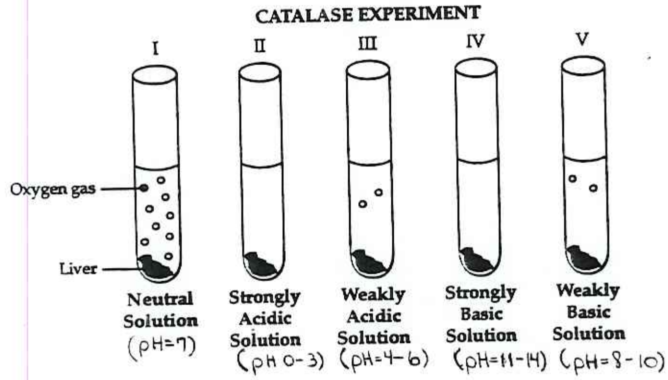
Student Name: ______________________________ Due Date: __________

HW # 6 Packet

Scientific Method Mini Experiment

Catalase is an enzyme found in tissues of plants and animals, including humans. Catalase helps prevent a toxic buildup of hydrogen peroxide in cells by breaking it down into water and oxygen gas. Several students conduct an experiment to test the effects of pH on the activity of catalase. Each test tube contains a solution of hydrogen peroxide and water at various pH levels. The liver tissue is a source of catalase. The diagram below represents the results of their experiment.



1.) Define *catalase*?

2.) What **pH** range does catalase work **best** according to the students? results?

3.) Define **independent variable**. Name the **independent variable** in this mini experiment.

4.) Define **dependent variable**. Name the **dependent variable** in this mini experiment.

5.) What variables stayed **consistent** among **all 5** test tubes?

6.) Name a **source** a catalase.

Name Date Class

Chapter 8

Cellular Transport and the Cell Cycle

Reinforcement and Study Guide

Section 8.1 Cellular Transport

In your textbook, read about osmosis: diffusion of water.

Complete the table by checking the correct column for each statement.

Statement	Isotonic Solution	Hypotonic Solution	Hypertonic Solution
1. Causes a cell to swell			
2. Doesn't change the shape of a cell			
3. Causes osmosis			
4. Causes a cell to shrink			

In your textbook, read about passive transport and active transport.

For each item in Column A, write the letter of the matching item in Column B.

Column A

_______ **5.** Transport protein that provides a tubelike opening in the plasma membrane through which particles can diffuse

_______ **6.** Is used during active transport but not passive transport

_______ **7.** Process by which a cell takes in material by forming a vacuole around it

_______ **8.** Particle movement from an area of higher concentration to an area of lower concentration

_______ **9.** Process by which a cell expels wastes from a vacuole

_______ **10.** A form of passive transport that uses transport proteins

_______ **11.** Particle movement from an area of lower concentration to an area of higher concentration

_______ **12.** Transport protein that changes shape when a particle binds with it

Column B

a. energy

b. facilitated diffusion

c. endocytosis

d. passive transport

e. active transport

f. exocytosis

g. carrier protein

h. channel protein

HSA Practice Questions

1.) Which of the following is a **by-product** of **photosynthesis**?

a.) ATP
b.) glucose
c.) water
d.) carbon dioxide

2.) **Chlorophyll** is the primary pigment in plant chloroplasts. It absorbs all wavelengths of light, **EXCEPT**-

a.) green
b.) red
c.) yellow
d.) all of the above

3.) By what process do **cells transport** wastes from within the cell to the external environment?

a.) facilitated diffusion
b.) passive transport
c.) endocytosis
d.) exocytosis

4.) **Proteins** are assembled by which **organelles**?

a.) ribosomes
b.) nuclei
c.) lysosomes
d.) mitochondria

5.) Which of the following organelles is involved in the **digestion** of other worn-out organelles?

a.) lysosomes
b.) endosome
c.) golgi apparatus
d.) rough ER

6.) Which of the following processes is **<u>an</u>aerobic**?

a.) glycolysis
b.) citric acid cycle
c.) electron transport chain
d.) all the above

FLIP-OVER →

7.) You are conducting osmosis experiments with a test tube of human cells in solution. **You add a teaspoon of table salt to the test tube.** According to the principles of osmosis, what can you predict will happen to the cells.

a.) they will swell and burst
b.) they will not be affected
c.) they will shrink and shrivel
d.) they will undergo rapid mitosis

8.) The solution in **question #7** is

a.) hypertonic
b.) isotonic
c.) hypotonic
d.) passive

9.) Where is the **electron transport chain** located in the **light-dependent** reactions?

a.) nucleus
b.) mitochondria
c.) thylakoid membrane
d.) cytoplasm

10.) Where do the **light-independent** reactions of photosynthesis take place?

a.) stroma
b.) thylakoid membrane
c.) mitochondria
d.) cell wall

11.) Which of the following is a **reactant** in **photolysis**?

a.) electron
b.) oxygen
c.) proton
d.) water

12.) Which of the following cells contains a **nucleus**?

a.) bacterial cell
b.) plant cell
c.) prokaryote
d.) virus

Discover Magazine July 2012-Earth's Last Unexplored Wilderness: Your Very Own Home

by Bruce Barcott Discover Magazine July 2012

Biologists are starting to explore the woolly ecosystems in our homes and hospitals, and figuring out how they can make us sick or keep us healthy. What's in the bathroom? *Serratia marcenscens*, a microbe that thrives in a damp conditions, is responsible for 1.4% of hospital acquired bacterial infections every year. Its habitats include toilets and showers.

Inside the University of Oregon campus, dozens of students bustle past on their way to class. Others chat with friends, send text messages, and order coffee from a small café. Meanwhile, in the air flowing around us and into our eyes, noses, mouths, and lungs, millions of microbes fight for survival. "Air isn't empty," Jessica Green continues. Not even close: A cubic meter of indoor air contains up to 10 million cells of bacteria. "Each one of us is shedding microbes from our bodies and resuspending microbes that have settled on the floor, on desks, on trash cans. They're swirling all around us. We're constantly walking through a microbial soup."

Created just two years ago, the Biology and the Built Environment (BioBE) Center has quickly become a global hub for research into the biology of the great indoors. At the center, microbiologists collaborate with architects and evolutionary ecologists on research that may ultimately influence how buildings are designed and constructed in the coming decades. They believe creating a healthy indoor microbial environment is not merely a matter of wiping desks and mopping floors. Green says it has to start at the beginning, with the earliest conception in the architect's mind.

Their research is already yielding surprising results. Pace's studies of residential showers have raised serious concerns that showerheads may act as delivery vehicles for bacteria that cause pulmonary disease. Dunn's microbial transects of the American house are turning up shocking similarities between the ecosystem of your pillow and that of your toilet. And you don't even want to know what is turning up in detailed analyses of public bathrooms. It's enough to make anyone into a hypochondriac. But to Green and her colleagues, all of these studies are just fodder for a larger discussion about the ecosystem of the indoors.

For more than a century, humans have attempted to wipe out microbes with disinfectants, antibacterial solutions, and antibiotic drugs. Based on the latest discoveries, Green and her colleagues are questioning that strategy. Maybe the path to indoor health is not a 'Kill 'em all' approach but one of encouraging a diverse ecosystem in which benign and beneficial microbes crowd out the pathogens. "Indoor homogeneity is something we as a culture have become accustomed to," Green tells me. "We've come to expect every room to be the same temperature, the same humidity, have the same flow of air. But rarely in the outdoor environment has homogeneity been good for an ecosystem. "The natural world functions best with a rich diversity of species, both at human scale and in the microbial universe. Yet we spend huge amounts of money, time, and effort trying to wipe out the diversity of microbial species indoors.

Microbial dynamics are especially critical in hospitals, where bacteria like Staphylococcus aureus can weaken and kill patients who have compromised immune systems. "Hospital-acquired infections kill 2,000 people every week in this country," Green says. "That's nearly three times the number of people who die in highway car accidents per week." Paradoxically, finding ways to encourage more microbial ecosystems in hospitals might help bring the number of infections down and is one of the BioBE team's primary challenges. In hospitals, at work, at home, we are constantly surrounded by invisible life. "It's there whether we like it or not," says Rob Dunn. "The only choice is which invisible life we will be surrounded by."

For nearly 100 years, the only microbes that biologists could study in detail were those that could be cultured—grown in a petri dish. Unfortunately, as few as 1 percent of all microbes respond to culturing. The rest were essentially invisible to science. That situation changed only with the development of high-throughput DNA analysis. Armed with the new technology, Norman Pace began a series of indoor microbial explorations. He had long been fascinated by waterborne microbes, so he set his sights on the organisms that make their homes in the shower. Between 2006 and 2008 his team took apart 45 showerheads from homes, apartments, and public buildings in Denver and other cities in Colorado. They swabbed shower curtains and the showerheads, then analyzed the DNA. The results blew his mind: "Once I recognized what was going on, I said, what kinds of organisms am I inhaling?"

Pace found both the curtains and the showerheads teeming with bacterial life. "That soap scum on the shower curtain isn't soap scum," he says. "It's a microbial biofilm. And it's also living in the showerhead." Most of the life in those biofilms was benign, made up of the kinds of microbes commonly associated with soil or water. But a distressing number of showerheads contained significant loads of *Mycobacterium avium*, a bacterium that can cause nontuberculous mycobacteria disease, or NTM, a pulmonary infection that can feel like an unshakable flu. "That steam you're breathing in the shower isn't just steam," Pace says. "It's full of aerosolized bacteria, and you're sucking it deep into your airways."

Inspired by Pace's findings, the Sloan Foundation's Paula Olsiewski put out a call for proposals for a full-scale indoor environments project. She was ready to put the foundation's financial muscle behind the nascent field. But she did not want the funding limited to microbiologists; Olsiewski wanted architects in on the research too. "If biologists are just sampling the buildings, they're missing the point," she says. "We want to know what's in a building, but we also want to know what those microbes do, how they evolve and react to changes in the built environment."The Centers for Disease Control and Prevention (CDC) reports that 1.7 million patients pick up harmful microbes—most commonly staph infections, named for the *Staphylococcus aureus* bacterium—in American hospitals every year. And while millions of dollars go into hospital associated pathogen research every year, until now no one had studied the hospital as an ecosystem, looking at the biodiversity of the total microbial population instead of just pathogens in isolation.

Science Journal Article Questions
Discover Magazine July 2012-Earth's Last Unexplored Wilderness: Your Very Own Home
by Bruce Barcott Discover Magazine July 2012

1.) Define ***Serratia marcenscens.*** Name some locations.

2.) Define the phrase "**microbial soup**".

3.) What does the acronym **BioBe** represents and their **main purpose** for their foundation?

4.) Name some of the **surprising** results discovered by the BioBe Center.

5.) Define ***Mycobacterium avium.***

6.) According to the **Centers for Disease Control (CDC)**, what **percentage** of American hospital patients are exposed to harmful microbes each year?

7.) On a scale from 1 to 10 (10 being the "**most clean**") how do you **rate** your showerheads and toilets in your household regarding "**microbial bioflim**"?