Activity #1

Answer Key

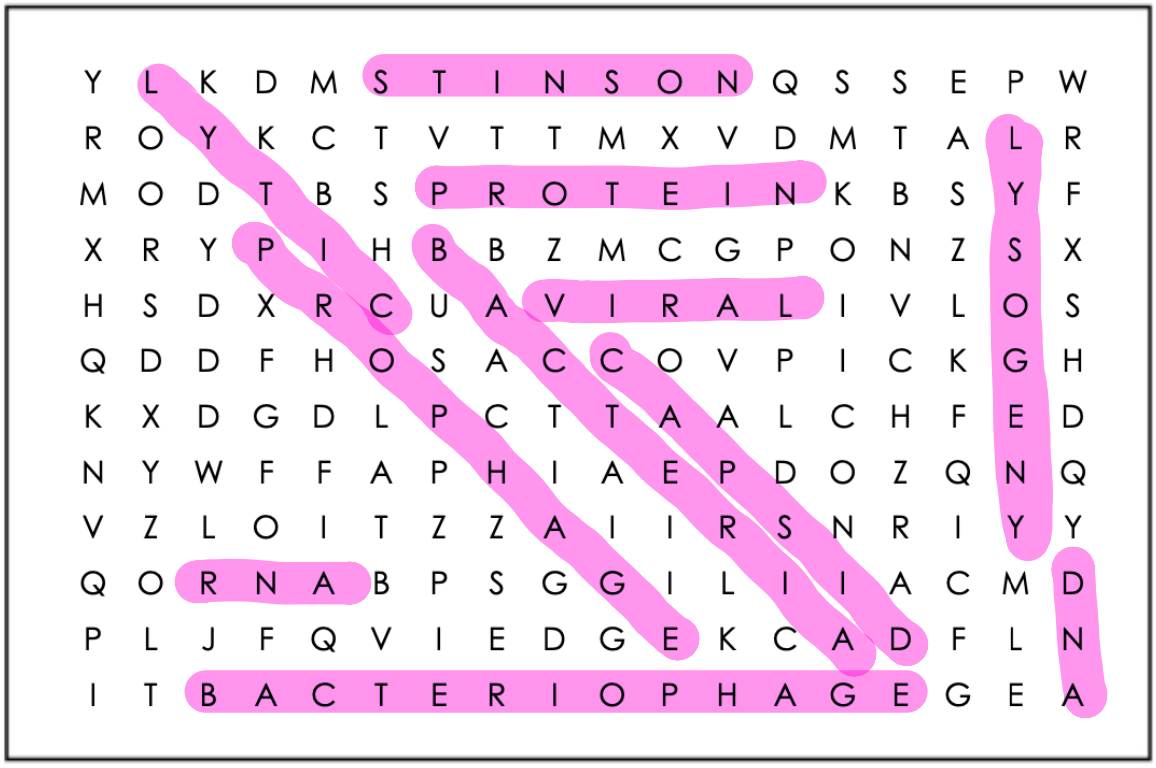
What Are Bacteriophages

V	I	R	U	S	E	S	Y	L	L	V	V	R	W	P	BACTERIOPHAGE
R	L	N	A	S	V	R	F	I	Y	L	A	O	E	E	CAPSID
E	O	Y	Q	S	B	C	W	J	S	I	J	E	M	P	LYTIC
V	N	K	R	J	A	N	A	N	O	A	S	Q	Y	U	TAIL
P	F	F	Q	O	C	K	Q	H	G	R	T	V	O	F	DNA
E	V	T	S	C	T	H	F	I	E	E	A	L	T	H	VIRUSES
M	O	A	S	X	E	X	D	V	N	J	I	H	Q	Y	LYSOGENIC
Z	H	L	Y	P	R	K	I	V	I	F	L	R	H	L	HOST
B	F	P	G	N	I	D	H	X	G	Y	E	C	O	Y	DIVERSE
S	U	J	L	X	O	O	H	D	N	A	S	C	S	T	UNIQUE
F	N	U	M	C	P	F	L	K	P	W	R	W	F	I	INFECT
Q	I	G	S	W	H	V	Y	T	H	S	E	S	O	C	
I	Q	T	X	V	A	M	C	B	W	U	S	P	I	A	
D	U	O	N	R	G	P	B	H	X	S	V	Y	Z	D	
D	E	B	T	T	E	C	N	V	J	R	V	L	Y	M	

Activity #2: Phage Hunter Word Search

Name: _____ **Date:** _____

Phage hunter



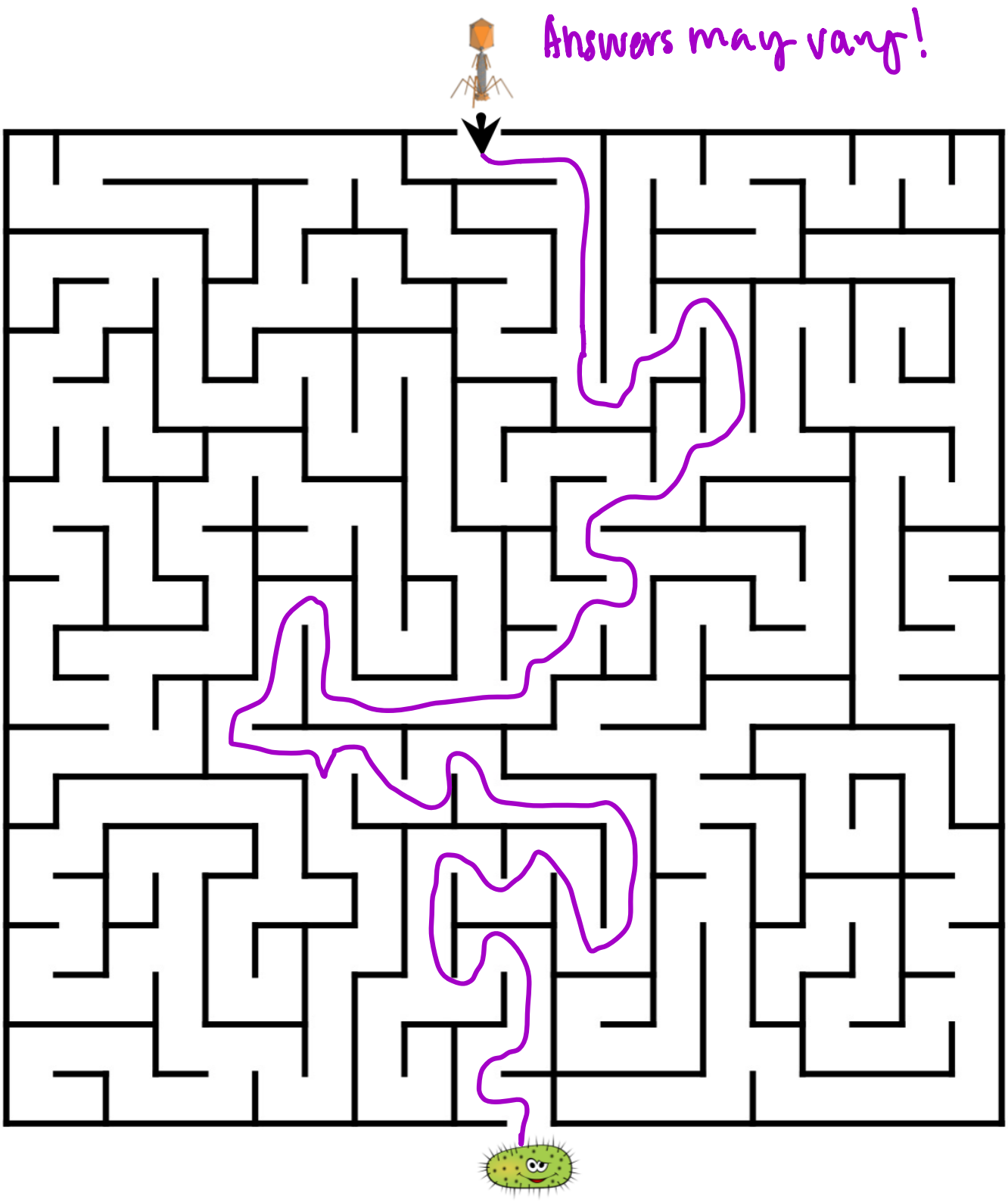
Y	L	K	D	M	S	T	I	N	S	O	N	Q	S	S	E	P	W
R	O	Y	K	C	T	V	T	T	M	X	V	D	M	T	A	L	R
M	O	D	T	B	S	P	R	O	T	E	I	N	K	B	S	Y	F
X	R	Y	P	I	H	B	B	Z	M	C	G	P	O	N	Z	S	X
H	S	D	X	R	C	U	A	V	I	R	A	L	I	V	L	O	S
Q	D	D	F	H	O	S	A	C	C	O	V	P	I	C	K	G	H
K	X	D	G	D	L	P	C	T	T	A	A	L	C	H	F	E	D
N	Y	W	F	F	A	P	H	I	A	E	P	D	O	Z	Q	N	Q
V	Z	L	O	I	T	Z	Z	A	I	I	R	S	N	R	I	Y	Y
Q	O	R	N	A	B	P	S	G	G	I	L	I	I	A	C	M	D
P	L	J	F	Q	V	I	E	D	G	E	K	C	A	D	F	L	N
I	T	B	A	C	T	E	R	I	O	P	H	A	G	E	G	E	A

Find the following words in the puzzle.
Words are hidden → ↓ and ↘ .

~~BACTERIA~~
~~BACTERIOPHAGE~~
~~CAPSID~~
~~DNA~~
~~LYSOGENY~~
~~LYTIC~~
PROPHAGE
~~PROTEIN~~
~~RNA~~
~~STINSON~~
TAIL
~~VIRAL~~

Activity #3: Phage Maze

Your goal in this activity is to successfully help the bacteriophage reach the host so it can infect and kill the deadly pathogen that is causing the disease!



Activity #4: Challenge yourself to this trivia!

Do your best to answer these trivia questions about bacteriophages. Answer the questions first on your own, then compare your answers with other students in your group!

Correct answers are in yellow. Teaching tip: give a prize at the end of the trivia to the students who finished all the questions in a time from you chose. Possibly play

1. The viral genome integrated into the bacterial genome is called?
   A) Prophage
   B) Virion
   C) Capsin

2. Bacteriophages are?
   A) Viruses that attack bacteria
   B) Bacteria that attack viruses
   C) Free living viruses

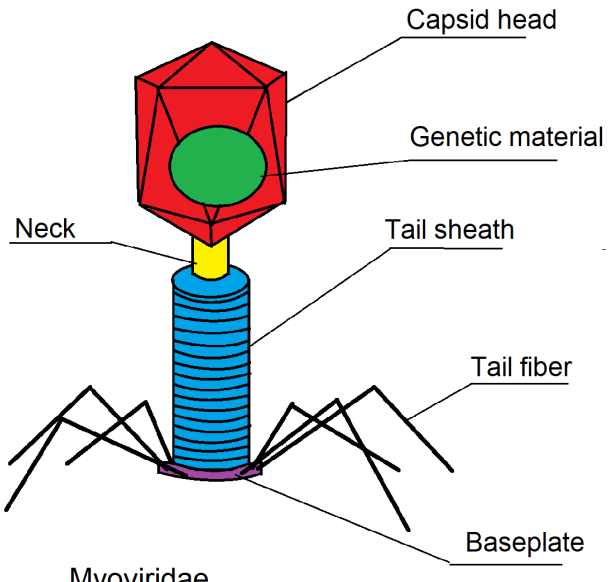
3. The genome of bacteriophage are:
   A) DNA
   B) RNA
   C) Both DNA and RNA

4. Which of the following are not a part of the exterior structure of a bacteriophage:
   A) Capsid
   B) Cell wall
   C) Tail fibres

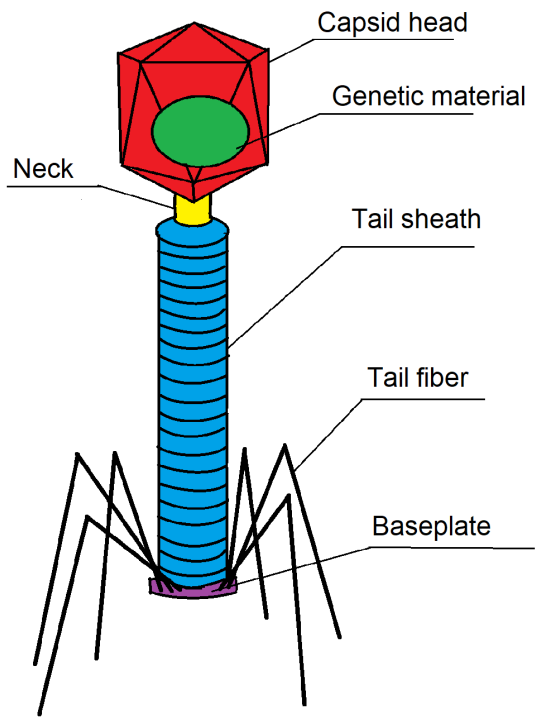
5. What do a bacteriophage's tail fibers do?
   A) Give the phage the ability to move around
   B) Allow phage to attach to a host cell
   C) Insert virions into the host cell
   D) All of the above

PHAGE MORPHOLOGY

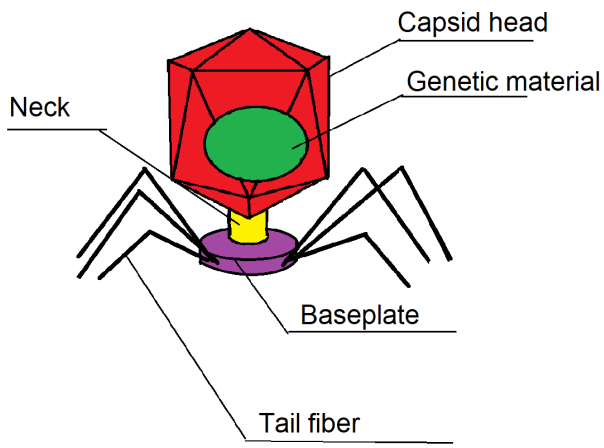
Using the word bank, label the parts of each phage morphology. Color each part of the phages as instructed below!



Myoviridae



Siphoviridae



Podoviridae

WORD BANK (some words will be used more than once!)

Myoviridae	Tail sheath	Baseplate
Siphoviridae	Genetic material	Neck
Podoviridae	Capsid head	Tail fiber

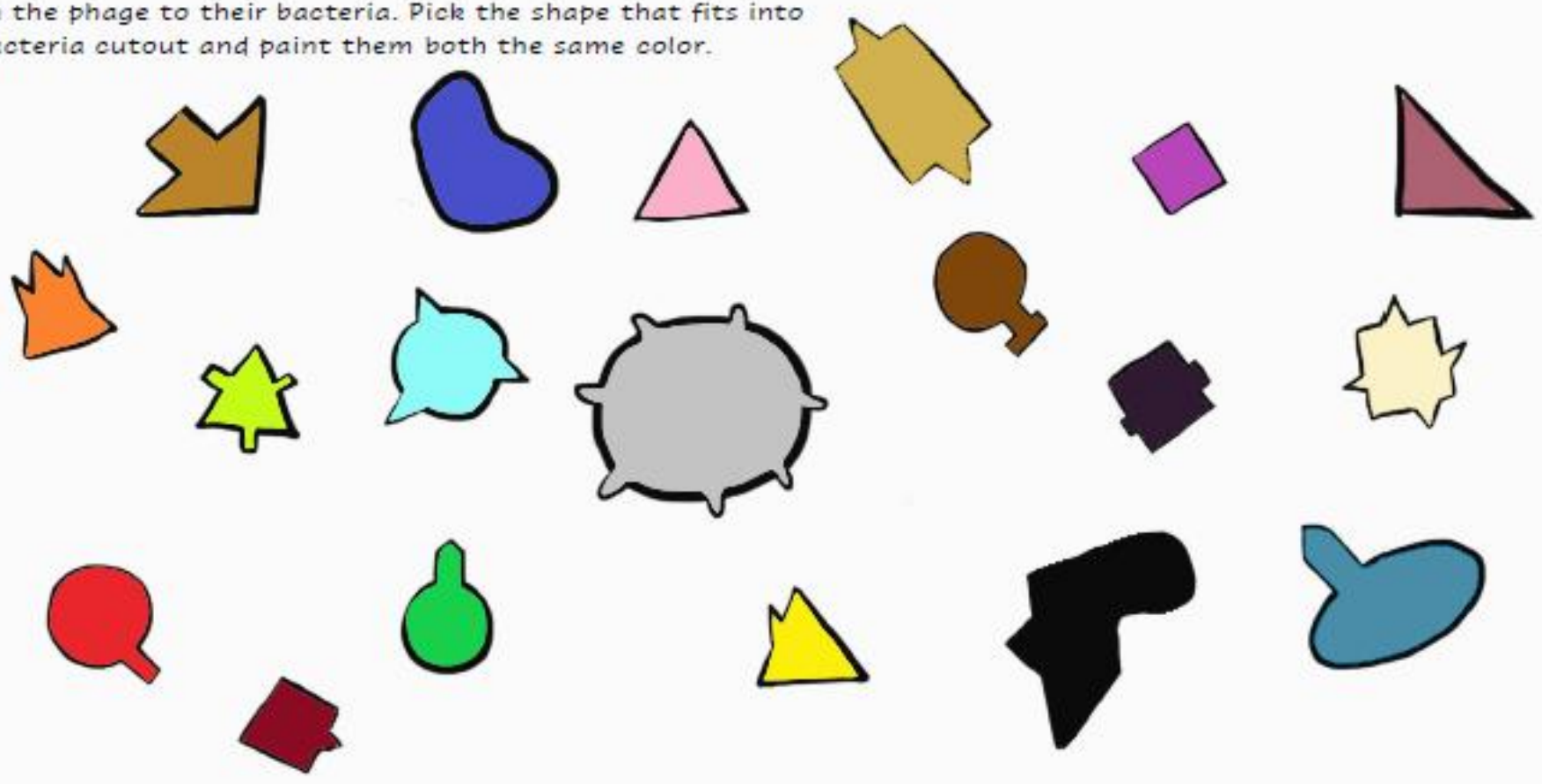
COLOR THE...

Tail sheath blue	Baseplate purple
Genetic material green	Neck yellow
Capsid head red	

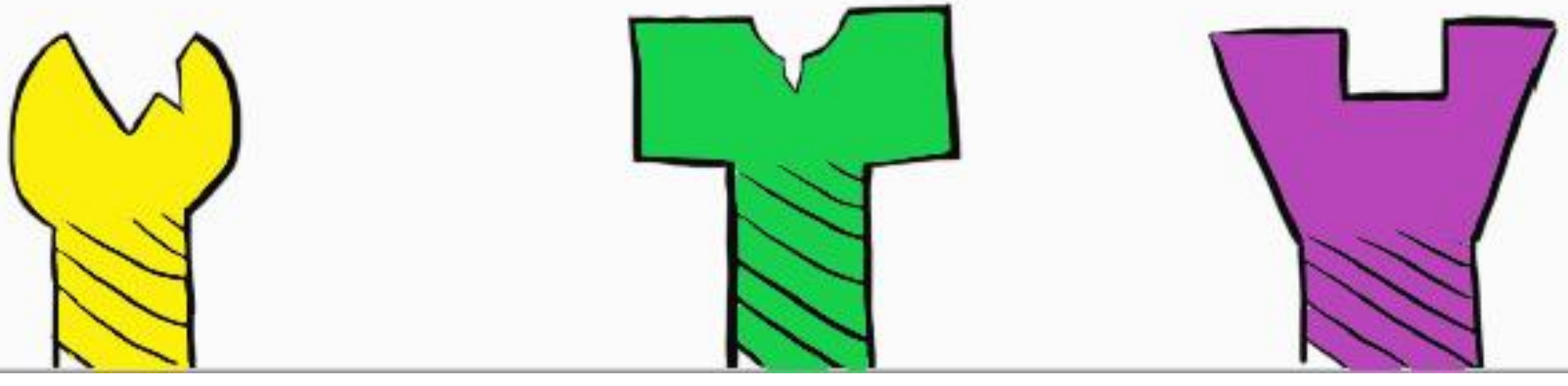
ANSWER KEY

Did you know? Bacteriophages are the most abundant organisms on Earth? These tiny creatures are very specific to their host. That is, they must match their hosts exactly in order to infect them.

Match the phage to their bacteria. Pick the shape that fits into the bacteria cutout and paint them both the same color.



Activity #8



Activity #9

KEY

Down

1. RNA
2. Plasmid
4. Internal Protein
6. Base plate
7. Virus
8. Sheath
13. Lytic Cycle

Across

3. Bacteria
5. DNA
9. Bacteriophage
10. Protease
11. Nucleic Acids
12. Tail Fibers
14. Capsid
15. Lysogenic Cycle
16. Nuclease
17. Prophage

The Invisible World of Bacteria

Instructions: Read through the worksheet and answer the questions along the way.

Did you know that, right now, there are billions of living organisms all around you that you can't even see? These tiny organisms are called bacteria and it is impossible to see them with your eyes (even when you are wearing glasses or even using a magnifying glass). Because bacteria are so small, we must use a special tool called a microscope to see them. These bacteria may be small, but they play a big role in our lives.

Question #1

True or false, we can see bacteria with our human eyes alone.

a. True
b. False

Bacteria are forms of life that are made up of cells just like you or your pet animal at home. Bacteria are some of the most abundant life forms found on our planet and there are more bacteria than all humans and other animals combined.

Question #2

Which organism is the most abundant?

a. Humans
b. Dogs
c. Bacteria
d. Fish

Bacteria are found in almost all corners of the Earth. Some live in the ocean, some live on your toothbrush, and some even live inside of you!

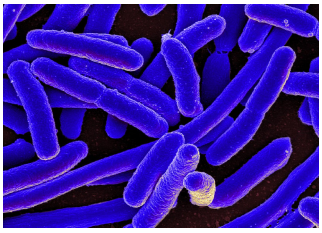
Question #3

Name three places where bacteria live or where you think you may find them.

1. Various answers accepted
2. Various answers accepted
3. Various answers accepted

Examples include: hands, table, chair, grass, inside of us etc

Bacteria sound pretty neat, right? They are! However, not all bacteria are good bacteria. Many of the bacteria living inside of you or on you are there to help you. They are able to help you digest food or even help repair an injury. But bacteria are not always nice to us.



Question #4

True or false, there are helpful and harmful bacteria.

a. True
b. False

There are certain types of bacteria that cause disease and make us feel bad. If you have ever had strep throat or an ear infection, it is possible that bacteria are making you feel sick. You may have even gone to the doctor for medicine to help you feel better. One way to help us feel better when bacteria make us sick is to take medicine called antibiotics. Antibiotics have the ability to cure an illness caused by bacteria by killing them.

Question #5

What treatment do doctors often use to kill bacteria?

a. Bandages
b. Antibiotic medicine
c. Cast
d. Shot/vaccine

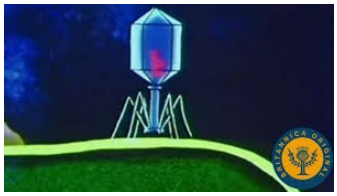
Medicines used to treat diseases caused by bacteria are very helpful, but recently they have become less effective.

Just like you may have learned how to ride a bike or swim, many bacteria are learning to survive even when medicine is taken.

Question #6
What are bacteria learning how to do?

a. Survive medicine
b. Ride a bike
c. Swim
d. Cook

Because bacteria are becoming so smart, doctors and scientists are searching for a new way to help people get better when bacteria makes them sick. One way they are doing this is by making the bacteria themselves sick. This is done by using bacteriophages, also known simply as phages. Phages are viruses that infect and kill bacteria.



Question #7
What is the name for a virus that infects/kills bacteria?
Answer:___Bacteriophages/phages____

Believe it or not, phages are actually even smaller than bacteria and are more abundant than bacteria, making them some of the most abundant biological entities on our planet. Because there are so many phages, many of them have gone unnoticed or are simply understudied by scientists. Many research projects in today's world focus on discovering new things about these phages.

Question #8
True or false, there are more phages on the Earth than bacteria.

a. True
b. False

Learning about and discovering new phages is important because they do have the ability to infect and kill harmful bacteria. Doctors are now looking into using these phages to treat sick patients when medicine doesn't work. Getting involved in biology or science classes can introduce you to this work!

Question #9
What are doctors trying to use to treat illnesses caused by bacteria?

a. Surgery
b. Healthy food
c. Love
d. Phages

Question #10
Are you interested in biology and science?

a. Yes
b. Maybe
c. No