

Name: _____ Period: _____ Date: _____

BIOLOGY FINAL REVIEW SHEET ANSWERS

* Although the biology final is not considered cumulative, topics covered the second semester require the knowledge and understanding of concepts from the first semester.

** This review sheet is not intended to substitute for studying. It is in no way comprehensive. The review sheet is to be used as a *supplementary resource* to help you review for your upcoming exam. It is highly recommended that you review previous quizzes, tests, labs, homework, and review sheets.

Topics Covered:

**italicized topics were covered during semester I.*

Scientific Method

Organic Compounds

Cell Structure and Function

Osmosis and Diffusion

Cell Energy

Photosynthesis

Cell Respiration

DNA

RNA

Protein Synthesis

Mitosis

Meiosis

Genetics

Biological Change

*On the day of the exam, students may bring one 3x5 handwritten note card to aid them in answering the questions. The student's name must be written on the note card and the note card will be collected at the end of the exam. Students will also be expected to bring a #2 pencil.



Key Concepts in Biology:

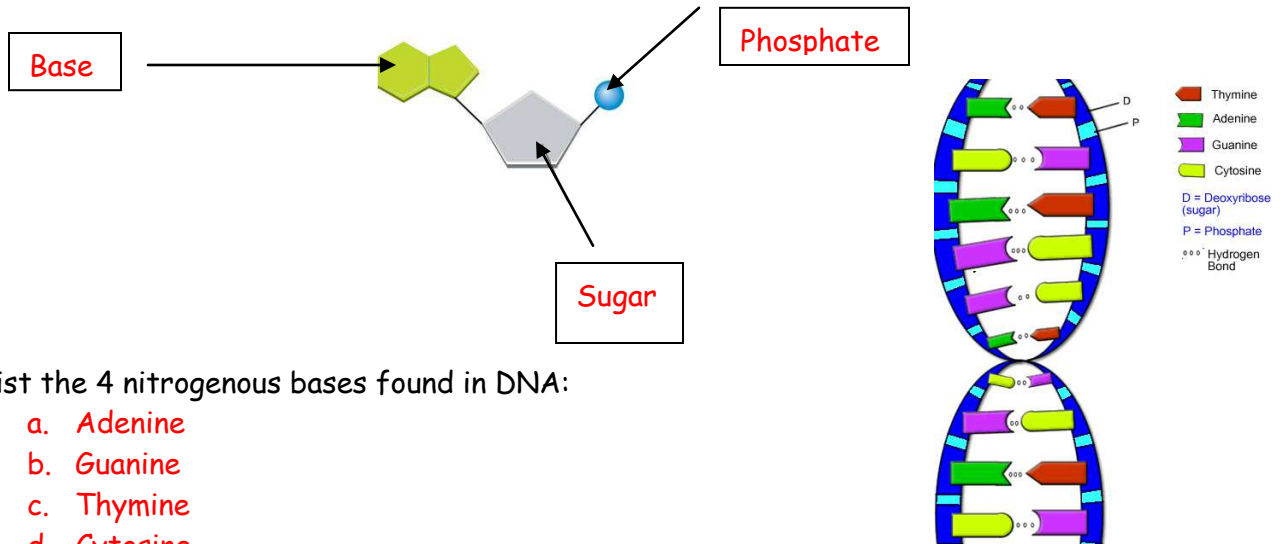
- *What are the main functions of the cell membrane?*
- *What happens during diffusion?*
- *What is osmosis?*
- *Where do plants get the energy they need to produce food?*
- *What is ATP?*
- *What is the role of ATP in cellular activities?*
- *How is energy released from ATP?*
- *What is the overall equation for photosynthesis?*
- *What is the role of light and chlorophyll in photosynthesis?*
- *What happens in the light-dependent reactions?*
- *What is the Calvin Cycle?*
- *What is cellular respiration?*
- *What is the overall equation for cellular respiration?*
- *What happens during the process of glycolysis?*
- *What happens during the Krebs cycle?*

- *How are high-energy electrons used by the electron transport chain?*
- *Compare and contrast photosynthesis and cellular respiration.*
- What is the overall structure of a DNA molecule?
- What are the 4 nitrogenous bases in DNA?
- What happens during DNA replication?
- Compare and contrast DNA and RNA.
- What are the three main types of RNA and what are their functions?
- Compare transcription and translation.
- What is a mutation?
- Define diploid and haploid.
- What are the main events of the cell cycle?
- What are the 4 phases of mitosis?
- What occurs during each phase of mitosis?
- What happens during the process of meiosis?
- Describe how cancer occurs.
- What is crossing over? When does it occur?
- Compare and contrast the resulting cells of mitosis and meiosis.
- What is the difference between genotype and phenotype?
- What is the difference between homozygous and heterozygous?
- What is the principle of probability?
- What is a punnett square?
- You must be able to use punnett squares to determine the genotype and phenotype of offspring.
- Who was Gregor Mendel and what did he conclude about inheritance during his study of pea plants?
- Define the law of independent assortment.
- Define the law of segregation.
- Define the law of dominance.
- What is a karyotype?
- What is a pedigree?
- What is a genetic disease?
- Why are sex-linked diseases more likely to occur in males?
- Explain the phrase "nature vs. nurture."
- Define evolution.
- What is one driving force of evolution?
- Who was Charles Darwin?
- What does Darwin's theory of evolution suggest?
- Define fitness and natural selection.
- What is the fossil record? What is the significance of the fossil record?
- Describe the phrase "evolutionary arms race."
- What is considered predators that humans should still fear?

Final Review Questions

DNA, RNA and Protein Synthesis

1. Label the three parts (5C-sugar, phosphate group & nitrogenous base) of the nucleotide below:



2. List the 4 nitrogenous bases found in DNA:

- Adenine
- Guanine
- Thymine
- Cytosine

3. Which two bases are considered purines? **Adenine & Guanine**

4. Which two bases are considered pyrimidines? **Cytosine & Thymine**

5. Describe Chargaff's "base-pair" rules: **A bonds with T & G bonds with C**

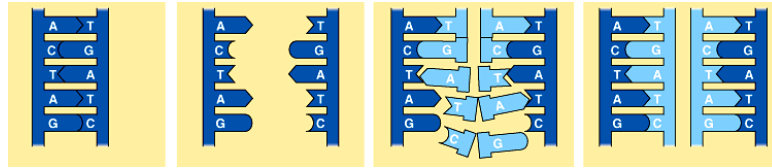
6. Be able to differentiate between DNA and RNA:

	DNA	RNA
Sugar	Deoxyribose	Ribose
Shape	Double Helix	Single Strand
4 Bases	A, T, G, C	A, U, G, C
Location	Nucleus	Cytoplasm




7. The shape of DNA is a **double helix**.

8. DNA contains the **blueprint (code)** for life.

9. Replicating a DNA strand is making an identical **copy** of the DNA strand.



10. After replication, a DNA consists of one **new** strand and one **old** strand.
11. DNA replication occurs in the **nucleus** of the cell.
12. List 3 ways RNA differs from DNA:
 - a. **Shape (single stranded vs. double stranded)**
 - b. **Base (uracil instead of thymine)**
 - c. **Sugar (ribose instead of deoxyribose)**
13. Label the 3 forms of RNA and their function:

	Form of RNA	Function
	mRNA	Carries copies of DNA instructions for assembling amino acids into proteins
	rRNA	Holds ribosomal proteins in place and help locate the beginning of the mRNA message
	tRNA	Transfers each amino acid to the ribosome during protein synthesis

14. Define transcription: **the process by which part of the DNA sequence is copied into RNA**
15. Define translation: **process by which nucleotides in mRNA are decoded into a sequence of amino acids in a polypeptide (protein)**
16. Transcription occurs in the **nucleus** of a cell.
17. Translation occurs in the **cytoplasm** of a cell.
18. What is the basic building block of proteins? **Amino acids**
19. Why are proteins so important to the cell???. **Proteins are each specifically designed to build or operate all the components of a living cell. Proteins are the keys to almost everything living cells do. Remember "pro-" means number one!**
20. *Replicate* the following DNA strand: ATTCGGCAGCGT: **TAAGCGGTCGCA**
21. *Transcribe* the following DNA strand: ATTCGGCAGCGT: **UAAGCGGUCGCA**
22. *Translate* the following mRNA strand into the proper amino acid sequence: AUGAAUGAGUUUUGA
methionine-asparagine-glutamic acid-phenylalanine-stop

MITOSIS AND MEIOSIS

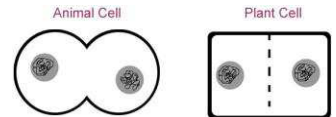
23. The process in which a cell divides into 2 identical daughter cells is called **mitosis**.

24. Mitosis occurs in **somatic (body)** cells.

25. Interphase is made up of **G1, S, and G2 phases**.

26. In order, mitosis is made up of 4 phases: **prophase, metaphase, anaphase & telophase**

27. The cell's DNA is replicated during the **S** phase of Interphase.



28. What are the 4 main events that happen during prophase? **DNA coils and condenses, nuclear membrane breaks down, spindle fibers appear, centrioles appear**

29. What is the difference between cytokinesis in plant cells and in animal cells? **Cytokinesis is the division of the cytoplasm. In plant cells, a cell plate forms and in animal cells, the cell membrane pinches (cleaves) inward.**

30. Define cancer: **a disorder in which body cells lose the ability to control growth.**

31. Define meiosis: **process of reduction division in which the # of chromosomes per cell is cut in half**

32. Meiosis creates special cells called **gametes** that contain half the genetic information of the original parent cell.

33. The ♂ gamete is called a **sperm** cell and the ♀ gamete is called an **egg** cell.

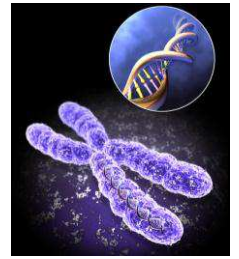
34. Prior to cell division, a gamete cell is **haploid (n) / diploid (2n)?**

35. After cell division, the resulting daughter cells are **haploid (n) / diploid (2n)?** *circle one*

36. If the human diploid number is 46, the haploid number is **23**.

	Mitosis	Meiosis
Types of Cells	Body Cells	Sex Cells
Number of Cell Divisions	1	2
Final Number of Daughter Cells	2	4
Genetic Diversity Produced (identical or nonidentical)	identical	nonidentical
Final Chromosome Number (haploid or diploid)	diploid	haploid

38. How many total chromosomes are in each human body cell? 46
39. How many pairs of chromosomes are in each human body cell? 23
40. What is the diploid number of cells in the human body? 46
41. What is the haploid number of cells in the human body? 23
42. How many total chromosomes are in a gamete (sperm cell or egg cell)? 23
43. Mitosis produces two genetically (identical) (diploid) daughter cells.
44. Meiosis produces four genetically (different) (haploid) daughter cells.



GENETICS



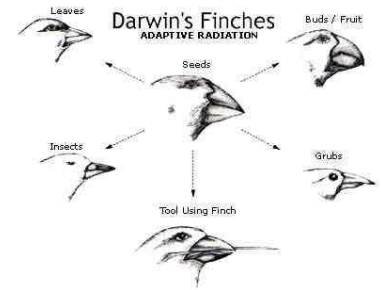
1. The branch of biology that studies heredity is called **genetics**.
2. Gregor Mendel was a monk and a scientist in the mid-1800s who studied **pea** plants. He is considered the "father of genetics."
3. A **trait** is a characteristic that distinguishes one individual from another. Give two examples of a trait. **hair color, eye color, widow's peak, ear lobes.. etc..**
4. A different form of a gene is called an **allele**.
5. Mendel's *Law of Dominance* states **dominant alleles will show up over the recessive alleles (dominant alleles "mask" the recessive alleles)**
6. **Homozygous** is two identical alleles for the same trait while **heterozygous** is two different alleles for the same trait.
7. Define genotype: **genetic make-up of an organism.**
8. The **dominant** allele is more common in the human population and is represented by a capital letter.
9. The **recessive** allele is less common in the human population and is represented by a lowercase letter.
10. Define phenotype: **physical characteristics of an organism (traits that are visible)**
11. The chemical factors that Mendel concluded determined traits are called: **genes**

- Situations in which one allele for a gene is not completely dominant over another allele for that gene are called: **incomplete dominance**
- A cross between a red cow and white cow produce all speckled offspring. This type of inheritance is known as **codominance**.
- Be able to calculate probability using PUNNETT SQUARES. Remember, a *punnett square* is a diagram used to show the results for a trait when two parents are crossed. Punnett squares can be used to determine the *probability*, or the chance of an offspring having a particular trait.

EVOLUTION

- Charles Darwin** was the scientist who traveled on the HMS Beagle and made several observations in the Galapagos Islands.
- The name of the book Darwin published about his findings in the Galapagos is *The Origin of Species*
- Define *adaptation*: **any heritable characteristic that increases an organism's ability to survive and reproduce in its environment**

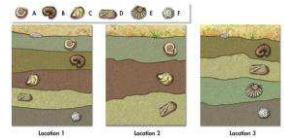
- Finch**, a type of bird, was the animal Darwin observed the most while in the Galapagos.



- The main structural adaptation he found among the finches was the difference in beak **shape** and **size**.
- Based on James Hutton and Charles Lyell's work, the earth is estimated to be **4 billion** years old.
- The combination of physical traits and behaviors that helps organisms to survive and reproduce in their environment is known as **adaptation**.
- According to Darwin's theory of natural selection, the individuals who tend to survive are the ones who have adaptations best suited to the current **environment**.
- A giraffe's long neck and legs are an example of **adaptation**.
- The preserved remains of ancient organisms are known as **fossils**.

11. What is the name of a scientist who specializes in the study of fossils? **paleontologist**

12. Fossils are most often found in what type of rock? **Sedimentary rock**



13. How do fossils form? **Material surrounds the dead animal to help protect it from decay and preserves it (rock, ice, tar, amber)**

14. What is the fossil record? **Collective accumulation of artifacts which have been fossilized all over the world.**

15. What do the similarities in the early development of different species tell us about their past? **Similarities in embryonic development means similarities in genes; demonstrates common ancestry**

16. What are homologous structures? What are some examples of homologous structures? **Structures that are shared by a related species and that have been inherited from a common ancestor. Examples include human arm, bird wing, horse leg, alligator foot etc.**

17. What are analogous structures? What are some examples of analogous structures? **Body parts that share a common function but not a common structure. Examples include butterfly wing and bird wing.**

18. What are vestigial organs? What are some examples of vestigial organs? **Vestigial organs are structures that are inherited from common ancestors but have lost much or all of its original function. Examples of vestigial organs in humans include wisdom teeth, appendix, tail bone (coccyx), little toe, and tonsils. Vestigial organs found in snakes and whales include the pelvic bone, indicating that their ancestors used to have legs to walk on land.**

19. What does the term "survival of the fittest" mean? **Organisms with characteristics best suited to the current environment will survive while those who do not have characteristics best suited for their environment will die and have fewer offspring. Stronger is not always better!**

20. Define half-life: **length of time required for half of the radioactive atoms in a sample to decay.**

21. Define "mass extinction:" **event during which many species become extinct during a relatively short period of time.**

22. Geologists use this method to determine the EXACT age of certain rocks: **radiometric dating**

23. Are genetic mutations good or bad? Explain. **Most of the time, a change in the DNA sequence that affects genetic information is detrimental (bad) to the organism. For example, a change in DNA (base mutation or chromosome mutation) can cause result in a genetic disorder.**

Mutations can also create genetic variations that will lead to phenotypic variations in a species. For example, a mutation caused the first moth to change from a light color to a dark color.