

## Answers to Questions for Comprehension

### Student Textbook page 478

**Q1.** Primary sex characteristics are structures that have a direct role in reproduction, and these include the gonads (ovaries and testes), the penis, and the vagina. Secondary sex characteristics such as facial hair, muscle development in men and prominent breasts in women are structures that are not directly related to reproductive function.

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**Q2.** The paragraph, graphic organizer (e.g. flow chart), or diagram should indicate the following: the *scrotum* contains the *testes*, which contain the *seminiferous tubules* (long coiled tubes) where the sperm is produced and nurtured by the Sertoli cells. Sperm are transported to the *epididymis*, where they mature and become motile. Sperm then move to the storage duct known as the *ductus deferens* (or vas deferens) awaiting transport to the penis.

**Q3.** The interstitial cells are hormone-secreting cells that lie between the seminiferous tubules. Sertoli cells are inside the seminiferous tubules, where they nourish the sperm cells.

**Q4.** Seminiferous tubules → epididymis → ductus deferens → urethra.

- Q5.** The acrosome is a cap-like structure that covers the head of the sperm and contains the enzymes needed to penetrate the protective membrane surrounding the ovum. Without these enzymes, the sperm would not be able to penetrate and fertilize the egg.
- Q6.** *seminal vesicles*: contribute mucus-like fluid containing fructose; *prostate gland*: contributes alkaline and mucus-like fluids; *Cowper's gland*: contributes alkaline and mucus-like fluids

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- Q7.** Fertilization takes place in the oviduct.
- Q8.** Both a fertilized ovum and an unfertilized ovum travel down the oviduct. A fertilized ovum will leave the oviduct and implant itself into the endometrium (lining in the uterus). An unfertilized ovum does not implant itself in the endometrium and will pass through the cervix and vagina.
- Q9.** The endometrium is the lining of the uterus. It is richly supplied with blood vessels that provide nutrients to support the implanted zygote as it develops from an embryo into a fetus.
- Q10.** Menstruation is the monthly shedding of the endometrium, including tissues and blood flow, if a fertilized egg has not implanted itself.

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**Q11.** HIV (human immunodeficiency virus) attacks the white blood cells known as helper T cells, which are the cells in the human immune system that signal the other immune cells to fight infections. (Refer to Section 8.3 of *Inquiry into Biology 20*, p. 292) With the immune system weakened in this way, the body of the infected person becomes vulnerable to a host of infections that it would have otherwise been able to overcome. When the helper T cell count drops to a certain level, the condition is classed as AIDS (acquired immunodeficiency syndrome), and the body is incapable of defending itself from opportunistic infections such as pneumonia or tuberculosis, which will eventually kill the infected person.

**Q12.** HIV is transmitted through the exchange bodily fluids. Methods of transmission include sexual contact and the sharing of needles. Mothers with HIV can pass the virus to their child during pregnancy, birth, or by breastfeeding.

**Q13.** Methods of Transmission of Hepatitis A, B, and C

Hepatitis A	Hepatitis B	Hepatitis C
<ul style="list-style-type: none"><li>■ drinking water that is contaminated with fecal matter</li><li>■ oral or anal sexual contact with an infected person</li></ul>	<ul style="list-style-type: none"><li>■ sexual contact with an infected person</li><li>■ contact with infected bodily fluids or blood</li></ul>	<ul style="list-style-type: none"><li>■ contact with infected needles or syringes</li><li>■ transfusions of infected blood</li></ul>

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**Q14.** The most common symptoms of genital herpes infections are: discomfort caused by tingling or itching followed by blisters. Most common areas of infection are the genitals, buttocks, and thighs.

**Q15.** It is recommended that mothers with genital herpes give birth by Caesarian section to reduce the risk of infecting the baby as it passes through the birth canal. If the baby is infected, blindness, neurological disorders, or death can result.

**Q16.** People who are infected with HPV (human papilloma virus or genital warts) do not always display symptoms. This is particularly dangerous because the untreated infected individual may develop more serious disorders such as cervical cancer or other tumours. In addition, the infected person may unknowingly pass the virus to someone else who could develop complications or pass it further.

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**Q17.** Causes and treatments for chlamydia, gonorrhea, and syphilis

<b>Disease</b>	<b>Cause</b>	<b>Treatment</b>
chlamydia	bacterium <i>Chlamydia trachomatis</i>	antibiotics
gonorrhea	bacterium <i>Neisseria gonorrhoeae</i>	antibiotics
syphilis	bacterium <i>Treponema pallidum</i>	antibiotics

### **Answer to Question for Comprehension**

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- Q18. (a)** The XY chromosome combination will produce a genetically male offspring.
- (b)** The XX chromosome combination will produce a genetically female offspring.

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**Q19.** Male sex hormones and their significance

Male Sex Hormone	Significance
GnRH (gonadotropin-releasing hormone)	an increase in the production of this hormone initiates puberty; stimulates release of FSH and LH
FSH (follicle-stimulating hormone)	stimulates the development of the sex organs and production of testosterone, and inhibin
LH (luteinizing hormone)	stimulates the production of testosterone
testosterone	stimulates the development of the male reproductive tract (sex organs) and secondary sex characteristics; inhibits the release of LH
inhibin	acts on the anterior pituitary to inhibit FSH production

**Q20.** The roles of GnRH, FSH, and LH in the development of the female reproductive system:

Female Sex Hormone	Significance
GnRH (gonadotropin-releasing hormone)	initiates puberty; stimulates release of FSH and LH from the anterior pituitary
FSH (follicle-stimulating hormone)	stimulates the follicle to produce estrogen
LH (luteinizing hormone)	stimulates the corpus luteum to produce progesterone

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**Q21.** The menstrual cycle ensures that an ovum is released at the same time that the uterus is most receptive to a fertilized egg.

**Q22.** Two stages of the ovarian cycle:

- (a)** The follicular stage – FSH levels (released by the pituitary gland) increase, stimulating one follicle to mature. The maturing follicle releases estrogen and some progesterone. The increased estrogen inhibits the release of FSH and stimulates the release of GnRH. This leads to an increase in LH, causing the follicle to burst and the ovum to be released.
- (b)** The luteal stage – after the ovum is released, LH causes the follicle to develop into a corpus luteum. The corpus luteum releases progesterone and some estrogen. Increased levels of these hormones inhibit

FSH and LH production. As the corpus luteum degenerates, progesterone and estrogen levels drop, resulting in the secretion of FSH and the cycle beginning again.

**Q23.** The corpus luteum secretes progesterone and some estrogen, which inhibit FSH and LH production. When the corpus luteum degenerates, the level of those hormones drops, stimulating an increase in FSH and LH production as a new follicle begins to mature. If the ovum is fertilized, the corpus luteum does not degenerate and instead keeps the levels of progesterone high enough to support the endometrium and the embryo/developing fetus.

**Q24.** The ovarian cycle begins the same day as the uterine cycle—the first day of menstruation. The ovarian cycle refers to events occurring in the ovary, beginning with the degeneration of the corpus luteum and a drop in the levels of estrogen and progesterone; the uterine cycle relates to events occurring simultaneously in the uterus, beginning with the shedding of the endometrium. A new follicle begins to mature in the ovary and levels of estrogen go up; around the 6th day, due to high blood estrogen levels, the endometrium begins to thicken. Around day 14 (ovulation), the endometrium thickens rapidly, and if fertilization does not occur, the corpus luteum degenerates, progesterone and estrogen levels drop again, the endometrium breaks down, and menstruation begins again.