Adult Basic Education

Science

Biology 3101B

Reproduction and Development

Study Guide

Prerequisites: Biology 2101A
Biology 2101C
Biology 3101A

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 3101B

Biology 3101B is the second of three courses (the others are Biology 3101A and Biology 3101C) that are equivalent to Biology 3201 in the current high school system. **This course is a pre-requisite for Biology 3101C.**

Biology 2101A, *The Cell*, Biology 2101C, *Maintaining Dynamic Equilibrium I*, and Biology 3101A, *Maintaining Dynamic Equilibrium II*, are **pre-requisites** for this course. However, before deciding to leave out any courses in the Biology concentration, you should ensure that you are aware of what courses you will need to complete in order to meet the entrance requirements for the receiving post-secondary institution that you plan to attend.

Biology 3101B helps you to understand the principles of how living organisms reproduce and develop at both the cellular and individual levels. The primary emphasis is placed on human systems. You should begin to appreciate the complexity and importance of reproductive technologies and be able to discuss and analyze, from a variety of perspectives, the relative risks and benefits that these technologies create.

You will have labs for this unit. Let your instructor know in advance that you are getting close to needing to do these labs. Each lab will require a written lab report, which will be evaluated as part of your course mark. In addition, there are assignments that you will be required to complete and submit to your instructor for marking. The marks that you get on the labs and assignments will contribute to your final mark in the course.

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 - Cell Division

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

Reading for this unit: *Biology*
Chapter 14: Introduction: page 458
Section 14.1: pages 460-467
Section 14.2: pages 470- 479

References and Notes

Referring to pages 460 - 465, write answers for questions 1.1 - 1.6 ▶ ▶

In addition to the words you are explaining by answering the questions, you should know how to use the following terms correctly as you complete the writing for this section:

- *chromatin*
- *parent cell*
- *daughter cell*
- *chromosomes*
- *sister chromatids*
- *centromere*

Work to Submit

Writing:

1.1 Define
(i) cell cycle
(ii) mitosis
(iii) cytokinesis

1.2 (a.) Why do organisms need new cells?

(b) What is the function of mitosis?

1.3 What happens during interphase?

1.4 Describe what happens during each of the stages of mitosis;
(i) prophase
(ii) metaphase
(iii) anaphase
(iv) telophase

1.5 Label the diagram showing the stages of mitosis (found in Appendix A).

1.6 Why is it important that each daughter cell has the same number of chromosomes as the parent cell?

Unit 1 - Cell Division

References and Notes	Work to Submit
Referring to Investigation 14.A; "Observing the Cell Cycle in Plant and Animal Cells", pages 466-467 ▶ ▶ **Note:** *"Exploring Further" section of the Lab is not required.* **Viewing:** *If you have internet access, you can go to http://www.mcgrawhill.ca/school/booksites/biology/student+resources/toc/unit+5+reproduction+and+development/chapter+14+cellular+reproduction/cool+stuff+to+see+and+do/movie+mitosis+and+cell+division.php and view the movie Mitosis and Cell Division.*	**Laboratory:** Complete the investigation and record your observations. Complete *Post Lab Questions* and *Conclude and Apply* section

Unit 1 - Cell Division

References and Notes	Work to Submit
Referring to pages 470-478, write answers for questions 1.7 - 1.11 ▶▶ *In addition to the terms included in the questions, you should know how to use the following terms correctly as you complete the writing for this section:* ▪ *haploid* ▪ *diploid* ▪ *reduction division* ▪ *autosome* ▪ *sex chromosome* ▪ *homologous chromosome* ▪ *tetrad* ▪ *crossing over* ▪ *non-sister chromatid*	**Writing:** 1.7 Define meiosis. 1.8 Describe what happens during each of the stages of meiosis I and meiosis II; (i) prophase I (ii) metaphase I (iii) anaphase I (iv) telophase I (v) prophase II (ii) metaphase II (iii) anaphase II (iv) telophase II 1.9 Label the diagram showing the stages of meiosis (found in Appendix A). 1.10 Why is it necessary that the number of chromosomes is reduced during the production of sex cells? 1.11 Define crossing-over and explain how it contributes to genetic variation.

Unit 1 - Cell Division

References and Notes

Referring to pages 477-478, write answers for questions 1.12 - 1.14
▶▶

You should know how to use the following terms correctly as you complete the writing for this section:

- *gametogenesis*
- *spermatogenesis*
- *oogenesis*
- *spermatagonium*
- *oogonium*

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:

1.12 (a) Define spermatogenesis.

(b) Briefly describe the process of spermatogenesis.

1.13 (a) Define oogenesis.

(b) Briefly describe the process of oogenesis.

(c) Why is only one functional egg produced during oogenesis?

1.14 Copy and complete the following table comparing human sperm and egg cells:

	Sperm Cell	Egg Cell
Size		
Energy Reserves		
Mitochondria		
Numbers Produced		
Motility		
Outer structure		

Unit 2 - Reproductive Systems: Strategies

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

Reading for this unit: *Biology*

Chapter 6:	Section 6.2:	pages 175-177
	Section 6.3:	page 186
Chapter 5:	Section 5.1:	page 134
	Section 5.3:	pages 154, 155, 157
Table 1:	"Modes of Reproduction" in Appendix A	

References and Notes

Referring to the table "Modes of Reproduction" in Appendix A, write answers for questions 2.1 - 2.3 ▶▶

In addition to the terms included in the questions, you should know how to use the following terms correctly as you complete the writing for this section:

- *anther*
- *pollen*
- *filament*
- *stigma*
- *style*
- *ovary*
- *petal*
- *sepal*
- *pollination*

Work to Submit

Writing:

2.1 Explain the difference between sexual and asexual reproduction.

2.2 Name 4 types of asexual reproduction, give a brief description and a representative example of each.

2.3 (a) Label the diagram of the reproductive structures in a flowering plant (found in Appendix A).

(b) Give the function of each of the following:
- (i) pistil
- (ii) stamen
- (iii) pollen
- (iv) ovules
- (v) seed
- (vi) fruit

Unit 2 - Reproductive Systems: Strategies

References and Notes	Work to Submit
As you work through Investigation 6.A,"Reproductive Structures in Flowers", pages 176-177 ⏯⏯	**Laboratory**: Record your observations as you complete Investigation 6.A.
Note: *Exploring Further section is not required.*	Complete "Post Lab Questions" and "Conclude and Apply".
	Writing:
Referring to pages 175-176, write answers for question 2.4 ⏯⏯	2.4 Starting with pollination and ending with seed formation, describe the process of sexual reproduction in flowering plants.
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 - Reproductive Systems: Regulation

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

Reading for this unit: *Biology*
Chapter 15: Section 15.1: pages 486 - 499

References and Notes

Referring to pages 486-489, write answers for questions 3.1 - 3.2 ▶▶

In addition to the terms included in the questions, you should know how to use the following terms correctly as you complete the writing for this section:

- *puberty*
- *menstrual cycle*
- *follicle*
- *ovulation*
- *menstruation*

Work to Submit

Writing:

3.1 (a) Label the diagram of the human male reproductive system (found in Appendix A).

(b) Describe the function of the following parts of the human male reproductive system:

(i) testis
(ii) scrotum
(iii) seminiferous tubules
(iv) epididymis
(v) sperm duct (vas deferens)
(vi) Cowper's (bulbourethral) gland
(vii) seminal vesicle
(viii) prostate
(ix) urethra

3.2 Give the function of the following hormones:

(i) inhibin
(ii) follicle stimulating hormone (FSH)
(iii) luteinizing hormone (LH)
(iv) testosterone

Unit 3 - Reproductive Systems: Regulation

References and Notes	Work to Submit
Referring to pages 490-492, write answers for question 3.3 ▶▶	**Writing:** 3.3 (a) Label the diagram of the human female reproductive system (found in Appendix A). (b) Describe the function of the following parts of the human female reproductive system: (i) ovary (ii) follicles (iii) oviduct (fallopian tube) (iv) fimbriae (v) uterus (vi) endometrium (vii) cervix (viii) vagina
Referring to pages 496-499, write answers for question 3.4 ▶▶	3.4 Give the function of the following hormones: (i) estrogen (ii) progesterone (iii) luteinizing hormone (LH) (iv) follicle stimulating hormone (FSH)
Assignment 1 is found in Appendix B of this Study Guide. Refer to pages 496 - 499 to do the assignment. ▶▶	**Assignment:**
Note: ***The material covered in the assignments will not be tested. You should submit the completed assignments to your instructor for marking.***	Complete Assignment 1, "Sexually Transmitted Infections".

Unit 4 - Reproductive Technologies

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

Reading for this unit: *Biology*
Chapter 15: Section 15.2: pages 500 - 505

References and Notes

Assignment 2 is found in Appendix B of this Study Guide. Refer to pages 501-502 to do the assignment. ▶▶

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

Work to Submit

Assignment:

Complete Assignment 2, "Reproductive Technologies".

Unit 5 - Embryonic Differentiation and Development

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

Reading for this unit: *Biology*
Chapter 15: Section 15.3: pages 506-514

References and Notes

Referring to pages 506-509, write answers for questions 5.1 - 5.6 ▶▶

In addition to the terms included in the questions, you should know how to use the following terms correctly as you complete the writing for this section:

- *zygote*
- *embryo*
- *fetus*
- *trimester*
- *labour*

Work to Submit

Writing:

5.1 Trace the path of the sperm from the epididymis of the male to the oviduct of the female.

5.2 Describe the process of fertilization.

5.3 (a) How are fraternal twins produced?

(b) How are identical twins produced?

5.4 (a) Define cleavage.

(b) What is a morula?

(c) What is a blastocyst?

(d) What is implantation and when does it occur?

5.5 (a) What is a gastrula?

(b) What do we call the layers of the gastrula?

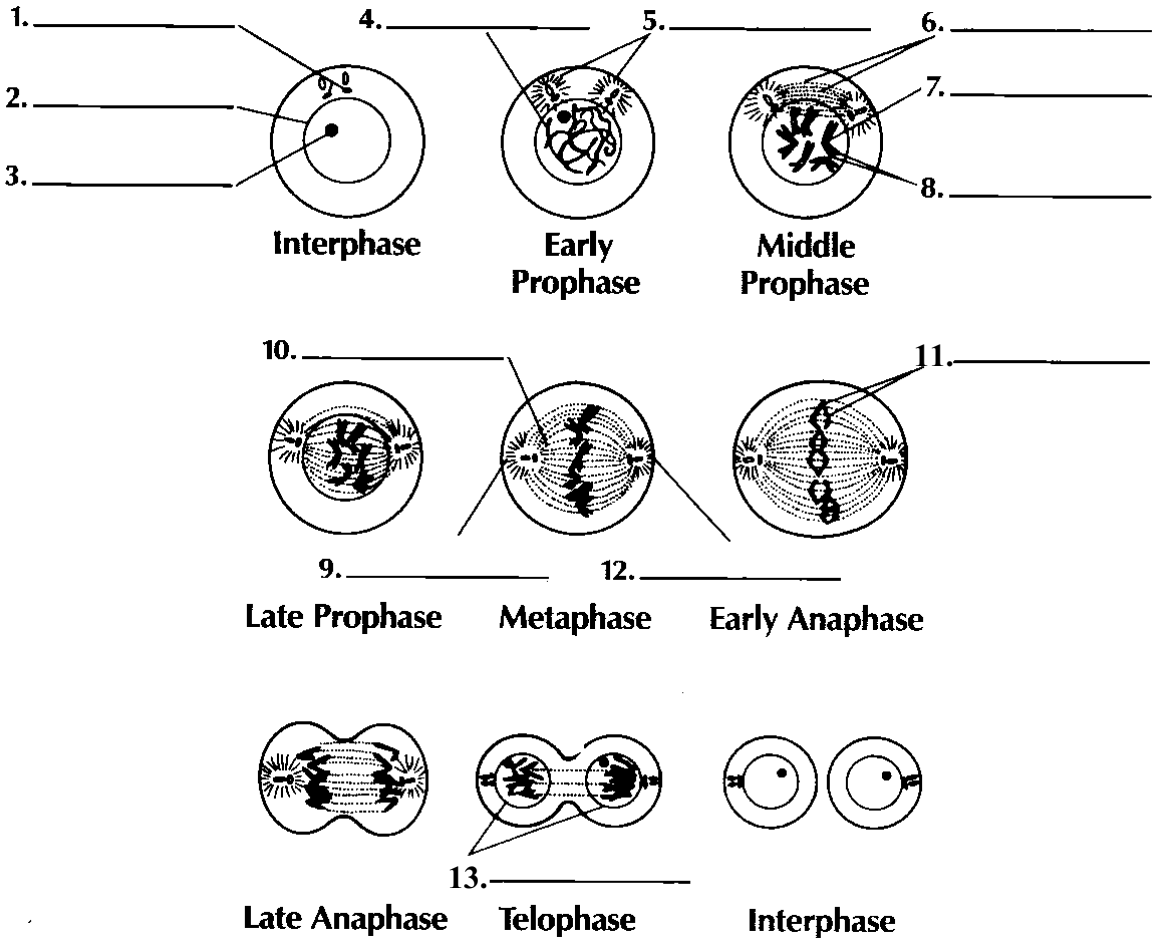
5.6 What is differentiation?

Unit 5 - Embryonic Differentiation and Development

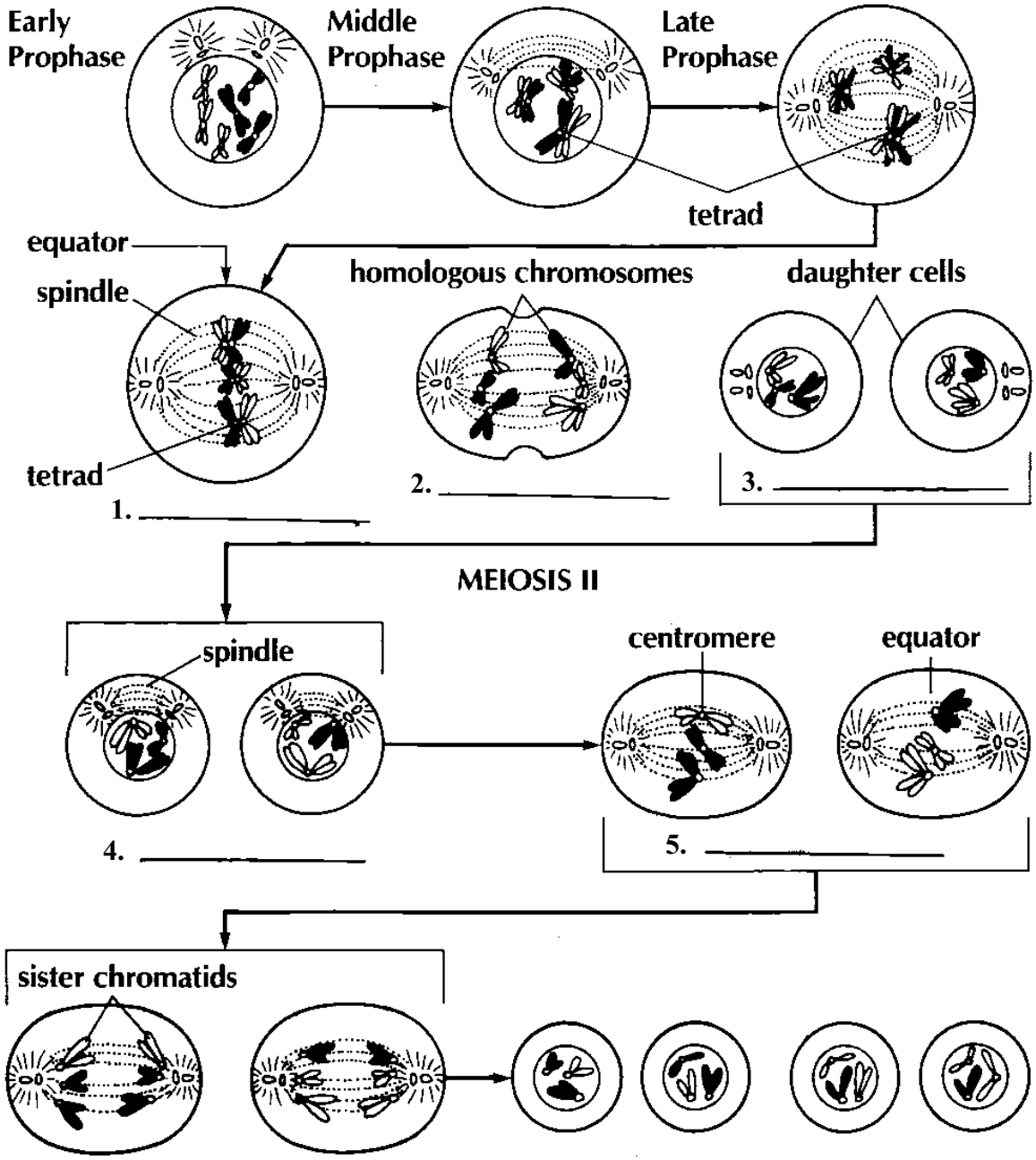
References and Notes	Work to Submit
Referring to pages 510-513, write answers for questions 5.7 - 5.9 ▶▶	**Writing:** 5.7 Define and give the function of the placenta. 5.8 Define and give the function of the umbilical cord. 5.8 (a) Define teratogen. (b) Describe the effects of 2 teratogens (cigarette smoke and alcohol) on a developing embryo. 5.9 Briefly describe the 3 stages of childbirth (dilation stage, expulsion stage, placental stage).
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.	

Appendix A

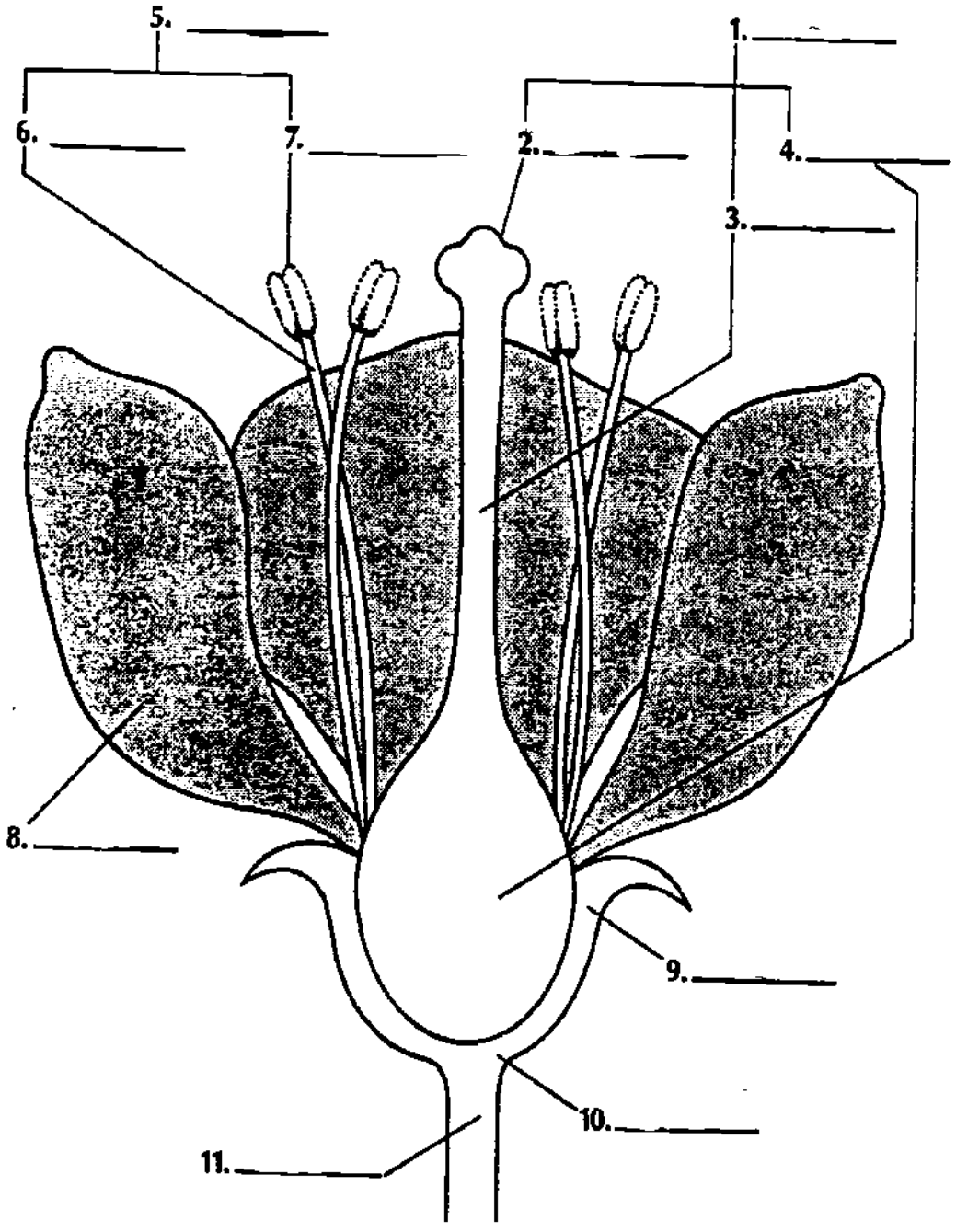
Diagrams



Interphase and Mitotic Cell Division in Animal Cells



Stages of Meiosis

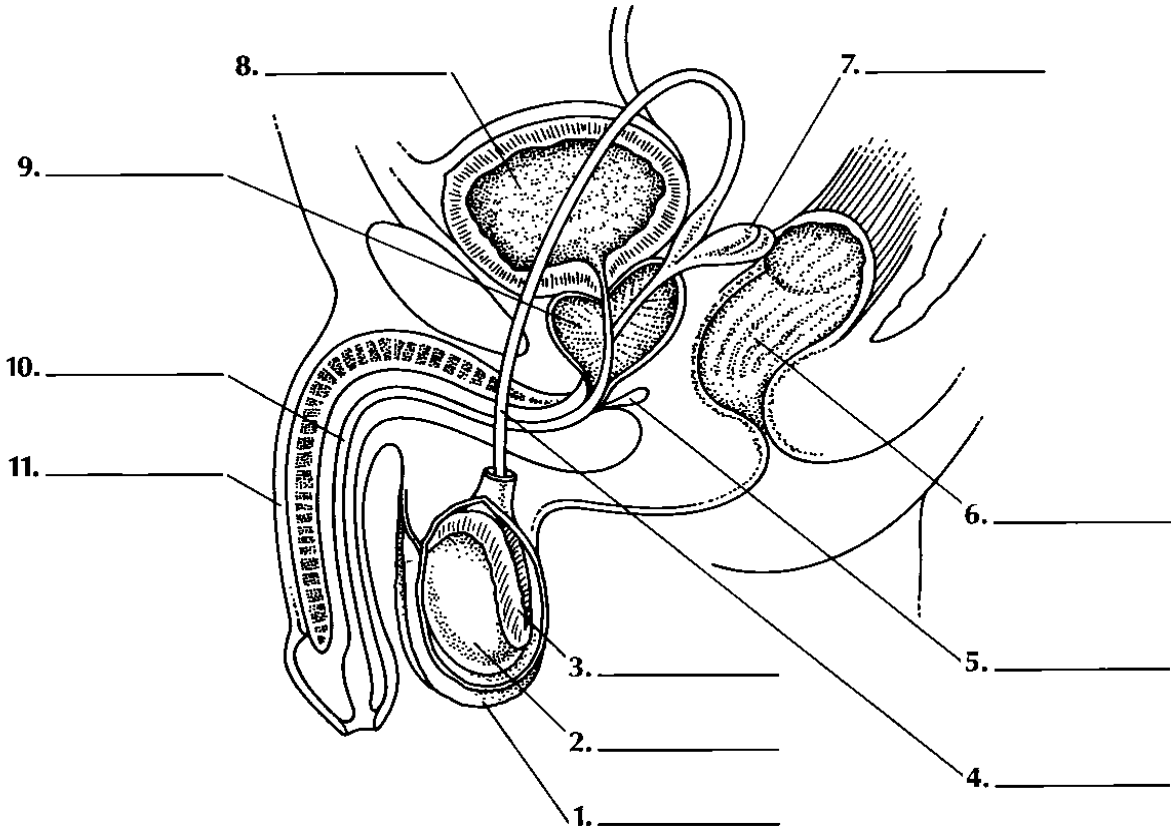


Reproduction Structures in a Flower Plant

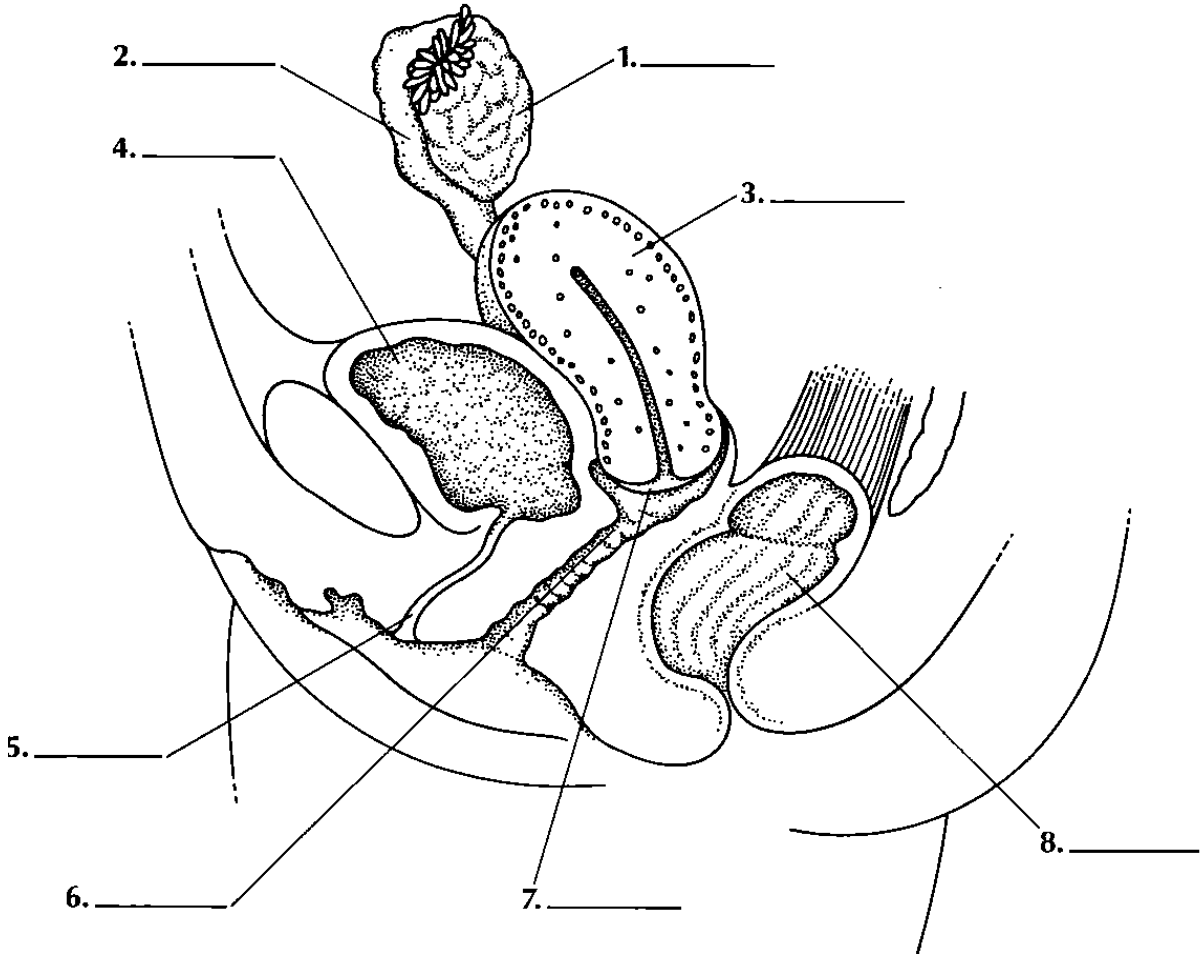
Table 1
Modes of Reproduction

	Types	Description	Representative Example
Asexual *One Parent cell divides by mitosis to produce 2 identical cells which are clones of the parent.*	Budding	An outgrowth on the parent organism develops into a new organism that separates from the parent.	Ultimately, yeast, and hydra
	Binary Fission	Through mitotic cell division copies of the parent are made the parent "splits" to create new cells.	Bacteria
	Sport Production	Through mitotic cell division copies of the parent are made the parent "splits" to create offspring.	Fungi eg. Rhizopus
	Fragmentation	Pieces of the parent organism break off and are dispersed. Each section is able to form a new organism.	House Plants grown from cuttings
	Parthenogenesis	Through mitotic cell division offspring are produced from unfertilized eggs.	Some insects eg. Balsam Wolly aphid

Sexual	*New offspring are created as a result of the fusion of egg and sperm nuclei. The offspring resemble but are not identical tot he parents.*



Reproductive System of Human Male



Reproductive System of Human Female

Appendix B

Assignments

Assignment 1

Sexually Transmitted Infections

1. What does STI stand for?

2. Describe the cause, symptoms and treatments for each of the following STI's:

    (i) HIV and AIDS

    (ii) chlamydia

    (iii) hepatitis B

    (iv) genital herpes

    (v) syphilis

    (vi) gonorrhea

Assignment 2

Reproductive Technologies

1. Define contraception.

2. Give a brief description of each of the methods of birth control listed below and explain how it works:

(i) abstinence

(ii) birth control pills

(iii) NorplantTM (implant)

(iv) morning after pill

(v) Depo-ProveraTM (needle)

(vi) IUD (intrauterine device)

(vii) tubal ligation

(viii) diaphragm

(ix) spermacidal jellies and foams

(x) condom

(xi) vasectomy

(xii) rhythm method