

It's Alive!!

(or is it?)

A teaching *tidbit* developed for the
SMI
Scientific Teaching Institute
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Learning Outcome: By the end of the lesson students will be able to judge whether something is living or nonliving by comparing the characteristics of viruses and bacteria.

Materials/Teacher Prep:

Each *student* will need a handout.

Each *lab group* will need two plastic bags (or envelopes if bags are unavailable), two pieces of string/yarn/thread, a characteristics page and colored pencils/markers/crayons. It is nice if one of the bags is smaller and has a smaller string loop - but if only one size of bag is available - go for it!

Lesson Components:

Engage: Is something the students have not seen before alive?

Possible activities include the nuclear flea/dancing raisin lab which is described variously at:

<http://tlc.ousd.k12.ca.us/~acody/7cif4.html>

<http://www.spartechsoftware.com/reeko/Experiments/ExpDancingRaisins.htm>

You might also consider the glue critter activity.

www.flinnsci.com/Documents/demoPDFs/Biology/BF10227.pdf

<http://teachers.net/lessons/posts/168.html>

Explore: Continue with the characteristics of living things.

Explain: Continue with the characteristics of living things

Extend: Determine if the characteristics on the list are key to identifying living things and place in the appropriate baggie.

Evaluate: Make a Venn diagram and discuss results

Want more about whether or not something is living?

Is there life on Mars? How can we tell?

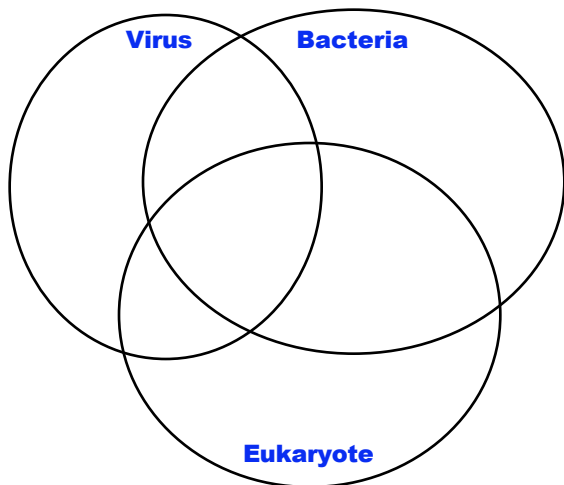
<http://mars.jpl.nasa.gov/msp98/why.html>

<http://www.nasa.gov/phoenix>

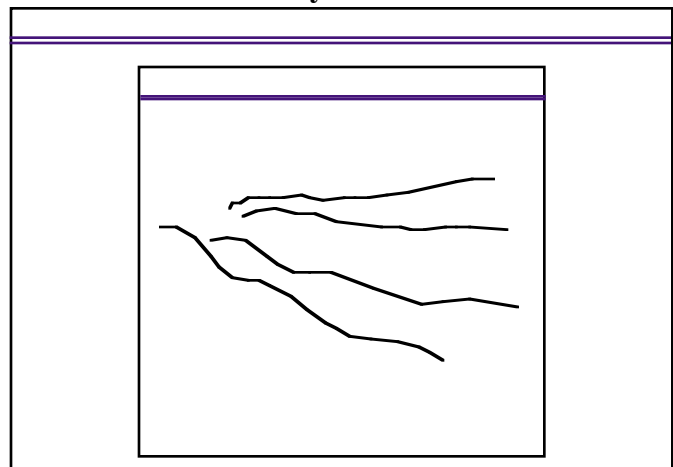
Voyages Through Time, <http://www.seti.org/epo/vtt-curriculum/index.php>, a high school curriculum.

Want more about the characteristics of viruses and bacteria?

This activity can be expanded to include eukaryotes.



Eukaryote Model



Medium plastic baggie with several pairs of string inside a large plastic baggie.

It's Alive!! (or is it?)

Instructions:

Prepare your virus and bacteria models as shown.

Color the characteristics on your list that are found in all living things **red**.

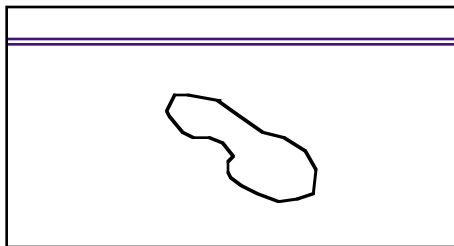
Color the characteristics on your list that are *not* found in all living things **green**.

Cut out the characteristics and place them in the appropriate models.

Discuss your models.

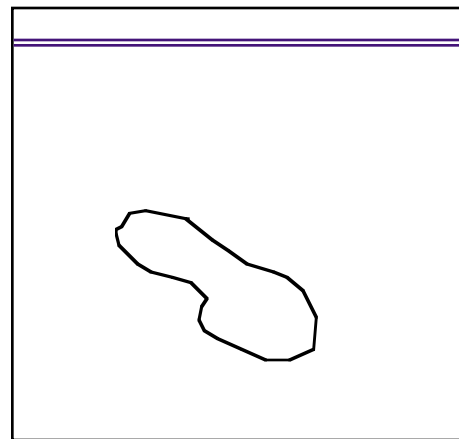
Make a Venn diagram showing the characteristics of life and the three entities you modeled.

Virus Model

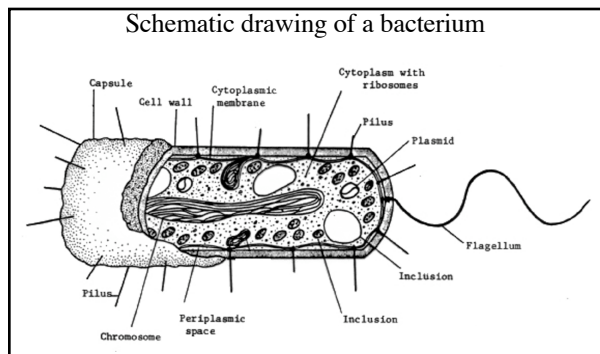
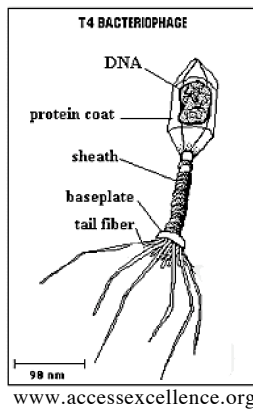


Small *plastic baggie* with small *loop of string*.

Bacteria Model



Medium *plastic baggie* with medium *loop of string*.



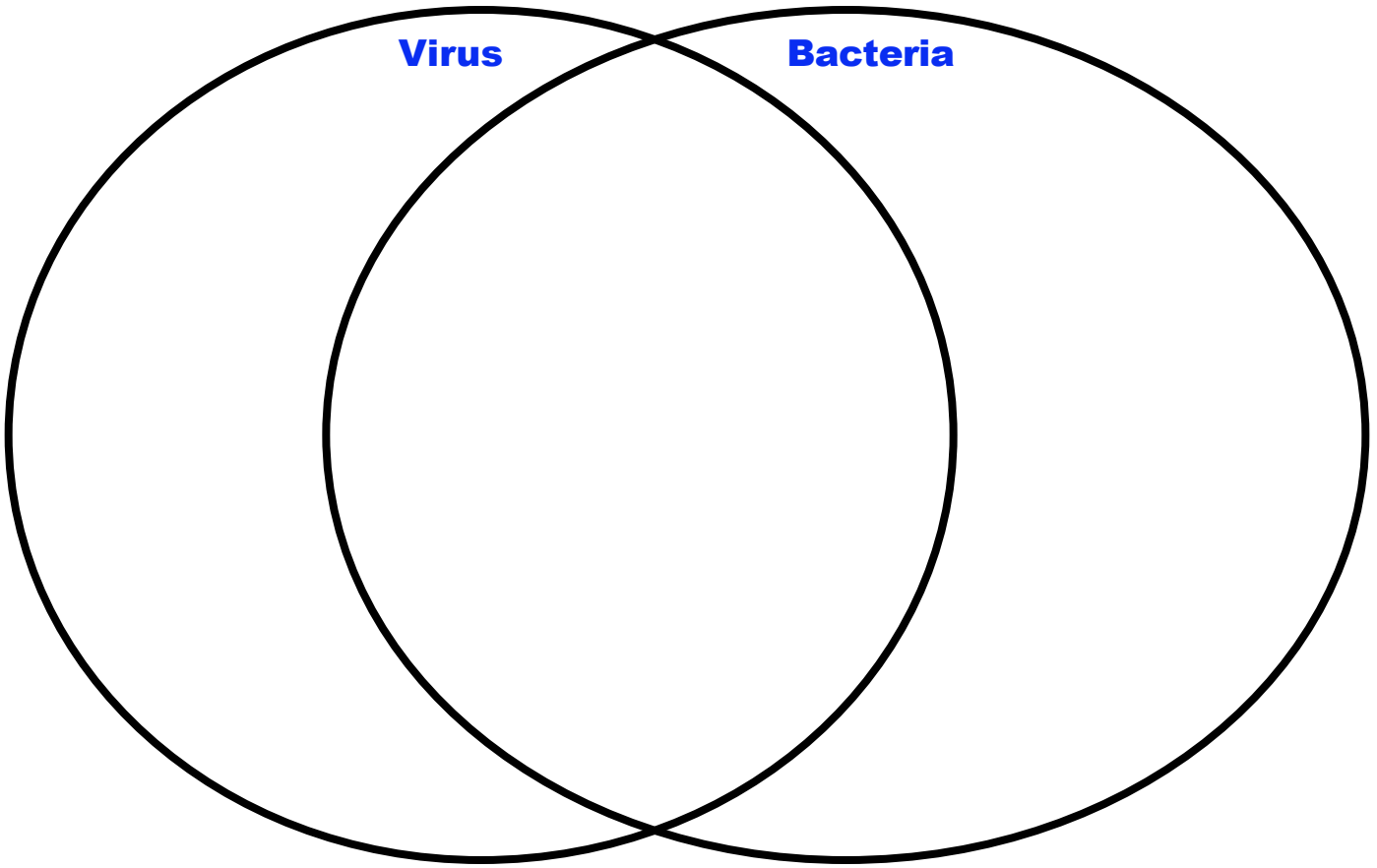
http://www.bact.wisc.edu/themicrobialworld/schematic_bacterium.jpg

1. What do the baggies and the strings represent in each of the models?

Virus: _____

Bacteria: _____

2. Include the characteristics of life on your Venn diagram.



3. Which of these entities do you think are alive? _____

Why? _____

Instructions:

Color the characteristics on your list that are found in all living things **red**.

Color the characteristics on your list that are *not* found in all living things **green**.

Cut out the characteristics and place them in the appropriate models. Discuss your models.

Make a Venn diagram showing the characteristics of life and the three entities you modeled.

Breathe	Breathe
Can cause disease	Can cause disease
Evolve	Evolve
Has nucleic acid	Has nucleic acid
Has nucleus	Has nucleus
Has ribosomes	Has ribosomes
Made of cell(s)	Made of cell(s)
Maintain homeostasis	Maintain homeostasis
Move	Move
Reproduce itself	Reproduce itself
Respond to environment	Respond to environment
Synthesized by another organism	Synthesized by another organism
Think	Think
Use energy	Use energy
Pick your own characteristic.	Pick your own characteristic.
Pick your own characteristic.	Pick your own characteristic.

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Prepare your virus and bacteria models as shown.

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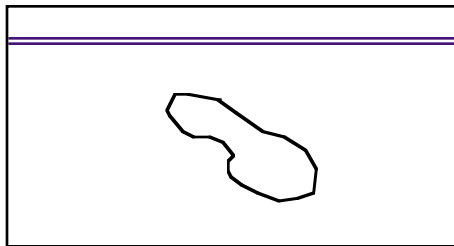
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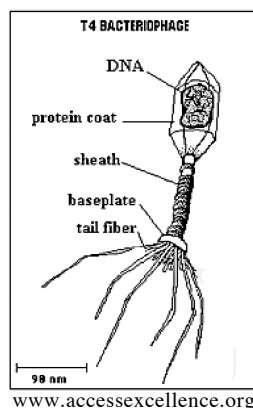
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Make a Venn diagram showing the characteristics of life and the three entities you modeled.

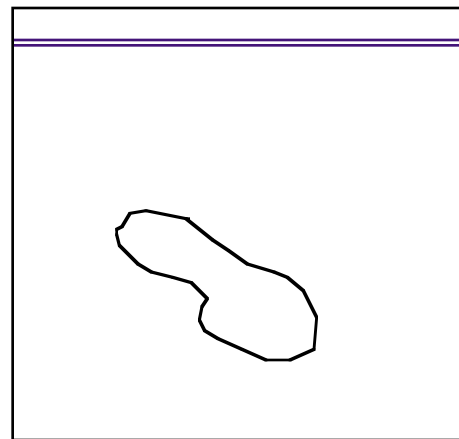
Virus Model



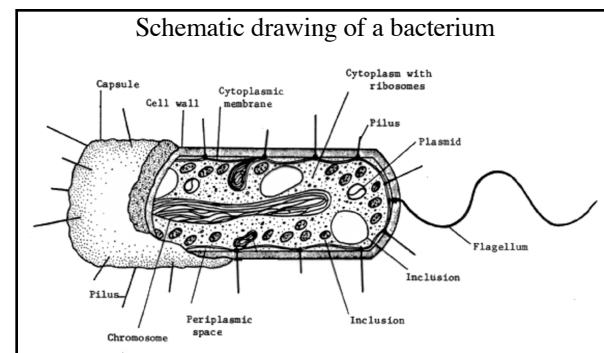
Small *plastic baggie* with small *loop of string*.



Bacteria Model



Medium *plastic baggie* with *medium loop of string*.

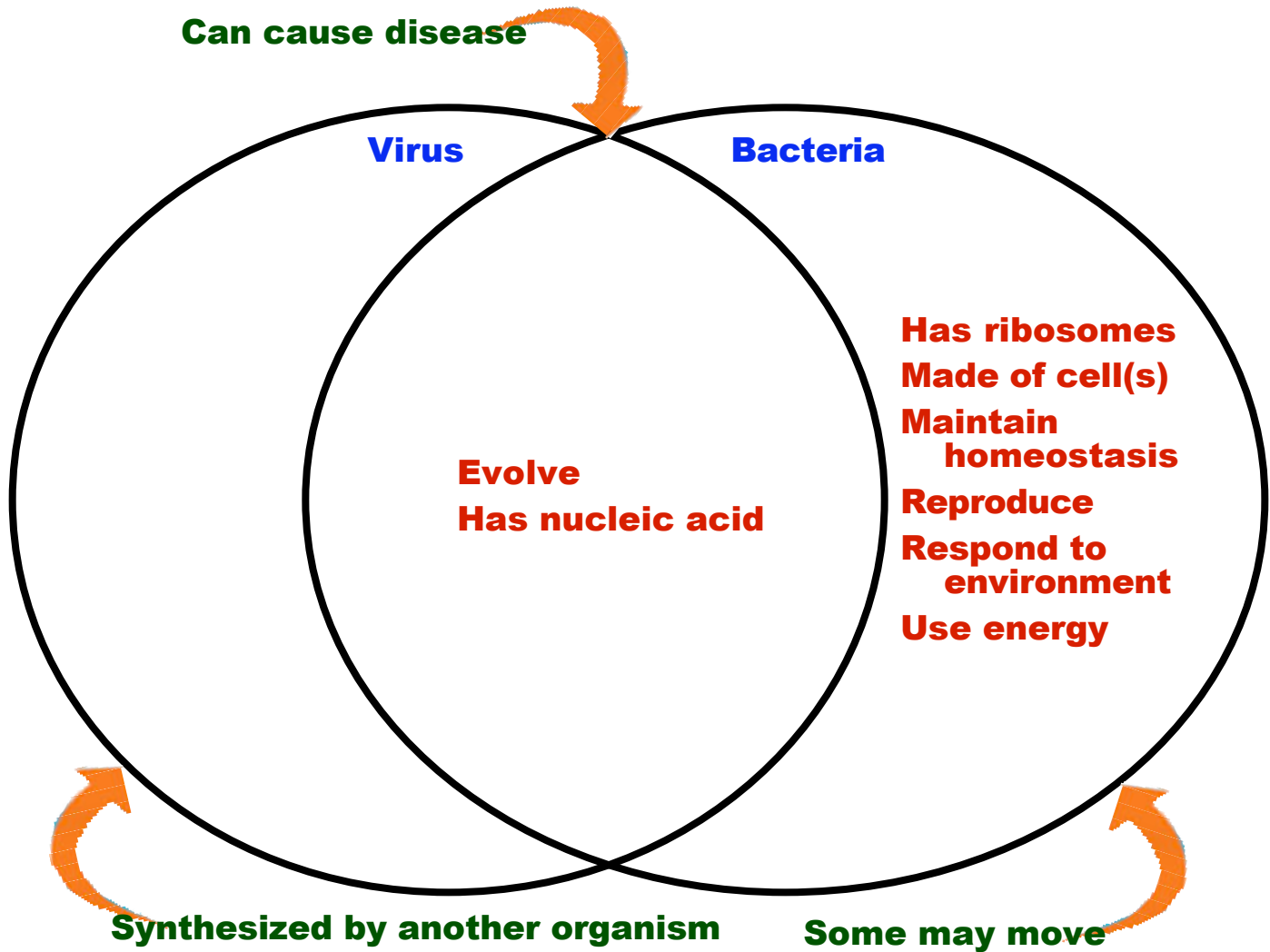


1. What do the baggies and the strings represent in each of the models?

Virus: **Sample answer: The bag is the protein coat and the loop of string is the nucleic acid, often DNA.**

Bacteria: **Sample answer: The bag is the cell membrane and the loop of string is the bacterial chromosome, a loop of DNA.**

2. Include the characteristics of life in your Venn diagram.



Characteristic Key

Characteristic of all life.
Not a characteristic of life.

Not in the diagram:

Has nucleus
Breathe
Think

3. Which of these entities do you think are alive? **Sample answer: Bacteria are alive.**

Why? **Sample answer: Bacteria & Eukaryotes are made of cells, can maintain a pretty constant internal environment (homeostasis), respond to their environment, use energy, and reproduce. Viruses just hijack the organelles of the host cells and make them build virus parts.**
