

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Section: \_\_\_\_\_

## Na-K Pump Activity

### The Amazing Cell Pump

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

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**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)

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### Work the Pump

Click to run the pump cycle.

### Watch What Happens:

#### Loading Dock (Inside):

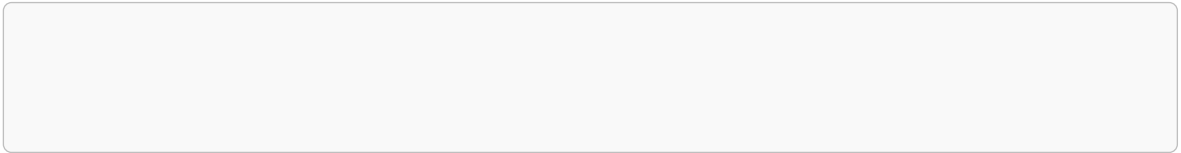
- ----- orange  $\text{Na}^+$  ions hop on
- Green ATP energy attaches

#### Energy Use:

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

#### Swap Time:

- Orange ions jump OFF

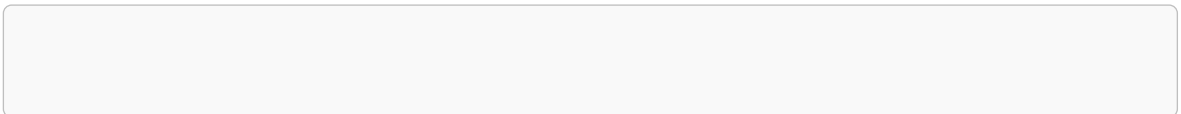


#### Return Trip:

- Pump flips back
- Purple ions jump off INSIDE

#### Count the Trade: For each ATP used:

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



### Phase 3: EXPLAIN (4 minutes)

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#### Why This Matters

**Energy Required:** The pump needs ATP because it's:

**The Trade-Off:** Why move 3 out but only 2 in? This makes the outside more \_\_\_\_\_ charged. This creates an electrical '\_\_\_\_\_'

**Cell Jobs:** This gradient helps with:

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

## Phase 4: ELABORATE (1 minute)

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### 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)

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Circle the best answer:

The pump uses energy to move ions:

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.