Chapter 15-1
Body Organization and Homeostasis

- Levels of organization
  - cell – basic unit
  - tissue – group of similar cells performing the same job
    ~ muscle: contracts and shortens to help you move; ex. muscles
    ~ nerve: controls body by carrying messages back and forth between
      brain and other parts; ex. nerves, spinal cord
    ~ connective: connects all parts of body and provides support; ex.
      bone, cartilage, fat, blood, tendon, ligament
    ~ epithelial: covers body in and out; ex. skin, lining of internal
      organs
  - organ – different kinds of tissues doing a job; ex. heart, blood vessels
  - organ system – group of organs working together; ex. circulatory

- Homeostasis: body’s tendency to keep internal balance in spite of
  changes in external environment; ex. when body needs food, the brain
  sends signals that you are hungry; homeostasis happens when you eat.

- Stress
  - body’s reaction to threatening/challenging/disturbing events
  - it upsets homeostasis
  - body’s response
    a. alarm stage: a chemical, adrenaline, is released into the blood to
      give you quick energy and prepare you for quick action; breathing
      increases, there is more oxygen taken, heart beats faster, more blood
      is delivered to muscles and other organs and less to places you don’t
      need such as the skin; pupils get wider so you see better
    b. fight or flight response: body systems work together (respiratory
      system brings more oxygen, circulatory system delivers this oxygen
      to where it is needed, muscular system works with skeletal system to
      help you move
  - long term stress causes the body to be unable to restore homeostasis;
    leads to tiredness, irritability, sickness if not dealt with
  - stress should be recognized as a normal part of life and you should be
    able to deal with it through physical activity, talking about it to a
    trusted adult, eating right, sleeping right, and resting.
Chapter 15-2
Skeletal System

- Functions
  - provides shape and support (backbone is made of 26 vertebrae that help you bend/twist)
  - helps to move the body working with the muscles that pull on the bone
  - protects organs, ex. skull protects the brain
  - produces substances, ex. blood cells
  - stores minerals that make the bone hard, ex. Calcium and Phosphorus

- Bones
  - properties: strong, lightweight, hard
  - growth: new bone tissue is made all the time, especially following an accident and during physical growth
  - structure
    a. tough membrane covers it, blood vessels and nerves run through
    b. compact bone with small canals running through carrying blood vessels
    c. spongy bone with small spaces within making them lightweight but strong
    d. marrow is the soft, connective tissue in the spaces; red marrow makes blood cells, yellow marrow stores fat
  - formation
    Cartilage is connective tissue which is more flexible than bone. As an infant, much of the skeleton is cartilage, then it gets replaced by bone until growth stops. The process is called ossification. Not all cartilage gets replaced by bone, ex. in the knee it acts as a cushion.
  - number: depends on age; the human adult has 206; the baby has 275 (some will fuse later)
• Joints
  - connect 2 bones together
  - allow bones to move in different ways
  - 2 types
    a. immovable, ex. the skull bones and the ribs attached to the sternum
    b. movable, ex. most of the joints in body allowing movement
Note: bones in the movable joints are held together by another strong connective tissue, ligaments. The bones move smoothly with the help of cartilage at the ends that keeps them from rubbing and a fluid that lubricates them.

• Care
  - balanced diet including Calcium and Phosphorus; ex. meat, whole grains, dairy, vegetables
  - exercise; be sure to have appropriate safety equipment

These measures will help prevent osteoporosis – a condition when the bones become weak and break easily due to loss of minerals. It is more common in females.
Chapter 15-3
Muscular System

- Number: 600
- Groups
  - voluntary: under your control; ex. the ones that move your arm
  - involuntary: not under your control; ex. the heart muscle
- Types
  - skeletal
    a. attached to bones
    b. move bones; a connective tissue, the tendon, attaches muscle to bone
    c. voluntary
    d. react and tire quickly
    e. striated (with bands)
  - smooth
    a. inside internal organs
    b. control internal functions like digestion
    c. involuntary
    d. react and tire more slowly
    e. not striated
  - cardiac
    a. in heart
    b. controls blood flow; repeated contractions of the heart are referred to as heartbeats
    c. involuntary
    d. doesn’t get tired
    e. striated
- How do muscles work?
  - they contract and become shorter, thicker after receiving messages from the nervous system
  - because they only contract and not extend, skeletal muscles work in pairs; so if one contracts the other returns to original length.
- Care
  - exercise for strength and flexibility
  - take precautions to prevent injury such as muscle sprain and pulled muscles – warm up and cool down before and after exercise
  - wear proper gear while exercising
  - rest until injury ends
Chapter 15-4
Integumentary System (Skin)

• Largest organ

• Functions
  - protects body: a layer of dead cells on top acts as a barrier to keep germs and harmful substances out
  - keeps important substances, such as water, in
  - gathers information about the environment (pressure, pain, temperature) through the nerves
  - maintains body temperature: if too warm the blood vessels in the skin enlarge to increase blood flow and move heat from the body out; also the sweat glands in the skin secrete perspiration through the pores taking the excess heat off your body as the sweat evaporates
  - sweat glands also take wastes out
  - produces vitamin D in presence of sunlight; vitamin D is important for the bones since it absorbs the Calcium in your food

• Parts
  Epidermis
  - outermost layer
  - thinner
  - no nerves/blood vessels; you don’t feel pain from shallow scratches or bleed from them
  - new cells form deep inside, move upward, die and become part of the surface of the epidermis, finally are shed carrying bacteria and other harmful substances out, and are replaced by the dead cells below which provide protection
  - certain cells produce melanin, a pigment to give color to skin. The more melanin, the darker is the skin. Exposure to sunlight stimulates the skin to produce more melanin which helps protect the skin from burning.
Dermis
- lower layer
- located above fat which pads the internal organs and helps keep heat in
- has the nerves (information), blood vessels (blood flow), sweat glands (perspiration), hair follicles (hair growth), and oil glands (oil waterproofs the hair and keeps skin moist)

• Care
- eat properly
- drink water daily; after strenuous exercise water is needed to replace the water lost in perspiration
- limit sun exposure; repeated exposure can damage skin cells and cause them to divide uncontrollably (cancer) and can cause the skin to be leathery and wrinkled
  ^ wear hat, sunglasses, proper clothing
  ^ use sunscreen
  ^ avoid the sun 10:00 a.m. – 2:00 p.m. when it is the strongest
- keep it clean to get rid of germs, dirt, and oil; oil clogs oil glands leading into bacterial infections such as acne
- keep it dry; Athlete’s Foot is caused by a fungus that lives in warm and moist places