

Answers from CK-12 Life Science For Middle School Teacher's Edition
<http://www.ck12.org/saythanks>

Day 36

1. Excretion is any process in which excess water or waste is removed from the body.
- The organs of the excretory system include the large intestine, liver, skin, lungs, and kidneys.
- The urinary system is the organ system that filters waste products and excess water from the blood and excretes them from the body as urine. It includes two kidneys, two ureters, the urinary bladder, and the urethra. The kidneys filter blood and form urine. The ureters carry urine from the kidneys to the urinary bladder. The urinary bladder stores urine until it is excreted from the body through the urethra during urination.
- The kidneys of a person with kidney failure can't filter blood to maintain homeostasis. Hemodialysis is a medical procedure in which a patient's blood is filtered through a machine. The machine does the work of the failing kidneys and keeps the patient alive.
- Blood with wastes enters each kidney through an artery, which branches into many capillaries. After passing through capillaries and being filtered, the clean blood leaves the kidney through a vein. Tiny structures called nephrons are the functional units of the kidneys. The part of each nephron called the glomerulus is where blood in the capillaries is filtered. Excess water and wastes are filtered out of the blood. The tubule of the nephron collects these substances. Some of the water is reabsorbed. The remaining fluid is urine.
- The kidneys maintain homeostasis by controlling the amount of water and dissolved substances in the blood. They do this by excreting more or less of the water or substances in urine. The kidneys also secrete hormones that control body processes and help maintain homeostasis. For example, one of the kidney hormones stimulates bone marrow to produce red blood cells when more are needed.

Day 39

- The nervous system is a complex network of nervous tissue that carries electrical messages throughout the body.
- Answers may vary. Sample answer: Three functions of the nervous system are controlling muscles, maintaining balance, and sensing the internal and external environments.
- Neurons are nerve cells. They have a special shape that lets them pass electrical signals from one cell to another. Each neuron has three main parts: cell body, dendrites, and axon. The cell body contains the nucleus and other organelles. Dendrites receive nerve impulses from other cells. The axon passes on the nerve impulses to other cells. It branches at the end into multiple nerve endings so it can transmit impulses to many other cells. Nerve impulses are messages carried by neurons. Each nerve impulse is an electrical signal that is received by a dendrite, passed through the cell body and axon, and then passed on to another cell or cells.
- Answers may vary. Sample answer: Two nervous system diseases are meningitis and epilepsy.

Meningitis is an infection of the membranes covering the brain and spinal cord. It is caused by bacteria or viruses. Symptoms of meningitis include headache, fever, and a stiff neck. Epilepsy is a disease in which seizures occur. A seizure is a period of lost consciousness that may include violent muscle contractions. It occurs because of abnormal electrical activity in the brain. Epilepsy may be caused by an infection, injury, or tumor. In many cases, however, the cause can't be identified.

5. A brain injury that affects a patient's ability to see most likely injured the occipital lobe of the cerebrum. This part of the brain controls the sense of sight. It processes and interprets sensory information from the eyes.
6. The nerve endings of an axon don't actually touch the dendrites of other neurons. The messages must cross tiny gaps between neurons, called synapses. Chemicals called neurotransmitters carry the message across the gaps. When a nerve impulse arrives at the end of an axon, neurotransmitters are released. They travel across the synapse to the dendrite of another neuron. The neurotransmitters bind to the membrane of the dendrite. This triggers a nerve impulse in the next neuron.
7. The nervous system has two main parts, called the central nervous system and the peripheral nervous system. The central nervous system includes the brain and spinal cord. The peripheral nervous system includes all of the rest of the nervous tissue in the body. It consists of a complex network of nerves that control all body parts. The brain in the central nervous system is the control center of the body. Nerve impulses pass back and forth between the brain and the peripheral nervous system via the spinal cord. Information from the peripheral nervous system is interpreted by the brain, which tells the peripheral nervous system how to make the body respond.

Day 46

1. Light passes through the cornea, through the pupil, through the lens; the lens focuses light on the **retina**, which has light-sensing photoreceptor cells called rods and cones. When light hits rods and cones, it causes chemical changes which start nerve impulses. The nerve impulses travel through the **optic nerve to the brain which** makes sense of the nerve impulses and tells you what you are seeing.
2. The **cornea** is a clear, protective covering on the outside of the eye.
3. The lens helps focus light at the back of the eye. The lens must bend light from nearby objects more than it bends light from far-away objects. The lens changes shape to bend the light by just the right amount to bring objects into focus.
4. **Rods** let us see in dim light. **Cones** let us detect light of different colors.