

## Chapter Twenty-six: Reproduction and Development

### Teacher Notes

#### Lesson One: Animal Reproduction

- Asexual Reproduction-reproduction that does not involve the union of sex cells and in which a single parent produces offspring that are genetically identical to the parent.
  - budding-when a part of the parent organism pinches off and forms a new organism
  - fragmentation-parts of an organism break off and then develop into a new individual that is identical to the original one
  - regeneration-a body part is lost and that lost part will develop into a new organism
- Sexual Reproduction-reproduction in which sex cells from two parents unite to produce offspring that share traits from both parents.
  - Egg-a sex cell produced by a female
  - Sperm-the male sex cell
  - Zygote-fertilized egg
  - Fertilization-the joining of egg and sperm to form a zygote
  - egg and sperm cells form by meiosis
    - this results in each egg and sperm cell having 23 chromosomes (rather than the 46 found in other body cells)
  - genes-home to genetic information
  - chromosomes-are made of a cell's DNA
- Internal and External Fertilization
  - External Fertilization-the union of sex cells outside the bodies of the parents.
  - Internal Fertilization-fertilization of an egg by sperm that occurs inside the body of a female.
- Mammals-all reproduce sexually; nurture young with milk, and reproduce in one of three ways
  - monotremes-mammals that lay eggs
  - marsupials-give birth to partially developed live young and then continue to develop inside a pouch
  - placental mammals-are nourished inside their mother's body before birth

#### Lesson Two: Human Reproduction

- The Male Reproductive System
  - produces sperm and delivers it to the female reproductive system
  - Testes-the primary male reproductive organs, which produce sperm and testosterone.
  - testosterone is the main male sex hormone that regulates the production of sperm and the development of male characteristics
  - sperm leaves testis it is stored in a tube called epididymis where they mature
  - vas deferens-tube that passes from the epididymis into the body through the prostate gland; sperm mix with fluids here
  - prostate gland-surrounds the neck of the bladder
  - semen-the mixture of sperm and fluids

- to leave the body semen passes through the vas deferens into the urethra
- penis-the male organ that transfers sperm to a female and that carries urine out of the body.
- The Female Reproductive System
  - female system produces eggs, nurtures fertilized eggs, and gives birth
  - zygotes-fertilized eggs
  - ovary-in the female reproductive system of animals, an organ that produces eggs.
    - also release estrogen and progesterone (main female sex hormones)
      - these hormones release eggs and development of female characteristics
- The Egg's Journey
  - ovulation-an egg is released from an ovary and passes into a fallopian tube
  - fallopian tube-leads from each ovary to the uterus; the egg passes from the fallopian tube to the uterus
  - fertilization usually occurs in the fallopian tube; the resulting zygote enters the uterus
    - zygote then attaches to the thick lining of the uterus
  - uterus-the hollow, muscular organ in which a fertilized egg is embedded and in which the embryo and fetus develop
  - vagina-the female reproductive organ that connects the outside of the body to the uterus
    - baby passes through vagina at birth
- Menstrual Cycle-cycle that the female body goes through to prepare the body for pregnancy.
  - occurs from puberty to late 40's or 50's
  - monthly discharge of blood and tissue from the uterus
  - lasts about 5 days
  - when menstruation ends the lining of the uterus thickens
  - ovulation occurs about the 14<sup>th</sup> day of the cycle
  - if the egg isn't fertilized in a few days menstruation begins and flushes the egg away
- Multiple Births
  - identical twins-occurs when an egg splits after fertilization; genetically the same
  - fraternal twins-occur when two eggs are fertilized at the same time; are not genetically identical
  - twins are the most common multiple birth
  - higher order multiples are rare and are usually the result of fertility drugs
- Reproductive System Problems
  - STDs-sexually transmitted disease-a disease that can pass from a person who is infected with the STD to an uninfected person during sexual contact.
    - STI-sexually transmitted infections
  - AIDS (acquired immune deficiency syndrome) which is caused by HIV (human immunodeficiency virus)
  - Hepatitis B-a liver disease also caused by a virus
  - Cancer-disease in which cells grow at an uncontrolled rate

- cancer cells can form in reproductive organs
  - most common reproductive cancers in men are cancer of the testes and cancer of the prostate gland
  - most common reproductive cancers in women are breast cancer and cervical cancer
- Infertility-difficulty producing offspring
  - men may be infertile if they don't produce enough healthy sperm
  - can also be caused by STDs
  - women may be infertile if they don't ovulate normally
  - can also be caused by STDs like gonorrhea and Chlamydia

### **Lesson Three: Growth and Development**

#### **-From Fertilization to Embryo**

- human development begins when man deposits sperm into a woman's vagina; sperm travel through the uterus, cover the egg and the one sperm gets through the outer coating of the egg.
- this triggers a membrane to form around the egg to keep other sperm from entering.
- when the sperm's nucleus joins the egg's nucleus the egg becomes fertilized
- fertilized egg (zygote) travels down the fallopian tube toward the uterus (about 5-6 days); while this is occurring the cell divides many times
- 11 to 12 days after fertilization the zygote becomes a tiny ball of cells called an embryo
  - Embryo-a developing human, from fertilization through the first 8 weeks of development
  - embryo implants itself in the uterus

#### **-From Embryo to Fetus**

- Placenta-the partly fetal and partly maternal organ by which materials are exchanged between fetus and mother.
  - provides embryo with oxygen and nutrients from the mother's blood
  - waste produced by the embryo are removed in the placenta and carried by the mother's blood
  - mother and embryo's blood flow close to each other but usually don't mix
- Weeks 1 and 2
  - start counting pregnancy from the first day of last menstrual period
  - fertilization has not occurred yet
- Weeks 3 and 4
  - fertilization takes place around the end of the second week
  - in week 3 the zygote moves to the uterus and divides many times
  - when it becomes an embryo it attaches to the wall of the uterus
  - by the end of week 4 the implantation is complete; the woman is pregnant
    - embryo's blood cells begin to form and is about 0.2 cm long
- Weeks 5 to 8

- embryo becomes surrounded by a thin membrane called the amnion which is filled with amniotic fluid and protects the growing embryo from bumps and injury

- during week 5 the umbilical cord forms

  - Umbilical Cord-the structure that connects the fetus to the placenta

- in this stage the heart, brain, other organs, and blood vessels start to form.

- weeks 5 and 6 ears and eyes take shape; spinal cord begins to develop

- week 6 tiny limb bud appear

- week 8 muscles start developing

- embryo is about 16 mm long; can swallow and blink

- Weeks 9 to 16

  - week 9 embryo may begin to make movements

  - Fetus-a developing human from seven or eight weeks after fertilization until birth.

  - week 13 face looks more human; muscles grow stronger

    - can make fists and move

    - fetus doubles and triples size within a month

  - week 10 is about 36 mm long; at 16 is about 108-116 mm long

- Weeks 17 to 24

  - week 17 fetus can make faces

  - week 18 fetus starts making movements the mom can feel; can hear sounds through the uterus; may jump at loud noises

  - week 23 fetal movement is vigorous

  - a baby born after week 24 may survive but would require a lot of help

  - between weeks 17 to 24 the fetus grows 25-30 cm

- Weeks 25 to 36

  - about week 25-26 lungs are well developed but gets oxygen from mom

  - by week 32 eyes are open and can perceive light through the mother's abdominal wall; sunlight affects sleep patterns

  - at 36 weeks the fetus is almost ready to be born

- Birth

  - at 37-38 weeks the fetus is fully developed

  - full term pregnancy usually last 40-42 weeks

  - birth begins when the mother's uterus starts to contract

  - contractions push the fetus through the vagina

    - after the umbilical cord is cut and the baby takes its first breath

    - mother then expels the placenta and birth is complete

- From Birth to Death

  - Infancy and Childhood

    - infancy is the stage from birth to 2

      - grow quickly; nervous system develops; and coordination increases

    - childhood lasts from 2 to puberty

      - permanent teeth; muscles are more coordinated

  - Adolescence

- from puberty to adulthood
- during puberty reproductive system becomes mature
  - boys usually age 11 to 16
    - muscles develop; voice lowers, body and facial hair appear
  - girls usually age 9 to 14
    - body fat on hips and thighs increases, breasts enlarge, body hair appears, menstruation begins

-Adulthood

- from 20 to 40 young adult stage
  - peak of physical development, at 30 aging begins
- from 40-65 middle age
  - hair may turn gray, athletic abilities decline, skin may wrinkle
- over 65 old adult
  - aging process continues