

**Answers to Chapter 3 Homework**

<b>3.1</b>	<b>Hierarchy of Structure in Animals</b>
<b>2</b>	a) Heart – is only in the circulatory system b) Lungs – are in the circulatory and respiratory systems.
<b>4</b>	Function all organisms must do .....and..... organ system that helps do this Movement → musculoskeletal system Reproduction → reproductive system Respond to environment → nervous system (receives messages from environment) Grow → digestive system brings nutrients to cells so they can grow Take in oxygen & remove carbon dioxide → circulatory & respiratory Remove waste → digestive and urinary
<b>5</b>	There aren't dozens or hundreds of organ systems because there aren't dozens or hundreds of functions organisms need to do! There are only a handful of functions (listed in #4) that all living things need to do. Once these needs are met, there is no need to develop more organ systems.
<b>6</b>	There is no hierarchy of structure in a cell because the cell is the simplest unit of life and it is able to all on its own perform the necessary functions: obtaining food and removing waste (diffusion and osmosis and engulfing`), reproduction (by mitosis or asexual reproduction) and movement if needed (by cilia or flagella or by moving cytoplasm like amoeba)

<b>3.2</b>	<b>Stem Cells</b>
<b>1</b>	Cellular differentiation means that cells become different or specialize to do a specific job.
<b>2</b>	Stem cells are undifferentiated cells that can divide and become specialized cells. Embryonic stem cells (stem cells in an embryo) can differentiate to become any kind of cell. Adult stem cells or tissue stem cells can differentiate only into a few types of cells. ie: bone marrow cells can become white blood cells, red blood cells or platelets and that's all.
<b>3</b>	Umbilical cords have a supply of tissue stem cells. They cannot be any kind of cell, but they can differentiate into the different blood cells. So they are considered `tissue stem cells`.
<b>4</b>	Being able to harvest (get) true stem cells means we may be able to regrow any kind of tissue. This could be immensely helpful when treating illness and major injuries.
<b>5</b>	Leukemia is a cancer of the blood. The bone marrow is producing too many blood cells and they are not functioning properly. The doctors first must kill off the diseased white blood cells and also radiate and kill the bone marrow producing them. Then they obtain healthy bone marrow cells from a matched donor (or the patients own umbilical cord if it was banked) and inject back into the patient. These new, healthy bone marrow cells reform a healthy blood system.
<b>6</b>	Regeneration is beneficial because when a body part is injured or severed, the organism can regrow it including tissue, blood vessels, nerve tissue and bone.
<b>7</b>	Starfish and salamanders are able to regenerate severed limbs. Humans cannot regrow nervous tissue but can regrow skin, bone and muscle. Not all organisms can regenerate completely.

Organ system homework

Digestive System – Chapter 3.3 p. 82 # 1-5	
1. *notice is said digestive tract.	The 3 main parts of the digestive tract and their jobs are: mouth (which starts breaking down food by mashing it up with teeth and chemically breaking down with enzymes), esophagus (which connects mouth to stomach), stomach (holds & churns food and produces acids to break down food more), intestine (absorbs nutrients & re-absorbs water)
2.	Food needs to be digested so it can be absorbed and brought to all cells in your body.
3.	Substances that are added : <ul style="list-style-type: none"> <li>° Saliva – in mouth – contains enzymes to help break down food.</li> <li>° Digestive enzymes /stomach acid – in stomach to help break down.</li> <li>° Mucus – added by epithelial cells all along tract – helps move food smoothly and protects lining against digestive enzymes.</li> <li>° Liver, pancreas &amp; gall bladder add enzymes to digest.</li> <li>° Liver – adds bile to break down fat.</li> </ul>
4.	Smooth muscles contract to move food along in our esophagus, stomach and intestines. (We don't have to think about it – they just do the job for us!)
5.	Colitis – digestive disorder – this occurs when the epithelial lining of our intestines gets inflamed.

Circulatory System – Chapter 3.4 p. 87 # 1,2,3,4,5,8	
1	The function of the circulatory system is to move substances around the body. (think of the video!)
2	Substances that get moved around include <ul style="list-style-type: none"> <li>° nutrients – from the intestines to rest of body</li> <li>° oxygen – from lungs to rest of body</li> <li>° carbon dioxide – from rest of body to lungs</li> <li>° waste – from body tissues for disposal (some go to kidney)</li> </ul>
3	The circulatory works together with the digestive system. As the food moves along and gets digested, nutrients are then absorbed from the intestines into the blood stream to be moved around the body to individual cells.
4	An angiogram is like a regular x-ray except that for an angiogram, fluorescent dye is injected into the heart's arteries. This helps visualize the arteries better.
5	There are 3 different types of blood vessels: arteries (thick walls), veins (thinner walls) and capillaries (very tiny blood vessels with very thin walls). So... <ul style="list-style-type: none"> <li>A) Is artery (thick walls)</li> <li>B) Is a capillary (only 1 red blood cell can fit through)</li> <li>C) Is a vein since it has thin walls.</li> </ul>
8	Cardiac muscle contracts at the same time, unless the smooth muscle in your intestines that doesn't necessarily all contract at the same time. Also, cardiac muscle is always contracting in a regular pattern (heart beat). The intestine muscles don't always contract – especially when there is no food in them.

Respiratory System – Chapter 3.6 p. 95 # 1-5	
1	Main parts of the respiratory system: Nose, mouth, trachea, bronchi, lungs and diaphragm. The lungs are the organ.
2	Epithelial cells that line the pathway do 2 things: 1) produce mucus to keep things moist and to trap debris and 2) have cilia that move mucus and filter out any foreign materials.
3	The respiratory system works together with the circulatory system. The gas exchange ( $O_2$ and $CO_2$ ) occurs in the lungs. The small blood vessels (capillaries) surround the smallest air sacs called alveoli. Here diffusion occurs. Oxygen moves from lungs to oxygen poor blood. Also the carbon dioxide moves from high concentration in capillaries to low concentration in the lungs. The circulatory system depends on the respiratory system to exchange these gases.
4	Breathing and gas exchange are not the same. Breathing is the process of taking air into your lungs (inhalation) and expelling air (exhalation). Gas exchange is what occurs between the alveoli and the capillaries: oxygen and carbon dioxide diffusing across the thin membrane.
5	<ul style="list-style-type: none"> <li>a) Although tuberculosis can show up on an x-ray of the chest, so can pneumonia. So an x-ray is not enough (insufficient) to confirm tuberculosis.</li> <li>b) Medical staff need to look at lunch and stomach secretions to confirm that it is or is not tuberculosis.</li> </ul>

<b>Musculoskeletal System (3.8)</b>	
p. 99	
#2	Ligaments – hold bones together. They are tough & elastic (stretchy a bit) Tendon – connect muscle to bone. They are less elastic (stretchy) than ligaments
#3	Skeletal muscle is called voluntary muscles because I voluntarily control. I think about it and it contracts and makes the bones its connect to move. Skeletal muscles are connected to the skeleton bones like my lower arm bones. I can voluntarily make my lower arm move (see Fig. 5 in text).
#5	Bone fractures will happen more often in weaker bones. Older people lose bone density (often due to osteoporosis) which weakens the bone. This makes the bone easier to fracture (maybe due to a fall).
#6	Fast twitch muscles contract quickly. They are good for contracting a muscle in a short period of time. Our leg muscles (for running) should have a greater percentage of fast twitch muscles as would hands and arms (they also move and respond quickly).

<b>Nervous System (3.10)</b>	
p. 104	
#3	At bat: Sensory cells in eyes SEE the ball > communicate to brain > Motor nerves tell the arm to swing > I hit the ball and my sensory cells in hand feel this and my sensory cells in eye see the ball go up into the air > tell brain. **key is 2 way communication between peripheral nervous system and central nervous system (brain)
#4	Nervous system → tells respiratory system when to breath faster/deeper (ie: running) Nervous system → tells our brain when we are hungry (so we eat and use our digestive system) or when our bladder is full (so our urinary system allows us to go to the bathroom) Nervous system → tells our circulatory system when heart should beat faster (ie: running)
#5	Sensory nervous detect information about our environment. ie: our ears tell us about sounds around us. Our eyes tell us about vision information
#7	Jila may have damaged the part of the brain that processes hearing. The ear might work find and is receiving signals but the brain may not be processing or interpreting it.

3.11	Interactions of Systems
1	<p>Using Figure 1 to help:</p> <p>Digestive system and circulatory system interact. The circulatory system obtains the broken down nutrients and circulates to all parts of body</p> <p>Urinary system interacts with circulatory system. The urinary system takes waste products out of the circulatory system and disposes of them.</p> <p>Respiratory system and circulatory system interact. The respiratory system obtains oxygen which the circulatory system picks up and circulates throughout body. Conversely, the lungs remove carbon dioxide from circulatory system and exhale.</p>
2	<p>a) Circulatory system seems to interact with many other systems.</p> <p>b) The circulatory system is so integrated because it is the transport system. It is one of the ways the body communicates and works with all the other parts of the body.</p>
3	<p>Frogs exchange gases (oxygen and carbon dioxide) through their lungs and through their skin.</p>
4	<p>A tapeworm does not need a digestive system because it lives in the digestive system of other animals. It merely absorb the food around them. In fact, they have little to do – no need to protect themselves, move around etc. It is a very simple organism.</p>
5	<p>Duck feet are webbed. The skeleton would need to be formed such that the `toes` are spread out and the skin would need to be stretched across. So..integumentary (skin) system interacts with skeletal system.</p>
6	<p>a) integumentary &amp; nervous interaction -- Our nervous system would detect cold and cause our skin to get `goosebumps`</p> <p>b) musculoskeletal &amp; nervous – if our nervous system detects pain (ie: hand is on something very hot) then the musculoskeletal moves the hand away.</p> <p>c) respiratory system &amp; nervous - If we are exercising intensely, then the nervous system would send a message to the lungs to breath deeper and faster to obtain more oxygen and expel more carbon dioxide.</p> <p>d) urinary system &amp; nervous – if our bladder feels full (nervous system detects), then it is time to expel some waste from bladder!</p>