Science Semester II Study Guide

Nikhil Gaitonde

May 2019

Chapter 11

1. **Gene** A unit of heredity which is transferred from a parent to offspring. A distinct sequence of nucleotides forming part of a chromosome, the order of which determines the order of monomers in a polypeptide which a cell may synthesize.
2. **Allele** One of two or more alternative forms of a gene that arise by mutation and are found at the same place on a chromosome.
3. **Hybrid** The offspring of crosses between parents with different traits
4. **Genome** The complete set of genes or genetic material present in a cell or organism
5. **Dominant allele** One allele of a gene is expressed even if another allele is present. The dominant allele masks the expression of the other allele.
6. **Recessive allele** This form of allele will be expressed only if the other pair is the same type. If the other pair is dominant, then the recessive will not be expressed.
7. **Heterozygous** Organisms that have two *different* alleles for the same trait.
8. **Homozygous** Organisms that have two *identical* alleles for a particular trait.
9. **Principle of Dominance** If two or more forms (alleles) of the gene for a single trait exist, some forms of the gene may be dominant and others may be recessive.
10. **Inheritance pattern of dominant allele** - always shows up in allele
11. **Inheritance pattern of recessive allele** - only shows up if both recessive alleles are present
12. **Law of Segregation** Each adult has two copies of each gene. These genes are segregated from each other when gametes are formed.
13. **Law of Independent Assortment** The alleles for different genes usually segregate independently of one another
14. **Genotype** The genetic make-up of an organism - shows the combination of alleles (ex: PP or Pp or pp)
15. **Phenotype** The characteristics or traits that show up - the appearance of an organism(ex: purple flower or white flower)
16. **Incomplete dominance** When one allele is NOT completely dominant over another (they blend - pink carnations)
17. **Codominance** Both alleles are expressed in the phenotype (black and white chicken)
18. **Multiple alleles** Genes that are controlled by more than two alleles
19. **Alleles for the blood groups (genotypes and phenotypes)** Three alleles for this gene
    - I^A, I^B and i
    - Alleles I^A and I^B are codominant
    - i is recessive
20. **Diploid number vs Haploid number** Haploid is Total number of chromosomes found in a gamete (23 for humans). Humans are diploid organisms, carrying two complete sets of chromosomes: one set of 23 chromosomes from their father and one set of 23 chromosomes from their mother.

21. **Somatic cell vs sex cell** - somatic cell is is the body cell while sex cell is either x or y
22. **Importance of meiosis** - creates diversity
23. **Homologous chromosomes** Homologous chromosomes are chromosome pairs (one from each parent) that are similar in length, gene position, and location. The position of the genes on each homologous chromosome is the same. However, the genes may contain different alleles.
24. **Tetrad**
    - Each chromosome pairs with its corresponding homologous chromosome to form a tetrad. This process is called Synapsis.
    - There are 4 chromatids in a tetrad.
25. **Importance of crossing over**
    - Homologous chromosomes form a tetrad
    - Chromatids cross over one another
    - The crossed sections of the chromatids are exchanged.
    - Crossing-over produces new combinations of alleles.

    Understand from pictures
26. **Gamete formation in males** In male animals, meiosis results in four equalsized gametes called sperm. *Understand from pictures*
27. **Gamete formation in females** Only one egg results from meiosis. The other three cells, called polar bodies, are usually not involved in reproduction. They give up their cytoplasm to nourish the 1 good egg. *Understand from pictures*
28. **Should be able to**
    - *set up and interpret a monohybrid cross and a dihybrid cross*
    - *predict probability of offspring from Punnett square*

Chapter 12

1. **Structure of DNA (a drawing will help you remember)** - deoxyribose,phosphate group,nitrogenous base
2. **Parts of a nucleotide** Monomer of nucleic acids made up of:
    - 5-carbon Sugar
    - Phosphate Group
    - Nitrogenous Base
3. **Base pairing rule** - Adenine pairs with Thymine and Cytosine pairs with Guanine
4. **Purines** Double ring bases. Adenine, Guanine.
5. **Pyrimidines** Single ring bases. Cytosine, Thymine.
6. **Structure of RNA** - Ribose,phosphate group,nitrogenous base
7. **Difference between RNA and DNA** RNA
    - Number of strands = One strand
    - Type of sugar = Ribose
    - Nitorgen bases = AUCG
    - Location = Nucleus, cytoplasm, ribosome

    DNA
    - Number of strands = 2 strands
    - Type of sugar = Deoxyribose

- Nitrogen bases = AUCG
- Location = Nucleus

8. **Types of RNA and functions - mRNA, rRNA, tRNA**
   mRNA
   - Messenger RNA
   - Carries DNA copies to rest of the cell

   rRNA
   - Ribosomal RNA
   - what a ribosome is made up of

   tRNA
   - Trannsfer RNA
   - transfers each amino acid to the ribosome according to the message received from mRNA
9. **Codon** - 3 consecutive nucletides on the mRNA that stand for one amino acid
10. **Stop codon** Stop transcription here. UAA, UAG, UGA
11. **Start codons** Start transcription here. AUG or methionine.
12. **Anticodon** - 3 bases that are complementary to one mRNA codon
13. **DNA replication (where it takes place, what it is, enzymes involved)**
    Prokaryote
    - starts at one point and continues until entire chromosome is replicated

    Eukaryote
    - occurs at hundred of places
    - proceeds in both directions until each chromosome is completely copied
    - sites where rpelication and seperation occur are called replication forks

    what it is - duplication of DNA enzymes involved
    - Helicase
    - DNA polymerase
    - DNA ligase
14. **Transcription (where it takes place, what it is, structures and enzymes involved)** where it takes place - takes place in nucleus what it is - DNA is copied in form of RNA Structures and enzymes involved - RNA polymerase How it works
    - begins at a promoter
    - RNA polymerase binds to a promoter
    - This signals the DNA to unwind so the enzyme can"read" the bases in one of the DNA strand
    - The enzyme is now ready to make a strand ofmRNA with a complementary sequence of bases
    - Transcription ends when RNA polymerase crosses a stop (termination) sequence in the gene. The mRNA strand is complete, and it detaches from DNA.
    - The DNA that has already been "read" zips back up into a double helix structure
15. **Translation (what this is, structures involved, where it takes place)** where it takes place - cytoplasm what it is - synthesis of proteins structures involved - mRNA,tRNA
16. **Should be able to**
    - *make a complementary DNA strand when given bases of one strand*
    - *be able to figure out the DNA, mRNA, tRNA sequences and polypeptide chain when either is given*
    - *read the Genetic Code*
    - *Recognize a mutation as substitution, nonsense, silent, frameshift, insertion, deletion*

Chapter 13

1. **Selective breeding** Breeding only those plants or animals with desirable traits.
2. **Hybridization** Crossing of dissimilar individuals to bring together the best of both organisms.
3. **Inbreeding** Continued breeding of individuals with similar characteristics, organisms are genetically similar.
4. **Restriction enzymes (Where are they found? How they work? Blunt End vs Sticky End)** Prokaryotic enzymes that recognize and cut DNA at specific sequences, called restriction sites. Work by chopping up the foreign DNA. Sticky Ends: Single ended strands left by restriction enzymes for some other strand to bind to it. Blunt Ends: Some Restriction Enzymes leave no single stranded, but regular double sttanded. Not sticky.
5. **Gel electrophoresis - purpose and process**

   purpose - to sepereate DNA strands based on their size

   process

   (a) Restriction enzymes cut DNA into fragments
   (b) fragments are poured into wells on a gel
   (c) voltage is applied to gel
   (d) DNA is negatively charged so move toward positive ends of gel
   (e) the smaller the fragment, the faster and further it will move across the gel
6. **DNA Fingerprinting and how it works** - analyzes DNA sections that have little or no known function but vary widely from one individual to another

   process

   (a) Restriction enzymes are used to cut the DNA into fragmetns containing genes and repeats
   (b) fragments containing repeats are labeled
7. **Plasmid** Small circular bacterial DNA.
8. **Recombinant DNA - process; examples; enzymes involved**

   process

   (a) remove bacterial plasmid
   (b) cut plasmid with restriction enzymes
   (c) cut DNA from another organism with restriction enzymes
   (d) Combine the cut pieces of DNA together with the enzyme ligase and insert the recombinant DNA into bacteria
   (e) reproduce recombinant bacteria
   (f) foreign genes will be expressed

   examples - Growth hormone, insulin enzymes involved - DNA ligase, restriction enzymes, DNA plasmid
9. **Transgenic organisms** - organism that contians genes from another species
10. **Cloning (what this is, not the process)** - producing an exact genetic copy of an organsim

Chapter 14

1. **Karyotype and its purpose** Cells are photographed during mitosis, a picture of chromosomes grouped in pairs able to show changes in chromosomes
2. **Autosomes vs Sex chromosomes** Autosomes - 44 autosomal chromosomes Sex Chromosomes - 2 chromosomes X and Y Male: XY Female: XX
3. **Biological sex determination in humans** child sex determined by father
4. **Rh factor in human blood** determined by prescence or abscence of Rh protein on red blood cell surface
5. **Blood type inheritance - which alleles are involved; which are dominant and recessive; antigens and antibodies**

- 4 groups - A, B, AB and O
- AB group - three alleles I^A, I^B, and i
- I^A and I^B are codominant, while allele i is recessive
- antigen is A and B
- A group - allele I^A with I^A or I^A with i produce antigen A
- B group - allele I^B with I^B or I^B with i antigen B
- O group - allele i with i produce no antigen

6. **Why is X-linked recessive inheritance more common in males?** because they have only one X chromosome
7. **Non disjunction** the failure of one or more pairs of homologous chromosomes or sister chromatids to separate normally during nuclear division, usually resulting in an abnormal distribution of chromosomes in the daughter nuclei.
8. **Should be able to**
   - *Interpret and create pedigree chart - autosomal dominant, recessive, X-linked recessive*
   - *Interpret a karyotype*

Chapter 15

1. **Lamarck's hypothesis of evolution** All organisms have a tendency to be perfect. They are continuously changing and acquiring new features to live successfully in their environments. Example: Bird ancestors desired to fly so they tried until wings developed
2. **Struggle for existence?** Members of each species compete regularly for food, living space, and other life necessities.
3. **Competition** Organisims competing for limited resources or for mating
4. **The definition of fitness according to Darwin** Ability of an individual to survive and reproduce
5. **Survival of the fittest** Those best suited for environment, survive and reproduce.
6. **Four main steps of Natural selection with their definition**
   (a) Overproduction: Have more kids than can survive
   (b) Variation: Individuals differ
   (c) Selection: Different survival probability
   (d) Traits of surviving individuals become more common.
7. **The definition of and types of sexual selection** Two types
   Intersexual : Mate Choice (females choosing a mate)
   Intrasexual : Competition for mates (males fighting among themselves for a female)
8. **Descent with modification** Each living species has descended by changes from another species over time.
9. **Homologous structures** Bodily structures similar in structure due to sharing a common ancestor, but different in function. (e.g hands of mammals). Evidence of common ancestory.
10. **Analogous structures** Bodily structures similar in function, but not in structure. *NOT EVIDENCE OF COMMON ANCESTRY but of evolution.*
11. **Vestigial organs** Structures that are present but diminished in size or function. Give evolutionary history. Long time ago, must have been useful.
12. **The five main points of Darwin's theory**
    (a) Individual differ, and some of this variation is heritable
    (b) Offspring produce more offspring than can survive; those that don't survive do not reproduce
    (c) Due to limited resources, organisms compete

(d) Natural Selection: Individuals best suited to their environment survive and reproduce thus passing their heritable traits to the offspring. Others die or leave fewer offspring. Species change over time.

(e) Common ancestory for all species.

13. **DNA evidence of evolution** Amino acid sequences for a protein is compared between organisms. Similar sequence means closely related.

Chapter 16: 16-3 The Process of Speciation

1. **Reproductive isolation** When the members of two populations cannot interbreed and produce fertile offspring.
2. **Behavioral isolation** Two populations can interbreed but have different mating rituals or strategies.
3. **Geographic isolation** Two populations separated by geographic barriers such as rivers or mountains.
4. **Temporal isolation** Two or more species with overlapping range, reproduce at different times. Mating seasons are different.

Chapter 17

1. **Fossils and how they form** Preserved remains of organisms from remote past. Mostly in sedimentary rocks.

   Organism dies. Body combines with sedimentary rocks. Remains buried together with sediments. Water minerals enter fossil and harden the fossil. Layers of sediment keep adding up. Weight and pressure converts fossil to rock.
2. **Relative dating** Age of a fossil is determined by comparing its placement with that of fossils in other layers of rock.
3. **Index fossil** Used to define and identify geologic periods. Must have a short vertical range, wide geographic distribution and rapid evolutionary trends.
4. **Half life** How long does it take for a radioactive substance to reduce to half its original value.
5. **Earth's early atmosphere** Hydrogen Cyanide, CO_2, CO, N, H_2S, H_2O vapor but no O_2.
6. **Why life didn't form as soon as the Earth was formed** No O_2. Poisonous earth's atmosphere.
7. **When and under what conditions life started on Earth** 2M to 3M years after earth had liquid H_2O. Photosynthetic organisms were to start life.
8. **Endosymbiotic theory** Eukaryotic cells arose from prokaryotic organisms.
   - Cell membranes start in prokaryotes. Primitive eukaryotic cell.
   - Some prokaryotes enter eukaryotes. Symbiosis (joint help) each other.
   - Inner prokaryotes evolve into organelles.
9. **Photosynthetic organisms** Use sunlight for energy.
10. **Chemosynthetic organisms** Use chemicals for energy
11. **The two major mass extinctions** End of permian and end of cretaceous period.
12. **Adaptive radiation/divergent evolution** Adaptive is a type of divergent evolution. Single species evolves into many new species to fill available niches (Finches). Divergent:
13. **Convergent evolution** Structures similar because they evolved to do the same job, not because they were inherited from a common ancestor.
14. **Coevolution** Process by which two species evolve in response to changes in each other over time.
15. **Punctuated equilibrium** Long stable periods are interrupted by brief periods of more rapid change.
16. **Should be able to**
    - *Determine which organism is more evolved when looking at a cladogram*
    - *Determine common ancestors from a cladogram*
    - *Determine what traits organisms share when looking at a cladogram*
    - *Calculate half life*

Plate Tectonics

1. **Continental crust**
    - Thicker
    - Mostly Granite (igneous rock)
    - Less dense than oceanic crust
2. **Oceanic crust**
    - Thiner
    - Mostly Basalt (igneous rock)
    - More dense than continental crust
3. **Convection currents**
    - Form of heat transfer. Currents within fluids
    - Hot. Molecules move apart. Fluid less dense. Rises.
    - Cold. Molecules move together. Fluid more dense. Sinks
    - Movement is vertical.
4. **Continental drift theory** Wegener's hypothesis was that all the continents were once joined together in a single landmass - Pangaea and have since drifted apart.
5. **Age of Earth**

Chapter 19

1. **Shapes of bacteria**
    - Bacili: Rod shaped
    - Cocci: Spherical
    - Spirilli: Spiral or Corkscrew shaped prokaryotes
2. **Gram positive bacteria** Thick cell walls with lots of peptidoglycan. Stain dark violet stain
3. **Gram negative bacteria** Thinner cell walls. No peptidoglycan. Have an outer lipid layer (makes it harder to kill). Stain pink
4. **Structure of virus** Nucleic Acid, Protein and sometimes lipid cover.

Chapter 35-1 Homeostasis

1. **Homeostasis** Process by which organisms keep internal conditions mostly constant even if external environment changes.
2. **Negative feedback loop** Something changes from set value. Body makes response to do opposite (negative thing). Makes variable get back to set value. (*Give examples*)
3. **Levels of organization in human body**
    - Cells
    - Tissues
    - Organs
    - Organ Systems

Chapter 37

1. **Structure of heart**
   - Cardiac Muscle Tissue (Myocardium) forms thick middle layer between outer and inner heart layers
   - Layers : Outer (Epicardium), Inner (Endocardium)
   - Pericardium : Membrane enclosing the heart
   - Septum : Divides left from right
   - Atria : Upper chambers of the heart that receive blood
   - Ventricles ; Pump blood out of the heart
2. **Importance of valves** Prevents blood from flowing back into atria
3. **Circulation of blood through the heart**
   (a) The right atrium receives oxygen-poor blood from the body and pumps it to the right ventricle through the tricuspid valve.
   (b) The right ventricle pumps the oxygen-poor blood to the lungs through the pulmonary valve.
   (c) The left atrium receives oxygen-rich blood from the lungs and pumps it to the left ventricle through the mitral valve.
   (d) The left ventricle pumps the oxygen-rich blood through the aortic valve out to the rest of the body.
4. **Pulmonary circulation**
   Circulates blood between the heart and the lungs.
   Deoxygenated blood leaves the right ventricle through pulmonary arteries, which transport it to the lungs.
   In the lungs, the blood gives up carbon dioxide and picks up oxygen.
   The oxygenated blood then returns to the left atrium of the heart through pulmonary veins
5. **Systemic circulation** Circulates blood between the heart and the rest of the body.
   Oxygenated blood leaves the left ventricle through the aorta. The aorta and other arteries transport the blood throughout the body, where it gives up oxygen and picks up carbon dioxide.
   The deoxygenated blood then returns to the right atrium through veins
6. **Pacemaker** Sino Atrial Node
   (a) Contraction begins in sino atrial node in right atrium
   (b) Impulse spreads from pacemaker to network of fibers in atria causes atria to contract.
   (c) Impulse also reaches atrial-ventricular node. Reaches fibers in verntricles, causing them to contract
   (d) When atria contracts, blood flows into ventricles
   (e) when ventricles contract, blood flows out of heart
7. **Arteries** Large vessels that carry blood from the heart to the tissues of the body.
   Except for the pulmonary arteries, all arteries carry oxygen-rich blood.
   Arteries have thick, elastic walls that allow them to withstand the pressure of the blood as the heart contracts
8. **Veins** Large veins contain valves that keep blood moving toward the heart.
   Many veins are located near and between skeletal muscles.
   Contraction of skeletal muscles helps move blood in veins toward the heart
9. **Capillaries** Very narrow (one cell thick). Bring oxygen and nutrients to tissues and take waste and carbon dioxide from them.
10. **Systolic pressure** Pressure on the arteries when the ventricles contract. Time of highest pressure in the arteries
11. **Diastolic pressure** When ventricles relax. Lowest pressure.

12. **Red blood cells structure and function** Their flexible disc shape helps to increase the surface area-to-volume ratio of these extremely small cells. This enables oxygen and carbon dioxide to diffuse across the red blood cell's plasma membrane more readily. Red blood cells contain enormous amounts of a protein called hemoglobin. This iron-containing molecule binds oxygen as oxygen molecules enter blood vessels in the lungs. Hemoglobin is also responsible for the characteristic red color of blood. Unlike other cells of the body, mature red blood cells do not contain a nucleus, mitochondria, or ribosomes. The absence of these cell structures leaves room for the hundreds of millions of hemoglobin molecules found in red blood cells. A mutation in the hemoglobin gene can result in the development of sickle-shaped cells and lead to sickle cell disorder.

13. **Blood clotting steps**

    (a) Blood vessels injured

    (b) platelets clump at site form thromboplastin - helps convert prothrombin to thrombin

    (c) Thrombin converts fibrinogen into fibers casuing clot

14. **Structure of respiratory system** Nose, mouth, epiglottis, pharynx, larynx, trachea, lungs, bronchus, bronchiole and diaphragm

    - Upper respiratory tract: Includes the nose, mouth, and the beginning of the trachea (the section that takes air in and lets it out).
    - Lower respiratory tract: Includes the trachea, the bronchi, broncheoli and the lungs (the act of breathing takes place in this part of the system).
    - The trachea – the tube connecting the throat to the bronchi.
    - The bronchi – the trachea divides into two bronchi (tubes). One leads to the left lung, the other to the right lung. Inside the lungs each of the bronchi divides into smaller bronchi.
    - The broncheoli - the bronchi branches off into smaller tubes called broncheoli which end in the pulmonary alveolus.
    - Pulmonary alveoli – tiny sacs (air sacs) delineated by a single-layer membrane with blood capillaries at the other end.
    - The inner surface of the lungs where the exchange of gases takes place is very large, due to the structure of the air sacs of the alveoli.
    - The lungs – a pair of organs found in all vertebrates. The structure of the lungs includes the bronchial tree – air tubes branching off from the bronchi into smaller and smaller air tubes, each one ending in a pulmonary alveolus.

15. **Path of air flow from nasal cavity to alveoli**

16. **Gas exchange between alveoli and capillaries** The exchange of gases takes place through the membrane of the pulmonary alveolus, which always contains air: oxygen (O2) is absorbed from the air into the blood capillaries and the action of the heart circulates it through all the tissues in the body. At the same time, carbon dioxide (CO2) is transmitted from the blood capillaries into the alveoli and then expelled through the bronchi and the upper respiratory tract.

17. **Diaphragm** muscular partition between the chest and the abdominal cavity

18. **Process of Inhalation**

    - The diaphragm contracts and moves down
    - The rib muscles contract and cause the ribs to move outward
    - The volume of the chest cavity increases
    - Air pressure in the lungs decreases (Boyle's Law)
    - The difference in air pressure between the lungs and outside air causes air to rush into the lungs.

19. **Process of Exhalation** Passive event.

    - The diaphragm relaxes
    - The size of the chest cavity decreases
    - Pressure in the chest cavity is greater than atmospheric pressure.
    - Air is pushed out of the lungs.

20. **How breathing is controlled** Controlled by medulla oblongota (in brain). Looks at CO_2. If high, then makes diaphragm contract. Get air in. More CO_2, more impulse to breathe in.
21. **Tobacco and the respiratory system** Three dangerous things:
    - Nicotine: Increases BP and heart rate. Stimulant.
    - Carbon Monoxide: Sticks to hemoglobin. So oxygen cannot stick. So cells starved for oxygen.
    - Nicotine and Carbon Monoxide: Paralyze Cilia
    - Tar: Cause cancer (carcinogenic)

Chapter 38: (No 38-1)

1. **Process of digestion from mouth to large intestine including accessory structures**
    (a) teeth cut, tear and crush food into small fragments
    (b) as teeth grind food, salivary glands secrete saliva
    (c) during swallowing, the tongue and throat muscles push chewed food down throat
    (d) from throat, food passes through esophagus into stomach
    (e) stomach continues mechanical and chemical digestion
    (f) stomach churns fluids and food producing chyme
    (g) chyme flows into small intestine
    (h) pancreas secrete enzymes and sodium bicarbonate
    (i) liver produces bile which helps break down smaller molecules
    (j) after leaving small intestine, it goes through large intestine
2. **Mechanical digestion** Chewing to break down large pieces. Teeth cut and tear into food.
3. **Chemical digestion** Use enzymes to break down food.
4. **Amylase** Enzyme in saliva that breaks the chemical bonds in starches and releases sugars
5. **Lysozyme** Enzyme in saliva that fights infections by digesting bacterial cell walls. in starches and releases sugars
6. **Pepsin** Enzyme that digests protein. Pepsin works best under acidic conditions. Released in stomach.
7. **Structures of excretory system** lungs, skin, liver, large intestine, kidneys
8. **Filtration** -
    (a) blood with waste products enter kidney
    (b) kdineys remove waste products
9. **Reabsorption**
10. **Urine composition** Urea, excess salt and water.
11. **Water balance**
    Water level high
    (a) Water level rises
    (b) less ADH is released kidneys
    (c) increase water removal(urine)

    Waer level low
    (a) water level low
    (b) hypothalamus signals pituitary
    (c) pituitary releases ADH
    (d) Blood carries ADH to kidneys
    (e) Kidneys decrease removal of water
    (f) you get thirsty

Chapter 39

1. **Hormones** Coordinate slower but longer-acting responses including reproduction, development, energy metabolism, growth, and behavior. Secreted by endocrine system.
2. **Exocrine glands vs Endocrine glands**
   - Exocrine glands release secretions through ducts directly to the organs that use them. Eg: glands that release sweat, tears, digestive juices – effect is localized.
   - Endocrine glands release their secretions directly into the bloodstream – can affect cells throughout the body
3. **Regulation of Thyroxine**
   (a) High Thyroxine - 1. no TRH 2. no TSH 3. no thyroxine
   (b) Low Thryoxine - 1. Hypothalamus secretes TRH 2. TRH simulates pituitary to secrete TSH 3. TSH stimulates release of thyroxine
4. **Regulation of water**
   (a) Water Oversupply, less ADH released, kidneys increase water removal
   (b) Water level low, hypothalamus signals pituitary, pituitary releases ADH, Blood carries ADH to kidneys, kidneys decrease removal of water, brains sends the signal of thirst
5. **Regulation of calcium**
   (a) Calcium High - thyroid secretes calcitonin, kidneys reabsorb less calcium, reduces amount of calcium absorbed
   (b) Calcium Low - PTH is released, kidneys absorb more calcium from food
6. **Regulation of blood glucose**
   (a) High Glucose - pancreas secrete insulin, cells take glucose out of blood
   (b) Low Glucose - Glucogen released from pancreas, stimulates liver and skeletal muscles to break down glycogen, causes fat cells to break down fats
7. **Structure of sperm** Head, mid-peice, tail
8. **Structures of the male reproductive system**
   (a) scrotum
   (b) testes
   (c) epididymis
   (d) vas deferens
   (e) Seminal vesicles
   (f) Urethra
   (g) Prostate gland
   (h) Bulbourethral gland
9. **Structures of the female reproductive system**
   (a) Fallopian tube
   (b) Ovary
   (c) Uterus
   (d) Urinary bladder
   (e) pubic bone
   (f) urethra
   (g) cervix
   (h) rectum
   (i) vagina
10. **Menstrual cycle phases (including hormones)**

- follicular phase, ovulation, luteal phase, menstruation
- Horomones: FSH, Estrogen, LH, Progesterone

11. **Fertilization (what this is and where it takes place)** The process of a sperm joining an egg. Sperm swims up the fallopian tues from vagina. If egg is in the fallopian tube, fertilization likely.
12. **Zygote** A fertilized egg.
13. **Function of placenta** Connects the mother and developing embryo. Embryo gets its oxygen and nutrients and excretes its waste products. Acts as a barrier to some harmful or disease-causing agents. But HIV, measles can cross. Also drugs and alcohol can penetrate placenta.
14. **Hormones involved in child birth and milk production**
    - : Signal baby is ready. Synchronize uterine contractions. Dilate the cervix. Prepare mother for nursing.
    - Prolactin stimulates production of milk. (Horomone secreted by pituatary glands).
    - Oxytocin: Affects involuntary muscles in uterine walls. They contract rhythmically - called labor.
15. **Identical twins vs fraternal twins**
    - Fraternal: If two eggs are released during the same cycle and fertilized by two different sperm
    - Identical: A single zygote may split apart to produce two embryos

Chapter 40: (No 40-1 and 40-4)

1. **Non-specific defenses** Defenses are designed to keep most foreign things out of the body.
2. **First line of defense**
    - Intact skin: Epidermis shield against invaders. Secrete chemicals that kill invaders. pH maintained between 3 and 5. Acidic to prevent microbe colonization.
    - Mucus and Cilia: Mucus is viscous fluid and traps bacteria and foreign particles. Hair like cilia sweeps this goop into throat for coughing and swallowing. Keep goop away from lungs.
    - Saliva: Contain lysozyme to break bacterial cell wall (kill bacteria)
    - Tears: Also has lysozyme
    - Stomach Acids: Strong acids break down swallowed bacteria
3. **Second line of defense**
    - Blood WBC : Attack invaders. Initiate inflammatory response to protect tissue. Phagocytes: Engulf and destroy bacteria in lysosomes.
    - Fever: High temp means pathogen growth slowed or stopped. High temp increases heart rate so WBC can get to infection place faster.
    - Interferon: When virus infection body releases interferon. Interferes with virus replication. Block synthesis of key proteins required for viral replication.
4. **Antigens** Any substance, as a virus or bacterium, that triggers immune response. Specific Defense.
5. **Antibodies** Protein that recognizes and binds to an antigen.
6. **Risks of transplant** Immune system thinks transplant in foreign and attacks it. Makes transplants tough. Cells have marker proteins on surface which lets immune system recognize them. Can cause organ rejection.
7. **Passive Immunity** Antobodies produced by other animals are injected into the bloodstream. Eg. Mom passing down immunity to baby via breast milk or placenta.
8. **Active Immunity** You produce the antibodies - Your body has been exposed to the antigen in the past either by infection or vaccination.
9. **Allergies** Immune system mistakenly recognizes harmless foreign particles as serious threats.
10. **What is histamine?** Allergens attach to mast cells. Mast cells in locations where external contact possible. Mast cells start inflammatory response. These release histamines. Histamines increase blood flow and fluid production in affected area. Sneezing, watery eyes, runny nose.

11. **Humoral immunity** Defends the body against antigens and pathogens in body fluids (blood and lymph) - involves mainly B cells. Produce antibody.

12. **Cell mediated immunity** Defends the body against abnormal cells and pathogens inside living cell - involves mainly T cells. No antibody production.

13. **Secondary immune response** When 2^{nd} time person exposed to antigen, immunological memory is triggered and immune system can start making antibodies immediately.

14. **Autoimmune disorder** When the immune system attacks the body's own cells, it produces an autoimmune disease. Thinks body's own cells are pathogens.

15. **Immunodeficiency disorder** Person has a weakened immune response. E.g. AIDs caused by HIV.