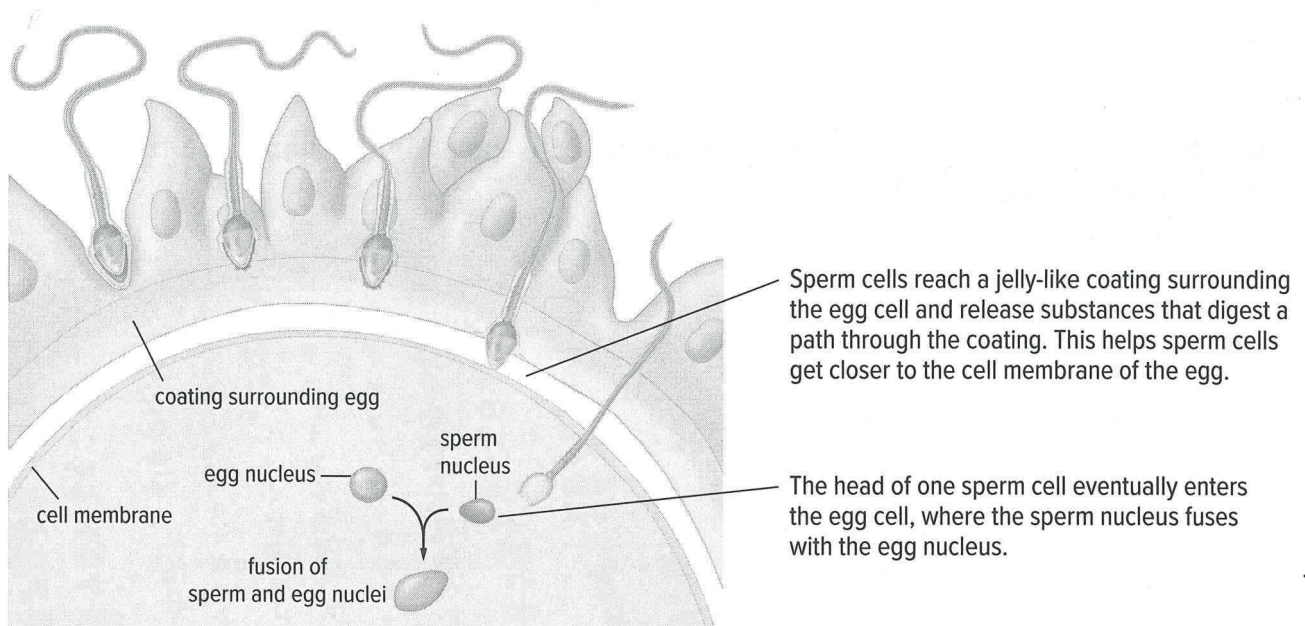


## How do living things sexually reproduce?

Use with textbook pages 44-57.

### Gametes

**Gametes**, also known as sex cells, are required during sexual reproduction. The male gamete is the *sperm* and the female gamete is the *egg*. The sperm combines with the egg to form a *zygote* in a process called **fertilization**. Half of the genetic material of the zygote comes from the sperm and the other half comes from the egg. The figure below shows the union of the egg and the sperm.

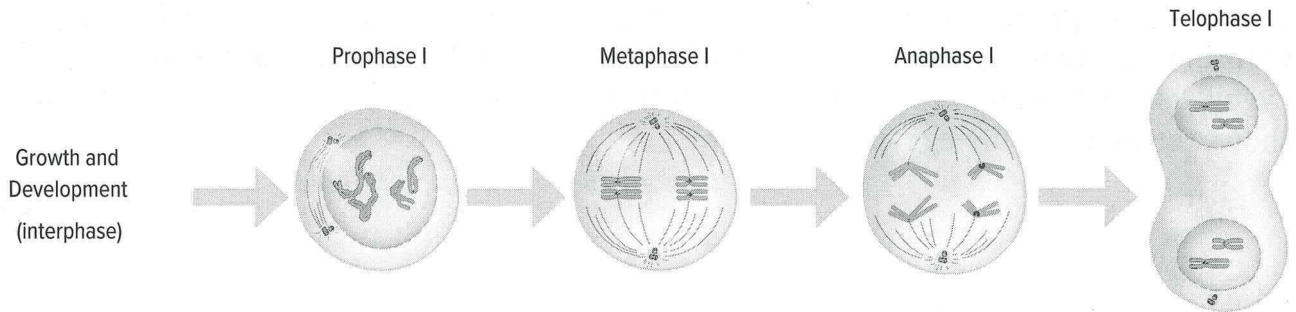


### Haploid and Diploid

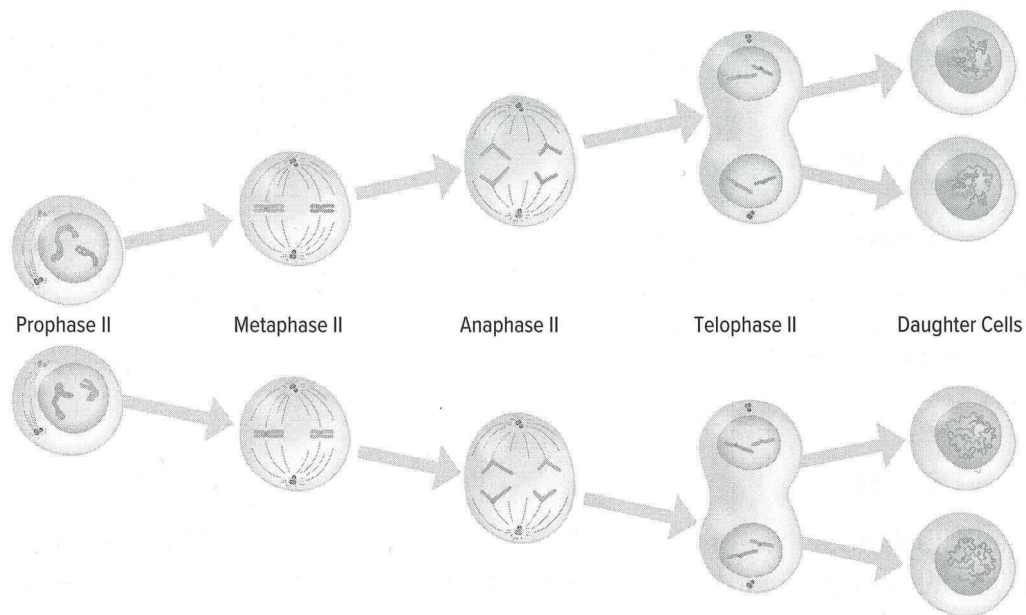
Gametes have half the normal number of chromosomes and are said to be **haploid**. When two gametes combine, they form a cell that is **diploid**, having a full set of chromosomes. These chromosomes are paired and are called *homologous chromosomes*. In the pair, one chromosome comes from the female parent and the other comes from the male parent. Figure 1.19 on page 49 shows the difference between haploid and diploid cells.

## Meiosis

During **meiosis**, a diploid cell undergoes two consecutive cell divisions to produce four haploid cells. These four cells are the gametes that will be involved in sexual reproduction. The figure below shows the first cell division.



Once the cell has divided once, the two daughter cells each divide again. The figure below shows the second cell division.



## Human Development

After fertilization, the single-celled *zygote* undergoes a series of cell divisions to become an *embryo*. The embryo continues to divide, grow, and develop into a fetus. Table 1.2 on page 53 of the textbook shows the key prenatal developments over nine months.

## Sexual Reproduction in Other Organisms

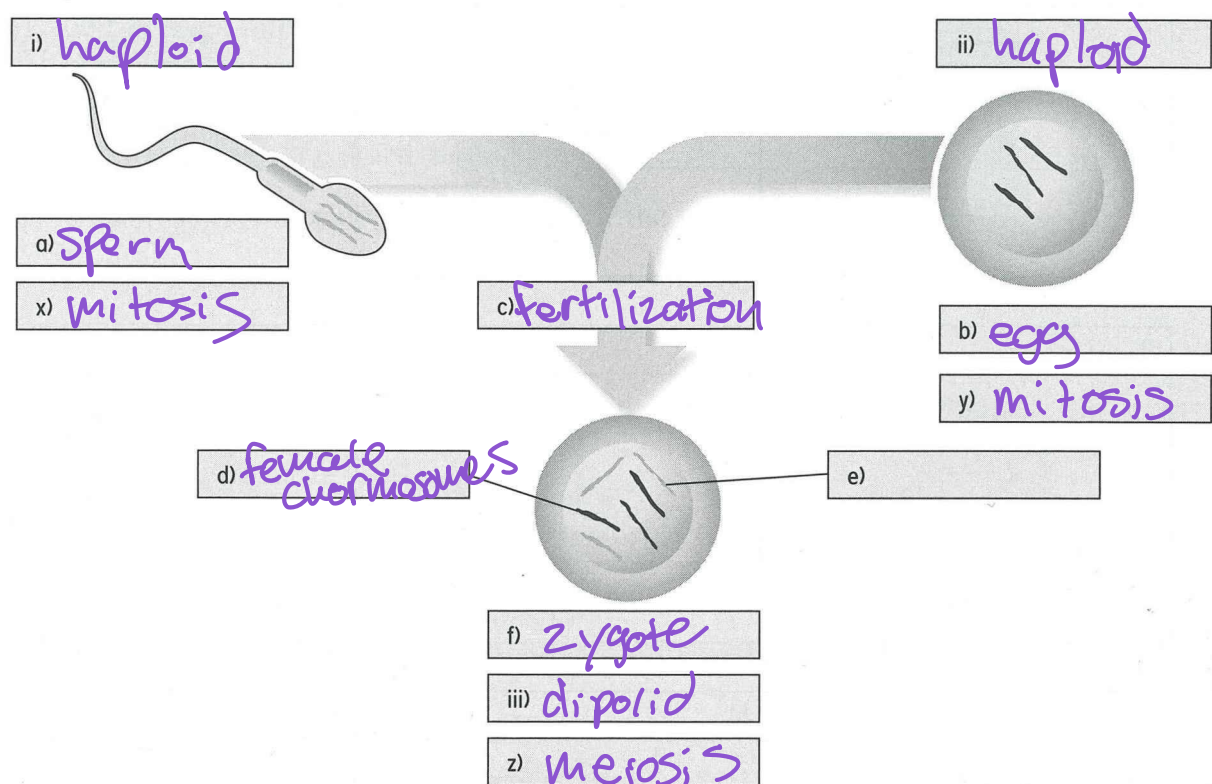
Other organisms reproduce through sexual reproduction as well. Some fertilized eggs develop inside the female's body, while others develop outside the body. In plants, seeds and pollen are involved in pollination and fertilization. Refer to Figure 1.23 on pages 54 and 55 of the textbook to review the different ways organisms reproduce.

## Gametes

Use with textbook pages 46-48.

### 1. Label the diagram below.

- Use the following terms for parts a) to f): **female chromosome, male chromosome, egg, fertilization, sperm, zygote.**
- Use the following terms for parts i), ii), and iii), **diploid, haploid.**
- Identify the method (mitosis or meiosis) that produces the cell. Label boxes x), y), and z).



### 2. Determine how many chromosomes are in the gametes and body cells of these organisms.

	Organism	Number of Chromosomes in the Gametes	Number of Chromosomes in the Body Cells
a)	Human, <i>Homo sapiens</i>	23	46
b)	Sea otter, <i>Enhydra lutris</i>	19	38
c)	Spirit bear, <i>Ursus americanus</i>	37	74
d)	Chinook salmon, <i>Oncorhynchus tshawytscha</i>	34	68
e)	Red fox, <i>Vulpes vulpes</i>	17	34

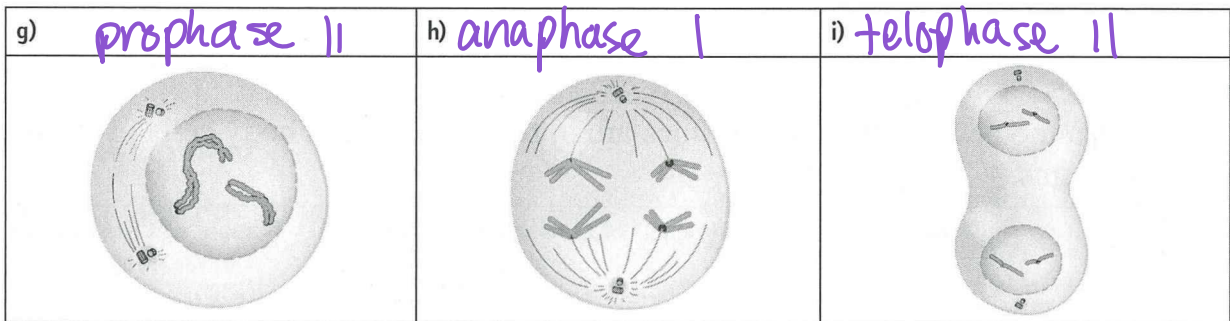
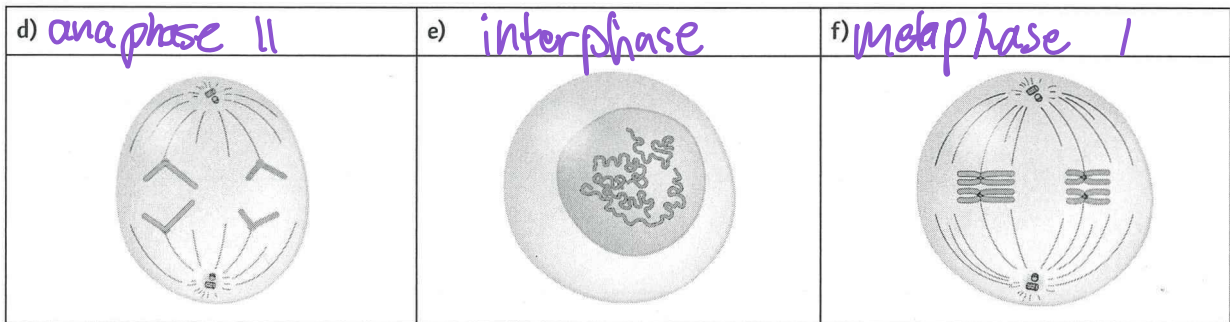
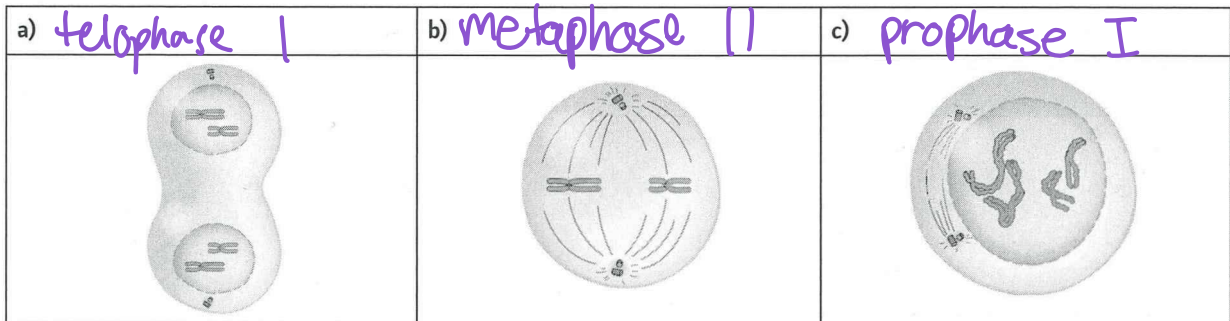
## Meiosis

Use with textbook pages 49-51.

1. What is the purpose of meiosis?

To create more cells that makes up the body

2. Label each diagram with the corresponding stage of meiosis: **anaphase I**, **anaphase II**, **interphase**, **metaphase I**, **metaphase II**, **prophase I**, **prophase II**, **telophase I**, **telophase II**.



3. Which stage of meiosis is each of the following statements describing? Choose from the following list of terms: **anaphase I**, **anaphase II**, **metaphase I**, **metaphase II**, **prophase I**, **prophase II**, **telophase I**, **telophase II**, **interphase**.

- a) two nuclei form telophase I
- b) four nuclei form telophase II
- c) cell is growing and developing interphase
- d) homologous chromosomes pair up prophase I
- e) cell divides into two daughter cells telophase I
- f) cell divides into four daughter cells telophase II
- g) DNA condenses into chromosomes prophase I
- h) nuclear membrane starts to disappear prophase I
- i) chromosomes line up in the middle of the cell metaphase I
- j) DNA exists as chromosomes but not homologous pairs  
prophase II
- k) chromosomes separate and move to the ends of the cell  
anaphase I
- l) each nuclei formed has a complete copy of the cell's DNA  
telophase I
- m) nuclear membrane starts to disappear and homologous chromosomes pair  
prophase I
- n) homologous chromosome pairs separate and start to move to the two ends of the cell  
anaphase I
- o) spindle fibres line up the homologous chromosome pairs in the middle of the cell  
metaphase I

**Human Development***Use with textbook pages 52-53.***1. Skim, Scan, and Study**

As you read Concept 3, determine the purpose for reading pages 52 and 53. Review the three different purposes for reading and the different approaches.

Purpose	Reading Approach
Preview the text to get an idea of what the text contains.	Skim: Read the text over quickly.
Find specific information.	Scan: Read the text somewhat quickly.
Learn a new concept.	Study: Read the text slowly.

You can determine the reading approach by the placement and features of the text. For example, text that is placed in the introductory paragraph is often meant to stimulate interest and may not include important concepts. Text with boldfaced words should be read slowly.

Choose the reading approach that you think should be used for each of the following tasks and explain why. Skim, scan, or study to complete each task and determine whether the approach chosen is appropriate.

- a) Get a general idea about Figure 1.22.

Human development from fertilized egg to newborn in embryonic + fetal

- b) Determine when the embryonic stage and the fetal stage occur during prenatal development.

embryonic - first 8 weeks after implantation  
fetal - next 30 weeks until birth

- c) Learn what happens during each of the nine months in prenatal development.

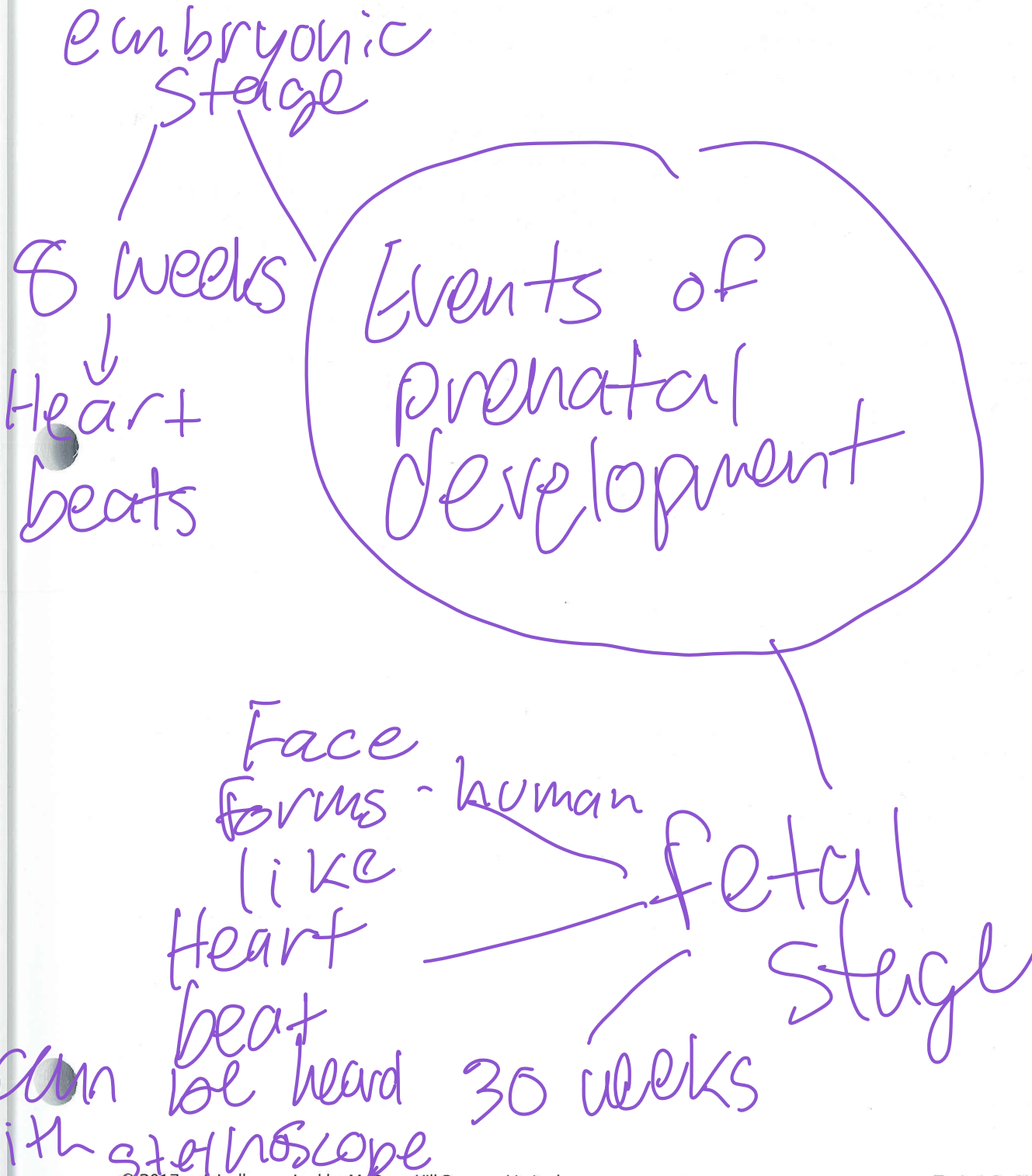
1-3) limbs, spinal column and nervous system, fused eyelids.

4-6) face, Heartbeat can be heard, mom can feel movements.

7-9) upside down fetus, can survive if born, fat + more of nails.  
Looks more normal.

## 2. Using Graphic Organizers

Summarizing concepts with a graphic organizer can help you comprehend and remember concepts better. Use lines and arrows to show sequence relationships. Create a graphic organizer of your choice to summarize the events that occur during prenatal development.



## Different Types of Sexual Reproduction

Use with textbook pages 54-55.

### 1. Summarizing

Summarizing means to restate the main ideas in your own words. A summary can be in point form, in sentence form, or graphic form. For example, the first row of the table below shows you how to create a summary of the concepts covered on pages 54 and 55. Complete the rest of the table.

Section of the Text	Main Topic	What the Text Says about the Main Topic	Supporting Details
Page 54, statement 1 about mammals	Development inside the female occurs in mammals.	"Development from fertilized egg to offspring of most mammals occurs inside the female, who is also the source of nourishment."	<ul style="list-style-type: none"> <li>• A cow carries a young elk inside her and gives birth.</li> <li>• The fetus of a sea otter develops inside the female sea otter.</li> <li>• A baby orca grows inside the mother.</li> </ul>
Page 54, statements 2-5 about insects	Some insects develop without fertilization	In some insects, such as bees, eggs can develop without fertilization.	<ul style="list-style-type: none"> <li>• mantis bites off the head of the male (that she mates with)</li> </ul>
Page 54, statement 6 about fungi	they can produce sexually and asexually	Fungi such as yeasts and mould can reproduce sexually and asexually as well as other organisms	<ul style="list-style-type: none"> <li>• Sexual reproduction in fungi is different from other organisms</li> </ul>
Page 55, statements 1-2 involving eggs	eggs develop into offspring outside the female's body	"fertilized eggs develop into offspring outside the female's body"	<ul style="list-style-type: none"> <li>• offspring are released when the eggs hatch</li> </ul>
Page 55, statements 3-4 about plants	Plants reproduce in different ways.	"plants sexually reproduce in different ways"	<ul style="list-style-type: none"> <li>• pollen can be transferred by wind</li> <li>• seeds require pollination</li> </ul>



## 1.3 Assessment

Match each term on the left with the best description on the right. Each description may be used only once.

Term	Description
1. <u>C</u> diploid	A. a sex cell
2. <u>A</u> gamete	B. union of the egg and sperm
3. <u>E</u> haploid	C. has a full set of chromosomes
4. <u>D</u> meiosis	D. process that produces haploid cells
5. <u>B</u> fertilization	E. has half the number of chromosomes

Circle the letter of the best answer for questions 6 to 20.

6. What does the female parent contribute in sexual reproduction?
  - A. an egg
  - B. a sperm
  - C. a zygote
  - D. an ovary
7. Where are sperm produced?
  - A. in the brain
  - C. in the testes
  - B. in the uterus
  - D. in the ovaries
8. How are eggs and sperm similar?
  - A. They are diploid cells.
  - B. They are haploid cells.
  - C. They are produced by mitosis.
  - D. They are produced by fertilization.
9. What is formed when a sperm fertilizes an egg?
  - A. a zygote
  - B. a gamete
  - C. a haploid cell
  - D. a homologous chromosome
10. The Vancouver Island marmot has 40 chromosomes in its body cells. How many chromosomes would you expect a male marmot to have in its sperm cells?
  - A. 10 chromosomes
  - B. 20 chromosomes
  - C. 40 chromosomes
  - D. 80 chromosomes

11. The gametes of a white-tailed deer have 35 chromosomes. When the sperm of a white-tailed buck combines with the egg of a white-tailed doe, how many chromosomes would the zygote have?
- A. 17.5 chromosomes
  - B. 35 chromosomes
  - C. 70 chromosomes
  - D. 140 chromosomes
12. What usually combines during fertilization?
- A. zygotes
  - C. gametes
  - B. embryos
  - D. diploid cells
13. Which of the following shows the series of events in human development?
- A. embryo → zygote → sperm + egg → fetus
  - B. sperm + egg → fetus → zygote → embryo
  - C. zygote → fetus → embryo → sperm + egg
  - D. sperm + egg → zygote → embryo → fetus
14. What allows a zygote to develop into an embryo?
- A. the zygote dividing by mitosis over several weeks
  - B. the zygote dividing by meiosis over several weeks
  - C. the zygote developing into gametes through mitosis over several weeks
  - D. the zygote fusing with another zygote and then dividing by meiosis over several weeks
15. Which of the following is associated with sexual reproduction?

I	meiosis
II	pollination
III	fertilization

- A. I and II only
- B. I and III only
- C. II and III only
- D. I, II, and III

16. Which of the following applies to meiosis?

	Number of Cell Divisions	Number of Daughter Cells
<input checked="" type="radio"/> A.	2	4
<input type="radio"/> B.	2	2
<input type="radio"/> C.	1	4
<input type="radio"/> D.	1	2

17. Paired chromosomes are called

A. diploid.

C. asexual.

B. haploid.

D. homologous.

18. During which phase of meiosis are the homologous chromosome pairs lined up in the middle of the cell?

A. prophase I

C. telophase I

B. anaphase I

D. metaphase I

19. Four nuclei form around the sets of chromosomes during

A. prophase II.

C. telophase II.

B. anaphase II.

D. metaphase II.

20. When is the nuclear membrane disappearing during meiosis?

A. interphase and prophase I

C. telophase I and telophase II

B. prophase I and prophase II

D. metaphase I and anaphase II

21. Complete the following Frayer model for gametes.

