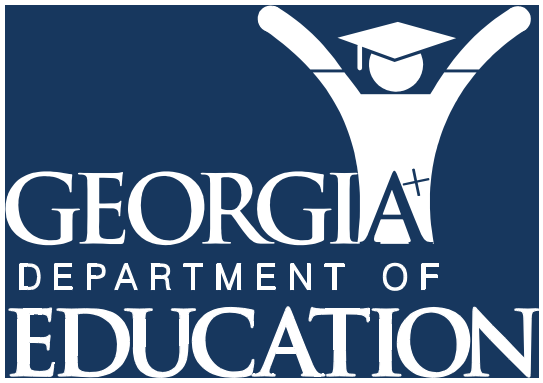


Exam Preparation for Science and Social Studies Program

ExPreSS

June 14 through June 25
2010

STUDENT

Week One

Georgia High School Graduation Test
Science Content

Cells and Heredity

- Evaluates the nature of the relationships between structures and function in living cells by explaining the roles of cell organelles and by analyzing the function of the four major macromolecules.
- Evaluates how biological traits are passed on to successive generations by comparing and contrasting the roles of DNA and RNA.
- Analyze the role of DNA in storing and transmitting cellular information.
- Explains Mendel's laws and the role of meiosis in reproductive variability.
- Investigates the use of DNA technology in forensics, medicine, and agriculture.
- Derives the relationship between single-celled and multi-celled organisms by analyzing the complexity and organization of organisms in their ability for obtaining, transforming, transporting, releasing, and eliminating the matter and energy used to sustain the organisms.

Ecology

- Describes the interdependence of all organisms on one another and evaluates the relationships among organisms, populations, communities, ecosystems, and biomes.
- Analyzes the flow of matter and energy through ecosystems as components of a food chain or food web.

Structure and Properties of Matter

- Analyzes the structure of the atom in terms of proton, electron, and neutron locations as well as atomic mass, atomic number, atoms with different numbers of neutrons and different numbers of protons.
- Explains properties of solutions.

Energy Transformations

- Distinguishes the characteristics and components of radioactivity and explains the process of half-life as related to radioactive decay.
- Analyzes the atomic/molecular motion of solids, liquids, gases and plasmas.
- Identifies and explains energy transformation within a system.
- Investigates and describes molecular motion as it relates to thermal energy changes in conduction, convection, and radiation.

Forces, Waves, and Electricity

- Analyzes relationships between force, mass, and motion by applying the calculations of velocity and acceleration.
- Evaluates the application of Newton's three laws in everyday situations related to inertia explaining falling objects as related to gravitational force.
- Applies mass and weight to appropriate situations.
- Applies the calculations of work and mechanical advantage to complex systems.
- Analyzes the properties of waves by explaining the transfer of light, heat, and sound energy through the application of wave theory.
- Explains the properties of electricity and magnetism by applying and relating these to electromagnets and simple motors.

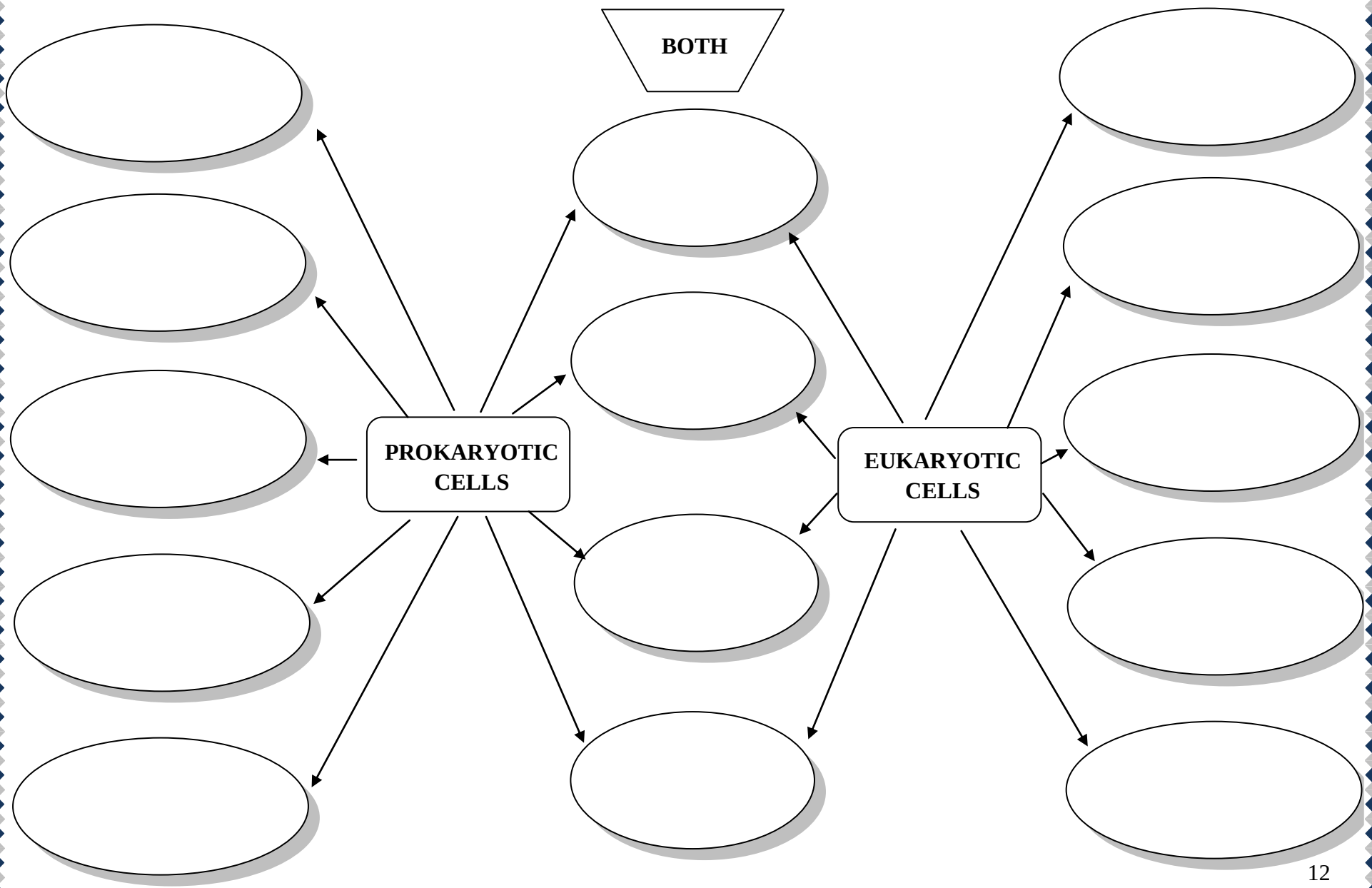
Instructional Calendar at a Glance

Day	Content
Monday June 14	**Domain: Cells and Heredity** • Students describe the structures of cells and the structure and function of their components. • Students examine the similarities and differences between prokaryotic and eukaryotic cells.
	Domain: Structure and Properties of Matter • Students describe atoms, understanding the structure of an atom. • Students identify the symbol, atomic number, and atomic mass of the first 20 elements on the periodic table.
Tuesday June 15	**Domain: Cells and Heredity** • Students explain the process of inheritance of genetic traits. • Students differentiate between DNA and RNA, recognizing the role of each in heredity.
	Domain: Structure and Properties of Matter • Students apply the properties of solutions, analyzing solutions in terms of solutes and solvents.
Wednesday June 16	**Domain: Cells and Heredity** • Students analyze the similarities and differences between organisms of different kingdoms.
	Domain: Energy Transformations • Students understand radioactivity. • Students examine the phases of matter and the related atomic and molecular motion.
Thursday June17	**Domain: Cells and Heredity** • Students explain the process of inheritance of genetic traits. ❖ Students demonstrate understanding of Mendel's Laws in genetic inheritance and variability. • Students discuss the use of DNA technology in the fields of medicine and agriculture.
	Domain: Energy Transformations • Students investigate and describe molecular motion as it relates to thermal energy changes in conduction, convection, and radiation. • Students analyze energy transformations and the flow of energy in systems.
Friday June 18	**Domain: Cells and Heredity** • Students differentiate how organisms from different kingdoms obtain, transform, and transport, energy and/or material. • Students understand the relationships between single-celled and multi-celled organisms, on a broad, conceptual level.
	Progress Assessment

Day	Content
Monday June 21	**Domain: Ecology** • Students evaluate relationships between organisms, populations, communities, ecosystems, and biomes.
	Domain: Forces, Waves, and Electricity ▪ Analyzes relationships between force, mass, and motion by applying the calculations of velocity and acceleration.
Tuesday June 22	**Domain: Ecology** • Students describe the flow of matter and energy through an ecosystem by organizing the components of food chains and webs.
	Domain: Forces, Waves, and Electricity ▪ Students evaluate the application of Newton's three laws in everyday situations related to inertia explaining falling objects as related to gravitational force. ❖ Applies the calculations of work and mechanical advantage to complex systems.
Wednesday June 23	**Domain: Cells and Heredity** • Students differentiate the functions of the macromolecules. • Students describe the structures of cells and the structure and function of their components.
	Domain: Forces, Waves, and Electricity • Students describe the properties of waves.
Thursday June 24	**Domain: Ecology** • Students use diagrams to interpret the interactions of organisms within food chains and webs. • Students determining the role of different organisms in food chains and webs.
	Domain: Forces, Waves, and Electricity • Students understand the properties of electricity and magnetism.
Friday June 25	**Biology Key Concepts – Review**
	Physical Science Key Concepts –Review
	Administration of the Georgia High School Graduation Test

Monday's, June 14
Materials Section

Double Bubble Double Sided Map of
Eukaryotic and Prokaryotic Cells Comparisons



Cell Organelles

Name: _____

Organelle	Prokaryotic or Eukaryotic or Both	Plant or Animal or Both	Location in cell [nucleus or cytoplasm]	Describe the function
Nucleus				
Cell Membrane				
Cytoplasm				
Ribosomes				
Endoplasmic Reticulum				
Golgi Apparatus				
Lysosomes				
Mitochondria				
Chloroplasts				
Cell Wall				
Plasmid				
Chromosome				

Names:			

Structure of the Atom	
What I know I know	
What I think I know	
What I think I will learn	
What I have learned	

Tuesday's, June 15
Materials Section

Anticipation Guide: Facts on DNA and RNA

Instructions:
In the column labeled me, place a check next to any statement with which you agree. After the classroom discussion, compare your opinions with those presented during the lesson.

Me	After the lesson	Statements
		1. DNA is the hereditary material in humans and almost all other organisms.
		2. Nearly every cell in a person's body has the same DNA.
		3. Most DNA is located in the cell nucleus (where it is called nuclear DNA), but a small amount of DNA can also be found in the mitochondria (where is called mitochondrial DNA)
		4. DNA bases pair up with each other, Adenine with Thymine and Cytosine with Guanine, to form units called base pairs. Each base is also attached to a sugar molecule and a phosphate molecule.
		5. Each strand of DNA in the double helix can serve as a pattern for duplicating the sequence of bases.
		6. RNA serves as a temporary copy of genes that is use as a template for protein synthesis.
		7. RNA molecules are built from three basic components: ribose, phosphate, and a family of four bases guanine, adenine, cytosine, and uracil.
		8. The RNA molecule is single stranded, and folded in various shapes.
		9. RNA and DNA are both nucleic acids
		10. RNA can carry genetic information.

Video Viewing Summary

Name: _____ Date: _____

Instructions:

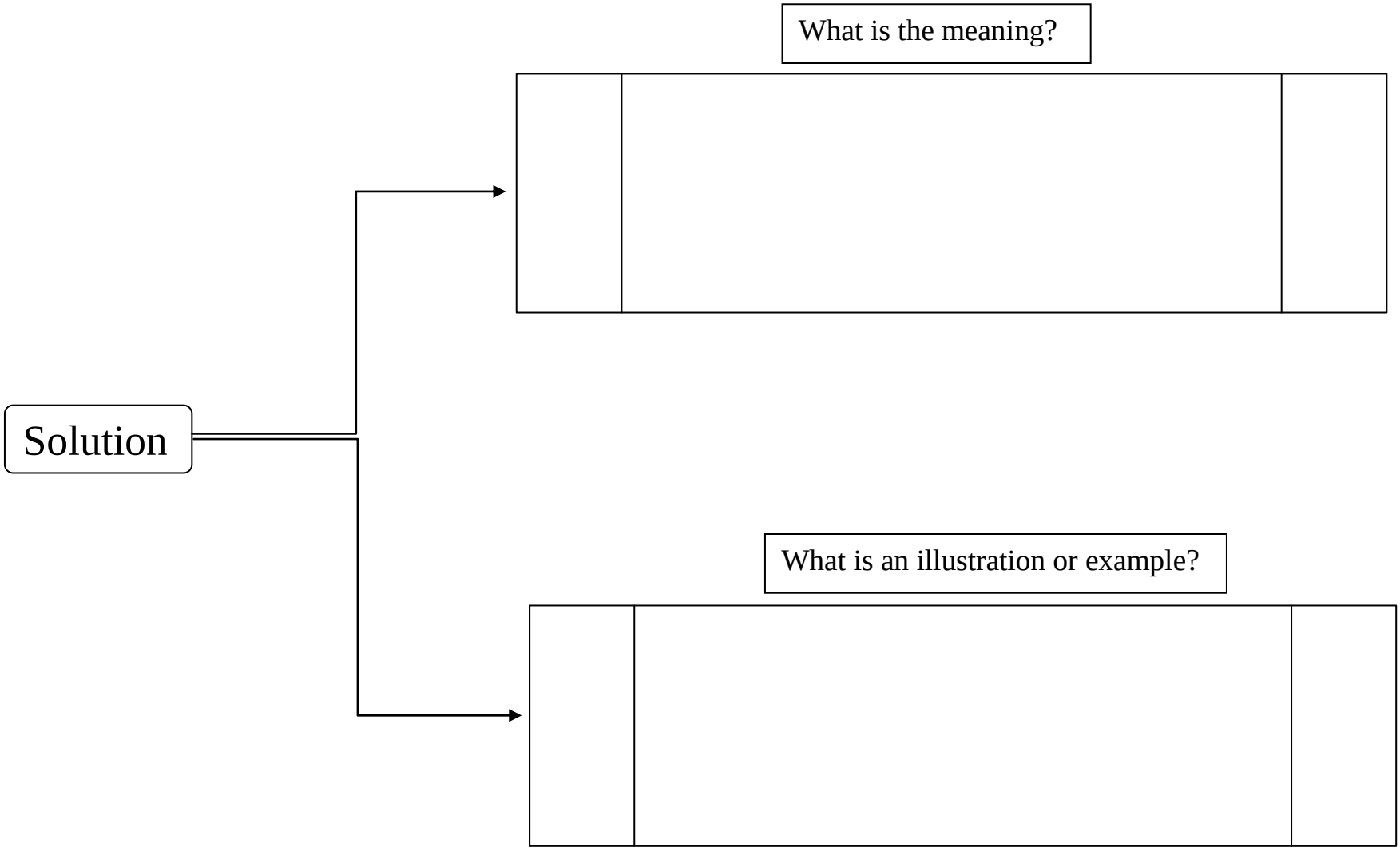
Write your answer to the following questions based on the Transcription of DNA to Messenger RNA video that you just watched.

What is the structure of DNA?	
How is RNA different from DNA?	
How do the nitrogen bases pair?	
What is a nucleotide?	
What is transcription?	
How does transcription happen?	
What is a codon?	

Solution Concept Map

Instruction:

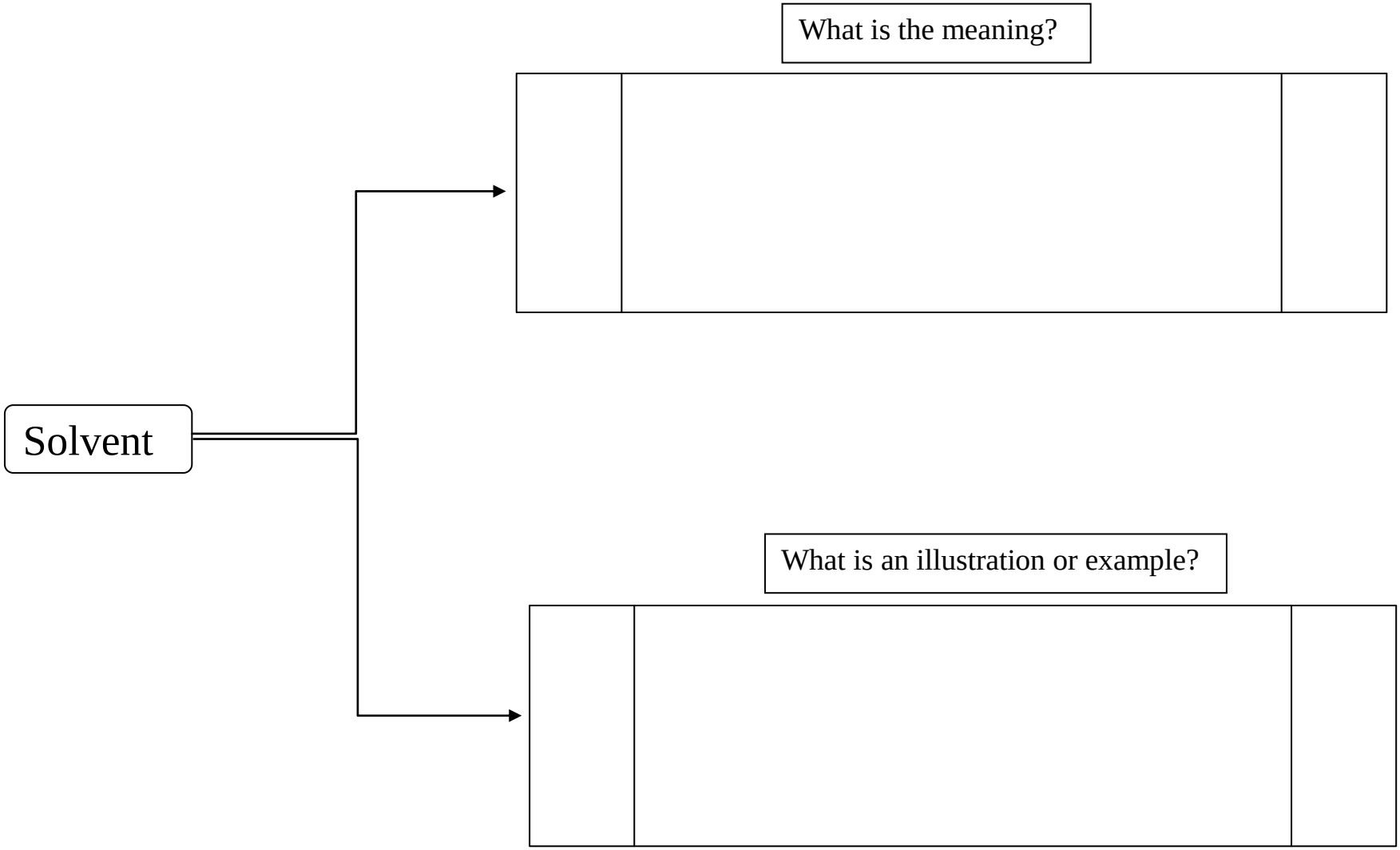
In the boxes to the right provide an explanation and give an illustration/example of the concept on the left.



Solvent Concept Map

Instruction:

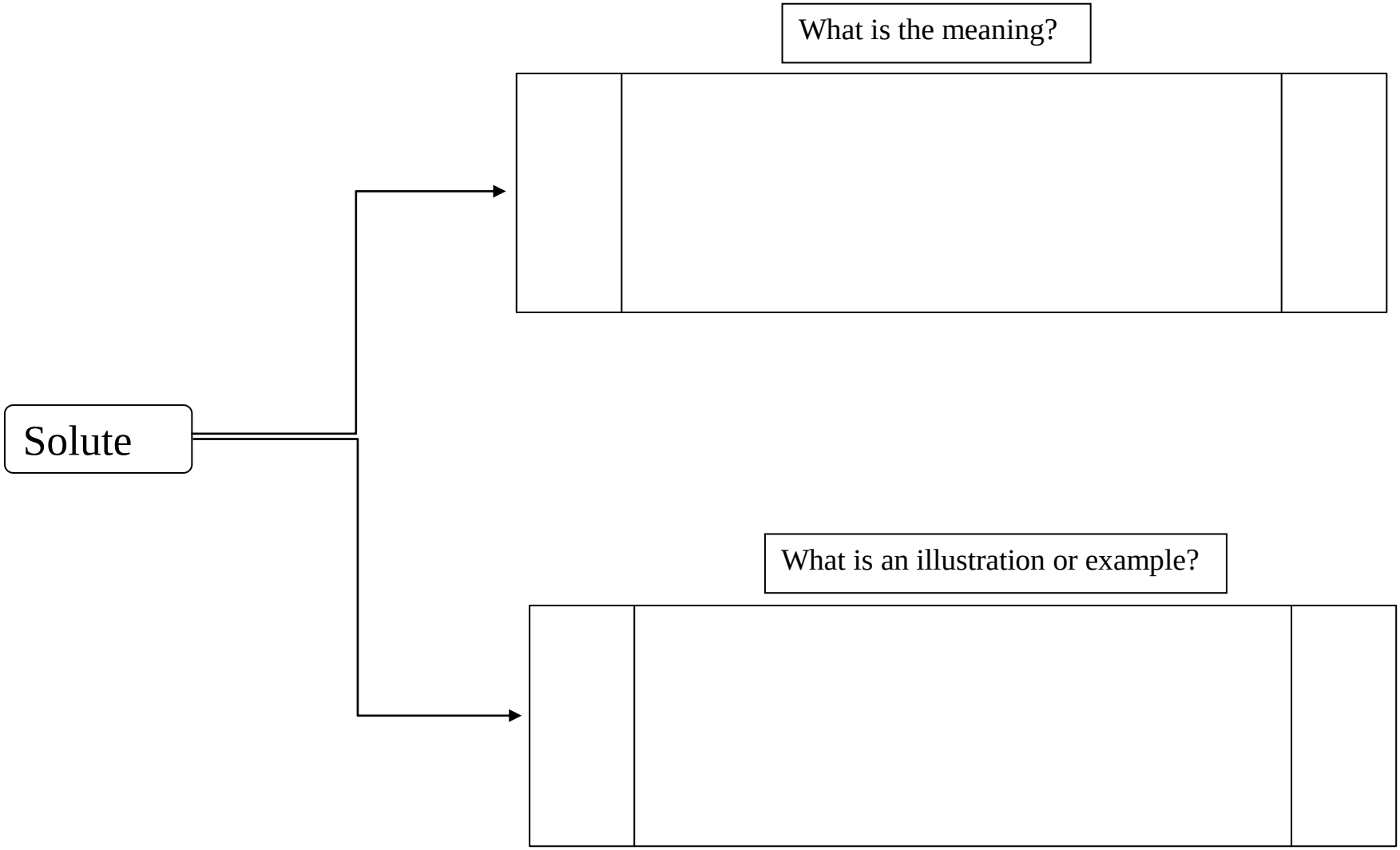
In the boxes to the right provide an explanation and give an illustration/example of the concept on the left.



Solute Concept Map

Instruction:

In the boxes to the right provide an explanation and give an illustration/example of the concept on the left.



Rate of Solution Inquiry Lab

Standards

SPS6. Investigate the properties of solutions

a. Describe solution in terms of
   - solute/solvent
   - conductivity
   - concentration

b. Observe factors affecting the rate a solute dissolves in a specific solvent

SCSh1. Students will evaluate the importance of curiosity, honesty, openness, and skepticism in science.

c. Explain that further understanding of scientific problems relies on the design and execution of new experiments which may reinforce or weaken opposing explanations.

SCSh2. Students will use standard safety practices for all classroom laboratory and field investigations.

a. Follow correct procedures for use of scientific apparatus.
b. Demonstrate appropriate techniques in all laboratory situations.
c. Follow correct protocol for identifying and reporting safety problems and violations.

SCSh3. Students will identify and investigate problems scientifically.

a. Suggest reasonable hypotheses for identified problems.
b. Develop procedures for solving scientific problems.
c. Collect, organize and record appropriate data.
e. Develop reasonable conclusions based on data collected.

SCSh4. Students will communicate scientific investigations and information clearly.

a. Write clear, coherent laboratory reports related to scientific investigations.

Background Information:

Solutions are usually homogeneous mixtures that contain a solute (substance being dissolved) and a solvent (material that dissolves another substance). Solutes and solvents can be solids, liquids, or gases. One of the most common types of solutions involves a solid dissolved in a liquid. Water is usually referred to as the *Universal Solvent* because of the number of solutes that dissolve in water. Alcohols and organic solvents are the other common liquid solvents.

There are several factors that affect how quickly a solute dissolves in a solvent. In this activity, you will choose one factor as your independent variable– temperature, amount of stirring, or particle size. Remember that the other factors must be held constant.

Materials:

• test tubes • beakers • mortar & pestle • spatula • thermometer (alcohol or stainless steel temp probe)	• stirring rod • 100-mL graduated cylinder • hot plate • balance	• NaCl (granular) • NaCl (crystalline rock salt) • crushed ice • distilled water

Safety:
Safety goggles and aprons must be worn! Your procedure must be approved by the instructor before beginning the lab.

Hypothesis:
Identify your independent and dependent variables. Construct a hypothesis that predicts how your independent variable will influence the rate of solution. (Will the solute dissolve faster or slower?)

Variable:
My group will manipulate _____ (temperature, amount of stirring, particle size)

Procedure:
Design a step-by-step procedure to test your independent variable. Before you start, ask your teacher to approve your procedure by initialing your notebook.

Data and Calculations:
Prepare a data table of your results.

Analysis:

1. Describe your experiment in terms of solute*/solvent/solution*. Explain.
2. Characterize solutions as *unsaturated, saturated* or *supersaturated.* Explain.
3. Summarize your results (What does your data show?). Make a statement that describes how your independent variable influences the rate of solution. State whether or not your hypothesis was correct.
4. Put your group findings on the chart. Complete the information below from the class results.

Factors that Affect Rate of Solution

Variable	**Results**
Particle size	
Temperature	
Stirring	

5. Identify in each experiment the *solute/solvent/solution*.
6. Characterize solutions in each experiment as *unsaturated, saturated* or *supersaturated.*
7. Describe how each tested independent variable influences the rate of solution.

Video Viewing Summary

Name: _____ **Date:** _____

Instructions:

Write your answer to the following questions based on the Solubility videos that you just watched.

What needs to happen for a reaction to occur in a solution?	
What is solubility?	
What does it mean that a substance is completely soluble in water?	
What is one example of the use of knowing the solubility of a substance?	
Why do smaller particles dissolve faster than larger ones?	
What factors affect the solubility of a substance?	

Wednesday's, June 16
Materials Section

Six Kingdom Classification System Graphic Organizer

	Archae-bacteria	Eubacteria	Protista	Fungi	Plantae	Animalia
Common Characteristics						
Common Examples						
Cell Type (prokaryote or eukaryote)						
Complexity (unicellular or multicellular)						
Mode of Nutrition (autotrophic or heterotrophic)						
Type of Habitat						
Type of Reproduction (asexual or sexual or both)						

Kingdom Stations Lab

Station #	Organism	Kingdom	Body Type	Cell Type	Nutrition	Reproduction	Cell Structure
1							
2							
3							
4							
5							
6							

Station #1

Organism	Fungi 
Characteristics	Fungi are not plants. The living body of the fungus is a mycelium made out of a web of tiny filaments called hyphae. The mycelium is usually hidden in the soil, in wood, or another food source. These webs live unseen until they develop mushrooms, truffles, cups, etc. Must fungi build their cell walls out of chitin, this is the same material as the hard outer shells of insects. Fungi feed by absorbing nutrients from the organic material in which they live. Fungi do not have stomachs. They must digest their food before it can pass through the cell wall in the hyphae. Fungi reproduce by releasing spores from a fruiting body, which is the mushroom. The mushroom releases spores into the air, and the wind carries the spores off to start the next generation.

Station #2

Organism	Praying Mantis 
Characteristics	Praying Mantis is named for its prominent front legs, which are bent and held together at an angle that suggests the position of prayer. These insects are formidable predators. They have triangular heads poised on a long "neck" or elongated thorax. Mantis can turn their heads 180 degrees. Mantises are typically green or brown, so they are well camouflaged on the plants among which they live. The Praying Mantis uses their front legs to snare their prey that generally consists of moths, crickets, grasshoppers, flies, and other insects. Females regularly lay hundreds of eggs in a small case, and nymphs hatch looking much like tiny versions of their parents.

Station #3

Organism	Euglena 
Characteristics	Euglenas are single cell organisms that live in freshwater. Euglenas are green like plants and thus carry out photosynthesis. However, unlike plants Euglena does not have a cellulose cell wall. In addition, Euglenas possess a long whip-like structure on one side that propels them through water. Euglena is unique in that it is both heterotrophic (must consume food) and autotrophic (can make its own food). The euglena has a stiff pellicle outside the cell membrane that helps it keep its shape. In the center of the cell is the nucleus, which contains the cell's DNA and controls the cell's activities. The interior of the cell contains a jelly-like fluid substance called cytoplasm.

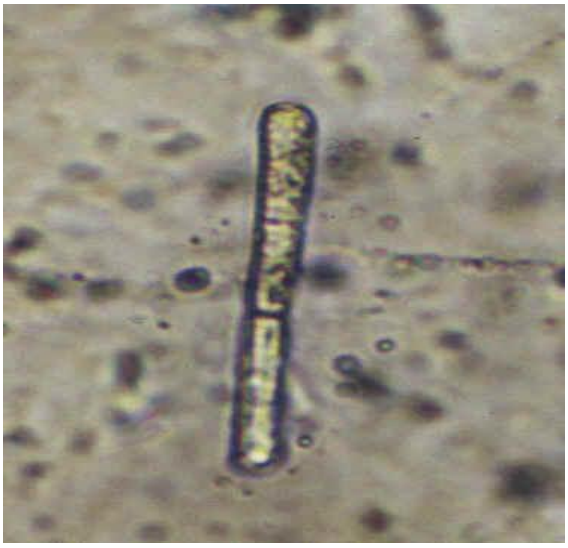
Station #4

Organism	African Elephant 
Characteristics	The African elephant is the largest living land mammal. Elephants can live in nearly any habitat that has adequate quantities of food and water. Elephants consume about 5% of their body weight and drink 20-50 gallons of water per day. The life-cycle of an elephant has been arbitrarily broken up into three main divisions; baby, adolescent, and adult. Elephants are colloquially called pachyderms which mean thick-skinned animals. The skin is covered with hair. Female elephants have one calf after a twenty-two month pregnancy.

Station #5

Organism	White Pine 
Characteristics	The White Pine has the distinction of being the tallest tree in eastern North America growing to be 50’ – 80’ feet in height. Their leafs are in the form of needles, 3 to 5 inches long, with five, slender, flexible needles per fascicle. The needles appear blue-green because of 3 or more glaucous lines of stomata. The trees reproduce sexually by seeds that are transported by wind. The cone production begins when the tree is between 5 – 10 years old. Good seeds are produced every 3 – 5 years, with some seed produced in intervening years. The bark of these trees darkens and thickens as they age. It is smooth and gray on young growth and becomes gray-brown, deeply furrowed with broad ridges of irregular rectangular purple-tinged scaly plates as the tree gets older. The White Pines are moderately fire resistant and can grow in nearly all soil types.

Station #6

Organism	Cyanobacterium 
Characteristics	The cyanobacteria are aquatic and photosynthetic organisms. They are quite small and usually unicellular, though they often grow in colonies large enough to see. Cyanobacteria are very important to plants as the chloroplast with which plants make food for themselves is actually a cyanobacterium living within the plant's cells. Like other bacteria, cyanobacteria have no nucleus or internal membrane systems. In many species, however, the external membrane has been folded to increase total surface area. The ability of cyanobacteria to perform oxygenic photosynthesis is thought to have dramatically changed the composition of life forms on Earth by provoking an explosion of biodiversity and leading to the near-extinction of oxygen-intolerant organisms. Cyanobacteria reproduce by binary fission (splitting in two).

RADIOACTIVITY ANTICIPATION GUIDE

Name:_____ Date: _____

Directions: You will be learning about radioactivity. BEFORE WE BEGIN, read statements below and decide if you think they are true or false. Put a check next to each statement in the "Before" column under either "True" or "False".
You will then perform two activities on Radioactive Decay.
After the two activities you will re-evaluate each statement and mark "True" or "False" in the "After" column. Note: You may change your initial opinion or keep it the way it is.

Before		**Statement**	**After**	
True	**False**		**True**	**False**
		Half-life is the amount of time it takes half of the atom in the isotope to decay to a new element. Half-life happens instantly.		
		Nuclear fission happens when charged atomic nuclei join together to form a heavier nucleus while nuclear fusion is the process whereby the nucleus of a particular heavy element splits into two nuclei.		
		Nuclear energy has great potential for practical applications.		
		Nuclear reactions convert matter into energy through the process of radioactive decay, fission and fusion.		
		Beta particles are high-energy electrons emitted by certain types of radioactive nuclei.		

STATION 1
Ice, Ice, Baby

Teacher note: At this station, place a beaker that is about halfway filled with ice. Set this up a few minutes ahead of time so that the ice has some time to melt, leaving some ice and some water in the beaker.

Materials:
Beaker
Thermometer- Laser or Traditional
Ice

Instructions

1. The ice in beaker #1 is changing phase. Draw a picture showing what is happening to the motion of the molecules as the ice changes phase.

2. Check the temperature of the ice/water mixture. What do you think will happen to the temperature as the ice turns to water?

3. Shoot the outside of the bottom of the beaker with the laser thermometer (or use a traditional thermometer). Record the temperature.

4. Shoot the outside of the top of the beaker at the point where the ice is just turning to water (or use a traditional thermometer). Record the temperature.

STATION 2
Colored Molecules?

Teacher note: Students will be able to observe how temperature affects the rate at which the particles disperse due to molecular motion.

Materials:
2 Beakers, 1 with water at room temperature, 1 with cold water
Food coloring
Timing device

Instructions
One of these beakers contains room temperature water and the other contains cold water.

1. Place 2 drops of food coloring in the room temperature water and time how long it takes for the water to completely turn color. Write it down.

2. Place 2 drops of food coloring in the cold water and time how long it takes for the water to completely turn color. Write it down.

3. Write an explanation of the effect temperature has on how fast particles move.

STATION 3
What Can the Matter Be?

Teacher note: This station is set up as an "observation only" station. Students will be able to observe boiling, evaporation, condensation, and precipitation.

Materials:

- Beaker of water on hotplate that is continuously boiling.
- Ring stand and ring with a small piece of glass placed on top of the ring directly over the boiling water on the hotplate (approximately 6 inches apart)

Instructions

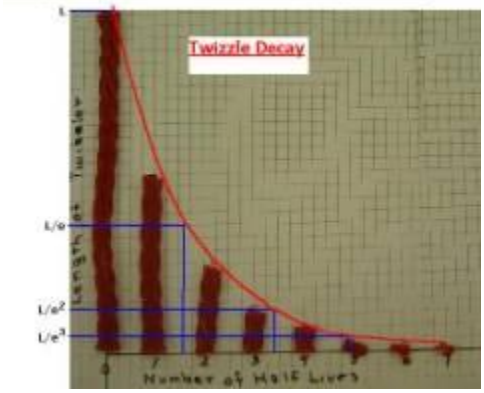
1. Draw a diagram of the experimental set-up and describe the evidence that you can see that a phase change is taking place. Identify in your diagram where you see this evidence.
2. Draw a diagram showing the motion of the molecules as they go through each phase change.

Twizzlers Lab- ½ Life

Materials:
1 Twizzlers
Graph paper
Timer
1 Pair of Scissors

Instructions:
Before beginning, draw an X and a Y axis on your graph paper. Label the Y axis "amount" and the X axis "Time".

1. Hold the "undecayed" Twizzler vertically against the Y axis with one end at the origin. Mark the length. This represents the beginning amount. See photo below.



2. Make several equally space marks on the X axis. Each mark represents 30 seconds.
3. The teacher announces "TAKE A BITE"! Each student must eat HALF the length of the Twizzler or cut it in half.
4. Record the new Twizzler length on your graph at the 30 seconds mark.
5. After 30 seconds repeat step 3 until the Twizzler can no longer be halved, taking a bite every 30 seconds.
6. Finish graphing your results.

Analysis/Conclusions

1. Did the Twizzler ever completely disappear? Explain.
2. What is the half life time of your radioactive Twizzler? Explain.
3. If you had started with a Twizzler twice as long, how would that affect the shape of the resulting graph? Explain.
4. How would your graph look if each ½ life took 60 seconds?

Half Life Matrix: Example Problem

How many grams of iodine 131 (half life- 5 days) would be left after 20 days if you start with 25 grams? Answer: 1.56 g

The half life is			**5 days**
Number of half-lives passed	**Amount of Matter**		**Time**
0	**Started with**	**25 g**	**0 { days }**
1	How Much is left	12.5g	5 days
2	How Much is left	6.25 g	10 days
3	How Much is left	3.12 g	15 days
4	How Much is left	1.56 g	20 days
5	How Much is left		

Half Life Calculations Cards

Card #1

Problem
How long will it take 600 grams of Plutonium 239 (half life 24,000 years) to decay to 18.75 grams?

A. 120,000 yrs.
B. 24,000 yrs.
C. 3 half-lifes
D. 600 yrs

Calculation Template

The half life is			**days**
Number of half-lives passed	**Amount of Matter**		**Time**
0	**Started with**		**0 {_____}**
1	How Much is left		
2	How Much is left		
3	How Much is left		
4	How Much is left		
5	How Much is left		

Card #2

Problem
K-42 has a half-life of 15.5 hrs. If 13.125g of K-42 remains undecayed after 62.0 hours, what was the original sample size?

A. 26.25g
B. 39.36g
C. 52.5g
D. 13.125g

Calculation Template

The half life is			**days**
Number of half-lives passed	**Amount of Matter**		**Time**
0	**Started with**		**0 {_____}**
1	How Much is left		
2	How Much is left		
3	How Much is left		
4	How Much is left		
5	How Much is left		

Card #3

Problem

An isotope of cesium (cesium-137 has a half -life of 30 years. If 20 mg of cesium-137 disintegrates over a period of 90 years, how many mg of cesium-137 would remain?

A. 5 mg
B. 10 mg
C. 20 mg
D. 2.5 mg

Calculation Template

The half life is			**days**
Number of half-lives passed	**Amount of Matter**		**Time**
0	**Started with**		**0 {_____}**
1	How Much is left		
2	How Much is left		
3	How Much is left		
4	How Much is left		
5	How Much is left		

Card #4

Problem
Thallium-208 has a half-life of 3 min. How long will it take for 120.0 g to decay to 7.50 g?

A. 6 min.
B. 9 min.
C. 3 min.
D. 1.5 min.

Calculation Template

The half life is			**days**
Number of half-lives passed	**Amount of Matter**		**Time**
0	**Started with**		**0 {_____}**
1	How Much is left		
2	How Much is left		
3	How Much is left		
4	How Much is left		
5	How Much is left		

Card #5

Problem
If 60 g of Lithium-9 has a half-life of 100 years, how long will it take for lithium-9 to decay to 15 g?

A. 400 yrs.
B. 300 yrs.
C. 200 yrs.
D. 100 yrs.

Calculation Template

The half life is			**days**
Number of half-lives passed	**Amount of Matter**		**Time**
0	**Started with**		**0 {_____}**
1	How Much is left		
2	How Much is left		
3	How Much is left		
4	How Much is left		
5	How Much is left		

Thursday's, June 17
Materials Section

Video Viewing Summary

Name: _____ **Date:** _____

Instructions:

Write your answer to the following questions based on Gregor Mendel's Rules of Heredity: Using the Punnett Squares video that you just watched.

What are traits?	
What determines which traits will be passed down?	Rule 1:
	Rule 2:
Why are Punnett Squares used in heredity?	
What does it mean to have an organism that is purebred?	
What is a dominant trait?	
What is a recessive trait?	
When is offspring called hybrid?	

GENETICS BASICS

Practice Problems

PROBLEM 1

In dogs, wire hair (A) is dominant to smooth (a). In a cross of a homozygous wire-haired dog with a smooth-haired dog, what will be the phenotype of the F_1 generation?

What would be the genotype?

GENETICS BASICS

Practice Problems

PROBLEM 2

Woodrats are medium sized rodents with lots of interesting behaviors. You may know of them as packrats. Let's assume that the trait of bringing home shiny objects (A) is controlled by a single locus gene and is dominant to the trait of carrying home only dull objects (a). Suppose two heterozygous individuals are crossed.

a. How many of each genotype would be expected if only 4 offspring were produced?

AA____ Aa_____ aa_____

b. How many of each phenotype brings home shiny objects?

AA____ Aa_____ aa_____

c. How many of each phenotype brings home dull objects?

AA____ Aa_____ aa_____

GENETICS BASICS

Practice Problems

PROBLEM 3

The common grackle is a species of robin-sized blackbirds that are fairly common over most of the United States. Suppose that long tails (A) were dominant to short tails in these birds. A female short-tailed grackle mates with a male long-tailed grackle who had one parent with a long tail and one parent with a short tail.

a. What is the male's genotype?

b. How many of each genotype will be found in the F_1 generation (assume 4 offspring)?

AA_____ Aa_____ aa_____

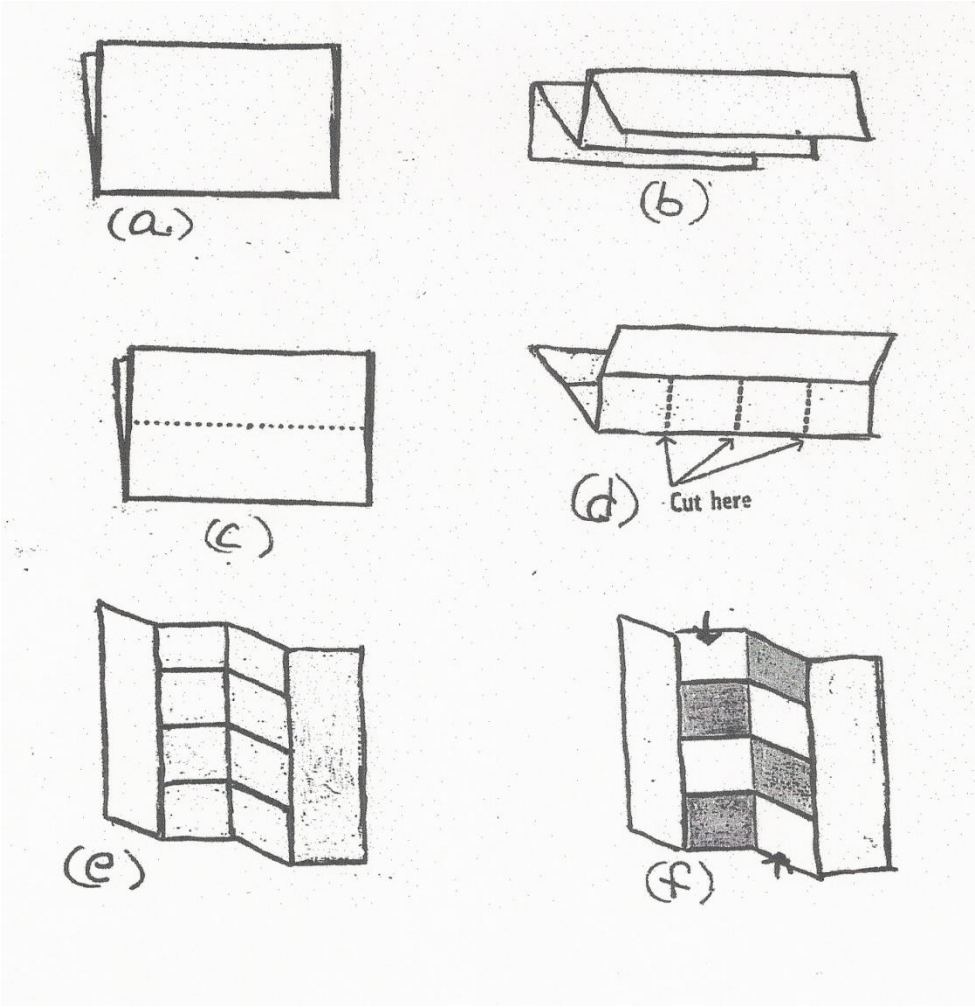
c. How many of each phenotype will be found in the F_1 generation?

Long Tail_____ Short Tail_____

Hidden Page Foldable

Instructions:

a. Fold a piece of paper in half "hamburger style" (see picture a).
b. Fold the two sides back towards the center (see picture b). You should now have a "W".
c. Return the side folds to their original positions (see picture c).
d. Holding your paper on the fold, cut a line in the middle of the paper from the fold to the creased mark made in step b.
e. Make two additional cuts halfway between the middle cut and the outside edges (see picture d).
f. Open the sheet of paper (see picture e).
g. Cut two strips of paper such that each one fits through the slots made by the cuts made on step e.
h. Weave a strip of paper that has been previously cut to fit through ½ of the slotted area. Weave the second strip of paper in the opposing remaining slots (see picture f).



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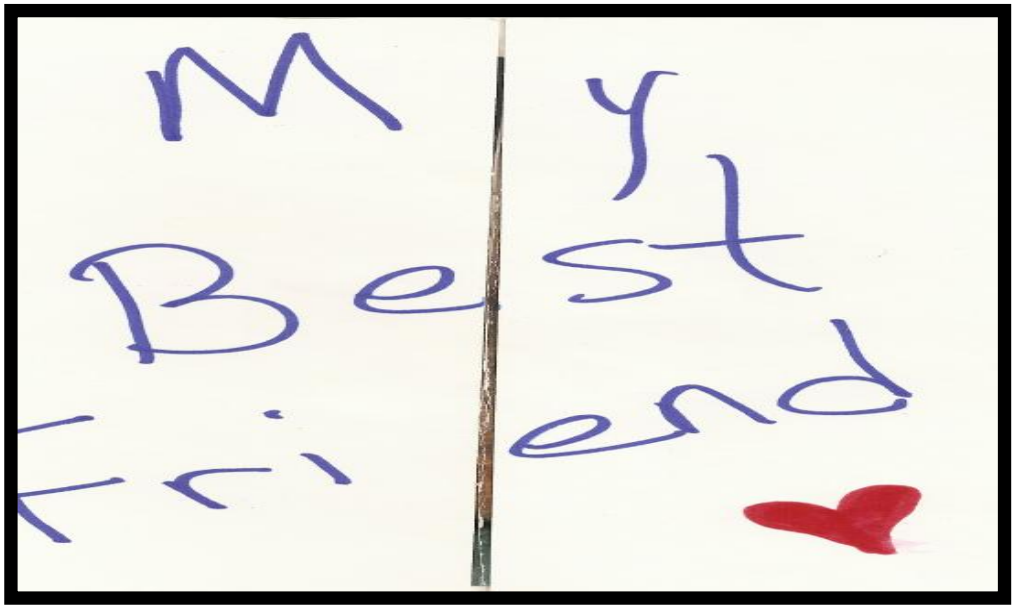
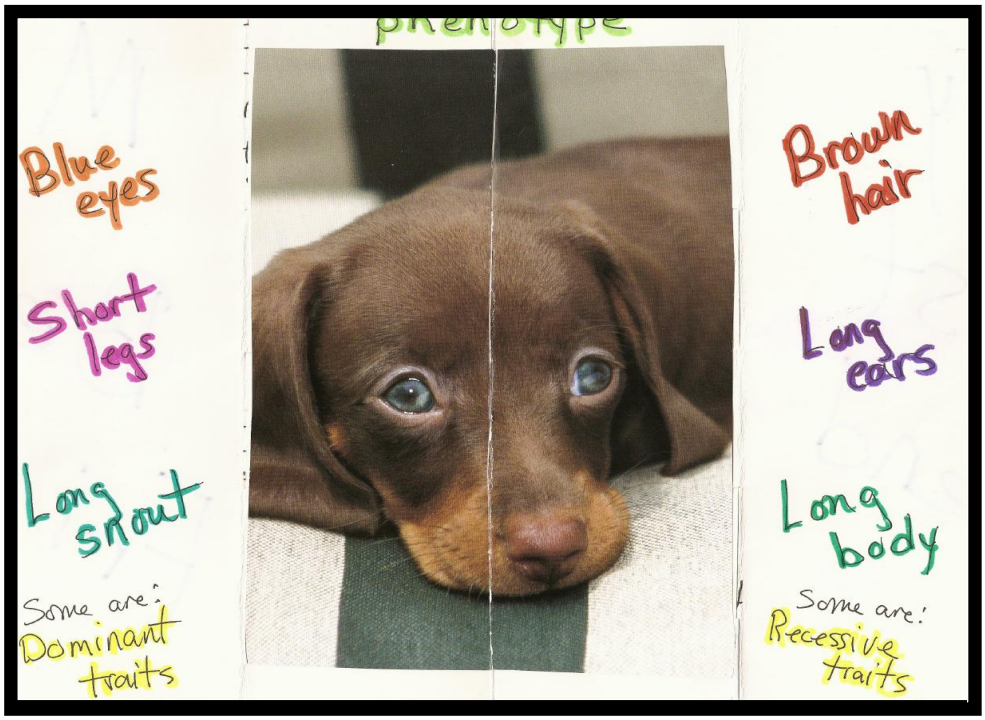
Example of the final product

Front View



Inside View 1



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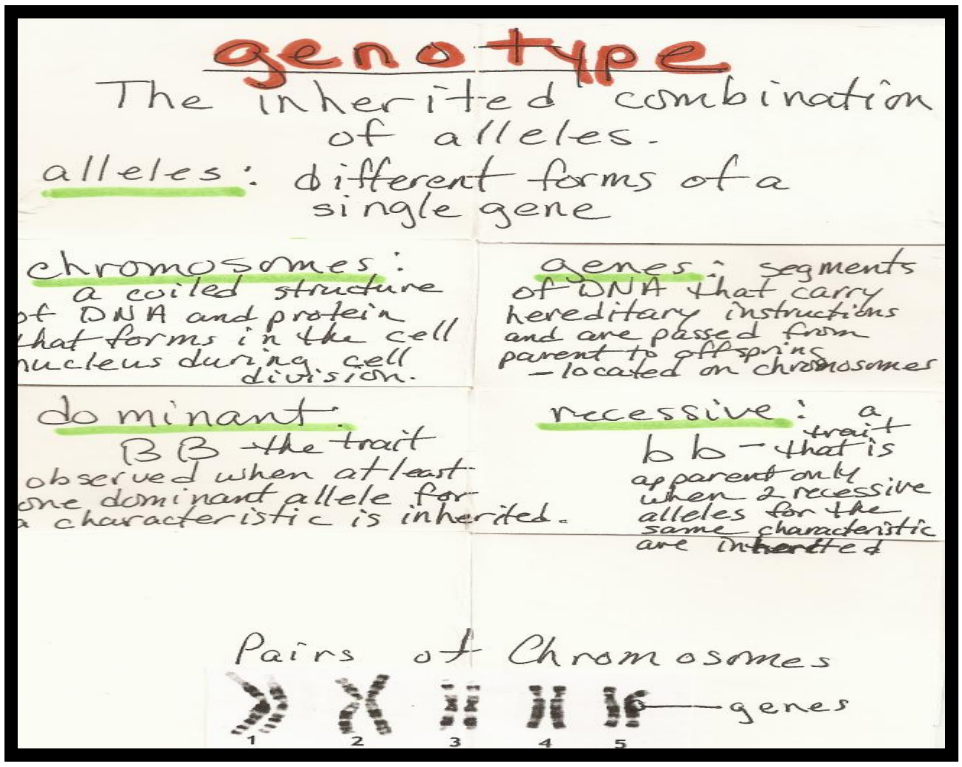
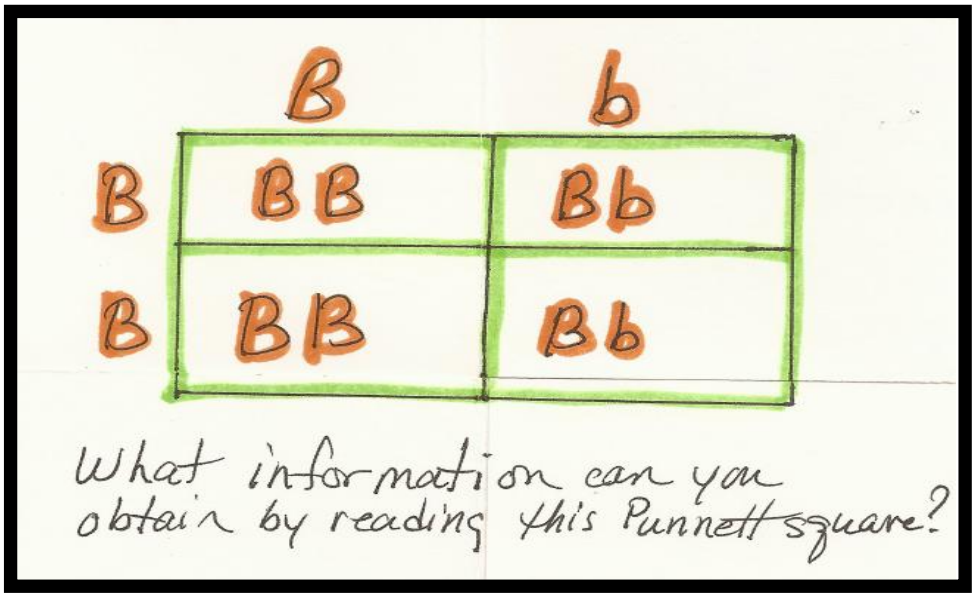
Inside View 2



Inside View 3



Genetics Problems Manipulatives 1

In areas of the very deep and damp southeastern United States lives a giant flying cockroach known as a Palmetto bug. Assume that long antennae (A) are dominant to short antennae (a). Supposed that a homozygous recessive male mates with a short antennae female. What are the possibilities for their offspring? What are the genotypic and phenotypic possibilities for the F1 generation?

GENOTYPE **PHENOTYPE**

Genetics Problems Manipulatives 2

Kelp, a large, multi-cellular type of algae, has air bladders in the blades to help them float near the surface of the ocean where they can get more sunlight. Assume that having many air bladders (A) is a dominant trait. What would the offspring possibilities be of two heterozygous individuals?

GENOTYPE **PHENOTYPE**

Biotechnology as Seen Today –Pros and Cons

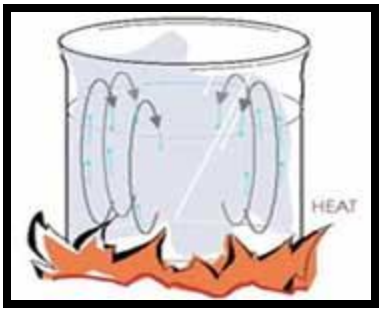
PROS	CONS
Comments	**Comments**

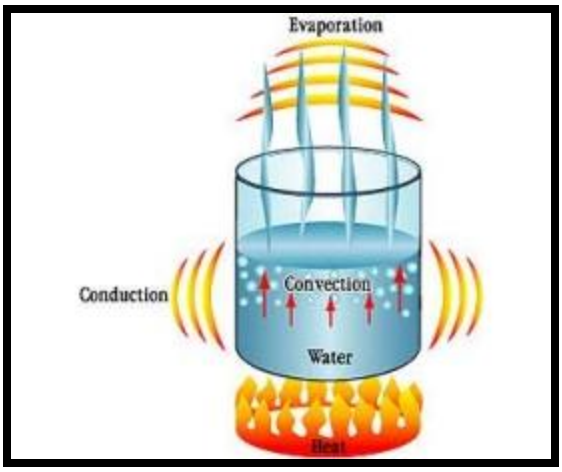
Conduction, Convection & Radiation Demo

Instructions:

1. Take a beaker and fill it with tap water.
2. Place the beaker on a hotplate on high.
3. Add a few drops of food coloring.

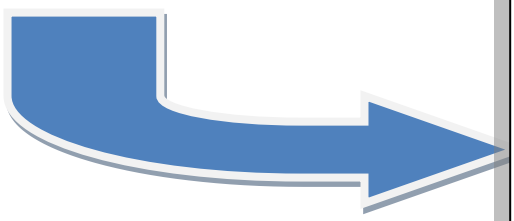
The water will be heated from the conduction of heat from the hotplate to the glass to the water. Water near the base of the beaker will heat up and become less dense then the water above it. This will cause it to move towards the top of the beaker and it will carry the dye with it in a convection cell. Explain the dynamics to the students as they observe it. Relate this to thermals in the atmosphere and vultures that ride them higher into the atmosphere.





Heat Transfer Basic Concepts

Concept	Your definition
Convection	



Drawing

Heat Transfer Basic Concepts

Concept

Radiation

	Your definition

Drawing

Heat Transfer Basic Concepts

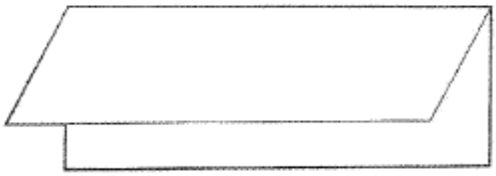
Concept	Your definition
Conduction	

Drawing

Conduction, Convection, Radiation Foldable Activity

Instructions:

i. Have students take a piece of construction paper and fold it 'hotdog' style (see picture a).
ii. Cut two slits to the fold line to create three flaps.
iii. On those flaps, have students write the words "conduction", "convection", and "radiation" along with a picture representing each type of thermal energy transfer.
iv. Using the information given by the teacher during direct instruction, have students write the definition given and in their own words on the inside of each flap.
v. On the inside bottom, students should include general information about energy transfer that was given during direct instruction.

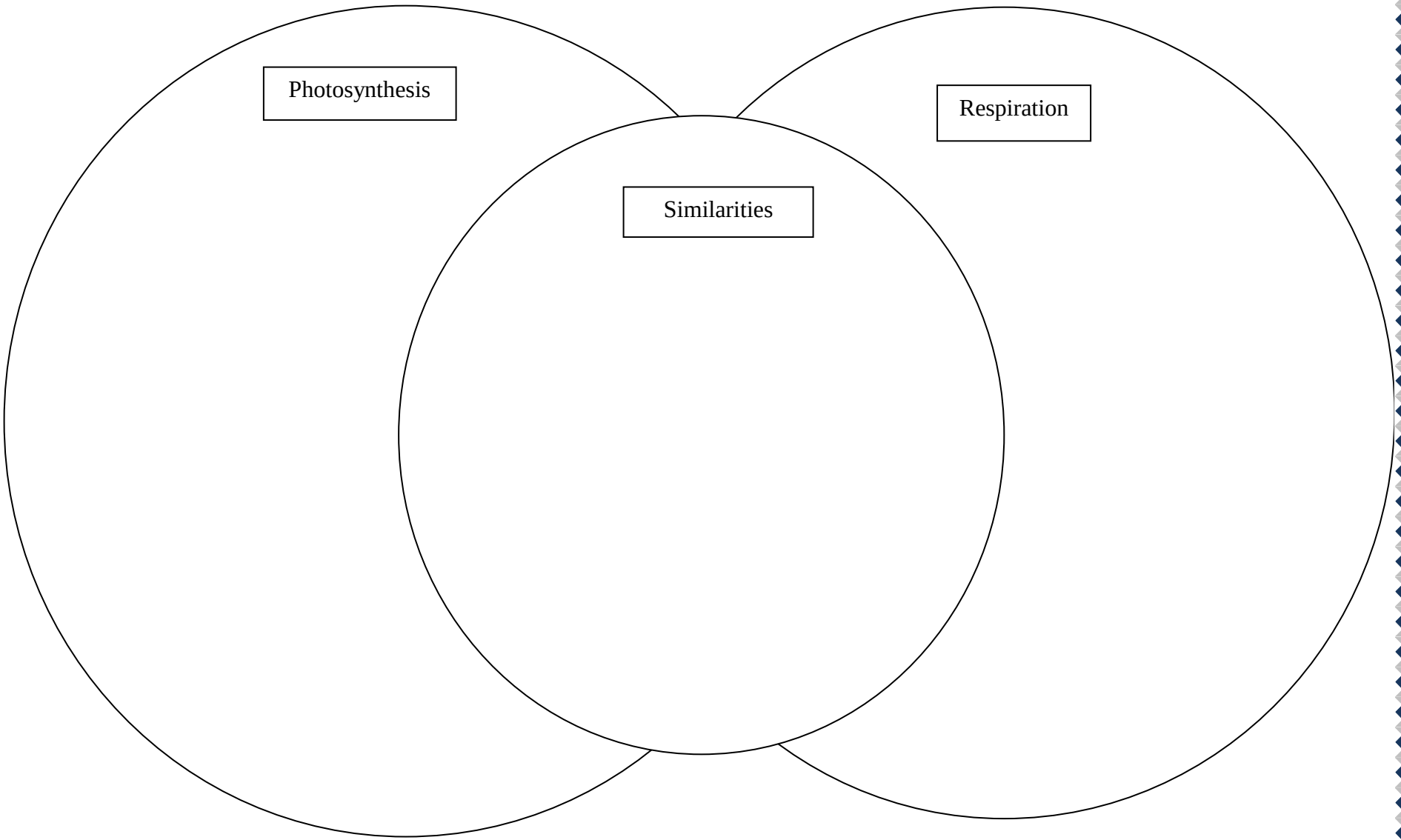


Picture a

Friday's, June 18
Materials Section

Water and Life Video	
Why is water so important for life?	
Why is water important for plants?	
How is water important for photosynthesis?	
How does water move up from the soil to the leaf of the plants?	
What is homeostasis?	
Why is the cell membrane important for the cell?	
What are the two ways in which materials can pass through the cell membrane?	
Explain diffusion	
What is osmosis?	
Explain Active Transport	

Photosynthesis and Respiration Venn Diagram



Optional Phrases for Venn Diagram

Involves chemical reactions
Occurs in chloroplasts
Occurs in mitochondria
Produces glucose $C_6H_{12}O_6$
Produces H_2O
Requires enzymes
Used by all organisms
Used by animals
Used by plants
Uses CO_2
Uses O_2

Involves energy
Converts energy from one form to another
Involves an electron transport chain
Light independent reactions (Calvin Cycle)
Light dependent reactions
Requires chlorophyll
Traps light energy
Produces CO_2
Produces O_2
Aerobic or anaerobic
Glycolysis

Photosynthesis Video Review	
Which organisms have the ability to carry out photosynthesis?	
How are the organisms that are capable of using light energy to produce their own food called?	
How are the organisms that are not capable of using light energy to produce their own food called?	
Write the chemical reaction for photosynthesis and identify its products	
How is glucose used?	
In which organelle does photosynthesis occurs?	
What is the role of enzymes in the process of photosynthesis?	
How is the ATP molecule used?	
How is the ATP used?	

Reflection Guide Questions

	What I already know	What I found out
Photosynthesis is		
Cellular respiration is		
How can I distinguish between photosynthesis and cellular respiration?		

General Resources

PERIODIC TABLE

PERIODS	GROUP 1 (Ia)	GROUP 2 (IIa)	3	4	5	6	7	8	9	10	11	12	GROUP 13 (IIIa)	GROUP 14 (IVa)	GROUP 15 (Va)	GROUP 16 (VIa)	GROUP 17 (VIIa)	GROUP 18 (VIIIa)
1	1 **H** *Hydrogen* 1.00797 1																	2 **He** *Helium* 4.0026 2
2	3 **Li** *Lithium* 6.941 2, 1	4 **Be** *Beryllium* 9.0122 2, 2											5 **B** *Boron* 10.811 2, 3	6 **C** *Carbon* 12.011 2, 4	7 **N** *Nitrogen* 14.0067 2, 5	8 **O** *Oxygen* 15.9994 2, 6	9 **F** *Fluorine* 18.998 2, 7	10 **Ne** *Neon* 20.183 2, 8
3	11 **Na** *Sodium* 22.9898 2, 8, 1	12 **Mg** *Magnesium* 24.312 2, 8, 2											13 **Al** *Aluminum* 26.9815 2, 8, 3	14 **Si** *Silicon* 28.086 2, 8, 4	15 **P** *Phosphorus* 30.9738 2, 8, 5	16 **S** *Sulfur* 32.064 2, 8, 6	17 **Cl** *Chlorine* 35.453 2, 8, 7	18 **Ar** *Argon* 39.948 2, 8, 8
4	19 **K** *Potassium* 39.102 2, 8, 8, 1	20 **Ca** *Calcium* 40.08 2, 8, 8, 2	21 **Sc** *Scandium* 44.956 2, 8, 9, 2	22 **Ti** *Titanium* 47.90 2, 8, 10, 2	23 **V** *Vanadium* 50.942 2, 8, 11, 2	24 **Cr** *Chromium* 51.996 2, 8, 13, 1	25 **Mn** *Manganese* 54.9380 2, 8, 13, 2	26 **Fe** *Iron* 55.847 2, 8, 14, 2	27 **Co** *Cobalt* 58.9332 2, 8, 15, 2	28 **Ni** *Nickel* 58.71 2, 8, 16, 2	29 **Cu** *Copper* 63.546 2, 8, 18, 1	30 **Zn** *Zinc* 65.37 2, 8, 18, 2	31 **Ga** *Gallium* 69.72 2, 8, 18, 3	32 **Ge** *Germanium* 72.59 2, 8, 18, 4	33 **As** *Arsenic* 74.9216 2, 8, 18, 5	34 **Se** *Selenium* 78.96 2, 8, 18, 6	35 **Br** *Bromine* 79.904 2, 8, 18, 7	36 **Kr** *Krypton* 83.80 2, 8, 18, 8
5	37 **Rb** *Rubidium* 85.47 2, 8, 18, 8, 1	38 **Sr** *Strontium* 88.905 2, 8, 18, 8, 2	39 **Y** *Yttrium* 88.905 2, 8, 18, 9, 2	40 **Zr** *Zirconium* 91.22 2,8,18, 10, 2	41 **Nb** *Niobium* 92.906 2,8,18,12,1	42 **Mo** *Molybdenum* 95.94 2,8,18,13,1	43 **Tc** *Technetium* (97) 2,8,18,13, 2	44 **Ru** *Ruthenium* 101.07 2,8,18,15,1	45 **Rh** *Rhodium* 102.905 2,8,18,16, 1	46 **Pd** *Palladium* 106.4 2,8,18,18,0	47 **Ag** *Silver* 107.868 2,8,18,18,1	48 **Cd** *Cadmium* 112.40 2,8,18,18,2	49 **In** *Indium* 114.82 2,8,18,18,3	50 **Sn** *Tin* 118.69 2,8,18,18,4	51 **Sb** *Antimony* 121.75 2,8,18,18,5	52 **Te** *Tellurium* 127.60 2,8,18,18,6	53 **I** *Iodine* 126.9045 2,8,18,18,7	54 **Xe** *Xenon* 131.30 2,8,18,18,8
6	55 **Cs** *Cesium* 132.905 2,8,18,18,8,1	56 **Ba** *Barium* 137.34 2,8,18,18,8,2	57-71 *Lanthanide Series**	72 **Hf** *Hafnium* 178.49 2,8,18,32,10,2	73 **Ta** *Tantalum* 180.9488 2,8,18,32,11,2	74 **W** *Tungsten* 183.85 2,8,18,32,12,2	75 **Re** *Rhenium* 186.2 2,8,18,32,13,2	76 **Os** *Osmium* 190.2 2,8,18,32,14,2	77 **Ir** *Iridium* 192.2 2,8,18,32,15,2	78 **Pt** *Platinum* 195.09 2,8,18,32,16,2	79 **Au** *Gold* 196.967 2,8,18,32,18,1	80 **Hg** *Mercury* 200.59 2,8,18,32,18,2	81 **Tl** *Thallium* 204.37 2,8,18,32,18,3	82 **Pb** *Lead* 207.19 2,8,18,32,18,4	83 **Bi** *Bismuth* 208.9806 2,8,18,32,18,5	84 **Po** *Polonium* (209) 2,8,18,32,18,6	85 **At** *Astatine* (210) 2,8,18,32,18,7	86 **Rn** *Radon* (222) 2,8,18,32,18,8
7	87 **Fr** *Francium* (223) 2,8,18,32, 18, 8, 1	88 **Ra** *Radium* (226) 2,8,18,32, 18, 8, 2	89-103 *Actinide Series**	104	105													

KEY

atomic number - 5
atomic symbol - **B**
name of element - *Boron*
atomic weight - 10.811
electron arrangement - 2, 3

SCIENCE FACTS AND FORMULAS

Some of the questions in this test require you to solve problems. This page contains all the basic facts and formulas you will need to solve those problems. You may refer to this page as often as you wish while you take the test. Some questions may require information from the periodic table on the previous page.

Basic Facts

- Acceleration due to gravity = 9.8 meters/second/second (9.8 m/s^2)
- Weight = Mass (m) × Acceleration due to gravity (g) ($W = mg$)
- Density = Mass/Volume
- Volume of a Rectangular Solid = Length × Width × Height ($V = lwh$)
- 1 Newton = 1 kilogram·meter/second/second
- 1 joule = 1 Newton·meter
- 1 watt = 1 Newton·meter/second = 1 joule/second

Motion

Velocity (V) = $V_0 + at$,

Where V_0 = Initial Velocity, a = Acceleration, and t = Time

Acceleration = Change in Velocity/Time Elapsed $\left(a = \frac{V - V_0}{t}\right)$

Force

Force = Mass × Acceleration ($F = ma$)

Mechanical Advantage

Actual Mechanical Advantage: $\left(AMA = \frac{F_R}{F_E}\right)$

Where F_R is Force due to resistance and F_E is Force due to effort.

Ideal Mechanical Advantage: $\left(\text{IMA} = \frac{\text{Effort Length}}{\text{Resistance Length}}\right)$

Work

Work = Force × Distance ($W = F \cdot d$)

Electricity

Voltage = Current × Resistance ($V = I \cdot R$)