

Semester One Final Review: Fresh for 2010.

It is Large with a capital "L". You have to sit down and study very seriously. This is not a joke.

Final exam format:

There will be a multiple choice section and a short answer section.

- Multiple choice questions have one possible answer and require you to find the answer and then bubble in a scantron paper.
- There will be three optional short answer questions. You will have the opportunity to choose questions to answer from a list of topics we have covered this semester. Each question can count for 15% of your final exam total, thus lowering the weight of the multiple choice section. You do not have to do the short answers. If you don't, it means that the multiple choice section will be worth 100% of your final exam grade.

General Study Tips. Because I care. For real.

1. Study every night in a quiet place. Do not wait until the day of the test to study. Study tonight. Try your best. Don't give up. Studying leads to knowledge. Knowledge leads to success.
2. Get any notes or papers you missed from another student.
3. Even if you were absent, you will still be tested on the stuff!!
4. Read your notes and handouts again and again.
5. Rewrite notes.
6. Look up words you don't understand or know in your book or a dictionary.
7. Try to explain what you need to know to someone who is not in this class (example: parents, guardians, brothers, sisters, friends).
8. Draw pictures of what the words you need to know mean.
9. Make flashcards.
10. Study with someone else in this class.
11. Make an appointment to get help !!!
12. Do not listen to people talking about the test right before it is passed. It will just make you nervous and you might lose your confidence.

Questions for me?? Ask at the start of class when I say, "Does anyone have a question?" Or, I have some free periods that you can get help during. Look up when I am free on www.biologyhuman.com. I am also at school starting at 7:30 A.M. Or you can email me->stillerb@newtrier.k12.is.us. AIM=biologyhuman. There is no excuse for not being able to find me for help.



"Mr. Osborne, may I be excused? My brain is full."

PCB Biology 4 Final Review Questions: Designed to help you get ready for a very large and important test. Do your best. Do not cheat yourself by getting answers from someone else.

My advice:

- ◆ Do not write on this paper, instead write the numbers and answers on another sheet. That way, you can do this again and again. And then you can wait a day and do it again.
- ◆ Go through first, answering only what you know (or think you know)
- ◆ Go through again with your notes, finding the correct answers to those you could not get right off.
- ◆ Go through with your textbook, finding the remaining answers.
- ◆ Pay attention to everything else in your notes and your book due to the fact that these are not the questions that will appear on the final exam.
- ◆ Good Luck. Promise to do your best so you can feel good about yourself.

You should be using your book and your notes to learn stuff that you do not know. Don't know a word in a question? Look it up! Have no idea what a mutation is? Look it up. It's not like wow, it's like whoa.

Overstand? Any questions?

Intro: Key Themes of Biology

1. List/describe levels of organization in living things: atoms to biosphere
2. Define/describe homeostasis.
3. Describe the relationship between structure and function.
4. List the five kingdoms of life. Describe the characteristics of each kingdom: cell type (prokaryotic or eukaryotic, unicellular or multicellular), type of nutrition (photosynthetic or non-photosynthetic).
5. Describe the scientific method
6. Explain the structure of a controlled experiment.

Evolution

1. Define evolution.
2. Describe Darwin's theory of evolution by natural selection.
3. Explain how natural selection leads to both adaptation and diversity.
4. Critique a comment such as "Polar bears evolved white fur so that they could more effectively blend in with their environment," and be able to rephrase it in a better way.

Basic Ecology

1. ecology, ecosystem, biotic, and abiotic, biome, food chain, food web, biomass, limiting nutrients.
2. trophic level; three trophic levels in a typical ecosystem
3. primary productivity.
4. Ecological pyramids: productivity, biomass, numbers
5. Describe the carbon cycle.

Chemistry. Its all about chemicals.

1. What is an element, compound, atom, molecule, etc.?
2. What elements are required for life?

3. What are the properties of protons, neutrons, and electrons?
4. Describe the different types of bonds and give examples.
5. What makes a bond polar/nonpolar?

Water. Water is delicious as well as being the basis for all life

1. What special properties of water allow it to behave the ways it does?
2. Explain why water is less dense as a solid than a liquid.
3. What does hydrophilic and hydrophobic mean, and give examples of molecules that are both hydrophilic and hydrophobic.
4. What does pH measure? Also, know the pH scale and what it means.

Carbon. It is more than the main component of coal.

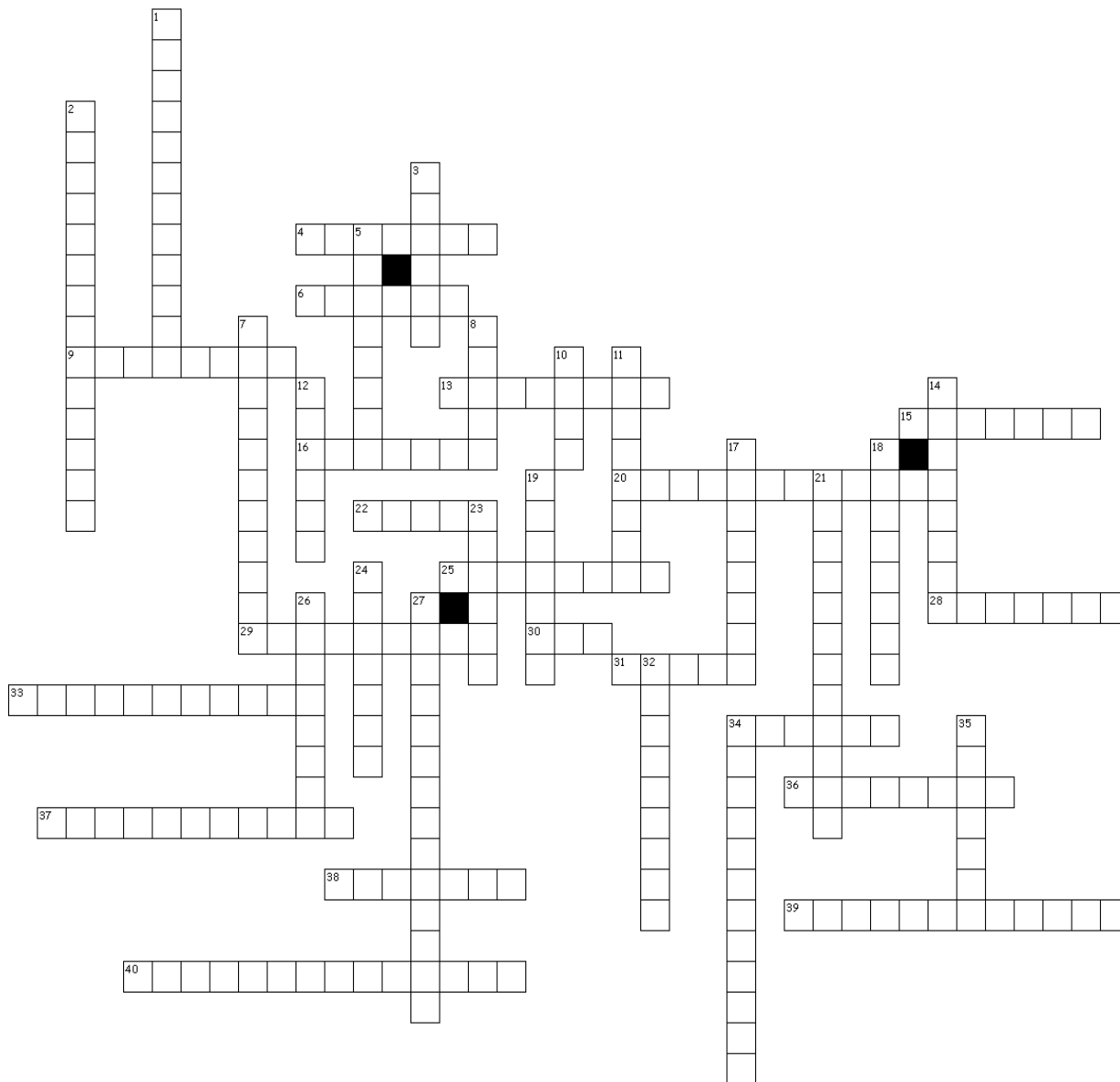
1. Why is carbon so versatile in life?
2. What is an organic molecule?
3. What molecular structures can carbon make?
4. What is an isomer? Structural isomers? Geometric isomers?
5. Be able to know and recognize the functional groups. What are they?

Macromolecules. They are big, but still relatively small when compared to an organism.

6. What is a monomer? Polymer?
7. Describe dehydration synthesis and hydrolysis with examples.
8. What are carbohydrates and what are they used for in life?
9. Be able to recognize a carbohydrate by its structure.
10. What are the prominent monosaccharides? Disaccharides? Polysaccharides?
11. What are the properties of carbohydrates?
12. List and describe the family of lipids and their roles in biology.
13. What is a fatty acid, and where would it be found?
14. What are the properties of saturated and unsaturated fatty acids?
15. Describe the structure and function of phospholipids.
16. Be able to recognize the molecular structure of the different lipids.
17. What are the building blocks of protein?
18. Be able to recognize amino acids, and if they are polar, nonpolar, or ionic.
19. What is a peptide bond and how does it form?
20. What is a polypeptide?
21. Describe the major functions of proteins in biology?
22. Explain how that protein molecule you ate for lunch will be used in your body.
23. What are the four levels of protein structure, and how do they specifically affect a protein's conformation.

Metabolism and Enzymes. Reactions Galore.

1. What is metabolism?
2. Describe exergonic and endergonic reactions in the context of metabolism.
3. What role do enzymes play in metabolism?
4. What makes enzymes so specific?
5. How does temperature and pH affect enzymes?
6. What are coenzymes and cofactors?
7. Explain competitive inhibition and noncompetitive inhibition.
8. Explain allosteric regulation, feedback inhibition.



Across

- 4. famous disaccharide (table sugar)
- 6. makes four covalent bonds
- 9. -OH
- 13. negatively charged particle
- 15. one unit of biological molecule
- 16. many units covalently bonded together
- 20. energy molecule formula CH₂O
- 22. -NH₂
- 25. makes one covalent bond
- 28. particle with no charge
- 29. also known as dietary fiber
- 30. atom with extra or missing e-
- 31. H₂O
- 33. compound the can't mix w/ water
- 34. carbohydrate storage in plants
- 36. water sticking to non-water
- 37. covalent bond btwn amino acids
- 38. carbon based molecule
- 39. bond formed by sharing electrons
- 40. fat liquid at room temp

Down

- 1. number of protons in atom
- 2. many unit carbohydrate
- 3. positive particle found in nucleus

- 5. C double bonded to O and OH
- 7. compound that mixes with water
- 8. uneven distribution of e- in bond
- 10. the basic unit of matter
- 11. 2 or more atoms bonded together
- 12. fats, oils, steroids and waxes
- 14. water sticking to other water
- 17. even distribution of e- in bond
- 18. C double to O and two R groups
- 19. lipid hormone molecule
- 21. two unit carbohydrate
- 23. makes 2 covalent bonds
- 24. famous monosaccharide
- 26. carbohydrate storage in animals
- 27. sweet monomer
- 32. building block of protein
- 34. fat that is solid at room temp
- 35. made of chain of amino acids

Cell Parts and Functions

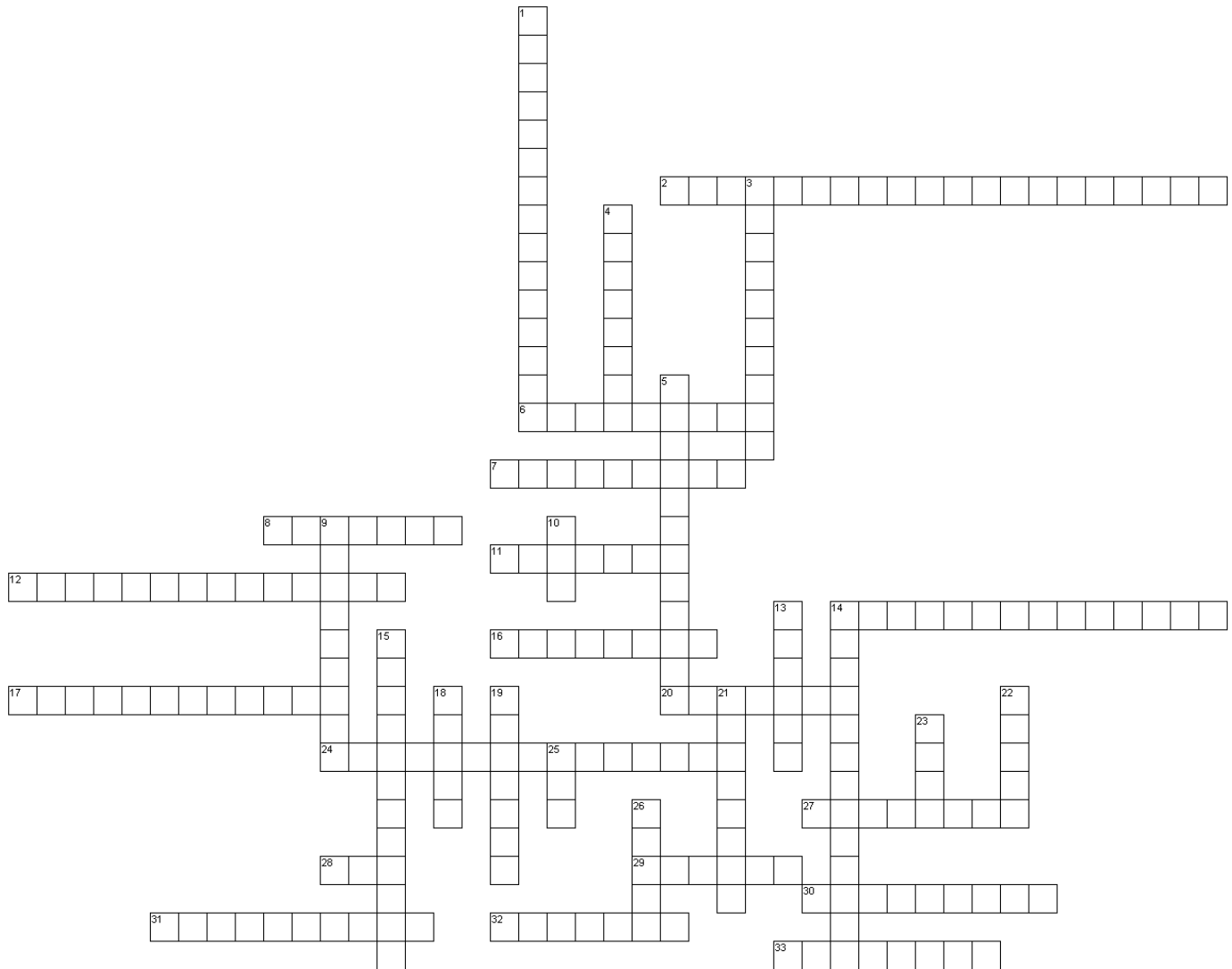
1. What is the Cell theory, and what does it say?
2. Basic differences between prokaryotic and eukaryotic cells.
3. From the Animal Cell diagram, the following parts and their functions: nucleus, nuclear membrane, nuclear pores, nucleolus, chromatin, cytoplasm, cytosol, mitochondria, ribosomes (free v. bound), rough and smooth E.R., Golgi complex, lysosome, peroxysome, vacuole, cytoskeleton, centriole, cilia, and flagella.
4. From the Plant Cell diagram: cell membrane, cell wall, vacuole, chloroplasts, chromoplasts, amyloplasts, Golgi, Ribosome, E.R., Mitochondrion, Microtubule, Microfilament, Lysosome, Peroxisome, Cytosol, Nuclear membrane, Nuclear Pore.
5. What parts are in plant cells that aren't in animal cells? What can each cell do that the other can't?
6. Endomembrane system. The flow of materials in cell export, creation of lysosomes, digestive enzymes, membrane components, digestion of engulfed food particles, etc. Describe what happens at the receiving and shipping side of the Golgi.
7. Explain why cells are small. Overall relationship between surface area and volume. Adaptations of eukaryotic cells that enable them to be bigger than prokaryotic cells. Applications of this concept.

Membranes

1. Define selective permeability. Explain why selective permeability is so important to living systems (including cells).
2. Explain the formation of bilayers from phospholipid molecules.
3. Describe the evidence for the fluid mosaic model.
4. Explain the fluid mosaic model of the membrane, and the roles played by saturated and unsaturated hydrocarbons tails, cholesterol, and proteins.
5. If given a diagram like the one you have of the cell membrane, be able to identify all the parts
6. Describe the functions of membrane carbohydrates.
7. List the substances that can pass through the phospholipid part of the bilayer.
8. Define diffusion, osmosis, and passive transport.
9. Predict how water will behave in response to a concentration gradient.
10. Define/describe, hypotonic, hypertonic, isotonic,, and osmoregulation.
11. Describe conditions under which plants will become turgid or flaccid. Relate this to plasmolysis.
12. Describe osmotic conditions under which animal cells will become shriveled, and when they'll explode.
13. Describe facilitated diffusion, and contrast it with active transport.
14. List two examples of active transport.
15. Compare/contrast endocytosis, exocytosis, pinocytosis, and receptor-mediated endocytosis.
16. The endosymbiotic theory: what is it, what's the evidence for it?

Cells and Organelles: The crossword review.

You should know all of these answers! This is true. Use your notes, your study guides and a book to figure the clues out and fill in the puzzle. When you are finished, use it to study!!!!!!



Across

2. tunnels for proteins in cell
6. cell type with nucleus and organelles
7. only in animals. used in cell division.
8. big in plants. stores water and salts.
11. kingdom that has cell walls and chloroplasts
12. packages and labels proteins
14. semipermeable border to cell
16. unicellular eukaryotes and algae kingdom
17. turn sugar into cellular energy
20. the control center of the cell is the _____.
24. multicellular means this.
27. whiplike structure used for swimming
28. what is stored in nucleus
29. plural of nucleus
30. makes protein for cell
31. cell type that do not have nuclei.
32. d-still's university
33. digests food for the cell

Down

1. semipermeable border of nucleus
3. cell parts surrounded by membrane(s).
4. kingdom humans are part of
5. helps cell maintain shape
9. fluid cytosol and organelles make this
10. delp stiller's favorite team
13. kingdom all bacteria are in
14. main part of plasma membrane
15. use light to make sugar from CO₂
18. most of the volume of cells
19. delp stiller's first name
21. only in bacteria, plants and fungi.
22. hair-like structures that beat and move stuff.
23. d-still's favorite color
25. number of cells in bacterium
26. mushrooms are in this kingdom

Cellular Respiration Review

1. What's the overall equation for cellular respiration? What's the purpose of cellular respiration?
2. What happens during glycolysis? What goes in? What comes out? Where in the cell does it occur? What are the key events that happen in between?
3. Why is glycolysis thought to be one of the most ancient of metabolic processes?
4. Contrast aerobic and anaerobic respiration? Which produces more ATP? Why?
5. What happens during fermentation? Compare/contrast lactic acid fermentation and alcohol fermentation.
6. What is the function of NAD/NADH and FAD/FADH₂. Which member of each pair is oxidized? Which is reduced? When do these oxidations or reductions occur?
7. Compare/contrast substrate level phosphorylation with oxidative phosphorylation.
8. Describe the structure of a mitochondrion. What phases of cellular respiration are associated with which part of the mitochondrion?
9. What are the two main reactions that happen in the mitochondrial matrix?
10. Compare/contrast the formation of acetyl-CoA with fermentation.
11. What happens in the Krebs Cycle? Why is it a cycle? What goes in? What comes out?
12. In the Krebs Cycle, what is the first compound formed? How many carbons does it have? How is it made?
13. You exhale two exhaust products of cellular respiration: carbon dioxide and water. How is the carbon dioxide produced? How is the water produced?
14. What's the electron transport chain? Where does it occur? How does it work? What does it do?
15. Why can a cell get more energy from a molecule of NADH than from FADH₂?
16. What is chemiosmosis? How does it produce ATP?
17. Why is oxygen required for cellular respiration? What happens to cellular respiration when oxygen is absent?
18. What's the energy yield from each stage of cellular respiration?

Photosynthesis Review

1. What's the relationship between photosynthesis and respiration? How does each work as a redox reaction? Which is catabolic? Which is anabolic? Which occurs in autotrophs? Which in heterotrophs? Which cellular structures are involved in each? What kinds of phosphorylations occur in each?
2. In photosynthesis, what is the source of the carbon and hydrogen in the carbohydrates produced? What is the source of the oxygen that gets produced?
3. What are the two main phases of photosynthesis? Where does each occur? What goes in and comes out of each?
4. How do pigments work? What's the difference between a green pigment and a yellow one?
5. Describe the various structure/function relationships involved in photosynthesis (leaves, chloroplasts, thylakoids)?
6. In the light reactions, explain the role of photons, water, chlorophyll, ETC, ATP synthase, .
7. How is ATP generated by the light reactions?
8. What is carbon fixation? Why is it important?
9. Describe the Calvin cycle (inputs, outputs, role of rubisco, role of RuBP, overall flow in terms of numbers of carbons in key intermediates, what gets harvested).
10. Describe photorespiration. How did it evolve? When does it occur? What does it produce? Why is it a problem?
11. Compare/contrast the anatomy and biochemistry of C₃ , C₄ and CAM plants.

Cell Division

1. Compare cell division in eukaryotes and prokaryotes.
2. Compare cell division in plants and animals
3. Distinguish between mitosis and cytokinesis.
4. Describe the phases of the cell cycle (G₁, S, G₂, M, G₀). When does differentiation occur? When does the cell have the most DNA? The least? Which phase is the shortest? When are chromosomes duplicated? When does mitosis occur?
5. Describe the phases of mitosis. Be able to identify diagrams of cells in various stages.
6. Describe the function of, or state in which stage you'd see: centrosomes, centromeres, spindle fibers, cell furrow, etc.
7. Distinguish between chromosomes, chromatin, sister chromatids. If a cell has 82 centromeres, how many chromosomes will it have after mitosis? If a cell has 56 sister chromatids in metaphase, how many chromosomes will the daughter cells have after cytokinesis.
8. Define locus.
9. Contrast sex chromosomes and autosomes.
10. Define karyotype.
11. What are homologous chromosomes.
12. Contrast haploid and diploid, and discuss their relation to gametes and somatic cells.
13. Describe what gets separated in meiosis I and meiosis II.
14. Define the events of prophase I
15. Describe how the events of meiosis I generate variation in offspring (crossing over and independent assortment of chromosomes).
16. Compare/contrast mitosis and meiosis.

Genetics

1. Define monohybrid cross, P generation, F₁ generation, F₂ generation. Describe the typical results of Mendel's monohybrid crosses for the F₁ and F₂ generation.
2. Contrast dominant and recessive alleles, homozygous and heterozygous, genotype and phenotype, testcross.
3. Describe Mendel's Law Of Segregation, and draw a Punnett square to show how it works in a monohybrid cross.
4. Describe the principle of Independent Assortment. Use it to explain a dihybrid cross, and draw a Punnett square to show how the whole thing works.
5. Define and describe incomplete dominance; multiple alleles, and polygenic inheritance.
6. Describe how the ABO system of blood type works on a genetic level.
7. Be able to interpret a pedigree chart.
8. In *Drosophila*, what's a wild-type character, and how does it interact with mutations.
9. What are linked genes?
10. Why do linked genes sometimes recombine?
11. What's the recombination frequency for unlinked genes?
12. What's the relationship between the distance of two linked genes and their recombination frequency.
13. Describe the chromosomal basis of sex determination in humans.
14. Define aneuploidy and non-disjunction, and describe how one can lead to the other.
15. Describe the chromosomal basis and characteristics of Down syndrome, Klinefelter syndrome, and Turner syndrome.

DNA Structure and Replication

1. Describe the findings of the following scientists in relationship to our understanding of the structure and characteristics of DNA: Chargaff, Griffith, Hershey-Chase, Rosalind Franklin, Watson and Crick.

2. Describe the structure of DNA: nucleotide structure, sugar-phosphate backbone, location of hydrogen bonds, location of covalent bonds, anti-parallel structure, etc.
3. Compare/contrast the conservative, semi-conservative, and dispersive models of DNA replication. Which one is correct, and how do we know?
4. Explain DNA replication. Include the roles of the following: helicase, DNA polymerase,, ligase, Okazaki fragments, leading strand, lagging strand, nucleoside triphosphates.
5. Describe how DNA is proofread and repaired.
6. Describe the end replication problem in eukaryotic chromosomes, and the role of telomeres and telomerase.

Genes, Transcription, and Translation

1. What's the relationship between genes, DNA, and chromosomes?
2. Chromosome is to cookbook as gene is to _____.
3. Recite and explain the "central dogma" of molecular biology.
4. Compare/contrast DNA and RNA.
5. Explain transcription: base pairing, RNA polymerase, promoter, coding sequence, terminator.
6. Describe postranscriptional modifications of a primary RNA transcript: caps, tails, intron excision, ribozymes, etc.
7. Explain the relationship between the coding strand of DNA, codons, anti-codons, and amino acids. How many nucleotides code for one amino acid? Why?
8. Given any sequence of DNA, mRNA, tRNA anticodons, or amino acids, be able to figure out all of the others.
9. Describe translation: initiation, elongation, and termination; structure/role of tRNAs, peptidyl transferase, amino-acyl tRNA synthetases.
10. Describe the various types of mutations: insertion, deletion, frameshift, missense, nonsense.
11. Describe polyribosomes.

Gene Regulation

1. operons
2. Chromatin structure/packaging (histones, nucleosomes, chromatin fiber, etc).
3. Repetitive DNA
4. Control of gene expression (chromatin modification, transcription factors, post-transcriptional control)
5. Homeotic genes (homeoboxes)
6. Signal transduction.

Hi. I think you know a lot of biology. Word.