

Objective 1 Day 1

1. Which type of graph makes it easy to see that Oxygen is roughly one-half the total?

A. Pie Graph

2. Which type of graph makes it easy to see that Oxygen is almost twice the amount of Silica?

A. Column

3. Which type of graph allows you to easily see how the different elements compare to one another (how big they are to each other)?

A. Column

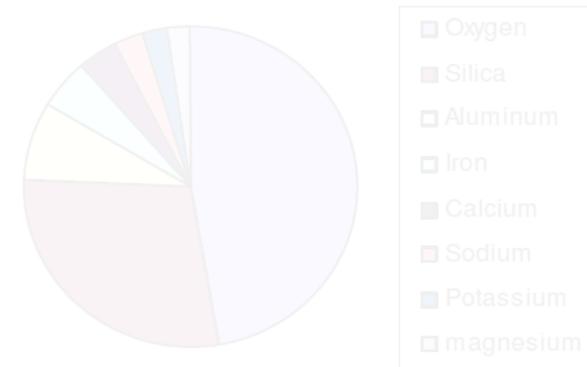
4. Which type of graph allows you to easily see how each element compares to the total mass (what percentage they are of the whole)?

A. Pie

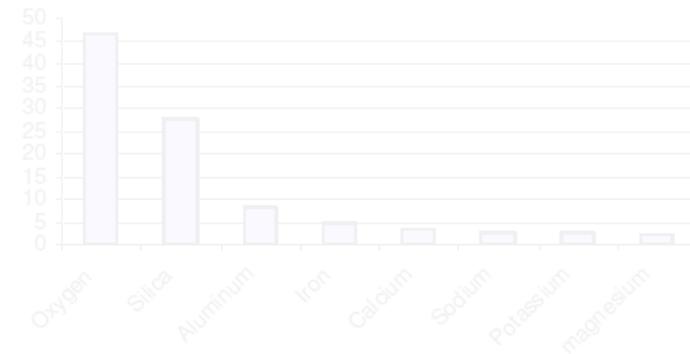
5. Which graph makes no sense for this data?

A. Line

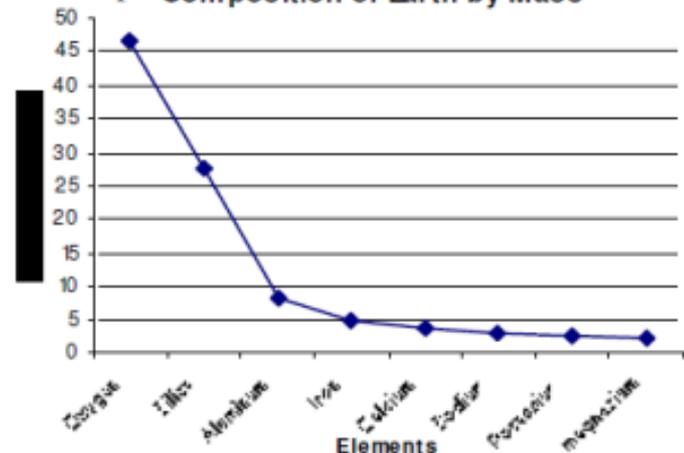
Pie Graph Composition of Earth by Mass



Column Graph Composition of Earth by Mass



Line Graph Composition of Earth by Mass



6. Which kind of graph would you use: bar graph (B); pie chart (C); line graph (L)?

A. _____ You want to know how where an object is after 3 seconds.

A. Line graph

B. _____ You want to know how the population of migratory birds differs between multiple wetland locations.

A. Chart

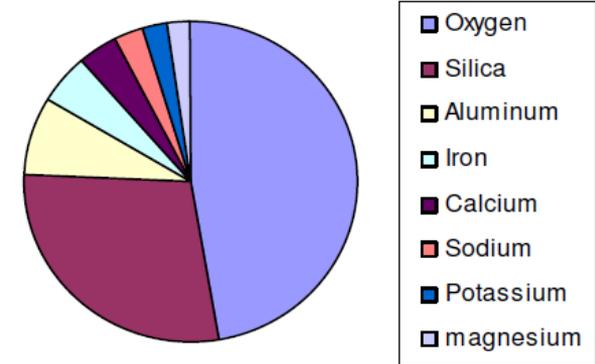
C. _____ You want to know what percentage of your income is spent on entertainment.

A. Pie

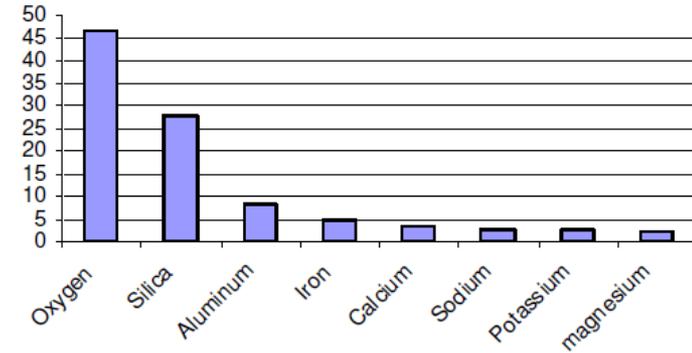
D. _____ You want to predict the population of insects at a certain time after collecting data for several days.

A. Line

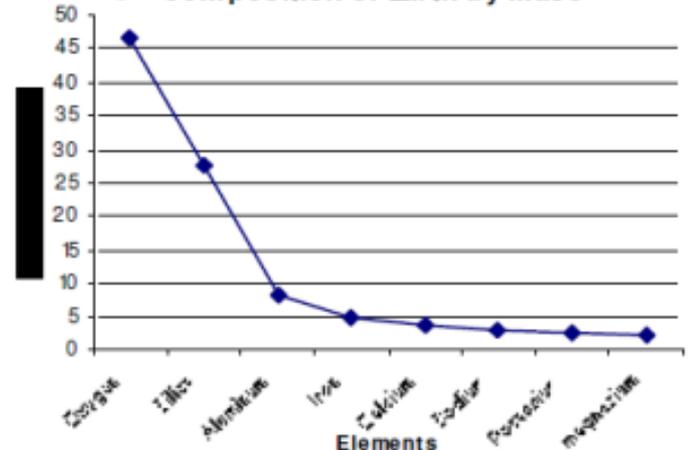
Pie Graph Composition of Earth by Mass



Column Graph Composition of Earth by Mass



Line Graph Composition of Earth by Mass



7. (For lines graphs) - X or Y axis?

Day 1—Graphs

TAKS Objective 1—Nature of Science

A. _____ Is the dependent variable.

A. Y

B. _____ Is the responsive variable.

A. Y

C. _____ Records what you are measuring.

A. Y

D. _____ Records one of the control variable.

A. N/A

E. _____ Records what you are changing in the experiment (experimental variable).

A. X

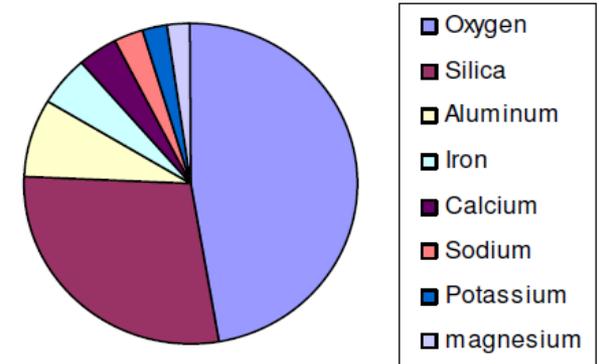
F. _____ Is the manipulated variable.

A. X

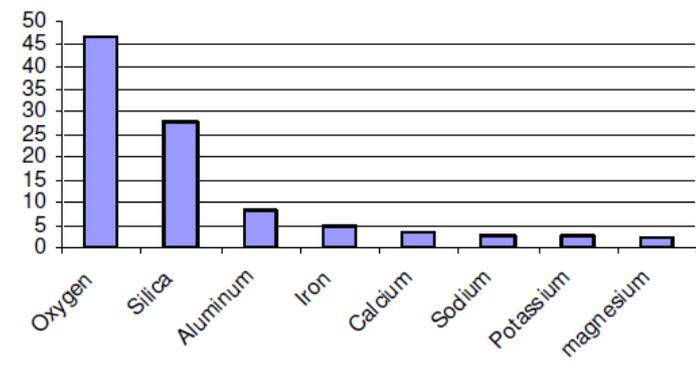
G. _____ Is the independent variable.

A. X

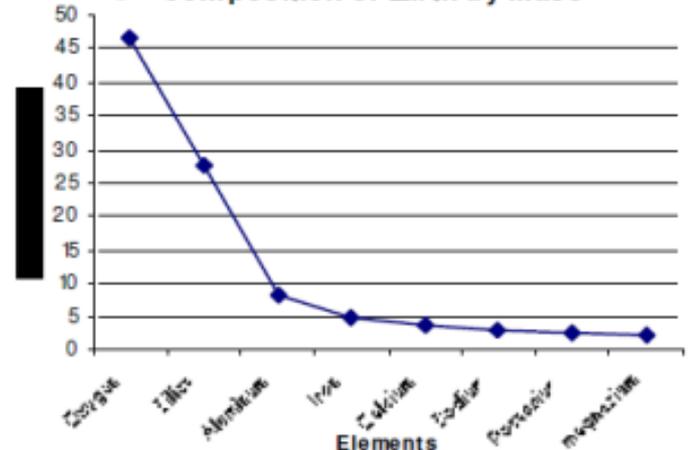
Pie Graph Composition of Earth by Mass



Column Graph Composition of Earth by Mass



Line Graph Composition of Earth by Mass



Objective 1 Day 2

See the notes: "How to Setup Good Experiments". On the website: Notes and Examples | Nature of Science.

1. Control, Experimental, or Responsive Variable?

A. ___ What you are studying in the experiment.

A. E

B. ___ There are many of these in a good experiment.

A. C

C. ___ What happens in the experiment.

A. R

D. ___ There is only one of these in a good experiment.

A. E

E. ___ What you record in an experiment.

A. R

2. Why do good experiments have control setups? (*Explain completely.*)

To see if experimental variables does anything or has a negative effect.

Objective 1 Day 2



Plant Food A *Plant Food B* *No Plant Food*

Start	10 cm	10.1 cm	9.8 cm
week 1	11.1 cm	12.2 cm	11.8 cm
week 2	12.7 cm	14.5 cm	13.2 cm

3. A) What is the control setup for this experiment?

No Plant food

B) What is the experimental variable for this experiment?

Plant food

C) Give two possible control variables for this experiment.

Type of soil, amount of water and amount of sunlight.

D) Which plant food is better?

Food B

E) What does the “No plant food” setup tell you about plant food A?

Plant food A is worse than nothing – retards growth

4. A pharmaceutical company has developed a new acne drug. To get this new drug approved, they need to do scientific trials to prove effectiveness. What would be the control setup for this drug?

Some patients are not given the drug. So they don't know that they are given a placebo. (pills with no active drug).

5. Which of the following statements could be supported by the scientific method and why?

A) "Come to Willarby Auto Store—the best car dealership in town."

No - this is an opinion

B) "Try Dry-Toes Powder. A recent independent research company proved Dry-Toes powder kept feet dry up to 30% longer than any other foot powder."

Yes - this could be proved.

C) "Acorn Powder helps you live longer and stronger. 89 year old Ethyl Krumke swears by Acorn Powder. 'I take my Acorn Powder every day, just like my mother!' "

No - this is an opinion

6. Qualitative (I) or Quantitative (II) data?

A. _____ The speed of an object.

II Quantitative

B. _____ The color of a substance..

I Qualitative

C. _____ The height a plant grows.

II Quantitative

D. _____ The mass of a rock when measuring density.

II Quantitative

E. _____ How an animal reacts due to different stimuli.

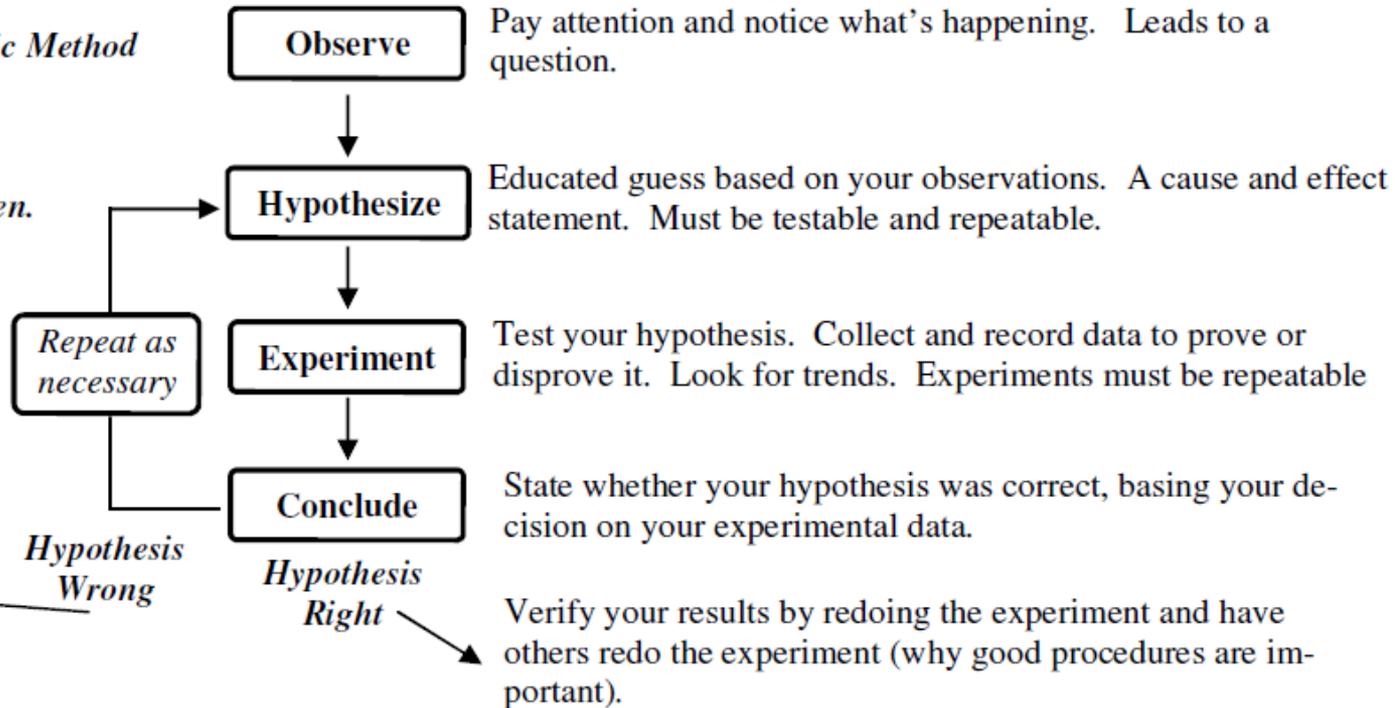
I Qualitative

Objective 1 Day 3

Basic 4 Steps of the Scientific Method

The scientific method is always looking for “Cause and effect”: what caused something to happen.

Happens often in science and is actually good. Then your experimental data becomes part of your observation. Rethink

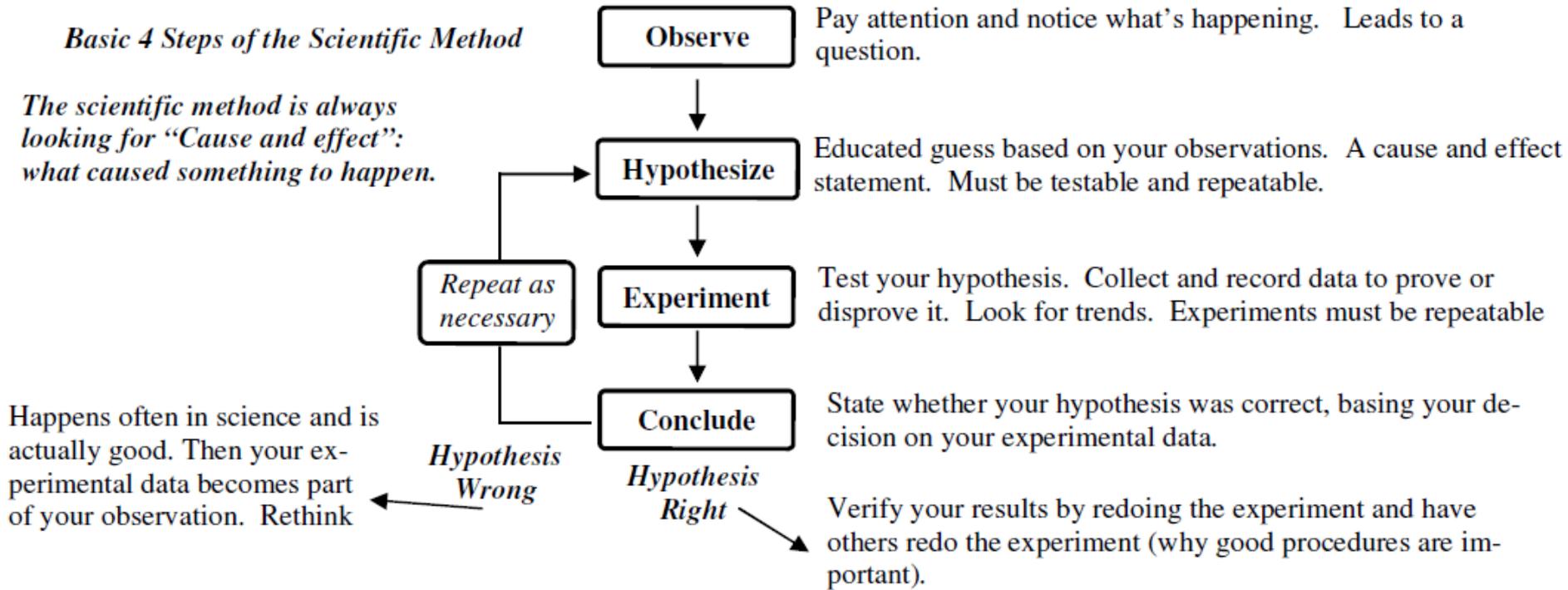


1. Which part of the scientific method?

- A. Exp A scientist measures the amount of acid necessary to dissolve a certain amount of magnesium.
- B. Hyp You believe your car won't start because you are out of gas.
- C. Obs You notice that a ball rolls farther up a hill depending on how fast it was going.
- D. Con You decide that adding salt to ice water allows the ice water to get colder than water alone.

Basic 4 Steps of the Scientific Method

The scientific method is always looking for “Cause and effect”: what caused something to happen.



2. Theory, Hypothesis, or Guess? Remember: an hypothesis comes from observations that can be tested in an experiment. A Theory is an hypothesis that has had been successfully tested so that it is considered scientific fact.
- A. **G.** You think that a person is going to come late to the bus because they were late yesterday.
 - B. **Hyp** You think that some plastic water bottles may not be healthy because you can taste the plastic in the water.
 - C. **Th** The earth revolves around the sun. The sun does not revolve around the earth.
 - D. **Hyp** You think that adding salt to water allows it to have a higher boiling point (it boils at a higher temperature).

Liquid	Color	Burns?	Volume	Density
A	Clear	No	35 mL	1 g/mL
B	Pale Yellow	Yes	12 mL	.94 g/mL
C	Clear	No	46 mL	1 g/mL
D	Blue	Yes	88 mL	.99 g/mL

3. The data was collected about 4 unknown liquids.
What can you conclude from this experiment and why?

Liquid A and C are the same liquid.

Why?

Same density, color and Flammability.

4. Hypotheses must be testable, repeatable, and verifiable thru facts. What is wrong with the following hypotheses?

A. A plant is happier when it is given distilled water.

Not testable – can't know if a plant is happy.

B. People like Milkman Mac and Cheese better than Cheesehead Mac and Cheese.

These are not facts they are opinions.

Objective 1 Day 4



1. A. Give five of the six lab safety rules the person is following.

1. Goggles; 2. Gloves; 3. Apron; 4. Rolled up sleeves; 5. Pointing test tube away while heating. 6. Materials away from edge of lab table.

- B. If the person had long hair what else should they do?

Pull long hair back (hair is flammable)

- C. What should the person do to protect their feet?

Closed-toed shoes.

- D. If there is an emergency in the lab, what is the first person that should be told?

tell teacher.

2. How should we smell a chemical in the lab (*use the correct word*)?

wafting - wave a small amount toward your nose.

3. In the lab, where do we store very dangerous gases or substances that give off fumes?

fume hood.

4. You mix chemicals together in the lab. Why should you not put the extra chemicals back in the original container?

Could contaminate rest of the chemical.

5. A. When diluting an acid, do we add acid to water or water to acid?

B. Why? *Acids are more dense than water. Water on top could flash boil, splash, and burn you.*

6. Give two rules for safety when cutting with a sharp instrument.

Cut away and on hard surface.

7. Corrosive (I) (caustic), combustible (II), or carcinogen (III)?

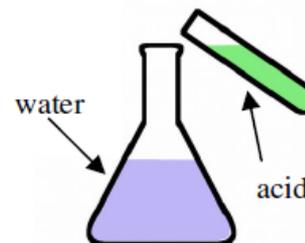
- A. II Flammable.
B. I Eats away at something.
C. III Causes cancer.
D. I Eats away what it touches.
E. II Wood or gasoline.
F. I Strong acid on your skin

Diluting Acids

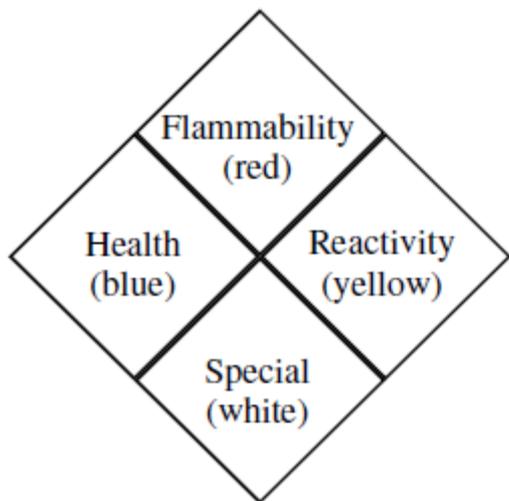
Never add water to a concentrated acid!

When acid compounds are dissolved in water, heat is produced (sometimes a lot of heat). Acids are more dense than water, so if you add water to a concentrated acid, water sits on top and can

flash boil (quickly boil). The boiled water can splash up burning you with hot water and acid. If the acid is added to water it sinks thru the water and is diluted safely.



Always add acids to water!



Numbers on the safety diamonds range from 0 (safe) to 5 (most dangerous).

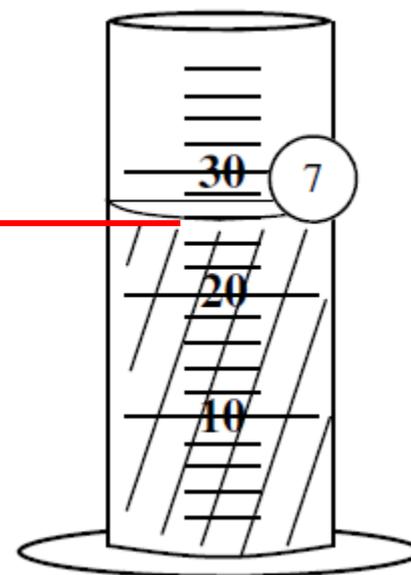
8. Give the number and color for the following:
- A. Blue - 0 Water is safe to drink.
 - B. Red - 5 Gasoline burns very quickly.
 - C. Yellow - 5 Sodium will react very quickly in water.
 - D. Blue - 5 Hydrochloric acid is poisonous.

9. What do we call the curve at the top of the liquid in #7 below?

Meniscus

10. Measure the liquid in #7 below.

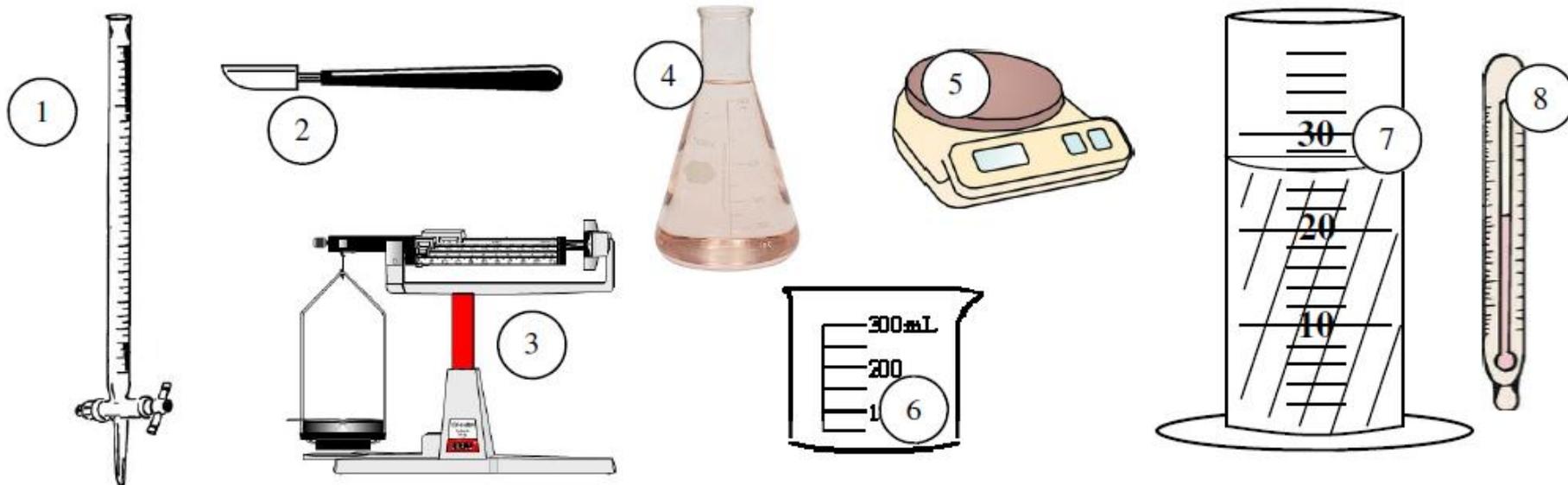
26 ml



11. Use the pictures below to answer the following. (Can be more than one.)

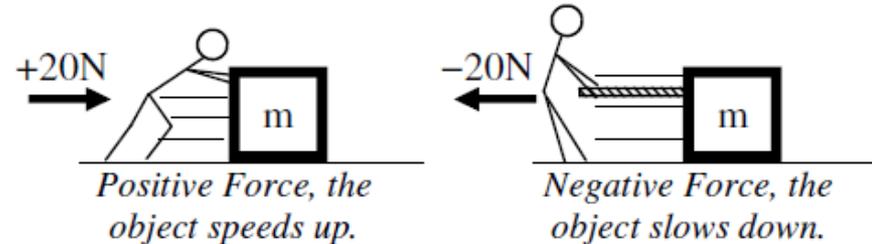
- A. 3,5 Used to measure mass.
B. 8 Used to measure temperature.
C. 1,6,7 Used to measure volume.
D. 1 Used to add very small amounts of a liquid.
E. 4,6 Used to carry liquids.
F. 1,7 Very accurate for measuring liquids
G. 2 Used to make fine cuts in specimen
H. 7 Which is more precise 6 or 7?
I. 4 Used to mix liquids by swirling

- J. 1 A burette
K. 7 A graduated cylinder
L. 5 Electronic scale
M. 3 Beam balance
N. 8 Thermometer
O. 2 Scalpel
P. 4 Erlenmeyer Flask
Q. 6 Beaker

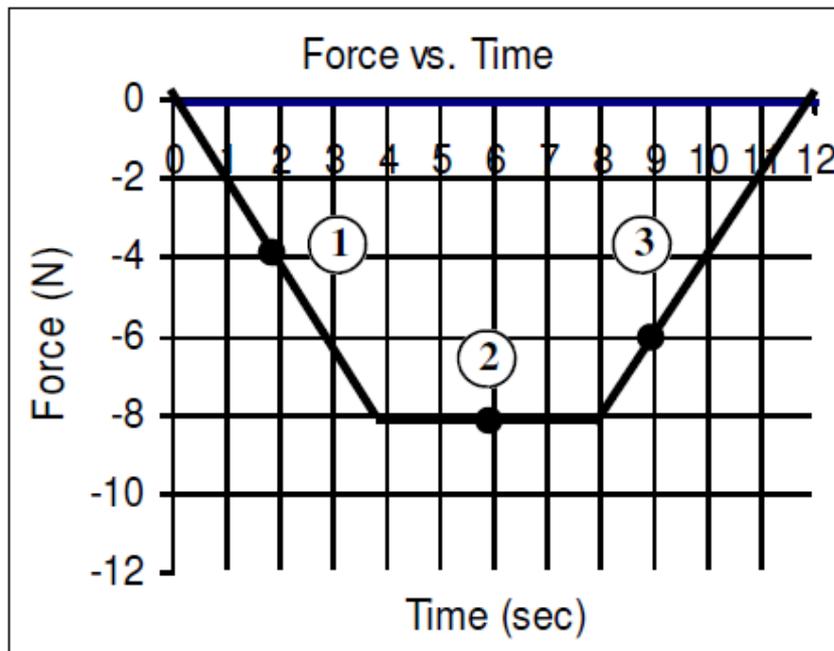


Objective 1 Day 5

When predicting trends and making inferences from data and graphs, be sure to actually read the data (not just the shape). If a graph is given to you, then the answer is there on the graph, in the data.



Notice above the difference between positive and negative forces for an object moving to the right.



- The graph shows the forces acting on an object that is moving to the right. Be sure to read the numbers, not the shape.
 - Looking at circle 1:
 - Is circle 1 a positive or negative force? **Negative**
 - How much force is acting? **-4N**
 - Is the object speeding up or slowing down at this point? **Slowing Down**
 - Looking at circle 3:
 - How much force is acting? **-6N**
 - Is it a positive or negative force? **Negative**
 - Is the object speeding up or slowing down at this point? **Slowing down**

Again, look at the numbers *NOT* the shape!

time	distance	difference
0	0	1.6
0.5	1.6	
1	3.2	
1.5	4.8	
2	6.4	

2.5 8.0 (6.4 + 1.6)

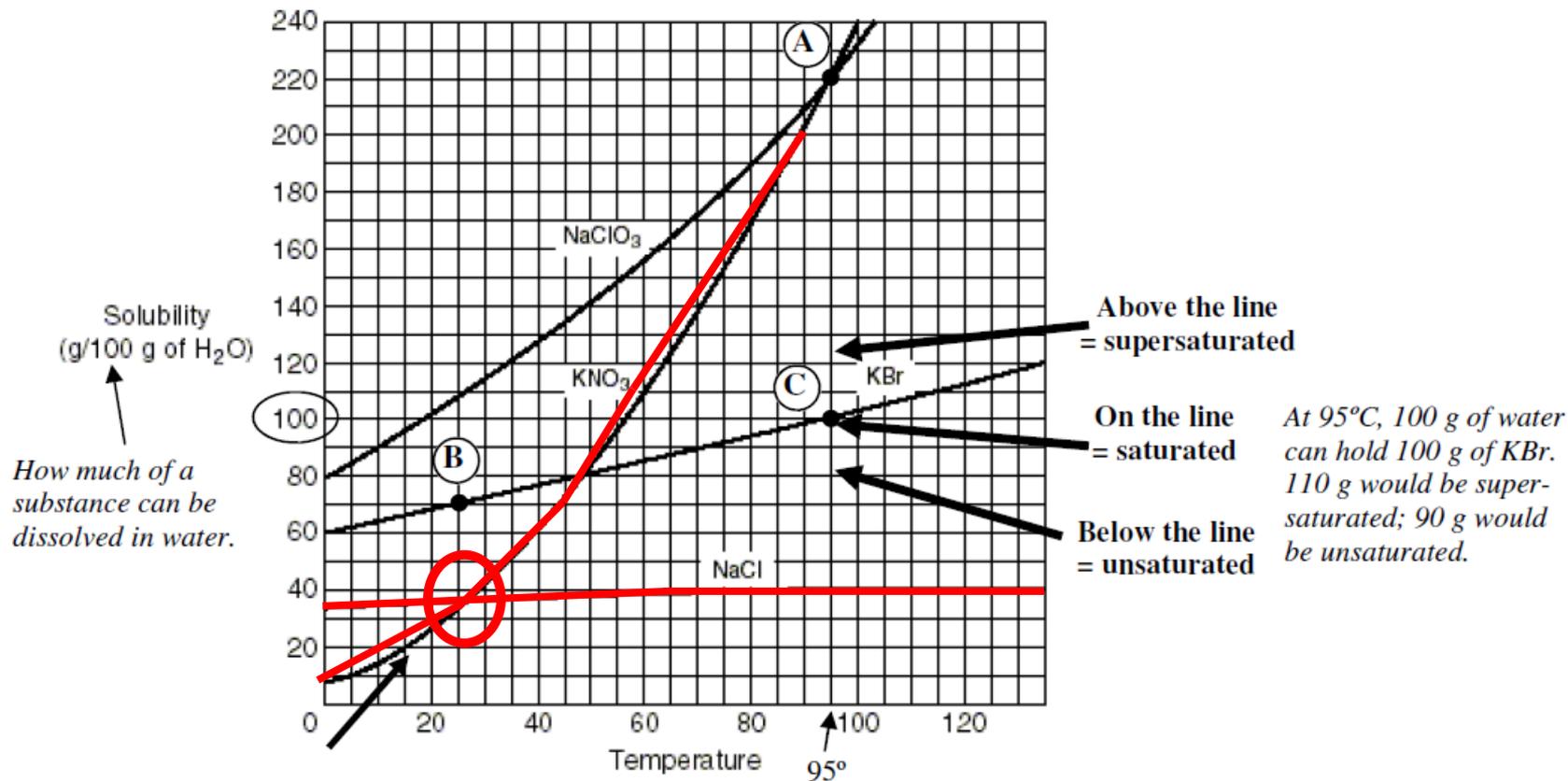
3.0 9.6 (8.0 + 1.6)

Continue the table on
your own.

When finding trends in data often you must calculate the trend.

2. Use the data table at the left to answer the following.

- Next to the graph, calculate the difference between each set of data (*between each set of distances*).
- Does the amount of distance traveled each second increase, decrease, or stay constant? **It stays constant**
- If the object's motion does not change, how far will it have travelled in 3 seconds? (*To answer this, continue the table by writing your own rows below and following the trend.*)



3. A. What is the x-axis variable? **Temperature**
- B. What is the y-axis variable? **Solubility**
- C. Which compound does not seem to be affected much by temperature? **NaCl**
- D. Which compound is most affected by temperature? **KNO₃**
- E. At which temperature does NaCl and KNO₃ have the same solubility? **26°**
- F. Which of the following statements can be supported by the graph?
 - i. As the temperature increases water can dissolve less table salt. **No – NaCl goes up**
 - ii. If the water is stirred more salt is able to be dissolved. **Not on graph (it is true though)**
 - iii. Between 0°C and 40°C KNO₃ has the greatest increase in solubility. **Yes**
 - iv. Smaller particles of NaClO₃ causes faster dissolution. **Not on graph (but still true)**

Objective 2 Day 6 Answers

1. Without this organelle, the cell would be unable to repair itself or continue to grow.

Ribosome

2. Without this organelle, if a plant cell lost water, it would shrink.

Central Vacuole

3. Celery is hard to bend partly because of this organelle.

Cell wall

4. Helps the cell maintain homeostasis by selectively allowing certain substances into or out of the cell.

Cell Membrane

5. A. What color is a chloroplast?

Green

B. Why?

Chlorophyll

6. The nucleus from Cell A is removed and replaced by the nucleus from Cell B. Afterwards, which cell's characteristics will Cell A have?

Cell B's

7. A cell needs certain molecules to function. These come from outside the cell.

A. What organelle will allow or disallow these molecules to get in?

Cell membrane

B. Which organelle moves these molecules around the cell.

Golgi Apparatus

C. Which organelle will make these molecules into proteins?

Ribosome's

D. Where the plans for making the proteins is stored (and comes from)?

Nucleus

E. Which organelle makes energy for these molecules to be used?

Mitochondria

F. Which organelle will then move the finished proteins around the cell?

Endoplasmic reticulum

G. Which organelle will break up these materials when the cell is done with them?

lysosomes

8. Plants actually have two organelles that make energy. Which ones?

Mitochondria and chloroplast

9. If this organelle is removed, a cell loses its ability to function.

Nucleus

10. Photosynthesis or Respiration?

- A. R Occurs in the lungs of animals.
- B. P Occurs only in plants.
- C. R Carbon dioxide is a product
- D. P Takes in sunlight.
- E. R Uses glucose as energy.
- F. P Carbon dioxide is a reactant.
- G. P Produces oxygen.
- H. R Produces water.
- I. R Occurs in both plants and animals.
- J. P Makes glucose.
- K. P Uses water as a reactant.

These next questions are still from the above notes. Read carefully.

11. Where is ATP created in a cell?

Mitochondria

12. What is the proof that respiration is a combustion reaction?

Produces heat and water

Objective 2 Day 7 Answers

Kingdom, Phylum, Class, Order, Family, Genus, Species

Most general

Less related

Most specific.

More closely related

All scientific names have two parts; genus and species:

Ex: Human (*Homo sapiens*):

Genus Species

The farther to the right that the words are the same, the closer the species are:

Roses and Humans - different *Kingdoms*

Worms and Humans - different *Phylums*

Eagles and Humans – different *Classes*

Horses and Humans – different *Order*

Monkeys and Humans – different *Family*

Neanderthals and Humans – different *Species*

(but very closely related)

1. Which of the badgers below are most closely related?

A. North American Badgers – *Taxidea taxus*

C. Eurasian Badgers – *Meles meles*

B. Palawan Badger – *Mydaus marchei*

C. Javan Stink Badger – *Mydaus javanensis*

2. Which are more closely related: organisms of the same family or same class?

3. Which kingdom (*might be more than one*)?

Animals A. Flat worms.

Plants B. Ferns.

Archeobacteria C. A bacteria that lives in a thermal vent at the bottom of the ocean.

Fungi D. Made up of decomposers with a spongy cell wall.

Plant /Protista E. Makes their own food.

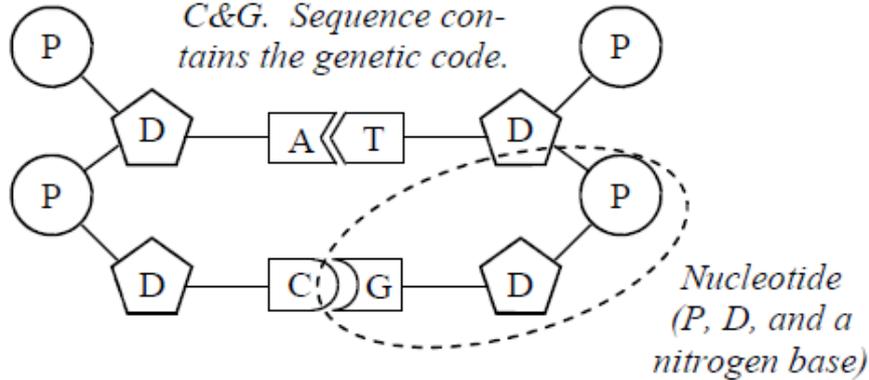
Eubacteria F. Live with humans and even help with digestion.

Objective 2 Day 8 Answers

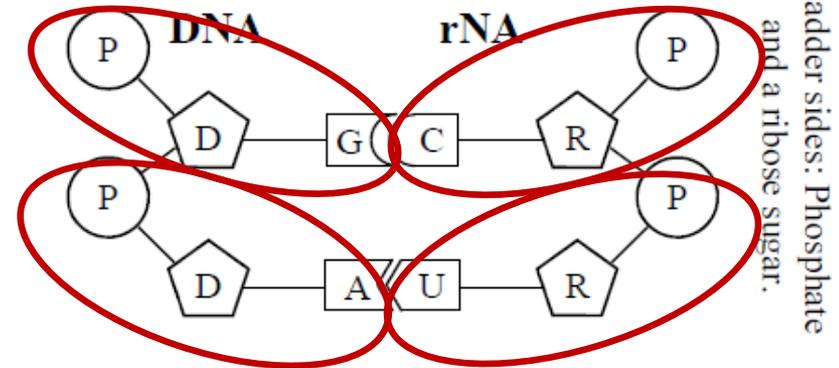
DNA – Found in the nucleus of all cells. Contain the characteristics of a cell.

DNA has two sides (double helix [ladder])

*4 nitrogen bases.
Always pair: A&T;
C&G. Sequence con-
tains the genetic code.*



RNA has only 1 side.
It has Uracil instead of Thymine.



1. A. On the diagram at the right circle each individual nucleotide.

B. How many nucleotides are there in the diagram? **Four**

2. DNA, RNA (could be both).

A. **Both** Contains nitrogen bases.

B. **DNA** Found in the nucleus of a cell.

C. **DNA** Double helix structure.

D. **DNA** A goes with T

E. **Both** Has a sugar on its side.

F. **RNA** Has uracil

G. **Both** Has a phosphate backbone

H. **RNA** Has ribose as a sugar

3. Given the following genetic codes give the paired sequence.

DNA	RNA
A	U
C	G
G	C
G	C
T	A

DNA	DNA
T	A
G	C
C	G
G	C
A	T

Gametes—Egg or sperm; has only 1/2 the chromosomes of a full cell.

Zygote—fertilized egg. Has the full set of chromosomes.

Mitosis—Cell division for regeneration (exact copies to replace aging body cells).

Meiosis—Cell division for sexual reproduction: produces gametes (egg or sperm).

DNA Mutation—Occurs when the nitrogen base sequence is copied wrong. Doesn't cause a permanent mutation unless it occurs in the gametes and is passed on to the offspring.

4. Will it cause a mutation of the species?

- A. N A gene mutation occurs when a skin cell is replicated.
- B. Y A mutation happens during meiosis.
- C. N If the sequence is copied perfectly.
- D. Y If the sequence is off by one nitrogen base when making a sperm cell.
- E. N If the mutation occurs during mitosis.
- F. Y If the mutation ends up in a gamete cell.

5. If the gamete cell has 28 chromosomes, how many chromosomes are in the zygote?

56 Chromosomes

Objective 2 Day 9

Transcription: Process in which DNA is copied into mRNA. (Before it can ride it must transcribe.)

Translation: Process in which proteins are made from tRNA. (Before it can create it must translate.)

Ribosomes: Cell organelle where proteins are created.

Amino Acids: Building blocks of proteins.

Codon: Code of three nitrogen bases that tells the ribosome what amino acid to make. Ex. AGA

1. Translation (TL) or Transcription (TS)?

A. TL When mRNA is turned into tRNA.

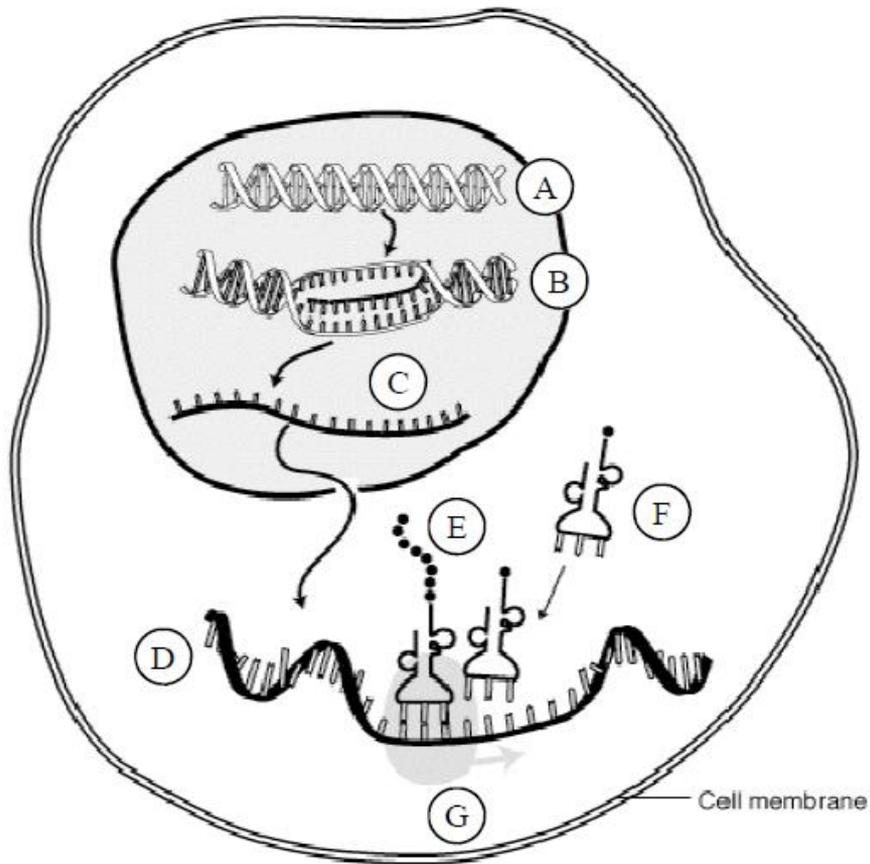
C. TS Occurs in the nucleus.

B. TS When DNA is turned into mRNA.

D. TL Occurs at the ribosomes.

2. The three nitrogen base code that tells the r ribosomes which a amino a acid to make is called a:

codon



3. The picture at the left shows the steps in protein synthesis in an animal cell.

A. The double coiled molecule at letter A is called the DNA.

B. The double coiled molecule is unzipping and giving its code to the single stranded molecule at letter B. This single stranded molecule is the mRNA.

C. The process in which molecule A becomes molecule C is called t transcription.

D. Molecule F is called the tRNA.

E. When D becomes F is called t translation.

F. Letter E shows the chaining of amino acids to make a p protein.

G. Two of the cell's major organelles are shown in grey.

i. A, B, and C are in the nucleus.

ii. G shows the ribosomes.

Second Nitrogen Base (2nd letter)

		Second Nitrogen Base (2nd letter)							
		U		C		A		G	
U	UUU	Phenylalanine	UCU	Serine	UAU	Tyrosine	UGU	Cysteine	U
	UUC		UCC		UAC		UGC		C
	UUA	Leucine	UCA		UAA	Ochre	UGA	Opal	A
	UUG		UCG		UAG	Amber	UGG	Tryptophan	G
C	CUU	Leucine	CCU	Proline	CAU	Histidine	CGU	Arginine	U
	CUC		CCC		CAC		CGC		C
	CUA		CCA		CAA	Glutamine	CGA		A
	CUG		CCG		CAG		CGG		G
A	AUU	Isoleucine	ACU	Threonine	AAU	Asparagine	AGU	Serine	U
	AUC		ACC		AAC		AGC		C
	AUA		ACA		AAA	Lysine	AGA	Arginine	
	AUG	Methionine	ACG		AAG		AGG		G
G	GUU	Alanine	GCU	Alanine	GAU	Aspartic acid	GGU	Glycine	U
	GUC		GCC		GAC		GGC		C
	GUA		GCA		GAA	Glutamic acid	GGA		A
	GUG		GCG		GAG		GGG		G

First Nitrogen Base (1st letter)

Third Nitrogen Base (3rd letter)

4. From the codon chart at the left, what amino acid comes from the following codons:

- i. CAG: **Glutamine**
- ii. AGC: **Serine**
- iii. GUA: **Alanine**

1. Which body system?

A. The only system that has completely different parts for males and females.

Reproductive

B. Surrounds the entire body.

Integumentary

C. Attacked by the AIDS virus.

Immune

D. Protects your brain.

Skeletal

E. Moves the bones.

Muscular

F. Stomach and intestines.

Digestive

System	Function	Organs
Circulatory system	moves water, oxygen, and nutrients around the organism	heart, veins, arteries, capillaries
Digestive System	breaks down food to be absorbed by body.	mouth, teeth, throat, esophagus, stomach, small and large intestines
Nervous system	interprets and sends information throughout the organism, motor function.	brain, spinal cord, nerves (neurons)
Endocrine System	secretes hormones to regulate body functions.	testis and ovaries (and others)
Reproductive System	produces egg and sperm to propagate (continue) species.	genitals, testicles, ovaries
Integumentary System	protects from external environment;	skin (also attachments like hair and nails)
Skeletal system	supports body, place for muscle attachment, protects organs	bones, ligaments (attachments), cartilage (nose)
Respiratory System	used to exchange CO ₂ and O ₂ between blood and air.	nose, mouth, wind pipe (trachea), lungs
Muscular system	used for locomotion, support, and protection	muscles, tendons (for attachment)
Excretory/ Urinary system	used to remove waste products from organism	bladder (storage tank), kidneys (filter), colon
Immune System	protects from and fights infections	white blood cells, skin (as a barrier)

G. Causes you to feel anxious. **Endocrine**

H. A bird's feathers. **Integumentary**

I. Protects your bones. **Integumentary**

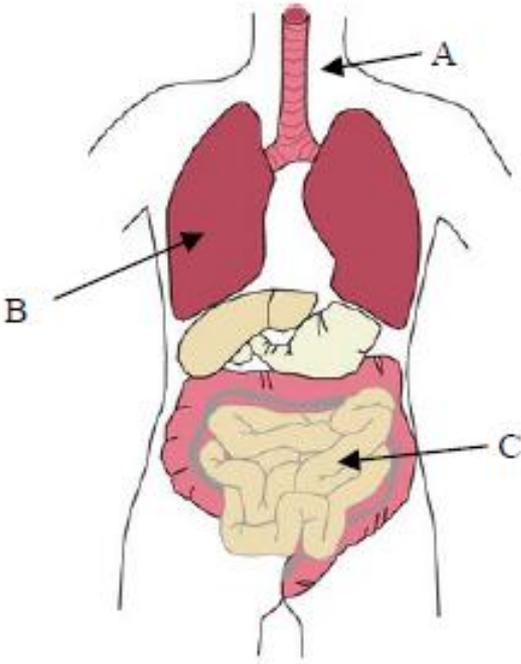
J. Helps you get well from the flu. **Immune**

K. Removes unabsorbed food. **Excretory**

L. Is like the cell membrane for a cell. **Integumentary**

M. Makes decisions for the body. **Nervous**

System	Function	Organs
Circulatory system	moves water, oxygen, and nutrients around the organism	heart, veins, arteries, capillaries
Digestive System	breaks down food to be absorbed by body.	mouth, teeth, throat, esophagus, stomach, small and large intestines
Nervous system	interprets and sends information throughout the organism, motor function.	brain, spinal cord, nerves (neurons)
Endocrine System	secretes hormones to regulate body functions.	testis and ovaries (and others)
Reproductive System	produces egg and sperm to propagate (continue) species.	genitals, testicles, ovaries
Integumentary System	protects from external environment;	skin (also attachments like hair and nails)
Skeletal system	supports body, place for muscle attachment, protects organs	bones, ligaments (attachments), cartilage (nose)
Respiratory System	used to exchange CO ₂ and O ₂ between blood and air.	nose, mouth, wind pipe (trachea), lungs
Muscular system	used for locomotion, support, and protection	muscles, tendons (for attachment)
Excretory/ Urinary system	used to remove waste products from organism	bladder (storage tank), kidneys (filter), colon
Immune System	protects from and fights infections	white blood cells, skin (as a barrier)



2. Which four systems does the heart transport for?

Digestive, Respiratory, Immune, Urinary, Endocrine

3. Which two systems have been opened when you bleed?

Integumentary, Circulatory

4. Large muscles in the extremities of the body (arms and legs) surround veins and arteries. When these muscles contract, they squeeze veins and arteries, helping which system?

Circulatory system (muscles help pump blood in the legs and arms)

5. How does the skin help the immune system?

As a barrier. Keeps stuff out of body.

6. How is the skin part of the nervous system?

Sensory—feeling textures, temperature, pressure...

7. Circulatory systems can be open or closed. Which do we have?

Closed

8. Amphibians allow oxygen thru their skin. Which system is this helping?

Respiratory

9. Some muscles are autonomous (you don't control them). Give two examples.

Heart, lungs, muscles in intestines.

10. In the diagram at the left, identify the three organs.

A. B. C.

A. Trachea (wind pipe) B. Lungs C. Intestines (small)

Objective 3 Day 10 “Plants”

Autotrophic—make their own food (glucose) thru photosynthesis:
Photosynthesis occurs in the plant cells in the chloroplast organelle.

Plant structures—

Leaves—absorb sunlight. Bigger leaves = more absorption. Have a waxy coating (cuticle) to reduce water loss. Leaves have stoma/ stomata on underside of leaves—opening that lets in CO₂ and lets out O₂. Stomas open if there is enough water in the plant and close if there is not enough water, to protect against more water loss.

Stems—support structure (cell wall) and for veins (circulation) for moving water and nutrients around.

Phloem (flow-em) - moves sugars down (“flows low” or “flows food”).

Xylem—draws water up (“xy—high”).

Allow Transpiration—water is pulled up thru plant (called “capillary action” - water sticking to itself, like a straw). This water “chaining” pulls water up from the roots, which pull in water by osmosis.

Roots—draw up water and dissolved nutrients from the ground.

Fibrous root—spreads out like spider webs. Holds top soil.

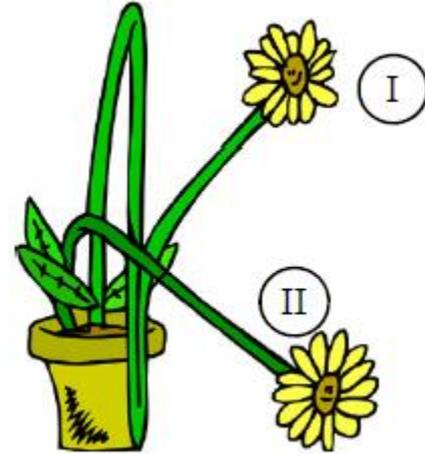
Tap root—goes down deep (like a carrot), searching for water.

Wilting—when plants don’t have enough water. Water give turgor pressure (like a balloon). When plants don’t have enough water they wilt, lose turgor pressure and become flaccid (limp).

1. All plants make their own food, so plants are called autotrophs.
2. Where do plants get their energy? **The sun**
3. What is glucose? **Plant sugar**
4. Where is glucose produced in a plant cell? **chloroplast**
5. If plants make their own food (glucose), where do plants use glucose? **In mitochondria (respiration for ATP).**
6. The process of water evaporating from leaves and pulling more water up thru the plant is called: **Transpiration**

7. Leaves, Stems, or Roots?

- A. R Absorbs water thru osmosis.
- B. S Pulls water up to the leaves.
- C. L Has stomas.
- D. S Supports the plant, like a skeleton.
- E. R Helps keep land from eroding.
- F. L Have waxy coating (called the cuticle).



8. The xylem transports water up the plant, while the phloem transports glucose back down.

9. Flower I or Flower II?

- A. 2 Is wilting.
- B. 1 Has sufficient water.
- C. 2 Is flaccid.
- D. 2 Has less turgor pressure.
- E. 2 Is probably closing its stomas.
- F. both Will be drawing water up thru its roots.

10. Cacti grow in harsh desert environments, where there is a lack of water. This is why cacti grow slowly and must defend themselves from consumers. For this defense, the leaves of cacti have evolved into small, sharp needles. These are not green, so they do not have chlorophyll. To make food, photosynthesis occurs in a cacti's green stem. Also to retain moisture cacti stems have a very waxy, called the cuticle. The stems also act like plant leaves by having the stoma.

11. Why do cacti only open their stomas at night?

To lose less water thru transpiration.



Objective 3 Day 11

“Energy Flow thru Ecosystems”

An ecosystem is made up of organisms and their environment. Ecosystems contain biotic factors (“living” factors, like organisms or their by-products) and abiotic factors (“non-living” factors, like rocks or water).

Herbivore – eats herbs - plants: a cow, gazelle, etc.

Carnivore – carne – meat; meat eaters; lions, tigers

Omnivore – eats plants and meat: bears, raccoons.

Producer – produces food for the world - plants

Consumer – eats producers – animals

Decomposer – recyclers of the ecosystem; eat dead organisms: mushrooms, fungi.

Organism interactions—

Symbiosis: two organisms living together. 4 types:

Mutualism: Both are benefited. Ex: bees and flowers.

Commensalism: One doesn’t care. Ex: a bird living in a tree. Good for bird; tree doesn’t care.

Predation: Once kills and eats the other. Ex: Lion and a gazelle.

Parasitism: One eats the other but the other doesn’t die; Ex: Mosquitoes eating blood of humans.

1. Biotic or Abiotic Factor?

A. A Ice.

B. B Seeds or nuts.

C. B Deer.

D. A Weather

E. B Manure (animal waste)

F. A Elevation.

2. Give two biotic and two abiotic factors in a tropical island ecosystem.

Biotic—crabs; trees; coconuts; shells (by-product).

Abiotic—sand, wind, sun, ocean, temperature; moist air.

3. What kind of symbiosis?

A. Barnacles (a kind of shellfish) live on whales. Barnacles are filter feeders (eat organisms from the water that passes through it). Living on the whale gives a barnacle greater food access since the whale moves, allowing more water to pass through it.

Commensalism (whale could care less)

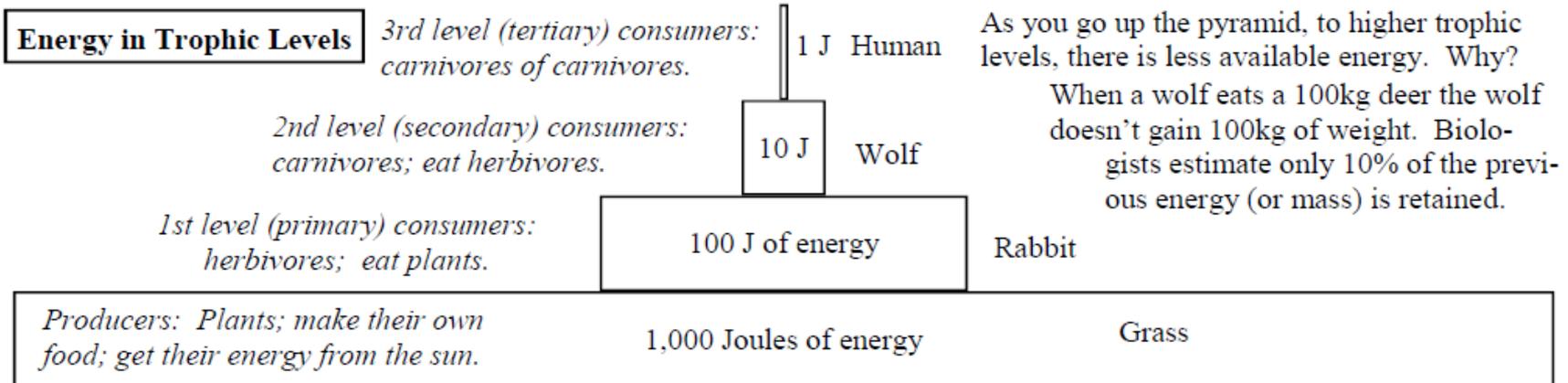
B. Dogs living with humans. **Mutualism**

C. Vampire bats suck the blood of cows. **Parasitism**

C. A humans eating a steak. **Predation**

D. Birds scrounging for worms after a farmer plows a field. - **Predation**

4. When you eat a salad you are a herbivore. When you eat meat you are a carnivore. But human's eat both plants and meat so actually humans are omnivores.



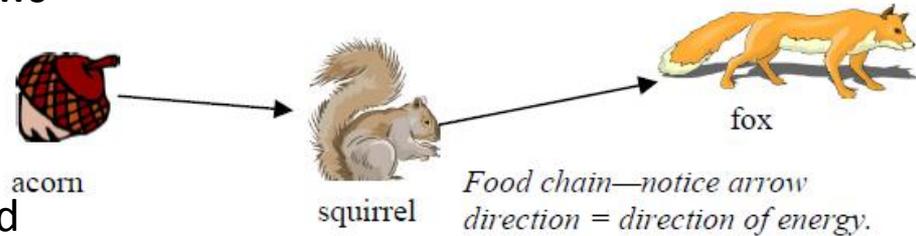
5. Producers, 1st Level Consumers; 2nd Level Consumers: 3rd Level Consumers?

- A. 1st A cow.
- B. 3rd The least amount of energy in an ecosystem.
- C. 1st Humans when we eat vegetables
- D. 2nd A lion.
- E. Prod. Has the most amount of mass in an ecosystem.
- F. 3rd A fox when it eats a snake, which eats a mouse.

6. If there is 50 joules of energy at the tertiary consumer level of an ecosystem, how much energy was in the producer level?

2nd level = 500 J; 1st level = 5000 J; producer level = 50,000 J

Food Chain – A single chain of organisms that shows who-eats-who. Arrows point to where energy flows (to the eater: from broccoli to you). For instance: energy of squirrel goes to fox (fox eats squirrel).



Food Web – a group of multiple, interwoven Food Chains for a particular biome.

7. Of the organisms shown below give an example of a:

A. Predator: **eagle; snake; owl**

B. Herbivore: **mouse, cricket**

C. 1st level consumer: **cricket, mouse**

D. Decomposer: **vulture**

E. Producer: **grass, fruit**

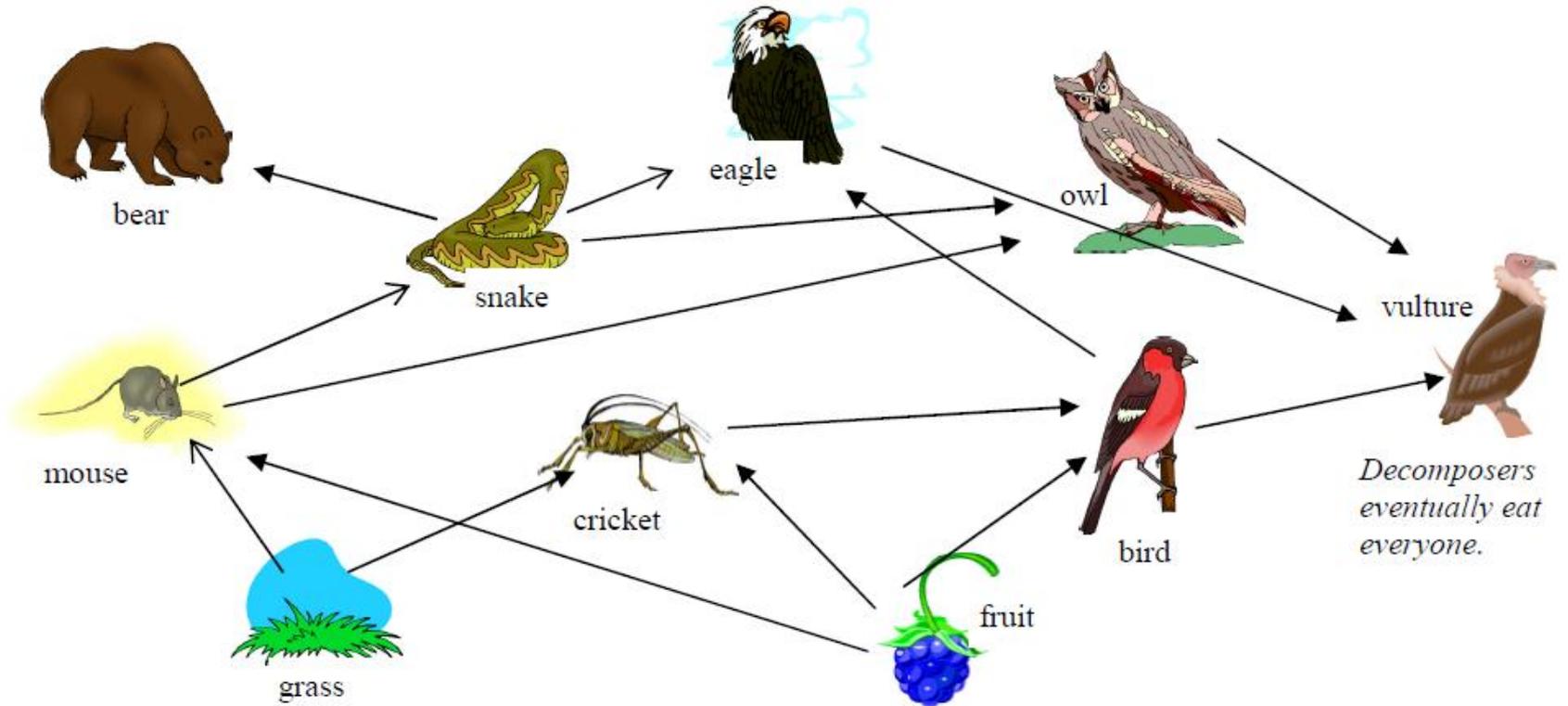
F. Omnivore: **mouse; bear; bird**

G. A carnivore of carnivores: **Bear, eagle, owl**

H. A 1st level consumer: **Mouse, cricket, bird**

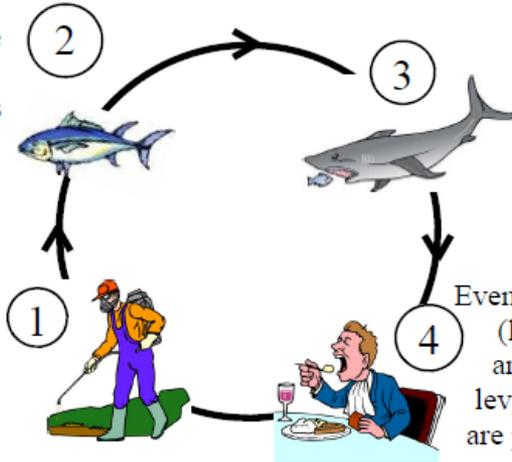
I. Least energy in the ecosystem: **Bear, owl, eagle**

8. Below, draw a food web consisting of at least four food chains. Be careful of the arrow directions



Biomagnification

Animals ingest (eat) pollution. Over time the amount of toxins in their bodies builds up.



Toxic pollution (oil, pesticides, fertilizer, metals) are used and get in the water or environment.

Each big fish eats many little fish. The amount of toxins increases substantially as you go up the food chain.

Eventually, top predators (like humans) eat fish and animals with high levels of pollution. We are poisoning ourselves.

In the 1960's bald eagles almost went extinct because of DDT, a very powerful and common pesticide. By banning DDT, improving water quality, and protecting habitat, bald eagles are no longer threatened. But others are...



9. What is a toxin?

Poison

10. Give two ways that toxins get into the environment.

**Fertilizer on lawn;
oil from cars; garbage; trash**

11. Which of the animals above would have the most toxins due to biomagnifications?

Eagle; owl; vulture; bear

12. True or false (and why): pollutants in the environment only hurt animals and not humans.

Humans eventually eat animals that are higher on the food chain and have higher levels of toxins—we get the highest dose!

Objective 3 Day 13

“Viruses and Bacteria”

A Little About Bacteria (which are very little, themselves)...

...living, single-celled organisms.

...have cell membrane, actual DNA and ribosomes, but no organelles. (prokaryotes [no nucleus]).

...cause diseases such as streptococcus (strep throat; pneumonia) and diphtheria (rare in US).

...killed by antibiotics, but they adapt quickly, so overuse of antibiotics is bad.

...Spread by contact between people. Stopped by washing hands; hand sanitizer; coughing into your elbow; staying home when sick.

...are necessary for good health, especially in digestion (we can't digest plant matter [cellulose] without them).

...being “too clean” (or overusing antibiotics) can kill good bacteria (but they can be repopulated, like with yogurt).

Viruses

...surrounded by hard protein coat with DNA or RNA fragments (no genes) [see diagram].

...can't make their own energy or proteins and need a host cell to reproduce, so VIRUSES ARE NOT ALIVE!

...CANNOT BE KILLED WITH ANTIBIOTICS (which attacks cell membranes).

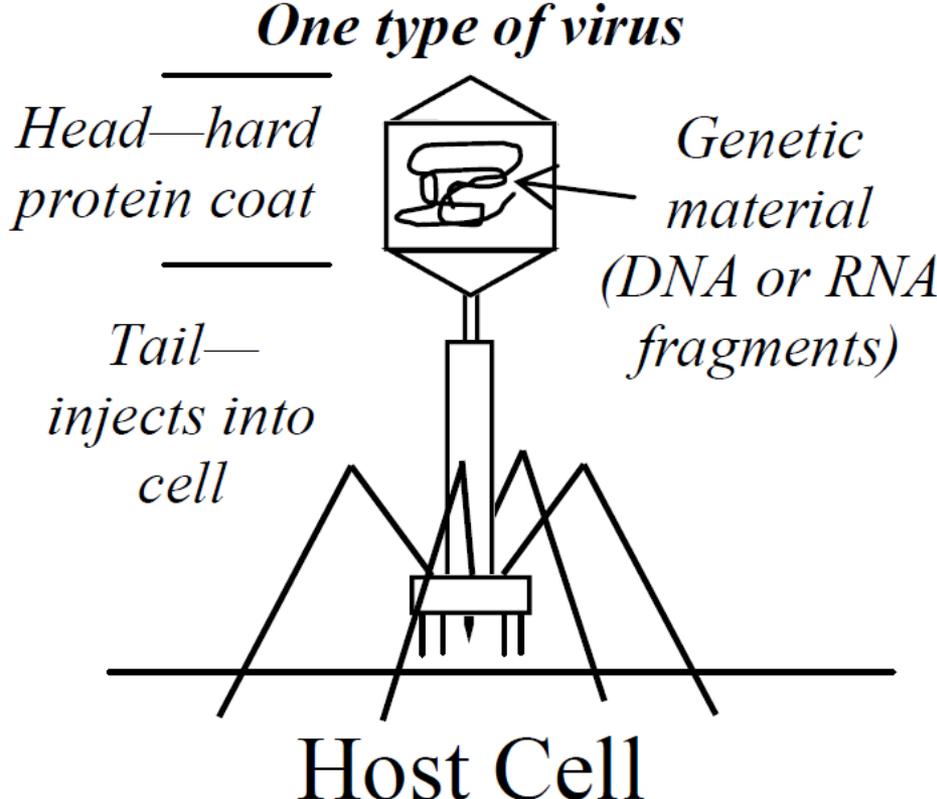
...cause AIDS: attacks helper T-cells [white blood cells]

...cause smallpox: like chickenpox, but more dangerous; eradicated throughout the world; US hasn't vaccinated for it since 1972.

...cause warts, common cold, influenza (flu) - again, antibiotics will not help.

(Taking antibiotics for a cold will only help bacteria become resistant.)

...stopped by prevention (hand washing), antiviral medication, or vaccines (injection of weakened virus so immune system learns to fight it).



1. Virus or bacteria?

- A. Both Has genetic material.
- B. B Are alive.
- C. B Help us with digestion.
- D. V Needs a host cell to reproduce.
- E. V Have hard protein coating.
- F. B Have a cell membrane.
- G. Both Can cause diseases.
- H. B Can be beneficial.
- I. B Are in yogurt.
- J. B Can replicate if given nutrients.
- K. V Takes over a cell.
- L. B Has complete DNA.
- M. None Has a nucleus.
- N. B Can make its own proteins.
- O. B Killed by antibiotics.
- P. V Causes colds and flu.

2. Give three ways to help prevent the spread of viruses or bacteria.
Washing hands, sanitizer, sneezing in elbow, staying home when sick.

3. Give two ways that viruses “seem” to be alive.
Have genetic material and multiply

4. Give proof that virus are not alive.
Need host to reproduce

5. You feel ill, go to the doctor, and ask for antibiotics. What should the doctor do?
Is it a virus or a bacteria

6. Why can the over use of antibiotics be harmful to us?
Can strengthen bacteria or kill good bacteria.

7. Bacteria cause disease. As a result a friend of yours says that all bacteria should be eliminated. Respond.
We need bacteria to survive.

8. Give three diseases that cannot be cured by antibiotics.
Colds, warts, flu, small pox, AIDS.