Adult Basic Education

Science

Biology 2101C

Maintaining Dynamic Equilibrium I

Study Guide

Prerequisite: Biology 2101A

Credit Value: 1

Text: *Biology.* Bullard, Chetty, et al; McGraw-Hill Ryerson, 2003.

Biology Concentration

Biology 1101
Biology 2101A
Biology 2101B
Biology 2101C
Biology 3101A
Biology 3101B
Biology 3101C

Table of Contents

To the Student

I. Introduction to Biology 2101C

Cells, tissues, organs organ systems and ultimately organisms, must maintain a biological balance despite changing external conditions. Homeostasis is the state of internal balance so critical to existence. It represents a dynamic equilibrium displaying constant interactions and checks and balances both within organisms and between organisms and their environment. There are a variety of systems within living things responsible for the maintenance of this delicate balance. This course will identify and introduce the role of the circulatory, respiratory, digestive, excretory, and immune systems.

There are two required assignments in this course. These must be passed in for marking. The mark that you get will be used to partially determine your final mark for the course.

Biology 2101C is the third of 3 courses (the others are Biology 2101A and Biology 2101B) that are equivalent to Biology 2201 in the current high school program.

Biology 2101A is a prerequisite for this course.

Biology 2101C is a pre-requisite for all remaining Biology courses in the Biology concentration.

To the Student

II. Use of Science Study Guides

Before beginning this course, ensure you have the text and any other resources needed *(see the information in the Introduction to this course for specifics)*.

As you work through the Study Guide, you will see that it is divided according to the Units listed in the Table of Contents. When you open a unit it will have the following components:

Reading for this Unit:
Here you will find the chapters, sections and pages of the text you will use to cover the material for this unit. Skim the sections of the textbook, look at the titles of the sections, scan the figures and read any material in the margins. Once you have this overview of the unit, you are ready to begin. Do not be intimidated by the content. You will work through the text, section by section, gaining knowledge and understanding of the material as you go.

References and Notes	**Work to Submit**
This left hand column guides you through the material to read from the text. Read any highlighted notes that follow the reading instructions. The symbols ▶▶ direct you to the questions that you should complete when finished a reading assignment..	You come across three (3) headings in this right hand column. **Writing:** This section comprises your notes for the unit. Here you will find either written questions or references to specific questions or problems from your text. You may want to write out each question followed by the answer. This material should be checked by your instructor before moving on to the next unit. Mathematical problems should have their solutions checked as you go. **Laboratory:** This section indicates if there is a Core Lab that should be completed for the unit. Let the instructor know in advance that you will be ready for the lab. A lab report should be submitted for each Core Lab. Your instructor will provide guidelines as to how s/he wants the report written. **Assignment:** This section indicates if there is an assignment that should be completed for the Unit. The information in the "References and Notes" column will indicate how you obtain the assignment. These assignments frequently relate the science content to technology, society and the environment.

III. Recommended Evaluation

Written Notes	10%
Labs/Assignments	20%
Test(s)	20%
Final Exam *(entire course)*	50%
	100%

The overall pass mark for the course is 50%.

Unit 1 - Homeostasis

To fulfill the objectives of this unit, students should complete the following:

Reading for this unit: *Biology*
Chapter 9: Introduction: page 298
Section 9.1: pages 300 - 303

References and Notes

Referring to pages 298 and 300, write answers for questions 1.1 - 1.2 ▶▶

Referring to Figure 9.2, page 301, write an answer for question 1.3 ▶▶

See your instructor to discuss which questions you should do from the "Section Review" and/or "Chapter Review" and any additional work that may be required for this unit.

Work to Submit

Writing:

1.1 Define homeostasis.

1.2 Explain what is meant by dynamic equilibrium.

1.3 Briefly describe the role of one body system (either respiratory, excretory or digestive) in maintaining equilibrium.

Unit 2 - The Circulatory System

To fulfill the objectives of this unit, students should complete the following:

Reading for this unit: *Biology*

Chapter 9:	Section 9.2	pages 304 - 313
	Section 9.3	pages 314 - 315
	Section 9.4	pages 322 - 328

References and Notes

Referring to pages 304 - 313, write answers for questions 2.1 - 2.3 ▶▶

Note:
Remember that you learned in Biology 2101A that cells require and take up nutrients and gases, and they excrete wastes that must be eliminated. This exchange must take place continuously. It relies on the ability of the circulatory system to transport these materials to and from the cells of organisms. This therefore, is the ***main function of the circulatory system.***

Referring to pages 314 - 315, write answers for questions 2.4 - 2.5 ▶▶

Work to Submit

Writing:

2.1 Name and briefly explain the three primary cycles of the blood vessels.

2.2 (a) Name and describe the function of the main three types of blood vessels.

(b) What feature of arteries keeps blood flowing in the right direction?

(c) What feature of veins keeps blood flowing in the right direction?

2.3 Name and describe the function of the four components of blood.

2.4 Label the diagram of the human heart (found in Appendix A) .

2.5 Describe the pathway of blood through the heart (starting with the superior vena cava and ending with the aorta).

Unit 2 - The Circulatory System

References and Notes	Work to Submit
Referring to pages 322 - 323, write answers for questions 2.6 - 2.7 ▶▶	**Writing:** 2.6 (a) What is the lymphatic circulatory system? (b) What is lymph? 2.7 Describe 2 functions of the lymphatic system.
Assignment 1, Part 1, is found in Appendix B of this Study Guide. Refer to pages 323 - 328 to do the assignment. ▶▶ ***Note:*** ***The material covered in the assignment will not be tested. You should submit the completed assignment to your instructor for marking.***	**Assignment:** 2.8 Complete Assignment 1, Part 1, "Disorders of the Circulatory System".
See your instructor to discuss which questions you should do from the "Section Review" and/or "Chapter Review" and any additional work that may be required for this unit.	

Unit 3 - The Respiratory System

To fulfill the objectives of this unit, students should complete the following:

Reading for this unit: *Biology*
Chapter 10: Introduction: page 332
Section 10.1: pages 334 - 337
Section 10.3: pages 343 - 348

References and Notes

Referring to pages 334 - 338, write answers for questions 3.1 - 3.4 ▶▶

Notes:
*Remember that describing organisms as **aerobic** means that they require oxygen to survive.*

***Respiratory surface** means the surface area available for gas exchange.*

Work to Submit

Writing:

3.1 Describe the process of gas exchange.

3.2 (a) What are the 2 requirements of a respiratory surface?

(b) What is the respiratory surface of air-breathing vertebrates?

3.3 Label the diagram of the human respiratory system (found in Appendix A).

3.4 State the function of each of the following:

(i) nasal cavity
(ii) trachea
(iii) bronchi
(iv) bronchioles
(v) alveoli
(vi) diaphragm

Unit 3 - The Respiratory System

References and Notes	Work to Submit
Assignment 1, Part 2, is found in Appendix B of this Study Guide. Refer to pages 343 - 348 to do the assignment. ▶▶ ***Note:*** ***The material covered in the assignment will not be tested. You should submit the completed assignment to your instructor for marking.*** *See your instructor to discuss which questions you should do from the "Section Review" and/or "Chapter Review" and any additional work that may be required for this unit.*	**Assignment:** 3.5 Complete Assignment 1, Part 2, "Disorders of the Respiratory System".

Unit 4 - The Digestive System

To fulfill the objectives of this unit, students should complete the following:

Reading for this unit: *Biology*

Chapter 11:	Introduction:	page 352
	Section 11.1:	pages 354 - 358
	Section 11.2:	pages 359 - 373

References and Notes

Referring to pages 354 - 358, write answers for questions 4.1 - 4.2 ▶▶

Referring to pages 359 - 368, write answers for questions 4.3 - 4.6 ▶▶

Note:
In addition to the terms for which you are writing definitions in this unit, you should also know the meaning of the following terms and be able to use them properly:

- *essential nutrients*
- *heterotrophs*
- *autotrophs*
- *balanced diet*

Work to Submit

Writing:

4.1 What is the function of the digestive system?

4.2 (a) Name the six basic nutrients that a healthy diet must include and give the food sources of each.

(b) Describe the function of each of the nutrients.

4.3 Define mechanical and chemical digestion and state the part(s) of the digestive system where each occurs.

4.4 Label the diagram of the human digestive system found in Appendix A.

4.5 State the function of each of the following:

(i) salivary glands
(ii) esophagus
(iii) gastric glands
(iv) stomach
(v) liver
(vi) pancreas
(vii) gall bladder
(viii) small intestine
(ix) large intestine

Unit 4 - The Digestive System

References and Notes	Work to Submit
	Writing: 4.6 Explain each of the following terms: (i) taste buds (ii) duodenum (iii) colon (iv) villi (v) rectum (vi) peristalsis
There is a worksheet in Appendix C that you should complete for review of digestion. ▶▶	**Worksheet:** 4.7 Complete the "Digestion Worksheet".
Assignment 1, Part 3, is found in Appendix B of this Study Guide. Refer to pages 369 - 373 to do the assignment. ▶▶ ***Note:*** ***The material covered in the assignment will not be tested. You should submit the completed assignment to your instructor for marking.***	**Assignment:** 4.8 Complete Assignment 1, Part 3 , "Disorders of the Digestive System".
See your instructor to discuss which questions you should do from the "Section Review" and/or "Chapter Review" and any additional work that may be required for this unit.	

Unit 5 - The Excretory System

To fulfill the objectives of this unit, students should complete the following:

Reading for this unit: *Biology*
Chapter 11: Section 11.3: pages 374 - 381

References and Notes

Referring to pages 374 - 377, write answers for questions 5.1 - 5.5 ▶▶

Note:
Don't think that the human excretory system is all about the kidney. Several other organs that are involved in the excretory system are the lungs, the skin and the liver.

Work to Submit

Writing:

5.1 Explain how the following act as organs of excretion

(i) lungs
(ii) skin
(iii) liver
(iv) kidney

5.2 Label the diagram of the human excretory system (found in Appendix A).

5.3 Label the diagram of the human urinary system (including the internal structure of the human kidney), (found in Appendix A).

5.4 Label the diagram of the nephron, (found in Appendix A).

5.5 Describe the function of the nephron. Include in your explanation, the function of each of the following:

(i) glomerulus
(ii) Bowman's capsule
(iii) loop of Henle
(iv) tubules - proximal and distal
(v) collecting duct

Unit 5 - The Excretory System

References and Notes	Work to Submit
Assignment 1, Part 4, is found in Appendix B of this Study Guide. Refer to pages 377 - 381 to do the assignment. ▶▶ ***Note:*** ***The material covered in the assignment will not be tested. You should submit the completed assignment to your instructor for marking.*** *See your instructor to discuss which questions you should do from the "Section Review" and/or "Chapter Review" and any additional work that may be required for this unit.*	**Assignment:** 5.6 Complete Assignment 1, Part 4 , "Disorders of the Excretory System".

Unit 6 - The Immune System

To fulfill the objectives of this unit, students should complete the following:

Reading for this unit: *Biology*
Chapter 11: Section 11.4: pages 382 - 386

References and Notes

Assignment 2 is found in Appendix B of this Study Guide. Refer to pages 382 - 386 to do the assignment. ⏯⏯

Note:
Pay special attention to Figure 11.26 when completing the assignment.

Note:
The material covered in the assignment will not be tested. You should submit the completed assignment to your instructor for marking.

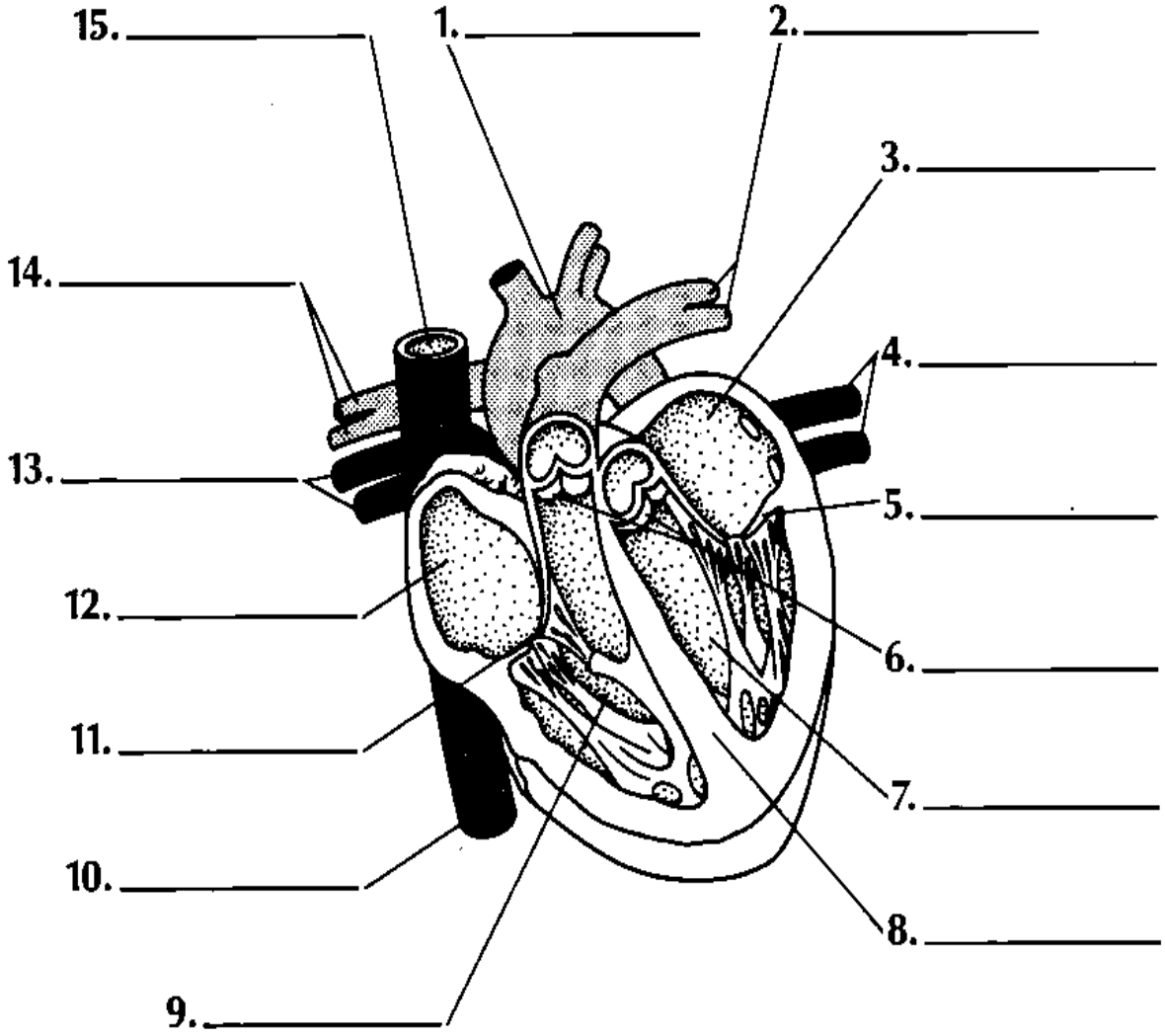
Work to Submit

Assignment:

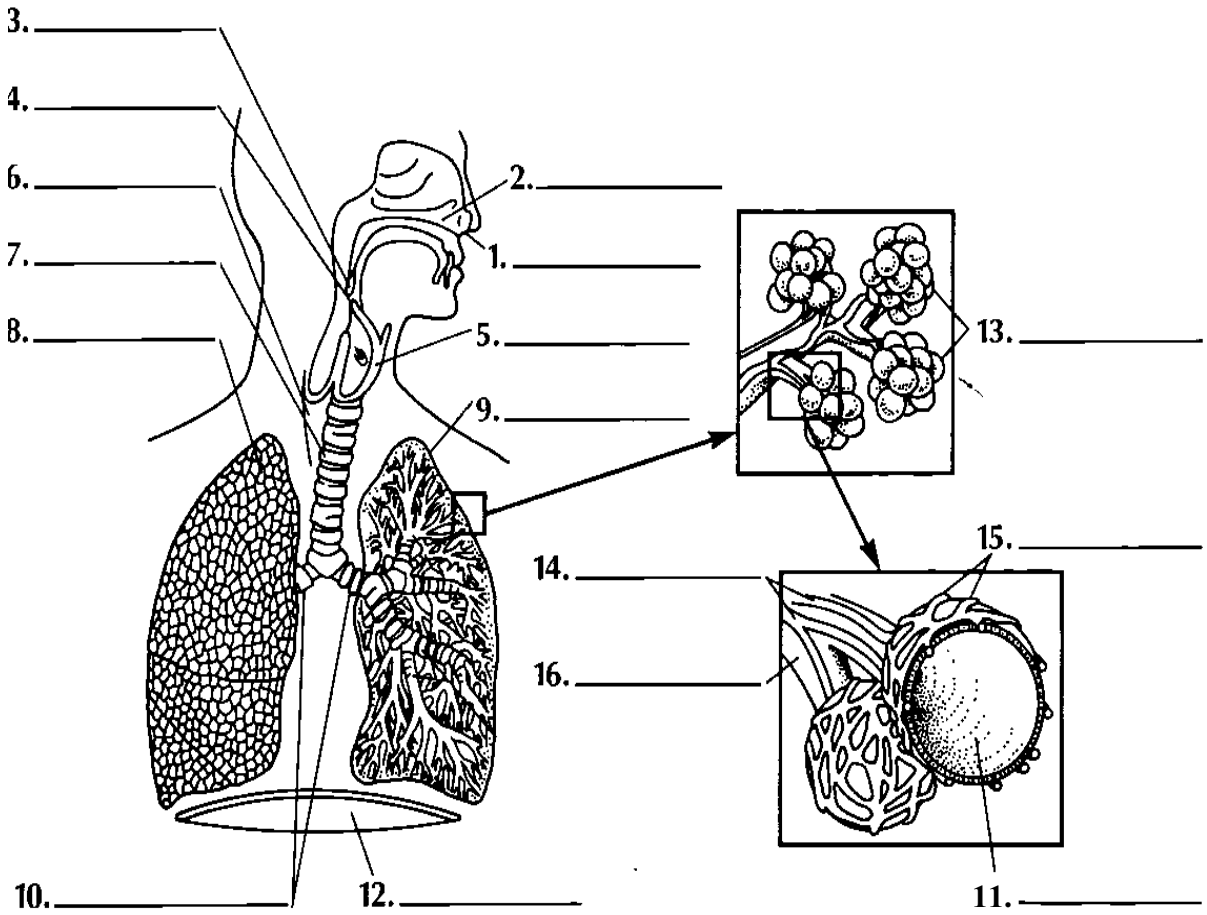
6.1 Complete Assignment 2, "The Immune System".

Appendix A

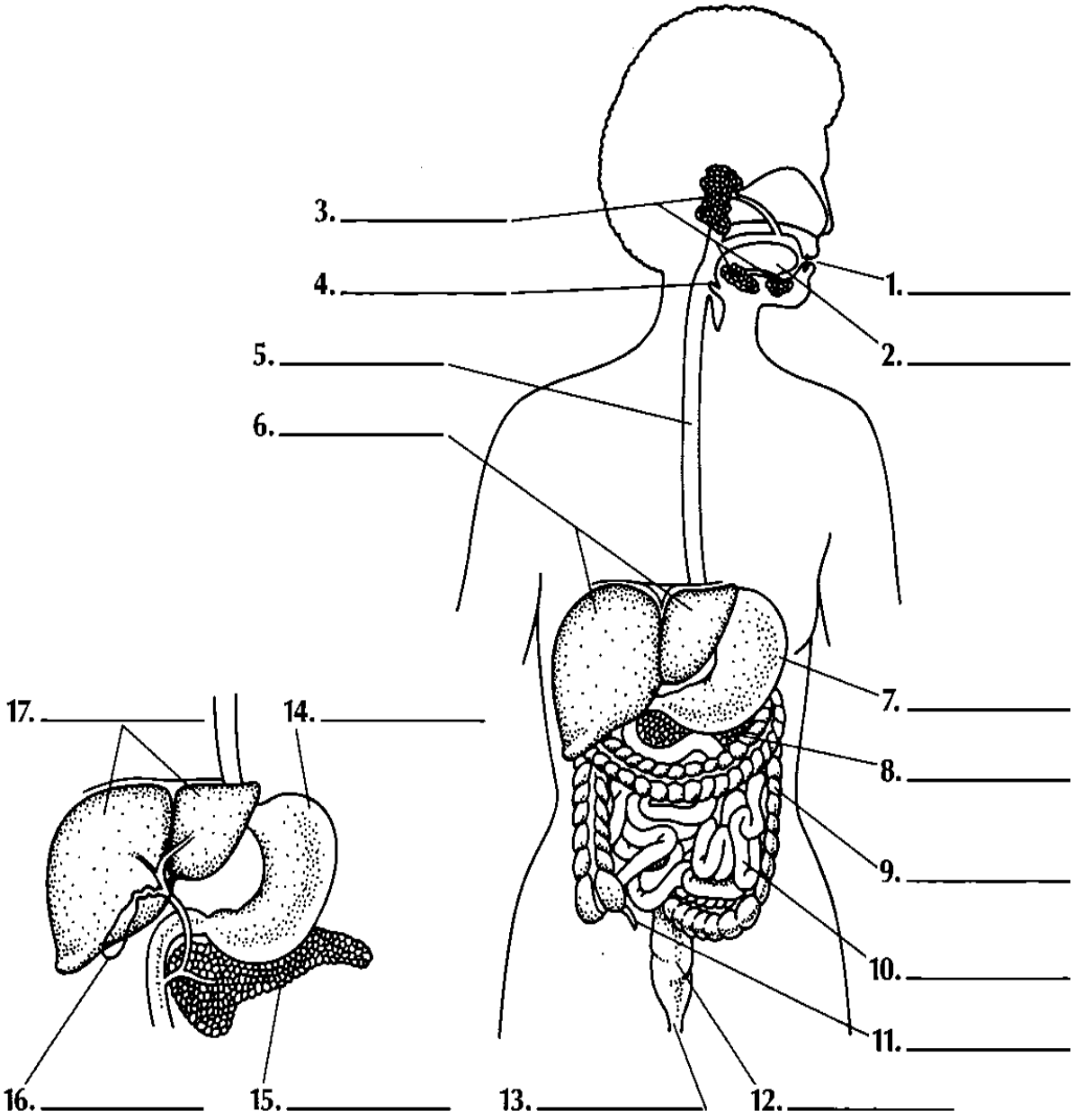
Diagrams



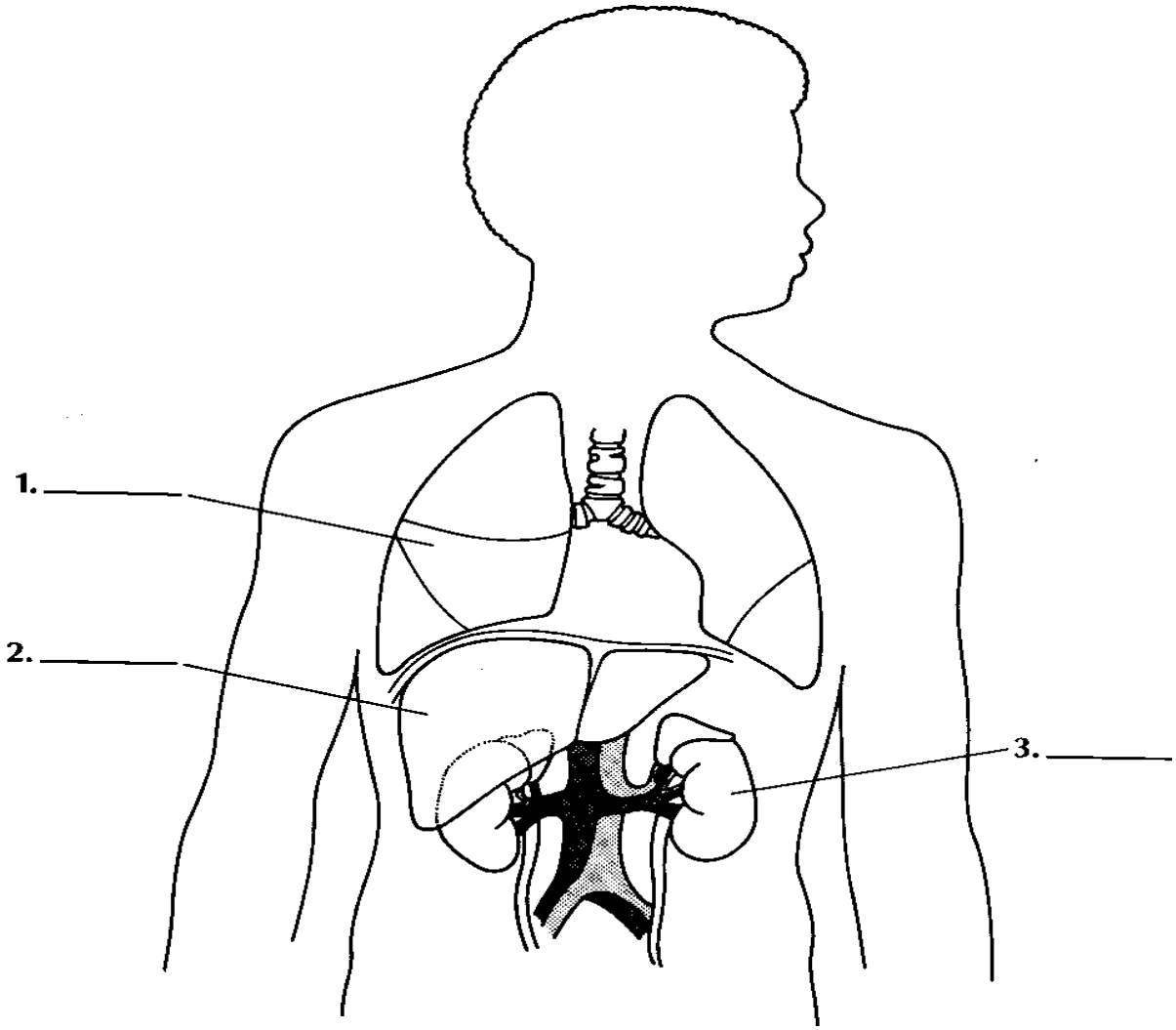
Structure of the Human Heart



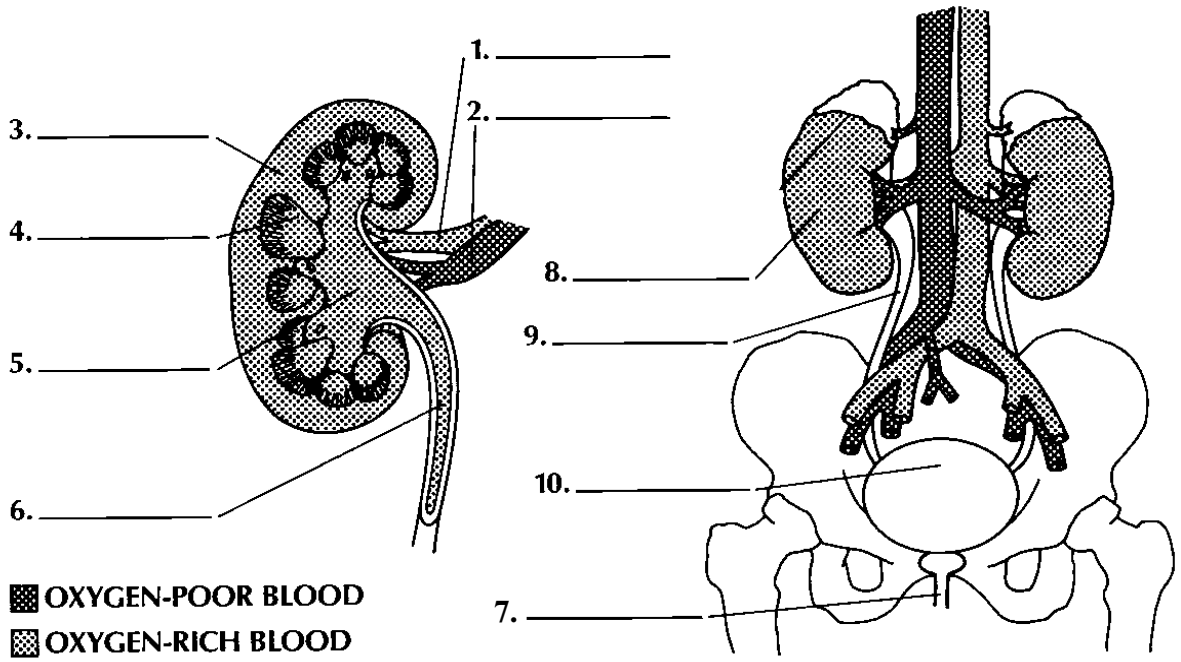
The Human Respiratory System



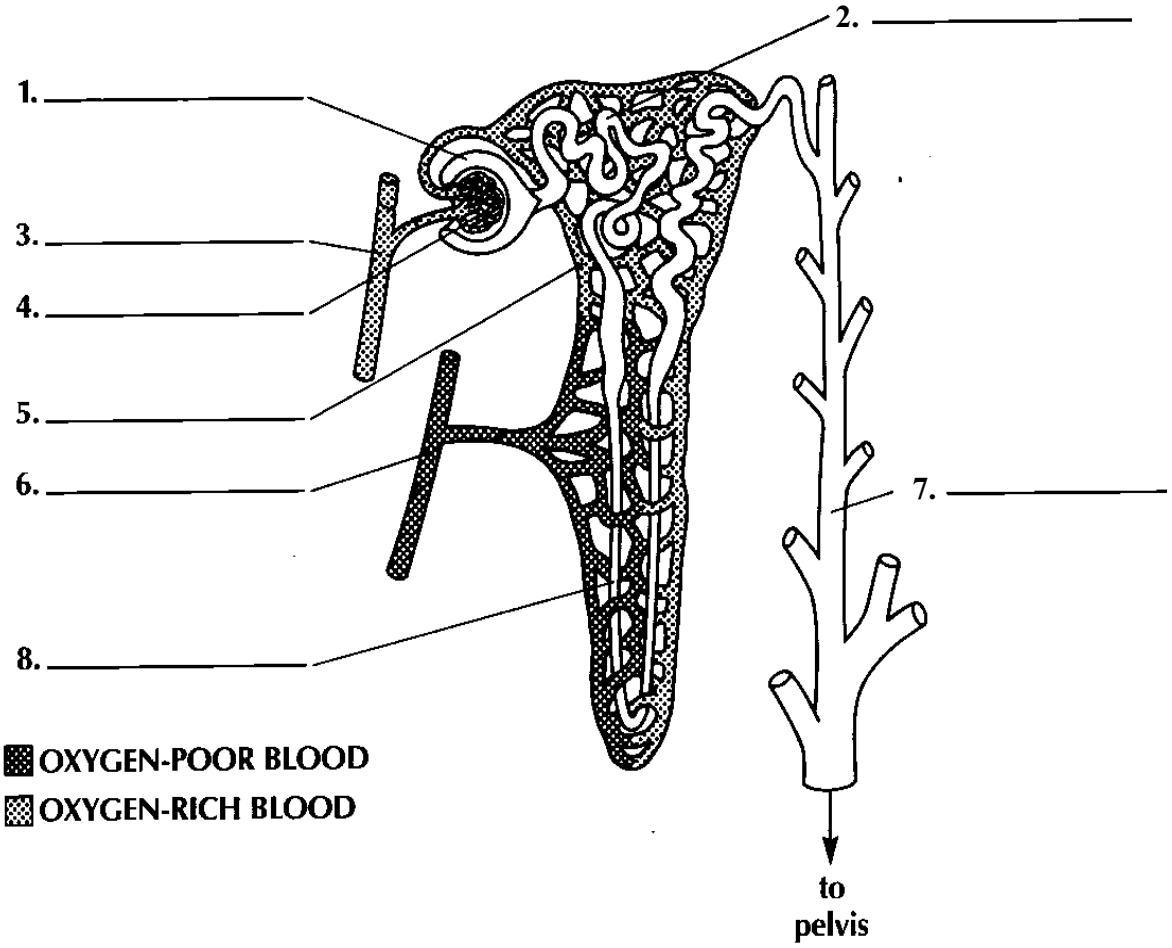
Human Digestive System



Organs of the Human Excretory System



The Human Urinary System



The Nephron

Appendix B

Assignments

Assignment 1

Part 1

Disorders of the Circulatory System

1. Explain what is meant by each of the following disorders that are linked to the circulatory system and describe their effects on the organism as a whole.

   (i) hypertension

   (ii) atherosclerosis

   (iii) arteriosclerosis

2. Describe each of the following treatments for circulatory problems.

   (i) angioplasty

   (ii) coronary bypass

   (iii) clot-busting drugs

3. What is a coronary shunt and how is it used?

Assignment 1

Part 2

Disorders of the Respiratory System

1. (a) Explain what lung cancer is.

   (b) Describe how a carcinoma forms and how it causes death.

2. Describe 2 common causes of cancer.

3. (a) Describe 3 different forms of pneumonia.

   (b) What are the treatment options for each of the different forms?

4. (a) What is asthma?

   (b) What are the symptoms of asthma?

5. Explain how asthma can be managed.

Assignment 1

Part 3

Disorders of the Digestive System

1. Describe each of the following disorders of the digestive system.

   Include the cause, how the digestive system is affected, and the treatment that is available.

   - ulcers
   - gall stones
   - ileitis
   - colitis

2. Describe two reasons why good nutrition is important.

3. (a) Explain why some people use diet supplements and herbal remedies.

   (b) Give 3 examples of common herbal remedies and what they are used for.

4. Briefly describe the eating disorders anorexia nervosa and bulimia nervosa.

Assignment 1

Part 4

Disorders of the Excretory System

1. Describe each of the following disorders of the excretory system.

   Include the cause, how the excretory system is affected, and the treatment that is available.

   - kidney stones
   - kidney infection (pyelonephritis)
   - bladder infection (cystitis)

2. Explain what is meant by hemodialysis (kidney dialysis) and explain how it works.

Assignment 2

The Immune System

1. Define immunity and pathogen.

2. Name 3 ways that pathogens are prevented from entering the blood stream (the body's first line of defense).

3. Describe the body's second line of defense.

4. Describe the body's third line of defense.

5. Explain how antibodies and antigens are related.

6. Explain the difference between active immunity and passive immunity and describe how a person obtains each.

7. (a) Define autoimmune disease.

   (b) Give an example of an autoimmune disease.

Appendix C

Worksheet

Digestion Worksheet

Organ	Associated Glands	Chemical Digestion (Enzyme Action)	Mechanical Digestion	Other Secretions
Mouth				
Stomach				
Small Intestine				
Large Intestine				