Unit 6: Review Answers

Student Textbook pages 540-543

Answers to Understanding Concepts Questions

1. The human reproduction system is unique because its organs and chemical pathways are not all contained within the body of one individual—the interaction of two individuals is required for it to complete its function. In addition, it's the only body system that functions to support the continuation of the species, rather than to support the well-being of the individual.

2. Similarities between the male and female reproductive system should include any three of: a pair of gonads that produce sex hormones; both produce gametes with 23 chromosomes; both the male and female have internal and external sex organs; ducts and glands that control the formation and transport of gametes as well as secondary sex characteristics; sex hormones are regulated by negative feedback loops.

Differences between the male and female reproductive systems should include any three of: male gametes are motile, female gametes are not; males produce 100 million sperm a day, while females have a fixed number of gametes; male gametes are ejaculated daily, while one female gamete is released (typically) once per month; males deposit gametes in the females for fertilization; the female reproductive system has a finite span, the male reproductive system can function until death.

3. The male sex cell, the sperm, is a much smaller cell than the egg, being only about 0.06 mm long. The sperm has three parts: an oval head, a cylindrical middle piece, and an extended tail. The oval head contains the nuclear material, containing 23 chromosomes, and the acrosome,

which contains enzymes needed to penetrate the protective layer around the egg. The mid-piece contains many mitochondria that power the sperm's motility. The egg is a much larger gamete (approximately 0.1 mm), is not motile, and also contains 23 chromosomes. The mature egg contains a large quantity of cytoplasm to provide nourishment for the first few days after fertilization. It is also encased in a protective jelly-like layer that the acrosome of the sperm must penetrate for fertilization.

4. The primary germ layers are the endoderm, mesoderm and the ectoderm. They first appear in the gastrula.

5. The hormonal fluctuations during the month prepare a mature ovum and endometrium of the uterus each 28-day cycle. If fertilization does not occur, the ovum, tissues, and blood of the endometrium are shed through the vagina in the menstrual flow.

6. Seminiferous tubules are long coiled tubes in the testes, and they are where sperm is produced. Sertoli cells are found within the tubules; they support, regulate and nourish the developing sperm. Interstitial cells surround the seminiferous tubules, and they secrete male sex hormones. Sketch should be pased on Figure 14.3 on page 480 of the student textbook.

7. (a) The components of semen include: sperm, nutrients, alkaline and mucoid fluids

(b) testes (sperm); epididymis (supports maturing sperm); ductus deferentia (stores sperm); seminal vesicles (nutrients and fluid); prostrate gland (alkaline and mucoid fluids); Cowper's gland (alkaline and mucoid fluids). (Students' answers may begin with ductus deferentia.)

(c) Semen is mainly alkaline to neutralize the acidic environment of the female reproductive tract and help the sperm survive.

8. A. Ductus deferens
B. Urethra
C. Penis
D. Epididymis
E. Testis
F. Scrotum
G. Seminal vesicle
H. Prostate gland
I. Fimbriae
J. Ovary
K. Uterus
L. Cervix
M. Vagina

9.

Structure	Function
ductus deferens	conducts and stores sperm
urethra	conducts semen through the penis
penis	carries semen into the female reproductive tract
epididymis	supports developing sperm; stores mature sperm
testes	produce sperm and sex hormones
scrotum	pouch of skin that holds the testes
seminal vesicle	produces a mucoid fluid that contains energy in the form of fructose
prostate gland	contributes alkaline and mucoid fluids to semen
fimbriae	sweeps the ovum into the oviduct after it has been released
ovary	produces eggs in the female
uterus	houses and nourishes an embryo after implantation
cervix	connects the uterus to the vagina
vagina	entrance for penis to deposit sperm; exist for fetus during birth

10.

Hormone	Function in Males	Function in Females
GnRH	stimulates release of FSH and LH from the anterior pituitary	stimulates release of FSH and LH from the anterior pituitary
FSH	stimulates the development of the sex organs and gamete production	stimulates the development of the sex organs and gamete production
LH	stimulates the production of testosterone	triggers ovulation and (with FSH) stimulates the production of estrogen

Hormone	Function in Males	Function in Females
Estrogen	minor	stimulates the development of the female reproductive tract and secondary sex characteristics
Progesterone	minor	causes uterine thickening
Testosterone	stimulates the development of the male reproductive tract and secondary sex characteristics	minor

11. **(a)** *secreted by follicular cells*: estrogen and some progesterone

(b) *stimulates maturing of female sex organs:* GnRH, to trigger LH and FSH to trigger estrogen and progesterone

(c) *maintains the uterine lining during pregnancy:* progesterone

(d) *secreted by the corpus luteum:* progesterone (and some estrogen)

(e) *stimulates the development and function of the corpus luteum:* LH

(f) *promotes thickening of the endometrium:* estrogen

(g) *stimulates development of ovarian follicles:* FSH

(h) *high concentrations inhibit GnRH secretion:* FSH and LH

12. The male reproductive hormone testosterone is regulated by an internal feedback mechanism that keeps the level of testosterone relatively constant. GnRH is released from the hypothalamus; this triggers the release of FSH and LH from the anterior pituitary. FSH causes the interstitial cells to secrete testosterone and the seminiferous tubules to release inhibin. Inhibin acts on the anterior pituitary to inhibit production of FSH until the level drops enough to signal to the testes to release less inhibin so the anterior pituitary will release more FSH.

LH is also regulated by an internal feedback mechanism: LH causes testosterone to be released to maintain the secondary sex characteristics. Testosterone acts on the anterior pituitary to inhibit the release of LH until more testosterone is needed.

13. The inner cell mass and the trophoblast are both part of the blastocyst. The trophoblast is the outer layer, and this develops into the chorion, to ultimately become part of the placenta that nourishes the embryo. The inner cell mass develops into the actual embryo.

14. *Endoderm*: any two of: cellular lining of respiratory tract, digestive tract, urinary bladder, urethra; liver (most); tonsils (partial); gall bladder; parathyroid glands; pancreas; thyroid glands; thymus

Mesoderm: any two of: dermis of the skin; cellular lining of blood vessels, lymphatic vessels, body cavities; muscle tissue; connective tissue (including bone, cartilage, blood); adrenal cortex; kidneys and ureters; heart; spleen; internal reproductive organs

Ectoderm: any two of: outer skin (dermis) and associated structures (hair, nails, sweat glands, mammary glands); nervous tissue and sense organs; pituitary gland; tooth enamel; adrenal medulla; eye lens

15. *Chorion*: encloses all the other membranes and the embryo; forms the fetal portion of the placenta.

Amnion: develops from the embryonic disk and grows to enclose the embryo. It becomes filled with amniotic fluid to protect the embryo and is penetrated only by the umbilical cord.

Allantois: becomes the foundation for the umbilical cord and also part of the urinary bladder

Yolk Sac: contributes to the formation of the digestive tract and produces the first red blood cells, as well as the future egg or sperm cells

16. Seminiferous tubules are long, coiled tubes inside the testes. The function of the seminiferous tubules is to produce sperm.

17. **(a)** male

(b) The acrosome is a cap on the head of the sperm that contains enzymes that can digest a path through the coating that protects the egg and allow the sperm to penetrate and fuse with the egg.

18. The jelly-like coating and membrane of the egg are chemically stimulated to close up after penetration by a sperm, which prevents the egg from being fertilized by more than one sperm.

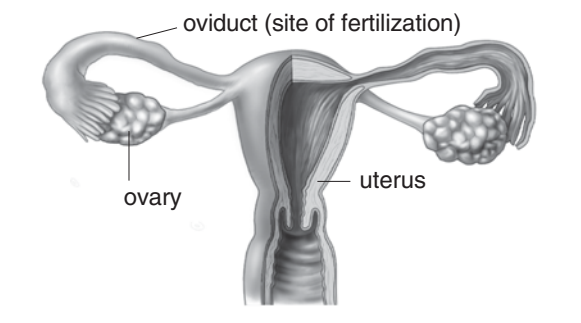
19. Answers could include: abstinence, and male and female condoms. The students may also answer that condoms coupled with other forms of birth control, such as the pill, are even more effective at preventing pregnancy than just condoms alone.

20. The morula is the 16-celled structure that leaves the oviduct (it was formed through cleavage after fertilization); it is the same size as the zygote. The blastocyst is the structure that forms after the morula fills with fluid that diffuses from the uterus. It has two different groups of cells (trophoblast and inner cell mass) and is the structure that implants in the endometrium.

21. No. Women cannot become pregnant because their hormone levels have changed after menopause. They no longer produce a mature ovum because of low FSH levels, nor do they ovulate due to lower levels of LH. In addition, menopausal women do not produce a thickened endometrium because of lower levels of estrogen and progesterone.

22. Prolactin (from the anterior pituitary) allows for milk production, and oxytocin (from the posterior pituitary) allows for the letdown of the milk so that it will flow.

23. The student diagram should show a reasonable facsimile of the female reproductive system.



24.

Hormone	Produced by	Target organ(s)	Effect(s)
testosterone	testes (interstitial cells)	entire body for secondary sex characteristics	■ development of secondary sex characteristics; helps to promote sperm production
GnRH	hypothalamus	anterior pituitary	■ stimulates release of FSH and LH
estrogen	ovaries (follicle cells prior to day 14, corpus luteum after day 14)	ovaries, uterus	■ inhibits ovulation ■ stimulates thickening of endometrium

Hormone	Produced by	Target organ(s)	Effect(s)
FSH	anterior pituitary	ovaries in females; testes in males	■ stimulates development of sex organs ■ stimulates gamete production

25. Chromosomal sex, or the genetic sex, is determined at fertilization by the union of the male and female gametes. The female gamete contributes an X chromosome; the sperm can either contribute an X or a Y chromosome. The resulting females are XX, and males are XY due to chromosomal factors. At the seventh week of development, hormonal influences will develop the male and female anatomy. GnRH will stimulate the release of LH to stimulate the production of testosterone in males (LH), and this promotes the development of the male reproductive tract. In puberty, testosterone will also stimulate the development of the secondary sex characteristics. In females, GnRH stimulates the production of FSH and LH, which stimulates the follicles to produce estrogen, which stimulates the development of the female reproductive tract, and, in puberty, the secondary sex characteristics.

26. Male gametes are produced in the testes, and they mature and are stored within the epididymis. They travel through the ductus deferens where they mix with glandular secretions to create semen. The sympathetic nervous system causes ejaculation through the urethra into the female vagina. The sperm motility is provided by the tail of the sperm. Sperm propel themselves up the vagina through the cervix and the uterus and into the oviducts where fertilization occurs.

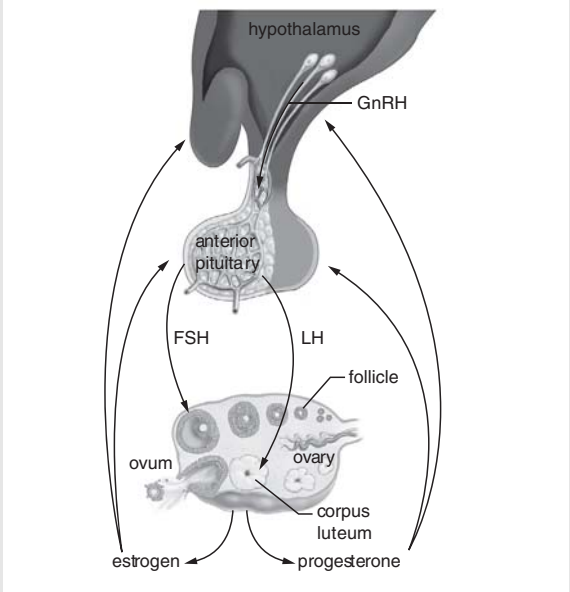
Female gametes (ova) are produced within the ovaries. When an ovum is released, it is swept by fimbriae from the ovary to the uterus via the oviduct. The beating of cilia creates a current that moves the ovum toward the uterus. Fertilization typically occurs in the oviduct where the ovum is relatively inert and accessible to the swarming sperm.

27. (a) *Fertilization:* LH - promotes ovulation; FSH stimulates the maturing of the follicle in females and testosterone production in males

(b) *Development of the placenta:* hCG - this hormone promotes the continuance of high levels of progesterone and estrogen as the placenta is formed, as its role is to maintain the corpus luteum.

(c) *Parturition:* Prostaglandins cause the release of oxytocin; both prostaglandins and oxytocin cause the uterus to contract throughout labour.

28.



Answers to Applying Concepts Questions

29. Students' responses should include eight of the following key events:

- fertilization (formation of the zygote in the oviduct)
- cleavage (eventually forming the morula)
- morula's arrival in the uterus
- continued mitotic divisions to form the blastocyst (second week)
- implanting of blastocyst in the endometrium
- trophoblast becomes the chorion (ultimately the fetal part of the placenta)
- development of the inner cell mass
- formation of the amniotic cavity
- formation of the embryonic disk
- gastrulation (differentiation of embryonic disk into the three primary germ layers: the endoderm, mesoderm, and ectoderm)
- morphogenesis (formation of distinct structures of the organism)
- neurulation (formation of the neural tube, the basis of the brain and spinal cord)
- heart begins beating
- rapid growth and differentiation as blood cells form, lungs and kidneys take shape, and arm and leg buds appear
- appearance of distinct head with evidence of eyes, ears, and nose
- cells in the brain differentiate
- arms and legs lengthen and begin to flex
- gonads begin to produce hormones
- organs form and nervous system begins to coordinate body activity
- skeleton of cartilage forms

30. Both the sperm and the ovum contain a nucleus with 23 chromosomes. Structurally they are quite different because they have very different roles in the reproduction process. One egg is produced monthly, and while it has a protective coating that can only be penetrated by human sperm, it is not structured to be elusive and has no structures to propel itself. The ovum is passed through the oviduct and contains enough nourishment to keep a zygote alive in the crucial early days after fertilization. Sperm, on the other hand, must navigate the acidic environment of the female reproductive tract, making their way through a number of structures (vagina, cervix, uterus) before coming upon the ovum in the oviduct. The comparatively tiny sperm have tails to propel themselves through the female reproductive tract, mitochondria to provide energy for the job, and an enzyme in their oval heads that can dissolve some of the protective coating on the egg. They are also numerous enough and small enough to be able to swarm the egg for maximum chance at penetration.

31. The testes need to descend into the scrotum so that they can be in the cooler environment they require for spermatogenesis to occur. The scrotum is normally 3-4 degrees cooler than body temperature. If the testes remained within the body, the male would be unable to produce viable sperm.

32. Since the developing embryo of a reptile is outside of the parent, within a hard shell, it must have a large amount of yolk available to nourish its entire development but will not require a placenta and an umbilical cord. Instead, the extra-embryonic structures will perform slightly different functions, as noted in Investigation 15.A: the amnion will provide protection and allow for movement for the developing embryo; the chorion (outermost) and the allantois work together to allow for gas exchange, waste storage, and the absorption of calcium; and the large yolk sac and yolk to store nutrients for the developing embryo.

33. Gametes have 23 chromosomes instead of 23 pairs because this half is the complement of chromosomes for the human species. Each parent provides 23 chromosomes to the zygote, which will have the necessary 23 pairs or chromosomes.

34. In the aftermath of ovulation, the follicle that released the ovum becomes the corpus luteum. The corpus luteum produces mostly progesterone, which inhibits the production of FSH and LH.

(a) If the egg is fertilized and the resulting blastocyst implants in the endometrium, the trophoblast releases human chorionic gonadotropin (hCG), which prevents the corpus luteum from disintegrating. For the next three months, the corpus luteum continues to produce progesterone to maintain the endometrium and prevent menstruation (until the placenta can secrete enough estrogen and progesterone to maintain the endometrium).

(b) If the egg is not fertilized, the corpus luteum begins to degenerate after about 10 days. Progesterone and estrogen levels decline and the endometrium, blood, tissues, and ovum are shed. The menstrual cycle begins again when the levels of progesterone and estrogen drop low enough to trigger the release of more FSH and LH.

35. If both the male and female of the couple were infertile or sterile, this couple could use donor eggs and sperm from two other individuals. Using a reproductive technology such as IVF, the zygote would be formed in a lab and this dividing cell mass would then be implanted in a surrogate mother to be carried to term. Thus the child would have "5 parents": the two who will raise him/her, as well as the two who contributed their gametes, and the surrogate mother who carried the child.

36. An indication that ovulation is soon to occur is the marked rise in blood levels of LH released from the

anterior pituitary. This rise in LH triggers the release of an ovum from one of the developing follicles.

37. The hormone testosterone is produced in the interstitial cells of the testicles. Without the testicles, testosterone would not be produced.

38. The graph shows the period of embryonic/fetal development that is most sensitive to the effects of teratogens. During the first eight weeks of pregnancy, specifically between weeks 3 and 8, the embryo is the most vulnerable to damage by teratogens. Whatever the mother ingests or inhales is circulated throughout the blood and can cross over to the embryo's bloodstream in the placenta. Some of these substances can result in structural abnormalities in the embryo/fetus.

Answers to Making Connections Questions

39. (a) The woman's age and her high level of physical activity will have an impact on the couple's ability to conceive. At the age of 35, her chances of successfully reproducing are reduced, and high levels of physical activity may be affecting her menstrual cycle.

(b) Less physical activity will reduce the physiological stress on her body, and the hormonal levels of her body may return to a level that can sustain a pregnancy. The couple can also begin to track her ovulation periods by using kits from the pharmacy, as well as consulting with their physician to monitor blood hormone levels and determine her ovulatory cycle so they may try for conception at the optimum time.

(c) IVF, superovulation, or surrogate motherhood may help the couple.

40. Students will show any three of the following likely effects of the expanding uterus on the mother: back ache, hip pain, pressure on the bladder resulting in frequent urination, abdominal cramps, higher blood pressure, shortness of breath, swelling (particularly of the feet and legs), development of varicose veins, and unsteady or altered balance.

41. A woman with only one ovary can still become pregnant. Typically, alternate ovaries produce the mature ovum each month. If she was missing an ovary, she may ovulate less often, but she would still have the ability to produce and nurture a mature ovum, as well as produce the hormones to sustain a pregnancy.

42. If a male has a vasectomy, he is still able to produce sperm because the operation only cuts and ties the sperm ducts (which transport the sperm). The sperm die, and the nutrients from them are reabsorbed into the bloodstream. After a vasectomy, the semen does not contain any sperm.

43.

Role of FSH in males	Role of FSH in females
■ GnRH released from the hypothalamus triggers release of FSH from the anterior pituitary gland	■ GnRH released from the hypothalamus triggers release of FSH from the anterior pituitary
■ at puberty, FSH works with LH to cause the testes to produce and release testosterone	■ at puberty, FSH acts on the ovaries to stimulate the production of estrogen to help stimulate development of secondary sex characteristics and launch the reproductive cycle
■ after puberty, FSH causes the interstitial cells in the testes to produce and release testosterone ■ at the same time, FSH causes the cells of the seminiferous tubules to release inhibin, which acts upon the anterior pituitary to stop FSH production in a negative feedback loop that keeps testosterone production relatively constant over time	■ after puberty, FSH stimulates one follicle to mature each month ■ rising levels of estrogen inhibit the release of FSH until the level drops low enough to cause the pituitary gland to produce FSH to begin the cycle again

44. Create a rubric before students begin the project to show how it will be marked; you may want to consult students on how to analyze the outlines. In addition to assessing the projects for accuracy, creativity, neatness, and completeness, the students should include the following:

- information concerning the stages of embryonic/fetal development, including the risks and vulnerabilities at various stages
- information concerning how teratogens can affect the embryo/fetus
- information on key teratogens and environmental risks, particularly in the immediate area
- tips for protecting against the effect of teratogens
- detailed description of the visuals, including full source information

45. Until about the seventh week of development, male and female embryos are anatomically identical. After the seventh week, the development of the primary sex characteristics begins. Between approximately 18-22 weeks, the gonads should be large enough for an ultrasound technician to be able to correctly assess the gender of the child.

46. Students could select any three of the following:

- *Primary amenorrhea*

  Primary amenorrhea affects approximately 1 in 1,000 adolescent girls in the United States. The most common causes of primary amenorrhea include:

  - *Chromosomal abnormalities.* Certain chromosomal abnormalities can cause a premature depletion of the eggs and follicles involved in ovulation and menstruation.
  - *Problems with the hypothalamus.* Functional hypothalamic amenorrhea is a disorder of the hypothalamus—an area at the base of the brain that acts as a control center for the body and regulates the menstrual cycle. Excessive exercise, eating disorders such as anorexia, and physical or psychological stress can all contribute to a disruption in the normal function of the hypothalamus. Less commonly, a tumour may prevent the hypothalamus from functioning normally.
  - *Pituitary disease.* The pituitary is another gland in the brain that's involved in regulating the menstrual cycle. A tumour or other invasive growth may disrupt the pituitary gland's ability to perform this function.
  - *Lack of reproductive organs.* Sometimes problems arise during fetal development that lead to a baby girl being born without some major part of the reproductive system, such as uterus, cervix, or vagina. Because her reproductive system didn't develop normally, she won't have menstrual cycles.
  - *Structural abnormality of the vagina.* An obstruction of the vagina may prevent menstrual periods from occurring. A membrane or wall may be present in the vagina that blocks the outflow of blood from the uterus and cervix.

- *Secondary amenorrhea*

  Secondary amenorrhea is much more common than primary amenorrhea. Many possible causes of secondary amenorrhea exist:

  - *Pregnancy.* In women of reproductive age, pregnancy is the most common cause of amenorrhea. When a fertilized egg is implanted in the lining of the uterus, the lining remains to nourish the fetus and isn't shed by menstruation.
  - *Contraceptives.* Some women who take birth control pills may not have periods. When oral contraceptives are stopped, it may take three to six months to resume regular ovulation and menstruation. Contraceptives that are injected or implanted, such as Depo-Provera, also may cause amenorrhea, as can progesterone-containing intrauterine devices, such as Mirena.
  - *Breast-feeding.* Mothers who breast-feed often experience amenorrhea. Although ovulation may occur, menstruation may not. Pregnancy can occur despite the lack of menstruation.
  - *Stress.* Mental stress can temporarily alter the functioning of the hypothalamus—an area of the brain that controls the hormones that regulate the menstrual cycle. Ovulation and menstruation may stop as a result. Regular menstrual periods usually resume after stress decreases.
  - *Medication.* Certain medications can cause menstrual periods to stop. For example, antidepressants, antipsychotics, some chemotherapy drugs, and oral corticosteroids can cause amenorrhea.
  - *Illness.* Chronic illness may postpone menstrual periods. As the patient recovers, menstruation typically resumes.
  - *Hormonal imbalance.* A common cause of amenorrhea or irregular periods is polycystic ovary syndrome (PCOS). This condition causes relatively high and sustained levels of estrogen and androgen, a male hormone, rather than the fluctuating condition seen in the normal menstrual cycle. This results in a decrease in the pituitary hormones that lead to ovulation and menstruation. PCOS is associated with obesity; amenorrhea or abnormal, often heavy uterine bleeding; acne; and sometimes excess facial hair.
  - *Low body weight.* Excessively low body weight interrupts many hormonal functions in the body, potentially halting ovulation. Women who have an eating disorder, such as anorexia or bulimia, often stop having periods because of these abnormal hormonal changes.
  - *Excessive exercise.* Women who participate in sports that require rigorous training, such as ballet, long-distance running or gymnastics, may find their menstrual cycle interrupted. Several factors combine to contribute to the loss of periods in athletes, including low body fat, stress, and high energy expenditure.
  - *Thyroid malfunction.* An under-active thyroid gland (hypothyroidism) commonly causes menstrual irregularities, including amenorrhea. Thyroid disorders can also cause an increase or decrease in the production of prolactin—a reproductive hormone generated by the pituitary gland. An altered prolactin level can affect the hypothalamus and disrupt the menstrual cycle.
  - *Pituitary tumor.* A noncancerous (benign) tumour in the pituitary gland (adenoma or prolactinoma) can cause an overproduction of prolactin. Excess prolactin can interfere with the regulation of menstruation. This type of tumour is treatable with medication, but it sometimes requires surgery.

- *Uterine scarring.* Asherman's syndrome, a condition in which scar tissue builds up in the lining of the uterus, can sometimes occur after uterine procedures, such as a dilation and curettage (D and C), Caesarean section or treatment for uterine fibroids. Uterine scarring prevents the normal buildup and shedding of the uterine lining, which can result in very light menstrual bleeding or no periods at all.
- *Premature menopause.* Menopause occurs at an average age of 51. If menopause is experienced before age 40, it's considered premature. The lack of ovarian function associated with menopause decreases the amount of circulating estrogen in the body, which in turn thins the uterine lining (endometrium) and brings an end to the menstrual periods. Premature menopause may result from genetic factors or autoimmune disease, but often no cause can be found.

47. At 10 weeks the woman is in her first trimester. The ovaries, specifically the corpus luteum, are still needed to produce the estrogen and progesterone necessary to maintain the pregnancy. At 16 weeks, the time when the ovaries were removed, the placenta was well enough developed that it could produce sufficient amounts of estrogen and progesterone to maintain the pregnancy. The ovaries were not needed.

48. Doctors did not measure luteinizing hormone (LH) in these women. Luteinizing hormone is released near the middle of the average menstrual cycle in response to high blood estrogen levels. It stimulates ovulation to occur. If fertilization and then implantation occur, the high estrogen and progesterone levels inhibit further release of LH. If a woman is pregnant, it is known that LH will not be present.

An alternative answer could be: Doctors did not measure human chorionic gonadotropin (hCG) because they already knew from the examination at eight weeks gestation that the woman was pregnant. hCG is present in the urine of women who are pregnant and is what pregnancy tests detect.

49. (a) In the oophorectomized woman, FSH concentration was low at 37 weeks gestation and remained low in the samples taken 8 h and 4 days after delivery but increased considerably at 5 weeks postpartum, reaching its highest level 2 months postpartum.

In the control women, FSH level was not measured at 37 weeks gestation nor at 8 h or 4 days postpartum. At five weeks the FSH level was approximately five times less than in the patient and about eight and a half times less at two months.

(b) Suckling (breast-feeding) normally inhibits release of FSH and LH for a period of time after birth. This study shows that the ovaries may be required to fully exert this gonadotropin (FSH and LH) - suppressing effect

50. Without ovaries the woman is in an artificial menopause and therefore lacking estrogen and progesterone. She may start to experience menopausal symptoms, so by giving her HRT, a treatment used for women experiencing real menopause, these symptoms can be alleviated.

51. Most of the estrogen produced in this late stage of pregnancy is produced by the placenta, not the ovaries, so the levels are similar in the patient and control group.

52. Delivery of the baby is due to oxytocin from the posterior pituitary gland stimulating the uterine muscles to contract. Breast-feeding is also possible because prolactin, the hormone that stimulates production of milk, comes from the anterior pituitary gland. Release or let-down of the milk is controlled by oxytocin. The ovaries are not involved in either of these functions.