Reproductive System

Course
Anatomy and Physiology

Unit XVI
Reproductive System

Essential Question
What are the tissues and systems of the human body?

TEKS
130.206(c)
6A,6B
10A,10B,10C, 10D
11A,11B,11C

Prior Student Learning
Understanding of the cell

Estimated time
7-10 hrs

Rationale
To pursue a career in health care, proficiency in anatomy and physiology is vital.

Objectives
Upon completion of this lesson, the student will be able to:

- Define and distinguish terms pertaining to the reproductive system
- Differentiate between the major organs of the male reproductive system
- Differentiate between the major organs of the female reproductive system
- Analyze diseases and disorders of the reproductive system
- Compare and contrast the male and female reproductive system

Engage
How does the reproductive system work?

Key Points

I. Anatomy of Male Reproductive System
   A. Perineum – external
      1. Area between the symphysis pubis anterior, the coccyx posterior, and the ischial tuberosity laterally
      2. Area contains the penis, scrotum, and anus
   B. Scrotum – external
      1. Skin covered pouch that hangs at the root of the penis
      2. Superficial fascia divides it into right and left halves
      3. Each sac contains a testis, epididymis, and the distal part of the spermatic cord
      4. Involuntary dartos and cremaster muscles are sensitive to temperature changes and cause the testes to be drawn toward the body when temperatures are cold (become shorter and wrinkled)
      5. Heat causes relaxation of these muscles (flaccid and loose)
      6. Maintains testes temperature at a constant level, about 3 degrees Celsius below normal body temperature
      7. Lower temperature required for sperm formation
      8. Suspension outside the abdominopelvic cavity makes

them more prone to injury and trauma
9. Hydrocele: scrotal swelling due to trauma, infection, or congenital obstruction

C. Penis – external
1. Three masses of erectile cavernous tissue held together by skin that surrounds the urethra
   a. 2 dorsal corpora cavernosa
   b. 1 ventral corpus spongiosum
2. These masses overlap to form bulging glans penis distally
3. Skin double folded to form the foreskin/prepuce
4. Phimosis: tightness of the foreskin
5. Circumcision: surgical procedure to remove the foreskin
6. When the cavernous tissue is empty, the penis is flaccid or relaxed

D. Testes – internal
1. Small ovoid glands that are suspended in the scrotal pouch by a spermatic cord- male gonads
2. Testicular blood vessels (vas afferens) reach the testes by passing through the spermatic cord
3. Dense white fibrous capsule called the tunica albuginea encases each testis
4. Each testis divided into 200+ cone shaped lobules internally that contain specialized cells called Leydig cells, and tiny, coiled, seminiferous tubules (sperm factories)
5. Tubules from each lobe join to form a plexus called rete testis
6. Series of sperm ducts that drain the rete testis join to form the single coiled tube called the epididymis
7. Sperm producing cells line the tubules and are surrounded by elongated support cells called Sertoli cells
8. Leydig cells (interstitial) secrete testosterone (male hormone responsible for secondary sexual characteristics beginning at puberty – 10 to 14 years old)
9. Also lining the tubules are cells that have receptor proteins for FSH (stimulates the seminiferous tubules to produce sperm more rapidly), LH/ICSH (stimulates the Leydig cells to secrete more testosterone)
10. High blood concentration of testosterone inhibits the anterior pituitary's secretion of FSH and LH/ICSH (Negative Feedback)
11. Orchitis: inflammation of the testes; can be due to

trauma, mumps, etc.

12. Cryptorchidism: failure of the testes to descend into the scrotum

E. Spermatozoon
    1. Male sex cell: life span = 48 hours (some super sperm can live up to 72 hours)
    2. Composed of head, neck, middle piece, and tail
    3. Undergo maturing process called Capacitation
    4. Head
        a. Compact genetic chromatin material covered by a specialized acrosome cap which contains enzymes that break down the cervical mucosa
        b. Acrosome cap contains enzymes that allow sperm to pass into the uterus and fallopian tubes and penetrate the outer covering of the mature ovum
    5. Neck: contains core of mitochondria that provides energy for sperm locomotion
    6. Tail: typical flagella for motility of 3 inches per hour

F. Epididymis
    1. 20 foot coiled tube located neat the posterior surface of each testis
    2. Divided into the head (connected to the testis by efferent ductules) , a body, and a tail (continuous with the vas deferens
    3. Stores immature sperm temporarily
    4. Takes about 20 days for sperm to travel through and mature
    5. Secretes a small amount of seminal fluid (semen)
    6. During ejaculation, smooth muscle contracts and expels sperm to next duct

G. Vas deferens/ductus deferens
    1. Tubular extension of the epididymis that has thick muscular walls
    2. Can be palpated in the scrotal sac as a smooth movable cord
    3. Vas deferens from each testis ascends the scrotum and passes through the inguinal canal as part of the spermatic cord to the abdomen
    4. Extends over the top and down the posterior surface of the bladder through the prostate gland where the enlarged portion (ampulla) joins the duct from the seminal vesicle to form the ejaculatory duct
    5. Propels live sperm from their storage sites to the urethra
    6. During ejaculation smooth muscle rapidly squeezes

sperm forward
7. Vasectomy: surgical procedure to cut the vas deferens to interrupt the sperm pathway (semi-permanent birth control – can be reversed)

H. Ejaculatory Ducts
1. 2 short tubes that pass through the prostate gland to terminate in the urethra
2. Formed by the union of the vas deferens with the ducts of the seminal vesicles

I. Urethra: conveys urine and semen to tip of penis

J. Seminal Vesicles: Accessory Gland
1. Located behind and posterior to the prostate gland at the base of the bladder
2. Made of pouches of convoluted secretory epithelium that secrete a yellowish, alkaline, viscous fluid rich in fructose, ascorbic acid, amino acids, and prostaglandins
3. 60% of fluid - semen
4. Serves as energy source for sperm motility after ejaculation
5. Sperm and seminal fluid mix in ejaculatory duct
6. Secretion dependent on adequate levels of testosterone in the blood

K. Prostate Gland: Accessory Gland
1. Doughnut-shaped gland that lies just below the bladder
2. Secretes acid phosphatase, a thin alkaline substance that makes up 33% of the semen volume
3. Milky, alkaline fluid activates the sperm
4. Alkalinity protects the sperm from the acid environment of the urethra and the vagina - increases sperm motility
5. BPH: benign prostatic hypertrophy; condition where the prostate enlarges - causes urinary retention and obstruction

L. Bulbourethral Gland (Cowper's Gland): Accessory Gland
1. Pea-shaped glands on either side of the urethra
2. Secrete an alkaline, thick, clear mucus that aids in sperm motility and lubricates the urethra
3. Released prior to ejaculation
4. Neutralizes traces of acidic urine and acts as a lubricant during intercourse

M. Semen
1. Milky, white, somewhat sticky fluid mixture of sperm and secretions
2. Transport medium, nutrients and chemicals that

protect and facilitate movement of sperm
3. Hormone relaxin enhances sperm motility
4. Basic pH 7.2 – 7.6 neutralizes acidic environment of vagina
5. 2 – 6 ml
6. 50 – 100 million sperm per milliliter
7. Should be > 20 million sperm per milliliter

II. Physiology of Male Reproductive System
A. Spermatogenesis
1. Sequence of events in seminiferous tubules of testes that leads to production of male gametes or sperm
2. Healthy male produces several hundred million sperm per day
B. Blood Testis Barrier
1. Prevents membrane antigens of sperm from entering blood
2. Since sperm is not produced until puberty, immune system would view them as foreign and destroy them
C. Mechanism and Effects of Testosterone Activity
1. At puberty, testosterone prompts spermatogenesis
2. Causes reproductive organs to grow and assume adult function
3. As adult, normal levels of testosterone required to maintain normal structure and function of reproductive organs
D. Male Fertility
1. Depends on size, shape, motility, and number of mature sperm
2. Infertility: abnormally low ability to reproduce
3. Sterility: complete inability to reproduce; sperm count below 50 million/milliliter of semen
4. Oligospermia: sperm count below 150 million/ml of semen; caused by fever, infection, radiation, malnutrition, trauma, etc.

III. Male Sexual Response
A. Erection
1. Erectile tissue of penis, corpora cavernosa, becomes engorged with blood
2. Parasympathetic nerve fibers stimulate arterioles to dilate, increasing blood flow
3. Blood flow is cut off by trapping blood, causing penis to stay erect
4. Impotence: failure to attain/maintain an erection; can be caused by alcohol consumption
B. Ejaculation
1. Propulsion of semen from male duct system

2. Reproductive ducts and accessory glands contract, emptying their contents into the urethra
3. Bladder sphincter muscle constricts , preventing expulsion of urine
4. Bulbospongiosus muscles of penis undergo rapid series of contractions propelling semen from urethra (called climax or orgasm)

IV. Female Reproductive System Functions
- A. Produce ovarian hormones: estrogen and progesterone
- B. Produce, nurture, and sustain developing ovum
- C. Accomplish delivery

V. Anatomy of Female Reproductive System
- A. Vulva: External Genitalia
  1. Folds of skin that cover and protect the entrance to the female reproductive system
  2. Labia majora: 2 outer lips composed of skin, fat, and pubic hair that extend from the pubic bone to the perineum
  3. Labia minora: 2 smaller, thin hair-free internal lips (folds) covered with mucosa and sebaceous glands; forms a hood to cover the clitoris
  4. Mons pubis: fatty rounded area overlying the pubic symphysis
  5. Clitoris: protruding structure composed of erectile tissue (becomes swollen during sexual arousal)
- B. Vestibular Glands (Bartholin's Glands)
  1. Located on each side of the labia minora
  2. Secretes mucoid fluid for moisture and lubrication during intercourse
- C. Urinary Meatus: located just below the clitoris
- D. Skene's Glands: near the urinary meatus; tiny mucous glands that also lubricate
- E. Perineum
  1. Area of skin between the vagina and the anus
  2. Stretches during delivery, but sometimes it has to be cut (episiotomy) to prevent tearing during delivery
- F. Anus
  1. Outlet of the rectum controlled by the anal sphincter
  2. Used during pregnancy and labor for exams of the cervical opening and birth canal
- G. Mammary Glands
  1. Present in both sexes, become functional only in females
  2. Development is controlled by the female hormones estrogen and progesterone
  3. Size depends on the amount of fat deposition -- NOT

the amount of glandular tissue

4. Composed of 15-20 lobes of mammary glands responsible for milk production (lactation)
    a. Lobes consist of clusters of secreting cells called alveoli that are lined with milk-producing cells
    b. Alveoli secrete milk into drainage tubules that drain into lactiferous ducts; these ducts exit the breast at tiny openings on the nipple surface
    c. Lactiferous sinus or ampulla: where milk accumulates during lactation
5. Areola: circular pigmented area around the nipple; contains many sebaceous glands that secrete lubrication during nursing
6. Complex lymphatic drainage system; therefore cancer cells often spread from the breast to other areas of the body
7. Estrogen promotes duct development; progesterone promotes duct and alveoli development
8. Milk is present at the 5^{th} – 6^{th} month of pregnancy, but high levels of progesterone and estrogen prevent the release of milk during gestation
9. At delivery, a drop in the hormone levels due to the shedding of the placenta triggers the release of Prolactin by the anterior pituitary gland. Prolactin is responsible for milk production.
10. As the infant sucks, the posterior pituitary releases oxytocin which causes the alveoli to contract. Milk flows into the main sinuses and is released from the nipple. Oxytocin also causes uterine contractions, so breast-feeding moms regain abdominal muscle tone faster!
11. If mom does not want to breast feed, she may have an injection to inhibit Prolactin secretion.
12. The first few days after delivery, colostrum (a thin, yellowish fluid rich in antibodies, protein, calcium, fat, and salt) is released. It also has a laxative effect to help the newborn expel meconium. After 3 days, breasts become engorged with blood and lymph and produce bluish-white milk.

H. Ovaries

1. Hard, fibrous, silvery-white, pitted organs attached to the uterus by ovarian ligaments
2. Structure: composed of ovarian follicles embedded in connective tissue that contain over 2 million immature oocytes at birth; follicles surrounded by several layers of hormone-secreting endocrine cells

3. Function
    a. Produce and secrete the hormones estrogen and progesterone upon demand from the anterior pituitary secretion of FSH and LH; these hormones are responsible for the development of secondary sexual characteristics
    b. By puberty, oocyte count has dropped to approximately 350,000; ovaries systematically release one ovum at a time (ovulation) until menopause (when ovaries atrophy and shrivel)
    c. Follicles change into structure called the corpus luteum after ovulation

I. Uterine (Fallopian) Tubes
    1. 4 inch long tubes that are an extension of the upper uterus
    2. Distal end curves around an ovary but is not attached to it
    3. Structure
        a. Isthmus: proximal end near the uterus
        b. Ampulla: enlarged middle part
        c. Infundibulum: funnel shaped end with fringelike fimbriae
        d. Lined with epithelial membrane that is continuous with the peritoneum
        e. Fimbriae become active close to ovulation to create currents in the peritoneal fluid so as to carry the oocyte into the uterine tube
        f. Oocyte carried toward the uterus by peristalsis and the rhythmic beating of cilia
    4. Function
        a. Catches and carries ovum from ovary to uterus
        b. Conception (fertilization) usually takes place in the fallopian tubes
        c. Implantation usually occurs in the uterus
        d. Ectopic pregnancy: implantation that occurs in the fallopian tube or outside the uterus

J. Uterus
    1. Pear-shaped muscular organ that is 3 inches long, 2 inches wide, and 1 inch thick
    2. Lies in the pelvic cavity between the bladder and the rectum
    3. Flexed anteriorly, held in place by uterine ligaments
    4. Structure
        a. Fundus: rounded upper part
        b. Body: main part
        c. Cervix: narrow, lower part that is a small canal

with 2 openings (an internal os that opens to the uterus body, and an external os that opens to the vagina - has mucus plug that protects the uterus by providing a physical barrier)

d. Menstrual flow, unfertilized ovum, fetus, and lochia discharge all pass through the cervix to the vagina

5. Layers
   a. Endometrium: lining of the uterus; simple columnar epithelium anchored by thick connective tissue ; highly vascular
      (1) Stratum compactum: surface layer of ciliated columnar epithelium
      (2) Stratum spongiosum: middle layer of loose connective tissue
      (3) Stratum basale: dense inner layer that attaches to myometrium
      (4) During menstruation, compact and spongy layers slough off
   b. Myometrium
      (1) Thick layer (3 layers) of smooth muscle that extend in all directions to give the uterus great strength to expel the fetus
      (2) Thick in the fundus and thin in the cervical area
   c. Perimetrium
      (1) Outermost serous layer
      (2) Parietal peritoneum
      (3) Only part of the uterus has this covering
6. Functions
   a. Developing offspring implants in endometrium
   b. Forms placenta to sustain developing fetus
   c. Expels fetus by uterine contractions
   d. Shed unused endometrium during menstruation
   e. Surgical removal of the uterus is called a hysterectomy

K. Vagina
1. Structure
   a. 7 to 8 cm long tube-like passageway leading from the vulva to the cervix of the uterus
   b. Thin walled smooth muscled tube lined with mucous membrane arranged in rugae (folds)
   c. Hymen: folds of mucous membrane forming a border around the external opening of the vagina
2. Function
   a. Receives penis and semen during intercourse

b. Discharges menstrual flow and uterine secretions
c. Delivers fetus at birth by great distention during labor
d. pH 3.5 – 4.0 to reduce possibility of infection

VI. Physiology of Female Reproductive System

A. Oogenesis

1. Total supply of eggs that female releases is determined by the time of birth
2. From puberty to about age 50
3. Process in which eggs are produced
4. One ovulation each month
5. 400 – 500 oocytes of potential 700,000 released during lifetime

B. Ovarian Cycle: 3 stages usually lasting 28 days

1. Follicular phase
   a. Period of follicular growth
   b. Days 1 – 10
   c. Under influence of FSH, follicles enlarge and secrete estrogen and tiny amounts of progesterone
   d. Only one oocyte matures and migrates to the surface of the ovary
2. Ovulatory phase
   a. Days 11 – 14
   b. With a surge of LH, the follicle balloons, ruptures and expels the ovum (ovulation; life span of ovum is 12 –48 hours)
   c. 1 – 2% of ovulations more than one oocyte is released which could result in multiple births
3. Luteal phase
   a. Days 14 – 28
   b. Ruptured follicle regroups and transforms into the corpus luteum which grows for 7 – 8 days (secretes progesterone during this time to increase endometrial tissue)
   c. Without fertilization, FSH and LH levels drop, estrogen and progesterone secretion drops, and the endometrium sloughs off during menstruation; arterioles constrict causing ischemia to the endometrium, death of the tissue and sloughing off as menstrual discharge; corpus luteum diminishes to white scar called the corpus albicans, which eventually disappears
   d. If fertilized, menstruation does not occur and the corpus luteum continues to secrete progesterone for the first trimester; placenta then assumes the

role of secreting progesterone

C. Uterine (Menstrual) Cycle: 3 stages
    1. Menstrual phase
        a. Thick functional layer of endometrium becomes detached
        b. Bleeding for 3 – 5 days
        c. Passes through the vagina
        d. Menstrual flow: 50 – 150 ml. of blood
    2. Proliferation phase
        a. Days 6 – 14
        b. Estrogen causes endometrium repair
        c. Mucosa becomes velvety, thick and well vascularized
        d. Cervical mucus thins to form channels that aid movement of sperm into uterus
        e. Ovulation occurs
    3. Secretory phase
        a. Days 15 – 28
        b. Increased level of progesterone
        c. Uterus ready for implantation of embryo
        d. Cervical plug forms: blocks sperm and keeps uterus “private” if embryo implants
        e. No fertilization - endometrial cells die

D. Female Sexual Response
    1. Engorgement of clitoris, vaginal mucosa and breasts with blood
    2. Erection of nipples
    3. Secretion of vestibular glands for lubrication during intercourse
    4. Orgasm is muscle tension throughout body and rhythmic contraction of uterus
    5. Orgasm is NOT required for conception

VII. Contraception

A. Birth Control Pills
    1. Works on negative feedback mechanism
    2. Made of synthetic estrogen and progesterone (causes high levels in the blood)
    3. Decreases secretion of FSH and LH from the anterior pituitary
    4. In the absence of FSH and LH, follicular development and ovum maturation as well as ovulation will not occur - fertilization unlikely
    5. 99% effective if taken as prescribed

B. Mechanical/Chemical Barriers
    1. Condom: latex covering over the penis that traps sperm

a. Not very effective for birth control
b. Limited protection against STDs

2. Diaphragm: plastic dome-shaped object placed in the vagina to block sperm from the cervical opening
    a. Must be fitted by a doctor
    b. Tears can occur
    c. Does not protect against STDs
3. Cervical cap: plastic object that fits over the cervical opening
    a. Must be fitted by a doctor
    b. Does not protect against STDs
4. Spermicides: acidic chemical in the form of foams, gels, creams, sponges that destroy sperm in the vagina
5. IUDs
    a. Intrauterine device of plastic or copper wire that is placed in the uterus for long periods of time
    b. Presence of a foreign body in the uterus will inhibit pregnancy by inhibiting implantation
    c. Does not protect against STDs
6. Vasectomy/tubal ligation
    a. Surgical sterilization to prevent the passage of the ovum or the sperm
    b. Vasectomy has limited success at reversal by reconnecting the severed vas deferens
    c. Tubal ligation (cutting the uterine tube) = permanent
    d. Neither method protects against STDs
7. Rhythm Method
    a. Temporary abstinence
    b. Intercourse is avoided during the periods when conception is most likely (4 days before ovulation and 3 days after ovulation)
    c. Very ineffective
    d. Too many variables can influence when the female ovulates i.e. stress, illness, etc.
    e. Does not protect against STDs
8. Coitus Interruptus
    a. Withdrawal of the penis prior to ejaculation
    b. Not effective as birth control due to possibility of sperm in the pre-ejaculate
    c. Does not protect against STDs

VIII. Conception and Pregnancy

A. Fertilization – sperm + ova = zygote

1. Ovum can be fertilized over a maximum range of 72 hours each menstrual cycle.

2. Estimated that 30% of all fertilized ova naturally do not survive
3. In vitro fertilization - first attempted in 1978
    a. Ovum retrieved by laparoscope, mixed with semen in a test tube
    b. Returned to uterus after 2 ½ days
    c. 50% success rate of fertilization
    d. 20 – 30% implant rate of those fertilized
4. Begins when the head of one sperm enters the ovum
5. Occurs in outer 1/3 of fallopian tube
6. Fertilized ovum called a zygote - one cell, one nucleus, all the necessary ingredients for its development

B. Cell Division
    1. Called cleavage
    2. Bulk of cell does not change
    3. Rapidly dividing cell ball develops from a blastomeres - morula - Blastocyst
    4. Passage to the uterus takes 7 - 9 days
C. Embryo Stage: begins the 2nd week and extends through the 8th week
D. Fetal Stage: after the 8th week and continues until birth
E. Blastocyst
    1. Fluid filled hollow ball of cells
    2. Burrows little finger-like projections called villi into the blood supply of the endometrial lining
    3. Outer rim becomes the chorion (fetal membrane)
    4. Cells near the outer rim become the embryo
F. Placenta
    1. Develops by 3 months
    2. Takes over job of the primitive villi providing nourishment for the fetus and carrying fetal waste to maternal blood
    3. Joined to fetus by the umbilical cord
    4. Secretes large amount of HCG (human chorionic gonadotropin) that stimulates the corpus luteum to continue to secrete estrogen and progesterone
    5. Begins to secrete estrogen and progesterone
    6. Most early pregnancy tests check for the high HCG level in urine
    7. Approximately 8 inches in diameter, 1 inch thick, and about 1/6 of fetal weight
    8. Transfer of nourishment and waste occurs by osmosis
    9. Calcium, Phosphorus, amino acids, glucose, fats, bacteria, viruses, antibodies pass from maternal side to fetal side
    10. NO intermixing of maternal blood and fetal blood

11. Oxygen and carbon dioxide pass through by diffusion
12. Prevents passage of some but not all harmful substances into fetus (nicotine, alcohol, most drugs pass through placental barrier and harm the fetus)
13. Umbilical cord: 1 umbilical vein, 2 umbilical arteries, Wharton's jelly enclosed in a membrane

G. Fetal Circulation
Placenta - Umbilical Vein (oxygenated blood) - Ductus Venosus - Inferior Vena Cava - Right Atrium - Foramen Ovale - Left Atrium - Left Ventricle - Aorta - Upper Extremities - Superior Vena Cava - Right Atrium - Right Ventricle - Pulmonary Arteries - Ductus Arteriosus - Aorta - Trunk and Lower Extremities - Hypogastric Arteries - Umbilical Arteries (deoxygenated blood)

H. Birth
1. Lung function established
2. Umbilical vein and umbilical arteries become fibrous cords
3. Once cord is cut, large amount of blood returns to the heart from the lungs
4. Foramen ovale closes due to equalization of pressure in the atria and normal circulation begins

IX. Pregnancy

A. Physiological Changes
1. Hegar's sign: softening of the lower part of the uterus; about the 6^{th} week
2. Goodell's sign: softening of the cervix
3. Chadwick's sign: tissue around the vagina and external genitals become thicker, softer, and take on a bluish, purple color
4. Braxton-Hicks contractions: painless, intermittent contractions of the uterus (enlargement)
5. Ballottement: rebounding of the floating fetus in the uterus when the fetus is lightly tapped during a vaginal exam; after the 4^{th} month

B. Signs and Symptoms
1. Skin
   a. Linea nigra: dark line from umbilicus to mons pubis
   b. Cholasma gravidarium: a dark freckle-like pigmentation of the face
   c. Striae gravidarium: white streaks on breasts, abdomen, and thighs
2. Cessation of menses
3. Urinary frequency
4. Morning sickness

5. Quickening: 1st sensation of fetal movement; 4th month
6. Breasts: larger, fuller, more tender; areola darker
7. Fetal heartbeat: heard 3rd month with fetone
8. Ultrasound: sound waves that scan the abdomen to identify outline of baby and placenta
9. Souffle: soft murmur produced by blood flow in the placenta and umbilical arteries

X. Labor and Delivery

A. Engagement and Lightening
   1. Final 2 – 4 weeks of gestation
   2. Fetal head sinks into pelvis (engagement)
   3. Effects on mother (lightening): fundus lowers, upper abdomen flattens, breathing easier but walking more difficult

B. Onset of Labor
   1. The “Show”: mucus streaked with blood from the cervix
   2. Rupture of bag of waters: amniotic sac tears and releases amniotic fluid
   3. Labor pains: regular contractions of the uterus

C. True Labor
   1. Characterized by rhythmic, increasingly intense uterine contractions
   2. Cervix changes shape
      a. Effacement: shortening
      b. Dilation: widening
   3. Crowning: fetal head presents at the vulva
   4. Presentation: manner in which the fetus presents itself in the vagina
      a. Cephalic: head first
      b. Breech: buttocks/legs first

XI. Diseases and Disorders Including Sexually Transmitted Diseases

A. Dysmenorrhea: painful spasms of uterine muscles
B. Amenorrhea: absence of normal menstruation; causes can be hormone imbalance, pregnancy, weight loss, menopause
C. DUB: dysfunctional uterine bleeding; irregular or excessive bleeding due to hormonal imbalance and hyperplasia of the endometrium
D. PMS: premenstrual syndrome; irritability, fatigue, nervousness, depression, cause unknown
E. PID: pelvic inflammatory disease; salpingitis, oophoritis
F. Vaginitis: usually yeast infections (Candida); causes leukorrhea (white discharge); can be viral, bacterial, fungal, protozoan; thick discharge, mild pain on urination, itching; treatment = metronidazole
G. Myoma: fibroma/fibroids; benign tumors of smooth muscle

H. Ovarian cysts: fluid filled sac that develops from a follicle that fails to rupture completely or a corpus luteum that fails to degenerate
I. Endometriosis: displaced endometrial tissue, usually on the peritoneum
J. Cancer: ovaries, breast, uterus, cervix (Pap smear) → female; testicular, prostate (PSA blood test) → male
K. Hermaphrodite: has both testicular and ovarian tissue, rare in humans, more common in other species
L. Klinefelter's Syndrome: XXY (47) male with small testes, gynecomastia, subnormal intelligence; occurs in 1:700 live births
M. Turner's Syndrome: XO (45) female, poorly developed gonads, short stature, impaired intelligence, ovaries fail to respond to FSH, LH stimulation
N. Gonorrhea
    1. Bacteria spread by genital contact as well as contact with anal and pharyngeal mucosal surfaces
    2. Males: painful urination and discharge of pus
    3. Females: lower abdominal discomfort, vaginal discharge, abnormal bleeding
    4. Treated with antibiotics
O. Syphilis
    1. Caused by bacteria
    2. Causes ulcers (chancres) on penis and in vagina
    3. Secondary signs: pink rash over body, fever, joint pain
    4. Tertiary: destructive lesions of CNS, blood vessels, bones, skin
    5. Treated with penicillin
P. Chlamydia
    1. Most common STD
    2. Vaginal discharge or burning abdominal, rectal, or testicular pain
    3. Painful intercourse and irregular menses
Q. Genital Herpes
    1. May remain silent for weeks or years
    2. Blister-like lesions
    3. Congenital herpes can cause severe malformation of fetus
    4. Can lead to cervical cancer
    5. Incurable
R. Genital Warts
    1. Viral
    2. Common skin wart on genitals
    3. Caused by the papilloma virus
    4. Treatment: chemical or physical removal

5. Can lead to cervical cancer
6. Incurable

S. Hepatitis B
    1. Viral
    2. Incurable
    3. Immunization available

T. AIDS
    1. Acquired immunodeficiency syndrome
    2. Viral
    3. Early: weight loss, frequent fevers, mild infections, weakness, enlarged lymph glands
    4. Later: susceptibility to common infections, pneumonia, cancer
    5. Treatment: antivirals, immunostimulants to slow progress of virus
    6. Incurable

U. Nongonococcal Urethritis
    1. bacterial infection
    2. thin, clear discharge from penis or vagina, mild pain during urination

V. Pubic Lice
    1. Cause: louse
    2. Itching in region of pubic hair
    3. Treatment: creams, lotions, or shampoos containing gamma benzene hexachloride

Activity

I. Complete the Compare and Contrast Male and Female Anatomy Writing Activity.
II. Design and create a poster of the menstrual cycle and the ovarian cycle
III. Design and create a poster of sexually transmitted diseases, Signs and Symptoms, and Treatment
IV. For additional activities see “Reproductive Medical Terminology” Lessons
V. Identify anatomical structures of reproductive system on dissected cat – compare male and female anatomy. (*This can be accomplished as a virtual tour on the internet, or if your budget allows, the students can dissect cats.)*

Assessment

Reproductive System Test
Male Reproductive System Quiz
Female Reproductive System Quiz

Writing Rubric
Project Rubric

Materials
For activity I. Activity handout and Writing Rubric
For activity II and III. Poster board, marker, colored pencils and computers with internet, Project Rubric
For activity IV. Computer with internet access to texashste.com website
For activity V. Dissection Cat 1 for every 2-4 students, and dissection tools AND/OR computers with internet access

Utah State Office of Education, (2005). *Medical Anatomy and Physiology Teacher Resource CD*. Utah.

Accommodations for Learning Differences
For reinforcement, the student will label anatomical drawings of the reproductive system.

For enrichment, the student will research and report on a specific disorder of the reproductive system.

National and State Education Standards
National Health Science Cluster Standards
HLC01.01 Academic Foundations
Health care workers will know the academic subject matter required (in addition to state high school graduation requirements) for proficiency within their area. They will use this knowledge as needed in their role.
HLC1O.01 Technical Skills
Health Care Workers will apply technical skills required for all career specialties. They will demonstrate skills and knowledge as appropriate.

TEKS 130.206 (c)
130.206 (c)(6)(A) investigate and describe the integration of the chemical and physical processes, including equilibrium, temperature, pH balance, chemical reactions, passive transport, active transport, and biofeedback, that contribute to homeostasis;
130.206 (c)(6)(B) determine the consequences of the failure to maintain homeostasis;
130.206 (c)(10)(A) analyze the relationships between the anatomical structures and physiological functions of systems, including the integumentary, nervous, skeletal, musculoskeletal, cardiovascular, respiratory, gastrointestinal, endocrine, and reproductive;
130.206 (c)(10)(B) evaluate the cause and effect of disease, trauma, and congenital defects on the structure and function of cells, tissues, organs, and systems;

130.206 (c)(10)(C) research technological advances and limitations in the treatment of system disorders;
130.206 (c)(10)(D) examine characteristics of the aging process on body systems;
130.206 (c)(11)(A) explain embryological development of tissues, organs, and systems;
130.206 (c)(11)(B) identify the functions of the male and female reproductive systems; and
130.206 (c)(11)(C) summarize the human growth and development cycle.

Texas College and Career Readiness Standards
English Language Arts
II. B. Understand new vocabulary and concepts and use them accurately in reading, writing, and speaking.
III. B. Develop effective speaking styles for both group and one-on-one situations.
IV. A. Apply listening skills as an individual, and as a member of a group in a variety of settings.
IV. B. 2. Listen actively and effectively in one-on-one communication situations.

Science
1.A.1. Utilize skepticism, logic, and professional ethics in science.
1.A.2. Use creativity and insight to recognize and describe patterns in natural phenomena.
1.A.3. Formulate appropriate questions to test understanding of a natural phenomenon.
1.A.4. Relay on reproducible observations of empirical evidence when constructing analyzing, and evaluating explanations of natural events and processes.
1.E.2. Use essential vocabulary of the discipline being studied.
3.A.1. Use correct applications of writing practices in scientific communication.

Compare and Contrast Male and Female Anatomy

Write a three paragraph essay describing the differences and similarities between the male and female reproductive organs. The names of the structures are listed below.

Male Organs:

Scrotum	Testes	Vas Deferens
Epididymis	Urethra	Cowper's Gland
Seminal Vesicle	Prostate Gland	Urinary Bladder
Ejaculatory Duct	Ureter	Glans Penis

Female Organs:

Ovaries	Fimbriae	Labia Majora	Urethra
Uterus	Ova	Labia Minora	Anus
Vestibular glands	Perineum	Vulva	Clitoris

("Medical anatomy and," 2005)

REPRODUCTIVE SYSTEM TEST

Multiple Choice

1. The membrane that may cover the vaginal opening of the female is called the:
   a. hymen
   b. mons pubis
   c. labia
   d. clitoris

2. Which of the following statements is true of the menstrual cycle?
   a. Estrogen levels are lowest at the time of ovulation.
   b. Progesterone levels are highest at the time of ovulation.
   c. FSH levels are highest during the proliferation phase.
   d. None of the above is true.

3. A fluid mixture called semen could contain:
   a. sperm cells
   b. secretion from the prostate
   c. secretions from the seminal vesicles
   d. all of the above

4. Failure of the testes to descend into the scrotum before birth is called:
   a. cryptococcoses
   b. coccidioidomycosis
   c. cryptorchidism
   d. cholelithiasis

5. Which of the following is NOT an accessory organ of the female reproductive system?
   a. breast
   b. Bartholin's glands
   c. Ovary
   d. All of the above are accessory organs

6. Which of the following structures can be referred to as male gonads?
   a. testes
   b. epididymis
   c. vas deferens
   d. all of the above

7. Sperm cells are suspended outside the body cavity so as to:
   a. protect them from trauma
   b. keep them at a cooler temperature
   c. keep them supplied with a greater number of blood vessels
   d. protect them from infection

8. Removal of the foreskin from the glans penis is called:
   a. vasectomy
   b .sterilization
   c. circumcision
   d. ligation

9. The colored area around the nipple of the breast is called:
   a. areola
   b. lactiferous duct
   c. alveoli
   d. none of the above

10. Many events occur during the secretory phase of the menstrual cycle including:
   a. follicles develop
   b. lowest levels of estrogen occur
   c. highest levels of progesterone occur
   d. the ovum is released

Fill-in-the-Blank Complete the following statements using the terms listed below.

   a. clitoris
   b. hysterectomy
   c. endometrium
   d. prostate
   e. circumcision
   f. FSH (follicle stimulating hormone)
   g. corpus luteum
   h. ovulation
   i. menses
   j. scrotum
   k. epididymis
   l testosterone

11. Surgical removal of the foreskin from the glans penis is called _____.

12. Interstitial cells of the testes function to produce _____.

13. The doughnut-shaped accessory organ or gland that surrounds the male urethra is called the _____.

14. Surgical removal of the uterus is called _____.

15. The _____ houses sperm cells as they mature and develop their ability to swim.

16. The skin-covered external pouch that contains the testes is called the _____.

17. The lining of the uterus is called _____.

18. The hormone progesterone is secreted by a structure called the _____.

19. Fertilization of an egg by a sperm can only occur around the time of _____.

20. From about the first to the seventh day of the menstrual cycle, the anterior pituitary gland secretes _____.

Matching Only ONE answer is correct.

a. LH
b. tunica albuginea
c. anabolic hormone
d. dysmenorrhea
e. amenorrhea
f. oligospermia
g. lips
h. Bulbourethral glands
i. corpora cavernosa
j. sex cell

21. Testosterone

22. Penis

23. Painful menstruation

24. Cowper's glands

25. Saclike covering of the testes

26. Decreased sperm count

27. Labia

28. Failure to have a menstrual cycle

29. Ovulating hormone

30. Gamete

Multiple Choice

Kelly and Adam Jones are trying to conceive their first child.

31. If Kelly has a regular 28-day cycle, during which days of her cycle is coitus most likely to result in fertilization?
    a. 1-4
    b. 5-8
    c. 12-15
    d. 24-27

32. If fertilization occurs:
    a. the endometrium remains intact
    b. the uterus enlarges
    c. the normal chromosome number is achieved
    d. all of the above

Matching

    a. cryptorchidism
    b. hysterectomy
    c. prostatic hypertrophy
    d. amenorrhea
    e. prostatectomy

33. A condition characterized by enlargement of the prostate gland.

34. The surgical removal of the uterus.

35. Surgical removal of the prostate gland.

36. The failure of the testes to descend from the abdominal cavity in the final stages of fetal development.

37. Absence of menses.

Matching

a. vaginitis
b. toxic shock syndrome
c. premenstrual syndrome
d. phimosis
e. hydrocele
f. inguinal hernia
g. Sterility

38. Protrusion of the intestines into the scrotum

39. Inflammation or infection of the vaginal lining

40. Tight foreskin

41. Inability to reproduce

42. Caused by staphylococcus bacteria

43. Symptoms are irritability, fatigue, and nervousness

44. Accumulation of watery fluid in the scrotum

Multiple Choice

45. Which of the following is the correct path for semen to follow?
    a. prostate, seminal vesicles, epididymis, Cowper's gland, vas deferens
    b. Cowper's glands, epididymis, seminal vesicles, vas deferens, prostate
    c. Vas deferens, prostate, Cowper's glands, epididymis, seminal vesicles
    d. epididymis, vas deferens, seminal vesicles, prostate, Cowper's glands

46. In the female, what lies in the pelvic cavity behind the urinary bladder?
    a. spine
    b. brain
    c. uterus
    d. kidney

47. What are the fringelike projections at the ends of the Fallopian tubes?
    a. fimbriae
    b. femur
    c. fingers
    d. ovaries

48. What kind of diagnostic test is performed to detect cervical cancer?
    a. blood test
    b. pap smear
    c. HIV test
    d. Mammogram

True/False

49. Infertility involves only the female partner.

50. Dysfunctional uterine bleeding (DUB) is not caused from a hormonal imbalance.

51. Exogenous infections result from pathogens that normally inhabit the intestines, vulva, or vagina.

52. Menses lasts about 20 days.

53. The myometrium is the muscle layer of the uterus that contracts during labor.

Extra Credit. Worth 2 points each.

1. List 2 STDs and name the causative organism for each STD listed.
    a.

    b.

2. Name the test used to screen for prostate cancer and identify what the initials represent.

Project Rubric

Student: _____Date: _____

Scoring criteria	4. Excellent	3. Good	2. Needs Some Improvement	1. Needs Much Improvement	N/A
Clearly/effectively communicates the main idea or theme.					
Reflects application of critical thinking.					
Information clearly provided in an organized and thoughtful manner.					
Strong examples used to describe the theme or objective.					
Illustrations follow a logical reasoning.					
Each image and font size is legible to entire audience.					
No spelling, grammatical or punctuation errors.					

NOTE: N/A represents a response to the performance which is "not appropriate."

Writing Rubric

Student: _____ Date: _____

Scoring criteria	4. Excellent	3. Good	2. Needs Some Improvement	1. Needs Much Improvement	N/A
The writing has all required parts from introduction to conclusion in smooth transition.					
The writing is interesting, supportive, and complete.					
The writing demonstrates that the writer comprehends the writing process.					
Accurate spelling, grammar, punctuation.					
Content of paragraphs emphasizes appropriate points.					
The writer shows an understanding of sentence structure, paragraphing, and punctuation.					
All sources and references are clearly and accurately documented.					

NOTE: N/A represents a response to the performance which is "not appropriate."