Name: **Date:** **Section:**

Water Potential Activity: Water Movement in Plants

Cells and Water: A Balancing Act! 💧

Phase 1: ENGAGE (5 minutes)

- *Getting Started:**

Open peebedu.com and navigate to Interactive Water Potential Simulation

- *First Impressions:**

1. Look at the beaker - what do you see?

- Controls on right = _____

1. Click "Add Solute" - watch what happens!

1. **Big Question:** 🤔

Why do your fingers get wrinkly in the bath but not in the rain?

- *Fun Fact:** Your body has about 37 trillion cells, each balancing water! 💧

Phase 2: EXPLORE (18 minutes)

- *Adventure 1: Making Solutions** 🧪

Let's add different "seasonings" to our water!

- *Solution Recipe Book:**

What I Added	How Many Clicks	What Happened to Numbers
Sugar (sucrose)	5	Water potential = _____
Salt (NaCl)	5	Water potential = _____
Road salt ($CaCl_2$)	5	Water potential = _____

  - *Discovery:** Which one changed the water potential the MOST? _____
  - *Adventure 2: Cell Testing Lab** 🔬

Time to add cells! Try each one in plain water first:

  - *Cell Observation Journal:**

Draw what happens to each cell:

Cell Type	In Plain Water	Draw It!
Plant cell	Swells / Shrinks / Same	[Box]
Animal cell	Swells / Shrinks / Same	[Box]
Red blood cell	Swells / Shrinks / Same	[Box]

  - *Think:** Why don't they all do the same thing? _____
  - *Adventure 3: The Goldilocks Challenge** 🐻

Find the "just right" solution for each cell (where it stays the same size):

  - *Perfect Match Game:**

Cell Type	Solute I Used	How Much?	Success?
Red blood cell	✓ or ✗		
Plant cell	✓ or ✗		
Bacteria	✓ or ✗		

- *Pattern Alert:** Which cell needs the MOST salty water? _____
- *Adventure 4: Extreme Conditions!** 🌡️

Pick a plant cell and put it in salty water. Now change things:

- *Environmental Testing:**

What I Did	What Happened to Cell	Why I Think This Happened
Made it hot (50°C)		
Made it cold (0°C)		
Evaporated water		
Added more water		

Phase 3: EXPLAIN (12 minutes)

- *How Water Moves** 💧➡️

1. **Water's Rules:**

Water is like kids at recess - it goes where there's more room!

Fill in the rule:

```
```

Water moves FROM: _____ water potential (less stuff dissolved)

Water moves TO: _____ water potential (more stuff dissolved)

```

1. **The Magic Equation** (simplified):

Lower water potential = More dissolved stuff = Water wants to go there!

Match these:

```

Pure water • • Very negative number

A little salt water • • Zero

Very salty water • • Small negative number

```

1. **Cell Survival Strategies:**

How do cells deal with water?

- **Too much water:** Cell might _____
- **Just right:** Cell stays _____

1. **Real-Life Examples:**

Draw lines to match:

```

Pickle in salt water • • Cells swell up

Raisin in water • • Cells shrink

Fresh vegetables • • Cells stay firm

Slug with salt • • Cells lose water fast

```

## Phase 4: ELABORATE (8 minutes)

- *Water Potential in Your World!** 🌍

1. **Kitchen Science:**

Why do we put salt on icy roads?

- Salt makes water potential: Higher / Lower (circle one)
- Cells nearby might:

_____

1. **Garden Mystery:**

Your mom waters the plants, but accidentally uses salt water!

- What happens to plant cells?

_____

- How to save the plants?

_____

1. **Ocean Life:**

How do fish survive in the salty ocean?

| Problem | Fish Solution |
| --- | --- |
| Ocean is VERY salty | |
| Cells could shrink | |
```

1. **Sports Drinks:**

Why do athletes drink special drinks instead of just water?

Phase 5: EVALUATE (7 minutes)

- *Show What You Know!* 🎯
1. **Fill in the Blanks:**

When you put a cell in _____ water, water moves into the cell.

When you put a cell in _____ water, water moves out of the cell.

The cell stays the same in _____ solutions.

1. **True or False:** (Circle your answer)
- T / F Water always moves from high to low water potential
- T / F All cells react the same way to salt water
- T / F Temperature doesn't affect water movement
- T / F Plant cells can burst from too much water
- T / F Your blood is isotonic to your cells
1. **Drawing Challenge:**

Draw what happens to a red blood cell in:

```

Pure Water: Salt Water: Blood:

[Box] [Box] [Box]

```

1. **Problem Solving:** 🧩

Your goldfish bowl accidentally gets salt in it!

- Fish cells normally have Ψ = -0.5
- Salt water now has Ψ = -2.0

- What should you do?

_____

1. **Create a Warning Label:**

Make a warning label for salt near a garden:

⚠️ WARNING:

_____

- *Exit Ticket:** 🎟️

Rate your understanding:

- Water movement: 😕 😐 😊 😃
- Why cells shrink/swell: 😕 😐 😊 😃
- Using the simulation: 😕 😐 😊 😃

One cool thing I learned:

_____

One question I still have:

_____

- --

Fun Extensions:

1. **Home Experiment:**
- Put gummy bears in different liquids
- Measure size after 24 hours
- Graph your results

- Explain using water potential

1. **Cell Comic Strip:**
   - Create a 6-panel comic
   - Show a cell's adventure
   - Include different solutions
   - Add speech bubbles!
1. **Design a Cell Spa:**
   - What solutions would you offer?
   - Create a menu for different cells
   - Include "treatments" and effects
   - Make it funny but scientific!

Amazing Facts! 🌟

- A camel's red blood cells are oval to survive dehydration!
- Plants can create 300 pounds of pressure with water
- Your kidneys filter 180 liters of fluid daily
- Jellyfish are 95% water
- Seeds can survive with almost no water for years!

Key Vocabulary:

See activity for vocabulary specific to this topic.