LEARNING OBJECTIVES

- Differentiate mitosis from meiosis
- Locate and describe the male and female reproductive organs
- Describe the function of the male and female reproductive organs
- Discuss the phases of the menstrual cycle
- Discuss the effects of hormonal control on the male and female reproductive systems
- Describe the stages of labor and delivery
- Explain common disorders of the male and female reproductive systems
ETHICAL DILEMMAS

1. Convicted pedophiles occasionally get the option of early release from prison if they agree to chemical castration, involving the injection of

ANSWERS TO TEST YOUR KNOWLEDGE

Test Your Knowledge 18–1 Answers, p. 461

1. c
2. b
3. d
4. c
5. b

Test Your Knowledge 18–2 Answers, p. 467

1. d
2. b
3. c
4. b
5. b

Test Your Knowledge 18–3 Answers, p. 470

1. b
2. c
3. b
4. c
5. b
Test Your Knowledge 18–4 Answers, p. 472
1. c
2. c
3. b
4. b
5. d

Test Your Knowledge 18–5 Answers, p. 476
1. b
2. d
3. a
4. b

Test Your Knowledge 18–6 Answers, p. 479
1. b
2. a
3. d
4. b

ANSWERS TO THE CASE STUDY, P. 485
Maria’s rather vague symptoms could be caused by many different problems. The doctor could try ultrasound, CAT scan, MRI, or even x-ray to look for problems in Maria’s abdomen. Pain in her abdomen and back could be the result of a tumor or a herniated disk or many other problems. The doctor might suggest a colonoscopy to check for problems in her digestive system or a cystoscopy to check for abnormalities in the urinary bladder. The doctor should also do a Pap smear.

However, Maria’s symptoms mainly point to endometriosis, the abnormal growth of endometrial tissue outside the uterus. Her pain and other symptoms are part of a group of often vague symptoms associated with endometriosis, the most common cause of infertility. Unfortunately, the only way to tell for sure if Maria has endometriosis is with a laparoscopy, exploratory abdominal surgery.

ANSWERS TO REVIEW QUESTIONS, P. 485

Multiple Choice
1. b, 2. a, 3. d, 4. c, 5. a, 6. d

Fill in the Blank
1. erection; ejaculation
2. seminal vesicles; prostate
3. Meiosis (reduction/division)
4. negative
5. fertilization
6. Endometriosis

**Short Answer**

1. Sperm are made in the seminiferous tubules of the testes. They mature in the epididymis. From the epididymis, sperm flow up the vas deferens and into the body. They pass the seminal vesicles and enter the urethra. Then sperm travel through the prostate and eventually out the end of the penis during ejaculation. The sperm will travel up the vagina into the uterus, eventually reaching the fallopian tubes, where fertilization takes place if an egg is present.

2. Four hormones control the female reproductive cycle: estrogen, progesterone, luteinizing hormone (LH), and follicle-stimulating hormone (FSH). (The levels of LH and FSH are controlled further by GnRH from the hypothalamus.)

   At puberty, estrogen and progesterone are secreted by the ovary, increasing LH and FSH secretion from the pituitary. FSH stimulates follicles to mature, and LH stimulates ovulation.

   The follicular (proliferative) phase of the menstrual cycle is characterized by increased estrogen, which causes increased FSH and LH, which causes increased estrogen, in a massive positive feedback loop. This positive feedback loop causes ovulation and proliferation of the endometrium.

   Once ovulation occurs, the feedback loop reverses itself. This begins the luteal (secretory) phase. The leftover ruptured follicle secretes progesterone and a bit of estrogen. Progesterone causes the feedback loop to become negative. Thus, LH, FSH, and estrogen secretion decrease. Therefore, another follicle doesn't mature; another egg doesn't ovulate; and the lining of the uterus is maintained for about 10 days. After 10 days, the progesterone levels decrease and the endometrium is shed if fertilization has not occurred. The decrease in progesterone levels also allows estrogen, LH, and FSH to rise again, eventually stimulating ovulation, and the cycle begins again.

3. Labor consists of three stages. In the dilation stage, the uterine smooth muscle begins to contract, thereby moving the fetus down the uterus and causing the cervix to begin to dilate. When the cervix is completely dilated (10 centimeters), the second stage (expulsion) begins, during which the baby is actually delivered. The last stage of labor is the placental stage, in which the placenta or afterbirth is delivered because of final uterine contractions.

4. Eggs and sperm, with only half as many chromosomes as other cells, are produced by meiosis in the gonads, testes in males and ovaries in females. Fertilization occurs, resulting in a zygote. The zygote undergoes millions of rounds of mitosis and development within the female to change from an *embryo* to a *fetus* (the infant that is not born yet). Eventually after years of mitotic growth an adult is formed. That adult is capable of making eggs and sperm, and the cycle continues.
5. The process by which eggs are produced is called oogenesis. Oogenesis begins with the birth of oogonia, or egg stem cells, in the ovary. The oogonia undergo mitosis, producing millions of primary oocytes during fetal development. Primary oocytes undergo meiosis. The primary oocytes stay in a kind of suspended animation until puberty, when they finish developing. These primary oocytes eventually are surrounded by helper cells, called granulosa cells. Once surrounded by granulosa cells, the primary oocyte and surrounding cells are known as primordial follicles. These primordial follicles stay dormant until puberty. Hormonal signals during puberty cause some primordial follicles to enlarge and increase the number of granulosa cells. These enlarged cells are then called primary follicles. Once a girl reaches puberty, one primary follicle will become a secondary follicle. The secondary follicle will not complete its development unless it is ovulated and fertilized.