Adult Basic Education

Science

Biology 2101A

The Cell

Curriculum Guide

Credit Value: 1

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

Table of Contents

To the Instructor

I. Introduction to Biology 2101A

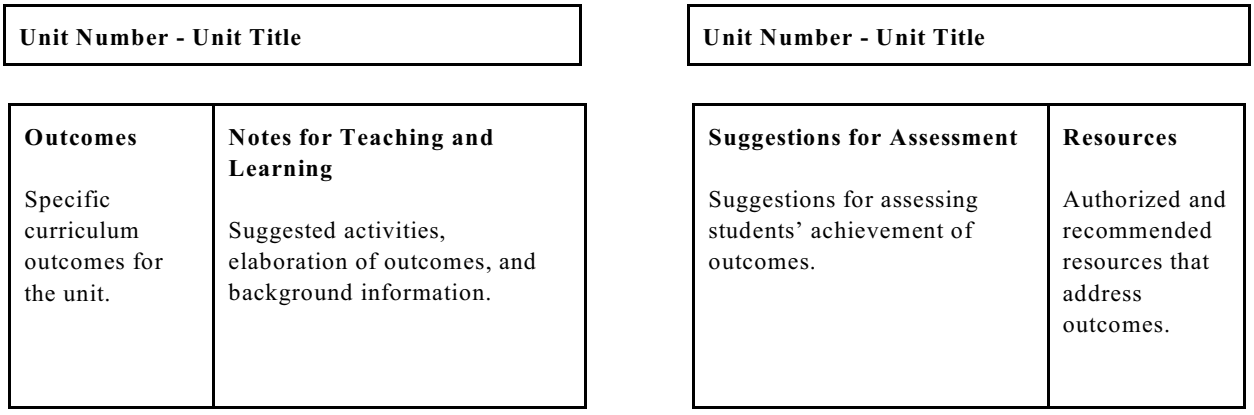
Biology 2101A is a pre-requisite for all remaining Biology courses in the Biology concentration. It covers the proper use of the microscope. It also includes a detailed study of the structure and functioning of both plant and animal cells. Finally, it introduces two of the important chemical processes , photosynthesis and respiration, that occur in cells.

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

II. Curriculum Guides

Each new ABE Science course has a Curriculum Guide for the instructor and a Study Guide for the student. The Curriculum Guide includes the specific curriculum outcomes for the course. Suggestions for teaching, learning, and assessment are provided to support student achievement of the outcomes. Each course is divided into units. Each unit comprises a **two-page layout of four columns** as illustrated in the figure below. In some cases the four-column spread continues to the next two-page layout.

Curriculum Guide Organization:
The Two-Page, Four-Column Spread



III. Study Guides

The Study Guide provides the student with the name of the text(s) required for the course and specifies the sections and pages that the student will need to refer to in order to complete the required work for the course. It guides the student through the course by assigning relevant reading and providing questions and/or assigning questions from the text or some other resource. Sometimes it also provides important points for students to note. (See the *To the Student* section of the Study Guide for a more detailed explanation of the use of the Study Guides.) The Study Guides are designed to give students some degree of independence in their work. Instructors should note, however, that there is much material in the Curriculum Guides in the *Notes for Teaching and Learning* and *Suggestions for Assessment* columns that is not included in the Study Guide and instructors will need to review this information and decide how to include it.

IV. Resources

Essential Resources

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

McGraw-Hill Ryerson Biology, Teacher's Resource.

Recommended Resources

McGraw-Hill Ryerson Biology, Teacher's Resource CD-ROM.

Biology 11/12 #D Science Animations.

Department of Education web site:
www.gov.nl.ca/edu/science_ref/main.htm

Textbook web site:
http://www.mcgrawhill.ca/school/booksites/biology/

Other Resources

Center for Distance Learning and Innovation:
http://www.cdli.ca/

V. 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%.

The Cell

Unit 1 - The Micro-universe of the Cell

Outcomes

1.1 Explain the cell theory.

1.1.1 State the four hypotheses of the cell theory.

1.1.2 Define biogenesis and abiogenesis.

1.2 Select and use apparatus and materials safely.

1.2.1 Identify the microscope as an important tool for biological research.

1.3 Use instruments effectively and accurately for collecting data.

1.3.1 Identify microscope parts and their function.

1.3.2 Demonstrate general care, focusing techniques and safety concerns.

1.3.3 Prepare, stain, and observe a wet mount of a specimen.

Notes for Teaching and Learning

Students will be introduced to many new terms throughout this course. Instructors could suggest that students start a vocabulary list and add to it regularly as they work through the unit.

Students will go to the lab for the first time in this course to fulfill the requirements for this section. Instructors should review "Safety in the Lab", (Appendix A of the text), with students before they start to work in the lab.

Students should develop the techniques and skills required for a microscope's efficient use. Students will arrive in Biology 2101A with varying levels of competency in the use of the microscope and accommodations will need to be made for this.

If both a compound microscope and dissecting (stereo) microscope are available, a look at the contrasts and different uses for these two instruments would be valuable.

Instructors should demonstrate the proper preparation and staining of a temporary, or wet mount slide, in order to minimize air bubbles and distractions to viewing.

Students could be provided with blank copies of a microscope diagram to use for practice.

Unit 1 - The Micro-universe of the Cell

Suggestions for Assessment

Questions 1.1 - 1.2 in the Study Guide should be assigned to cover Outcome 1.1. Students will find the answers to these questions in Section 1.1.

Question 1.4 in the Study Guide and the Core Lab should be assigned to cover Outcomes 1.2 and 1.3. Students will find the answers to these questions in Section 1.2 (including Investigation 1.A).

Instructors should assess the student's level of understanding by reading student answers to questions from the Study Guide and providing feedback.

Instructors should ensure that all necessary terms are being added to the student's vocabulary list and provide students with ideas about how to successfully remember definitions.

Resources

McGraw-Hill Ryerson Biology, pages 6, 12 - 22.

McGraw-Hill Ryerson Biology, Teacher's Resource.

McGraw-Hill Ryerson Biology, Teacher's Resource CD-ROM.

***Core Lab**: Investigation 1.A, "Caring for and Using a Microscope", pages 15 - 19.*

www.gov.nl.ca/edu/science_ref/main.htm

http://www.mcgrawhill.ca/school/booksites/biology/

Unit 1 - The Micro-universe of the Cell

Outcomes

1.4 Compile and display, using line diagrams and/or digital imagery, evidence and information collected through the use of the microscope.

1.4.1 Draw a biological drawing which includes the concept of field of view and calculation of specimen size.

1.4.2 Define depth of field.

1.4.3 Define resolution.

1.5 Using different types of cells as examples, compare and contrast prokaryotic and eukaryotic cells.

1.5.1 Describe the structural differences between prokaryotic and eukaryotic cells.

1.5.2 Observe features of prokaryotic and eukaryotic cells using microscope technology and/or diagrams.

Notes for Teaching and Learning

Outcome 1.4 is covered by doing Investigation 1.A. Instructors should review "How to Make Biological Drawings" (found in Appendix E of the text), with students before they complete Part D of the lab.

Instructors should refer to the Teacher's Resource for information to help with Investigation 1.A.

The Teacher's Resource also provides answers to all the questions in the text.

The Mini Lab, "Observing Stained Cells", page 24, may be used as practice for preparing and observing stained slides.

The Teacher's Resource CD-ROM contains Blackline Masters (BLM's), Labs, Additional Investigations and Assessment Checklists.

The figures throughout Section 1.3 of the text (and diagrams from other sources) may be used to achieve outcome 1.5.2.

Unit 1 - The Micro-universe of the Cell

Suggestions for Assessment

BLM 1-1, "Using a Microscope", can be copied and distributed to students for review and reinforcement.

A Microscope Diagram should be provided to students and completed and passed in with their lab report. Students should be prepared to complete a similar diagram for the exam on this course. Instructors may use various resources to choose an appropriate diagram.

Instructors should assess the student's lab report. A mark should be assigned for lab work and used as part of the evaluation for the course.

Resources

BLM 1-1, "Using a Microscope".

Unit 1 - The Micro-universe of the Cell

Outcomes

1.6 Describe the appearance and function of cell organelles.

1.6.1 Define organelle.

1.6.2 Describe the role of the following cellular structures:

(i) cell membrane
(ii) cytoplasm
(iii) nucleus
(iv) nucleolus
(v) endoplasmic reticulum
(vi) ribosome
(vii) mitochondria
(viii) chloroplast
(ix) vacuole
(x) vesicle
(xi) golgi apparatus
(xii) microtubules / filaments
(xiii) cilia
(xiv) lysosome
(xv) flagella
(xvi) cell wall

1.6.3 Compare plant and animal cells in terms of type of organelles present

Notes for Teaching and Learning

Many students have difficulty with spellings and pronunciations of cell organelles. If available, an audiotape or videotape could be very useful to help with that. Encourage students to break each word into syllables to help them learn.

Physical models, charts of cells, and/or Internet websites graphically illustrate structures of cells and distinguish features predominant in plant or animal cells.

Comparison of diagrams on pages 25 and 32 of textbook can aid in highlighting these differences.

Instructors should provide students with unlabelled diagrams of plant and animal cells to use for practice in recognizing organelles.

Unit 1 - The Micro-universe of the Cell

Suggestions for Assessment

Instructors should check the diagrams that have been provided to students to ensure they are being labelled properly.

Questions 1.5 - 1.9 in the Study Guide should be assigned to cover Outcomes 1.5 and 1.6. Students will find the answers to these questions in Section 1.3.

This is the end of Unit 1. Instructors may assign questions from the Section Reviews and/or the Chapter Review, and assess student answers.

Answers for all questions in the text are provided in the Teacher's Resource.

Students should practice labelling cell diagrams until they are able to label them accurately without referring to the text.

Instructors may also give a chapter quiz that may be used as part of the final mark for the course.

Resources

Audio and/or video tapes of parts of the cell.

Cell Diagrams from various resources.

Biology 11/12 Computerized Assessment Banks.

Unit 2 - Interaction of Cell Structures

Outcomes

2.1 Explain how materials are able to move into and out of cells through a selectively permeable membrane.

- 2.1.1 Define homeostasis.
- 2.1.2 Explain the term selectively permeable.
- 2.1.3 Describe forms of passive transport (include diffusion and osmosis).
- 2.1.4 Define the terms hypotonic, hypertonic and isotonic.
- 2.1.5 Distinguish between active and passive transport.
- 2.1.6 Explain the processes of endocytosis (include pinocytosis and phagocytosis) and exocytosis.

2.2 Determine how the composition of extracellular fluids affects osmosis.

Notes for Teaching and Learning

Outcome 2.2 is covered by doing Investigation 2.B. The lab is written so that students determine their own experimental plan. Instructors may substitute a similar laboratory activity for this one to achieve the same outcome.

Instructors should encourage students to add the new terms that they are learning in this unit to the vocabulary list that they started in Unit 1.

Unit 2 - Interaction of Cell Structures

Suggestions for Assessment

Questions 2.1 - 2.5 in the Study Guide should be assigned to cover Outcome 2.1.1 - 2.1 5. Students will find the answers to these questions in Section 2.2 of the text.

Questions 2.7 - 2.8 in the Study Guide should be assigned to cover Outcome 2.1.6. Students will find the answers to these questions in Section 2.3 of the text.

Instructors should assess the student's 'lab report'. A mark could be assigned for lab work and used as part of the evaluation for the course.

BLM 2-2, "Illustrating Concentration Gradients", may be used to assess the student's understanding of the direction of osmosis.

Resources

McGraw-Hill Ryerson Biology, pages 38 - 67.

BLM 2-2, "Illustrating Concentration Gradients".

Core Lab: Investigation 2.B, "Osmosis in a Model Cell", pages 56-57.

Unit 3 - Photosynthesis and Respiration

Outcomes

3.1 Compare and contrast matter and energy transformations associated with the processes of photosynthesis and aerobic respiration.

- 3.1.1 Explain the importance of the processes of photosynthesis and aerobic respiration for individual organisms.
- 3.1.2 Demonstrate, using equations, that photosynthesis and aerobic respiration are complementary processes.

Notes for Teaching and Learning

The emphasis of outcome 3.1 is the difference between aerobic processes and photosynthetic processes. It is not intended for students to investigate biochemical processes (such as Kreb Cycle, glycolysis, fermentation, and so on) or light and dark reactions associated with plant growth.

Students should understand that photosynthetic organisms, using light as an energy source, remove CO_2, water and other materials from their environment in order to assemble more complex organic compounds and release, as a by-product, oxygen gas. Students should understand that respiration is a chemical process utilized by all organisms to extract energy from organic molecules. These organic substances are broken down into their components of CO_2 and water. The energy released is utilized by the organism for its own purposes or released to the environment.

Students who have recently completed Biology 1101 will be familiar with the concepts covered in this unit. They should be reminded of what they have already learned.

Instructors could assign selected questions from the Section Review, Chapter Review and/or Unit Review for review and reinforcement. Instructor prepared review sheets could also be provided.

Unit 3 - Photosynthesis and Respiration

Suggestions for Assessment

Instructors should assess the student's level of understanding by reading student answers to questions from the Study Guide and providing feedback.

Student answers for review questions should be assessed to determine their readiness for a final exam.

Instructors should give a final examination at the end of the course which covers all units of the course.

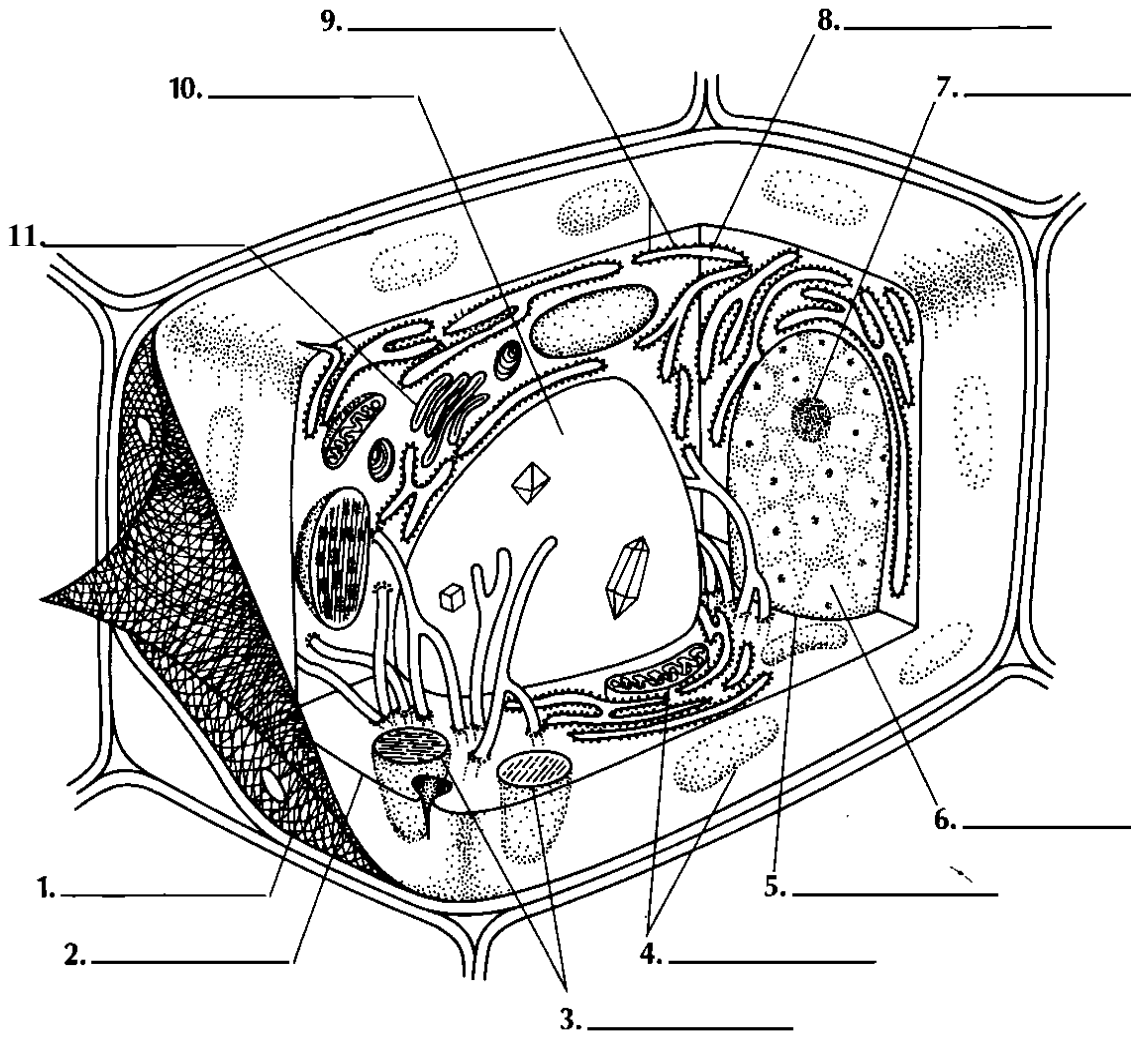
Resources

McGraw-Hill Ryerson Biology, pages 68, 70, 73, 82.

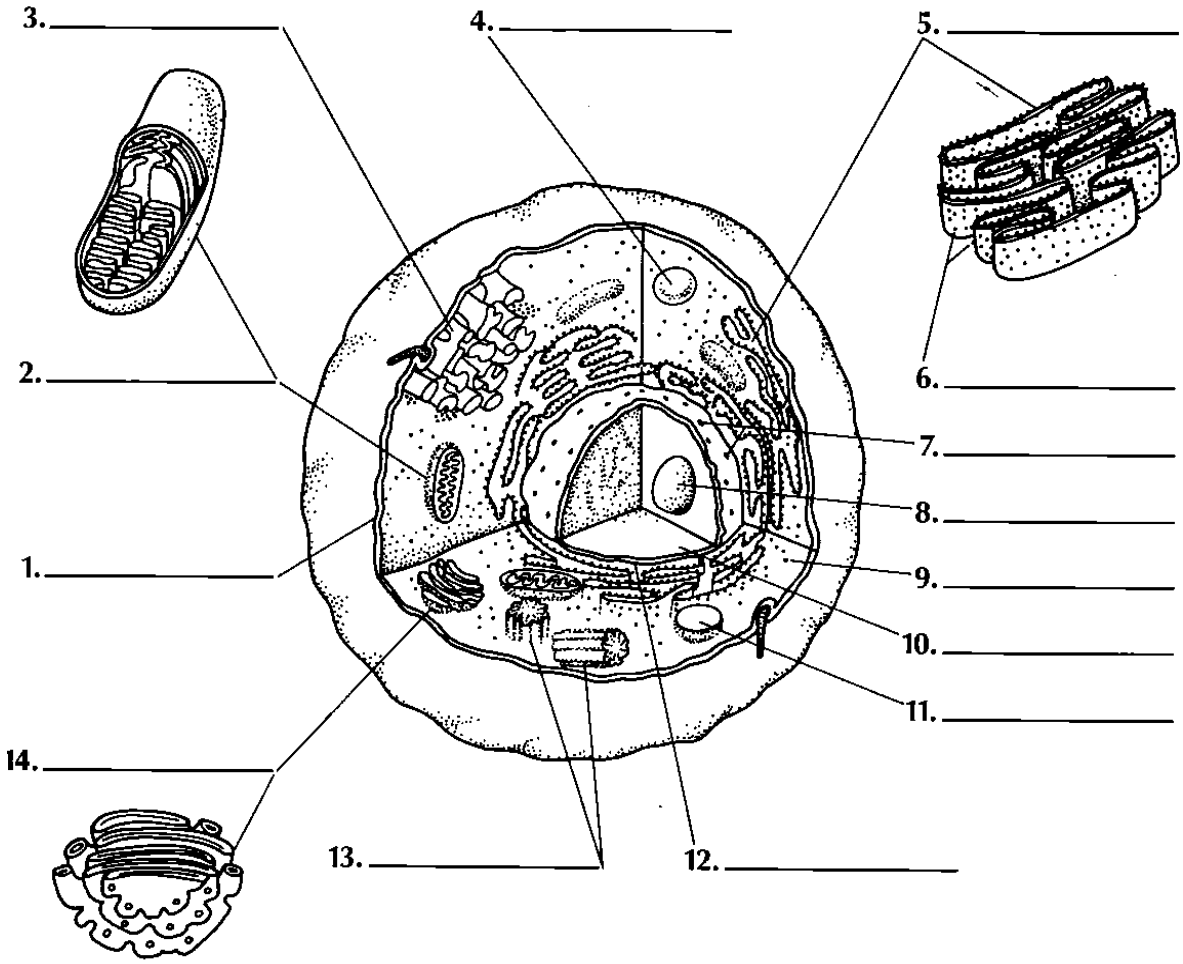
Biology 11/12 Computerized Assessment Banks.

Appendix A

Diagrams

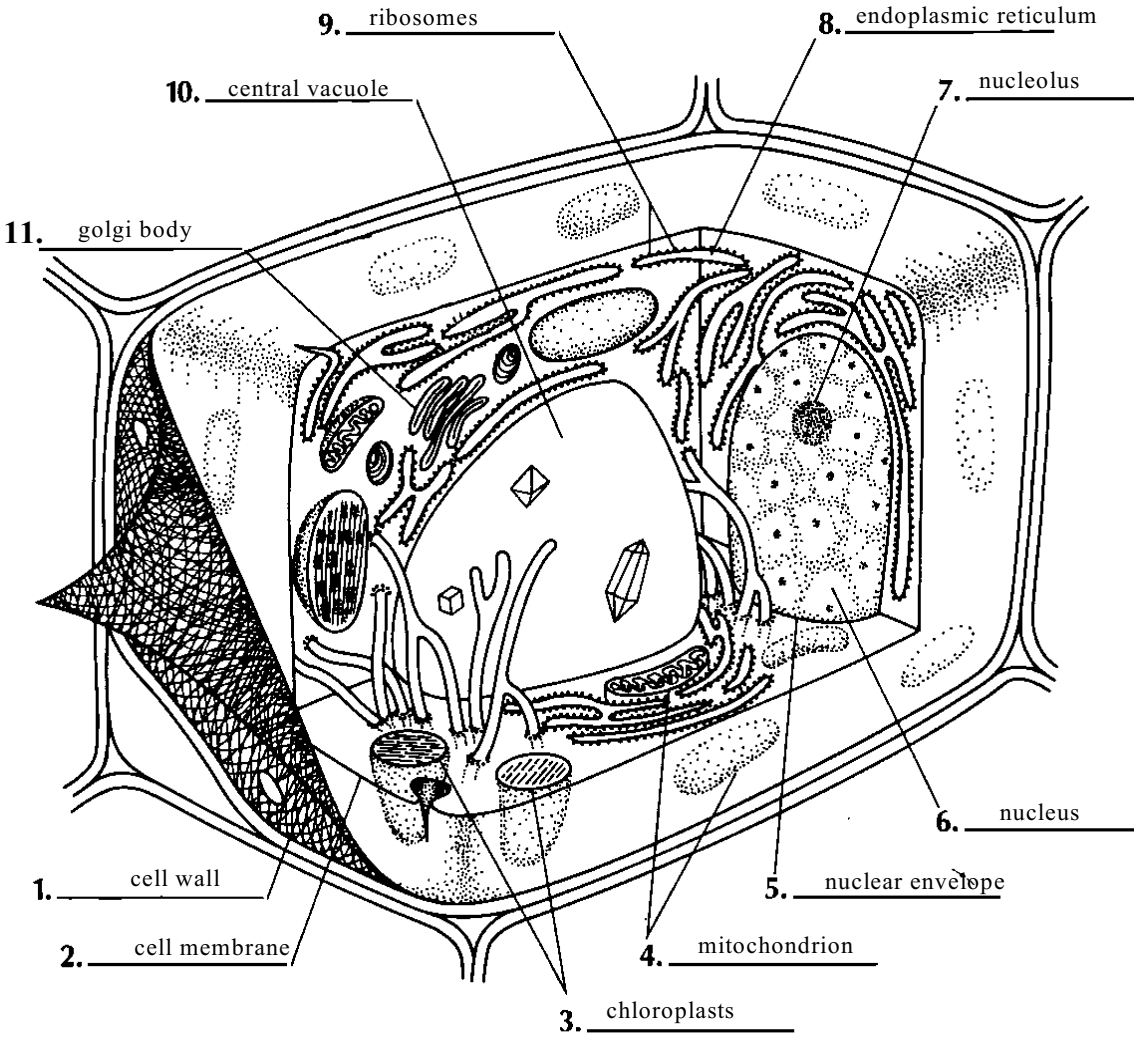


Generalized Structure of a Plant Cell

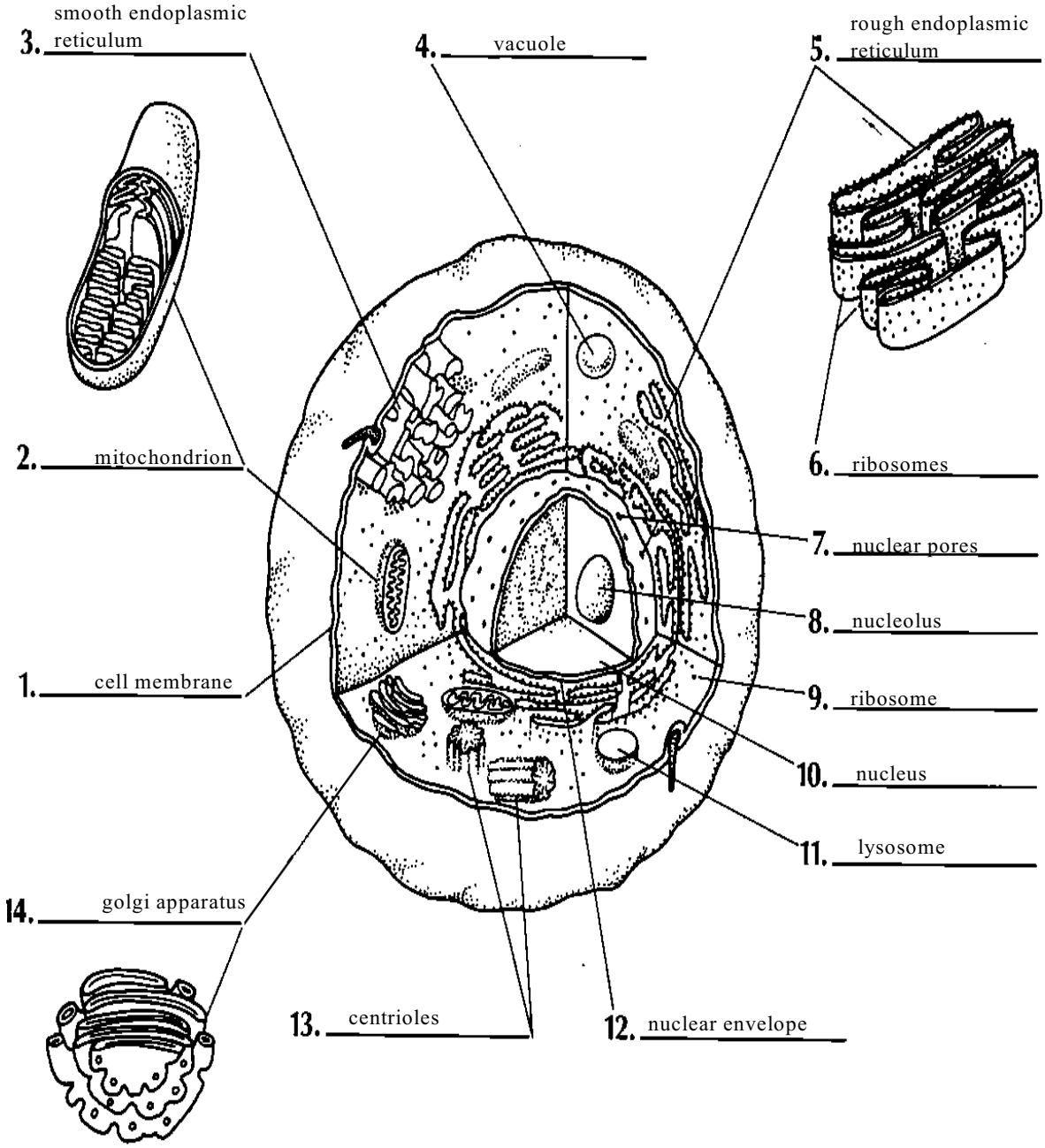


Generalized Structure of an Animal Cell

Answer Sheets



Generalized Structure of a Plant Cell - ANSWER SHEET



Generalized Structure of an Animal Cell - ANSWER SHEET