

## Transport & ATP — Student Worksheet

<b>Name:</b>	
<b>Date:</b>	
<b>Group Members:</b>	

### Safety Considerations

- Continue to follow lab safety rules when handling previous data or materials.
- Wash hands after handling lab notebooks, samples, or photos.

### Purpose

In this activity, you will examine how cells produce ATP and how this energy is used to power active transport, regulate ion balance, and maintain proper tonicity and homeostasis.

### Key Concepts

- **Passive transport:** movement down a concentration gradient without ATP
- **Active transport:** movement against a gradient using ATP
- **ATP:** cellular energy molecule that powers work

### Pre-Lab Questions (Individual)

Answer in full sentences in your binder or in the space provided below.

#### 1. Osmosis Review (Egg Lab)

Describe what happened to the egg in:

- Hypotonic solution: \_\_\_\_\_
- Hypertonic solution: \_\_\_\_\_
- Isotonic solution: \_\_\_\_\_

#### 2. Cell Volume and Function

Why is maintaining proper cell volume important for normal cell function?

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#### 3. Energy and Transport

Explain why cells cannot rely only on diffusion and osmosis to stay balanced.

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#### 4. ATP and Health (Prediction)

Predict what happens to a cell's water balance and health if ATP is limited.

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## **Procedure (Group)**

### **Step 1: Choose ONE Scenario**

- Dehydration
- Overhydration
- Severe diarrhea/vomiting
- Very salty diet
- Blood loss
- Heat stress
- Kidney malfunction
- Heart failure
- Severe malnutrition

Scenario: \_\_\_\_\_

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### **Step 2: System Analysis**

*Answer in complete sentences using evidence from the egg lab when possible.*

#### **5. Initial Fluid Changes**

Which body fluids are affected first, and how do water and solute levels change?

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#### **6. Effect on Cells**

How will this scenario affect cell tonicity and volume?

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**7. Passive Transport Response**

Which passive processes occur first, and in what direction does movement happen?

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**8. Need for ATP and Active Transport**

Why are passive processes not enough? Describe one ATP-requiring process involved.

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**9. Cell Function and Energy Demand**

How might this disturbance affect enzymes, metabolism, and ATP demand?

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**10. Whole-Body Consequences**

What symptoms might occur if balance is not restored?

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**Step 3: Feedback and Regulation**

**11. Homeostatic Control System**

Variable: \_\_\_\_\_

Sensor: \_\_\_\_\_

Control Center: \_\_\_\_\_

Effector: \_\_\_\_\_

Response: \_\_\_\_\_

Explain how this system supports cellular balance:

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#### **Step 4: Egg Lab Connection (Group)**

##### **12. Model Comparison**

Which egg condition best represents your scenario?

☐ Water    ☐ Sugar    ☐ Isotonic

Explain how the egg models your scenario and how living cells differ.

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#### **Conclusion Questions (Individual)**

##### **13. ATP and Tonicity**

Explain how ATP helps restore and maintain normal tonicity after osmosis.

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##### **14. When Energy Is Low**

Describe what happens to membrane transport and homeostasis when ATP is reduced.

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##### **16. Final Synthesis (3–4 sentences)**

Explain how ATP production, membrane transport, and osmosis work together to maintain homeostasis.

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## Submission Information

Upload to the assignment page by the due date. Submit ONE PDF containing:

- ☐ Completed worksheet

## Creation and Copyright Information

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Last updated by: Heather Talbott

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## Resources used in the creation of this material:

- Grammarly. (2026). Grammarly (Version 14.1268.0) [Software]. <https://www.grammarly.com/>
- OpenAI. (2026). ChatGPT (GPT-5) [Large language model]. <https://chat.openai.com/>