

Outline of the major topics covered in Human Biology (Genetics)

Reproductive System and Child Birth

Time: Four weeks

Homework Assignments

Reproductive System Internet Project

Birth Process Internet Project

Test

Anatomy of the Male Reproductive System

Discuss the common purpose of the reproductive system organs.

When provided with a model or diagram, identify the organs of the male reproductive system and discuss the general function of each.

Name the endocrine and exocrine products of the testes.

Discuss the composition of semen and name the glands that produce it.

Trace the pathway followed by a sperm from the testis to the body exterior.

Define erection, ejaculation, and circumcision.

Male Reproductive Functions

Define meiosis and spermatogenesis.

Describe the structure of a sperm and relate its structure to its function.

Describe the effect of FSH and LH on testis functioning.

Anatomy of the Female Reproductive System

When provided with an appropriate model or diagram, identify the organs of the female reproductive system and discuss the general function of each.

Describe the functions of the vesicular follicle and corpus luteum of the ovary.

Define endometrium, myometrium, and ovulation.

Explain the location of the following regions of the female uterus: cervix, fundus, body.

Female Reproductive Functions and Cycles

Define oogenesis.

Describe the influence of FSH and LH on ovarian function.

Describe the phases and controls of the menstrual cycle.

Mammary Glands

Describe the structure and function of the mammary glands.

Survey of Pregnancy and Embryonic Development

Define fertilization and zygote.

Describe implantation.

Distinguish between an embryo and a fetus.

List the major functions of the placenta.

Indicate several ways that pregnancy alters or modifies the functioning of the mother's body.

Describe how labor is initiated and briefly discuss the three stages of labor.

List several agents that can interfere with normal fetal development.

Developmental Aspects of the Reproductive System

Describe the importance of the presence/absence of testosterone during embryonic development of the reproductive system organs.

Define menopause.

DNA, DNA Replication and Protein Synthesis

Time: Four weeks

Homework Assignments

DNA and DNA Replication Internet Project

Protein Synthesis Internet Project

DNA replication and protein synthesis animations from the Internet

Jurassic Park Movie

GATTACA Movie

Test

DNA/RNA Structure and DNA Replication

Basic structure of a DNA molecule including components and bonds

Basic structure of a DNA nucleotide including the four bases

How each base bonds in the DNA molecule

Purines vs Pyrimidines structure and examples of each

Basic structure of a RNA nucleotide including the base Uracil

Watson, Crick and Franklin role in the discovery of the DNA molecule

Size of a DNA molecule

Chromosomes vs. genes

The difference between somatic and sex chromosomes

What is a karyotype and how can you determine certain characteristics of an individual.

DNA replication including the speed of replication, and specifics about the replication

including multiple origins, and enzymes needed and Okazaki fragments in replication

The basic cell cycle specifically the S-phase where the DNA is replicated

Basic information on cancer and rapid uncontrolled cell division

Protein Synthesis

Definition of a protein and their role in life processes

Definition of mRNA and tRNA and where is found/formed and their differences from DNA

Differences between transcription and translation

The difference between codon, a start codon, a stop codon and an anticodon

Role of the ribosome in protein synthesis

Description of the genetic code and how to read it

Define a peptide bond and where/when they form

Importance of the proteins amino acid sequence and folding pattern/function

Mutations including insertions, deletions, and substitutions which may or may not affect the shape or function of the protein

The specific mutation in such disorder like cystic fibrosis

Mitosis and Meiosis

Time: Two weeks

Homework Assignments

Mitosis Replication Internet Project

Meiosis Internet Project

Mitosis and Meiosis animations from the Internet and You Tube

Test

Mitosis

The basic structure of a cell including the major organelles found in an animal and a plant cell.

Mitosis is the creation of two cells identical to the parent cell including shape and number of chromosomes

Mitosis occurs in reproduction, growth and repair of cell that need it

Not all cells in the human body divide by mitosis or divide at all

Prokaryotic vs eukaryotic cell division

Specifics of the cell cycle including interphase and mitosis

All of the stages of mitosis including prophase, metaphase, anaphase, telophase and cytokinesis

Sister chromatids and homologous chromosomes and how the DNA folds itself into a condensed chromosome

Origin of the spindle apparatus in animal and plant cells

Differences between the cleavage furrow and a cell plate

Control of the cell cycle including checkpoints along the way including how the cell prevents uncontrolled divisions (cancer)

Meiosis

Animals produce gametes by a process called meiosis with half of the number of chromosomes of the original animal

Female gametes in the ovaries are called eggs and male gametes in the testes are called sperm

Meiosis allows for genetic diversity in population

A zygote is the cell produced by the combination of gametes called a zygote with a full set of chromosomes

Meiosis is divided into two stages, meiosis I and meiosis II

In males, 4 sperm cells are formed and in females 1 egg cell and 3 polar bodies are formed

Tetrads will cross over at sites called chiasma

Chromosomes are replicated in meiosis I but not in meiosis II

If cells do not separate properly in meiosis II, there will be an unequal amount of chromosomes will result, that is called non-disjunction

Down Syndrome, Klinefelter Syndrome and Turner's Syndrome are possible disorders that can result from non-disjunction.

END OF FIRST SEMESTER

Mendeillian Genetics

Time: Three and a half weeks

Dihybrid and trihybrid cross assignments

Homework Assignments

Gregor Mendel Internet Project

Punnett Square Internet Project

Test

Genetic Terminology

Define: traits, heredity, genetics, monohybrid cross, dihybrid cross, genotype, phenotype, heterozygous, homozygous, hybrid, allele, dominant and recessive traits

How to create and use a Punnett Square

Use the formula 2^n to determine the possible outcomes in a hybrid cross where n is the number of heterozygous traits

Determine the ratio of outcomes of a dihybrid cross

Reasons Mendel used pea plants in his experiments

Difference between cross pollination and self pollination in plants

Look at the traits that Mendel tested in his pea plant experiments

Mendel's three laws; law of dominance, law of segregation and law of independent Assortment

Variations in Mendel's laws; Incomplete dominance and codominance including Roan cows and human blood types

Genetic Disorders

Time: Three weeks

Homework Assignments

Genetic Disorders Internet Project

Actual videos of people's experiences with genetic disorders from the Internet

Test

Genetic Disorders

Genetic disorders are caused by abnormalities in the individual's DNA

A karyotype is a snap shot of an individual's chromosomes where some genetic abnormalities can be easily seen

Characteristics of Williams Syndrome including causes, symptoms, treatments and odds of getting the disorder

Characteristics of Turner's Syndrome including causes, symptoms, treatments and odds of getting the disorder

Characteristics of Klinefelter's Syndrome including causes, symptoms, treatments and odds of getting the disorder

Characteristics of Down Syndrome including causes, symptoms, treatments and odds of getting the disorder

X-Linked and Autosomal Chromosomal Disorders

Time: Three weeks

Homework Assignments

Chromosomal Disorders Internet Project

Actual videos of people's experiences with genetic disorders from the Internet
Test

X-Linked Genetic Disorders and Traits

What are X-linked dominant and an X-linked recessive disorders

Males are more likely to show the effects of an X-linked recessive disorder or trait

Describe a carrier, non-carrier and an unaffected person

Characteristics of Hemophilia including causes, symptoms, treatments and odds of getting the disorder

Characteristics of Duchenne Muscular Dystrophy including causes, symptoms, treatments and odds of getting the disorder

Characteristics of Rett Syndrome including causes, symptoms, treatments and odds of getting the disorder

Autosomal Genetic Disorders

What are autosomal dominant and autosomal recessive disorders

How to read a genetic family tree showing how and where disorders show up in various family members

Characteristics of Cystic Fibrosis including causes, symptoms, treatments and odds of getting the disorder

Characteristics of Sickle Cell Anemia including causes, symptoms, treatments and odds of getting the disorder

Characteristics of Tay Sachs Disease including causes, symptoms, treatments and odds of getting the disorder

Characteristics of Huntington's Disease including causes, symptoms, treatments and odds of getting the disorder

Review for Final

Final