Name: _____ **Date:** _____

Section: _____

Na-K Pump Activity

The Amazing Cell Pump

Phase 1: ENGAGE (2 minutes)

Getting Started: Open 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 (Na^+) want to flow: IN / OUT
- Purple ions (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:

Loading Dock (Inside):

- _____ orange 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:

- _____ Na^+ go out

Phase 3: EXPLAIN (4 minutes)

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)

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:

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.