

Definitions

active transport	a pump which drives particles in and out of the cell against the normal flow of diffusion
body cavity	any space in the body between the skin and the outermost tissues of the internal organs
cardiac muscle	an involuntary tissue making up most of the heart's mass which is primarily responsible for pumping blood
cartilage	type of connective tissue responsible for protection of bones and flexibility of joints; not as rigid as bone tissue but less flexible than muscle tissue
cell membrane	protective covering which surrounds a cell
collagen	group of proteins making up ~30% of all connective tissues; easily and widely converted into gelatin for industrial uses
columnar	skin cells which are much taller than they are wide
connective tissue	most widespread tissue; acts as "cellular glue" forming the framework and support structures for all body tissues and organs
connective tissue proper	type of connective tissue which includes tendons, ligaments and fat tissue; strong and flexible tissue which allows the body to hold onto fluids, absorb waste material, and stores fat
contracts	to shorten
cuboidal	cube-shaped skin cell
cytoplasm	fluid within a cell which acts as a storage area for gases, food, wastes, etc.
diffusion	the movement of any substance from an area of high concentration to an area of low concentration
epithelial	tissue which covers the outside of the body, outer surfaces of organs, body cavities, and various glands
esophagus	the muscular tube which carries your food to the stomach

facilitated diffusion	"gates" or "revolving doors" within cell membranes which allow certain types of particles to pass through
gelatin	compound formed from processed collagen; used for a variety of industrial products
glands	organs responsible for creating and releasing specific chemicals throughout the body
involuntary	actions which are not controlled by the brain
keratin	protein produced and used by the epidermis of the skin which provides a protective barrier against infection
lipid	fat
lumen	the inside spaces of a tubular structures such as the esophagus
matrix	a combination of fluid and fibers of various strengths which makes up connective tissue
muscle fibers	very long and threadlike cells which make up skeletal muscle
muscle tissues	a collection of elongated cells which contract (shorten) to enable locomotion of the organism or movement of the internal organs
myelin	a lipid which covers parts of the neurons and is vital for the promotion of nerve impulses
nerve impulse	a wave-like signal that moves through the body by an electric current
nervous tissue	responsible for creating and sending nerve impulses throughout the body
neuroglia	supporting cells: help to support the neurons throughout the body
neurons (nerve cells)	responsible for sending the nerve impulses throughout the body
organelles	specialized structures within a cell
osmosis	a special type of diffusion in which only water is being transported through the membrane
phosphate	a chemical made of one atom of phosphorus and four oxygen atoms

phospholipids	large molecule made up of a phosphate and two long "tails" of lipids; found in doubled layers as the main component of cell membranes
plasma	fluid portion of blood
proteins	large organic molecules each possessing a unique function)
semipermeable	property of the cell membrane which regulates the substances allowed in and out of the cell
simple epithelial tissue	epithelial tissue made of a single layer
skeletal muscle	voluntary tissue which is responsible for movement
smooth muscle	responsible for slow, involuntary movements of the internal organs
squamous	a thin, flat skin cell
stratified epithelial tissue	epithelial tissue made of several layers
striated tissue	tissues which contain visual stripes on its surface when viewed under a microscope

Sample questions to ask your child after completing the weekly reading.

What are the four different types of tissues within the human body?

Epithelial, Connective, Muscle, and Nervous

How is osmosis a special form of diffusion?

Diffusion is the movement of any substance from a high concentration to a low concentration. Osmosis is the movement of water through a semipermeable membrane from areas with low concentrations of dissolved substances into areas which contain high concentrations of dissolved substances.

What is the most abundant protein in the human body?

Collagen

How is blood considered a tissue?

Blood is a form of connective tissue as it is a combination of various types of cells, cell parts, and a fluid called plasma. By its definition, connective tissue is also a combination of fluid and fibers of various strengths, and a few cells.

Which two muscle types are involuntary and what does this term mean?

Cardiac and smooth muscles are involuntary. This means they will perform their functions without any conscious control by the individual.

Day Two:

Your child should check their work on the practice worksheets today with the answer key on the next page.

In addition, your child should read the lab activity and start collecting all of the necessary materials!

Answer Key for Practice Problems

Vocabulary Review

- | | | |
|--------------------------|----------------------------------|------------------------------|
| 1) skeletal muscle | 16) simple epithelial tissue | 30) neurons (nerve cells) |
| 2) facilitated transport | 17) stratified epithelial tissue | 31) smooth muscle |
| 3) phosphate | 18) lipid | 32) columnar |
| 4) myelin | 19) plasma | 33) organelles |
| 5) muscle tissues | 20) cytoplasm | 34) neuroglia |
| 6) matrix | 21) collagen | 35) lumen |
| 7) active transport | 22) phospholipids | 36) diffusion |
| 8) osmosis | 23) proteins | 37) esophagus |
| 9) squamous | 24) connective tissue | 38) epithelial |
| 10) nerve impulse | 25) glands | 39) striated tissue |
| 11) involuntary | 26) semipermeable | 40) contracts |
| 12) cardiac muscle | 27) cell membrane | 41) cartilage |
| 13) body cavity | 28) keratin | 42) connective tissue proper |
| 14) gelatin | 29) nervous tissue | 43) muscle fibers |

Multiple Choice and True/False

- | | |
|------|------|
| 1) B | 5) F |
| 2) E | 6) F |
| 3) C | 7) F |
| 4) A | 8) T |

Application Questions

Epithelium that functions to resist abrasion is stratified squamous epithelium. The moist stratified squamous epithelium lining the mouth and the keratinized stratified squamous epithelium of the skin are examples. The cells at the surface are flattened, and when scraped away due to abrasion they are replaced by the cells beneath them. In contrast epithelial cells that carry out absorption are either simple cuboidal or simple columnar. Because they are one layer thick, they are more susceptible to damage and are not resistant to abrasion. In addition, these cells are large in volume, which allows them to contain the organelles involved in transport, such as mitochondria to produce ATP in the case of active transport. The surfaces of the cells that absorb are likely to contain microvilli, which increases the surface area for absorption. The flat cells that resist abrasion have no microvilli.

Day Three: Lab Activity

Your child should have already read through this lab and has been reviewing all of this week's vocabulary words.

Collect your supplies for the lab:

3-4 eggs (a couple for practice)

White vinegar

Drinking glass

Plastic wrap

2-3 eggs

Sewing needle or similar item

Soap and water

Baby powder

Baby aspirator, syringe, or bicycle pump (optional)

Uncovering the Hidden Layers of an Egg

How do you like your eggs? Scrambled, fried, or folded?

The pliable and toughness of the protein keratin will be demonstrated.

Materials:

3-4 eggs (a couple for practice)

White vinegar

Drinking glass

Plastic wrap

2-3 eggs

Sewing needle or similar item

Soap and water

Baby powder

Baby aspirator, syringe, or bicycle pump (optional)

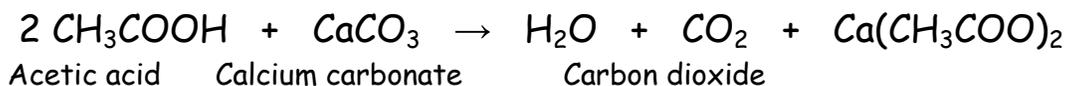
Procedure:

- 1) Place a small amount of soap onto the surface of the eggs and wash them thoroughly.
- 2) Carefully use the sewing needle to poke a small hole in both ends of a raw egg. This can be accomplished with constant pressure along with a twisting motion of the needle to avoid breaking the egg.
- 3) With both holes in a vertical position, insert the needle or other device into the hole to scramble the yolk. Needless to say, it would be best to do this over the sink. Be careful not to damage the egg shell during this process.
- 4) The contents of the egg must be removed at this time. This can be accomplished by blowing into one of the holes, thereby pushing the contents of the egg out of the second hole. Understandably, the placing of one's mouth onto the surface of an (already cleaned) egg can be a little discomfoting. If this is true, you may use a syringe, baby aspirator, or bicycle pump to force the contents of the egg out of one of the holes.
- 5) Fill a drinking glass with vinegar and submerge the egg shell until it is filled with vinegar. Cover the drinking glass with plastic wrap and allow it to sit undisturbed for 7-10 days. I know it takes a long time, but it is worth it!
- 6) After 7-10 days have passed, the white eggshell will be dissolved leaving behind the translucent double-membrane inside the egg. It will not be out of place to see large parts of the eggshell floating in the container at this time.

- 7) Once the egg shell has been completely dissolved gently squeeze out the vinegar left inside it. Dry it carefully and coat it with baby powder. Insert some of the powder into the egg as well. This will dry out the interior of the egg and prevent it from sticking to itself.
- 8) At this time you can carefully fold the eggshell into a small ball. To "reinflate" the shell, gently toss the egg into the air back and forth between your hands. The egg will inflate back into its original shape.

Explanation:

Much like an animal cell, the solid outer egg shell is covered with thousands of tiny pores which allow air and moisture to pass through. This hardened semipermeable membrane is made almost completely of calcium carbonate and is easily dissolved by the acetic acid within the vinegar. As the calcium carbonate reacts with the acetic acid, bubbles of carbon dioxide gas are created from the chemical displacement of the calcium from the carbonate molecule:



Under this hardened shell are two membranes made of the protein keratin. This double membrane of keratin is pliable enough to allow itself to be deflated and reinflated much like a balloon. The elastic nature and relative toughness of this protein makes it suited as the protective covering for our skin, hair, and nails.