Name: _____ 2026 BIO II Summer Work Total: 150pts

Biology II Honors Anatomy & Physiology - Summer Work Packet

DIRECTIONS (READ CAREFULLY)

This packet is designed to:

- Review foundational biology concepts
- Introduce anatomy & physiology concepts
- Practice scientific reasoning

SUBMISSION REQUIREMENTS

This assignment must be:

- Printed
- Completed entirely by hand
- Typed responses are not permitted.

HOW TO SUBMIT

Step	What You Must Do
1. Print	Print the entire packet.
2. Handwrite	Complete all answers neatly using full sentences.
3. Turn In	Turn in this packet during your class period on the first day of school.

This summer assignment should take about **4-6 hours total** and can be completed at your own pace over the summer. It reviews important Biology I concepts while also introducing some basic Anatomy and Physiology topics, so everyone starts Biology II Honors on the same page. Completing this work will help you be better prepared for the higher level of thinking, detailed explanations, and application-based learning expected in an honors course.

Questions? If you have questions while completing this packet, please email me. My email address is - aiswalt@berkscatholic.org

PART I: WHAT DOES IT MEAN TO BE ALIVE? (15 points)

1. (6 pts) Choose THREE characteristics of life and explain how each one occurs in the human body. Do not define — explain the biological process.

2. (6 pts) Using at least four characteristics of life, argue whether viruses should or should not be considered living. Support your reasoning.

3. (3 pts) If an organism could reproduce but could not maintain homeostasis, would it survive long term? Explain.

PART II: CELLS IN ACTION (25 points)

4. (6pts) Imagine a cell without mitochondria. Explain how this would affect:

- ATP production:

- Cellular respiration:

- The organism as a whole:

5. (6 pts) Compare prokaryotic and eukaryotic cells by explaining how structural differences impact their efficiency and complexity.

6. (6 pts) Choose TWO organelles and:

- Explain how their structure relates to their function

- Explain how they work together

7. (7 pts) Explain why the cell membrane must be selectively permeable. Include:

- Phospholipids
- Proteins
- An example of something entering and leaving

PART III: TRANSPORT & TONICITY (15 points)

8. A freshwater fish is placed into saltwater. Predict what happens to its cells and explain water movement. (5 pts)

9. Explain when a cell would use diffusion vs. active transport. Why is energy required in one process but not the other? (6 pts)

10. Explain why plant cells do not burst in hypotonic solutions but animal cells might. (4 pts)

PART IV: DNA & GENETICS (20 points)

11. Explain how the structure of DNA allows it to both store information and replicate accurately. (6 pts)

12. If one nitrogen base is changed in DNA, explain how this could affect:

- A gene
- A protein
- A physical trait
  (6 pts)

13. Why must DNA replication occur before mitosis and meiosis? What would happen if replication failed? (4 pts)

14. Explain how DNA, chromosomes, and proteins work together to determine traits. Use a specific example. (4 pts)

PART V: MITOSIS & MEIOSIS (20 points)

15. Explain how cell division in a skin cell differs from cell division in a sperm or egg cell. Include purpose and outcome. (6 pts)

16. Explain two specific mechanisms that increase genetic variation during meiosis. (6 pts)

17. If mitosis did not maintain chromosome number, what would happen to body cells over time? (4 pts)

18. Why is genetic variation important for the survival of a species? (4 pts)

PART VI: CELLULAR RESPIRATION & ATP (15 points)

19. Explain why increased breathing rate during exercise relates to cellular respiration and ATP production. (5 pts)

20. Explain why a cell cannot survive long without ATP, even if glucose is present. (5 pts)

21. Describe the structure of ATP and explain why breaking a phosphate bond releases energy. (5 pts)

PART VII: INTRODUCTION TO ANATOMY & PHYSIOLOGY (25 points)

22. Explain how homeostasis regulates body temperature using a negative feedback loop. (6 pts)

23. Choose ONE organ system and explain how it depends on at least two other organ systems to function properly. (6 pts)

24. Using a specific example, explain the difference between:

- Tissue
- Organ
- Organ system

(6 pts)

25. Describe one example of positive feedback in the human body and explain why it is used less frequently than negative feedback. (7 pts)

PART VIII: CASE STUDY – DIABETES & CELLULAR FUNCTION (15 points)

Case Study:

James is a 17-year-old student experiencing frequent urination, excessive thirst, unexplained weight loss, and fatigue. Blood tests show high glucose levels. His pancreas is not properly regulating insulin.

Insulin allows glucose to enter cells so it can be used in cellular respiration to produce ATP.

26. Explain why James feels fatigued even though his blood glucose levels are high. Connect insulin, glucose, cellular respiration, and ATP. (5 pts)

27. Explain how diabetes disrupts homeostasis. (4 pts)

28. Predict how untreated diabetes could affect:

- Muscle tissue
- Nervous tissue

Use ATP and energy demand in your explanation. (6 pts)