

SADDLEBACK COLLEGE
BIOLOGY 20
EXAMINATION 2 STUDY GUIDE

The exam will consist of multiple choice, true-false, "fill-in", and a few short answers for a total of 100 points

Please bring a pencil and a good eraser

The following is by no means everything on the test. This guide emphasizes main topics that are covered on the test in one fashion or another. Study your notes, the test is based on the notes given in class. Read your book to back up the notes given in class. Concentrate on the topics given in class when reading your book. Study groups can help - but you need to study not just talk! You will really learn the material if you can teach it to someone. Review your lecture notes in detail. Highlight new terms & concepts. Use the text to complete and correct your notes. Don't forget to use your text glossary & index to help define terms and find subjects. Good Luck!!!

This exam will focus on lecture on the following:

Cells & Membranes:

Know the differences between prokaryotic and eukaryotic cells. Know the different types of organelles and their functions. Know the components of the plasma membrane, its structure and function. Know the difference between diffusion, osmosis, active and passive transport - which do or do not require energy. Know what isotonic, hypotonic and hypertonic solutions are and their effects on cells. Know how large molecules move into and out of cells.

•
Energy - kinetic and potential (know examples of each) **Chapter 5**

- exergonic and endergonic reactions (examples for each)
- Know the two laws of thermodynamics (Which laws are known as the conservation of energy?)
- What is metabolism? Catabolism? Anabolism?
- ATP - how it works
- What are **enzymes** and how they work? **Chapter 5**
 - what is an active site - what types of molecules bind there
 - Factors that influence enzymatic activity
- **Cellular respiration (Chapter 6)**: understand why we need O₂ and why we exhale CO₂
 - glycolysis - where does it take place, reactants, products, amount of ATP produced
 - primer reaction/grooming phase - where does it take place, reactants, products, amount of ATP produced
 - Krebs cycle - where does it take place, reactants, products, amount of ATP produced
 - ETC & oxidative phosphorylation - where does it take place, reactants, products, amount of ATP produced
 - what are NADH and FADH₂ - how many ATPs are these equivalent to
 - What is substrate level phosphorylation? Where is most of the ATP produced & how?
 - alcohol and lactic acid fermentation - where does it take place, reactant, products and amount of ATP produced
 - Cori cycle – why it occurs, where does it occur, what are the 2 fates of lactic acid in the liver
 - What is lipolysis? What happens when you begin to breakdown proteins?
 - What is the fate of the foodstuff that we eat if they are not burned for energy?
- **Photosynthesis** - where does it take place, reactants, products (**Chapter 7**)
 - Light reaction - where does it take place, reactants, products (ATP, NADPH, and O₂)
 - What is photophosphorylation?
 - Know how plants produce O₂.
 - Calvin cycle - where does it take place, reactants, products (sugar) and the possible fates of these products
 - What is photorespiration? Know how plants cope with this (i.e. difference between C₄ & CAM plants)
 - What is the greenhouse effect? Know the role of CO₂ and plants in relation to the greenhouse effect.
 - What is the function of the ozone?
- **MITOSIS**
 - Know the different phases and what is occurring during each. Know the cell cycle. Cytokinesis.
 - Be able to label a diagram of the different phases - refer to the handout given and your text.
 - Be able to identify the different phases of both plant and animal cells undergoing cell division.
 - Differences between plant and animal cells.
 - Difference between chromatin, chromosomes and chromatids.
 - Know how many chromosomes are in the daughter cells after mitosis.
 - What is mitosis for? What are the five control factors for mitosis?
 - What is the problem with cancer cells? What p53 and p 21? Tumor suppressors.
 - What is tumor (benign & malignant)? What is metastasis?
 - What are telomeres and telomerases? Functions? How do we fight cancer cells?
 - Know the difference between karyokinesis and cytokinesis.

• **MEIOSIS**

- What is the difference between sexual and asexual reproduction?

- Where does meiosis occur? When does it occur? Why does it occur? When does it occur?
- What is spermatogenesis and oogenesis? Products of each?
- Know the following terms and how they relate to meiosis: homologous chromosomes, diploid, haploid, gametes, zygote, syngamy.
- Be able to label a diagram of the different phases - refer to your text.
- Know the different phases of meiosis and how they are different from mitosis?
- What are the sexual sources for variation? Crossing over? Independent assortment?
- What is nondisjunction? Trisomy? Monosomy?

Possible short answer questions:

These short answer questions will be chosen randomly so be prepared to answer them all.

1. Briefly explain the difference between catabolism and anabolism. Give an example of where each of these reactions takes place in your body.
2. Explain the difference between oxidation and reduction using either the cellular respiration or photosynthesis equation as an example.
3. Briefly explain how each of the following would interfere with enzyme activity of microorganisms which could spoil your food: canning (heating), freezing, pickling (soaking in acids) and salting.
4. Briefly explain the Cori cycle and why your body would undergo this particular cycle. Include the two regions, which this cycle occurs, and the two possible fates of glucose.
5. What is photorespiration? Explain how some species of plants cope with this condition - C4 and CAM.
6. What is the greenhouse effect? What is the role of CO₂ and plants in relation to the greenhouse effect? Include a brief discussion on some possible ways in which we can curb the greenhouse effect.
7. Briefly explain what plants do with the sugar they produce in photosynthesis.
8. Compare and contrast mitosis with meiosis I (the first division).
9. List and briefly discuss the events in the mitotic phases during cell division (Interphase, prophase, metaphase, anaphase, telophase, cytokinesis).
10. Explain the relationship between telomeres and telomerase and how they are involved with cancer. What is the latest regarding telomeric research?
11. Discuss the 5 control factors of cell division and briefly why cancer cells are easier to grow in the lab than other cells.
12. Compare and contrast chloroplasts and mitochondria. What general functions do they have in common? How are their functions different?
13. Explain how a eukaryotic cell benefits from its internal membranes and why they can be up to ten times larger than prokaryotes.
14. Draw and label the four major components of the cell/plasma membrane. Also give the functions of each of these components.

Point breakdown: 100 points total:

- Multiple choice, true/false, matching: 50-60 points
- Short answer: 40-50 points

Figure on 5 – 10 questions per section for the multiple guess, true/false, matching

These questions will be:

- factual recall (do you know the information)
- conceptual understanding
- application (can you apply the information that you learn or you just a vomit taker?)
 - the last two questions are what student call “tricky” questions because you really do not know the material

If you need help, please ask!!!