

Write the answers on your own paper, not on this sheet.

1. Define the following terms:

- | | |
|------------------|----------------|
| a. Genetics | f. Chromosome |
| b. Gene | g. Mitosis |
| c. Messenger RNA | h. Interphase |
| d. Anticodon | i. Mother cell |
| e. Codon | j. Centromere |

2. How are RNA and DNA the same? List at least two similarities.

3. How are RNA and DNA different? List at least two differences.

4. Protein synthesis takes place in two stages: transcription and translation.

- Where in the cell does transcription take place?
- Does transcription use mRNA or tRNA?
- Where in the cell does translation take place?
- Does translation use mRNA or tRNA?

5. A DNA strand has the following sequence of nucleotide bases:

cytosine, adenine, thymine, guanine, adenine, cytosine, cytosine, thymine, guanine

- What will the mRNA sequence be?
- What will the tRNA sequence be?
- How many amino acids will this sequence code for?

6. On YouTube, watch the video “**From RNA to Protein Synthesis**” by Michael Freudiger.

- How does the DNA get unwound?
- What happens to the amino acids inside the ribosome?

7. Bonus (+5 points): The textbook doesn't explain how DNA is copied when a cell decides to divide. On YouTube, watch the video “**DNA Replication**” by **yourgenome** to see how DNA is copied.

- How is DNA replication like protein synthesis?
- How is DNA replication different from protein synthesis?

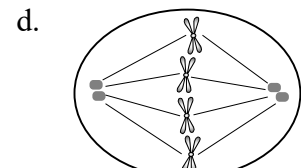
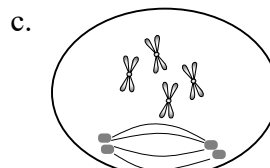
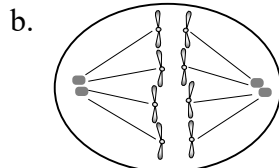
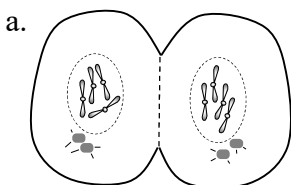
8. The DNA strands in just one of your cells can be almost six feet long. How does such a large amount of DNA get packed into a tiny cell?

9. During interphase, what does the DNA in the cell nucleus look like: strands or chromosomes?

10. Does a cell spend more time in interphase or in mitosis?

11. List the four stages of mitosis, in order.

12. Identify each stage of mitosis in these pictures of a cell dividing:



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1. Define the following terms:
 - a. Karyotype
 - b. Diploid cell
 - c. Haploid cell
 - d. Diploid number
 - e. Haploid number
 - f. Meiosis
 - g. Gametes
 - h. Virus
 - i. Antibodies
 - j. Vaccine
2. Your chromosomes come in homologous pairs. What does “homologous” mean?
3. How many pairs of chromosomes does a human being have?
4. How is the 23rd pair of chromosomes different for males and females?
5. A cell's diploid number is 16. What is its haploid number?
6. A cell has 14 pairs of chromosomes. What is its diploid number? What is its haploid number?
7. A plant cell undergoes normal cell division to make its roots grow longer. Is the cell undergoing mitosis or meiosis?
8. A plant cell creates haploid cells that will be used to make the plant's seeds so it can reproduce. Is the cell undergoing mitosis or meiosis?
9. What is the difference between a gamete and a regular cell?
10. What are male gametes called? What are female gametes called?
11. When two gametes join together, a diploid cell is formed. What is the diploid cell called?
12. Fill in the blanks to explain what happens in each stage of meiosis.
 - a. Prophase I: The _____ move to the opposite sides of the cell and spin fibers.
 - b. Metaphase I: The chromosomes _____ in the center of the cell.
 - c. Anaphase I: The pairs of chromosomes are _____.
 - d. Telophase I: The plasma membrane constricts to form two (diploid, haploid) cells with duplicated _____.
 - e. Prophase II: The _____ move to the opposite sides of the cell and spin fibers.
 - f. Metaphase II: The chromosomes _____ in the center of the cell.
 - g. Anaphase II: The copies of chromosomes are _____.
 - h. Telophase II: The plasma membrane constricts to form four (diploid, haploid) cells with single chromosomes.

13. In male animals, once telophase II ends, what happens to the cells?
14. In female animal cells that undergo meiosis, the final four cells are not all the same. Explain how they are different.
15. A cell with seven pairs of chromosomes undergoes mitosis.
 - a. How many cells will there be at the end of mitosis?
 - b. How many chromosomes will be in each cell?
 - c. Are the chromosomes paired or single?
16. A cell with seven pairs of chromosomes undergoes meiosis.
 - a. How many cells will there be at the end of meiosis?
 - b. How many chromosomes will be in each cell?
 - c. Are the chromosomes paired or single?
17. Why aren't viruses considered living organisms?
18. Explain how viruses reproduce?
19. What is the process in the previous problem called?
20. Name four diseases caused by viruses.
21. How do vaccines prevent people from getting seriously ill?
22. What happened to the number of cases of measles in the US after the measles vaccine was used on the general public in 1963? (See graph below.)
23. Bonus (+4 points): One complication of measles is pneumonia. What was the death rate from measles pneumonia in the 1920's?

Reported Measles Cases in the United States by Year
1954-2008

