TEACHER GUIDE

9th–12th Grade

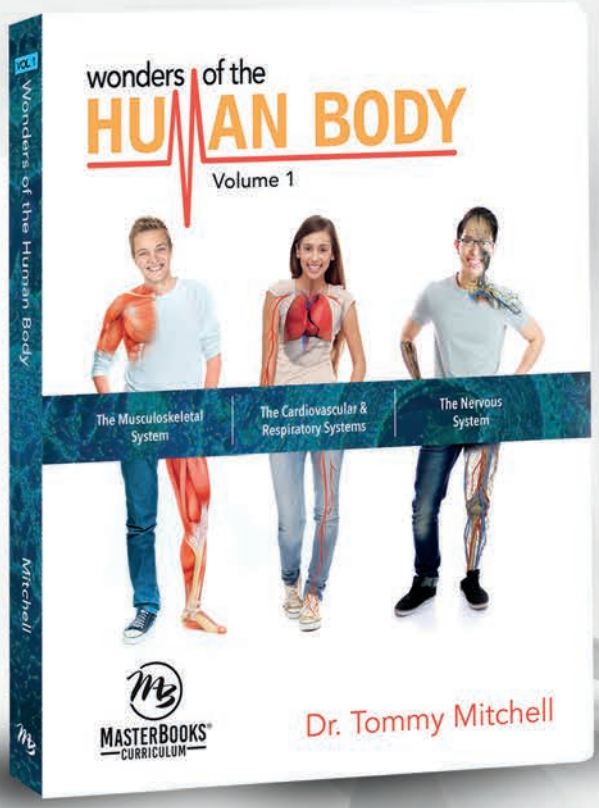
Includes Student Worksheets

Science

- Weekly Lesson Schedule
- Worksheets
- Quizzes & Tests
- Answer Keys

INTRODUCTION TO ANATOMY & PHYSIOLOGY 1

The Musculoskeletal, Cardiovascular, Respiratory, & Nervous Systems



wonders of the HUMAN BODY

MASTERBOOKS® CURRICULUM

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Introduction to Anatomy & Physiology 1 Revised

MASTERBOOKS CURRICULUM

Author: Dr. Tommy Mitchell

Master Books Creative Team:

Editor: Craig Froman

Design: Terry White

Cover Design: Diana Bogardus

Copy Editors:
Judy Lewis
Willow Meek

Curriculum Review:
Kristen Pratt
Laura Welch
Diana Bogardus

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Dr. Tommy Mitchell held an MD from Vanderbilt University School of Medicine and had a thriving medical practice for 20 years before pursuing creation ministry full time. Since 2005, Dr. Mitchell served as a popular speaker and author for Answers in Genesis. He passed into the presence of the Lord on September 17, 2019.

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MASTERBOOKS
CURRICULUM

Table of Contents

Using This Teacher Guide

Features: The suggested weekly schedule enclosed has easy-to-manage lessons that guide the reading, worksheets, and all assessments. The pages of this guide are perforated and three-hole punched so materials are easy to tear out, hand out, grade, and store. Teachers are encouraged to adjust the schedule and materials needed in order to best work within their unique educational program.

Fearfully and Wonderfully Made!

Explore the human body from a creation perspective in this dynamic Anatomy & Physiology course. Students will learn how amazing their bodies are — from the simplest parts to some of its most complex functions. Covering muscles and bones, along with the cardiovascular and respiratory systems, this course takes an in-depth look at how these systems work and how our bodies cannot possibly be an accident! Through worksheets, quizzes, and tests, students will solidify their knowledge of the human body, created by the one and only Master Designer.

	**Approximately 30 to 45 minutes per lesson, five days a week**
	**Includes answer keys for worksheets, quizzes, and tests**
	**Worksheets for each section**
	**Quizzes and tests are included to help reinforce learning and provide assessment opportunities**
	**Designed for grades 9 to 12 in a one-year science course**

Course Objectives: Students completing this course will

- Learn the incredible design of the human heart and how it is really two pumps in one
- Identify how blood moves through an incredible network of arteries and veins
- Investigate what "blood pressure" is and the marvelous systems that help regulate it
- Explore how the respiratory system allows us to get the "bad air out" and the "good air in"
- Review the ins and outs of the bones in your skeleton and how they function
- Discover detail as to how your marvelous muscles move you

Course Description

In this dynamic *Introduction to Anatomy & Physiology* course, students will not only begin to grasp the intricate workings of their bodies, but also learn of the wonders of the human body, designed by our Creator and loving Father. Nothing else in the universe is quite like it. The body is delicate yet powerful — incredibly complex but at times amazingly simple. Students will explore the structure, function, and regulation of the body in detail.

Throughout the two volumes studied over the course of the year, students will learn things to do to keep the body healthy, though in a fallen, cursed world, things are bound to go wrong. The human body is built from many kinds of cells and tissues, and students will learn how they work. We will look at what happens when disease or injury affects bones and muscles. The course also covers both the cardiovascular and respiratory systems, from the level of the cell to the organs themselves, examining these systems in depth.

Although the world insists that our bodies are merely the result of time and chance, as students examine the human body closely, they will see that it cannot be an accident. It can only be the product of a Master Designer.

First Semester Suggested Daily Schedule

Date	Day	Assignment	Due Date	✓	Grade
First Semester-First Quarter — ***The Musculoskeletal System***					
Week 1	Day 1	Read Foundations • Pages 6–7 • *Wonders of the Human Body Vol. 1* (WHBV1) Read Introduction with focus on course objectives • Pages 4–5 • Teacher Guide (TG)			
	Day 2	Read page 8–14 • (WHBV1)			
	Day 3	Worksheet 1 • Pages 17–18 • (TG)			
	Day 4	Read Pages 15–18 (to Ribosomes) • (WHBV1)			
	Day 5	Worksheet 2 • Pages 19–20 • (TG)			
Week 2	Day 6	Read Page 18 (from Ribosomes) to Page 24 • (WHBV1)			
	Day 7	Worksheet 3 • Pages 21–22 • (TG)			
	Day 8	Read Pages 25–30 • (WHBV1)			
	Day 9	Read Pages 31–35 • (WHBV1)			
	Day 10	Worksheet 4 • Pages 23–24 • (TG)			
Week 3	Day 11	Read Pages 36–41 • (WHBV1)			
	Day 12	Worksheet 5 • Pages 25–26 • (TG)			
	Day 13	Review Day to Complete All Prior Assignments			
	Day 14	Study Day to Prepare for Quiz			
	Day 15	**Unit 1: Quiz 1** • Pages 137–138 • (TG)			
Week 4	Day 16	Read Pages 42–45 • (WHBV1)			
	Day 17	Worksheet 6 • Pages 27–28 • (TG)			
	Day 18	Read Pages 46–49 (to Bone Cells) • (WHBV1)			
	Day 19	Worksheet 7 • Pages 29–30 • (TG)			
	Day 20	Read Page 49 (from Bone Cells) to Page 53 • (WHBV1)			
Week 5	Day 21	Worksheet 8 • Pages 31–32 • (TG)			
	Day 22	Read Pages 54–57 • (WHBV1)			
	Day 23	Worksheet 9 • Pages 33–34 • (TG)			
	Day 24	Read Pages 58–61 • (WHBV1)			
	Day 25	Worksheet 10 • Pages 35–36 • (TG)			
Week 6	Day 26	Read Pages 62–65 • (WHBV1)			
	Day 27	Worksheet 11 • Pages 37–38 • (TG)			
	Day 28	Read Pages 66–70 • (WHBV1)			
	Day 29	Worksheet 12 • Pages 39–40 • (TG)			
	Day 30	Read Pages 71–74 • (WHBV1)			
Week 7	Day 31	Worksheet 13 • Pages 41–42 • (TG)			
	Day 32	Read Pages 75–79 • (WHBV1)			
	Day 33	Worksheet 14 • Pages 43–44 • (TG)			
	Day 34	Study Day to Prepare for Quiz			
	Day 35	**Unit 1: Quiz 2** • Pages 139–140 • (TG)			

Date	Day	Assignment	Due Date	✓	Grade
Week 8	Day 36	Read Pages 80–84 • (WHBV1)			
	Day 37	Worksheet 15 • Page 45 • (TG)			
	Day 38	Read Pages 85–88 • (WHBV1)			
	Day 39	Worksheet 16 • Pages 47–48 • (TG)			
	Day 40	Read Pages 89–93 • (WHBV1)			
Week 9	Day 41	Worksheet 17 • Page 49 • (TG)			
	Day 42	Read Pages 94–98 • (WHBV1)			
	Day 43	Worksheet 18 • Pages 51–52 • (TG)			
	Day 44	Read Pages 99–102 • (WHBV1)			
	Day 45	Worksheet 19 • Pages 53–54 • (TG)			
First Semester-Second Quarter — ***The Musculoskeletal System***					
Week 1	Day 46	Review Day to Complete All Prior Assignments			
	Day 47	Study Day to Prepare for the Third Quiz			
	Day 48	**Unit 1: Quiz 3** • Pages 141–142 • (TG)			
	Day 49	Study Day to Prepare for Test			
	Day 50	**Unit 1: Test 1** • Pages 153–154 • (TG)			
Week 2	Day 51	Read Cardiovascular System • Pages 106–109 • (WHBV1)			
	Day 52	Read Pages 110–115 (to Cardiac Muscle) • (WHBV1)			
	Day 53	Worksheet 20 • Pages 57–58 • (TG)			
	Day 54	Read Page 115 (from Cardiac Muscle) to Page 120 (to Heart Valves) • (WHBV1)			
	Day 55	Worksheet 21 • Pages 59–60 • (TG)			
Week 3	Day 56	Read Page 120 (from Heart Valves) to Page 124 • (WHBV1)			
	Day 57	Worksheet 22 • Pages 61–62 • (TG)			
	Day 58	Read Pages 125–129 • (WHBV1)			
	Day 59	Worksheet 23 • Page 63 • (TG)			
	Day 60	Read Pages 130–136 • (WHBV1)			
Week 4	Day 61	Worksheet 24 • Pages 65–66 • (TG)			
	Day 62	Read Pages 137–141 • (WHBV1)			
	Day 63	Worksheet 25 • Pages 67–68 • (TG)			
	Day 64	Read Pages 142–146 (to Capillaries) • (WHBV1)			
	Day 65	Worksheet 26 • Pages 69–70 • (TG)			
Week 5	Day 66	Study Day			
	Day 67	**Unit 2: Quiz 1** • Pages 143–144 • (TG)			
	Day 68	Read Pages 146 (from Capillaries) to 152 (Cardiovascular Center) (WHBV1)			
	Day 69	Worksheet 27 • Pages 71–72 • (TG)			
	Day 70	Read Pages 150 (from Blood Pressure) to 150 (Blood Presure) • (WHBV1)			

Date	Day	Assignment	Due Date	✓	Grade
Week 6	Day 71	Worksheet 28 • Page 73 • (TG)			
	Day 72	Read Pages 152–161 • (WHBV1)			
	Day 73	Worksheet 29 • Pages 75–76 • (TG)			
	Day 74	Extra Study Day			
	Day 75	Extra Study Day			
Week 7	Day 76	Read Pages 162–168 (to Sinuses) • (WHBV1)			
	Day 77	Worksheet 30 • Pages 77–78 • (TG)			
	Day 78	Read Page 168 (from Sinuses) to Page 173 • (WHBV1)			
	Day 79	Worksheet 31 • Pages 79–80 • (TG)			
	Day 80	Read Pages 174–177 • (WHBV1)			
Week 8	Day 81	Worksheet 32 • Pages 81–82 • (TG)			
	Day 82	Read Pages 178–181 • (WHBV1)			
	Day 83	Worksheet 33 • Pages 83–84 • (TG)			
	Day 84	Read Pages 182–186 (to Expiration) • (WHBV1)			
	Day 85	Worksheet 34 • Pages 85–86 • (TG)			
Week 9	Day 86	Read Page 186 (from Expiration) to Page 190 (top paragraph) • (WHBV1)			
	Day 87	Worksheet 35 • Pages 87–88 • (TG)			
	Day 88	Read Page 190 (from second paragraph) to Page 193 (Control of Respiration) • (WHBV1)			
	Day 89	Worksheet 36 • Page 89 • (TG)			
	Day 90	Worksheet 36 • Page 90 • (TG)			
		Mid-Term Grade			

Second Semester Suggested Daily Schedule

Date	Day	Assignment	Due Date	✓	Grade
Second Semester-Third Quarter — ***Cardiovascular & Respiratory Systems***					
Week 1	Day 91	Read Page 193 (from Control of Respiration) to Page 195 (WHBV1)			
	Day 92	Read Pages 196–197 • (WHBV1)			
	Day 93	Worksheet 37 • Pages 91–92 • (TG)			
	Day 94	Worksheet 38 • Pages 93–94 • (TG)			
	Day 95	Review Day to Complete All Prior Assignments			
Week 2	Day 96	Study Day to Prepare for Quiz			
	Day 97	**Unit 2: Quiz 2** • Pages 145–146 • (TG)			
	Day 98	Study Day Volume One			
	Day 99	Study Day Volume Two			
	Day 100	**Unit 2: Test 2** • Pages 155–156 • (TG)			
Week 3	Day 101	Read Pages 200–202 (to Overview of the Nervous System) (WHBV1)			
	Day 102	Read Pages 202–205 (from Overview of Nervous System) (WHBV1)			
	Day 103	Worksheet 39 • Page 97 • (TG)			
	Day 104	Worksheet 39 • Page 98 • (TG)			
	Day 105	Read Structure of the Nervous System • Pages 206–209 (WHBV1)			
Week 4	Day 106	Read Pages 210–212 • (WHBV1)			
	Day 107	Worksheet 40 • Page 99 • (TG)			
	Day 108	Worksheet 40 • Page 100 • (TG)			
	Day 109	Read Pages 213–215 (to Nerves) • (WHBV1)			
	Day 110	Read Page 215 (from Nerves) to Page 217 • (WHBV1)			
Week 5	Day 111	Worksheet 41 • Page 101 • (TG)			
	Day 112	Worksheet 41 • Page 102 • (TG)			
	Day 113	Read Pages 218–223 • (WHBV1)			
	Day 114	Read Pages 224–231 • (WHBV1)			
	Day 115	Worksheet 42 • Page 103 • (TG)			
Week 6	Day 116	Worksheet 42 • Page 104 • (TG)			
	Day 117	Review Day to Complete All Prior Assignments			
	Day 118	Study Day to Prepare for Quiz			
	Day 119	**Unit 3: Quiz 1** • Pages 147–148 • (TG)			
	Day 120	Read Pages 232–235 (to Cerebrospinal Fluid) • (WHBV1)			

Date	Day	Assignment	Due Date	✓	Grade
Week 7	Day 121	Read Page 235 (from Cerebrospinal Fluid) to Page 238 (to Cerebrum - Gross Anatomy) • (WHBV1)			
	Day 122	Worksheet 43 • Page 105 • (TG)			
	Day 123	Worksheet 43 • Page 106 • (TG)			
	Day 124	Read Page 238 (from Cerebrum - Gross Anatomy) to Page 240 (end of first paragraph) • (WHBV1)			
	Day 125	Read Page 240 (from first full paragraph) to Page 242 (The Cerebrum) • (WHBV1)			
Week 8	Day 126	Worksheet 44 • Page 107 • (TG)			
	Day 127	Worksheet 44 • Page 108 • (TG)			
	Day 128	Read Page 242 (from The Cerebrum) to Page 243 (Cerebrum - Association Areas) • (WHBV1)			
	Day 129	Read Page 243 (from Cerebrum - Association Areas) to Page 245 (Which Is the Important Side?) • (WHBV1)			
	Day 130	Worksheet 45 • Page 109 • (TG)			
Week 9	Day 131	Worksheet 45 • Page 110 • (TG)			
	Day 132	Read Page 245 (from Which Is the Important Side?) to Page 247 (Brain Stem) • (WHBV1)			
	Day 133	Read Page 247 (from Brain Stem) to Page 249 (Cerebellum) (WHBV1)			
	Day 134	Worksheet 46 • Page 111 • (TG)			
	Day 135	Worksheet 46 • Page 112 • (TG)			
Second Semester-Fourth Quarter — ***Cardiovascular & Respiratory Systems***					
Week 1	Day 136	Read Page 249 (from Cerebellum) to Page 251 (end of first paragraph) • (WHBV1)			
	Day 137	Read Page 251 (from second paragraph) to Page 252 (Blood Brain Barrier) • (WHBV1)			
	Day 138	Worksheet 47 • Page 113 • (TG)			
	Day 139	Worksheet 47 • Page 114 • (TG)			
	Day 140	Read Page 252 (from Blood Brain Barrier) to Page 253 (WHBV1)			
Week 2	Day 141	Read Page 254 to Page 255 (Consciousness and the Mind) (WHBV1)			
	Day 142	Worksheet 48 • Page 115 • (TG)			
	Day 143	Worksheet 48 • Page 116 • (TG)			
	Day 144	Read Page 255 (from Consciousness and the Mind) to Page 257 (Spinal Cord - Gross Anatomy) • (WHBV1)			
	Day 145	Read Page 257 (from Spinal Cord - Gross Anatomy) to Page 259 • (WHBV1)			
Week 3	Day 146	Worksheet 49 • Page 117 • (TG)			
	Day 147	Worksheet 49 • Page 118 • (TG)			
	Day 148	Read Pages 260–261 (to Tracts in th Spinal Cord) • (WHBV1)			
	Day 149	Read Page 261 (from Tracts in th Spinal Cord) • (WHBV1)			
	Day 150	Worksheet 50 • Page 119 • (TG)			

Date	Day	Assignment	Due Date	✓	Grade
Week 4	Day 151	Worksheet 50 • Page 120 • (TG)			
	Day 152	Read Pages 262–264 • (WHBV1)			
	Day 153	Read Pages 265–267 • (WHBV1)			
	Day 154	Worksheet 51 • Page 121 • (TG)			
	Day 155	Worksheet 51 • Page 122 • (TG)			
Week 5	Day 156	Read Pages 268–277 • (WHBV1)			
	Day 157	Worksheet 52 • Page 123–124 • (TG)			
	Day 158	Study Day to Prepare for Quiz			
	Day 159	**Unit 3: Quiz 2** • Pages 149–150 • (TG)			
	Day 160	Read Pages 278–279 • (WHBV1)			
Week 6	Day 161	Read Pages 280–281 • (WHBV1)			
	Day 162	Worksheet 53 • Pages 125–126 • (TG)			
	Day 163	Read Page 282 • (WHBV1)			
	Day 164	Read Pages 283–284 (to Hearing) • (WHBV1)			
	Day 165	Worksheet 54 • Page 127 • (TG)			
Week 7	Day 166	Worksheet 54 • Page 128 • (TG)			
	Day 167	Read Page 284 (from Hearing) to Page 286 (end of first paragraph) • (WHBV1)			
	Day 168	Read Page 286 (from start of second paragraph) to Page 287 (Sound) • (WHBV1)			
	Day 169	Worksheet 55 • Page 129 • (TG)			
	Day 170	Worksheet 55 • Page 130 • (TG)			
Week 8	Day 171	Read Page 287 (from Sound) to Page 288 • (WHBV1)			
	Day 172	Read Pages 289–291 • (WHBV1)			
	Day 173	Worksheet 56 • Page 131 • (TG)			
	Day 174	Worksheet 56 • Page 132 • (TG)			
	Day 175	Read Pages 292–301 • (WHBV1)			
Week 9	Day 176	Worksheet 57 • Pages 133–134 • (TG)			
	Day 177	Study Day to Prepare for Quiz			
	Day 178	**Unit 3: Quiz 3** • Pages 151–152 • (TG)			
	Day 179	Study Day to Prepare for Test			
	Day 180	**Unit 3: Test 3** • Pages 157–158 • (TG)			
		Final Grade			

Unit 1 Worksheets:

The Musculoskeletal System

Words to Know: Define the Following:

1. Cells: _____
2. Anatomy: _____
3. Physiology: _____
4. Organs: _____
5. Digestive system: _____
6. Nucleus: _____
7. Cell membrane: _____
8. Cytoplasm: _____
9. Erythrocytes: _____

Fill in the Blank

1. The bones in the skeleton cannot remain strong without _____, which is manufactured by the skin.

2. There are over _____ different kinds of cells in the human body.

3. Psalm _____ says, "I will praise You, for I am fearfully and wonderfully made; marvelous are Your works."

4. Just as words are built of letters and books are built from words, so your body is built of organs and tissues, and all the organs and tissues are made of _____.

5. The study of microscopic anatomy is called _____.

6. Physiology of the circulatory system focuses on how the _____ works.

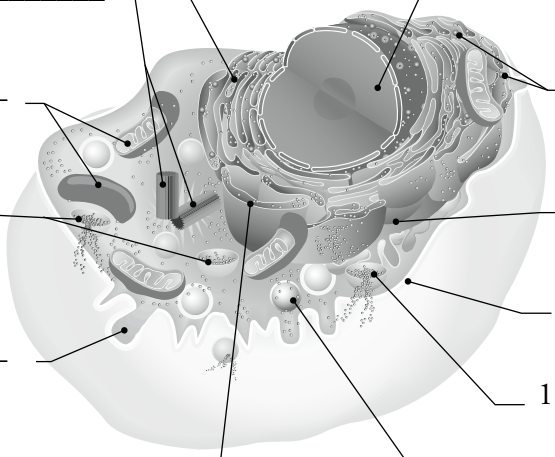
7. Cells are small but not _____.

8. Groups of cells form tissues, which can be thought of as one of four basic tissue types — epithelial, connective, muscle, and _____.

9. The cell is the smallest "_____ unit" of the body.

10. Most cells have three basic parts — a nucleus, a cell membrane, and _____.

Complete the Chart — Human Cell Structure



1. _____
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9. _____
10. _____
11. _____
12. _____

Words to Know: Define the Following:

1. Plasma membrane: _____
2. Intracellular fluid: _____
3. Extracellular fluid: _____
4. Water soluble: _____
5. Lipid: _____
6. Hydrophilic: _____
7. Hydrophobic: _____
8. Exocytosis: _____
9. Cytosol: _____
10. Lysosomes: _____

Fill in the Blank

1. The plasma _____ is far more than just a container, for it helps separate the two major fluid compartments of the body, the intracellular fluid and the extracellular fluid.

2. The plasma membrane is actually made up of two layers of molecules called _____.

3. The plasma membrane is composed of two layers of phospholipids, creatively called a phospholipid _____, which means "two layers of phospholipids."

4. The cytosol plus the organelles make up the _____.

5. _____ acids are the building blocks of proteins.

6. The _____ reticulum is a network of tubes and membranes that is connected to the nuclear membrane.

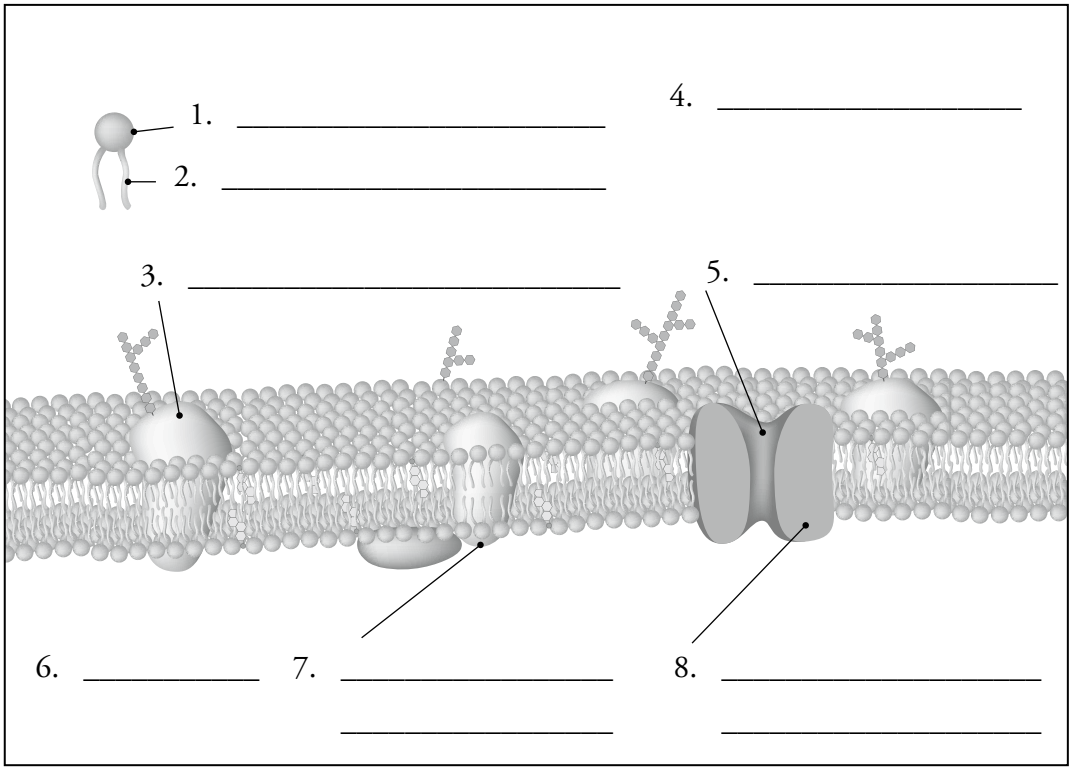
7. The _____ apparatus is a collection of small flattened sacs that stack on one another.

8. _____ break down worn-out organelles, bacteria, and toxic substances.

9. Lysosomes also aid the cell by breaking down substances the cell needs for _____.

10. By breaking down organelles that are worn out or no longer needed, the lysosomes _____ valuable materials.

Complete the Chart — Plasma Membrane Structure



Words to Know: Define the Following:

1. Messenger RNA: _____
2. Mitochondria: _____
3. Metabolize: _____
4. Cytoskeleton: _____
5. Centrioles: _____
6. Mitotic spindle: _____
7. DNA (deoxyribonucleic acid): _____
8. Gene: _____
9. Enzymes: _____
10. Antibodies: _____

Fill in the Blank

1. _____ are where proteins are made.

2. The instructions for what the cell is supposed to do are stored in the _____.

3. Protein-making ribosomes are located in the _____.

4. The mitochondria are responsible for producing _____-energy molecules.

5. ADP, adenosine diphosphate, is like a battery that needs to be _____.

6. The cell's favorite fuel is not wood or gasoline but the sugar _____.

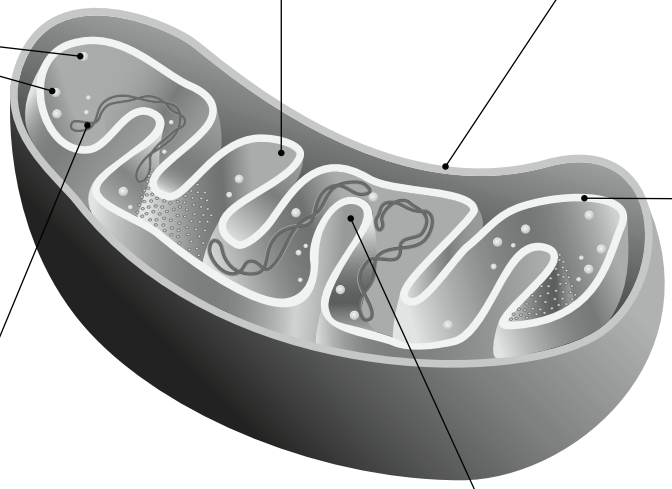
7. The number of mitochondria in a cell depends on the _____ needs of the cell.

8. DNA is a big molecule made up of two long strings of smaller molecules called _____.

9. Each double helix molecule of DNA is carefully organized and packaged into a _____.

10. DNA is a complex system of information that is used primarily to make the _____ in our body.

Complete the Chart — Mitochondria



1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

Unit 2 Worksheets:

The Cardiovascular & Respiratory Systems

Words to Know: Define the Following:

1. Cardiovascular system: _____
2. Respiratory system:_____
3. Physiology:_____
4. Skeletal muscles:_____
5. Mitochondria: _____
6. Esophagus:_____
7. Trachea: _____
8. Diaphragm: _____
9. Pericardium:_____
10. Epicardium: _____

Fill in the Blank

1. In one _____ your heart pumps enough blood to fill an Olympic-sized swimming pool.

2. The heart generates its own _____ signals.

3. Your heart began beating _____ days after you were conceived.

4. You have around _____ miles of blood vessels in your body.

5. Organs are made of tissues, and tissues are made of _____.

6. God created the first man and woman, Adam and Eve, perfect and complete, about _____ years ago.

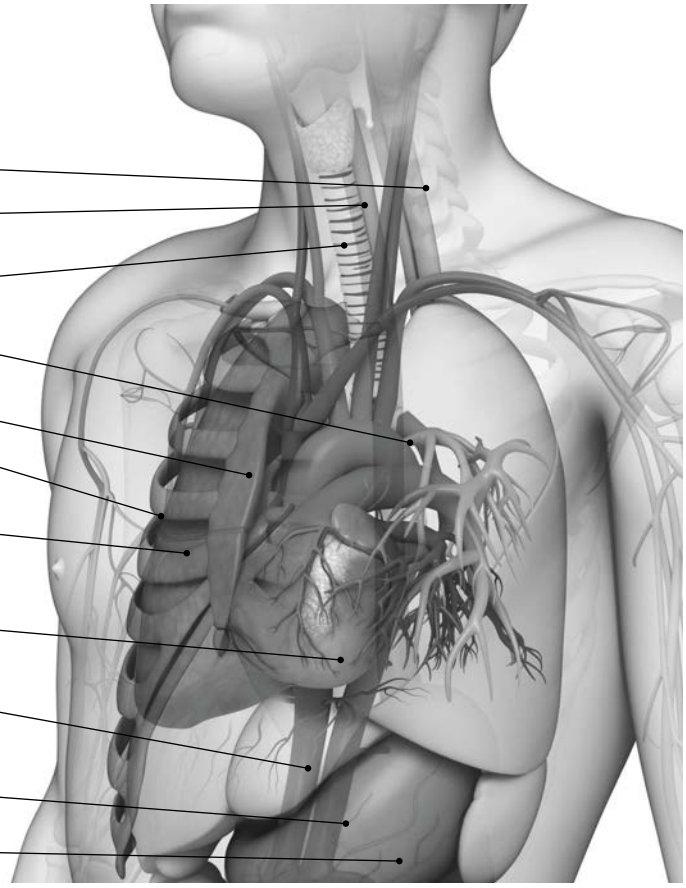
7. A normal _____ is about the size of a person's fist.

8. On average, the heart moves _____ liters of blood per day.

9. God designed the heart with its own _____ system.

10. The wall of the heart consists of three layers: the epicardium, the myocardium, and the _____.

Complete the Chart — Thoracic Cavity



1. _____
2. _____
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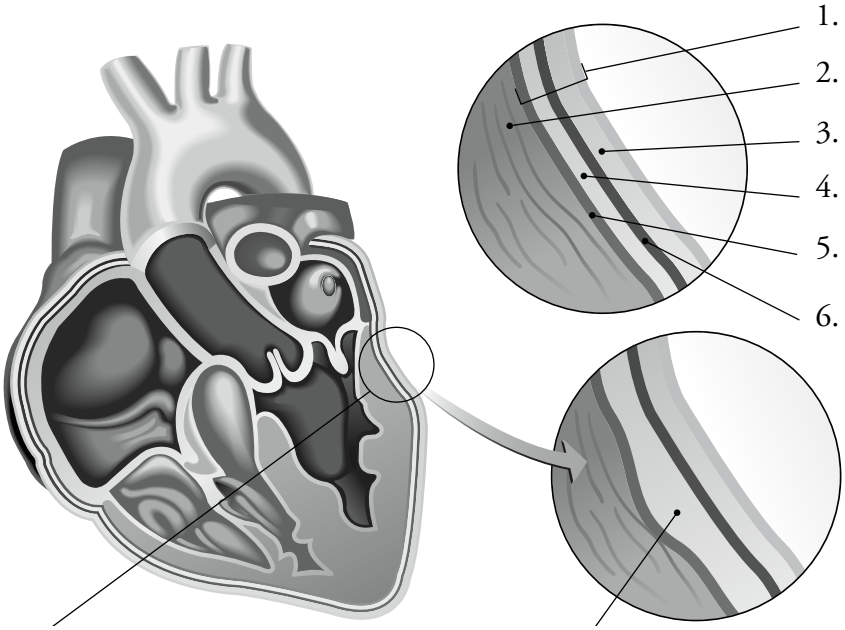
9. _____
10. _____
11. _____

Complete the Chart — Pericardium and Layers of the Heart



1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Words to Know: Define the Following:

1. Intercalated discs: _____
2. Desmosome: _____
3. Gap junctions: _____
4. Pulmonary circulation: _____
5. Systemic circulation: _____
6. Artery: _____
7. Veins: _____
8. Atria: _____
9. Pulmonary veins: _____
10. Vena cavae: _____

Fill in the Blank

1. Skeletal _____ is attached to the bones of the skeleton.

2. Smooth muscle is found in the walls of most of the hollow _____ of the body.

3. Cardiac muscle is found only in the walls of the _____.

4. Mitochondria generate energy for the _____.

5. _____ blood returns to the right side of the heart and gets pumped out to the lungs.

6. _____ blood returns to the left side of the heart from the lungs and gets pumped out to the brain and body.

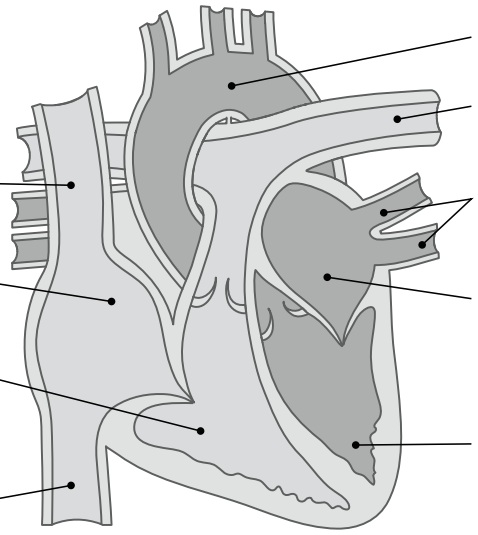
7. Oxygenated blood is a _____ red and deoxygenated blood is a more purplish-red color.

8. The human heart has _____ chambers.

9. The words _____ and inferior when speaking of the body mean "upper" and "lower," respectively.

10. The walls of the ventricles are made of _____ muscle than the atrial walls.

Complete the Chart — Chambers of the Heart



1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____

Words to Know: Define the Following:

1. Tricuspid valve: _____
2. Bicuspid valve: _____
3. Mitral valve: _____
4. Chordae tendineae: _____
5. Semilunar valves: _____
6. Pulmonary valve: _____
7. Incompetent: _____
8. Stenosis: _____
9. Cardiac cycle: _____
10. Atrial systole: _____

Fill in the Blank

1. A _____ must allow the blood to flow freely in one direction but then shut to stop any back-flow.

2. A _____ is like a little parachute that fills with blood from the ventricle under pressure.

3. The pressure of the _____ inside the ventricles pushes them shut.

4. Lunar means "moon," so semilunar means "_____-moon-shaped."

5. Damaged valves can cause different types of _____.

6. The first step in the cardiac cycle is the "_____ phase."

7. René-Théophile-Hyacinthe Laennec (1781–1826) invented the stethoscope in _____.

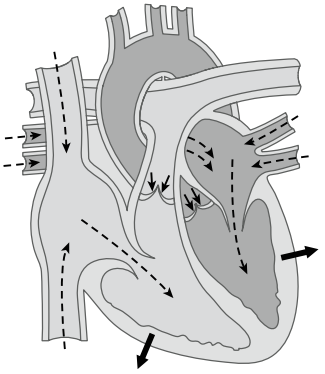
8. The period of time when a heart chamber is contracting is called _____.

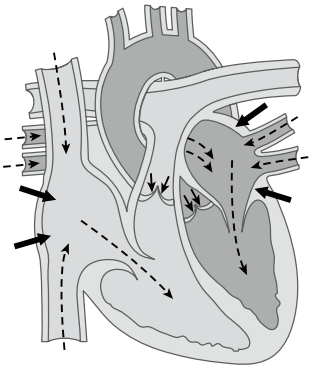
9. In the fifth and final step of the cardiac cycle, the ventricles _____.

10. Blood is prevented from flowing _____ into the ventricles in ventricular diastole.

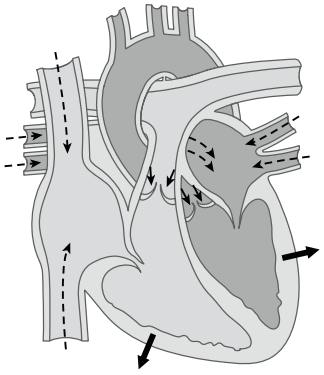
Complete the Chart — The Cardiac Cycle

1. _____



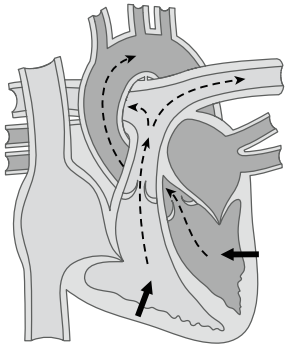


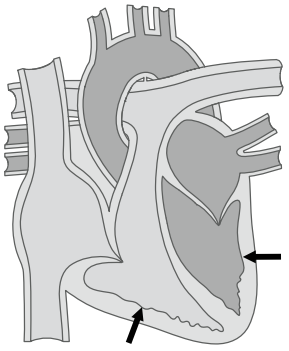
2. _____



5. _____

4. _____





3. _____

Words to Know: Define the Following:

1. Edema: _____
2. Peripheral: _____
3. Pulmonary edema: _____
4. Coronary circulation: _____
5. Interventricular septum: _____
6. Myocardial infarction: _____
7. Myocardial ischemia: _____
8. Coronary artery disease: _____
9. Autorhythmic cells: _____
10. Pacemaker: _____

Fill in the Blank

1. A _____ heart only empties around 60–70 percent of its contents with each beat.

2. God designed the _____ circulation — a way for the heart to pump blood to itself.

3. Because the heart works constantly, it needs lots of _____ and nutrients.

4. The circumflex artery brings blood to the left atrium and the left ventricle's back _____.

5. Every year, over _____ people in America have a heart attack.

6. There are two main sorts of procedures used to deal with a coronary artery blockage: the coronary angioplasty and coronary artery bypass _____.

7. _____ disease is the world's leading cause of death.

8. There are many risk factors that can lead to heart disease, including smoking, a lack of exercise, obesity, poor diet, high _____, diabetes, and high blood pressure.

9. Most of the heart consists of cardiac muscle _____.

Unit 3 Worksheets:

The Nervous System

Words to Know: Define the Following:

1. Sensory function: _____
2. Motor output: _____
3. Central nervous system: _____
4. Brain: _____
5. Peripheral nervous system: _____
6. Sensory division: _____
7. Afferent division: _____
8. Motor division: _____
9. Somatic nervous system: _____
10. Autonomic nervous system: _____

Fill in the Blank

1. The basic pattern of the nervous system consists of information coming into the nervous system. This information is then recognized and _____, and finally a signal is sent out instructing an organ (or organs) to respond in some manner.
2. The nervous system often compares what is sensed in the present to what has been _____ in the past.
3. _____ implies movement or some sort of action.
4. The two major divisions of the nervous system are the central nervous system (CNS) and the _____ nervous system (PNS).
5. The _____ cord extends from the base of the brain down to the lower levels of the spinal column.
6. The peripheral nervous system consists of the _____ nerves that extend from the brain, and the spinal nerves that extend from the spinal cord.
7. The PNS has two basic functions: carrying sensory information to the CNS and transmitting _____ out to the various parts of the body.

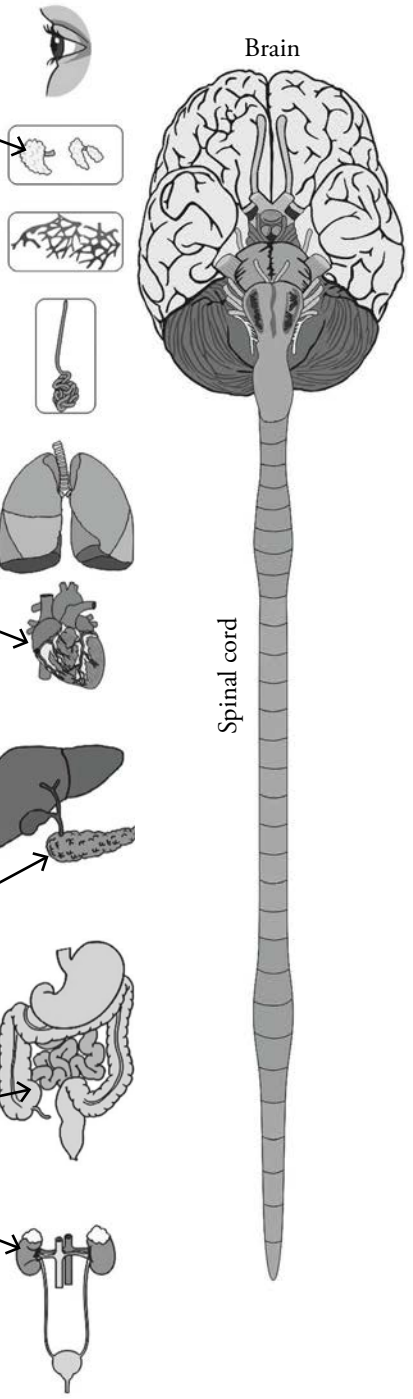
8. We can divide the PNS into two divisions, which are the _____ division and the motor division.

9. The motor division is sometimes called the _____ (meaning "carrying away") division because it carries instructions "away from" the CNS.

10. _____ means "body," so this part of the nervous system allows us to control our body's movements.

Complete the Chart — Automatic Nervous System

Parasympathetic



Salivary & Parotid Glands

1. _____
   _____

Heart

2. _____

Pancreas

3. _____

Intestines

4. _____
   _____

Kidneys

5. _____
   _____
   _____

Words to Know: Define the Following:

1. Neurons: _____
2. Stimulus: _____
3. Neuroglia: _____
4. Neurotransmitters: _____
5. Dendrites: _____
6. Axon terminals: _____
7. Multipolar neurons: _____
8. Bipolar neurons: _____
9. Unipolar neurons: _____
10. Interneurons: _____

Fill in the Blank

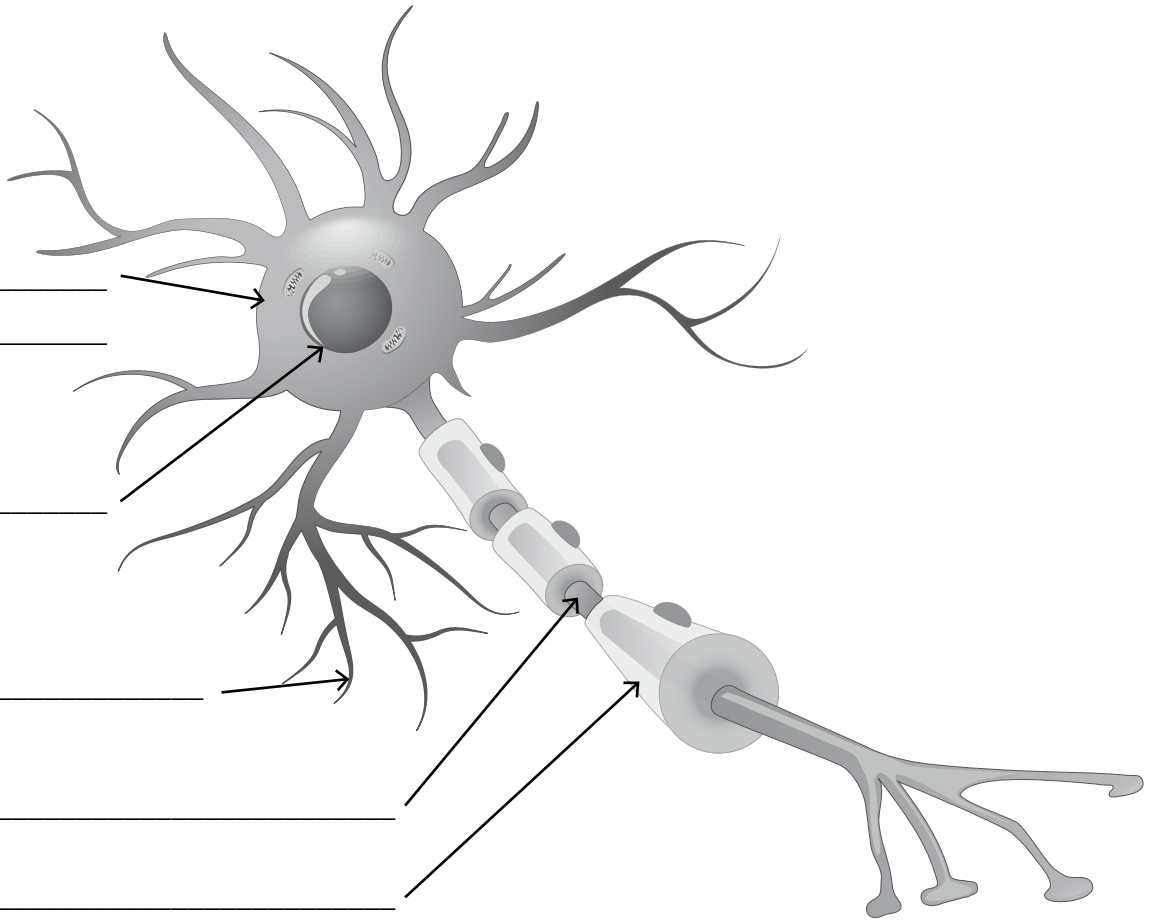
1. _____ tissue lines body cavities or covers surfaces.
2. _____ tissue helps provide a framework for the body and helps connect and support other organs in the body.
3. _____ tissue is the primary component of the nervous system.
4. _____ tissue is responsible for movement and includes skeletal, smooth, and cardiac.
5. The _____ is composed of three parts: the cell body, dendrites, and the axon.
6. The _____ is the portion of the neuron that carries a nerve impulse away from the cell body.
7. Unlike most cell types in your body, neurons cannot be routinely _____.

8. Neurons that transmit impulses away from the central nervous system are called motor or _____ neurons.

9. Sensory or _____ neurons carry impulses triggered by sensory receptors toward the central nervous system.

10. The four types of _____ cells in the central nervous system are the astrocytes, microglial cells, ependymal cells, and oligodendrocytes.

Complete the Chart — Neuron



1. _____
   _____
2. _____
3. _____
4. _____
5. _____

Words to Know: Define the Following:

1. Myelination:_____
2. Schwann cells: _____
3. Multiple Sclerosis (MS):_____
4. Neuron: _____
5. Motor neurons: _____
6. Sensory neurons: _____
7. Mixed nerves:_____
8. Nerve damage in the PNS: _____
9. Nerve damage in the CNS:_____
10. Wallerian degeneration: _____

Fill in the Blank

1. The _____ sheath provides electrical insulation for the axon.
2. There are small gaps between adjacent Schwann cells called _____ of Ranvier.
3. In the CNS, it is the oligodendrocyte that is responsible for _____.
4. The number of myelinated axons _____ from birth throughout childhood until adulthood.
5. Symptoms of MS include double vision, weakness, loss of _____, and paralysis.
6. A newborn baby has very little _____ of its body in the beginning.
7. A _____ is made of bundles of axons located in the peripheral nervous system.
8. With rare exceptions, mature neurons do not divide to _____ themselves.

9. We are not the products of chance, but special _____.

10. The enormous _____ of the body should remind us constantly of God's wisdom and creativity.

Complete the Chart — Anatomy of a Nerve

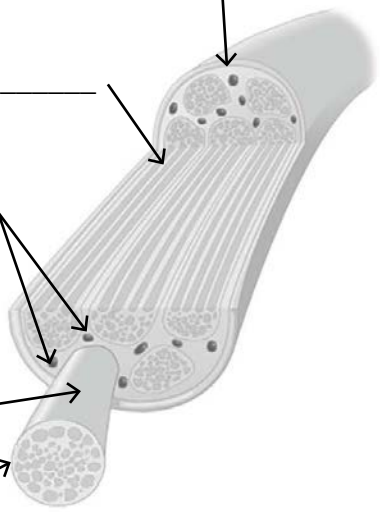
1. _____

2. _____

3. _____

4. _____

5. _____



Quizzes and Tests Section

for Use with

Introduction to Anatomy & Physiology

Match the words/phrases and their definitions.

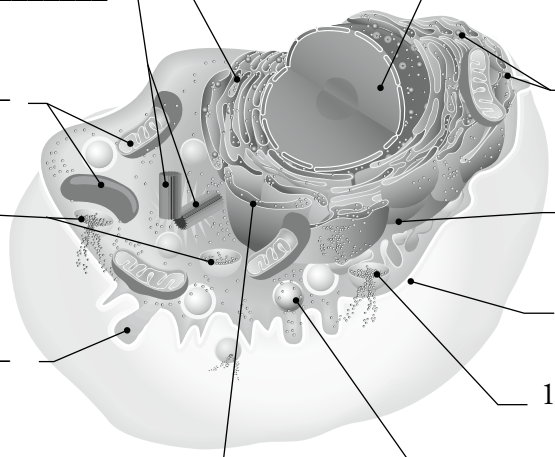
Organs	Exocytosis	Homeostasis	Metabolize	Programmed cell death
Antibodies	Lysosomes	Nucleus	Anatomy	DNA (deoxyribonucleic acid)

1. _____ a collection of various types of tissues that work together to perform a function
2. _____ the study of the body's parts and how they are put together
3. _____ the process of releasing material from inside the cell
4. _____ small vesicles containing enzymes that can digest many kinds of molecules and debris
5. _____ a controlled way of "burning" the fuel of the body
6. _____ stores the genetic instructions needed to make all the proteins in the body
7. _____ fight infectious invaders in your body
8. _____ the control center of the cell; it contains DNA
9. _____ the body has many mechanisms to help maintain a balance or "equilibrium" among its many systems
10. _____ the process by which some cells are designed to self-destruct

Fill in the blank with the correct answer.

1. Psalm _____ says, "I will praise You, for I am fearfully and wonderfully made; marvelous are Your works."
2. Most cells have three basic parts — a nucleus, a cell membrane, and _____.
3. _____ acids are the building blocks of proteins.
4. The cytosol plus the organelles make up the _____.
5. The instructions for what the cell is supposed to do are stored in the _____.
6. The cell's favorite fuel is not wood or gasoline but the sugar _____.
7. DNA is a complex system of information that is used primarily to make the _____ in our body.
8. Collections of organs and structures are called organ _____.
9. Proximal and distal:_____
10. Superior and inferior:_____

Complete the Chart — Human Cell Structure



1. _____
2. _____
3. _____
4. _____
5. _____
_____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____

Match the words/phrases and their definitions. **(5 points each)**

Autonomic nervous system	Müller cells	Spinal cord
Central nervous system	Neurons	Tracts
Cochlea	Peripheral nervous system	
Homeostasis	Sound	

1. _____ act like fiberoptic cables, efficiently transmitting the light that strikes the surface of the retina to the photoreceptor cells
2. _____ the part of the motor division that controls the involuntary functions
3. _____ provides a pathway for sensory information to reach the brain
4. _____ anterior to the vestibule; a spiral chamber made of bone
5. _____ the body's tendency to maintain internal balance
6. _____ the excitable nerve cells that transmit electrical signals
7. _____ a series of vibrations; cannot travel through a vacuum, such as in space
8. _____ the portion of the nervous system outside the brain and spinal cord
9. _____ bundles of axons in the central nervous system
10. _____ composed of the brain and the spinal cord

Fill in the blank with the correct answer. **(5 points each)**

autonomic	chemicals	nerve	opposite	permanent
barrier	increases	neuron	optic	waves

1. When we hear something, we are sensing sound _____ from the environment.
2. To prevent potentially harmful things from coming into contact with brain tissue, there is a blood brain _____.
3. The _____ nerve carries nerve impulses for vision.
4. Our ability to taste depends on our ability to detect, and then react to, certain _____ in our environment.
5. The cerebral hemispheres control the _____ sides of the body.
6. A _____ is made of bundles of axons located in the peripheral nervous system.
7. With an _____ reflex, you remain unaware of what happened.
8. The number of myelinated axons _____ from birth throughout childhood until adulthood.
9. Strokes can result in _____ neurologic damage or even death.
10. The _____ is composed of three parts: the cell body, dendrites, and the axon.

Answer Keys

for Use with

Introduction to Anatomy & Physiology Volume 1

Worksheet 1

Words to Know: Define the Following:

1. **Cells:** the building blocks of life
2. **Anatomy:** the study of the body's parts and how they are put together
3. **Physiology:** the study of how the parts of the body function; the study of how everything in the body works
4. **Organs:** groups of tissues that have a particular function
5. **Digestive system:** all the parts that process your food — from your mouth and stomach to your liver and intestines
6. **Nucleus:** the control center of the cell; it contains DNA
7. **Cell membrane:** forms the cell's outer border
8. **Cytoplasm:** most of the cell's work gets done here
9. **Erythrocytes:** red blood cells; their main job is to carry oxygen

Fill in the Blank

1. vitamin D
2. 200
3. 139:14
4. cells
5. histology
6. heart
7. simple
8. nervous
9. functional
10. cytoplasm

Complete the Chart — Human Cell Structure

1. Centrioles
2. Mitochondria
3. Peroxisome
4. Secretory vesicle
5. Smooth endoplasmic reticulum
6. Rough endoplasmic reticulum
7. Nucleus
8. Ribosomes
9. Golgi complex
10. Plasma membrane
11. Lysosome
12. Vesicle

Worksheet 2

Words to Know: Define the Following:

1. **Plasma membrane:** the envelope that contains the other components of the cell
2. **Intracellular fluid:** fluid inside the cells
3. **Extracellular fluid:** fluid that is outside the cells
4. **Water soluble:** something that can dissolve in water
5. **Lipid:** another name for a fat
6. **Hydrophilic:** a word that literally means "water-loving"
7. **Hydrophobic:** a word that literally means "water-fearing"
8. **Exocytosis:** the process of releasing material from inside the cell
9. **Cytosol:** the liquid found inside the cell
10. **Lysosomes:** small vesicles containing enzymes that can digest many kinds of molecules and debris

Fill in the Blank

1. membrane
2. phospholipids
3. bilayer
4. cytoplasm
5. Amino
6. endoplasmic
7. Golgi
8. Lysosomes
9. nutrition

10. recycle

Complete the Chart — Plasma Membrane Structure

1. Phospholipid head
2. Phospholipid tail
3. Transmembrane glycoprotein
4. Extracellular fluid
5. Pore
6. Cytoplasm
7. Transmembrane protein
8. Channel protein

Worksheet 3

Words to Know: Define the Following:

1. **Messenger RNA:** copies of the protein-building instructions from the nucleus
2. **Mitochondria:** they generate and store energy
3. **Metabolize:** a controlled way of "burning" the fuel of the body
4. **Cytoskeleton:** composed of a network of tubes and filaments that run throughout the cell
5. **Centrioles:** responsible for helping form a complex of microtubules
6. **Mitotic spindle:** guides the cell's chromosomes during cell division
7. **DNA (deoxyribonucleic acid):** stores the genetic instructions needed to make all the proteins in the body
8. **Gene:** each section of DNA that has the information for a particular protein
9. **Enzymes:** perform all the chemical reactions in your cells
10. **Antibodies:** fight infectious invaders in your body

Fill in the Blank

1. Ribosomes
2. nucleus
3. cytoplasm
4. high
5. recharged
6. glucose
7. energy
8. nucleotides
9. chromosome
10. proteins

Complete the Chart — Mitochondria

1. Ribosomes
2. Matrix
3. Outer membrane
4. Inner membrane
5. Cristae
6. DNA

Worksheet 4

Words to Know: Define the Following:

1. **Junk DNA:** once thought to be merely left over from our evolutionary past, though they actually are quite active and serve many functions
2. **Interphase:** the part of the cell cycle when a cell is not actually splitting into two cells
3. **Chromatid:** duplicated chromosomes stuck together during interphase
4. **Pair of sister chromatids:** a chromosome and its copy, stuck together
5. **Mitosis:** the part of the cell cycle that is directly involved with dividing the cell into two daughter cells
6. **Tissue:** a group of cells that perform similar or related functions
7. **Epithelial tissue:** lines your body cavities or covers surfaces
8. **Glandular epithelium:** this tissue forms the glands of the body
9. **Myofilaments:** muscle cells contain these structures that allow the cells to contract
10. **Connective tissue:** helps provide a framework for the body, and helps connect and support other organs in the body

Fill in the Blank

1. Designer

2. interphase
3. prophase
4. Metaphase
5. anaphase
6. telophase
7. DNA
8. nervous
9. movement
10. collagen

Complete the Chart — DNA Replication

1. Parent DNA
2. DNA primase
3. DNA helicase
4. DNA polymerase
5. Daughter DNA
6. Daughter DNA
7. DNA polymerase

Complete the Chart — Mitosis

1. Prophase
2. Metaphase
3. Anaphase
4. Telophase
5. Interphase

Worksheet 5

Words to Know: Define the Following:

1. **Organ:** a collection of various types of tissues that work together to perform a function
2. **Programmed cell death:** the process by which some cells are designed to self-destruct
3. **Anterior and posterior:** describe structures at the front (anterior) or the back (posterior) of the body
4. **Proximal and distal:** describe whether something is closer (proximal) or farther away (distal) from the middle of the body
5. **Superior and inferior:** describe whether something is above (superior) or below (inferior) something else
6. **Medial and lateral:** describe whether something is closer (medial) or farther away (lateral) from the midline, or center line, of the body
7. **Homeostasis:** the body has many mechanisms to help maintain a balance or "equilibrium" among its many systems
8. **Irreducible complexity:** many of the body's systems cannot work unless others are already in place and working properly

Fill in the Blank

1. systems
2. circulatory
3. D
4. anatomical
5. anterior
6. internal
7. cells
8. homeostasis

Complete the Chart — Body Systems and Organs Included

Skeletal System: Bones and joints

Muscular System: Muscles

Cardiovascular System: Heart and blood vessels

Respiratory System: Upper airway (nose, pharynx, larynx), trachea, and lungs

Nervous System: Brain, spinal cord, and nerves

Digestive System: Mouth, esophagus, stomach, intestines, liver, gall bladder, and pancreas

Urinary System: Kidneys, ureters, and bladder

Reproductive System: (Male) Testes, genital ducts, and prostate; (Female) Ovaries, uterus, fallopian tubes, and breasts

Integumentary System: Skin, nails, and hair

Endocrine System: Pituitary gland, hypothalamus, thyroid gland, parathyroid glands, pancreas, adrenal glands, testes (male), and ovaries (female)

Lymphatic System: Lymph nodes, lymph vessels, thymus, tonsils, and spleen

Complete the Chart — Anatomical Position

1. Lateral

Worksheet 20

Words to Know: Define the Following:

1. **Cardiovascular system:** the heart, with all its associated vessels
2. **Respiratory system:** gets oxygen from the air; you need oxygen to live; also gets rid of the carbon dioxide your body makes and consists of the lungs and all the tubes
3. **Physiology:** how the systems of the body work
4. **Skeletal muscles:** muscles that enable you to walk or use your hands
5. **Mitochondria:** tiny power-generators that keep the heart muscle continually supplied with energy
6. **Esophagus:** carries the food you swallow to your stomach
7. **Trachea:** carries the air you breathe to your lungs
8. **Diaphragm:** a large sheet of skeletal muscle that separates the chest cavity from the abdominal cavity
9. **Pericardium:** this sac goes around the heart
10. **Epicardium:** made mostly of connective tissue and provides a protective covering for the surface of the heart

Fill in the Blank

1. year
2. electrical
3. 22
4. 60,000
5. cells
6. 6,000
7. heart
8. 7,200
9. lubrication
10. endocardium

Complete the Chart — Thoracic Cavity

1. Spine
2. Esophagus
3. Trachea
4. Bronchus
5. Sternum
6. Rib
7. Lung
8. Heart
9. Inferior vena cava
10. Descending aorta
11. Stomach

Complete the Chart — Pericardium and Layers of the Heart

1. Normal pericardium
2. Cardiac muscle
3. Fibrous pericardial
4. Pericardial cavity
5. Visceral pericardial
6. Parietal pericardial
7. Pericardium
8. Pericardial effusion

Worksheet 21

Words to Know: Define the Following:

1. **Intercalated discs:** at the end of cardiac muscle cells are thick areas of the surrounding plasma membrane
2. **Desmosome:** helps hold the muscle fibers together as they contract
3. **Gap junctions:** provide a route for electrical signals to be transmitted from muscle cell to muscle cell
4. **Pulmonary circulation:** the right-sided circulation
5. **Systemic circulation:** the left-sided circulation
6. **Artery:** the name given to a blood vessel in which blood moves away from the heart
7. **Veins:** vessels carrying blood toward the heart

8. **Atria:** plural of atrium; collect blood as it returns to the heart
9. **Pulmonary veins:** the veins that bring blood from the lungs to the left atrium
10. **Vena cavae:** the veins that bring blood back from the brain and the body

Fill in the Blank

1. muscle
2. organs
3. heart
4. cell
5. Deoxygenated
6. Oxygenated
7. brighter
8. four
9. superior
10. thicker

Complete the Chart — Chambers of the Heart

1. Superior vena cavae
2. Right atrium
3. Right ventricle
4. Inferior vena cavae
5. Aorta
6. Pulmonary artery
7. Pulmonary vein
8. Left atrium
9. Left ventricle

Worksheet 22

Words to Know: Define the Following:

1. **Tricuspid valve:** blood passes from the right atrium into the right ventricle through this
2. **Bicuspid valve:** blood passes from the left atrium into the left ventricle though this
3. **Mitral valve:** used for the bicuspid valve because the two cusps look a little like a bishop's headdress, called a miter
4. **Chordae tendineae:** the ties that bind the cusps to the ventricular wall; this Latin name means "heart strings"
5. **Semilunar valves:** the valves guarding the exit from the ventricles
6. **Pulmonary valve:** the semilunar valve between the right ventricle and the pulmonary artery
7. **Incompetent:** a valve that is damaged and allows blood under high pressure to leak backward, where a whooshing murmur may be heard
8. **Stenosis:** if a damaged valve is stiff and does not open normally, the outflow of blood is impeded
9. **Cardiac cycle:** the name given to the five steps involved in filling the heart's chambers and pumping the blood
10. **Atrial systole:** after the passive filling of the ventricles, when the atria simultaneously contract

Fill in the Blank

1. valve
2. cusp
3. blood
4. half
5. murmurs
6. filling
7. 1816
8. systole
9. relax
10. backward

Complete the Chart — The Cardiac Cycle

1. The "filling phase" when the whole heart is relaxed (atrial and ventricular diastole)
2. The atria contract — atrial systole
3. The beginning of ventricular systole, enough to close the tricuspid and mitral valves
4. Ejection of blood from the heart as ventricular systole (contraction) continues, forcing their exit valves (the semilunar valves) open
5. Ventricular diastole — ventricles relax enough to allow their exit valves (the semilunar valves) to close

Worksheet 23

Words to Know: Define the Following:

1. **Edema:** swelling caused by fluid accumulating in tissues
2. **Peripheral:** means the swelling happens in parts of the body far away from the heart
3. **Pulmonary edema:** fluid in the lungs
4. **Coronary circulation:** a system of arteries and veins that delivers oxygen-rich blood to the heart muscle and carries away deoxygenated blood
5. **Interventricular septum:** muscular wall between the ventricles
6. **Myocardial infarction:** often called an "MI," this is commonly known as a heart "attack"
7. **Myocardial ischemia:** the situation where adequate oxygen is not delivered to the heart muscle
8. **Coronary artery disease:** a type of cardiovascular disease, a term that includes heart attacks and strokes and other diseases of the heart and blood vessels
9. **Autorhythmic cells:** these repeatedly produce electrical signals that stimulate the heart to contract
10. **Pacemaker:** it establishes and maintains the basic rhythm for the heart

Fill in the Blank

1. healthy
2. coronary
3. oxygen
4. wall
5. 700,000
6. surgery
7. Cardiovascular
8. cholesterol
9. cells

Worksheet 24

Words to Know: Define the Following:

1. **Cardiac conduction system:** or intrinsic conduction system; has two "nodes" that set the pace of the heartbeat
2. **SA node:** a small group of cells located in the upper portion of the right atrium's wall, near the entrance of the superior vena cava; the heart's main pacemaker; initiates each electrical impulse that stimulates the heart to contract
3. **Purkinje fibers:** deliver the electrical signals to their final destination; they are vital for maintaining the heart's smooth, coordinated pumping action
4. **Electrocardiogram:** the recording that is produced from the electrical impulses transmitted through the heart
5. **P wave:** the first major wave seen on the ECG; this wave reflects the electrical signal that begins the domino effect that ultimately makes the heart beat one time
6. **QRS complex:** the second large wave seen in a typical ECG
7. **T wave:** the last wave in an ECG
8. **Cardiac output:** the amount of blood pumped by the heart in one minute
9. **Stroke volume:** the amount (volume) of blood pumped with each heartbeat
10. **Echocardiogram:** an ultrasound of the heart

Fill in the Blank

1. sinus
2. 72
3. pacemaker
4. contract
5. electrodes
6. heart
7. ventricles
8. stroke
9. sound
10. ejection

Complete the Chart — Electrocardiogram

1. QRS complex
2. P wave
3. T wave
4. QT wave

The Nervous System Worksheet Answer Keys

Worksheet 1

Words to Know: Define the Following:

1. **Sensory function:** a vast number of sensory receptors throughout the body provide input to the nervous system
2. **Motor output:** simply what the body is told to do as the result of all this information input and processing
3. **Central nervous system:** composed of the brain and the spinal cord
4. **Brain:** the master control center of the nervous system
5. **Peripheral nervous system:** portion of the nervous system outside of the central nervous system
6. **Sensory division:** carries information from the skin and muscles as well as from the major organs in the body to the central nervous system
7. **Afferent division:** another name for sensory division, and meaning "bringing toward" because it carries nerve impulses "to" or "toward" the CNS
8. **Motor division:** carries instructions from the CNS out to the body
9. **Somatic nervous system:** instructions that are carried by the motor division and taken to muscles that we can consciously control
10. **Autonomic nervous system:** the part of the motor division that controls the involuntary functions

Fill in the Blank

1. processed
2. experienced
3. Motor
4. peripheral
5. spinal
6. cranial
7. instructions
8. sensory
9. efferent
10. Somatic

Complete the Chart — Automatic Nervous System

1. Stimulates saliva production
2. Slows heart beat
3. Stimulates pancreas
4. Stimulates intestinal motility
5. Decreases renin secretion (lowers blood pressure)

Worksheet 2

Words to Know: Define the Following:

1. **Neurons:** the excitable nerve cells that transmit electrical signals
2. **Stimulus:** excites a neuron, triggering an electrical signal called an action potential
3. **Neuroglia:** cells in nervous tissue that help protect and support the neurons
4. **Neurotransmitters:** the chemicals that transmit an electrical impulse from one neuron to the next
5. **Dendrites:** parts of neurons that receive inputs, and when received, an electrical signal is generated and transmitted toward the cell body
6. **Axon terminals:** where neurotransmitters are released to carry the neuron's signal on to the next cell in line
7. **Multipolar neurons:** most common type; have one axon and multiple dendrites
8. **Bipolar neurons:** have only two processes: one axon and one dendrite
9. **Unipolar neurons:** have a more unusual configuration with only one process extending from the cell body
10. **Interneurons:** means "between neurons"; carries impulses from one neuron to another within the central nervous system

Fill in the Blank

1. Epithelial
2. Connective

3. Nervous
4. Muscle
5. neuron
6. axon
7. replaced
8. efferent
9. afferent
10. glial

Complete the Chart — Neuron

1. Cell body
2. Nucleus
3. Dendrite
4. Node of Ranvier
5. Schwann cell

Worksheet 3

Words to Know: Define the Following:

1. **Myelination:** a process in which long axons are covered by a myelin sheath
2. **Schwann cells:** cells that initially indent to receive the axon, and then wrap themselves repeatedly around the axon
3. **Multiple Sclerosis (MS):** an autoimmune disease that results in the destruction of myelin sheaths in the central nervous system
4. **Neuron:** a nerve cell with dendrites and axons
5. **Motor neurons:** carry impulses away from the central nervous system
6. **Sensory neurons:** carry impulses toward the central nervous system
7. **Mixed nerves:** possess both motor and sensory fibers
8. **Nerve damage in the PNS:** does not always result in permanent loss of function
9. **Nerve damage in the CNS:** damage to the brain or spinal cord is more serious and more likely to be permanent than peripheral nerve injury
10. **Wallerian degeneration:** when distal portions of the axons begin to break down without nutrients

Fill in the Blank

1. myelin
2. nodes
3. myelination
4. increases
5. coordination
6. control
7. nerve
8. reproduce
9. creations
10. complexity

Complete the Chart — Anatomy of a Nerve

1. Epineurium
2. Axon
3. Blood vessels
4. Fascicle
5. Perineurium

Worksheet 4

Words to Know: Define the Following:

1. **Action potential:** a change in the membrane potential from negative to positive and then back again
2. **Depolarization:** the membrane potential becomes less and less negative, and then positive
3. **Threshold:** when the membrane potential reaches a certain level of depolarization to initiate the action potential
4. **All-or-none event:** when a stimulus is received, there is either a full action potential or there is no action potential at all
5. **Repolarization:** when the neuron's negative resting membrane potential is reset before another action potential can travel along that portion of the axon
6. **Continuous conduction:** when one region directly triggers the next, and the next, and the next, and so on in unmyelinated axons
7. **Saltatory conduction:** by generating local currents around the myelin sheath, the action potential seems to "leap" from one gap to the next

8. **Graded potentials:** vary with the strength of the stimulus; the greater the stimulus, the greater number of ion channels open
9. **Synapse:** the place where a neuron communicates with another neuron or with a muscle cell
10. **Chemical synapse:** designed to transfer nerve signals by releasing special chemicals called neurotransmitters

Fill in the Blank

1. neutral
2. concentration
3. resting
4. impulse
5. depolarization
6. frequent
7. polarization
8. synapses
9. signals
10. homeostasis

Complete the Chart — Synapses Can Occur in Many Locations

1. To a dendrite
2. To the cell body
3. To another axon
4. To extracellular fluid
5. To the bloodstream

Worksheet 5

Words to Know: Define the Following:

1. **Cranial vault:** also called the cranium; the large open space in the skull
2. **Meninges:** three layers of connective tissue that cover the brain and spinal cord
3. **Periosteal:** the outermost layer of the dura attached to the inside of the cranium
4. **Meningeal:** the inner layer of the dura
5. **Pia mater:** dips down into the folds and grooves in the brain
6. **Cerebrospinal fluid (CSF):** this fluid flows around the brain and spinal cord, cushioning both
7. **Meningitis:** an inflammation of the meninges; most commonly caused by an infection
8. **Cerebrum:** the human brain is made of four major parts; this is the largest part
9. **Sulci:** the folds of the cerebrum
10. **Cerebral hemispheres:** the two halves to the cerebrum

Fill in the Blank

1. 3
2. 20
3. synapses
4. dura
5. arachnoid
6. float
7. circulate
8. ventricle
9. folds
10. lobes

Complete the Chart — Ventricles of the Brain

1. Lateral ventricles
2. Third ventricle
3. Cerebral aqueduct
4. Fourth ventricle
5. Central canal

Worksheet 6

Words to Know: Define the Following:

1. **Gray matter:** made up of the cell bodies of neurons and neuroglia; cerebral cortex
2. **White matter:** made up of both myelinated and nonmyelinated axons
3. **Corpus callosum:** a large band of white matter that connects the two cerebral hemispheres
4. **Voluntary movement:** movement you can consciously control
5. **Lateralized (lateralization):** the responsibility for certain functions rests with one hemisphere or the other

Quiz: Section One

Match the words/phrases and their definitions.

1. **Organs:** a collection of various types of tissues that work together to perform a function
2. **Anatomy:** the study of the body's parts and how they are put together
3. **Exocytosis:** the process of releasing material from inside the cell
4. **Lysosomes:** small vesicles containing enzymes that can digest many kinds of molecules and debris
5. **Metabolize:** a controlled way of "burning" the fuel of the body
6. **DNA (deoxyribonucleic acid):** stores the genetic instructions needed to make all the proteins in the body
7. **Antibodies:** fight infectious invaders in your body
8. **Nucleus:** the control center of the cell; it contains DNA
9. **Homeostasis:** the body has many mechanisms to help maintain a balance or "equilibrium" among its many systems
10. **Programmed cell death:** the process by which some cells are designed to self-destruct

Fill in the blank with the correct answer.

1. 139:14
2. cytoplasm
3. Amino
4. cytoplasm
5. nucleus
6. glucose
7. proteins
8. systems
9. Proximal and distal: describe whether something is closer or farther away from the middle of the body
10. Superior and inferior: describe whether something is above or below something else

Complete the Chart — Human Cell Structure

1. Centrioles
2. Mitochondria
3. Peroxisome
4. Secretory vesicle
5. Smooth endoplasmic reticulum
6. Rough endoplasmic reticulum
7. Nucleus
8. Ribosomes
9. Golgi complex
10. Plasma membrane
11. Lysosome
12. Vesicle

Quiz: Section Two

Match the words/phrases and their definitions.

1. **Bone marrow:** helps to create red and white blood cells
2. **Periosteum:** the outermost layer of bone, which is a thin, fibrous membrane
3. **Osteo:** the Greek word for "bone"
4. **Chondrocytes:** these cells are what make cartilage
5. **Enzymes:** special proteins that speed up and control chemical reactions in the body
6. **Arthritis:** inflammation of one or more joints
7. **Callus:** a cartilage-like layer of tissue that forms inside a fracture
8. **Articulate:** connected by a joint
9. **Axial skeleton:** made up of the skull, the vertebral column, and the ribs
10. **Upper limb:** consists of the pectoral (or shoulder) girdle, arm, forearm, wrist, and hand

Fill in the blank with the correct answer.

1. support
2. compact
3. blood

2. somatosensory
3. permanent
4. nerves
5. circulate
6. autonomic
7. bridge
8. optic
9. opposite
10. chemicals

Quiz Section Three

Match the words/phrases and their definitions.

1. **Umami:** The taste sensation produced by the amino acids, glutamate and aspartate; described as "savory"
2. **Thermoreceptors:** Respond to temperature changes
3. **Cochlea:** Anterior to the vestibule; a spiral chamber made of bone
4. **Odorants:** Substances that can trigger smell
5. **Sound:** A series of vibrations; cannot travel through a vacuum, such as in space
6. **Retina:** Inner layer of the eye
7. **Hearing:** Our ability to convert the pressure waves (sound waves) in our environment to action
8. **Müller cells:** Act like fiberoptic cables, efficiently transmitting the light that strikes the surface of the retina to the photoreceptor cells
9. **Tympanic membrane:** Marks the boundary between the external ear and the middle ear
10. **Fungiform papillae:** Mushroom-shaped; scattered over the entire surface of the tongue

Fill in the blank with the correct answer.

1. receptor
2. chemicals
3. tympanic
4. buds
5. pupil
6. eardrum
7. waves
8. balance
9. frequency
10. vibrations

Semester Test

Match the words/phrases and their definitions.

1. **Müller cells:** Act like fiberoptic cables, efficiently transmitting the light that strikes the surface of the retina to the photoreceptor cells
2. **Autonomic nervous system:** The part of the motor division that controls the involuntary functions
3. **Spinal cord:** Provides a pathway for sensory information to reach the brain
4. **Cochlea:** Anterior to the vestibule; a spiral chamber made of bone
5. **Homeostasis:** The body's tendency to maintain internal balance
6. **Neurons:** The excitable nerve cells that transmit electrical signals
7. **Sound:** A series of vibrations; cannot travel through a vacuum, such as in space
8. **Peripheral nervous system:** The portion of the nervous system outside the brain and spinal cord
9. **Tracts:** Bundles of axons in the central nervous system
10. **Central nervous system:** Composed of the brain and the spinal cord

Fill in the blank with the correct answer.

1. waves
2. barrier
3. optic
4. chemicals
5. opposite
6. nerve
7. autonomic
8. increases
9. permanent
10. neuron