

Name:

Date:

Section:

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## Na-K Pump Activity: Active Transport in Cells

### The Amazing Cell Pump

#### Phase 1: ENGAGE (2 minutes)

##### Getting Started:

Open [peebedu.com](http://peebedu.com) and navigate to Sodium-Potassium Pump Interactive

Watch the pump in the cell membrane.

##### Think About It:

Imagine trying to pump water uphill - it takes energy!

This pump moves ions "uphill" against their natural flow.

##### Quick Look:

- Orange ions ( $\text{Na}^+$ ) want to flow: IN / OUT
- Purple ions ( $\text{K}^+$ ) want to flow: IN / OUT
- But the pump forces them the OPPOSITE way!

#### Phase 2: EXPLORE (5 minutes)

##### Work the Pump

Click to run the pump cycle.

##### Watch What Happens:

##### 1. Loading Dock (Inside):

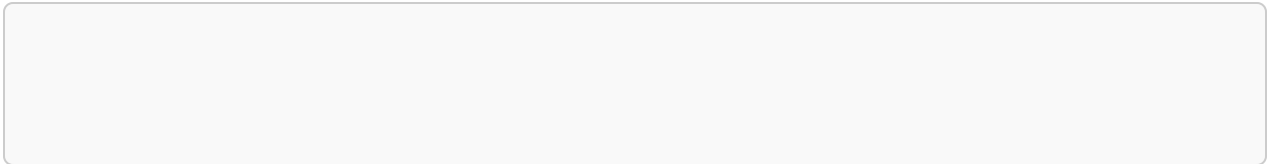
- Green ATP energy attaches

**1. Energy Use:**

- ATP breaks apart (POP!)
- Pump changes shape
- Opens to: INSIDE / OUTSIDE

**1. Swap Time:**

- Orange ions jump OFF



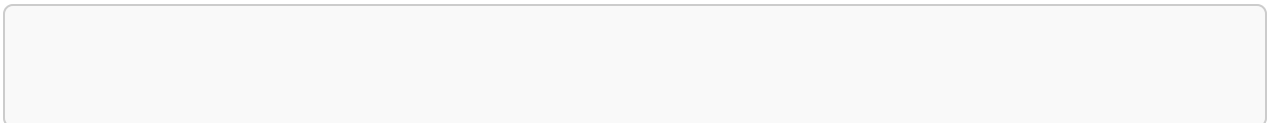
**1. Return Trip:**

- Pump flips back
- Purple ions jump off INSIDE

**Count the Trade:**

For each ATP used:

- \_\_\_\_\_  $\text{Na}^+$  go out



**Phase 3: EXPLAIN (4 minutes)**

**Why This Matters**

**1. Energy Required:**

The pump needs ATP because it's:

**1. The Trade-Off:**

Why move 3 out but only 2 in?

This makes the outside more \_\_\_\_\_ charged.

This creates an electrical " \_\_\_\_\_ "

### 1. **Cell Jobs:**

This gradient helps with:

- Sending nerve signals
- Making muscles move
- Bringing in food

## **Phase 4: ELABORATE (1 minute)**

### **Real Life**

#### **Athletes and Salt:**

Athletes drink sports drinks with sodium and potassium.

Why? Their pumps need these ions to:

#### **Pump Problems:**

If the pump stops working:

- Cells swell with water
- Nerves can't send signals
- Muscles get weak

## **Phase 5: EVALUATE (Quick Check)**

Circle the best answer:

1. The pump uses energy to move ions:

1. Each pump cycle trades:

**Big Question:**

Why do cells use 30% of their energy on this one pump?

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**Fun Fact:**

Your body has trillions of these pumps working right now!

**Key Vocabulary:**

See activity for vocabulary specific to this topic.