

Participate in a Flipped Case Based Lesson

## Teacher T Chart

<i>Hear</i>	<i>See</i>

7



**How much is too much?**

Below the text, there is a horizontal bar with a gradient from dark blue to light blue. At the bottom of the grid, there are six small, empty square boxes arranged horizontally.

Hold Your Wee  
For A Wii  
Contest



## Facts and Questions

- Write three facts and three questions on your individual facts and questions sheets

Facts

Questions

Facts





Questions



**Case/PBL Group Roles** Read the role cards and assign roles to each group member. You will work together to brainstorm facts and questions




**Notetaker**



**Spokesperson**




**Recorder**




**What is your job as Director?**

- Explain the task to the team
- Develop a plan with your group
- Keep track of time
- Help everyone get an equal chance to speak
- Encourage team to stay focused




**What is your job as Recorder?**

- Label each poster with appropriate headings and team members' names
- Record the ideas of team members exactly as stated. Do not change their wording into your wording.



**What is your job as Secretary?**

- Record on 8 1/2" x 11" paper the notes from team posters
- Be certain your notes (or a copy of your notes) are turned in to the teacher
- Share the information you have written down



**What is your job as Spokesperson?**

- Ask questions of the teacher as requested by team
- Plan what you will say to the class
- Present information from your team to the class

# Brainstorm Guidelines



- Take Turns and Call out ideas
- Record ideas as stated (verbatim)
- Strive for quantity
- Resist evaluation of ideas
- Encourage all ideas
- Piggy-back on other ideas

## Case/PBL Group Brainstorming

CREATE 2 POSTERS

Facts

Questions

→ **BRAINSTORM** *Facts and Questions*

→ Record the **initials** of each team members fact or question on the poster

**Why is too much water dangerous? Part I**

WHO, WHAT, WHY?

The Magazine answers...

**A Californian woman has died after taking part in a water-drinking contest, but why is too much water dangerous?**

We are regularly advised to drink more water. When you drink water, it clears skin, reduces tiredness and aids concentration.



But the death of a woman in the US after taking part in a water-drinking contest shows you can have too much of a good thing.

Jennifer Strange had taken part in the "Hold Your Wee for a Wii" game. This contest promised the winner a Nintendo Wii. Afterwards she reportedly said her head was hurting and went home, where she was later found dead. Initial tests have shown her death is consistent with water intoxication.



# FLIPPED LESSON

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Information to be disseminated at home!

Lesson 1: Cell Membrane Structure and Function

## What Happens In The Cells?

- Add Three Facts Your PBL Group Facts Poster
- [Inquiry Lab](#)

## Inquiry Lab: This is the Brain on Water



### Materials:

Distilled Water	Solution representing cytoplasm	Balance
Graduated cylinders	Beakers	Eggs (shell removed using vinegar)

\*Add any materials you choose. Check with your teacher to make sure they are available.

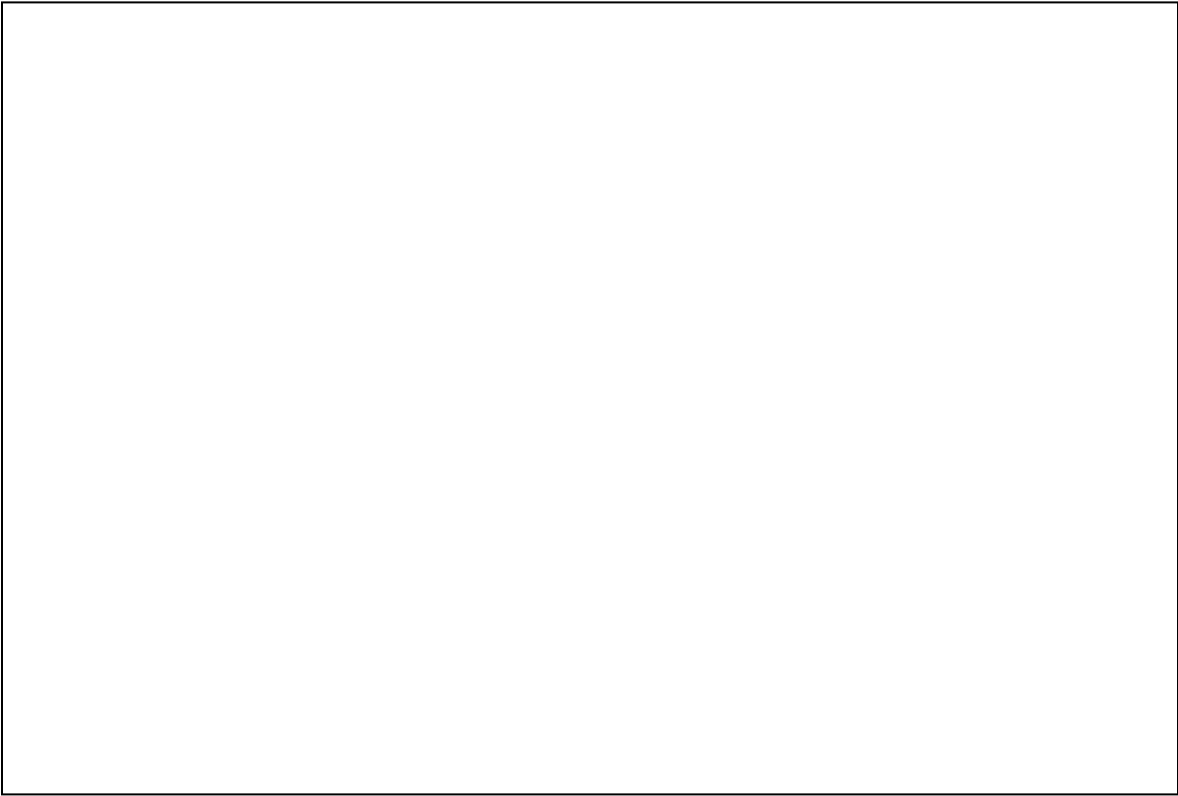
### Hypothesis:

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**Procedure:** Be sure to be specific about measurements, constants, control and data collection.

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**Data:** Use graphs and data tables as well as observations.

A large, empty rectangular box with a thin black border, intended for students to draw graphs or create data tables based on their observations.

**Conclusion:** Use questions from poster presentation on experimental design sheet.

A large, empty rectangular box with a thin black border, intended for students to write their conclusions or answer questions from a poster presentation.

## Plan Your Investigation

### Experimental Design Matrix

**Title of the Experiment:** What are you trying to find out?  
Ex. The effect of (independent variable) on (dependent variable) in organism .

**Question Asked:**

**Hypothesis:** What do you think will happen during the experiment?  
If (you do this) , then (this will happen) .

**Control:** Part of the experiment used as a comparison. Normal conditions

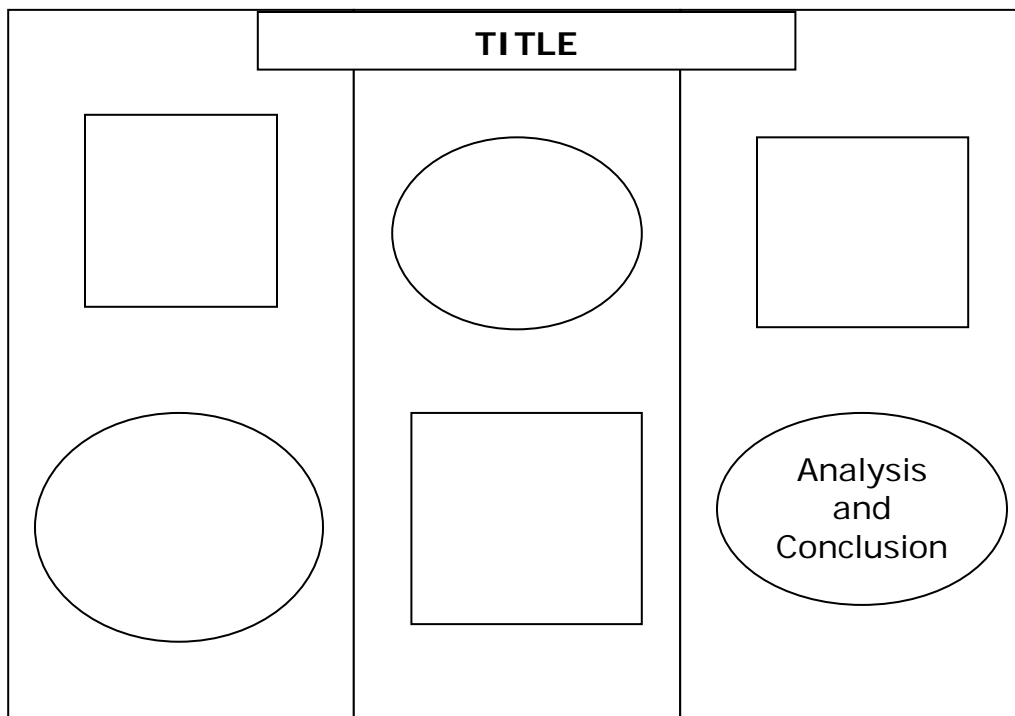
**Independent Variable:** What are you testing or changing in your experiment? What are your units of measurement?

**Dependent Variable:** What results will you measure? What are your units of measurement?

**Constants:** List at least five things that it would be important to keep the same during your experiment so that it will be a fair test of your hypothesis.

## Report Results *(optional)*

- Present your findings during a “Brain on Water.” You will use digital images, graphs and written descriptions in your poster presentation.
- The Written Part of Reporting Your Results Should Answer the Following Questions:
  - Summarize your procedure.
  - Did your experiment support or deny your hypothesis?
  - What data did you collect and what were your results?
  - What error may have been involved in this experiment?
  - What additional experiments could be performed?
- Label the diagram below in order to plan your poster presentation. Write down what you will put in the various spaces on your poster board for your group presentation. Label where you will position:
  - Data Collected
  - Abstract
  - Pictures
  - Summary of procedure
  - Diagrams, Charts and Graphs



- Watch The [News Report on Water Intoxication](#)
- Add Three Facts and Three Questions To Your PBL Group Poster
- [Vocabulary Survey](#)
- Read The Article: [Why Is Too Much Water Dangerous? Part II](#) and [Why Is Too Much Water Dangerous? Part I](#)

# FLIPPED LESSON

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Information to be disseminated at home!

[Lesson 2: Cell Membrane, Excretion and Osmoregulation](#)



What Do You Know?  
What Have You Heard About?  
What Do You **NOT** Know?



Vocabulary	Know	Heard Of	Don't Know	Definition
Osmosis				
Diffusion				
Concentration				
Cell Membrane				
Regulation				
Dilute				
Excretion				

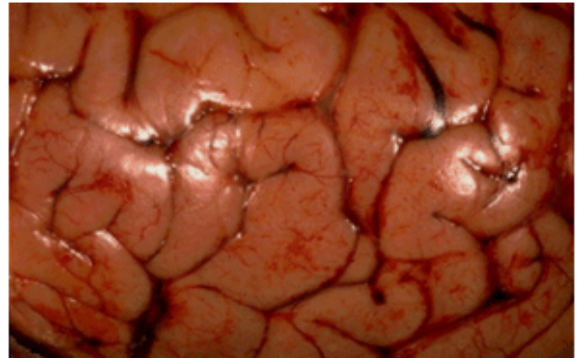
## **Why is too much water dangerous?**

WHO, WHAT, WHY?

The Magazine answers...

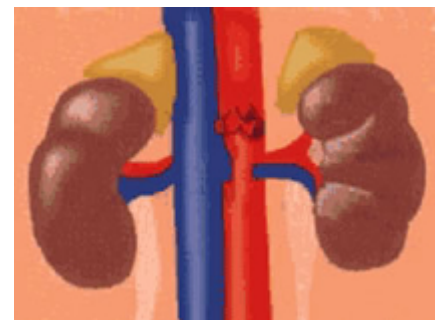
Drinking too much water can cause your brain to swell. The brain controls vital functions such as breathing. So what happens?

Water enters the body when we drink and is removed primarily in the urine and sweat. The amount of water in the body is regulated. Levels of certain compounds, such as salt, in the blood are maintained as a result.



If you drink too much water, the kidneys will not be able to work

fast enough to remove enough fluid from the body. The blood will become more dilute with low salt concentrations.



"If you drink too much water it lowers the concentration of salt in your blood so that it is lower than the concentration of salt in cells," says Professor Robert Forrest, a consultant in clinical chemistry and forensic toxicology at the Royal Hallamshire Hospital in Sheffield.

## **Why is too much water dangerous?**

WHO, WHAT, WHY?

The Magazine answers...

### **Confusion**

The water then moves from the dilute blood to the cells and organs where there is less water. Professor Forrest likens this to the effects seen in science-class experiments.

"If you put salty water on onion skin the cells will shrink, if you put too much water on it the cells will swell," he says.

This swelling is the same problem as in the brain during water intoxication.

"When the brain swells, it is inside a bony box so has nowhere to go," he says. "The pressure increases in the skull and you may get a headache. As the brain is squeezed it compresses vital regions regulating functions such as breathing."

Eventually these functions will be impaired and you are likely to stop breathing and die. Warning signs included confusion and headaches.

Symptoms normally occur very soon after drinking the water. If the gut is absorbing the water more slowly, then it can take longer for someone to experience symptoms.

Drinking several liters of water over a short period of time could be enough to cause water intoxication. People taking ecstasy are at greatest risk. The drug increases thirst and increases the release of hormones that control water levels, so more water is taken in but cannot be excreted. Also,

elderly people are at higher risk because their kidney function may be impaired.

There is a treatment for drinking too much water. It includes giving patients medicine to help decrease the amount of water in the body.

## **Hot**

The real problem is diagnosis. Patients can be very confused and are often mistakenly thought to have taken drugs.

Ursula Arens, of the British Dietetic Association, says water is essential for a variety of bodily functions, for example to excrete waste products such as urea.

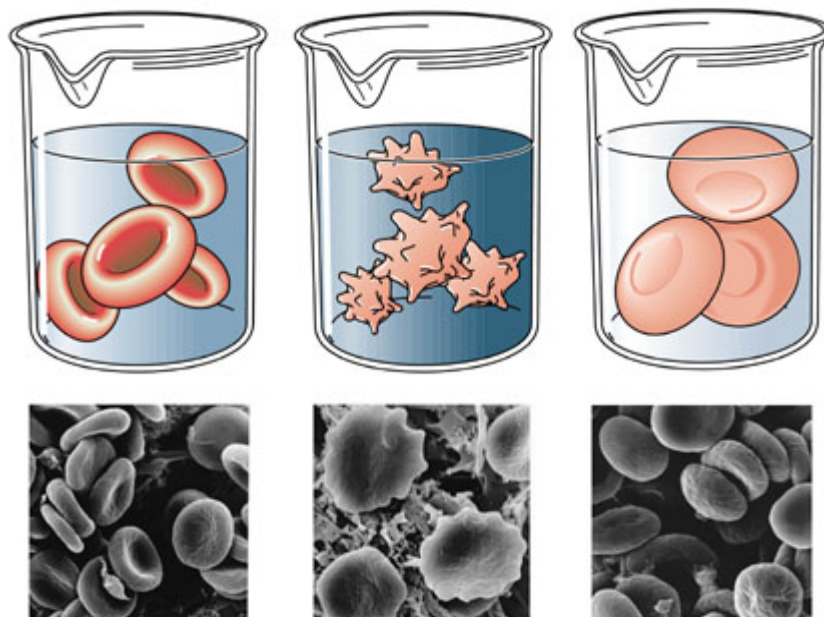
In normal circumstances we should aim to drink about one and a half liters of water every day. More water should be consumed during hot weather or exercise. More Signs that too little water has been taken in include bad breath, tiredness and a higher risk of bladder infections.

Drinking too much water is unusual. If you go to the bathroom very often or if urine is clear, this may be a sign of over consumption of water.

The diagram below shows red blood cells in different solutions.

Which of the diagrams represents what happens in cells of the brain during water intoxication?

Tobin/Dusheck, Asking About Life, 2/e  
Figure 4.20



A.

Concentration of salt in cells is the same as that in the solution around the cells

B.

Concentration of salt in solution around the cells is greater than that in the cells

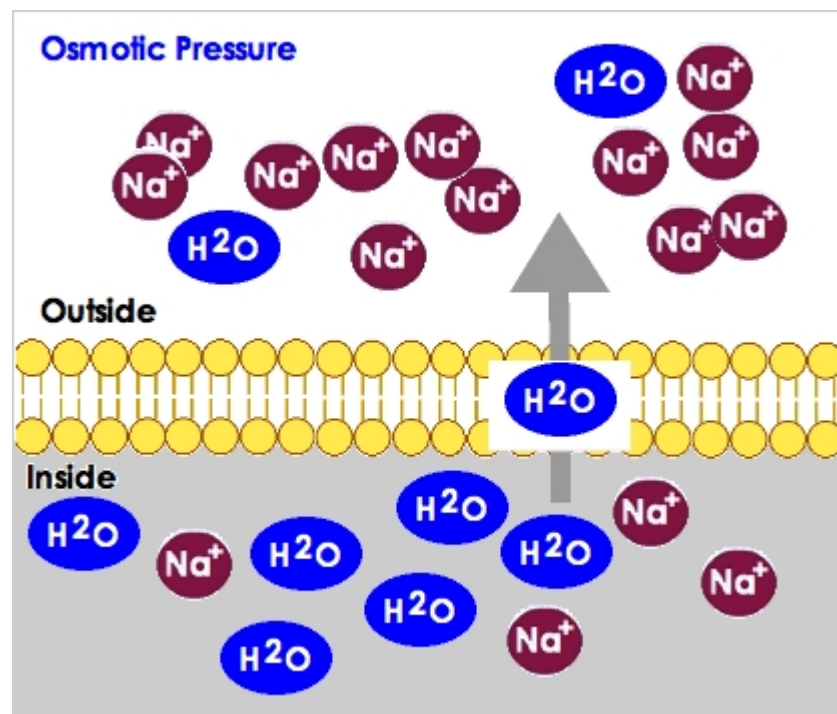
C.

Concentration of salt in cells is greater than that in the solution around the cells

Answer: \_\_\_\_\_

2. What happens when someone eats a lot of salt?

3. What happens in the cells of a person who has eaten a lot of salt? Use the diagram below to give you a hint.



# Conclusions

- [Watch The Final News Report](#)
  - A classmate is in trouble with drugs and has told you that he/she is planning to try to avoid a positive drug test by drinking an excessive amount of water.
    - Write this classmate a letter about what you have learned about water intoxication and explain to this person why they should not follow through with their plan
- (OR)
- Create a Movie to express the physiological dangers behind drinking an excessive amount of water in a short period of time.



## Final Project for "Hold Your Wee for a Wii"

**DIRECTIONS:** Write a letter to a friend who is in trouble with drugs and has told you that they are going to try to avoid a positive drug test by drinking an excessive amount of water. Include the scientific evidence you have discovered during this PBL:

- ▶ What is water intoxication?
- ▶ What happens in the body when you drink too much water?
- ▶ What happens to the concentration of salt in your body cells?
- ▶ How does the change in salt concentration effect your cells?
- ▶ What are the possible end results of drinking high levels of water in a short period of time?
- ▶ Have there been other cases of water intoxication?

This image shows a single sheet of white paper with rounded corners. The paper is ruled with thin, horizontal grey lines spaced evenly apart. There are no margins or other markings on the page.