

## Biology 12 - The Reproductive System!

- **Part A: Definitions:** Please define or explain the following terms, in your **OWN WORDS**, in as few words as **clarity allows**.

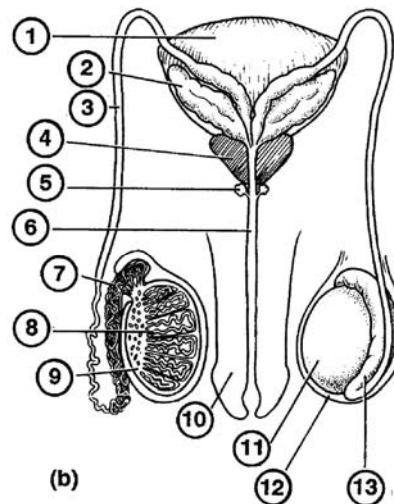
a)	testes	male gonads which produce sperm and testosterone
b)	scrotum	sac in which testes are suspended, hang underneath penis outside male's body
c)	seminiferous tubules	3 coiled tubes within each testis in which sperm is produced.
d)	epididymis	tubular storage sac on top of each testis in which sperm mature.
e)	sperm	the male gamete, consists of head, middle piece, and tail. Released during ejaculation.
f)	vas deferens	tube the carries sperm from epididymis to urethra during ejaculation.
g)	acrosome	cap on sperm head that contains enzymes which can dissolve the outer barriers of egg.
h)	spermatogenesis	development of sperm: involves meiosis
i)	penis	cylindrical shaped organ that hangs in front of scrotum that functions in sexual intercourse. Increased blood flow causes it to become erect.
j)	Interstitial cells	cells that lie between the seminiferous tubules that produce testosterone
k)	Sertoli cells	cells in the seminiferous tubules that support, nourish, and regulate the spermatogenic cells
l)	Semen	thick whitish fluid ejaculated from the penis (about 3.5 ml per ejaculation). Can contain as many as 400 million sperm plus secretions from the prostat, Cowper's and seminal vesicles.
m)	seminal fluid	non-sperm part of semen that nourishes (contains fructose), protects, lubricates sperm and helps it to move. Also contains prostaglandins that cause the uterus to contract.
n)	seminal vesicles	pair of organs that each have duct to join to each vas deferens. Produce secretion contain fructose to nourish sperm.
o)	prostate gland	donut shaped organ that surrounds upper part of urethra just below bladder. Secretes a milky alkaline fluid that helps sperm survive in the acidic vaginal canal.
p)	Cowper's glands	pea-sized organs that lie below the prostate on either side of urethra
q)	urethra	tube that carries urine from bladder during urination and semen from vas deferens (though never at the same time)
r)	testosterone	the principal male sex hormone that is needed for the development of the primary male sexual characteristics, maturation of sperm in spermatogenesis and also causes secondary sexual characteristics. It is also responsible largely for the sex drive and aggressive behavior.
s)	FSH (in males)	Follicle stimulating hormone. Released by the anterior pituitary in response to GnRH. Promotes spermatogenesis in the seminiferous tubules by causing the seminiferous tubules to take up testosterone. The release of FSH is stopped by the hormone inhibin, also released by seminiferous tubules.
t)	LH (in males)	Luteinizing hormone (sometimes called ICSH (interstitial cell stimulating hormone) in males. LH stimulates the interstitial cells to release testosterone.
u)	ovaries	female gonads that produce eggs and the female sex hormones. About 3 cm by 1 cm in size.
v)	oviducts	"Fallopian tubes" Cilia-lined tubes that transport eggs from ovaries to uterus. Are the usual site of fertilization.
w)	uterus	thick-walled muscular organ, shaped like an upside-down pear, when fetus develops. Normally about 5 cm wide.
x)	cervix	opening of uterus from vagina (joins vagina at nearly right angles).
y)	vagina	muscular tube with mucus-secreting lining; receives penis during intercourse, and serves as a birth canal.

z)	follicles	sac-like structures within ovaries (about a million per ovary at time of birth -- only about 400,000 remain by puberty); each follicle contains an immature egg (oocyte). Only about 400 follicles ever mature. Oogenesis takes place in follicle.
aa)	oocyte	an immature egg cell
bb)	zona pellucida	mucoprotein that surrounds the secondary oocyte.
cc)	ovulation	the release of a secondary oocyte (egg) from the ovary. It occurs once per month.
dd)	corpus luteum	a follicle that has released its egg. Corpus luteum produces estrogen and progesterone. If no pregnancy occurs, it breaks down in about 10 days. If pregnancy does occur, it breaks down in 3 - 6 months.
ee)	clitoris	small erectile organ in females above urethral opening that has many sense receptors and functions in arousal and orgasm.
ff)	hypothalamus	part of brain that ultimately controls release of sex hormones. Releases GnRH
gg)	FSH	Hormone released by anterior pituitary. In females, causes development of follicle, in males, promotes spermatogenesis.

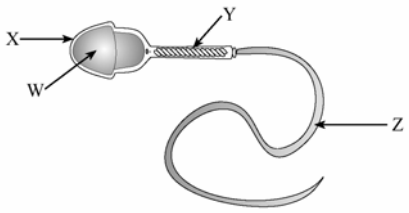
### Part B: Fill In The Blanks

- The part of the male reproductive system that creates an antacid secretion is called the **PROSTATE GLAND**.
- Semen is composed of **SPERM**, which is made in the **SEMINIFEROUS** tubules, and secretions from the **PROSTATE** gland, **COWPER'S** glands, and **SEMINAL** vesicles.
- The seminal vesicles secrete a fluid that is rich in the monosaccharide **FRUCTOSE**, which serves as **FOOD** for the sperm.
- Cowper's glands secrete a fluid that acts as a **LUBRICANT**.
- The **INTERSTITIAL** cells in the testes produce testosterone in response to the hormone **LH**.
- The hormone **FSH** promotes spermatogenesis.
- The male hormone testosterone is a **STEROID** hormone, meaning that it is **LIPID**-soluble. Like all steroid hormones, it is derived from the steroid hormone **CHOLESTEROL**.
- SPERM** is made inside the seminiferous tubules and sent from there to the **EPIDIDYMIS** for storage.
- Label the diagram of the male reproductive system.

1.	<b>BLADDER</b>
2.	<b>SEMINAL VESICLE</b>
3.	<b>VAS DEFERENS</b>
4.	<b>PROSTATE GLAND</b>
5.	<b>COWPER'S GLAND</b>
6.	<b>URETHRA</b>
7.	<b>EPIDIDYMIS</b>
8.	<b>SEMINIFEROUS TUBULES</b>
9.	<b>INTERSTITIAL CELLS</b>
10.	<b>PENIS</b>
11.	<b>TESTIS</b>
12.	<b>SCROTUM</b>
13.	<b>EPIDIDYMIS</b>



- List the structures through which sperm passes in order, from the following list: epididymis, seminiferous tubules, urethra, penis, vas deferens. **SEMINIFEROUS TUBULES, EPIDIDYMIS, VAS DEFERENS, URETHRA, PENIS**
- Label the parts of the diagram of the sperm cell and list a function for each part:



	Name	Function
W	HEAD	CONTAINS THE MALE'S 23 CHROMOSOMES
X	ACROSOME CAP	CONTAINS ENZYMES FOR ENTERING EGG
Y	MID-PIECE	CONTAINS MITOCHONDRIA FOR ENERGY FOR MOVEMENT
Z	TAIL	WIGGLES BACK AND FORTH TO PROPEL SPERM

12. List 3 function of testosterone

A	PROMOTES NORMAL DEVELOPMENT AND FUNCTION OF PRIMARY SEXUAL ORGANS
B	CAUSES DEVELOPMENT OF SECONDARY SEXUAL CHARACTERISTICS DURING PUBERTY
C	TESTOSTERONE IS NECESSARY FOR THE DEVELOPMENT OF SPERM

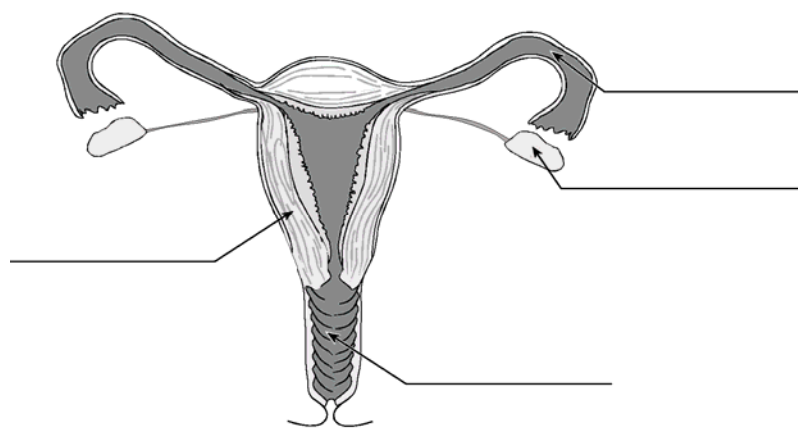
13. The **HYPOTHALAMUS** produces the hormone GnRH when testosterone and **INHIBIN** levels are **LOW**.

14. This causes the **ANTERIOR** pituitary gland to release **FSH** and **LH**.

15. LH causes **INTERSTITIAL** cells in the testes to release more **TESTOSTERONE**.

16. FSH causes the seminiferous tubules to absorb more **TESTOSTERONE**, which in turn causes them to produce more **SPERM**. As it makes more sperm, it also releases more of the hormone **INHIBIN**. High levels of this hormone feedback to the **HYPOTHALAMUS** and **PITUITARY**, causing them to release less of their hormones.

17. Label the following diagram and give a function for each labeled part.



	Name	Function
	UTERUS	SITE WHERE EMBRYO DEVELOPS
	OVIDUCT	CONDUCTS EGG TO UTERUS
	OVARY	PRODUCE HORMONES AND RELEASE EGGS
	VAGINA	RECEIVES PENIS AND SERVES AS BIRTH CANAL

18. List 3 functions of estrogen:

A	STIMULATES THE GROWTH OF THE UTERUS AND VAGINA, NECESSARY FOR EGG MATURATION
B	CAUSES AND MAINTAINS SECONDARY SEX CHARACTERISTICS AT PUBERTY
C	RESPONSIBLE FOR PROLIFERATIVE PHASE OF UTERINE CYCLE

19. The entrance to the uterus is called the **CERVIX**.

20. The female erectile organ containing many sensory nerve receptors is called the **CLITORIS**.

21. the menstrual cycle lasts on average **28** days. **Day 1** is the first day that **MENSTRUATION** starts, and usually finishes by day 5.

22. During menstruation, levels of female **HORMONES** are low.

23. In the follicular phase (days 1 – 14), low levels of hormones are detected by the hypothalamus, which releases **GnRH**. This is sent to the pituitary gland, which releases **FSH** and **LH**.

24. FSH causes several immature **EGGS**, along with their surrounding **FOLLICLE** cells, in the ovaries to begin to develop. The developing follicle cells release increasing amounts of **ESTROGEN**.

25. This hormone is responsible for the **PROLIFERATIVE** phase of the uterine cycle. In the uterus, **BLOOD** vessels and **GLANDS** proliferate.
26. Rising levels of estrogen cause the release of a large amount of **LH** on about day 13 which causes **OVULATION**.
27. Ovulation normally occurs on day **14**. In ovulation, the **EGG** is released from the ovary, leaving behind the **FOLLICLE** cells, which go on to form the **CORPUS LUTEUM**. This structure continues to release the hormones estrogen and progesterone. Of these two hormones, **PROGESTERONE** is most important for the luteal phase of the ovarian cycle. This hormone cause the **SECRETORY** phase of the uterine cycle. The uterine glands mature and release a thick mucus, and the endometrium **DOUBLES** in thickness.
28. High levels of **PROGESTERONE** cause **NEGATIVE** feedback to the anterior pituitary, shutting down the release of **LH**. Lower levels of LH cause the **CORPUS LUTEUM** to disintegrate. Since it is breaking down, it can no longer release estrogen and progesterone.
29. Low levels of female **HORMONES** by day 28 will cause the uterine **LINING** to be shed, and the cycle will start anew.
30. However, if fertilization happens, the **MENSTRUAL** cycle will be interrupted. Fertilization usually occurs in the upper **oviduct**. The fertilized egg is first called a **ZYGOTE** and then an **EMBRYO** as it divides through mitosis.
31. The embryo, upon reaching the **UTERUS**, will embed itself into the endometrium. This is called **IMPLANTATION**.
32. A shared set of membranes called the placenta forms around the embryo. This will begin to secrete the hormone HCG, which temporarily maintains the corpus luteum.
33. As the placenta develops and matures, it makes its own **ESTROGEN** and **PROGESTERONE**. This will maintain the uterine lining so that **MENSTRUATION** does not occur during pregnancy.
34. After 9 months, the fetus is ready to be born. The pressure of the baby's head against the cervix causes a nerve impulse to be sent to the hypothalamus. This causes the hypothalamus to release the hormone **OXYTOCIN** to the pituitary, which releases it into the blood. This hormone causes **LABOUR**. It operates on a **POSITIVE** feedback loop. The hormone causes the uterine muscles to **CONTRACT** with ever greater intensity until the baby is pushed out of the uterus through the **VAGINA**, which serves as the birth canal.

35.

COLUMN A	COLUMN B
prostate gland	
ovary	a) location for spermatogenesis _____
epididymis	b) has enzymes used to penetrate egg _____
seminiferous tubule	c) sperm mature here _____
uterus	d) secretes progesterone _____
fallopian tube	e) location of the developing fetus _____
ductus (vas) deferens	f) provides nutrients for sperm _____
acrosome	

COLUMN A	COLUMN B
acrosome	
corpus luteum	a) stimulates secretions from the corpus luteum _____
luteinizing hormone	b) causes the endometrium to thicken _____
estrogen	c) an organ of copulation _____
vagina	d) contains enzymes necessary to penetrate egg _____
urethra	e) area for maturation of sperm _____
epididymis	f) secretes testosterone _____
interstitial cell	