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## COURSE POLICIES

| OFFICE LOCATION: | L'H 245  
732.906.2523 ext.3355  
e-mail: mccbio@woodriverassociates.com or WKleinelp@middlesexcc.edu |
| Web Page | http://www.middlesexcc.edu/Faculty/William_Kleinelp |
| Office Hours | Monday 11:15 -12:15 by appointment  
Monday: 3:30 - 5:00  
Tuesday 11:15 - 12:15  
Wednesday: 3:30 - 5:00  
Thursday 2:00 - 3:30  
Other hours by appointment |
| eGrade Access URL | |
| COURSE CRITERIA | The Bio-111/112 sequence is an academically challenging and demanding university-parallel course sequence designed for Health Occupation students and others who are academically qualified. The prerequisites for Bio-111 are Bio-010 or one year High School Laboratory Biology AND one year of High School Chemistry or CHM 010 |
| LECTURE | The **lecture** component consists of two 80 minutes lectures per week. In the course of the semester 4-6 major examinations each worth 100 points on designated topics will be given. The examination format may be multiple choice, essay, true/false, fill-ins and short answer. Missed examinations may not be made up without  
(1) notification by phone call to my office of the absence and  
(2) a verifiable excuse. The examination will be made up within **ONE WEEK** of the scheduled date or a grade of ZERO is entered. All make-ups are **essay** in nature. |
| LABORATORY | The **laboratory** component consists of a three-hour laboratory per week. Attendance is **mandatory**. For each laboratory missed in whole or in part not less than 3% of your laboratory grade will be deducted at the end of the semester for each session missed. In the laboratory component 3 non-cumulative
practical examinations on selected topics (see schedule) each worth 100 points will be given. Practical examinations **CANNOT** be made up during the same semester. A grade of "I" will be given until the practical is made up in the next semester.

**Quizzes**

Quizzes will be given in lecture and each lab and may be unannounced. Expect a quiz each time you enter class. The lowest TWO quizzes will be dropped at the end of the semester. **QUIZZES CANNOT BE MADE UP.** If missed for ANY reason a grade of zero is entered. The will be given either during the first or the last 15 minutes of class time.

**Assignments**

Homework assignments relative to lecture/lab will be given by schedule and the material should be handed in on or before the date due. **LATE assignments will NOT be accepted.**

**Miscellaneous Information**

- The penalty for any type of cheating is a **F in the course.** No exceptions, no excuses (see policy)
- Any question regarding examinations, errors or question disputes needs to be addressed within one week of the examination return
- Lab and Lecture assignments should be read prior to coming to class. You will also be evaluated on your lab performance, dissection, attendance, behavior and participation. Good luck
- There is no scaling or curving on examinations.
- If you are going to be absent because of illness or family responsibilities please call/email me and inform me. If there is no notification, no make up will be possible.
- Feel free to email me at any time with questions. If you need instructions please ask.
- Although we do supply student gloves in lab for dissection they are the one size fits all, boy are these lousy gloves. I would strongly recommend purchasing a box of surgical gloves between two individuals.
- There is NO food or drink allowed in the laboratory. You will be asked to leave if you bring these items to lab.
- You are required to have safety glasses as a Departmental Policy in lab
- As a matter or courtesy to your fellow students, if
you come in late please enter quietly. If you are later than 15 minutes, relax and miss class and try to get to class on time.

- Please no active beepers, cell phones, PDA's, Bluetooth or other wireless or interactive devices etc. in class.
- You may record the lectures and lab lectures.
- Try to participate as much as possible. Ask questions.
- Information for the class will be available on the Internet

<table>
<thead>
<tr>
<th>Grade Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture = 42.5%</td>
</tr>
<tr>
<td>Lab = 42.5%</td>
</tr>
<tr>
<td>Quizzes = 10%</td>
</tr>
<tr>
<td>Homework, Assignments &amp; Participation = 5%</td>
</tr>
<tr>
<td>Grades are delivered via Internet through WEBGRADE.</td>
</tr>
<tr>
<td>It can be accessed via:</td>
</tr>
<tr>
<td>Your ID is your last name in lowercase letters and you password is the LAST FOUR digits of your student number. Grades are updated weekly.</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Grading Ranges:</th>
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<tbody>
<tr>
<td>A  89.5 - 100%</td>
</tr>
<tr>
<td>B+  85.5% - 89.4%</td>
</tr>
<tr>
<td>B   79.5 – 85.4%</td>
</tr>
<tr>
<td>C+  75.5% - 79.4%</td>
</tr>
<tr>
<td>C   69.5 - 75.4%</td>
</tr>
<tr>
<td>D   59.5 - 69.4%</td>
</tr>
<tr>
<td>F   less 59.5%</td>
</tr>
<tr>
<td>I do not curve or scale and do not provide extra credit</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CHEATING POLICY</th>
</tr>
</thead>
<tbody>
<tr>
<td>For the purposes of this course any individual(s) cheating shall be given</td>
</tr>
<tr>
<td>(1) an &quot;F&quot; for the entire course; in addition I will submit</td>
</tr>
<tr>
<td>(2) a letter to the Dean of Students pertaining to a violation of the Code of Student Conduct</td>
</tr>
<tr>
<td>(3) recommendation for dismissal from the course</td>
</tr>
<tr>
<td>I have established the following guidelines to identify cheating. These are</td>
</tr>
<tr>
<td>If you glance or gaze at another's test paper during an examination/quiz.</td>
</tr>
<tr>
<td>If there is verbal or written exchange of any information during an examination of any kind.</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>If you wear sunglasses during an examination or quiz.*</td>
</tr>
<tr>
<td>The wearing of a baseball cap during an examination of any kind</td>
</tr>
<tr>
<td>The use of a PDA during the course of a quiz/examination.</td>
</tr>
<tr>
<td>The copying of information from another, in any manner shape or form.</td>
</tr>
<tr>
<td>The extraction of material verbatim from any source..</td>
</tr>
<tr>
<td>The sharing of information in completing a <strong>graded</strong> homework</td>
</tr>
<tr>
<td>If your cell phone goes off during the course of an examination/quiz,</td>
</tr>
<tr>
<td>If you cell phone is visible during an examination or quiz.</td>
</tr>
<tr>
<td>If there are books or papers on your table, other than those required</td>
</tr>
</tbody>
</table>
## Lecture Schedule

<table>
<thead>
<tr>
<th>CHAPTER</th>
<th>TOPIC</th>
<th>PAGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction, Policies</td>
<td>C1: 1-28</td>
</tr>
<tr>
<td>2</td>
<td>Chemical Organization</td>
<td>C2: 29-59</td>
</tr>
<tr>
<td></td>
<td>(MATERIAL NOT COVERED in class: your responsibility)</td>
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<tr>
<td>3</td>
<td>Cell Organization</td>
<td>C3: 60-106</td>
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<tr>
<td></td>
<td>(basic cell structure &amp; organelles not covered in class your responsibility)</td>
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<tr>
<td>4</td>
<td>Tissue Organization</td>
<td>C4: 107-143</td>
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<tr>
<td>5</td>
<td>Integumentary system</td>
<td>C5: 144-170</td>
</tr>
<tr>
<td>6</td>
<td>Skeletal Tissue &amp; Markings (some material also covered in Lab)</td>
<td>c6: 171193</td>
</tr>
<tr>
<td>7</td>
<td>Skeletal Tissue Axial Skeleton (some material also covered in Lab)</td>
<td>C7: 194-230</td>
</tr>
<tr>
<td>7</td>
<td>Appendicular Skeleton (some material also covered in Lab)</td>
<td>C8: 231-257</td>
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<tr>
<td></td>
<td>EXAMINATION</td>
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</tr>
<tr>
<td>8</td>
<td>Articulations (some material also covered in Lab)</td>
<td>C9: 258-289</td>
</tr>
<tr>
<td>11</td>
<td>Nervous Tissue</td>
<td>C12: 403-438</td>
</tr>
<tr>
<td>9</td>
<td>Muscle Tissue (some material also covered in Lab)</td>
<td>C10: 290-324</td>
</tr>
<tr>
<td>10</td>
<td>Muscular System (some material also covered in Lab)</td>
<td>C11: 325-402</td>
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<tr>
<td></td>
<td>EXAMINATION</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Spinal Cord and Nerves</td>
<td>C13: 439-472</td>
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<tr>
<td>12</td>
<td>Brain and Cranial Nerves (some material also covered in Lab)</td>
<td>C14: 473-523</td>
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<td></td>
<td>EXAMINATION</td>
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<tr>
<td>13</td>
<td>Sensory and Integrative Systems (some material also covered in Lab)</td>
<td>C16: 547-573</td>
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<td>14</td>
<td>Autonomic Nervous System</td>
<td>C15: 524-545</td>
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<tr>
<td>13</td>
<td>Special Senses (some material also covered in Lab)</td>
<td>C17: 574-615</td>
</tr>
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<td></td>
<td>EXAMINATION</td>
<td></td>
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<tr>
<td>DATE</td>
<td>TOPICS</td>
<td>Exercise #</td>
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<tr>
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<tr>
<td>9.5-6</td>
<td>Body position/terms/cavities/planes</td>
<td>1</td>
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<tr>
<td></td>
<td>surface anatomy roundup</td>
<td>2</td>
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<tr>
<td></td>
<td>A.D.A.M computer program</td>
<td></td>
</tr>
<tr>
<td>9.12-13</td>
<td>Human skeletal system/articulation</td>
<td>6-8</td>
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<tr>
<td>9.19-20</td>
<td>Human skeletal system/articulation</td>
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</tr>
<tr>
<td>9.26-27</td>
<td>Human skeletal system/articulation</td>
<td>7-8</td>
</tr>
<tr>
<td>10.3-4</td>
<td>Articulations</td>
<td>9</td>
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<tr>
<td>10.10</td>
<td><strong>LABORATORY PRACTICAL I</strong></td>
<td>handout</td>
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<tr>
<td>10.11</td>
<td>ADAM/ human muscles histology</td>
<td>10-12 &amp; 4</td>
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<tr>
<td>10.17</td>
<td>A.D.A.M computer program</td>
<td>supplemental handout</td>
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<tr>
<td>10.18</td>
<td>human muscles identification/histology</td>
<td>10-12 &amp; 4</td>
</tr>
<tr>
<td>10.24</td>
<td>A.D.A.M human muscles identification/histology</td>
<td>handout</td>
</tr>
<tr>
<td>10.25</td>
<td></td>
<td>10-12 &amp; 4</td>
</tr>
<tr>
<td>10.31</td>
<td>A.D.A.M human muscles identification/histology</td>
<td>handout</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10-12 &amp; 4</td>
</tr>
<tr>
<td>11.1</td>
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<tr>
<td>11.14</td>
<td><strong>LABORATORY PRACTICAL II</strong></td>
<td>13</td>
</tr>
<tr>
<td>11.15</td>
<td>Nervous system: neuron &amp; histology</td>
<td>4</td>
</tr>
<tr>
<td>11.21-22</td>
<td>Nervous system: brain structure</td>
<td>14</td>
</tr>
<tr>
<td>11.28</td>
<td>Spinal cord and reflexes</td>
<td>15</td>
</tr>
<tr>
<td>11.29</td>
<td>histology</td>
<td>4</td>
</tr>
<tr>
<td>12.5-6</td>
<td>Eye/ Ear structure &amp; physiology</td>
<td>19</td>
</tr>
<tr>
<td>12.12-13</td>
<td>practical III</td>
<td></td>
</tr>
</tbody>
</table>

Laboratory Schedule Bio-111

Fall 2006

Will Kleinelp

LABORATORY ASSIGNMENTS WILL BE POSTED ON THE INTERNET
**ASSIGNMENTS**

This listing is NOT complete. For a full detailed listing of assignments please use our web page under Assignments. They will be updated routinely. ASSIGNMENTS

<table>
<thead>
<tr>
<th>Due Date</th>
<th>Assignment</th>
<th>Download Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.12 - 9.13</td>
<td>• Chapter 1</td>
<td>See web page</td>
</tr>
<tr>
<td>9.12 - 9.13</td>
<td>• Interactions: Control of BP</td>
<td>See web page</td>
</tr>
<tr>
<td>9.19 - 9.20</td>
<td>• Chapter 3</td>
<td>See web page</td>
</tr>
<tr>
<td>9.19 - 9.20</td>
<td>• Interactions: Cell structure</td>
<td>See web page</td>
</tr>
<tr>
<td>9.26 - 9.27</td>
<td>• Interactions: Plasma Membrane</td>
<td>See web page</td>
</tr>
<tr>
<td>9.26 - 9.27</td>
<td>• Interactions: Membrane Functions</td>
<td>See web page</td>
</tr>
<tr>
<td>9.26 - 9.27</td>
<td>• Chapter 4</td>
<td>See web page</td>
</tr>
<tr>
<td>10.10 - 10.11</td>
<td>• Interactions: Membrane Transport</td>
<td>See web page</td>
</tr>
<tr>
<td>10.10 - 10.11</td>
<td>• Chapter 10</td>
<td>See web page</td>
</tr>
<tr>
<td>10.17 - 10.18</td>
<td>Interactions: The Muscular System</td>
<td>See web page</td>
</tr>
<tr>
<td>10.17 - 10.18</td>
<td>• Chapter 10a</td>
<td>See web page</td>
</tr>
<tr>
<td>10.31 - 11.1</td>
<td>• Chapter 5</td>
<td>See web page</td>
</tr>
<tr>
<td>10.24 - 10.25</td>
<td>• Chapter 6</td>
<td>See web page</td>
</tr>
<tr>
<td>10.31 - 11.1</td>
<td>Chapter 7</td>
<td>See web page</td>
</tr>
<tr>
<td>11.7 - 11.8</td>
<td>Chapter 8</td>
<td>See web page</td>
</tr>
<tr>
<td>11.14 - 11.15</td>
<td>Chapter 9</td>
<td>See web page</td>
</tr>
<tr>
<td>11.21 - 11.22</td>
<td>• Chapter 11</td>
<td>See web page</td>
</tr>
<tr>
<td>11.21 - 11.22</td>
<td>Interactions: Nervous System overview</td>
<td>See web page</td>
</tr>
<tr>
<td>11.28 -11.29</td>
<td>• Chapter 12</td>
<td>See web page</td>
</tr>
<tr>
<td>12.5 - 12.6</td>
<td>Interactions: Events at the Synapse</td>
<td>See web page</td>
</tr>
<tr>
<td>12.5 - 12.6</td>
<td>• Chapter 12a</td>
<td>See web page</td>
</tr>
</tbody>
</table>

All assignments are due no later than the due date. Assignments NOT be accepted late for any reason. The download is in Microsoft Word. Each assignment can be submitted via email as an attachment or handed in on the date due. If emailed, they must be in MSW format.
CHAPTER QUESTIONS AND ASSIGNMENTS
<table>
<thead>
<tr>
<th>Chapter 1 Questions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. A plane that separates superior from inferior</td>
<td>A. Transverse</td>
</tr>
<tr>
<td>2. Branch of anatomy that deals with gross structures</td>
<td>B. buccal</td>
</tr>
<tr>
<td>3. Branch of anatomy that deals with developmental changes</td>
<td>C. Effector</td>
</tr>
<tr>
<td>4. Aggregation of cells similar in structure and function</td>
<td>D. Embryology</td>
</tr>
<tr>
<td>5. Process of removing metabolic wastes</td>
<td>E. Excretion</td>
</tr>
<tr>
<td>6. Ability to respond to stimuli</td>
<td>F. Homeostasis</td>
</tr>
<tr>
<td>7. Ability to breakdown food materials</td>
<td>G. Hydrolysis (digestion)</td>
</tr>
<tr>
<td>8. Dynamic equilibrium</td>
<td>H. Hypochondriac</td>
</tr>
<tr>
<td>9. Membrane adhering to the heart tissue</td>
<td>I. Hypogastric</td>
</tr>
<tr>
<td>10. Membrane adhering to the abdominal body wall</td>
<td>J. Ipsilateral</td>
</tr>
<tr>
<td>11. A section that divides the body into unequal right and left halves</td>
<td>K. Lumbar</td>
</tr>
<tr>
<td>12. Types of membrane that covers organs and structures</td>
<td>L. Meninges</td>
</tr>
<tr>
<td>13. The middle abdominopelvic region</td>
<td>M. Metabolism</td>
</tr>
<tr>
<td>14. The upper left abdominopelvic region</td>
<td>N. Parasagittal</td>
</tr>
<tr>
<td>15. The lower middle abdominopelvic region</td>
<td>O. Parietal peritoneum</td>
</tr>
<tr>
<td>16. The lower right abdominopelvic region</td>
<td>P. Pleural</td>
</tr>
<tr>
<td>17. The sum of all chemical processes</td>
<td>Q. Prone</td>
</tr>
<tr>
<td>18. Fluid found within joints</td>
<td>R. Receptor</td>
</tr>
<tr>
<td>19. Structure monitoring changes in body systems</td>
<td>S. Regional anatomy</td>
</tr>
<tr>
<td>20. Structure providing a response to a controlled condition</td>
<td>T. responsiveness</td>
</tr>
<tr>
<td>21. Position when the body is lying face down</td>
<td>U. Serous</td>
</tr>
<tr>
<td>22. On the same side of the body as another structure</td>
<td>V. Synovial</td>
</tr>
<tr>
<td></td>
<td>23. membrane lining brain and spinal cord</td>
</tr>
<tr>
<td>---</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td></td>
<td>24. cavity the lungs are enclosed within</td>
</tr>
<tr>
<td></td>
<td>25. another term for oral</td>
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<tr>
<td>Question</td>
<td>Answer</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>26. the outer perimeter of the cell</td>
<td>A. Active transport</td>
</tr>
<tr>
<td>27. site of ATP production</td>
<td>B. Antiporters</td>
</tr>
<tr>
<td>28. functions to propel the cell</td>
<td>C. Aquaporins</td>
</tr>
<tr>
<td>29. site for intracellular digestion</td>
<td>D. Cell identity markers</td>
</tr>
<tr>
<td>30. site for protein synthesis</td>
<td>E. Centriole</td>
</tr>
<tr>
<td>31. brains of the cell</td>
<td>F. Cilia</td>
</tr>
<tr>
<td>32. site for lipid and steroid synthesis</td>
<td>G. Cytokinesis</td>
</tr>
<tr>
<td>33. component comprising the genes</td>
<td>H. Dialysis</td>
</tr>
<tr>
<td>34. Site of ribosomes subunit manufacturing</td>
<td>I. Diffusion</td>
</tr>
<tr>
<td>35. accepted model of the plasma membrane</td>
<td>J. DNA</td>
</tr>
<tr>
<td>36. types of surface proteins on the plasma membrane</td>
<td>K. Facilitated transport</td>
</tr>
<tr>
<td>37. types of transmembrane proteins</td>
<td>L. Fluid mosaic</td>
</tr>
<tr>
<td>38. also knows as extracellular fluid</td>
<td>M. Golgi apparatus</td>
</tr>
<tr>
<td>39. movement of molecules from a higher concentration to a lower</td>
<td>N. Hypertonic</td>
</tr>
<tr>
<td>concentration</td>
<td></td>
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<tr>
<td>40. movement of water from a higher concentration to a lower</td>
<td>O. Hypotonic</td>
</tr>
<tr>
<td>concentration</td>
<td></td>
</tr>
<tr>
<td>41. passive movement of molecules aided by protein membrane carriers</td>
<td>P. Interphase</td>
</tr>
<tr>
<td>42. movement of molecules against a concentration gradient</td>
<td>Q. Integral</td>
</tr>
<tr>
<td>43. tonicity of a solution when the ratio of solute to solvent is</td>
<td>R. Interstitial fluid</td>
</tr>
<tr>
<td>equal</td>
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<tr>
<td>44. tonicity of a solution when the ratio of solute to solvent is</td>
<td>S. Isotonic</td>
</tr>
<tr>
<td>higher on one side of the membrane as compared to the other</td>
<td></td>
</tr>
<tr>
<td>45. tonicity of a solution when the ratio of solute to solvent is</td>
<td>T. Ligand</td>
</tr>
<tr>
<td>lower on one side of the membrane as compared to the other</td>
<td></td>
</tr>
<tr>
<td>46. movement and separation, of molecules through a membrane</td>
<td>U. Linkers</td>
</tr>
<tr>
<td>47. cell eating</td>
<td>V. Lysosome</td>
</tr>
<tr>
<td>48. cell drinking</td>
<td>W. Membrane potential</td>
</tr>
<tr>
<td>49. the electrical charge on a membrane</td>
<td>X. Mitochondria</td>
</tr>
<tr>
<td>50. organelle instrumental in cell division</td>
<td>Y. Mitosis</td>
</tr>
<tr>
<td>51. asexual cell division process</td>
<td>Z. Nucleolus</td>
</tr>
<tr>
<td>52. separation and movement of the cytoplasm</td>
<td>1. Nucleus</td>
</tr>
<tr>
<td>53. first of the cell division stages</td>
<td>2. Osmosis</td>
</tr>
<tr>
<td>54. a specific molecule that binds to a receptor</td>
<td>3. Peripheral proteins</td>
</tr>
<tr>
<td>55. structures that anchor the proteins in the plasma membrane</td>
<td>4. Phagocytosis</td>
</tr>
<tr>
<td>56. Glycoproteins and glycolipids in the cell membrane</td>
<td>5. Pinocytosis</td>
</tr>
<tr>
<td>57. Protein channels that allow water to pass through the membrane</td>
<td>6. Plasma membrane</td>
</tr>
<tr>
<td>58. when the membrane moves two co-dependent substances in the same direction</td>
<td>7. proteasomes</td>
</tr>
<tr>
<td>59. when the membrane moves two co-dependent substances in opposing directions</td>
<td>8. Ribosome</td>
</tr>
<tr>
<td>60. these structures destroy unneeded or damaged proteins</td>
<td>9. Symporter</td>
</tr>
</tbody>
</table>
Cell Structure and Function

Directions:
Insert and install your Interactions: Foundations CD.
a. Click the “Contents” button.
b. Open the Cellular Level of Organization file.
c. Click on Anatomy Overviews.
d. Work through Cell Structure and Function.

1. Define cells’ role in the body. ____________________________________________

2. Identify each of the following:

3. Click the cilium to learn more about their structure (and flagella).
   a. Describe the function of ciliated and flagellated cells in the body. _________________________________

   b. Identify the following cilia and flagella anatomy.
      - Doublet microtubules
      - Central pair of microtubules
      - Basal body
      - Plasma membrane
4. Return to the Generalized Cell homepage and click *Microvilli*.
   a. Describe microvilli function.

5. Return to the Generalized Cell homepage and click *secretory vesicle or golgi complex*.
   a. Describe secretory vesicle functions.
   b. Identify each of the following:

6. Return again to the Generalized Cell homepage and click on *cytoskeleton*.
   a. Name the three types of cytoskeletal structures.
   b. Describe three primary cytoskeletal functions.
7. Click on the **Centrosome** from the Generalized Cell homepage.
   a. What are the functions of the **pericentriolar area** and the **centrioles**?

8. Back to the Generalized Cell homepage. This time investigate **lysosomes** or **peroxisomes**.
   a. Explain lysosome functions.

9. From the Generalized Cell homepage, click either **Smooth** or **Rough Endoplasmic Reticulum**.
   a. Describe the function of:
      - *smooth ER*
      - *rough ER*

10. Return again to the Generalized Cell homepage. Click the **nucleus**.
    a. Describe nucleus function.
    b. Identify each of the following.
11. Return to the Generalized Cell homepage and investigate the cytosol.
   a. What is the importance of the cytosol? 

   a. Explain the various functions of the plasma membrane.

13. Click the mitochondria from the Generalized Cell homepage.
   a. Explain mitochondria function.
   b. Identify each of the following:
14. With one last trip back to the Generalized Cell homepage, investigate *ribosomes*. Describe ribosome function.
Plasma Membrane Structure

Directions:
Insert and install your Interactions: Foundations CD.
a. Click the "Contents" button.
b. Open the Cellular Level of Organization file.
c. Click on Anatomy Overviews.
d. Work through Plasma Membrane Structure.

1. a. Describe the general function of the plasma membrane. 

b. Identify each of the following:

2. Click the Phospholipid bilayer to investigate more details.

a. Describe phospholipid bilayer structure relative to polar and nonpolar parts of the molecules.

b. Identify the polar and nonpolar parts of a phospholipids molecule.
3. Return to the Plasma membrane homepage and click on *Cholesterol*.

   a. Describe the function of cholesterol molecules in the plasma membrane.

4. What functions do membrane proteins have?

   a. __________________

   b. __________________

   c. __________________
Membrane Functions

Directions:
Insert and install your Interactions: Foundations CD.
a. Click the "Contents" button.
b. Open the Cellular Level of Organization file.
c. Click on Animations.
d. Work through Membrane Functions.

Introduction

1. What are some general functions of the cell membrane? __________________________
   __________________________
   __________________________
   __________________________

2. Define selective permeability. __________________________
   __________________________

Transport

3. Describe membrane permeability for oxygen, water, and carbon dioxide.
   __________________________

4. Describe membrane permeability for ions and glucose. __________________________

5. a. What is the function of the membrane transport proteins? __________________________
   __________________________
   __________________________
   __________________________
   __________________________
   __________________________
    b. Contrast each type.
       open - __________________________
       gated - __________________________
       pump - __________________________
   c. Why is ATP needed for pumps? __________________________
   d. Describe transporter protein functions.
6. a. How are large molecules transported within cells?
   vesicle transport - 

b. What is achieved by exocytosis? ____________________________

c. What is achieved by endocytosis? ____________________________

   ____________________________

d. What is phagocytosis? ____________________________

7. How can membrane proteins perform the following functions?
   communication - ____________________________
   ____________________________
   enzymatic functions - ____________________________
   ____________________________
   cell identification - ____________________________
   ____________________________
   cell junction formations - ____________________________
   desmosomes - ____________________________
   tight junctions - ____________________________
   gap junctions - ____________________________
<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>The surface exposed to the body exterior of a tissue</td>
<td></td>
</tr>
<tr>
<td>Three functions of epithelial tissue</td>
<td></td>
</tr>
<tr>
<td>A single layer of epithelium</td>
<td></td>
</tr>
<tr>
<td>Multiple distinguishable epithelial layers</td>
<td></td>
</tr>
<tr>
<td>List two specialized types of squamous epithelium</td>
<td></td>
</tr>
<tr>
<td>Type of epithelium principally found in the kidney tubules</td>
<td></td>
</tr>
<tr>
<td>Type of tissue comprising the skin</td>
<td></td>
</tr>
<tr>
<td>Type of epithelium lining the bladder and uterus</td>
<td></td>
</tr>
<tr>
<td>Two types of tissue comprising transitional epithelium</td>
<td></td>
</tr>
<tr>
<td>Glands that secrete by exocytosis and the secretion is cellular free</td>
<td></td>
</tr>
<tr>
<td>Glands that secrete their substances directly into the bloodstream</td>
<td></td>
</tr>
<tr>
<td>Glands that secrete cellular products that rupture</td>
<td></td>
</tr>
<tr>
<td>The principle material found between the cells of connective tissue</td>
<td></td>
</tr>
<tr>
<td>Dense, high tensile strength and most numerous connective tissue fibers</td>
<td></td>
</tr>
<tr>
<td>Connective tissue fibers that exhibit elasticity and resiliency</td>
<td></td>
</tr>
<tr>
<td>Cell type found in connective tissue proper</td>
<td></td>
</tr>
<tr>
<td>Cell type found in cartilage connective tissue</td>
<td></td>
</tr>
<tr>
<td>Cell type found in connective tissue bone</td>
<td></td>
</tr>
<tr>
<td>Two classes of connective tissue proper</td>
<td></td>
</tr>
<tr>
<td><strong>Identify three types of membranes</strong></td>
<td></td>
</tr>
<tr>
<td>-------------------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Type of connective tissue that forms the lamina propria</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Connective tissue that stores fat</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Types of cells found in fat storing tissues</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Type of tissue found principally in lymphatic tissue</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Connective tissue type comprising ligaments</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Connective tissue type making up nasal septum</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Connective tissue type comprising ear lobe</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Connective tissue type comprising the intervertebral discs</strong></td>
<td></td>
</tr>
</tbody>
</table>
Transport Across the Plasma Membrane

Directions:
Insert and install your Interactions: Foundations CD.
a. Click the "Contents" button.
b. Open the Cellular Level of Organization file.
c. Click on Animations.
d. Work through Transport Across the Plasma Membrane.

Introduction

1. Briefly describe each of the following plasma membrane functions.
   a. importing -
   b. exporting -
   c. communicating -

Types of Transport

2. Describe two general types of passage through the plasma membrane.

3. Contrast the two types of transport processes.
   a. passive transport -
   b. active transport -

Diffusion

3. Describe gas transport across the plasma membrane.

4. Describe ion movement across the plasma membrane.

Facilitated Diffusion

5. a. Describe the function of transporter proteins in the plasma membrane.
b. Describe how insulin affects the plasma membrane.

Osmosis

6. Describe the role of aquaporins with regard to water movement.

7. a. Explain how solute concentrations determine water concentration.

b. Contrast the following types of solutions:

   isotonic -

   hypertonic -

   hypotonic -

Primary Active Transport

8. Describe primary active transport mechanisms using the sodium-potassium pump as an example.

Secondary Active Transport


b. How does secondary active transport maintain low calcium concentrations in the cytosol and/or absorption of nutrients into cell?
Endocytosis

10. Contrast each of the following types of endocytosis and describe how each is used by cells.

*Phagocytosis* -

*Pinocytosis* -

*Receptor Mediated* -

Exocytosis

11. What is the function of *exocytosis*?
<table>
<thead>
<tr>
<th></th>
<th>Chapter 10 Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Muscle contraction depends on which muscle component</td>
</tr>
<tr>
<td>2</td>
<td>The functional unit of muscle contraction</td>
</tr>
<tr>
<td>3</td>
<td>A voluntary muscle</td>
</tr>
<tr>
<td>4</td>
<td>A non-voluntary single celled muscle</td>
</tr>
<tr>
<td>5</td>
<td>The most external sheath surrounding a muscle</td>
</tr>
<tr>
<td>6</td>
<td>The innermost sheath surrounding a muscle fiber</td>
</tr>
<tr>
<td>7</td>
<td>The sheath surrounding the fascicles</td>
</tr>
<tr>
<td>8</td>
<td>The fascicle contains which muscle components</td>
</tr>
<tr>
<td>9</td>
<td>The point at which a muscle attached to the movable bone is called the</td>
</tr>
<tr>
<td>10</td>
<td>The point of muscle attachment to the nonmovable bone portion is the</td>
</tr>
<tr>
<td>11</td>
<td>Indirect muscle attachments involve a ropelike tendon called</td>
</tr>
<tr>
<td>12</td>
<td>The plasma membrane of a muscle cell</td>
</tr>
<tr>
<td>13</td>
<td>The cytosol of a muscle cell</td>
</tr>
<tr>
<td>14</td>
<td>The pigment that stores oxygen in muscle cells</td>
</tr>
<tr>
<td>15</td>
<td>The I band is comprised of which protein</td>
</tr>
<tr>
<td>16</td>
<td>The A band is comprised of which protein</td>
</tr>
<tr>
<td>17</td>
<td>The distance from z-disc to z-disc represents</td>
</tr>
<tr>
<td>18</td>
<td>The elastic filament is comprised of which protein</td>
</tr>
<tr>
<td>19</td>
<td>Identify the structure that stores calcium in muscle</td>
</tr>
<tr>
<td>20</td>
<td>The transverse tubule and the terminal cisternae comprise</td>
</tr>
<tr>
<td>21</td>
<td>The chemical that carries oxygen in muscle tissue</td>
</tr>
<tr>
<td>22</td>
<td>The first event in the contraction cycle</td>
</tr>
<tr>
<td>23</td>
<td>To which molecule does Ca^{2+} bind to on the actin myofilament</td>
</tr>
<tr>
<td>24</td>
<td>What molecule holds Tropomyosin in position</td>
</tr>
<tr>
<td>25</td>
<td>Identify the calcium binding protein</td>
</tr>
<tr>
<td>Question</td>
<td>Answer</td>
</tr>
<tr>
<td>----------</td>
<td>--------</td>
</tr>
<tr>
<td>1. Where muscle action potentials arise from</td>
<td>Neuromuscular junction</td>
</tr>
<tr>
<td>2. The region of communication between two neurons</td>
<td>Acetylcholinesterase</td>
</tr>
<tr>
<td>3. The synaptic end bulb transmits information to the</td>
<td>Aerobic</td>
</tr>
<tr>
<td>4. The first step in the muscle action potential</td>
<td>Anaerobic</td>
</tr>
<tr>
<td>5. Enzyme that destroys AcH</td>
<td>Creatine phosphate synthesis</td>
</tr>
<tr>
<td>6. In muscle metabolism excess ATP is used for which purpose</td>
<td>Fatigue</td>
</tr>
<tr>
<td>7. Metabolism that does not require oxygen</td>
<td>Glycogen</td>
</tr>
<tr>
<td>8. Metabolism that does require oxygen</td>
<td>Isometric</td>
</tr>
<tr>
<td>9. Inability for a muscle to maintain contraction after prolonged activity</td>
<td>Isotonic</td>
</tr>
<tr>
<td>10. Stored form of muscle sugar</td>
<td>Latent period</td>
</tr>
<tr>
<td>11. Somatic motor unit + muscle fibers</td>
<td>Motor end plate</td>
</tr>
<tr>
<td>12. The amount of added oxygen that is taken into the body after exercise</td>
<td>Motor unit</td>
</tr>
<tr>
<td>13. Brief contraction of a muscle fiber</td>
<td>Oxygen debt</td>
</tr>
<tr>
<td>14. Time between muscular stimulus and muscular response</td>
<td>Recruitment</td>
</tr>
<tr>
<td>15. Time frame of lost muscular excitability</td>
<td>Refractory period</td>
</tr>
<tr>
<td>16. Sustained muscular contraction</td>
<td>Release of AcH</td>
</tr>
<tr>
<td>17. The small quantity of muscle contraction that all muscle exhibits</td>
<td>Synapse</td>
</tr>
<tr>
<td>18. Process whereby the number of active motor units contracting a muscle increases</td>
<td>Tetanus</td>
</tr>
<tr>
<td>19. Contraction where muscle length remains the same but the applied force changes</td>
<td>Tone</td>
</tr>
<tr>
<td>20. Contraction where the muscle decreases in shape and the applied force remains the same</td>
<td>Twitch</td>
</tr>
</tbody>
</table>
The Muscular System

**Directions:**
Insert and install your Interactions: Foundations CD.
- a. Click the “Contents” button.
- b. Open the Organ and System Level of Organization file.
- c. Click on Anatomy Overviews.
- d. Work through The Muscular System.

1. a. Define the muscular system. ____________________________________________
   ____________________________________________

   b. Explain how muscular the three types of muscular tissue contribute to homeostasis. _______
   ____________________________________________
   ____________________________________________

2. Click on the cardiac muscle.
   a. Describe and define cardiac muscle function. ____________________________________________
   ____________________________________________

   b. Identify each of the following.
   
   ![Image of cardiac muscle diagram]

   - Endocardium
   - Myocardium (cardiac muscle)
   - Coronary blood vessels
   - Pericardium
   - Heart wall
3. Return to the main Muscular System page and click *Smooth Muscle*.

Describe and define smooth muscle functions.


4. Return, again, to the main Muscular System page. This time, click *Skeletal Muscle*.

a. Describe and define skeletal muscle functions.


b. Identify each of the following.

   - Origins of biceps brachii from scapula
   - Tendons
   - Belly of biceps brachii muscle
   - Elbow joint
   - Insertion of biceps brachii on radius
   - Radius
   - Ulna
Chapter 5 Questions

1. The subcutaneous tissue is also known as the
2. Identify the cell that produces keratin
3. Identify the cell that produces melanin
4. In what layer do these pigment cells reside?
5. Where do the Langerhans cells arise from
6. Identify the neural sensory structure for touch
7. the deepest layer of the epidermis
8. most superficial layer of the epidermis
9. identify the upper layer of the dermis
10. the formal name for sweat glands
11. What is the secretion of an eccrine gland
12. Identify the types of glands associated with the axillary region and groin
13. what type of glands are found in the ear
14. What is the glandular classification for sweat glands
15. what glands are found in conjunction with the hair follicles
16. Identify the secretion of #15
17. What cells control hair pigment
18. What muscle is associated with the hair follicle
19. the actively dividing area of the hair is the
20. Thinning or baldness in hair is called
21. The thickened proximal portion of the nail is called
22. The formal name for the cuticle is
23. the free edge of the name is called
24. what is acid mantle

A. Alopecia
B. Apocrine
C. Arrector pili
D. Bone marrow
E. Ceruminous
F. Eponychium
G. Hair matrix
H. Hypodermis
I. Hyponychium
J. Keratocytes
K. Low pH
L. Mammary
M. Melanocytes
N. Melanocytes
O. Merkel’s disc
P. Nail matrix
Q. Papillary
R. Sebaceous
S. Sebum
T. Stratum basale
U. Stratum basale
V. Stratum corneum
W. Sudoriferous
X. Sweat
## Chapter 6 Questions

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Longitudinal bone growth is called</td>
<td>A. Interstitial</td>
</tr>
<tr>
<td>Growth in the diameter of bone is called</td>
<td>B. appositional</td>
</tr>
<tr>
<td>What is the chief mineral used for bone development</td>
<td>C. Articular cartilage</td>
</tr>
<tr>
<td>Identify the membrane found on the outer perimeter of a bone</td>
<td>D. Articular cartilage</td>
</tr>
<tr>
<td>The bone forming cells</td>
<td>E. Bone remodeling</td>
</tr>
<tr>
<td>Bone destroying cells</td>
<td>F. Calcium</td>
</tr>
<tr>
<td>through which structure do blood vessels and nerves enter the bone</td>
<td>G. Diaphysis</td>
</tr>
<tr>
<td>what membrane secures the outer perimeter membrane to bone</td>
<td>H. Endochondral bone</td>
</tr>
<tr>
<td>The formal name for hematopoietic tissue</td>
<td>I. Endosteum</td>
</tr>
<tr>
<td>The structural unit of compact bone</td>
<td>J. Epiphyseal plate</td>
</tr>
<tr>
<td>Identify the central canal through the middle of the structural unit of</td>
<td>K. fracture</td>
</tr>
<tr>
<td>compact bone</td>
<td></td>
</tr>
<tr>
<td>The organic part of the bone is referred to as</td>
<td>L. Haversian canal</td>
</tr>
<tr>
<td>Process of bone development</td>
<td>M. Intramembraneous</td>
</tr>
<tr>
<td>Ossification type when bone is formed from cartilage</td>
<td>N. Myeloid tissue</td>
</tr>
<tr>
<td>Ossification type involving fibrous membranous connective tissue</td>
<td>O. Nutrient foramen</td>
</tr>
<tr>
<td>the growth plate</td>
<td>P. Osteoblasts</td>
</tr>
<tr>
<td>the shaft of a bone</td>
<td>Q. Osteoclasts</td>
</tr>
<tr>
<td>membrane lining the inner bone canal</td>
<td>R. Osteogenesis</td>
</tr>
<tr>
<td>undifferentiated bone forming cells</td>
<td>S. Osteogenic</td>
</tr>
<tr>
<td>sponge-like thin columns of bone in cancellous bone</td>
<td>T. Osteoid</td>
</tr>
<tr>
<td>which component is developed last in intramembraneous ossification</td>
<td>U. Osteon</td>
</tr>
<tr>
<td>which component is developed last in endochondral ossification (2</td>
<td>V. Periosteum</td>
</tr>
<tr>
<td>answers)</td>
<td></td>
</tr>
<tr>
<td>the ongoing replacement of old bone is called</td>
<td>W. Periosteum</td>
</tr>
<tr>
<td>a complete break in a bone</td>
<td>X. Sharpey’s fibers</td>
</tr>
<tr>
<td>ends of long bones are covered with</td>
<td>Y. Trabeculae</td>
</tr>
<tr>
<td>Question</td>
<td>Answer</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>1. Type of tissue associated with immovable joints</td>
<td></td>
</tr>
<tr>
<td>2. Type of tissue associated with slightly movable joints</td>
<td></td>
</tr>
<tr>
<td>3. Formal name for a suture joint</td>
<td></td>
</tr>
<tr>
<td>4. The teeth and their sockets represent which type of specific joint</td>
<td></td>
</tr>
<tr>
<td>5. What type of tissue does synchondroses have</td>
<td></td>
</tr>
<tr>
<td>6. What type of tissue do symphysis joints have</td>
<td></td>
</tr>
<tr>
<td>7. Freely movable joints are called</td>
<td></td>
</tr>
<tr>
<td>8. The tissue found at the ends of freely movable joint bones</td>
<td></td>
</tr>
<tr>
<td>9. Type of fluid found in freely movable joints</td>
<td></td>
</tr>
<tr>
<td>10. The two components of the articular capsule</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td></td>
</tr>
<tr>
<td>12. Type of joint movement that is a slipping movement</td>
<td></td>
</tr>
<tr>
<td>13. Movement in one place</td>
<td></td>
</tr>
<tr>
<td>14. Movement in two planes</td>
<td></td>
</tr>
<tr>
<td>15. Movement in three or more planes</td>
<td></td>
</tr>
<tr>
<td>16. Movement when the angle between two bones</td>
<td></td>
</tr>
<tr>
<td>17. Movement when the angle between two bones increases</td>
<td></td>
</tr>
<tr>
<td>18. Movement when a bone can circumscribe a circle</td>
<td></td>
</tr>
<tr>
<td>19. Movement when a bone moves about the axis of another</td>
<td></td>
</tr>
<tr>
<td>20. Movement when a bone moves towards the body</td>
<td></td>
</tr>
<tr>
<td>21. Movement when a bone moves away from the body</td>
<td></td>
</tr>
<tr>
<td>22. Movement when the sole of the foot turns medially</td>
<td></td>
</tr>
<tr>
<td>23. Movement when the sole of the foot turns laterally</td>
<td></td>
</tr>
<tr>
<td>24. Movement when a bone moves anteriorly on a transverse plane</td>
<td></td>
</tr>
<tr>
<td>25. Movement when moving a body part superiorly</td>
<td></td>
</tr>
<tr>
<td>26. type of joint that can flex and extend</td>
<td></td>
</tr>
<tr>
<td>-----------------------------------------</td>
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</tr>
<tr>
<td>27. type of joint where you can circumscribe a circle</td>
<td></td>
</tr>
</tbody>
</table>
1. Muscle contraction depends on which muscle component
2. The functional unit of muscle contraction
3. A voluntary muscle
4. A non-voluntary single celled muscle
5. Three functional characteristics of muscle

6. The most external sheath surrounding a muscle
7. The innermost sheath surrounding a muscle fiber
8. The sheath surrounding the fascicles
9. The fascicle contains which muscle components
10. The point at which a muscle attached to the movable bone is called the
11. The point of muscle attachment to the nonmovable bone portion is the
12. Indirect muscle attachments involve a ropelike tendon called
13. The plasma membrane of a muscle cell
14. The cytosol of a muscle cell
15. The pigment that stores oxygen in muscle cells
16. The I band is comprised of which protein
17. The A band is comprised of which protein
18. The distance from z-disc to z-disc represents
19. Identify the three proteins comprising the portions of the thin myofilament

20. The elastic filament is comprised of which protein
21. Identify the three components of the triad
Provide a schematic diagram of the sliding filament contraction mechanism. Begin when the muscle is at rest and continue until the muscle is at rest again.
### Chapter 11 Questions

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. describe the arrangement of fascicles in the digastric muscle</td>
<td>A. 1&lt;sup&gt;st&lt;/sup&gt; class lever</td>
</tr>
<tr>
<td>2. describe the arrangement of fascicles in the rectus femoris</td>
<td>B. 2&lt;sup&gt;nd&lt;/sup&gt; class lever</td>
</tr>
<tr>
<td>3. fleshy part of a muscle</td>
<td>C. 3&lt;sup&gt;rd&lt;/sup&gt; class lever</td>
</tr>
<tr>
<td>4. how are the arrangement of fascicles in the orbicularis oris</td>
<td>D. action</td>
</tr>
<tr>
<td>5. insertion of teres minor</td>
<td>E. Agonist</td>
</tr>
<tr>
<td>6. insertion of the longissimus capitis</td>
<td>F. Antagonist</td>
</tr>
<tr>
<td>7. insertion of the masseter</td>
<td>G. Belly</td>
</tr>
<tr>
<td>8. insertion of the omohyoid</td>
<td>H. Bipennate</td>
</tr>
<tr>
<td>9. insertion of the pectoralis minor</td>
<td>I. Circular</td>
</tr>
<tr>
<td>10. insertion of triceps brachii</td>
<td>J. Coracoid process</td>
</tr>
<tr>
<td>11. movable point for muscle attachment</td>
<td>K. Fascicles</td>
</tr>
<tr>
<td>12. Movement of a muscle</td>
<td>L. Fixators</td>
</tr>
<tr>
<td>13. muscles that oppose the movement of the prime mover</td>
<td>M. Fusiform</td>
</tr>
<tr>
<td>14. muscles that stabilize the origin of the prime mover</td>
<td>N. Humerus</td>
</tr>
<tr>
<td>15. origin of rhomboid major</td>
<td>O. Hyoid bone</td>
</tr>
<tr>
<td>16. origin of the sternocleidomastoid</td>
<td>P. insertion</td>
</tr>
<tr>
<td>17. origin of the supraspinatus</td>
<td>Q. Leverage</td>
</tr>
<tr>
<td>18. origin of the temporalis</td>
<td>R. Mandible</td>
</tr>
<tr>
<td>19. Stationary point at which a muscle attached</td>
<td>S. Mastoid process</td>
</tr>
<tr>
<td>20. The arrangement of skeletal muscle fibers</td>
<td>T. olecranon</td>
</tr>
<tr>
<td>21. The mechanical advantage to a lever</td>
<td>U. Origin</td>
</tr>
<tr>
<td>22. the prime mover causing the initial muscle action is also called</td>
<td>V. Scapula</td>
</tr>
<tr>
<td>the</td>
<td></td>
</tr>
<tr>
<td>23. these muscles aid the movements of the prime mover</td>
<td>W. Sternum</td>
</tr>
<tr>
<td>24. when the effort is between the fulcrum and the load</td>
<td>X. Synergist</td>
</tr>
<tr>
<td>25. When the fulcrum is between the effort and the load</td>
<td>Y. Temporal bone</td>
</tr>
<tr>
<td></td>
<td>26. when the load is between the fulcrum and the effort</td>
</tr>
</tbody>
</table>
Nervous System Overview

Directions:

a. Insert your Regulations CD.

b. Click the "Contents" button.

c. Open the Nervous System File.

d. Click Anatomy Overviews.

e. Click Nervous System Overview.

Click the "Spinal Cord" to examine anatomical details.

1. a. Locate each of these structures.

   ![Spinal cord diagram]

   Spinal cord

   Spinal meninges
   - Pia mater (inner)
   - Arachnoid (middle)
   - Dura mater (outer)

   Spinal nerve

   Subarachnoid space

   Subdural space

b. Name three spinal cord functions.

   •

   •

   •


2. Return to the main overview page. Click "proprioceptors" to investigate their function.

   What is the function of proprioceptors? ____________________________

   ______________________________________________________________
3. Once again, return to the main Nervous System Overview page. Click "spinal nerves".

   a. Identify each of the following:

   b. What are the general functions of spinal nerves? ________________________________

      __________________________________________________________________________
<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Functional unit of the nervous system</td>
<td>A. Action potentials</td>
</tr>
<tr>
<td>2. Nerves that carry information towards the brain</td>
<td>B. Axolemma</td>
</tr>
<tr>
<td>3. Nerves that carry information from the brain</td>
<td>C. Axon</td>
</tr>
<tr>
<td>4. The two divisions of the autonomic nervous system</td>
<td>D. Axon collaterals</td>
</tr>
<tr>
<td>5. ( I = V/R ) defines which law</td>
<td>E. Axon terminals</td>
</tr>
<tr>
<td>6. The regions comprising the central nervous system</td>
<td>F. Axoplasm</td>
</tr>
<tr>
<td>7. ( I = V/R ) defines which law</td>
<td>G. Bipolar</td>
</tr>
<tr>
<td>8. The supporting neural cells</td>
<td>H. Brain</td>
</tr>
<tr>
<td>9. Two cell types that support the peripheral nervous system</td>
<td>I. Dendrites</td>
</tr>
<tr>
<td>10.</td>
<td>J. Graded potentials</td>
</tr>
<tr>
<td>11. The cell body the neuron is called</td>
<td>K. Hyperpolarized</td>
</tr>
<tr>
<td>12. Structures which extend to the cell body are called</td>
<td>L. Motor</td>
</tr>
<tr>
<td>13. Structure that extends from the cell body</td>
<td>M. Myelin sheath</td>
</tr>
<tr>
<td>14. Branches of the axons</td>
<td>N. Neuroglia</td>
</tr>
<tr>
<td>15. Knoblike ending to the neuron</td>
<td>O. Neuron</td>
</tr>
<tr>
<td>16. Plasma membrane of the neuron</td>
<td>P. Ohms</td>
</tr>
<tr>
<td>17. Cytosol within the axon</td>
<td>Q. Parasympathetic</td>
</tr>
<tr>
<td>18. The outer phospholipid sheath around a neuron</td>
<td>R. Perikaryon</td>
</tr>
<tr>
<td>19. Neurons that have two processes</td>
<td>S. Satellite cells</td>
</tr>
<tr>
<td>20. ( I = V/R ) defines which law</td>
<td>T. Schwann cells</td>
</tr>
<tr>
<td>21. Channels that open/close in response to membrane potential are called</td>
<td>U. Sensory</td>
</tr>
<tr>
<td>22. Channels that open/close in response to chemicals are called</td>
<td>V. Spinal cord</td>
</tr>
<tr>
<td>23. Short lived local changes in the neuron’s membrane potential are called</td>
<td>W. Sympathetic</td>
</tr>
</tbody>
</table>
Events at the Synapse

Directions:

a. Insert your Regulations CD.
b. Click the "Contents" button.
c. Open the Nervous System File.
d. Click Animations.
e. Click Events at the Synapse.

Introduction

1. a. Where are synapses located? ____________________________________________

   b. What happens to “information” at the synapse? ____________________________

Types of Synapses

Electrical Synapses

2. What is another name for electrical synapses? ______________________________

3. What are connexons? ____________________________________________________

4. Where are gap junctions commonly found? _________________________________

5. Name three advantages of gap junctions.
   - ________________________________________________________________
   - ________________________________________________________________
   - ________________________________________________________________

Chemical Synapses

6. What is the synaptic cleft? _______________________________________________

7. Electrical impulses cannot jump the synaptic cleft. What is the role of neurotransmitters in achieving this task?
   ________________________________________________________________

8. Explain what is meant by a chemical synapse being “one way only.” ________________
Neurotransmission at Chemical Synapses

9. An action potential arriving at the presynaptic membrane causes Ca\(^{2+}\) ions to flow through channels into the cytosol. What affect does this have on the vesicles containing neurotransmitters?

10. What do the neurotransmitter molecules do once they are released into the synaptic cleft?

11. Neurotransmitters cause postsynaptic ion channels to open. Explain how this can lead to either a graded potential or a hyperpolarization.

12. What causes an action potential to be generated?

Excitatory and Inhibitory Potentials

13. Opening postsynaptic sodium ion channels cause graded potentials in that membrane. Explain why these are referred to as Excitatory Postsynaptic Membrane Potentials (EPSPs).

14. Opening Cl\(^-\) or K\(^+\) channels on the postsynaptic membrane will generate hyperpolarizations. Explain why these are referred to as Inhibitory Postsynaptic Membrane Potentials (IPSPs).

15. What influence do EPSPs and IPSPs have on whether or not an action potential will be generated at a neuron’s trigger zone?
Summation

16. Postsynaptic membrane potentials are summed (combined) and integrated at a neuron's trigger zone. These membrane potentials come from thousands of synapses from the neuron's dendrites.

a. Define *spatial summation*.

b. Define *temporal summation*.

17. IPSPs and EPSPs can combine to produce three possible outcomes. Describe what happens with each of the following.

a. *Hyperpolarization*

b. *Sub-threshold graded potential*

c. *Threshold graded potential*
| 1. Either nerves respond or they do not response is a statement reflecting which phenomenon | A. A |
| 2. The ability to convey an action potential down a neuron is called | B. B |
| 3. The ability to convey an action potential from one neuron to the next is called | C. All-or-none |
| 4. Which are the largest diameter nerve fibers | D. Amino acid |
| 5. Which are the smallest diameter nerve fibers | E. A xoaxonic |
| 6. Which are the fastest fibers | F. Axodendritic |
| 7. What is the relationship between diameter and speed | G. Axosomatic |
| 8. A synapse between an axon terminals and the dendrites of another is classed as | H. Biogenic |
| 9. A synapse between an axon terminals and the cell body of another is classed as | I. C |
| 10. A synapse between an axon terminals and the axon of another is classed as | J. Conduction |
| 11. Identify the process of adding together EPSP | K. Direct |
| 12. When you excite partially stimulated neurons to fire the process is called | L. Facilitation |
| 13. What class of neurotransmitter is indolamine | M. Neuronal pools |
| 14. What class of neurotransmitter is glutamate | N. Peptide |
| 15. What class of neurotransmitter is endorphin | O. reflex |
| 16. The millions of neurons in the central nervous system are organized into | P. Summation |
| 17. An automatic response to a stimulus | Q. Transmission |
Muscle Project

Follow the directions carefully!

1.) This project is due lab day 11.7 or 11.8

2.) Purchase one of the many ‘muscle man’ type magazines or search the Internet. Look for pictures in which muscles are in a contracted / sometimes exaggerated state. In order to use a muscle for the project, it must be in the contracted state. For example, the muscle covering the forehead, the frontalis is seen only when one is frowning – it gives a wrinkled appearance to the forehead. If you attempt to show this muscle on someone who is simply smiling, no credit will be given.

3.) Display your pictures in a book/booklet or on poster board in an organized fashion in a binder. Observe some of the samples on display in the lab. Organize the muscles into groups such as arm, leg, face….etc. Then divide them into anterior and posterior groups and label them clearly and neatly. Spelling counts! Label each muscle only one time. Each picture you use should show a well delineated muscle. E.g., it is difficult to see a biceps brachii on a 2” photo…. 

4.) Using the list of 37 superficial muscles, find and label 25 of them. In your project, correctly identify, label and then number them – 1 through 25.

5.) Using the list of 16 deep muscles, find and label 10 of them. In your project, correctly identify, label and then number them – 1 through 10. Since these are deep muscles which will not be apparent on the surface, you only need to indicate their approximate location on your pictures. E.g., the diaphragm can be indicated at the junction of the thoracic and abdominal cavities.

6.) Be sure to use some system to distinguish superficial from deep muscles. Some students prefer a section of superficial muscles followed by a section of deep muscles. Others will show them on the same picture but clearly code them – such as orange colored labels for superficial muscles and green labels for deep muscles.

7.) Then, for 15 of the muscles give a common everyday action for that muscle. For example, rhomboideus major is used when the arm is lowered against a resistance, as in paddling a canoe. Yes—you may use this one in your project! Identify the muscle and its everyday action.

8) NO ADAM pictures and no illustrations and hand drawings.
### Superficial Muscles

<table>
<thead>
<tr>
<th>Muscles</th>
<th>Muscles</th>
<th>Muscles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adductors*</td>
<td>Infraspinatus*</td>
<td>Soleus</td>
</tr>
<tr>
<td>Biceps brachii *</td>
<td>Latissimus dorsi*</td>
<td>Sternocephaloidostoid*</td>
</tr>
<tr>
<td>Biceps femoris*</td>
<td>Masseter*</td>
<td>Sternohyoid</td>
</tr>
<tr>
<td>Brachialis</td>
<td>Mylohyoid</td>
<td>Teres major*</td>
</tr>
<tr>
<td>Brachioradialis</td>
<td>Orbicularis oculi*</td>
<td>Tinialis anterior</td>
</tr>
<tr>
<td>Deltoid</td>
<td>Orbicularis oris*</td>
<td>Tensor fascia latae</td>
</tr>
<tr>
<td>Digastric</td>
<td>Pectoralis major*</td>
<td>Trapezius*</td>
</tr>
<tr>
<td>External oblique*</td>
<td>Rectus abdominis</td>
<td>Triceps brachii*</td>
</tr>
<tr>
<td>Frontalis</td>
<td>Restus femoris*</td>
<td>Vastus lateralis</td>
</tr>
<tr>
<td>Gastrocnemius*</td>
<td>Semitendinosus</td>
<td>Vastus medialis</td>
</tr>
<tr>
<td>Gluteus maximus*</td>
<td>Semimembranosus</td>
<td>Zygomaticus*</td>
</tr>
<tr>
<td>Gluteus medius</td>
<td>Serratus anterior*</td>
<td></td>
</tr>
<tr>
<td>Gracilis</td>
<td>Sartorius*</td>
<td></td>
</tr>
</tbody>
</table>

### Deep Muscles

<table>
<thead>
<tr>
<th>Muscles</th>
<th>Muscles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buccinator</td>
<td>Pectoralis minor</td>
</tr>
<tr>
<td>Diaphragm*</td>
<td>Rhomboids*</td>
</tr>
<tr>
<td>Erector spinae</td>
<td>Scalenes</td>
</tr>
<tr>
<td>Gluteus minimus</td>
<td>Splenius</td>
</tr>
<tr>
<td>Intercostals*</td>
<td>Supraspinatus*</td>
</tr>
<tr>
<td>Internal oblique</td>
<td>Temporalis</td>
</tr>
<tr>
<td>Levator scapula*</td>
<td>Teres minor</td>
</tr>
<tr>
<td>Occipitalis</td>
<td>Transverse abdominis</td>
</tr>
</tbody>
</table>
Grading Sheet

This sheet must be included as your face page on the project

<table>
<thead>
<tr>
<th>Adductor longus</th>
<th>Biceps brachii</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buccinator</td>
<td>Diaphragm</td>
</tr>
<tr>
<td>Biceps femoris</td>
<td>Brachialis</td>
</tr>
<tr>
<td>Erector spinae group</td>
<td>Gluteus minimus</td>
</tr>
<tr>
<td>Brachioradialis</td>
<td>Deltoid</td>
</tr>
<tr>
<td>Intercostals</td>
<td>Internal oblique</td>
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<tr>
<td>Digastric</td>
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</tr>
<tr>
<td>Levator scapula</td>
<td>Occipitalis</td>
</tr>
<tr>
<td>Frontalis</td>
<td>Gastrocnemius</td>
</tr>
<tr>
<td>Pectoralis minor</td>
<td>Rhomboideus</td>
</tr>
<tr>
<td>Gluteus maximus</td>
<td>Gluteus medius</td>
</tr>
<tr>
<td>Scalenes</td>
<td>Splenius</td>
</tr>
<tr>
<td>Gracilis</td>
<td>Infraspinatus</td>
</tr>
<tr>
<td>Supraspinatus</td>
<td>Temporalis</td>
</tr>
<tr>
<td>Latissimus dorsi</td>
<td>Masseter</td>
</tr>
<tr>
<td>Teres minor</td>
<td>Transverse abdominis</td>
</tr>
<tr>
<td>Mylohyoid</td>
<td>Orbicularis oculi</td>
</tr>
<tr>
<td>Orbicularis oris</td>
<td>Pectoralis major</td>
</tr>
<tr>
<td>Rectus abdominis</td>
<td>Rectus femoris</td>
</tr>
<tr>
<td>Sartorius</td>
<td>Semimembranosus</td>
</tr>
<tr>
<td>Semitendinosus</td>
<td>Serratus anterior</td>
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<td>Soleus</td>
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<td>Trapezius</td>
<td>Triceps brachii</td>
</tr>
<tr>
<td>Vastus lateralis</td>
<td>Vastus medialis</td>
</tr>
<tr>
<td>Zygomaticus</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AREA</th>
<th>Point Value</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superficial muscles</td>
<td>x 3.0</td>
<td>/75 points</td>
</tr>
<tr>
<td>Deep muscles</td>
<td>X 1.0</td>
<td>/15 points</td>
</tr>
<tr>
<td>Everyday Actions</td>
<td>X 1.0</td>
<td>/15 points</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Name ____________________________

Section ____________________________
HUMAN ANATOMY & PHYSIOLOGY I
Bio 111

Complete Annotated Laboratory Outline
2006-2007
Compiled by the A & P Faculty
The Biology Department
Terms of Position and Body Cavities

A. Terms of Position

1. Anatomical position
   - Biped
   - Quadriped
2. Superior / Cranial (cephalic)
3. Inferior / caudal
4. Anterior / ventral
5. Posterior / dorsal
6. Proximal
7. Distal
8. Medial
9. Lateral
10. Ipsilateral
11. Contralateral
12. Superficial
13. Deep
14. Supine
15. Prone
16. Plantar

17. Dorsum

B. Body Planes or Sections

1. Parasagittal (Sagittal)

2. Midsagittal

3. Coronal (frontal)

4. Transverse (cross)

5. Oblique

C. Anatomical Terminology

1. Axial

2. Cephalic
   a. Facial
   b. Frontal
   c. Orbital
   d. Otic
   e. Nasal
   f. Buccal
   g. Oral
   h. Mental
   i. Cranial

3. Cervical
4. Thoracic
   a. Pectoral
   b. Sternal
5. Abdominal
   a. Umbilical
   b. Coxal
6. Pelvic
   a. Pubic
7. Dorsal
   a. Scapular
   b. Vertebral
   c. Lumbar
8. Appendicular
9. Upper Limb
   a. Acromial
   b. Axillary
   c. Brachial
   d. Cubital
   e. Antecubital
   f. Olecranal
   g. Antebrachial
   h. Carpal
   i. Manual
   j. Palmar
   k. Digital
10. Lower limb
   a. Inguinal
   b. Gluteal
   c. Femoral
   d. Patellar
   e. Popliteal
   f. Cural
   g. Sural
   h. Fibular or peroneal
   i. Tarsal
   j. Pedal
   k. Calcaneal
   l. Plantar
   m. Digital

D. Abdominopelvic Regions

1. Transpyloric plane
2. Transtubercular plane
3. Right and left lateral planes
4. Umbilical
5. Epigastric
6. Hypogastric or pubic
7. Right and left hypochondriac
8. Right and left lumbar
9. Right and left iliac (inguinal)
E. Abdominal Quadrants

1. Right upper Quadrant
2. Right lower Quadrant
3. Left Upper Quadrant
4. Left lower quadrant

F. Body Cavities

2. Dorsal cavity
   a. Cranial cavity
   b. Spinal or vertebral

2. Ventral cavity
   a. Thoracic cavity
      (1). Pleural cavities
      (2). Mediastinum
         (a). Pericardial cavity
         (b). Other structures (blood vessels, esophagus, thymus and aorta)

Abdominopelvic cavity

(1) Abdominal
   (a) Peritoneal cavity
   (b) Retroperitoneal space

(2). Pelvic
F. Serous Membranes

2. Parietal and Visceral pleura

3. Parietal and Visceral Pericardium

4. Parietal and Visceral Peritoneum
Skeletal Plan

Allen & Harper: Lab Exercise: Ex. 10 p. 158
Tortora & Derrickson - Text p. 197-198
Web Site reference: http://www.middlesexcc.edu/anatomy

1. Foramen
2. Fossa
3. Groove or sulcus
4. Meatus
5. Fissure
6. Sinus or antrum
7. Condyle
8. Epicondyle
9. Tuberosity
10. Tubercle
11. Trochanter
12. Head
13. Process
14. Line
15. Crest
16. Spine or spinous process
17. Facet
18. Epiphysis
19. Ramus
Appendicular Skeleton

Allen & Harper: Lab Exercise: Ex. 10 p. 157-176
Tortora & Derrickson - Text Ch 8 p. 231-257
Web Site reference: http://www.middlesexcc.edu/anatomy

A. Humerus (AH p. 160)(TD p. 235)

1. Head
2. Anatomical neck
3. Surgical neck
4. Greater and lesser tubercles
5. Intertubercular groove (sulcus)
6. Capitulum (lateral condyle)
7. Trochlea (medial condyle)
8. Medial epicondyle
9. Lateral epicondyle
10. Olecranon fossa (dorsal, distal)
11. Coronoid fossa (anterior, over trochlea)
12. Radial fossa (anterior over capitulum)
13. Shaft or body (diaphysis)
14. Epiphysis (End of the bone)
15. Deltoid tuberosity
16. Right or left?
B. **Ulna** (AH p. 160) (TD p. 236)

1. Olecranon process
2. Coronoid process
3. Trochlear notch or Semilunar notch
4. Radial notch
5. Styloid process
6. Head
7. Right or left?

C. **Radius** (AH p. 160) (TD p. 235)

1. Radial head
2. Radial tuberosity
3. Styloid process
4. Ulnar notch
5. Right or left?
6. Neck of radius

D. **Hand and Wrist** (AH p. 163) (TD p. 238-239)

1. Carpals or wrist bones (8 per hand)
2. Metacarpals (5 per hand)
   a. Numbered I - V
   b. Proximal base, shaft & distal head
3. Phalanges (14 per hand)
   a. Proximal, middle, distal
   b. Proximal base, shaft & distal head
4. Right/Left

E. Scapula (shoulder blade) (AH p. 158)(TD p. 233)

1. Superior border
2. Inferior and superior angles
3. Vertebra (medial) border
4. Axillary (lateral) border
5. Spine of scapula / scapular spine
6. Acromion process
7. Coracoid process
8. Glenoid cavity
9. Supraspinous fossa
10. Infraspinous fossa
11. Subscapular fossa
12. Scapular notch
13. Acromioclavicular joint (AC)
14. Left or right?

F. Clavicle (collarbone) (AH p. 158) (TD p. 233)

1. Sternal (medial) end (triangular end)
2. Acromial (lateral) end (broad, flat and larger end)
G. Os Coxae (pelvic bones) (AH p. 164)(TD p. 240-245)

1. Major bones
   a. ilium
   b. Ischium
   c. Pubis

2. Iliac crest

3. Iliac spines
   a. Anterior superior
   b. Anterior inferior
   c. Posterior superior
   d. Posterior inferior

4. Greater sciatic notch

5. Lesser sciatic notch

6. Iliac fossa

7. Auricular surface (sacroiliac joint)

8. Ischial tuberosity

9. Ischial spine

10. Pubic symphysis

11. Pubic arch

12. Pubic crest

13. Obturator foramen
14. Acetabulum
15. Pelvic cavity
16. True and false pelvis
17. Pelvic girdle
18. Differentiate male and female pelvis (5 points)
19. Right/Left


1. Head
2. Neck
3. Greater trochanter
4. Lesser trochanter
5. Intertrochanteric line (anterior)
6. Intertrochanteric crest (posterior)
7. Medial condyle
8. Lateral condyle
9. Intercondylar fossa
10. Medial epicondyle
11. Lateral epicondyle
12. Linea aspera
13. Fovea capitis
14. Patellar surface
15. Nutrient Foramen
16. Right or left?

I. Patella (kneecap) (AH p. 167)(TD p. 247)
   1. Base
   2. Apex
   3. Anterior / posterior
   4. Articular facets for femur

J. Tibia (shinbone) (AH p. 167) (TD p. 248)
   1. Tibial crest (anterior crest)
   2. Lateral and medial condyles
   3. Intercondylar eminence
   4. Medial malleolus
   5. Fibular notch
   6. Tibial tuberosity
   7. Right or left?
   8. Articulation site for head of fibula on inferior surface of lateral condyle
   9. Articulation site for the Talus Bone

K. Fibula (AH p. 167)(TD p. 248)
   1. Lateral malleolus
   2. Head
L. Foot and Ankle (AH p. 169)(TD p. 248)

1. Tarsals (7 per foot)
   a. Talus
   b. Calcaneus

2. Metatarsals (5 per foot) (numbers I-V)
   a. Proximal base, shaft & distal head

3. Phalanges (14 per foot)
   a. Proximal, middle, distal
   b. Proximal base, shaft & distal head

4. Right/Left
Axial Skeleton

Allen & Harper: Lab Exercise(s): Ex. 9 p. 121-138
Tortora & Derrickson - Text Ch. 7 p. 198-230
Web Site reference: http://www.middlesexcc.edu/anatomy

A. Sutures (AH p. 124)(TD p. 209-210)
   1. Sagittal
   2. Coronal
   3. Lambdoidal
   4. Squamosal
   5. Sutural Bones (Wormian)
   6. zygomaticomaxillary
   7. Frontozygomatic
   8. Temperozygomatic

B. Cranial bones (8 cranial bones) (AH p. 124, 130) (TD p. 198-204)
   1. Frontal bone (1) (AH p.124, 130) (TD p. 199-200)
      a. Supraorbital notch or foramen
      b. Supraorbital margin
      c. Frontal sinus
      d. Zygomatic process
   2. Parietal bones (2) (AH p.124) (TD p. 200)
   3. Temporal bones (2) (AH p. 124, 130) (TD p. 200-202)
      a. Squamous portion
b. Petrous portion

c. Zygomatic process and arch

d. Mandibular fossa

e. Mastoid process

f. Styloid process

g. External auditory canal or acoustic meatus

h. Internal auditory canal or acoustic meatus

i. Jugular foramen (between temporal and occipital)

j. Foramen lacerum (between temporal and sphenoid)

k. Carotid canal

l. Ossicles
   a. incus, malleus, and stapes

m. Foramen spinosum

4. Occipital bone (1) (AH p. 124, 131) (TD p. 203)
   a. External occipital protuberance
   b. Occipital condyles
   c. Foramen magnum
   d. Hypoglossal canal
   e. Superior and inferior nuchal lines
5. Sphenoid bone (1) (AH p. 124, 131) (TD p. 203-205)
   a. Body
   b. Greater wings
   c. Lesser wings
   d. Optic foramen
   e. Sella turcica
   f. Hypophyseal fossa
   g. Superior orbital fissures
   h. Foramen ovale
   i. Pterygoid processes
   j. Foramen rotundum
   k. Sphenoid sinus (see sagittal view)

   a. Crista galli
   b. Cribiform plate (horizontal plate); contains olfactory foramina
   c. Perpendicular plate- upper portion of the nasal septum
   d. Superior and middle nasal conchae
   e. Sinuses
C. Facial Bones (AH p. 124, 131) (TD p. 205-208)

1. Mandible (TD p.207-208)
   a. Body
   b. Mental foramen
   c. Angle
   d. Ramus
   e. Mandibular foramen
   f. Mandibular condyle (condylar process)
   g. Mandibular notch
   h. Coronoid process
   i. Alveolar border (alveolus)

2. Nasal bones (2) (TD p.205)

3. Lacrimal bones (2) / Lacrimal fossa (TD p.207)

4. Vomer (1) (TD p.207)
    - Lower portion of the nasal septum

5. Zygomatic bones (2) (AH p. 124)(TD p.207)
    Temporal process of the zygomatic

6. Palatine bones (2) (AH p. 124)(TD p.207)
    Horizontal plate of the hard palate

   a. Incisive foramen
b. Palatine process of the hard palate

c. Zygomatic process of the maxilla

d. Infraorbital foramen

e. Inferior orbital fissure

f. Alveoli and processes

g. Maxillary sinus

8. Inferior nasal conchae (2) (TD p.207)

D. Hyoid (AH p. 138) (TD p. 212)
Suspended/attached by ligaments and muscles: Does not articulate with any other bone

E. Fontanels (AH p. 137)(TD p. 211)
1. Anterior or frontal

2. Posterior or occipital

3. Anterolateral or sphenoidal

4. Posterolateral or mastoidal

F. Sinuses (AH p. 136) (TD p. 198-204)

1. Mastoidal

2. Paranasal
   a. Frontal
   b. Maxillary
   Sphenoidal
   d. Ethmoidal
G. Bones that form the eye orbit (AH p. 130) (TD p. 209)
1. Frontal
2. Zygomatic
3. Maxilla
4. Sphenoid
5. Lacrimal
6. Ethmoid
7. Palatine

H. Bones that form the nasal septum (AH p. 132, 136) (TD p. 208)
1. Vomer
2. Perpendicular plate of the ethmoid

I. Bones that form the hard palate (AH p. 132) (TD p. 205-207)
1. Palatines bones
3. Maxilla (horizontal plate of-)

J. Sagittal section of the Skull (TD p. 201)
1. Frontal sinus
2. Sphenoidal sinus
3. Perpendicular plate
4. Vomer
5. Styloid process
6. Frontal bone
7. Cribiform plate
8. Crista galli
Axial Skeleton - Vertebrae + Thoracic Cage

Allen & Harper: Lab  Ex. 9 p. 138-156
Exercise(s):
Tortora & Derrickson - Text Ch. 7 p. 194 - 230
Web Site reference: http://www.middlesexcc.edu/anatomy

A. Natural curvatures of the vertebral column (AH p. 138) (TD p. 212 - 213)

1. Cervical
2. Thoracic
3. Lumbar
4. Sacral

B. Abnormal curves associated with the vertebral column (AH p.146) (TD p. 225 - 226)

1. Lordosis
2. Kyphosis
3. Scoliosis

C. Vertebrae (AH p. 138-148)) (TD p. 214)

1. Typical structures of all vertebrae (AH p.140) (TD p.214-215)

   a. Body or centrum
   b. Vertebral arch (neural arch)
      (1) Pedicle
      (2) Lamina
   c. Vertebral foramen
   d. Intervertebral foramen
e. Anterior-posterior surface

f. Intervertebral disc

g. Superior-inferior surfaces

h. Processes:
   (1) Transverse process
   (2) Spinous process
   (3) Inferior articulating surface or process
   (4) Superior articulating surface or process

4. Special features of Specific Vertebrae

   (1) Transverse Foramina
   (2) Bifid spinous process

b. Atlas (C1) First Cervical vertebra
   (1) Articulation site for occipital condyles
   (2) ‘Absence’ of a body

c. Axis (C2) (AH p. 141-142)
   Dens or odontoid process

d. Vertebral prominens
   Prominent spinous process on C7 (no bifid)

e. Thoracic Vertebrae (T1-T12) (AH p. 143)(TD p. 216, 218 & 219)
   (1) Long slender spinous processes, which are directed posteriorly and inferiorly
   (2) Demifacets on the body that articulate with the heads of ribs
(3) Facets on the transverse processes that articulate with the tubercle of a rib

(4) T10 through T12 begin looking more like the lumbar spinous processes

(5) Articulates rib to thoracic girdle.

f. Lumbar vertebrae (L1-L5) (AH p. 144)(TD p. 218, 220)
   (1) Thick dorsally directed spinous processes
   (2) Triangular vertebral foramen
   (3) Large superior and inferior articulating surfaces

g. Sacrum (5 fused vertebrae) (AH p. 145)(TD p. 218-219 & 221)
   (1) Sacral foramina (fused intervertebral foramina)
   (2) Sacral auricular surface (sacroiliac joint)
   (3) Median sacral crest
   (4) Ala
   (5) Sacral hiatus
   (6) Sacral foramen
   (7) Sacral canal
   (8) Body
   (9) Superior articulating processes

h. Coccyx (3-5 fused vertebrae) (TD 219-221)

D. **Sternum (breastbone)** (AH p. 146 - 147) (TD p. 222)
   1. Manubrium
a. Jugular notch (suprasternal)

b. Clavicular notch

2. Body or gladiolus

   Costal notches for articulation with the ribs

3. Xiphoid process

4. Sternal angle

E. Ribs (AH p. 146-148) (TD p. 222-223)

1. True (vertebrosternal ribs) (1-7 pairs)

2. False ribs
   a. Vertebrochondral ribs (8-10 pairs)
   b. Floating or vertebral (11+12 pairs)

3. Parts of Ribs
   a. Head
   b. Shaft or body
   c. Neck
   d. Angle
   e. Tubercle
   f. Costal cartilages
   g. Costal groove & Intercostals space
ARTICULATIONS

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I. Articulations

A. Definition of Arthritis and General Functions

B. Classification, Definitions, Location, Types of Movement
   (Non-Axial, Monaxial, Biaxial, Trail)

1. Synarthrosis
   a. Suture
   b. Synchondrosis
   c. Synostosis
   d. Gomphosis

2. Amphiarthrosis
   a. Syndesmosis
   b. Symphysis

3. Diarthrosis
   a. Saddle
   b. Ball and Socket
   c. Planar (gliding)
   d. Hinge
   e. Pivot
   f. Condyloid (ellipsoidal)
C. Joint Movements: Definitions and Examples

1. Flexion/Extension/Hyperextension
2. Abduction/Adduction
3. Rotation
   a. Lateral
   b. Medial
4. Circumduction
5. Gliding (Plane Movement)
6. Dorsiflexion/Plantar Flexion
7. Protraction/Retraction
8. Supination/Pronation
9. Inversion/Eversion
10. Depression/Elevation
A. OBJECTIVES
1. Learning some of the basic operations of A.D.A.M. SOFTWARE
2. Practicing using directional terms previously learned

B. GETTING INTO THE A.D.A.M. PROGRAM

1. Double Click on the A.D.A.M. Interactive icon

2. The A.D.A.M Interactive Anatomy screen will appear. Click on Dissectible Anatomy. Be patient, it will take a few seconds to work.

3. You should see on the screen a small man in a preview box. At the top of the box a dotted rectangular line should surround Dissectible Anatomy. If not click once on the words Dissectible Anatomy.

4. Under Gender make sure the button for male is on. When this button is activated or on, a black dot will be seen in the middle of the white circle next to the word. If this button is not on, click on it once.

5. Under View make sure the button for Anterior is on. Again if this button it is not on, click on it once.

6. Click open at the bottom of the screen. Wait for the hourglass to disappear.

7. Notice above the picture is a blue banner. In it you should see the words Male Anterior
C. USING THE ADAM PROGRAM -----USEFUL BUTTONS and ARROWS

1. **ENLARGING THE PICTURE**
   a. At the bottom right corner of the picture are three diagonal lines. Click on these, hold the mouse down and drag the picture towards the bottom of the screen. This will enlarge the picture.

2. **PICTURE LEFT/PICTURE RIGHT ARROWS**
   a. At the bottom of the picture is a long thin gray column with an arrow on one side and an arrow on the other side.
   b. **Click** on the **arrow**. What does the picture do? ______________________
   c. **Click** on the **arrow**. What does the picture do? ______________________
   d. You may also move the picture side to side by **clicking** on the **gray square** in this same column and moving it slowly from one side to the other.
   e. You can use these buttons to center the picture at anytime

3. **PICTURE UP / PICTURE DOWN ARROWS (SCROLL BAR)**
   Located to the right of the picture notice the long gray column with an **ARROW** at the top and an **ARROW** at the bottom. See the diagram on the separate page.
   a. **Click** on the **Arrow**. What does it do to the picture? ______________________
   b. **Click** on the **Arrow**. What does it do to the picture? ______________________
   You may also move the picture up or down by clicking on the gray rectangle in this same column and moving it slowly up or down.

4. The **ANATOMY VIEW BUTTON** is located to the left of the picture
   a. This button lets you see the different anatomical views: anterior, posterior, medial, and lateral as well as lateral and medial arm.
   b. **Click once** on the **View button**. A list of views will appear in a box. The view you are looking at on the screen has a small black dot in front of the word. Which word has a black dot in front of it? ______________
   c. What view do you see on the screen? ____________________________
d. **Click once on Posterior.** Wait for the hourglass to disappear. What happened to the picture? ________________________________ What does the blue banner above the picture say?

e. **Click** on the **View button. Click** once on **Lateral.** Wait for the hourglass to disappear. What happened to the picture? ________________________________ What does the blue banner above the picture say?

f. **Click** on the **View button. Click** once on **Medial.** It should appear in blue. Wait for the hourglass to disappear. What happened to the picture? ________________________________ What does the blue banner above the picture say?

g. **Return** the picture to the **Anterior View.** The screen may appear blank. You may need to center the picture with picture arrows.

5. **DEPTH BAR**  
This feature will allow you to move through the layers of the body from superficial to deep and deep to superficial.

a. Notice to the **left** of the picture is a **wide gray column** with an arrow on the top and an arrow on the bottom.

b. Make sure the **Depth button** (the square box in the column with the white center) is flush against the arrow at the top of the depth bar and **displays** the number “0”. If not click on the square box and move it up until it is flush against the top arrow.

c. **Click** once on the **bottom arrow** of the **Depth bar.** (Be patient it takes a second to change.) What number now appears? ________________________________

d. **Click** the arrow anyplace on the man and **hold the mouse button down.** What words appear on the screen? ________________________________. Where else on the screen do you see these words? ________________________________.

e. **Click** on the **bottom arrow** of the **depth bar** until the number on the **Depth button reads 9, 10 or 11.**

f. Move the depth bar until it reads 19.
g. To the left of the picture click on the **left most light bulb in the upper row**. The whole picture should now be colored. The picture is now in **Normal mode**.

h. **Click** with the arrow on the red area in the **shoulder region** and **hold the mouse button down**. Which muscles have you found? 

____________________________________________. Where else on the screen do you see these words? _______________________________________

i. **Click** with the arrow on the red area in the **chest region** and **hold the mouse button down**. Which muscle have you found? 

____________________________________________. What two ways gave you the name of this structure? ______________________________________,

____________________________________________

j. **Click** on the **Depth button** (the square box with the number in the middle) and move it up, again flush with the top arrow of the depth bar. What number again appears? ________.

k. Again **click** on the **Depth button** and hold. You will see 0 of 330 next to it in a box. **Move** the **Depth button down** or **use the bottom arrow** until it reads 150 of 330 in the box (This will take some practice. Don’t despair. ) You should see **150 on the Depth button**.

l. You should see the sternum with the ribs attached. The Pectoralis major muscle has been removed from the picture.

m. **Move** the **Depth button** or **use the bottom arrow** so it reads **200 of 330** in the box and **200 on the Depth button**.

n. **Click** with the arrow on either pink region in the chest area and hold the mouse button down. What is this structure? _________________

o. When you click on the bottom arrow of the depth bar or move the Depth button down are you moving from superficial to deep or deep to superficial layers? _______________________________________

p. **Move** the **Depth button** so it reads 150 of 330 in the box. What structures lateral to the sternum do you again see in the thoracic area? 

____________________________________

q. **Click** on the **top arrow** of the **depth bar and** hold the mouse down. In which direction are the numbers on the Depth Button moving?

____________________________________
r. **Click and hold** on the top arrow of the **Depth bar** until the Depth button reads 9, 10 or 11. What is happening to the picture?

___________________________________________________

s. When you click on the top arrow of the depth bar or move the Depth button up does it move from superficial to deep or deep to superficial layers?

____________________________________

6. **STRUCTURE LIST**

a. On the keyboard hit the “Ctrl” key (lower left corner) and the “L” key **once**. A large rectangular box called **List Manager** should appear. This is the **Structure list**. It is arranged in **Alphabetical Order**.

b. To move the **Structure list** click on the blue banner with the words “**List manager**“, hold the mouse down and drag the **Structure list** to another place on the screen.

c. Located to the **right** of the **Structure list** notice the **long gray column** with an ARROW at the top and an  ARROW at the bottom.

d. **Click** on the **Arrow**. In which direction through the alphabet is the list moving?

____________________________________

e. **Click** on the **Arrow**. In which direction through the alphabet is the list now moving?

____________________________________

You may also move through the structure list by clicking and holding on the scroll bar, the gray rectangle in this same column, and moving it slowly up or down.

f. To **remove** the **Structure list** again hit the “Ctrl” key and the “L” key **once**.

g. Bring the **Structure List** back onto the screen. (“Ctrl” key and “L” key once)

h. Locate and **Double click Brain** on the **Structure list**. Brain should be highlighted in blue on the Structure list.

i. Which section of the brain appears in the picture?

____________________________________

j. Locate and **Double click kidney** on the **Structure list**. You might need to move the picture up.
k. What happens to the color of kidneys?

________________________________________________________________________

l. What two places on the screen show you the name of this structure?

________________________________________________________________________

7. IDENTIFY BUTTON
This button will allow you to identify a particular body structure. This button is located near the top left corner of the screen and has an arrow on it.

a. Click once on the IDENTIFY BUTTON. The arrow you have been using to point to with on the picture is the Identify arrow.

b. Move the Depth button so it reads 200.

c. To the left of the picture click on the left most light bulb in the upper row. Again this is Normal Mode. The entire picture should be colored.

d. Move the Identify arrow to the large dark red meat like structure near the center of the picture.

e. Click and hold on this structure. What structure did you identify?

________________________________________________________________________

f. Where are the three places on the screen that identify this structure as the liver?

________________________________________________________________________,

________________________________________________________________________,

________________________________________________________________________

g. Click and hold on any structure on the picture. Again its name will appear at the top of the picture, in the Structure list and on the screen as you click and hold on the structure.

h. What structure did you identify?

________________________________________________________________________

8. HIGHLIGHT MODE BUTTON (Light bulb with spokes coming out of from it)
This button will allow you to isolate and highlight a particular body structure.
The Highlight Mode Button is located directly below the **Normal Mode** light bulb. When it is activated or on it will appear lighter in color and indented.

a. **Click** once on the **Highlight Mode Button**.

b. Use the scroll bar or down arrow to locate **liver** on the **Structure list**.

c. **Double click** on the word **liver** in the **Structure list**. How does the liver appear in the picture? ________________________________

d. **Click and hold** the **identify arrow** on the liver in the picture. In what three places does the name of the structure appear?

__________________________________________________________________________

What number appears on the Depth button? __________

e. Locate **pancreas** on the **Structure list**. (Remember the list is alphabetical).

e. **Double click** on the word pancreas in the **Structure list**. How does the pancreas appear? _________________________________. In what three places does the name appear?

__________________________________________________________________________

What number appears on the Depth button? __________

f. Which structure is deeper the liver or the pancreas? ________________________________

How do you know? ________________________________

g. **Click** on the **Normal Mode button** (It looks like a normal light bulb right above the light bulb with the spokes) **once** and Highlight is gone. Notice this button is now lighter in color and indented. You should see all the body structures in different colors.

h. **Return** to the **Highlight Mode** (the light bulb with the spokes) by **clicking once** on this button. (Again the button lightens and looks indented.) What organ is again highlighted? ________________________________

i. Hit “**Ctrl** “ key and “**L**” key once to remove the Structure list.

9. **FIND BUTTON** (look for the binoculars at the top of the screen)

This button will help you locate numerous body structures quickly. The Find button, with binoculars on it, is located above the blue banner that says Male Anterior.
a. **Click once on the Find Button** (Binoculars) or hit “Ctrl” key and “F” key at the same time once. A box with a white rectangle and blue rectangle will appear.

b. **Click** and **Hold on the blue banner** with the word **Find** in it, and **drag the box away** from the picture.

c. **Type exactly** (you must spell the word correctly) what you want to find **into the white rectangle**. If words are already there place the mouse at the end of the word, click, and use Backspace on the keyboard. This will erase the word.

d. **Type in clavicle.**

e. **Click Find located at the bottom of the box.** Wait for the hourglass to disappear. Another box will appear that says “Find Results “.

f. **Click** and **hold on the blue banner** with the words **Find Results** in it, and **drag the box away** from the picture.

g. **Click on Clavicle in the “Find Results” box** so it is highlighted in beige.

h. **Click on the box that follows the words “show structure in “......

i. **Click once on Male Anterior.** It will be highlighted in blue.

j. To **remove the boxes** from the screen **click the X in the top right corner of each box.**

k. You should now see the clavicle highlighted on the picture. If you do not see the clavicle highlighted center the picture.

l. **Click** on the **Find button** (binoculars) or hit “Ctrl” key and “F” key.

m. **Type sternum into the box**

n. **Click** and **hold on the blue banner** with the word **Find** in it, and **drag the box away** from the picture.

o. **Click Find in the box**

p. Make sure **sternum** is highlighted in the **Find results box. Drag the box away** from the picture.
q. Click on the box that follows “Show structure in”, click on male anterior, and remove the boxes from the screen by clicking the X in the top right corner of each box.

k. Observe where the structure is located. What color does it appear? ________________
USING A.D.A.M. to LOCATE ORGANS and REVIEW DIRECTIONAL TERMS

Congratulations, you are now ready to use A.D.A.M.

1. Make sure you are on the Anterior View

2. Click on the Highlight Mode (light bulb with the spokes) button.

3. Make sure the Depth button reads “0”. If not move the Depth button so it is flush against the top arrow of the depth bar.

EXPLORING the ORGANS of the VENTRAL CAVITY

1. Click on the Find Button (binoculars). Type in heart. Move the box away from the picture.

2. Click Find in the box.

3. Click on Heart in the Find Results box. Move the box away from the picture.

4. Click on the box after the words” show structure in “ and click on Male Anterior

5. Close the Find and Find results box by clicking the X in the top right corner of each box.

6. In what cavity is the heart located?
   ____________________________________________

7. What membrane has been cut away so you can see the heart?
   __________________________

8. Click on the Normal Mode button. (Normal light bulb)

9. What organs are lateral to the heart? Click on one of them to identify.
   _______________

10. Use the bottom arrow (picture up) or the scroll bar to move the picture until the shoulders are at the top of the screen.

11. What structure is directly inferior to the heart? (If you are not sure click on the structure). Remember the name will appear as you click and hold on the picture and at the top of the picture. ________________________
12. What three large blood vessels (one in red and two in blue) are superior and directly attached to the heart? If you are not sure click on each one to identify.
____________________________ and __________________________ and____________________________

13. **Click once** on the **bottom arrow** of the **depth bar**.

14. What type of section was cut through the heart to give this view?
____________

15. What will help you identify a structure? __________________________

16. **Move** the **Depth button** or use the **bottom arrow** so the depth button reads **169**.

17. **Click** on the structure between the lungs to identify it. Name the structure.
____________________________

18. **Move** the **Depth button** so it reads **173**. What structure do you see between the lungs? ___________________

19. Are you moving to a deeper or more superficial layer?
____________

20. **Identify** the structure that is posterior and superior to the heart? This structure appears as a series of white rings.
____________________________

21. **Move** the **Depth button** so it reads **176**.

22. **Click** on and identify the pink tubular organ that is posterior to the heart?
____________________________

23. Use the bottom arrow (Picture Up) on the scroll bar to move the picture until the diaphragm is at the top.

24. **Click** and **identify** the membrane in the middle of the abdomen.
____________________________

25. Using the **Find Button** (binoculars) locate the **lesser omentum**. The Depth button should read **199**.
26. Remember to **move the Find** and **Find results boxes away** from the picture. **Close** each box by **Clicking on the X** in the corner of each box.

27. **Bring up the Structure list.** (“Ctrl” and “L” key once).

28. **Locate greater omentum** and **double click** on it. The omenta are part of what membrane? (If you are not sure the text is a good place to look.)

29. Locate **Liver** on the **Structure list** and **double click on it.** In what cavity is the liver located? Which number is on the Depth button?

30. Is the liver superior or inferior to the diaphragm?

31. Locate and **double click Gall bladder** on the **Structure list** or use the **Find Button** (Binoculars). What is its position to the liver?

32. **Double click** on **stomach** on the structure list. If it was not on the Structure list how could you locate it? What number is on the Depth button?

33. How would you determine the stomach's position to the liver? Hint: Compare the numbers on the Depth bar for each structure.

34. Is the stomach anterior or posterior to the liver? (Hint: Which structure had the higher number on the depth bar?)

35. **Remove the Structure list** by hitting “Ctrl” key and “L” key.

36. Locate the **pancreas** by using the **Find Button.** Make sure pancreas is highlighted in the Find Results box. **Drag the Find and Find results boxes away** from the picture.

37. **Close the Find and Find results boxes.**

38. The **pancreas** should be highlighted in the picture. Is the pancreas deep or superficial to the stomach? How do you know?
39. Locate the **spleen**. Give the 2 ways you would try to find it. If you are not sure ask.
   a. ________________________________
   b. ________________________________

40. What is its position relative to the stomach?
   ________________________________

41. If you did not use the **Structure list** bring it back onto the screen. (**Ctrl**” key and “L” key once)

42. **Click** on **stomach** in the **Structure list** one more time. If the Structure list is not on the screen how would you bring it back into view?
   ________________________________

43. Look at the picture and click on the structure that is directly inferior to the stomach and identify. (Look for the name at the top of the picture and which structure is highlighted on the Structure list.) What is this structure?
   ________________________________

44. Locate and **Double click** on the **Ascending and Descending colon** on the **Structure list**. You will see two structures highlighted.

45. How would you identify each one? ________________________________

46. On which side of the body is the descending colon located? ________________

47. Identify the curved structure that is inferior and medial and directly attached to the descending colon? If you are not familiar with this term the text is a good place to look.
   ________________________________

48. Again locate and **Double click Ascending and Descending colon** on the **Structure list**.

49. Name the highlighted structure that is contralateral to the descending colon.
   ________________________________

50. **Click on Normal Mode**. (**the normal light bulb**). The whole picture should be colored.

51. Look at the red “worm-like” structure on the inferior surface of the ascending colon. Click on it for identification. ________________________________
52. What is the position of the vermiform appendix to the ascending colon?

53. What cavity contains all the organs mentioned in questions 21 -46?

54. Locate and **Double click on Urinary bladder** on the **Structure list**. What cavity is the urinary bladder located in? ___________________________ What number is on the Depth button? ________________

55. Locate and **Double click kidney** on the **Structure list**. Notice the fat (white covering) around the kidney. Why do you think it is there?

What number is on the **Depth button**? ____________________________

56. How would you decide if the kidney is superficial or deep to the urinary bladder in this view? ____________________________

57. Is the kidney superficial or deep to the urinary bladder?

58. Locate and **Double click Suprarenal gland** (adrenal gland) on the **Structure list**. What is the position of the suprrenal glands to the kidney? Two directional terms are needed here. ____________________________ and ____________________________

56. What is the position of the kidneys to the other abdominal organs?

**F. QUITTING THE A.D.A.M. PROGRAM**

1. To quit the program **go to File**, in the top, left corner of the screen. **Click on Exit**. You may exit the program at any time.

23. **Click on Start** in the bottom left corner of the screen.

4. **Click on Shut Down**.

5. Turn off the **monitor**.
A. How muscles affect actions (TD p.326, 327 & 330)

1. Origin
2. Insertion
3. Agonist or prime mover
4. Antagonist
5. Synergists

B. Ways of naming of Muscles (TD p.332-333)

1. Location
2. Shape Of muscle
3. Relative size of muscle
4. Direction of fibers
5. Number of origins
6. Location of origin & insertion points
7. Action of muscle

C. Muscle Histology (TD p. 292-293)

1. Locate these structures on diagrams and models:
   a. Epimysium
   b. Perimysium
   c. Endomysium
d. Fasicle

e. Muscle fiber (Muscle cell)

2. Three basic types of muscle tissues (TD p.309 Table 10-4)

   a. Skeletal muscle tissue

   b. Cardiac muscle tissue

   c. Smooth muscle tissue
HUMAN MUSCLE IDENTIFICATION AND REVIEW
PART 1

A. OBJECTIVES

1. Learning more of the basic operations of A.D.A.M. SOFTWARE
2. Learning the muscles of the head, neck, chest, abdomen and spine.

B. GETTING INTO THE A.D.A.M. PROGRAM

1. Double click on the A.D.A.M. Interactive icon.

2. The A.D.A.M. Interactive Anatomy screen will appear. Click on Dissectible Anatomy. Be patient, it will take a few seconds to work.

3. You should see on the screen a small man in a preview box. At the top of the box Dissectible Anatomy should be surrounded by a dotted line rectangle. If not click once on the words Dissectible Anatomy.

4. Under Gender make sure the button for male is on. When this button is activated or on, a black dot will be seen in the middle of the white circle next to the word. If this button is not on, click on it once.

5. Click on the View button. Make sure the button for Anterior is on. Again if this button it is not on, click on it once.

6. Notice above the picture is a blue banner. You should see the words Male Anterior
C. USING THE ADAM PROGRAM - USEFUL BUTTONS AND ARROWS

1. Review, if necessary, the buttons and arrows on A.D.A.M. previously learned.

2. At the bottom right corner of the picture are three diagonal lines. **Click** on these, hold the mouse down and drag the picture towards the bottom of the screen. This will **enlarge the picture**. Or **double click** on the banner with the words **Male anterior**.

3. **Click** on the **Highlight Mode button**. (Light bulb with the spokes)

4. **Center** the **head and neck muscles** on the screen.

5. **Bring up the Structure list**. (**“Ctrl”** and **“L”** key once)

D. ZOOM BUTTON (The Magnifying lens)

1. This button is located to the right of the Identify Arrow. It looks like a magnifying lens. It will make a structure either larger or smaller. The operation of this button is dependent on the initial size of the figure.

2. **Locate** and **Double Click Platysma muscle** on the **Structure list**.

3. **Click** on the **Zoom button**. Move the pointer to the screen. You should see a magnifying lens on the screen with a “+” in the center.

4. Place the **magnifying lens** on the **Platysma muscle**. **Click once**.

5. What did the picture do? ______________________________

6. Center the picture if necessary.

7. To return to a normal size picture, **Click** on the **ZOOM BUTTON**. You should see a “−” in the center of the lens.

8. Move the **magnifying lens anywhere** on the picture. **Click once**.

9. What did the picture do? ______________________________

10. Center the picture on the screen if necessary.
MUSCLES OF THE HEAD AND NECK

1. Click on EPICRANIAL muscles on the Structure list. It will be highlighted in red in the picture.

2. Click the ZOOM BUTTON.

3. Place the magnifying lens with the “+” on the EPICRANIAL muscle and click once.

4. Center the picture if necessary.

5. Click on the muscle. Identify it. ______________________________________

6. Where is this muscle located? ___________________________________________

7. How did the muscle get its name? ________________________________________
   This is only one of the two EPICRANIAL muscles.

8. Click the View button and click on Posterior.

9. Again locate and Double Click EPICRANIAL muscle on the Structure list.

10. Identify this muscle by clicking on it. _________________________________

11. Click on View and return to the Anterior View.

12. Locate and Double Click ORBICULARIS OCULI on the Structure list or use Find.

13. How does the muscle's appearance relate to its name? _________________________

14. Locate and Double Click ZYGOMATIC muscles on the Structure list. Center the muscle on the screen. Its insertion is to the skin and muscles at the corner of the mouth.

15. If the muscle contracts what will be the action on the mouth? 
   _____________________________________

16. Click on Normal Mode (the normal light bulb). The whole picture should be colored.

17. Identify the bone that acts as the origin for the ZYGOMATIC muscle? Click on the bone above the superior lateral end of the muscle to confirm your answer. (Any connection with its name?) _________________________________
18. **Remove** the **Structure list** from the screen. Hit "Ctrl" key "L" key once.

19. Use **Find** (binoculars) or **Ctrl and F** key **once** to locate **BUCCINATOR**. Move the **Find and Find Results boxes away** from the picture. Remember to **close** each of these **boxes** when they are **not needed**.

20. **Click** on **View** and **Click** on **Lateral View**.

21. Again use **Find** (binoculars) or **Ctrl and F** key **once** to locate **BUCCINATOR**. Move the **Find and Find Results boxes away** from the picture. (Remember to **close** each of these **boxes** when they are **not needed**.)

22. Name a muscle that has been removed so you can see the **BUCCINATOR** muscle.

____________________________________

23. Use **Find** to locate **TEMPORALIS** muscle. Move the **Find and Find Results boxes away** from the picture. Remember to **close** each of these **boxes** when they are **not needed**.

24. How does its location relate to its name? ______________________________________

25. Bring the **Structure list** back onto the screen.

26. Locate and **Double click** **MASSETER** on the **Structure list**. Its **origin** is the Zygomatic bone.

27. Identify the bone that acts as its **insertion**. **Click** on it to confirm your answer.

____________________________________

28. **Click** back on the **MASSETER** in the picture.

29. When this muscle contracts what is its action on the jaw?

____________________________________

30. **Click** on **View** and **Click** on **Lateral View**.

31. Locate the **DIGASTRIC muscle** by using the **Find Button** or use the **Ctrl” key and “F” key at once or bring up the **Structure List**.

32. Make sure **DIGASTRIC muscle** is highlighted in the Find Results box. **Drag** the **Find and Find results boxes away** from the picture. Remember to **close** each of these **boxes** when they are **not needed**.
33. The hyoid bone acts as the **insertion** for this muscle. The muscle is made of an anterior and posterior belly.

34. **Click** on the **POSTERIOR BELLY** of the **DIGASTRIC muscle**. Which process of the temporal bone acts as its **origin**? ________________________________

35. **Click** on the **ANTERIOR BELLY** of the **DIGASTRIC muscle**. Which facial bone acts as its **origin**? ________________________________

36. When both bellies of the **DIGASTRIC muscle** contract what is the action to the mandible? ___________________________________

37. Locate the **MYLOHYOID muscle** by using the **Find Button** or use the **Ctrl”** key and “F” key at once.

38. Make sure **MYLOHYOID muscle** is highlighted in the Find Results box. **Drag** the **Find** and **Find results boxes away** from the picture. Remember to **close** each of these **boxes** when they are **not needed**.

39. The mandible acts as the **origin** for this muscle. Which bone acts as its **insertion**? ________________________________

40. When this muscle contracts what is its action? ________________________________

41. What is true about the action of the **DIGASTRIC** and **MYLOHYOID** muscles? ________________________________. What do you call muscles that have the same action? ________________________________

42. Which muscle shown in this view (and which you have already looked at) acts as an antagonist to **DIGASTRIC** and **MYLOHYOID**? ________________________________

43. **Click** on **View** and return to the **Anterior View**.

44. Locate and **Double click** **ORBICULARIS ORIS** muscle on the **Structure list**.

45. Like **ORBICULARIS OCULI** how does the muscle get its name? ________________________________

46. What does contracting the muscle do to the lips? ________________________________
47. Locate and **Double click PLATYSMA** muscle on the **Structure list**. You may need to center the picture. Notice its **insertion** to the skin and muscles at the corner of the mouth.

48. Which muscle acts as its **origin**? __________________________

49. If the muscle contracts (shortens) what will happen to the mouth? ______________________________________________________________

50. What facial expression would you expect to see? ______________________________

51. Locate and **Double click STERNOCLEIDOMASTOID** muscle on the **Structure list**.

52. Identify the 2 bones that act as its **origin**? ___________________________ and __________________________. **Click** on them to confirm their identity.

53. **Double click STERNOCLEIDOMASTOID** on the **Structure list**. The muscle should again be highlighted in red.

54. Which part of the temporal bone acts as its **insertion**? (If you are not sure look at the muscle's name.) _____________________________

55. When both of these muscles contract what will be their action on the head? _____________________________

56. What will be the action of the head if only one of these muscles contracts? ______________________________________________________________

57. Locate and **Double click STERNOHYOID** on the **Structure list**.

58. What part of the sternum acts as its **origin**? _____________________________ **Click** on it if you can’t recognize the part.

59. Identify the bone that acts as its **insertion**? _____________________________

60. Which name, the **origin or insertion**, is always listed first when naming a muscle? (Look at how **STERNOCLEIDOMASTOID** and **STERNOHYOID** were named)

61. Locate and **Double click OMOHYOID** on the **Structure list**.
62. The scapula acts as its **origin**. Based on its name (and how it appears on the screen) which bone acts as its **insertion**? ________________________

62. Identify the muscle just medial to **OMOHYOID**. _______________________

63. **OMOHYOID** and the muscle named in # 57 are synergists. What is the action of the **OMOHYOID**? ________________________________

64. **Remove** the **Structure list** from the screen by hitting “**Ctrl**” key and “**L**” key once.

65. Locate the **ANTERIOR SCALENE** by using **Find** Make sure **ANTERIOR SCALENE** is highlighted in the **Find results box**. The **origin** for all the scalene muscles is the cervical vertebrae.

66. Move the **Find** and **Find Results boxes away** from the picture. Remember to **close** each of these **boxes** when they are **not needed**.

67. Which rib acts as the **insertion** for the anterior scalene? _____________________________ **Click** on it for identification.

68. **Click** on **View**. **Click** on **Lateral View**.

69. Again locate the **ANTERIOR SCALENE** by using **Find** Make sure **ANTERIOR SCALENE** is highlighted in the **Find results box**. The **origin** for all the scalene muscles is the cervical vertebrae.

70. Note the appearance and location of the muscle. _________________________________

71. Locate the **MIDDLE SCALENE** by using **Find**. Make sure **MIDDLE SCALENE** is highlighted in the **Find results box**. You may need to center the picture.

72. Move the **Find** and **Find Results boxes away** from the picture. Remember to **close** each of these **boxes** when they are **not needed**.

73. Which rib acts as its **insertion**? _________________________________ **Click** on it for identification.

74. **Click** on **View**. **Click** on **Anterior**.

75. Again locate the **MIDDLE SCALENE** by using **Find**. Make sure **MIDDLE SCALENE** is highlighted in the **Find results box**. You may need to center the picture.
76. Note the origin for all the SCALENES. Where specifically on the cervical vertebrae do the SCALENES insert? ___________________________ Click on it for identification.

77. The POSTERIOR SCALENE is the third scalene muscle. Its insertion is to the first and second rib.

78. When the SCALENE muscles contract what do they do to the position of the ribs? ___________________________

79. These muscles are involved in the process of inspiration (breathing in). You use the SCALENES to take a deep breath.

80. Which 2 muscles have been removed so you see can the SCALENE muscles? If you are not sure look in the structure list or ask your instructor. ______________________ and ______________________

81. How would you go to a Posterior view? ___________________________ Please do it.

82. Use Find. to locate SPLENIUS. Make sure SPLENIUS muscle is highlighted in the Find results box.

83. Move the Find and Find Results boxes away from the picture. Remember to close each of these boxes when they are not needed.

84. The origin of the SPLENIUS muscle is the cervical and thoracic vertebrae. Its insertion is to what process of the temporal bone? Click on it to identify. You may need to center the muscle on the picture. ___________________________

85. What is the action of the head when this muscle contracts? ___________________________

86. The ERECTOR SPINAE is composed of three columns of muscles located along the vertebrae. Use Find or hit the Ctrl and F key once to locate one of these columns, the LONGISSIMUS THORACIS. Make sure LONGISSIMUS THORACIS is highlighted in the Find results box.

87. Move the Find and Find Results boxes away from the picture. Remember to close each of these boxes when they are not needed.
88. Click on the Zoom. Move the Magnifying lens with the “—” over the muscle and click once so to view the entire muscle.

89. How was this muscle named? _________________________________

90. What is the action of the ERECTOR SPINAES? __________________________

Hint! Look at its name.

91. Before going on to the next section, review the following muscles on A.D.A.M.:

   HEAD AND NECK MUSCLES
   FRONTALIS
   PLATYSMA
   OCCIPITALIS
   STERNOCLEIDOMASTOID
   ZYGOMATIC
   STERNOHYOID
   DIGASTRIC
   SCALENES
   MYLOHYOID
   SLENIUS
   ORBICULARIS ORIS
   ERECTOR SPINAES(LONGISSIMUS THORACIS)
   ORBICULARIS OCULI
   BUCCINATOR
   TEMPORALIS
   MASSETER
   OMOHYOID

92. Review the HEAD and NECK MUSCLES in IRC available at the desk.
MUSCLES OF THE CHEST AND ABDOMEN

1. Click on the View button Make sure Anterior is on.

2. Bring the Structure list back onto the screen,

3. Locate and Double click the PECTORALIS MAJOR muscle on the Structure list.

4. Click on the Zoom Button and move the magnifying lens with the "—" over the PECTORALIS MAJOR muscle and click once.

5. You should be able to see the entire muscle. Center the picture if necessary.

6. What region of the body does it cover?

7. Click on the Zoom Button and place the magnifying lens with the "+" over the muscle and click once. If needed move the picture so either the left or right PECTORALIS MAJOR is in the center of the screen.

8. Its insertion is to what arm bone? Click on the bone to which the white tendon attaches to verify your answer.

9. When the PECTORALIS MAJOR contracts, does it rotate the arm medially or laterally?

10. What number is on the Depth button?

11. Locate and Double click PECTORALIS MINOR muscle on the Structure list.

12. What number is on the Depth button?

13. Describe its position relative to the PECTORALIS MAJOR.

14. Compare the size of this muscle to the PECTORALIS MAJOR. How did it get its name?

15. Locate and Double click SERRATUS ANTERIOR muscle on the Structure list.
The word “serratus” means saw. The anterior part of this muscle looks like the teeth of a saw. What 2 muscles have been removed so that the SERRATUS is visible? __________________________ and __________________________.

16. This muscle’s origin is on the anterior chest. What bones are the origins for this muscle? ______________________________

17. This muscle inserts on the scapula. How will the scapula move when this muscle contracts? ____________________________

18. Remove the Structure list from the screen.

19. Use Find or hit the Ctrl and F key once to locate the EXTERNAL INTERCOSTAL muscle. Make sure EXTERNAL INTERCOSTAL is highlighted in the Find results box.

20. Move the Find and Find Results boxes away from the picture. Remember to close each of these boxes when they are not needed.

21. Where are these muscles located? ________________________________

22. How did these muscles get their name? ________________________________

23. Identify the structures that act as its origin and insertion? __________________________

24. Click on the Zoom Button and move the Magnifying lens with the “+” over the EXTERNAL INTERCOSTAL and click once.

25. Draw the direction of the muscle fibers in the EXTERNAL INTERCOSTAL. __________________________

26. Use Find to locate INTERNAL INTERCOSTAL muscle. Make sure INTERNAL INTERCOSTAL muscle is highlighted in the Find results box.

27. Move the Find and Find Results boxes away from the picture. Remember to close each of these boxes when they are not needed.

28. How are these muscles named? ________________________________

29. Draw the direction of the muscle fibers found in the INTERNAL INTERCOSTAL muscle. ________________________________
30. Compare the direction of muscle fibers found in the EXTERNAL AND INTERNAL INTERCOSTALS. ____________________________

31. What do the INTERNAL INTERCOSTALS have in common with the EXTERNAL INTERCOSTAL muscles? ____________________________

32. Compare the actions of the EXTERNAL AND INTERNAL INTERCOSTAL MUSCLES. If you don’t know their actions, check in your textbook. ____________________________

33. Click on Zoom and move the magnifying lens with the “—” anywhere on the picture and click once. Center the picture.

34. Use Find or hit Ctrl and F key once to locate the muscle that separates the thoracic cavity from the abdominal cavity. You should remember this from the lab on body cavities. If you can’t remember, look it up. Make sure the proper word is highlighted in the Find results box.

35. Move the Find and Find Results boxes away from the picture. Remember to close each of these boxes when they are not needed.

36. Which muscle did you type in? ____________________________

37. The External Intercostals, Internal Intercostals and Diaphragm are all involved in the process of ____________________________.

38. Bring the Structure list back onto the screen. (“Ctrl” key and “L” key once)

39. Locate and Double click EXTERNAL ABDOMINAL OBLIQUE muscle on the Structure list. Center the muscle on the screen.

40. Draw the direction of the muscle fibers. ____________________________

41. Why is the name oblique given to this muscle? ____________________________

42. The origin of this muscle are the lower eight ribs. The insertion of this muscle is to the linea alba. If you are not sure what this is please ask.

43. To locate the linea alba, click in the middle of the abdominal region right above the belly button.
44. Click back on the EXTERNAL ABDOMINAL OBLIQUE muscle in the picture to highlight it in red.

45. Identify the structure that connects the muscle to the linea alba. Click on the large white area. (If you are not sure about this term the book is a good place to look.)

46. Click again on the EXTERNAL ABDOMINAL OBLIQUE muscle in the picture.

47. What is the number of the Depth button? ________________

48. When these muscles contract what will they do to the abdomen?
________________________

49. When these muscles contract what will the vertebral column do?
________________________

50. Locate and Double click the INTERNAL ABDOMINAL OBLIQUE muscle on the Structure list.

51. What is the number of the Depth button? ________________

52. Draw the direction of the muscle fibers. ________________

53. How do the muscle fibers of this muscle differ from the EXTERNAL ABDOMINAL OBLIQUE?
__________________________________________________________

54. The insertion of this muscle is the same as the EXTERNAL ABDOMINAL OBLIQUE. What do you expect the function of this muscle to be?
__________________________________________________________

55. Locate and Double click the TRANSVERSUS ABDOMINIS muscle on the Structure list. Center the picture.

56. Draw the direction of the muscle fibers. ________________

57. How did this muscle get its name?
__________________________________________________________

58. What is the number of the Depth button? ________________
59. Which 2 muscles have been removed so you can see this muscle? _______________________________ and _______________________________

60. When this muscle contracts what will it do to the abdomen? _______________________________

61. Going from superficial to deep list the INTERNAL ABDOMINAL OBLIQUE, TRANSVERSUS ABDOMINIS, AND EXTERNAL ABDOMINAL OBLIQUE. __________________________________________
______________________________________________
______________________________________________

62. Locate and Double click the RECTUS ABDOMINIS muscle on the Structure list.

63. Click on the Zoom Button and move the magnifying lens with the + over the muscle and Click once.

64. Describe the direction of the muscle fibers relative to the midline?
______________________________________________

65. Click on the Zoom Button and move the magnifying lens with the — over the muscle and Click once.

66. Identify the muscle pictured that is inferior to the ribs and lateral to the RECTUS ABDOMINIS. __________________________________________

67. Name two other sets of muscles (not shown at this depth) that are also lateral to the RECTUS ABDOMINIS? _______________________________ and _______________________________

68. Click back on the RECTUS ABDOMINIS in the picture.

69. Click on the Zoom Button and move the magnifying lens with the “+” over the superior part of the muscle and Click once.

70. Which part of the sternum acts as its insertion? _______________________________

71. Identify the other structures that also act as part of its insertion. _______________________________
72. The pubic symphysis acts as the origin of the Rectus abdominis. When the RECTUS ABDOMINIS contracts what does it do to the rib? ____________________________

73. When this muscle contracts what does it do to the vertebral column?
____________________________

74. Which three muscles are synergists of the Rectus abdominis? __________________________
______________________________, and _______________________________
75. Before going on to the next section, review the following muscles on A.D.A.M.

CHEST AND ABDOMINAL MUSCLES

PECTORALIS MAJOR
PECTORALIS MINOR
SERRATUS ANTERIOR
EXTERNAL INTERCOSTALS
INTERNAL INTERCOSTALS
DIAPHRAGM
EXTERNAL ABDOMINAL OBLIQUE
INTERNAL ABDOMINAL OBLIQUE
SERRATUS ANTERIOR
TRANSVERSUS ABDOMINIS
RECTUS ABDOMINIS

75. Review the CHEST and ABDOMINAL MUSCLES in IRC available at the desk.
HUMAN MUSCLE IDENTIFICATION AND REVIEW
PART 2

A. OBJECTIVES
1. Learning more of the basic operations of A.D.A.M. SOFTWARE
2. Learning more human muscles

B. GETTING INTO THE A.D.A.M. PROGRAM

1. Double click the A.D.A.M. Interactive icon.

2. The A.D.A.M. Interactive Anatomy screen will appear. Click on Dissectible Anatomy. Be patient, it will take a few seconds to work.

3. You should see on the screen a small man in a preview box. At the top of the box Dissectible Anatomy should be surrounded by a dotted line rectangle. If not click once on the words Dissectible Anatomy.

4. Under Gender make sure the button for male is on. When this button is activated or on, a black dot will be seen in the middle of the white circle next to the word. If this button is not on, click on it once.

MUSCLES OF THE SHOULDER AND BACK

1. Click on the View button. Make sure Anterior is on.

2. Locate and Double click DELTOID muscle on the Structure list. You may have to move the picture to the left or right to see this muscle.

3. Can you identify the bone that is one of the origins of this muscle? If not, click on it to identify this bone. _______________________

4. Click back on the Deltoid muscle so it is highlighted in red.

5. Click on Posterior view to see this muscle from the back. The posterior origin of this muscle is the scapulae.

6. Which arm bone acts as its insertion? ________________________.
7. What is the specific area on this bone where the **DELTOID** inserts?  
________________________________________________________

8. What will the arm do when this muscle contracts? ____________________________

9. Locate and **Double click TRAPEZIUS** muscle on the **Structure list**.

10. How is this muscle named? ____________________________

11. The **origin** of the **TRAPEZIUS** is the occipital bone and the thoracic vertebrae.

12. From this view identify the **posterior insertion** of the **Trapezius**.  
_________________________________________________________(Click on the bone if you don't know) The **anterior insertion** is the clavicle.

13. What is the action of the **TRAPEZIUS**? ____________________________

14. Locate and **Double click LATISSIMUS DORSI** muscle on the **Structure list**. You may need to move the picture up.

15. Notice the extensive fasciae that attach this muscle to the vertebrae.

16. **Click** on **Anterior view**.

17. Locate and again **Double click LATISSIMUS DORSI** on the **Structure list**. The muscle will be visible along the lateral thorax. Note the tendon that attaches this muscle to its **insertion**. Move the picture so you can see the arm. What bone will this muscle move?  
________________________________________________________

18. **Click** on **Posterior view**.

19. Locate and **Double click LATISSIMUS DORSI** on the **Structure list**.

20. Look at the group of muscles superior to the **LATISSIMUS DORSI**. These muscles are associated with the scapula and move the shoulder and arm.

21. **Click** on the **Zoom Button** and **move the magnifying lens with the + over the shoulder region** and **Click once**.

22. Center the picture and bring the Acromion process so it is at the top of the screen.
23. Locate the scapular spine. Can you name the muscle located superior to this spine? If not, click on it for identification. _________________________________

24. Can you name the muscle located inferior to the scapular spine? If not, click on it for identification. _________________________________

25. Look at the muscle inferior and lateral to INFRASPINATUS. Click on this muscle for identification. ________________________________.

26. Look at the muscle inferior to TERES MINOR. Click on it for identification.

27. You can see the tendons for the insertions of INFRASPINATUS and TERES MINOR on the humerus. Considering the locations of these insertions, what do you think the action of these muscles is? _________________________________(Check your answer in your textbook)

28. Adjust the picture so vertebral column is in the middle of the screen.

29. Click on the group of muscles between the two scapulae. Identify them. You may refer to the entire group simply as RHOMBOIDS

30. Before going on, review the locations, anterior and posterior, of the following muscles:

SHOULDER AND ARM MUSCLES

DELTÖID
TERES MAJOR
TRAPEZIUS
TERES MINOR
LATISSIMUS DORSI
RHOMBOIDS
SUPRASPINATUS
INFRASPINATUS

31. Review the SHOULDER AND ARM MUSCLES in IRC available at the desk.

32. Remove the Structure list from the screen.
33. Use the **Find button** to locate the **LEVATOR SCAPULAE muscle**. Make sure **LEVATOR SCAPULAE** is highlighted in the **Find results box**.

34. **Click** on the **Zoom Button** and **move the magnifying lens with the “—“ over the picture and Click once**.

35. **Move the Find and Find Results boxes away** from the picture. Remember to **close each of these boxes when they are not needed**

36. Its **origin** is the cervical vertebrae. What is its insertion? _______________________

37. From its name what do you conclude is the action of the **LEVATOR SCAPULAE**? ________________________________________________

38. How was this muscle named? ________________________________

39. **Bring the Structure list** back onto the screen. (‘Ctrl “key and ‘L” key once)

40. Locate and **Double click TRICEPS BRACHII muscle on the Structure list**.

41. Move the picture so that either the left or right muscle is fully visible. You should still be on **Posterior view**.

42. How was the **TRICEPS BRACHII** named? ________________________________

43. How many **heads or origins** will this muscle have? __________________________

44. What bone serves as its **insertion**? ________________________________

45. You can see two of its heads in this view at the superior end of the muscle. **Click on each tendon (white) to identify the heads.** ____________________________and ____________________________

46. What is the number on the **Depth button**? ___________

47. What bones act as the **origins** for the two heads? ______________________ and ______________________

48. Locate and **Double click** the **MEDIAL HEAD OF THE TRICEPS** muscle on the Structure list.

49. What is the number on the **Depth button**? ___________
50. Which of the heads of the **TRICEPS BRACHII** is deep? ___________________

51. Since this muscle **inserts** on the ulna, what is its action? ___________________________ (Check your answer in your textbook)

52. **Click** on Anterior view.

53. Locate and **Double click** the **BICEPS BRACHII** muscle on the Structure list. Move the picture so the entire muscle can be seen.

54. How many **heads or origins** does this muscle have? ___________________________

55. **Click** on the Zoom Button and move the magnifying lens with the “+” over the **shoulder area** and **Click once**.

56. **Click** on the two tendons to see these **origins**. The short head is attached to which bone? ___________________________. The long head is attached to which bone? ___________________________

57. The **Depth button** should read **81**

58. **Click** on the Zoom Button and move the magnifying lens with the — over the **muscle** and **click once**.

59. Move the picture up to locate the tendon (white). Which bone is the insertion site? ___________________________

60. Move the **DEPTH button** so it reads **82** so to remove the **BICEPS BRACHII**.

61. **Click** on the muscle deep to the **BICEPS BRACHII** and identify it ___________________________

62. Note the **origin** of this muscle on the humerus and its **insertion** to the other forearm bone.

63. What is the action for this muscle and the **BICEPS BRACHII**? ___________________________
64. Since these muscles have **similar origins and insertions**, they have the same action. What is the name for muscles that have the same action and assist the prime mover?

65. Locate and **Double click BRACHIORADIALIS** on the Structure list. Since this muscle also crosses the elbow joint in a similar way to the **BICEPS BRACHII** and **BRACHIALIS**, deep to the **BICEPS BRACHII**, will it have a similar action?

66. This muscle also rotates the radius to pronate the hand. Explain how its **insertion** on the distal radius makes this movement possible.

67. How is the **BRACHIORADIALIS** named?

68. The forearm muscles that cause wrist movement and move the fingers taper to long insertion tendons. Locate and **Double click FLEXOR DIGITORUM PROFUNDUS** on the Structure list.

69. What is the number on the **DEPTH Button**?

70. Do not remove the Structure list from the screen, simply move it out of the way.

71. **Click** on the **Zoom Button** and **move the magnifying lens with the + over** the carpal region and **click once**.

72. **Click** on any of the four long white tendons of this muscle. Which bones act as the insertion for these tendons? (You may need to move the picture)

73. Based on the name of this muscle when it contracts what is the action to the fingers?

74. Notice all the tendons of this muscle crowd together in the wrist and then pass into the fingers. A “wrist band” the **FLEXOR RETINACULUM**, a broad sheet of fibrous connective tissue, keeps these tendons from jumping out when tensed. Locate and **Double click FLEXOR RETINACULUM** on the Structure list.

75. What is the number on the **DEPTH button**?

76. Are the tendons of the **FLEXOR DIGITORUM PROFUNDUS** deep or superficial to the “wrist band”?
77. Click on and identify the large white tulip shaped structure posterior to the **FLEXOR RETINACULUM**. This structure helps reduce friction as the tendons move back and forth through the “wrist band”.

78. Click on and identify the small three pronged structures (a nerve) just below the “wrist band”.

79. Click on and identify **Median nerve** on the Structure list so you can see more of the nerve highlighted.

80. What three different structures pass through the “wrist band” which forms the anterior part of a tunnel in the carpal region?

81 Due to overuse and inflammation, the tendons of the **FLEXOR DIGITORUM PROFUNDUS** swell, compress the median nerve and the person suffers from Carpal Tunnel Syndrome.

82 Before going on review these muscles from anterior and posterior views.

**ARM AND HAND MUSCLES**

**LEVATOR SCAPULA**
**TRICEPS BRACHII, LONG, LATERAL AND MEDIAL HEADS**
**BICEPS BRACHII, LONG AND SHORT HEADS**
**BRACHIALIS**
**BRACHIORADIALIS**
**FLEXOR DIGITORUM PROFUNDUS**

83. Review the **ARM AND HAND MUSCLES** in IRC available at the desk.
MUSCLES OF THE HIP, THIGH AND LEG

1. Click on Posterior view.

2. Locate and Double click GLUTEUS MAXIMUS muscle on the Structure list. Center the entire muscle on the screen.

3. Note that the muscle’s origin is the ilium and its insertion is the femur. Knowing this, what is the muscle’s action? ________________________________. Hint! Think about its position.

4. Click on the muscle that is visible slightly superior and lateral to the GLUTEUS MAXIMUS. Identify this muscle. ________________________________.

5. Double click it in the Structure list to view it in its entirety.

6. Move the Depth button so it reads 108.

7. You should now see the GLUTEUS MINIMUS. Click on it to verify its identification.

8. Locate and Double click PIRIFORMIS muscle on the Structure list.

9. Notice its origin on the sacrum and its insertion on the femur. When this muscle contracts what is its action to the thigh? ________________________________. Which muscle acts as a synergist? ________________________________

10. The sciatic nerve, the largest nerve in the body, is directly posterior to this muscle. Locate and Double click SCIATIC NERVE on the Structure list.

11. Click on Anterior view.

12. Locate and Double click the PSOAS MAJOR muscle on the Structure list. A butcher would refer to this muscle as the tenderloin.

13. Notice its origin on the vertebral column. Which leg bone acts as its insertion? ________________________________. When this muscle contracts what is its action to the hip? ________________________________

14. Click on Posterior view.
15. Locate and **Double click** GRACILIS muscle on the **Structure list**. Move the picture up to better view the muscle. Remember you are viewing this muscle from the back (posterior view) so it appears as a very narrow muscle on the medial thigh. Considering its position, when it contracts, will the thigh be abducted or adducted? ______________

16. Look at the other posterior thigh muscles. **Click** on the muscle immediately lateral to the upper part of the GRACILIS. **Identify** this muscle. ______________

17. This muscle and the GRACILIS have similar locations on the inner thigh, what is their action? ______________

18. As you move laterally, **click** on each muscle to **identify** it. The one lateral to the Adductor magnus is ____________________________, next is ____________________________, and the third one is ____________________________These three muscles are the **HAMSTRINGS**. 

19. These hamstrings have their **origin** on the ischium and their **insertion** on the tibia, what is their combined action? ____________________________.

20. Would the term synergists apply here? _________ Explain. ____________________________

21. Note that the most lateral hamstring is the **long head** of the BICEPS FEMORIS.

22. **Click** on **short head** of the BICEPS FEMORIS on the **Structure List**. How was this muscle named? ____________________________

23. The most lateral thigh muscle that you can see in this posterior view is the **VASTUS LATERALIS**. **Click** on it to **identify** it. It is part of the anterior thigh muscles known as the **QUADRICEPS**.

24. Move the picture so that the calf of the leg is visible. The large calf muscle is the _____________________________. **Click** on the muscle on the picture to verify its identity.

25. This muscle is superficial to another calf muscle. You can see this deeper muscle on either side of the GASTROCNEMIUS.
26. Locate and **Double click SOLEUS** muscle on the **Structure list** to see the muscle in its entirety.

27. Note the Achilles or Calcaneal Tendon, which attaches both of these muscles (**GASTROCNEMIUS** and **SOLEUS**), to the calcaneus. Since the calcaneus is the **insertion**, what is the action of these muscles? ______________________________

28. **Click** on **Anterior** to turn the picture around.

29. Locate and **Double click SARTORIUS** muscle on the **Structure list**. Center the muscle on the screen.

30. Note that the **SARTORIUS** muscle **originates** on the ilium and **inserts** on the medial __________________. This muscle allows you to cross your legs. It is known as the “Tailor’s muscle”.

31. Notice the three muscles lateral and inferior to the **SARTORIUS**. You can see three of the four quadriceps muscles.

32. **Click** on the central one, **RECTUS FEMORIS**, which means "straight on the femur". The muscles medial and lateral to the **RECTUS FEMORIS** are large (vastus).

33. **Click** on the muscle medial to the **RECTUS FEMORIS**. **Identify** it. ______________________________

34. **Click** on the muscle lateral to the **RECTUS FEMORIS**. **Identify** it. ______________________________

35. The number on the **Depth button** for all three of the **QUADRICEPS** is **187**.

36. Locate and **Double click VASTUS INTERMEDIUS** muscle on the **Structure list**. This is the fourth quadriceps muscle.

37. What is the position of this muscle to the other **QUADRICEP** muscles? ______________________________ How do you know? ______________________________

38. Locate and **Double click ADDUCTOR LONGUS** muscle on the **Structure list**. Will this muscle move the thigh away from the midline or bring the thigh back to the midline? (Hint! Look at its name.) ______________________________
39. Click on the muscle medial to ADDUCTOR LONGUS. Identify it. _______________________________________.

40. Click on the muscle superior to ADDUCTOR LONGUS. Identify it. _______________________________________.

41. Click on the muscle superior to the ADDUCTOR BREVIS. Identify it. _______________________________________.

42. Locate and Double click TENSOR FASCIAE LATAE muscle on the Structure list. After viewing this muscle from the anterior, click on the lateral view.

43. Again locate and Double click TENSOR FASCIAE LATAE muscle on the Structure list.

44. Notice the white fascia lata that extends posterior from the muscle. Locate and Double click ILIOTIBIAL TRACT on the Structure list.

45. The fascia lata forms part of the ILIOTIBIAL TRACT. The ligaments of which other posterior muscle helps form the ILIOTIBIAL TRACT? _______________________________________.

46. Based on its name where does this TRACT start from and extend to? _______________________________________. Based on its location what might be its function? _______________________________________.

47. While looking at this lateral view, locate these muscles again in this view: GLUTEUS MAXIMUS, GLUTEUS MEDIUS, BICEPS FEMORIS, AND VASTUS LATERALIS. You can click on each one to verify its identification.

48. While still looking at this lateral view, move the screen to see the calf. Locate the TIBIALIS ANTERIOR. Click on it to highlight it. Look at the name of this muscle. How was it named? _______________________________________.

49. Move the picture to see the foot. Which muscles are responsible for this position? ___________________________ and ______________________. What action will TIBIALIS ANTERIOR have on the position of the foot? ______________________

50. Before exiting the program, review the following muscles in anterior, posterior and lateral views:
HIP, THIGH, AND LEG MUSCLES

GLUTEUS MAXIMUS, MEDIUS AND MINIMUS
PIRIFORMIS
PSOSAS MAJOR
GRACILIS
ADDUCTOR LONGUS, MAGNUS, BREVIS
PECTINEUS
SEMIMEMBRANOSUS
SEMITENDINOSUS
BICEPS FEMORIS
VASTUS LATERALIS, MEDIALIS, INTERMEDIUS
RECTUS FEMORIS
TENSOR FASCIAE LATAE
SARTORIUS
GASTROCNEMIUS
SOLEUS
TIBIALIS ANTERIOR

51. Review the HIP, THIGH AND LEG MUSCLES in IRC available at the desk.
E. QUITTING THE A.D.A.M. PROGRAM

1. To quit the program, go to File, in the top, left corner of the screen. Click on Exit. You may exit the program at any time.

2. Click on Start in the bottom left corner of the screen.

3. Click on Shut Down
Origin, Insertion and Actions of Muscles

Locate these muscles in the A.D.A.M program in conjunction with the A.D.A.M handout. Write the Origin (O), insertion (I) and action (A) for the muscles with these letters on the list. Limit the origins and insertions to the name of the bone unless otherwise indicated by your instructor or used in the ADAM muscle program. For any muscles without a letter just know its location. Know the antagonist and synergist for the muscles mentioned in the ADAM program. For example, which muscle acts as an antagonist to digastric and mylohyoid?

Learn how muscles get their name, for example, how orbicularis oculi or temporalis get their name?


1. Epicranial Muscles

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2. Frontalis

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5. Occipitalis

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6. Orbicularis oculi

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7. Zygomaticus

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8. Buccinator (deep)

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9. Temporals

10. Masseter

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11. Digastric (both bellies)

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12. Mylohyoid

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13. Orbicularis oris

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14. Platysma

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15. Sternocleidomastoid

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16. Sternohyoid

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15. Omohyoid (2 bellies)

16. Scalanes group

   a) Anterior

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   b) Posterior

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c) Middle

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17. Splenius (deep)

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18. Longissimus thoracis (erector spinae)

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1. Pectoralis major

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2. Pectoralis minor (deep)
3. Serratus anterior

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4. External intercostals (deep)

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5. Internal intercostals (deep)

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6. Diaphragm (deep)

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7. External oblique

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8. Internal oblique (deep)

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9. Transversus abdominis (deep)

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10. Rectus abdominis

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C. Shoulder muscles (AH p. 228-231) (TD p. 360-365)

1. Deltoid

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2. Trapezius

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3. Latissimus dorsi

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4. Supraspinatus (deep)

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5. Infraspinatus
6. Teres major

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7. Teres minor (deep)

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8. Rhomboids (deep)

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**D. Arms and Hand Muscles** (AH p.233-239) (TD p.366-377))

1. Levator scapulae (Deep)

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2. Triceps brachii lateral head

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3. Triceps brachii long head

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4. Triceps brachii medial head

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5. Biceps brachii long head

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6. Biceps brachii short head

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7. Brachialis

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8. Brachioradialis

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9. Flexor digitorum profundus

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10. Flexor retinaculum

11. Median nerve

E. Hip Thigh and Leg Muscles (AH p.240-246) (TD p.384-394)

1. Gluteus maximus

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2. Gluteus medius

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3. Gluteus minimus

4. Piriformis

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5. Psoas major

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6. Gracilis

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7. Adductor longus

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8. Adductor magnus

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9. Adductor brevis

10. Pectineus

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11. Hamstrings

1. Biceps femoris

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2. Semitendinosus

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3. Semimembranosus

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12. Quadriceps

a. Vastus lateralis

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b. Vastus medialis

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c. Rectus femoris

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d. Vastus intermedius

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13. Gastrocnemius

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14. Soleus

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15. Sartorius

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16. Tensor fascia latae

17. Tibialis anterior

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Muscles on Torso and Models

Locate these muscles on selected models and torsos.

A. Head and Neck
   1. Buccinator
   2. Digastric
   3. Frontalis
   4. Levator scapulae
   5. Masseter
   6. Occipitalis
   7. Orbicularis oculi
   8. Orbicularis oris
   9. Scalenes
   10. Splenius
   11. Sternocleidomastoid
   12. Temporalis
   13. Zygomaticus
   14. Digastric (2 heads)
   15. Mylohyoid

B. Leg
   1. Adductor brevis
   2. Adductor longus
   3. Adductor magnus
   4. Biceps femoris short head
   5. Biceps femoris Long head
   6. Gastrocnemius
   7. Gluteus minimus
   8. Gluteus medius
9. Gluteus maximus
10. Gracilis
11. Iliotibial tract
12. Piriformis
13. Rectus femoris
14. Sartorius
15. Semimembranosus
16. Semitendinosus
17. Soleus
18. Tensor fascia lata
19. Tibialis anterior
20. Vastus intermedius
21. Vastus lateralis
22. Vastus medialis

C. Arm and Shoulder
1. Biceps brachii long head
2. Biceps brachii short head
3. Brachialis
4. Brachioradialis
5. Deltoid
6. Infraspinatus
7. Subscapularis
8. Supraspinatus
9. Teres major
10. Teres minor
11. Triceps brachii lateral head
12. Triceps brachii long head
13. Triceps brachii medial head
D. Back and Chest

1. External intercostals
2. External oblique
3. Internal intercostals
4. Latissimus dorsi
5. Pectoralis major
6. Pectoralis minor
7. Rectus abdominis
8. Serratus anterior
9. Serratus posterior
10. Transversus abdominis
11. Trapezius
Locate these muscles on the body builder boards.

A. Adductor longus
B. Adductor magnus
C. Biceps brachii
D. Biceps femoris
E. Brachialis
F. Brachioradialis
G. Deltoid
H. External oblique
I. Frontalis
J. Gastrocnemius
K. Gluteus maximus
L. Gluteus medius
M. Gracilis
N. Infraspinatus
O. Latissimus dorsi
P. Masseter
Q. Orbicularis oculi
R. Orbicularis oris
S. Pectineus
T. Pectoralis major
U. Platysma
V. Rectus abdominus
W. Rectus femoris
X. Sartorius
Y. Semimembranosus
Z. Semitendinosus
AA. Serratus ventralis
BB. Sternocephalomastoid
CC. Sternohyoid
DD. Soleus
EE. Tensor fasciae latae
FF. Teres major
GG. Tibialis anterior
HH. Trapezius
II. Triceps brachii, lateral head
JJ. Triceps brachii, long head
KK. Vastus lateralis
LL. Vastus medialis
MM. Zygomaticus
REQUIRED ADAM MUSCLES

A. Head and Neck
   1. Buccinator
   2. Digastric (both bellies)
   3. Epicranial Muscles
   4. logisssimus thoracis (erector spinae)
   5. Masseter
   6. Mylohyoid
   7. Omohyoid (2 bellies)
   8. Orbicularis oculi
   9. orbicullaris oris
   10. Platysma
   11. scalanes group
       a. anterior
       b. posterior
       c. middle
   12. splenius
   13. sternocleidomastoid
   14. sternohyoid
   15. Temporalis
   16. Zygomatic
   17. Occipitalis
   18. Frontalis
   19. Temporalis

B. Chest and Abdomen
   12. Diaphragm
   13. External intercostals
   14. External oblique
15. Internal intercostals
16. Internal oblique
17. Pectoralis minor
18. Pectoralis major
19. Rectus abdominis
20. Serratus anterior
21. Transverses abdominis

C. Shoulders and Arms
1. Deltoid
2. Trapezius
3. Latissimus dorsi
4. Supraspinatus
5. Infraspinatus
6. Teres major
7. Teres minor
8. Rhomboideus

D. Arms and Hand Muscles
1. Biceps brachii long head
2. Biceps brachii short head
3. Brachialis
4. Brachioradialis
5. Flexor digitorum profundus
6. Levator scapulae
7. Triceps brachii lateral head
8. Triceps brachii long head
9. Triceps brachii medial head
10. Flexor retinaculum
11. Median nerve

**E. Hip Thigh and Leg Muscles**

1. Adductor brevis
2. Adductor longus
3. Adductor magnus
4. Biceps femoris (2 heads)
5. Gastrocnemius
6. Gluteus maximus
7. Gluteus medius
8. Gluteus minimis
9. Gracilis
10. Pectineus
11. Piriformis
12. Psoas major
13. Rectus femoris
14. Sartorius
15. Semimembranosus
16. Semitendinosus
17. Soleus
18. Tensor fascia lata
19. Tibialis anterior
20. Vastus intermedius
21. Vastus lateralis
22. Vastus medialis
NERVOUS SYSTEM

NEURON & NERVOUS TISSUE

A. Neuron

1. Cell body or perikaryon

3. Neurofibrils

4. Nissl bodies

5. Nucleus of neuron

6. Nucleolus

7. Mitochondria

8. Axon hillock (trigger area/zone)

9. Dendrite

10. Axon

12. Neurolemma

13. Schwann cell

14. Nucleus of Schwann cell

15. Myelin sheath

16. Node of Ranvier

17. Synaptic end bulbs
18. Axon terminals (telodendria)

19. Axolemma

20. Axoplasm

21. Motor (efferent) neurons
A. Whole Brain Model - (TD p.482, 492) (AH p.322, 329)

1. Gyrus
   a. Postcentral
   b. Precentral

2. Fissures & Sulci
   a. Longitudinal Fissure
   b. Fissure of Sylvius (Central Sulcus)
   c. Fissure of Rolando (Lateral Sulcus)
   d. Transverse fissure

3. Cerebrum
   a. Frontal lobe
   b. Parietal lobes
   c. Temporal lobes
   d. Occipital lobe

4. Cerebellum

5. Pituitary gland
7. Mammillary body
8. Pons
9. Medulla
10. Midbrain
   a. Cerebral Peduncles of midbrain
11. Olfactory bulb
12. Olfactory tract
13. Optic nerve
14. Optic tract
15. Optic chaisma
16. Oculomotor nerve
17. Trigeminal nerve

B. Sagittal Brain – Model (TD p.479) (AH p.320)
   1. Corpus callosum
   2. Choroid plexus
   3. Lateral ventricles
   4. Fourth ventricle
   5. Cerebral aqueduct
   6. Anterior commissure
   7. Thalamus
   8. Intermediate mass of thalamus
   8. Pineal gland
9. Hypothalamus
10. Fornix
12. Midbrain
   a. Corpora quadrigemina
      (1) Superior colliculi
      (2) Inferior colliculi
   b. Cerebral peduncles
13. Pons
14. Medulla oblongata
15. Cerebellum
   a. Arbor vitae
   b. Vermis
   c. Anterior & posterior lobes

C. Ventricle Model (TD p.478) (AH p.334-335)
1. Lateral ventricles (1\textsuperscript{st} & 2\textsuperscript{nd})
2. Third ventricle
3. Interventricular foramen
4. Cerebral aqueduct
5. Fourth ventricle
6. Intermediate mass (hole)
7. Choroid plexus
D. Brain Stem Model (TD p.484)

1. Pineal gland
2. Corpora quadrigemina
3. Thalamus/intermediate mass
4. Cerebral peduncles
5. 4th ventricle
6. Cerebral aqueduct
7. Choroid plexus
8. Pons
9. Medulla oblongata
10. Hypothalamus
11. Cranial nerve II - Optic
12. Cranial nerve III - Oculomotor
13. Cranial nerve V - Trigeminal
14. Fornix

E. Cranial Nerves (AH Ex. 21 p. 347 - 354)

1. Olfactory nerve fibers (I) [oh]
2. Optic (II) nerve [oh]
3. Oculomotor (III) nerve [oh]
4. Trigeminal(V) nerve [touch]
DISSECTION REQUIREMENTS

The brain dissection is required for lab. Students should work in pairs. Students should bring their dissection kit to the lab.

F. Whole sheep brain – Dorsal and ventral view (AH p.337)

1. Cerebrum
2. Cerebellum
3. Gyri and Sulci
5. Longitudinal fissure
6. Transverse fissure
8. Frontal, parietal, temporal, occipital lobes
9. Olfactory bulb
10. Olfactory tract
10. Optic nerve
11. Optic tract
12. Optic chiasma
13. Infundibulum
14. Mammillary body
15. Pituitary gland
16. Cerebral peduncles
17. Pons
18. Medulla oblongata
19. Spinal cord
20. Oculomotor nerve
21. Trigeminal nerve

G. Posterior view of the sheep brain (AH p. 338)

2. Corpora quadrigemina
   a. Superior colliculi
   b. Inferior colliculi

2. Pineal gland

I. Sheep Brain Dissection - Midsagittal cut through the longitudinal fissure of the brain (AH p.320-321, 325,338) (TD p.475)

1. Corpus callosum

2. Lateral ventricles

3. Fourth ventricle

4. Cerebral aqueduct

5. Thalamus / Intermediate Mass

6. Hypothalamus

7. Pineal gland

8. Fornix

9. Midbrain
   a. Corpora quadrigemina
      1) Superior colliculi
      2) Inferior colliculi
   ii. Cerebral peduncles
10. Pons

11. Medulla oblongata

12. Cerebellum
   b. Arbor vitae
   b. Vermis
   c. Anterior & posterior lobes

I. Frontal Section through the infundibulum of the sheep brain (AH p.327) (TD p.494)
   1. Gray matter of the cerebrum
   6. White matter of the cerebrum
   7. Lateral ventricles
   8. Third ventricle
   9. Corpus callosum
   10. Fornix
   11. Thalamus
   12. Hypothalamus
A. Spinal Cord Models (AH p.289-294)

1. Cervical enlargement
2. Lumbar enlargement
3. Conus medullaris
4. Cauda equina
5. Filum terminale
6. Meningeal layers
   a. Dura mater
   b. Arachnoid mater
   c. Pia mater (viewed also on dissection)
      [1] denticulate ligament – extension of pia mater
7. Meningeal Spaces
   a. Epidural
   b. Subdural
   c. Subarachnoid
8. Posterior median sulcus
9. Anterior median fissure
10. Posterior white column
11. Lateral white column
12. Anterior white column
13. Posterior gray horn
14. Lateral gray horn
15. Anterior gray horn
16. Gray commissure
17. Anterior white commissure
20. Central canal

B. Spinal Nerves (AH p.300-302) (TD p.446-447)

1. Organization and connective tissue coverings of a spinal nerve:
   a. Epineurium
   b. Perineurium
   c. Endoneurium
   d. Fascicle
2. Cervical (8)
3. Thoracic (12)
4. Lumbar (5)
5. Sacral (5)
6. Coccygeal (1)
8. Anterior (ventral root)
9. Posterior (dorsal root)
10. Dorsal root ganglion
11. Posterior (doral) rami
12. Anterior (ventral) rami
13. Rami communicantes
   a. sympathetic chain ganglia


1. Cervical (C1-C4 & contributions from C5)
   Phrenic nerve
2. Brachial (C5 – C8 and T1)
   a. Ulnar nerve
   b. Radial nerve
   c. Median nerve
3. Intercostal Nerves/Thoracic
   Thoracic nerves (T2 – T12)
4. Lumbar (L1-L4)
   Femoral nerve
5. Sacral (L4-L5 & S1-S4)
   Sciatic nerve

D. Spinal cord dissection (AH p.294) (TD p.441)

1. Dura mater
2. Pia mater
3. White matter
4. Gray matter
5. Anterior median fissure
6. Spinal nerves - rootlets
Laboratory Outline

Brain

1. Gyri

2. Sulci

3. Gray matter and white matter

4. Brain stem
   a. Medulla oblongata
   b. Pons
   c. Midbrain
      (1) cerebral peduncles
      (2) corpora quadrigemina
         (a) superior colliculi
         (b) inferior colliculi

5. Diencephalon
   a. Thalamus
      - intermediate mass
   b. Hypothalamus
      - Mammillary bodies
      - Pituitary gland (hypophysis)
        infundibulum
   c. Epithalamus
      - Pineal gland

6. cerebellum
   a. arbor vitae
   b. vermis
   c. lobes
7. **Cerebrum**
   a. longitudinal fissure
   b. transverse fissure
   c. lateral sulcus
   d. central sulcus
   e. hemispheres
   f. frontal lobes
      - precentral gyrus
   g. temporal lobes
   h. parietal lobes
      - postcentral gyrus
   i. occipital lobes
   j. cortex
   k. Cerebral nuclei (basal ganglia)
   l. White matter / tracts
      - Corpus callosum
      - fornix

8. **Ventricles and associated blood vessels**
   a. Lateral ventricles (2)
      - septum pellucidum
   b. Third ventricle
   c. Fourth ventricle
   d. Cerebral aqueduct or Aqueduct of Sylvius
   e. Choroid plexus
   f. Superior sagittal sinus
g. interventricular foramina

9. **Cranial nerves**

   a. Optic nerves (II)
      (1) optic chiasma
      (2) optic tracts

   b. Olfactory bulbs and nerves (I)

   c. Trigeminal nerves (V)

   d. Oculomotor nerves (III)

1. Lacrimal apparatus
   a. Lacrimal gland
   b. Lacrimal sac

2. Skeletal eye muscles
   a. Superior rectus muscle
   b. Inferior rectus
   c. Lateral rectus
   d. Medial rectus
   e. Superior & Inferior Oblique muscles

3. Fibrous tunic
   a. Sclera
   b. Cornea

4. Vascular tunic
   a. Choroid

   b. Ciliary body
      (1) Ciliary process
      (2) Ciliary muscle

   c. Ora serrata
d. Suspensory ligaments

e. Iris
   (1) Circular muscles
   (2) Radial muscles

5. Retina
   d. Pigmented layer
   e. Neural layer
      (1) Photoreceptor layer
      (2) Bipolar layer
      (3) Ganglion layer

   f. Macula lutea
      (1) Fovea centralis

   g. Optic disc (blind spot)

6. Optic nerve

7. Cornea

8. Pupil

9. Lens

10. Anterior cavity
    a. Anterior chamber
    b. Posterior chamber
    c. Aqueous humor

11. Vitreous Chamber
a. Vitreous humor

B. Eye Dissection (AH p.377)

1. Cornea
2. Sclera
3. Optic nerve
4. Pupil
5. Iris
6. Lens
7. Vitreous humor
8. Ciliary body
9. Ora serrata
10. Retina
11. Choroid
12. Optic disc
13. Rectus muscles
ANNOTATED LECTURE OUTLINE
REQUIRED MATERIAL
With Suggested Times
ANATOMY & PHYSIOLOGY I
COURSE LECTURE REQUIREMENTS

The following areas are required to be covered in the lecture portion of the course, except as noted.

I. Introduction of the Human Body (3 hours) (COMPLETED IN LAB)
   A. Introduction
      1. Definitions
         a. Anatomy
            (1) gross
            (2) microscopic
               i. cytology
               ii. histology
               iii. developmental
         2. Levels of Organization: chemical through organism
      3. Survey of Body Systems and their Structure and Function
      4. Homeostasis and Feedback Mechanisms: Brief Introduction
   B. Body Terms and Organization (1 to 1 ½ hours) (in lab)
      1. Anatomical Position
      2. Surface Anatomy
      3. Directional Terms
         a. superior/inferior
         b. medial/lateral
         c. proximal/distal
         d. anterior/posterior
         e. ventral/dorsal
         f. prone/supine
         g. superficial/deep
         h. cranial/caudal
      4. Anatomical Planes
         a. coronal (frontal)
         b. Sagittal
            (1) midsagittal
            (2) parasagittal
         c. transverse
         d. oblique
      5. Body Cavities
         a. Dorsal
            (1) cranial
            (2) spinal
         b. Ventral
            (1) thoracic
         c. Pleural
         d. Pericardial
         e. Mediastinal
            (1) abdominopelvic
      6. Abdominopelvic Regions
         a. Hypochondriac
         b. Epigastric
         c. Lumbar
         d. Hypogastric
         e. Iliac
II. Cellular Transport (3 hours)
A. Cell Membrane Structure and Function
1. Fluid Mosaic Model
   a. Phospholipids
   b. Proteins
      (1) integral
      (2) peripheral
   c. Cholesterol
   d. Pores (gates, channels)
   e. Semipermeability
   f. Charge on membrane (resting membrane potential)
2. Membrane Transport: General Characteristics (3 hours)
   a. Factors that Affect Movement Across Cell Membrane
      (1) size of molecule (molecular weight)
      (2) solubility in lipid
      (3) charge on ion or molecule and on the membrane
      (4) carrier molecules
3. Passive Transport Mechanisms
   a. Diffusion
      (1) simple
      (2) facilitated
      (3) filtration
      (4) dialysis
   b. Osmosis
      (1) osmotic pressure
      (2) solution, solute, solvent (definitions)
      (3) solutions: hypotonic, hypertonic, isotonic
4. Active Transport Mechanisms
   a. Sodium-Potassium Exchange Pump
   b. Endocytosis
      (1) phagocytosis
      (2) pinocytosis
      (3) receptor-mediated
      (4) cotransport, countertransport, syntransport
   c. Exocytosis
      (1) excretion
      (2) secretion

III. Tissue Level of Organization (3 hours)
A. Embryonic Tissues: Mesenchyme, Mucoid
B. Adult Tissues
   1. Epithelium
      a. General Characteristics and Functions
      b. Functions: Structural vs. Glandular Epithelium
      c. Types of Epithelium and Locations
         (1) simple: squamous, cuboidal, columnar, pseudostratified, ciliated; goblet cells
         (2) stratified: squamous, cuboidal, columnar
   2. Connective Tissue
      a. General Characteristics and Functions
Types and Locations
(1) loose: mucoid, mesenchyme, aereolar, reticular, adipose
(2) dense: regular, irregular
(3) specialized connective tissue: cartilage, bone, blood

Muscular Tissue: Skeletal, Smooth, Cardiac; Location and Function (covered with muscular system)

Nervous Tissue: Neurons, Neuroglia; Location and Function (covered with Nervous System).

Membranes
1. Definition and Classification as Organs
2. Definition and Location of each Type: Mucous, Serous, Synovial, and Cutaneous

IV. Integumentary System (3 hours)
A. Functions and Structure of the System
B. Skin Structure and Function
   1. Epidermis
   2. Dermis
   3. Hypodermis
C. Accessory Organs of the Skin
   1. Hair
   2. Nails
   3. Glands: Sudoriferous, Sebaceous, Ceruminous

V. Skeletal System (3 hours)
A. Structure of Organs and Functions of the System
B. Histology of cartilage: hyaline, elastic, fibrous
C. Structure of a Typical Long Bone: Gross and Histological Detail
D. Histology of Bone (Osteous) Tissue
   1. Osseous vs. Osteoid
   2. Compact vs. Cancellous
   3. Blood and Nerve Supply of Osseous Tissue
E. Bone Formation (Osteogenesis)
   1. Endochondral
   2. Intramembranous
F. Physiology of Bone
   1. Function of Calcium
   2. Hormonal Regulation of Calcium, Phosphorus
   3. Factors Affecting Normal Bone Growth and Remodelling
G. Survey of Bones (in laboratory)
   1. Axial Skeleton
   2. Appendicular Skeleton
   3. Fetal Skull and Fontanels
   4. Male vs. Female Skeleton
   5. Primary and Secondary Curves of Vertebral Column
      (Normal Curves and Abnormalities)
   6. Fetal vs. Adult Skeleton
H. Osseous Tissue
   1. Epiphysis
      a. proximal
      b. distal
   2. Diaphysis
   3. Metaphysis / epiphyseal plate or disc
   4. Marrow cavity
5. Periosteum
6. Endosteum
7. Nutrient foramen
8. Cancellous bone
9. Compact bone
10. Microhistology:
    a. Osteon or Haversion system
    b. Canaliculus
    c. Haversian canal or central canal
    d. Lacuna
    e. Lamellae
       (1) Interstitial
       (2) Circumferential
    f. Periosteum
    g. Endosteum
    h. Volkmann’s canal or perforating canal
    i. Compact bone
    j. Spongy bone
    k. Trabeculae
VI. **Articulations (3 hours) (COMPLETED IN LAB)**  
A. Definition of an Arthrosis and General Functions  
B. Classification, Definitions, Location, Types of Movement  
   (Non-Axial, Monaxial, Biaxial, Triaxial)  
   1. Synarthroses  
      a. Suture  
      b. Syndesmosis  
      c. Synostosis  
      d. Gomphosis  
   2. Amphiarthroses  
      a. Synchondrosis  
      b. Symphysis  
   3. Diarthroses  
      a. Saddle  
      b. Ball and Socket  
      c. Gliding  
      d. Hinge  
      e. Pivot  
      f. Ellipsoidal  
C. Joint Movements: Definitions and Examples  
   1. Flexion/Extension  
   2. Abduction/Adduction  
   3. Rotation  
   4. Circumduction  
   5. Gliding (Plane Movement)  
   6. Dorsiflexion/Plantar Flexion  
   7. Protraction/Retraction  
   8. Supination/Pronation  

VII. **Nervous System (12 hours)**  
A. Organs and General Functions of the System  
B. Divisions  
   1. Central (CNS)  
      a. Brain  
      b. Spinal Cord  
   2. Peripheral (PNS)  
      a. Cranial Nerves, Spinal Nerves  
      b. Somatic, Autonomic N.S.  
C. Nervous Tissue  
   1. Histology  
      a. Neuroglia: CNS-astrocytes, microglia, oligodendrocytes, ependymal cells, PNS-Schwann Cells, satellite Cells  
      b. Neuron  
         (1) Structure and Function  
         (2) Classification  
            i. by number of cytoplasmic extensions: uni, bi, multi, pseudouni-polar  
            ii. by function: sensory, motor, interneuron  
   2. Physiology  
      a. Nerve Impulse  
         (1) Membrane Potential  
         (2) Sodium – Potassium Exchange Pump  
         (3) Stimulus, Depolarization, Repolarization
(4) Propagation of Action Potential
   i. saltatory (discontinuous)
   ii. continuous
(5) Threshold (minimal) Level vs. Subthreshold (subliminal) Level Stimulus
(6) All-Or-None Theory
   i. synaptic transmission
   ii. chemical neurotransmitters and their functions
   iii. excitatory vs. inhibitory neurotransmitters
   iv. factors affecting rate of impulse transmission and propagation: axon diameter, amount of myelination

D. Spinal Cord and Spinal Nerves (SOME COMPLETED IN LAB)

1. Gross Structure, Functions, Location
2. Protective Coverings
   a. Vertebral Canal
   b. Meninges: Dura, Arachnoid, Pia Mater
   c. Denticulate Ligaments
   d. Adipose
3. Cross Sectional Structure
   a. Gray Matter (Horns): Location, Contents
   b. White Matter (Tracts): Location, Contents
4. Functions of Spinal cord
   a. Pathways (Tracts): Ascending and Descending
   b. Reflex Integration Center
5. Reflex Arc: Definition and Function
   a. Parts of a Reflex Arc and Function of Each
   b. Types of Reflexes
      (1) Monosynaptic, Polysynaptic
      (2) Contralateral, Ipsilateral
   c. Examples of Reflexes: Somatic, Autonomic
6. Spinal Nerves
   a. Definition, Location, Number
   b. Spinal Meninges
   c. Spinal Nerve Plexuses: Cervical, Brachial, Lumbar, Sacral

E. Brain

1. Protective Coverings: Skull, Cranial Meninges
2. Medulla Oblongata
   a. Structure, Location
   b. Functions
      (1) Vital Reflex Center
      (2) Non-Vital Reflex Center
      (3) Origin of Cranial Nerves IX-XII
      (4) Tracts: Ascending and Descending: Decussation of Pyramids
3. Pons Varolii
   a. Structure, Location
   b. Functions
      (1) Tracts
      (2) Origin of Cranial Nerves V-VIII
      (3) Respiratory Centers
4. Midbrain
   a. Location, Structure
b. Functions
   (1) Corpora Quadrigemina (Tegmentum)
   (2) Red Nucleus
   (3) Origin of Cranial Nerves III-IV
   (4) Substantia Nigra
5. Thalamus
   a. Location, Structure
   b. Functions
      (1) Sensory Relay Center
      (2) Sensory Information Interpretation
6. Hypothalamus
   a. Location, Structure, Connection to Hypophysis
   b. Functions
      (1) Endocrine Secretion: Control of Pituitary
      (2) Thermoregulation
      (3) Hunger, Thirst, Sex Drive
      (4) Limbic System: Emotions
      (5) Autonomic N.S. Control
      (6) Homeostasis
7. Cerebrum
   a. Location, Structural Features
      (1) Gyri
      (2) Sulci
      (3) Fissures
      (4) Lobes - 5
      (5) Hemispheres, R and L
      (6) White Matter
         i. projection fibers
         ii. association fibers
         iii. commissural fibers
      (7) Gray Matter
         i. cerebral cortex
         ii. basal (cerebral) nuclei (basal ganglia)
         iii. function of lobes: frontal, parietal, temporal, occipital, insula
8. Cerebellum
   a. Location, Structure
   b. Functions
9. Limbic System
   a. Location, Structure
   b. Functions
10. Reticular Formation
    a. Location, Structure
    b. Functions
11. Cranial Nerves
    a. Location, Structure, Number of Pairs, Names and Numbers
    b. Functions of Each: Sensory, Motor, Both
12. Cerebrospinal Fluid
   a. Site of Formation: Choroid Plexus
   b. Circulation and Return to Blood Circulation: Arachnoid Villi
   c. Functions
   d. Contents

13. Vascular Supply of the Brain
   a. Circle of Willis
   b. Blood-Brain Barrier
   c. Veins, Venous Sinuses

G. Autonomic Nervous System
   1. Divisions: Sympathetic, Parasympathetic
   2. Comparison of Sympathetic and Parasympathetic Divisions
      a. Locations
      b. Neurotransmitters
      c. Functions

VIII. Muscular System (3 hours)
   A. Characteristics of Muscular Tissue
      1. Irritability
      2. Contractility
      3. Elasticity
      4. Extensibility
   B. Function of Muscles
      1. Movements: Locomotion, Constriction – Dilation, Movement of Hair and Skin
      2. Maintenance of Posture and Equilibrium
      3. Heat Production
   C. Types of Muscle: Histology, Anatomy, Physiology
      1. Skeletal (Striated)
      2. Visceral (Smooth or Non-Striated)
      3. Cardiac (Striated)
      4. Voluntary or Involuntary
   D. Skeletal Muscle Structure
      1. Parts of a Muscle Cell
         a. Sarcolemma
         b. Sarcoplasm
         c. Sarcoplasmic Reticulum
         d. Transverse Tubules (T-Tubules)
         e. Triads
         f. Myofibrils
         g. Myofilaments: Action, Myosin, Troponin, Tropomyosin
      2. Skeletal Muscle Function
         b. Sliding Filament Theory
      3. Connective Tissue Coverings
         a. Endomysium
         b. Perimysium
         c. Epimysium
4. Connective Tissue Organs Associated with Muscles  
   a. Fasciae  
   b. Aponeuroses  
   c. Tendons  

E. Skeletal Muscle Physiology  
1. Elements of Contraction  
   a. T-Tubules  
   b. Sarcoplasmic Reticulum  
   c. Calcium  
   d. Protein Myofilaments  
2. All-Or-None Theory  
   a. Threshold (Liminal) Stimulus  
   b. Subthreshold (Subliminal) Stimulus  
3. Muscle Twitch: Definition and Phases  
   a. Latent Period  
   b. Contracton Phase  
   c. Relaxation Phase  
   d. Refractory Period: Absolute, Relative  
4. Cellular Respiration: Definition, Location, Function  
5. Tetanus: Complete, Incomplete  
6. Treppe  
7. Contraction Types  
   a. Isotonic  
   b. Isometric  

8. Energy for Contraction: Aerobic and Anerobic Pathways  
   a. ATP  
   b. Creatine  
   c. Glycogen  
   d. Oxygen Debt  
   e. Fatigue  
   f. Lactic Acid  

F. Cardiac Muscle Physiology (Very General)  
G. Visceral (Smooth) Muscle Physiology (Very General)  

H. Survey of Muscles (Detail in Laboratory Only)  
   1. Methods Used to Name  
   2. Origins, Insertions, Actions, Locations  
   3. Agonists, Antagonists, Synergists  

IX. Special Senses (3 hrs) (COMPLETED IN LAB)  
A. Eye (1 hour)  
   1. Structure, Location, Protective Coverings  
   2. Accessory Structures: Glands, Fluids, Hairs, Ducts  
   3. Physiology of Vision: Visual Pathway  
      a. Image Formation, Retina, Macula Lutea, Fovea Centralis  
      b. Refraction and Accommodation  
      c. Pupillary Reflex  
      d. Convergence  
      e. Photoreceptors: Rods, Cones, Chemical Reactions
B. Ear (1 hour) (COMPLETED IN LAB)

1. Structure of the Ear
   b. Middle: Ossicles, Eustachian (Tympanopharyngeal) Tube
   c. Inner: Cochlea, Oval and Round Windows, Scali Tympani, Vestibule, Fluids

2. Transmission of Sound Waves: Tympanic Membrane, Ossicles, Cochlear Fluid

3. Neural Mechanism of Hearing: Auditory Pathway

4. Equilibrium: Semicircular Canals, Bony and Membraneous Labyrinths, Otoliths and Hair Cells