tissue between cells.
- Coordinates the cells of a tissue.
- Involved in cell-cell communication.

Cytoplasm:
- Often called cytosol.
- The area of the cell between the nucleus and the cell membrane.
- This area contains the various organelles of the cell.
- Consists of a gelatin-like, watery fluid that contains salts, minerals, and many organic molecules and compounds.

Intercellular Junctions:
- Plasmodesmata in plant cells provide passageways between plant cells.
- Tight junctions bind neighboring animal cells tightly together to prevent the leakage of fluids from a tissue.
- Desmosomes fasten animal cells together in strong sheets.
- Gap junctions provide channels between adjacent animal cells.