

*Watson Ranch  
Elementary Science*

Science in the Industrial Age  
*Lab and Review  
Book*

*LEVEL 1*

*Property of:*

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Lesson 2

This is a challenge lesson, so I want to challenge you to make your own notebook page for it!

Lesson 3

This is a challenge lesson, so I want to challenge you to make your own notebook page for it!

## Lesson 4

1. The study of how life is distributed throughout the world is called \_\_\_\_\_.

2. Where is the earth's magnetic field the strongest:

near the poles **OR** near the equator?

3. In the space below draw a picture of a needle hovering horizontally near a magnet (like in your experiment).



4. \_\_\_\_\_ was exerting a force and pulling the needle down, but the magnetic force was \_\_\_\_\_ in the beginning, causing the needle to hover. The experiment also helped identify the weaker magnet, because the needle would fall when it was \_\_\_\_\_ to that magnet.



Lesson 6

This is a challenge lesson, so I want to challenge you to make your own notebook page for it!

## Lesson 7

1. When you see bubbles forming in a liquid, then you know that a \_\_\_\_\_ is being formed.
2. A \_\_\_\_\_ speeds up a chemical reaction but doesn't get used up.
3. Explain why a catalyst might appear to be necessary for a chemical reaction but really isn't. Use the hydrogen peroxide part of your experiment as an example in your explanation.

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Lesson 8

1. Animals with a backbone are called \_\_\_\_\_ and animals with no backbone are called \_\_\_\_\_.
2. A person like Lamarck who believes in a God who created the world but doesn't interact with it is called a \_\_\_\_\_.
3. Make a drawing in the box like the one on page 23, and use it to explain Lamarck's view of inheritance. Be sure to use the words "inheritance," "offspring," and "generations" in your answer.

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Lesson 10

1. Dew is formed when grass and flowers are cool enough, causing the \_\_\_\_\_ in the surrounding air to condense.
2. Frost can form on the grass (or windows) when its temperature is low enough to \_\_\_\_\_ water
3. Explain the term “dew point” in your own words:

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Examples of frost (on the left) and dew (on the right).



## Lesson 11

1. If a gas weighed 10 times as much as an equal volume of hydrogen gas, how many protyles would Prout say it was made of?

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2. A fundamental particle is a particle out of which all

\_\_\_\_\_ are made.

3. Make a drawing like the one on page 33, showing Prout's idea of a protyle using hydrogen and oxygen as examples. Oxygen weighs 16 times as much as an equal volume of hydrogen. Use that drawing to explain what Prout thought a protyle was.



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Lesson 12

1. The prefix *macro* means \_\_\_\_\_.
2. The macronutrients are \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.
3. Why are those three things called “macronutrients?”

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4. The prefix *micro* means \_\_\_\_\_.



This breakfast has all three of the macronutrients. Can you figure out which part of the breakfast contains which macronutrients? HINT: The eggs have two of them, the bread and potatoes have one, and the cheese has one.

Lesson 13

1. The earth's \_\_\_\_\_ field causes a compass needle to point north.

2. Explain what you did in your experiment and what it demonstrated.

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3. What is an electromagnet?

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Lesson 14

1. Explain what an alloy is, and describe the alloy you made in your experiment.

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2. What is the alloy known as steel, and why is it used instead of pure iron?

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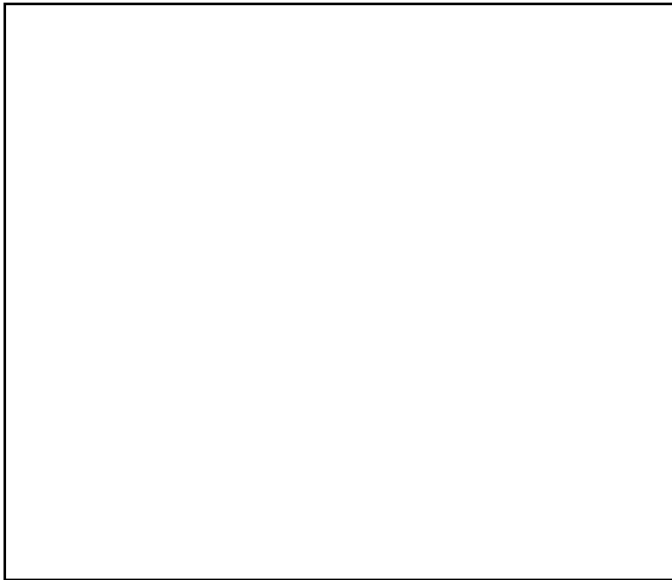
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1. Draw a picture of your experiment and explain why it worked the way that it did.



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2. How does this relate to a motor?

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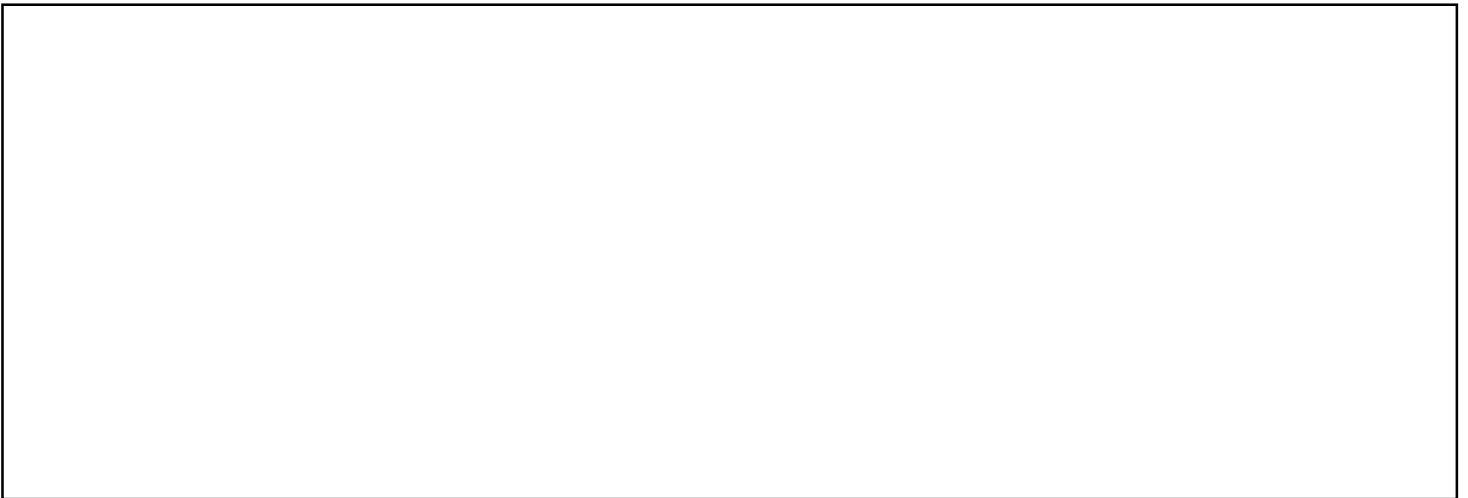
Lesson 16

1. The pattern of magnetic force lines coming from a magnet is called a \_\_\_\_\_.

2. Which pole of the magnet do magnetic force lines come out of?

\_\_\_\_\_

3. Draw a picture of the pattern you saw in your experiment.



4. Explain what you did to get the pattern and what it means.

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\_\_\_\_\_

Lesson 17

This is a challenge lesson, so I want to challenge you to make your own notebook page for it!



Lesson 19

1. All magnetic fields (whether from a permanent magnet or from one created with external electricity) come from the movement of

\_\_\_\_\_.

2. If the above is true, what makes a permanent magnet magnetic?

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3. Define electromagnetics.

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## Lesson 21

1. Draw a diagram of the brain like the one found on the bottom of page 62. Label the cerebrum, cerebellum, and brain stem



2. Coordination between your muscles is controlled by the

\_\_\_\_\_.

3. The part of your brain responsible for evaluating and using the information you get from your senses is the \_\_\_\_\_.

4. The \_\_\_\_\_ controls the vital functions.



Lesson 23

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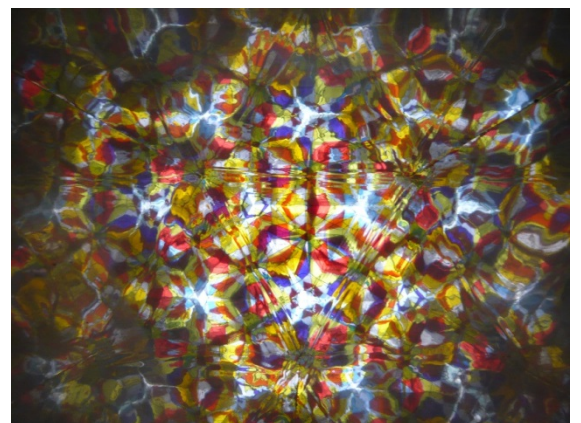
## Lesson 24

1. Put your drawings of the experiment results below:

2. In your experiment, different sounds produced different patterns of \_\_\_\_\_, so the salt also formed different patterns.

3. Wheatstone's sound-visualization system was called a \_\_\_\_\_ because the patterns it formed were something like what was seen in a kaleidoscope.

A view through a kaleidoscope. Can you see how the patterns are similar?





Lesson 26

1. The accurate judgement of the distance an object is from your body is called \_\_\_\_\_.

2. What is binocular vision?

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3. How does the answer to #1 come from the answer to #2?

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Lesson 27

This is a challenge lesson, so I want to challenge you to make your own notebook page for it!

Lesson 28

1. Which view of geology doesn't require long periods of time?

Catastrophism **OR** Uniformitarianism

2. What phrase best summarizes uniformitarianism?

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3. Which view of geology did Lyell believe?

Catastrophism **OR** Uniformitarianism

4. What was Lyell's motivation for studying geology that way?

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Lesson 29

1. Define diffusion

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2. How did diffusion allow the ammonia to mix with the cabbage water in your experiment?

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3. What does Graham's Law say about the speed at which diffusion Occurs?

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Lesson 30

1. What is a colloid?

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2. How does it compare to a solution?

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3. Draw the flashlight part of your experiment, indicating which glass you saw the beam of light in.



Lesson 31

1. Describe your experiment and explain why you heard different sounds during it.

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2. What kind of light can bees see that we cannot?

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3. What do bees do with that light?

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Lesson 32

1. What does pepsin do for digestion?

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2. Where is pepsin found in the body?

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3. What other parts of the body have chemicals like pepsin?

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4. Why does the body need so many chemicals like pepsin?

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## Lesson 33

1. If you were able to print out a picture of your model, use glue or tape to put it below. Otherwise, sketch it below. Either way, point out the parts of the cell that are labeled in the drawing on page 100.

2. What kind of cell is that? Plant **OR** Animal

3. What does cell theory tell us?

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Lesson 34

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## Lesson 35

Write a story about a drop of blood. It starts in the lungs and is headed to a muscle that needs energy. In the story, tell what the blood is bringing to the muscle, what the muscle does with it, and what the blood takes from the muscle. Also, tell what happens when the drop of blood gets back to the lungs. If you don't want to write a story, draw a picture that gives the same information.

Lesson 36

This is a challenge lesson, so I want to challenge you to make your own notebook page for it!

## Lesson 37

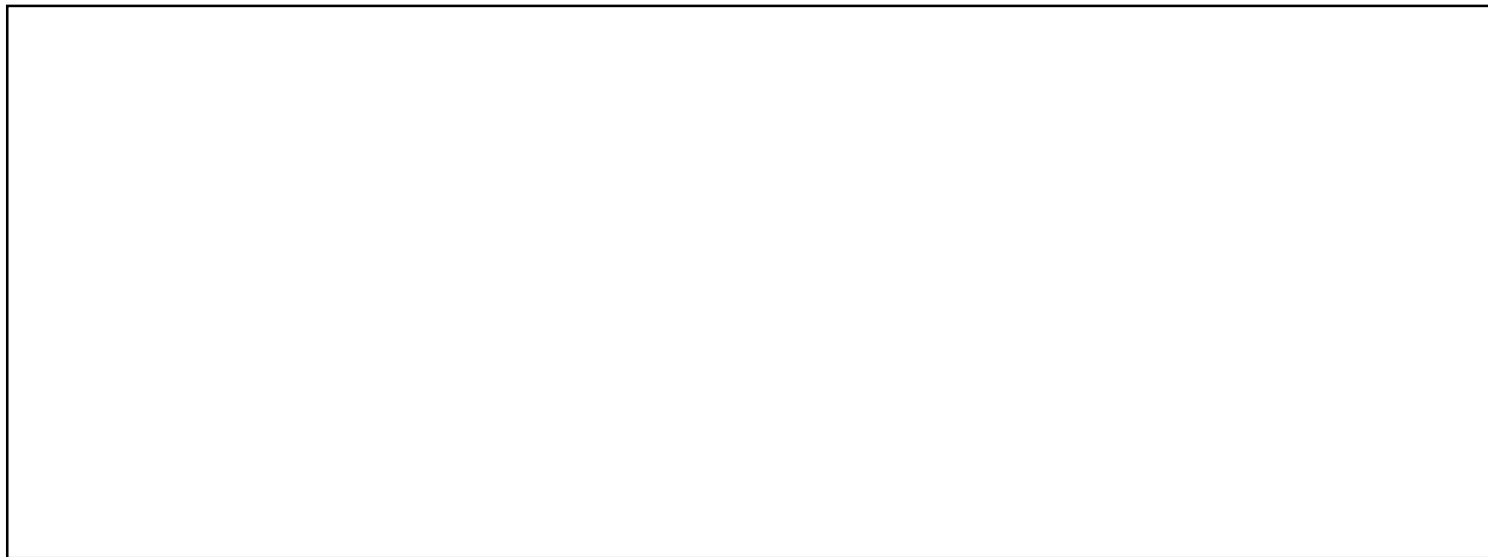
1. The First Law of Thermodynamics says that \_\_\_\_\_

cannot be created or destroyed. It can only be \_\_\_\_\_  
from one form to another.

2. Explain why all the energy in living things actually comes from the sun. You can use just words, or you can use an illustration with words.

## Lesson 38

1. Draw a picture like the one on page 115 and use it to explain the Doppler effect.



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2. The same thing happens to light, as long as the source is traveling \_\_\_\_\_ enough.





## Lesson 40

1. Astronomers observed that the planet \_\_\_\_\_ wasn't behaving according to Newton's Universal Law of Gravitation. This led them to believe that there had to be another \_\_\_\_\_.
2. Le Verrier used \_\_\_\_\_ to predict where an unseen planet would be found. He shared his findings with Galle who looked where he predicted and found a planet. We now call that planet \_\_\_\_\_.
3. Describe your experiment and explain how it relates to how the scientists of Le Verrier's day interpreted the motion of Uranus.

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## Lesson 41

1. Draw your fountain as it was working, and explain where the energy that powered it came from.



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2. Why did squeezing the balloon caused the water to come out faster and higher?

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Lesson 42

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## Lesson 44

1. Draw the two models you made in step 6 of the experiment (which represent molecules like  $\text{CH}_4$ ) and then draw the two models you made in step 11 (which represent molecules like  $\text{CH}_2\text{IF}$ ).



2. Explain why the second set of models represents a chiral molecule and how that differs from the first set of models.

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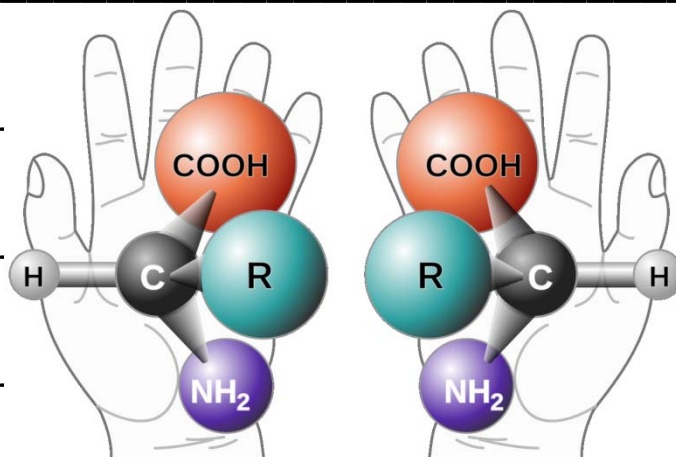
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This picture shows how the chirality of chemicals and your hands are the same.

Lesson 45

1. Explain your experiment and why one glass had bubbles in it but the other glass did not.

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2. Explain what pasteurization does to a liquid that you will eventually drink.

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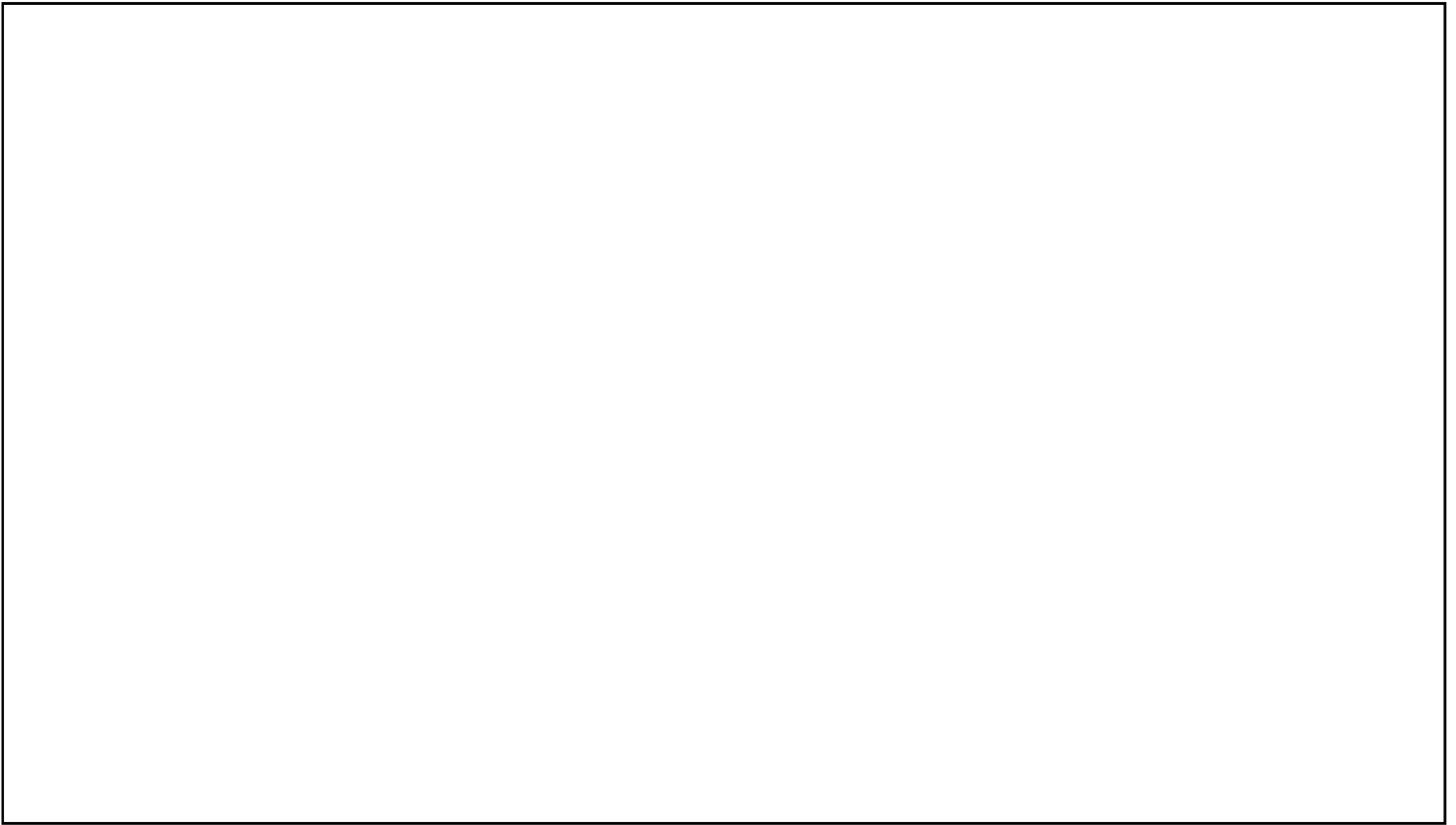
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## Lesson 46

1. The idea that living things can be produced by non-living things is called \_\_\_\_\_.

2. Draw a picture that shows the two types of flasks that Pasteur used. Point out the one in which microorganisms grew.



3. Based on his experiment (and yours), where did the microorganisms in the broth actually come from?

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## Lesson 47

1. Silk comes from the \_\_\_\_\_ that silk worms form when they undergo the process of \_\_\_\_\_ where they change from a caterpillar into a silk moth.

2. A \_\_\_\_\_ is an illness that can be passed from one person to another.

3. What is a quarantine?

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4. How did Pasteur use a quarantine to solve the French silk problem?

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The adult form of the silkworm.  
Artist: Zivya License: CC 3.0

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Lesson 48

1. A vaccine makes your body able to \_\_\_\_\_ a disease-causing organism infecting it.

2. Bacteria and viruses can both cause disease, but they are very different. True **OR** False

3. How does a vaccine do its job?

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4. What is the difference between Jenner's smallpox vaccine and Pasteur's vaccines?

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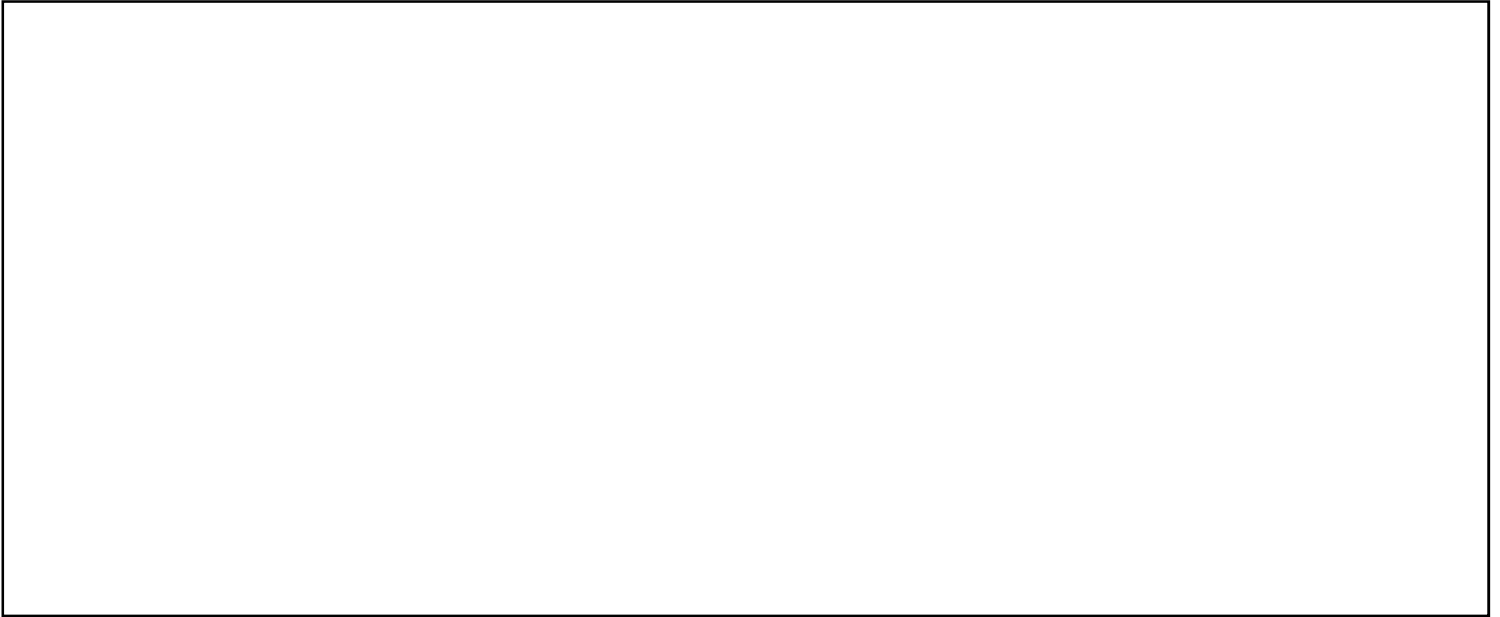
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## Lesson 49

1. Make a drawing of two objects that are in contact with one another. Label one as hot and the other as cold. Draw an arrow to show which way heat travels.



2. How will the temperatures of the objects change over time?

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3. State the Second Law of Thermodynamics.

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Lesson 50

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Lesson 51

1. What do we call the “movie” that you made in your activity?

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2. How is each individual picture that you drew similar to Wallace’s observations?

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3. What did Wallace think an animation of his observations would show?

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## Lesson 52

1. All the colors of creation can be formed from three

\_\_\_\_\_ colors.

2. Are the primary colors for light the same as the ones for ink?

Yes **OR** No

3. The primary colors for light are called \_\_\_\_\_

primary colors. The three colors in this group are \_\_\_\_\_,

\_\_\_\_\_ and \_\_\_\_\_.

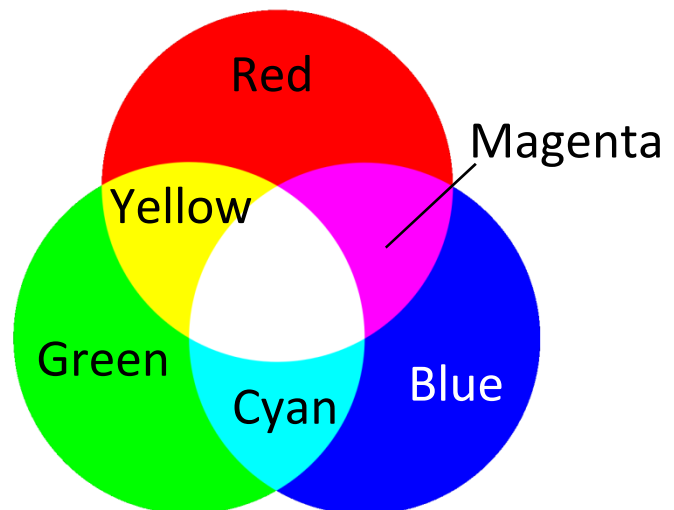
4. The primary colors for inks and pigment are called

\_\_\_\_\_ primary colors. The three colors in this group

are \_\_\_\_\_, \_\_\_\_\_ and

\_\_\_\_\_.

This diagram shows you how the primary colors relate to one another:




Lesson 53

This is a challenge lesson, so I want to challenge you to make your own notebook page for it!

Lesson 54

1. Make a drawing that illustrates what makes up Saturn's rings.



2. How did Maxwell determine what Saturn's rings are made of?

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3. Why was it accepted as the correct explanation?

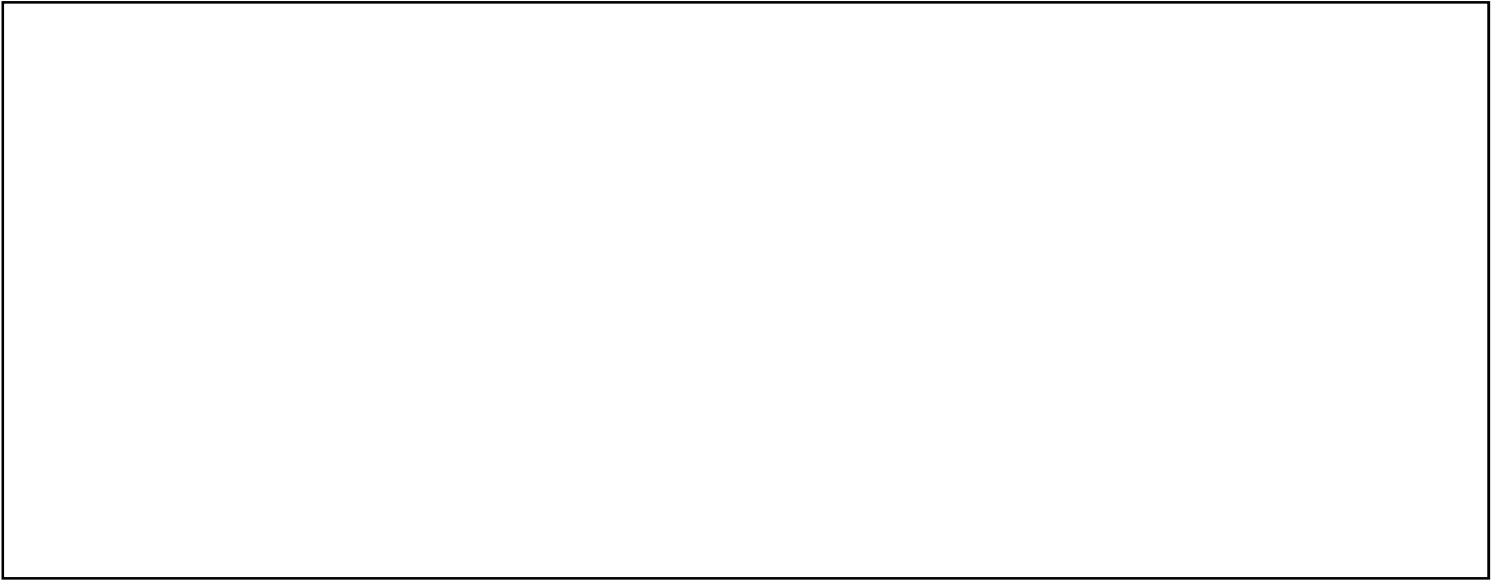
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Lesson 55

1. Make a drawing that illustrates what scientists think light waves look like.



2. How can light travel through empty space?

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3. Why is light called “electromagnetic radiation?”

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Lesson 56

1. Define natural selection.

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2. How did Darwin use the experiences of breeders like pigeon breeders as evidence for natural selection?

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3. He called the kind of selection used by pigeon breeders:

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Lesson 57

1. Put your pictures or drawings from your activity below:

2. How is this like evolution by natural selection?

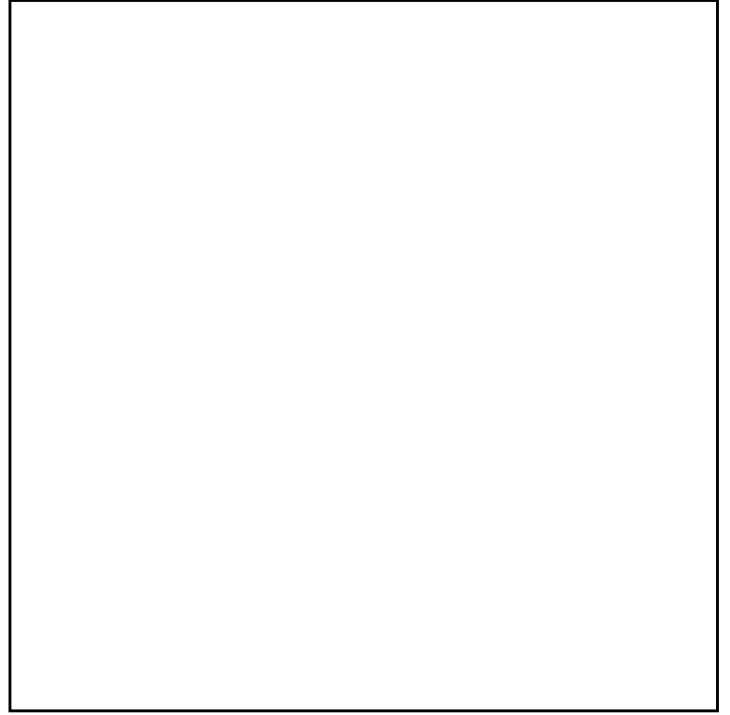
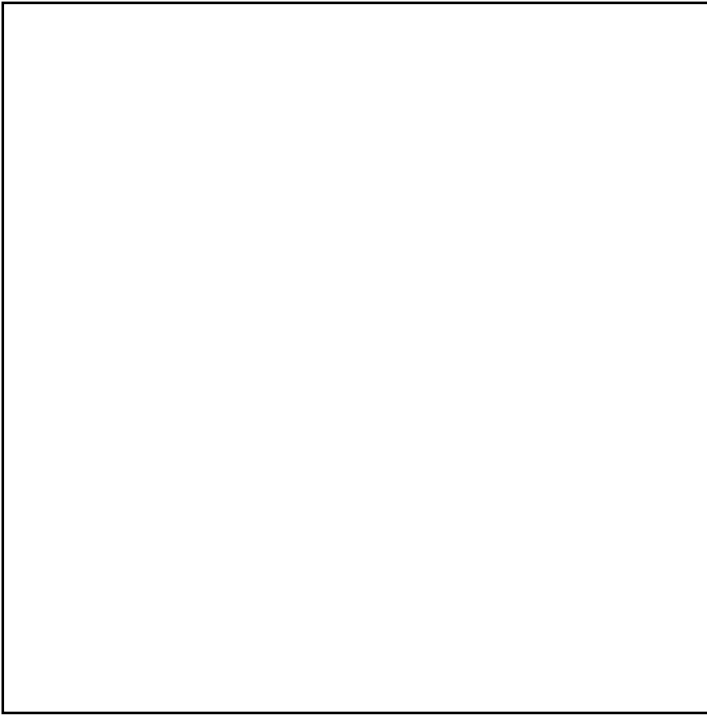
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Lesson 58

1. Draw two similar (but not identical) butterflies.



2. Use your drawings to explain mimicry.

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Lesson 59

1. Explain your experiment and how it shows that rubbing alcohol is a good antiseptic.

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2. Why do doctors use it on a patient's skin before giving the patient a shot?

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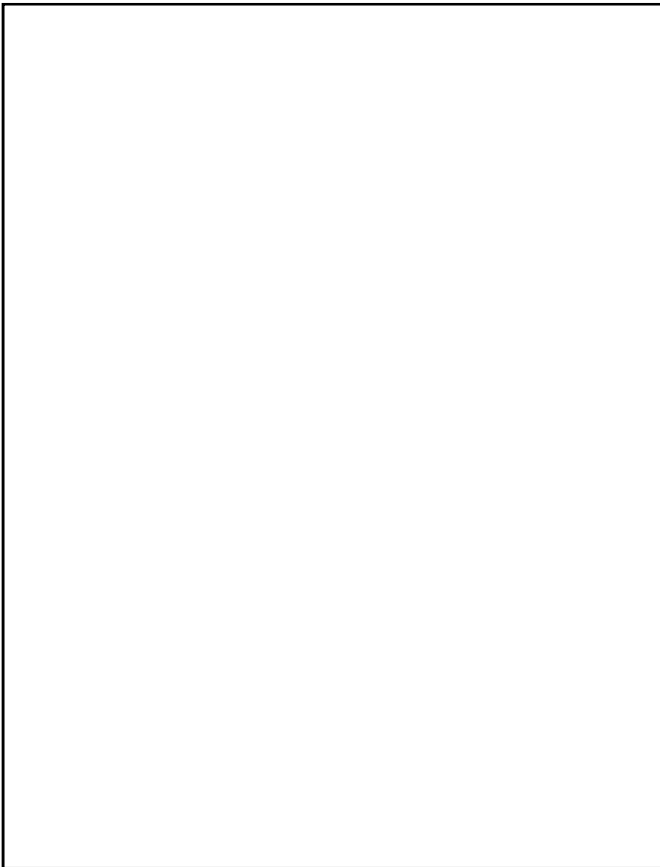
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Lesson 60

This is a challenge lesson, so I want to challenge you to make your own notebook page for it!

Lesson 61

1. Make a drawing like the one on page 188 and use it to explain the results of your experiment.



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2. How was your experiment like the work that Alfred Nobel did on explosives?

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3. What is Alfred Nobel remembered for today?

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Lesson 62

1. The term \_\_\_\_\_ refers to a thin tube.

2. We have capillaries inside our bodies that connect our \_\_\_\_\_ and \_\_\_\_\_.

3. Water is sucked into a paper towel because of \_\_\_\_\_.

4. Suppose a paper towel was made from fibers that do not attract water. Would it be able to soak up water? Why or why not?

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5. Suppose a paper towel had large gaps between the fibers. Would it soak up more or less water than a paper towel that had small gaps between the fibers? Why?

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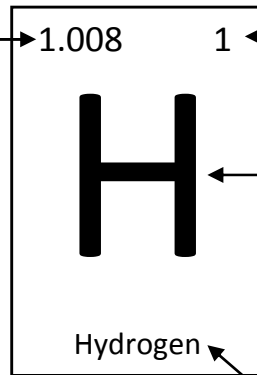
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## Lesson 63

1. Label the things pointed out in the Periodic Table entry for Hydrogen:



2. Why does the Periodic Table of the Elements have the structure that it does?

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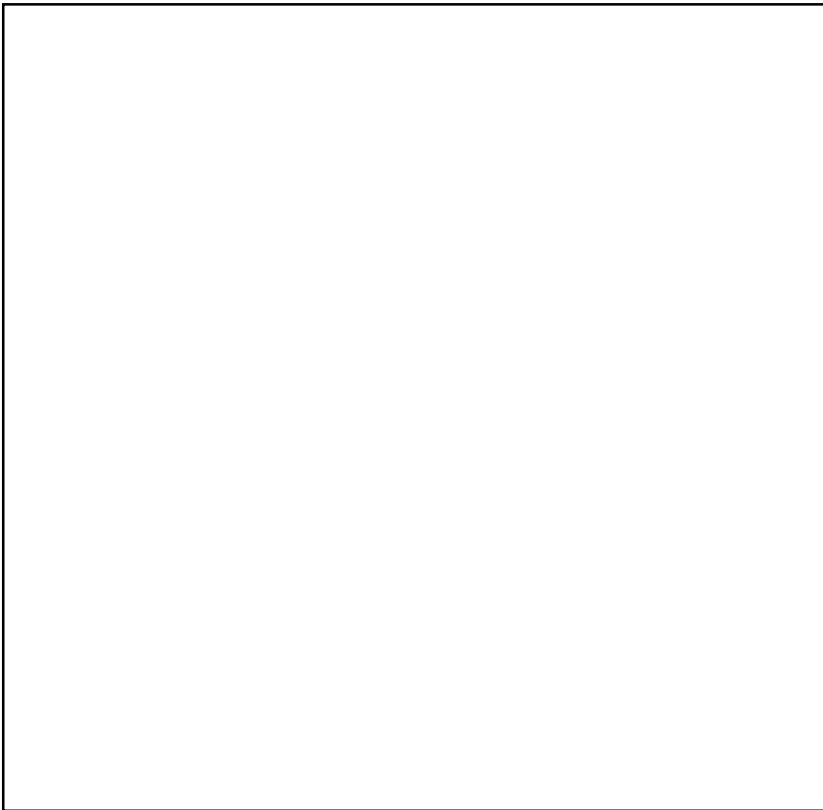
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1. Draw a picture like the one on page 198 and use it to explain how meteor showers occur.



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2. Distinguish between a meteor and a meteorite.

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## Lesson 65

1. A \_\_\_\_\_ is a natural waterway and a \_\_\_\_\_ is an artificial waterway (one that is built).

2. A mistranslation of the word meaning channel led many to believe that there was intelligent life on \_\_\_\_\_.

3. Something that comes from a planet other than the earth is often called \_\_\_\_\_.

4. Both Schiaparelli and Lowell believed they saw something on the surface of Mars (either channels or canals). What do recent space studies show?

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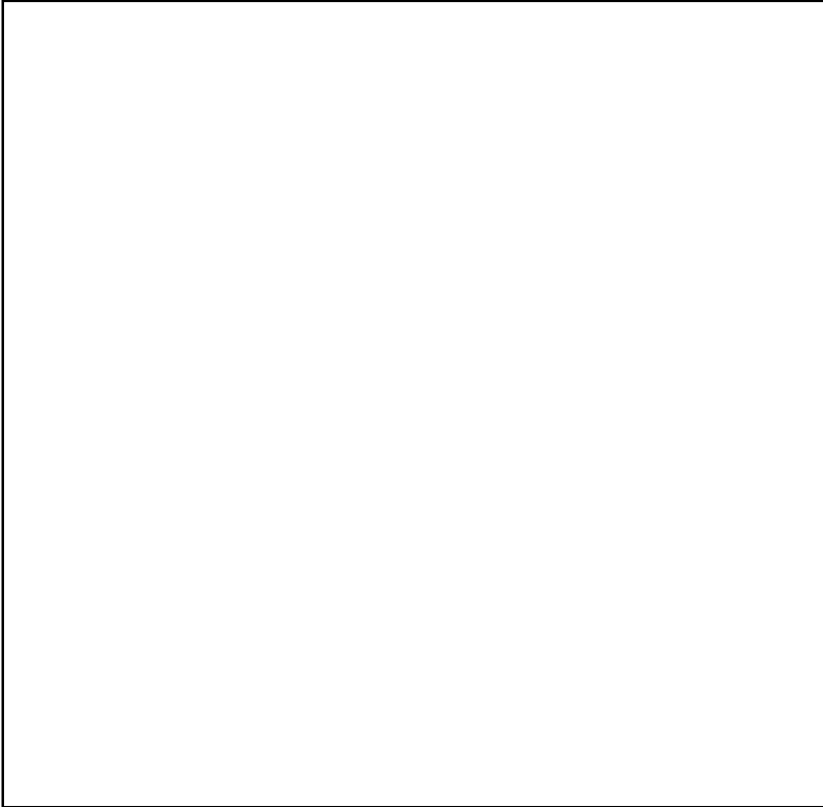
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5. When you see something that isn't there, you are experiencing an

\_\_\_\_\_.

Lesson 66

1. Draw a picture of what you saw in your experiment and use it to explain what happened. Include the terms “refraction” and “index of refraction.”



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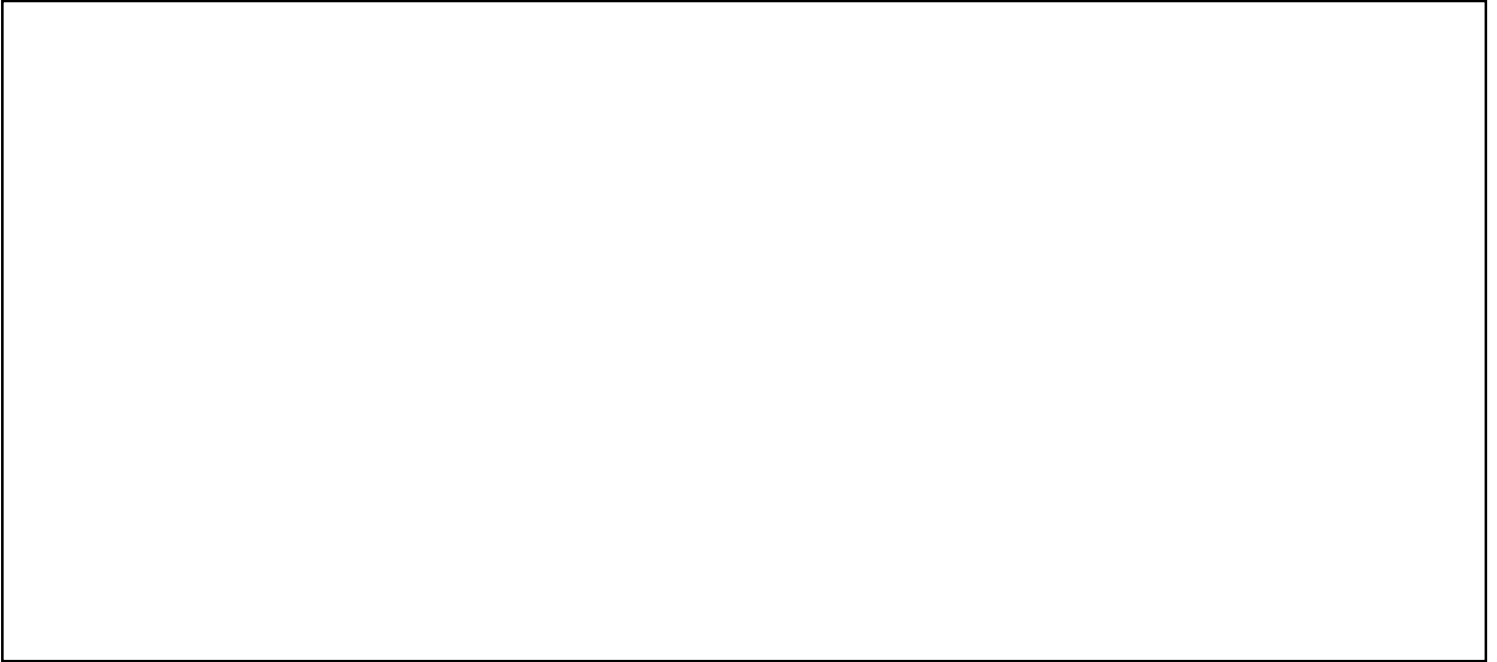
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Lesson 67

1. Draw a neuron and label the cell body, dendrites, and axons.



2. What do neurons do and where can they be found in the body?

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3. What are the two parts of the nervous system?

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Lesson 69

This is a challenge lesson, so I want to challenge you to make your own notebook page for it!

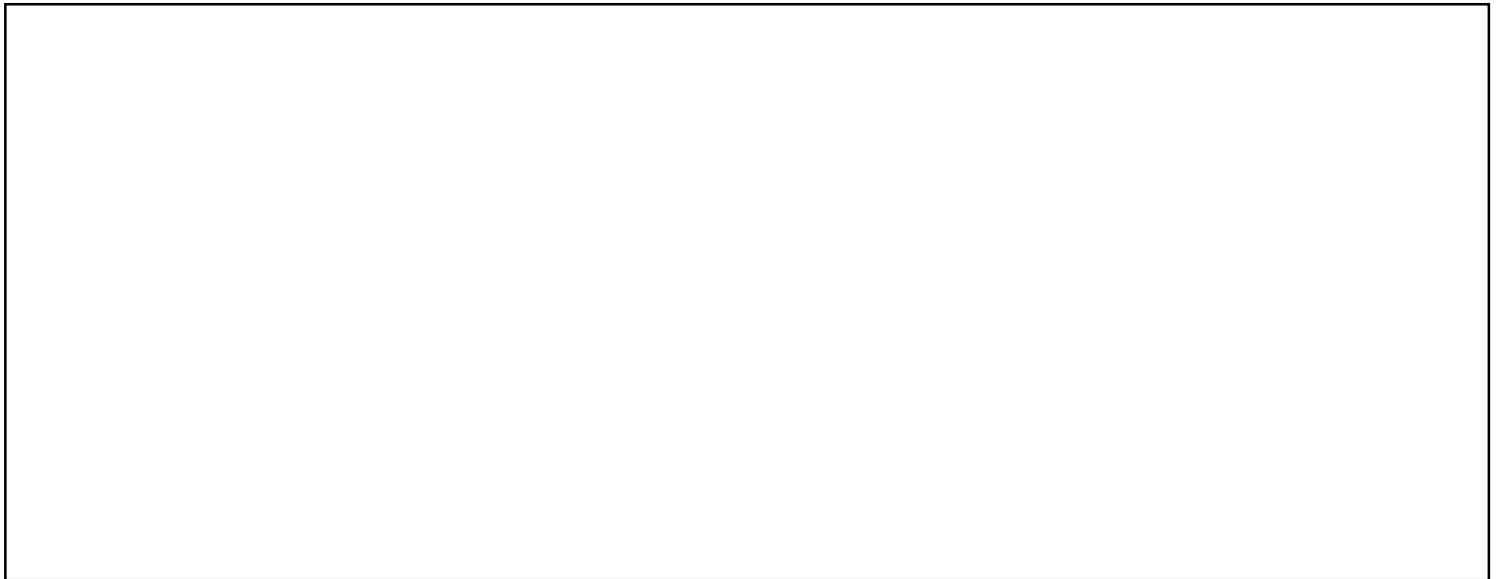


Lesson 71

1. When something travels faster than sound, we say it is

\_\_\_\_\_.

2. Make a drawing like the one at the top of page 219 and explain how something travelling supersonically makes a shock wave.



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Lesson 72

This is a challenge lesson, so I want to challenge you to make your own notebook page for it!

Lesson 73

1. The germ theory of disease says that \_\_\_\_\_ (and other germs) cause disease.

2. Explain what Koch did to add to the evidence for the germ theory of disease.

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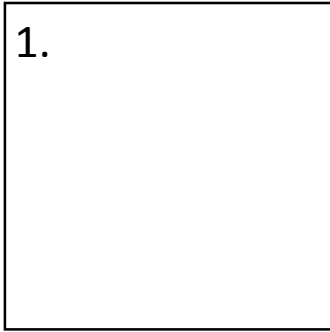
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3. Bacteria can form \_\_\_\_\_ which allow microscopic organisms to survive deadly conditions and contain everything necessary for life but don't do anything associated with living.

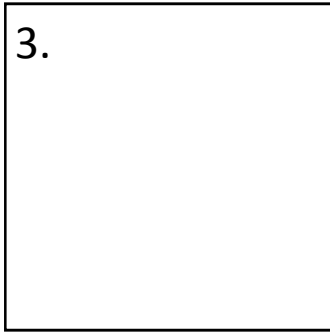
Lesson 74

1. Make drawings that look like the cells labelled “1,” “3,” “6,” “7,” “8,” and “10” in the drawing on page 227. Point out what Flemming called chromatin, and explain why he called the process by which cells make duplicates of themselves “mitosis.”

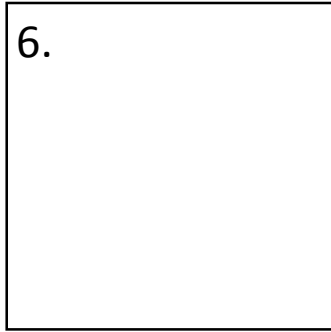
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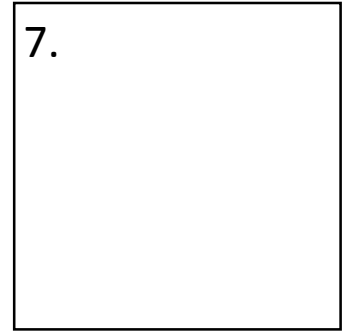
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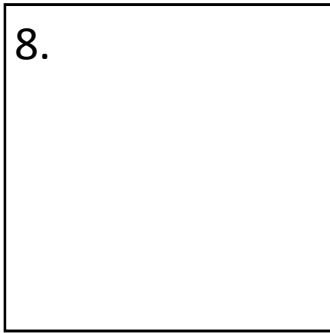
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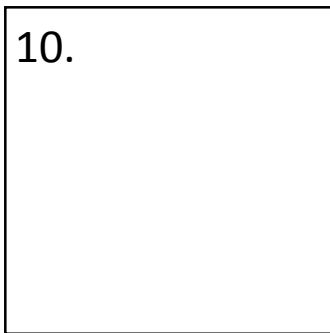
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Lesson 75

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Lesson 78

This is a challenge lesson, so I want to challenge you to make your own notebook page for it!

Lesson 79

1. How quickly living things burn their food for energy is called their

\_\_\_\_\_.

2. What relationship did Rubner find between an animal's surface area?

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3. Why is that?

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## Lesson 80

1. \_\_\_\_\_ describes a substance that when in the presence of a strong magnet will become magnetic.
2. \_\_\_\_\_ describes a substance that when in the presence of a strong magnet will be attracted to the magnet but will not become magnetic.
3. \_\_\_\_\_ describes a substance that is repelled by a magnet.
4. What can you do to turn a ferromagnetic substance into a paramagnetic substance?

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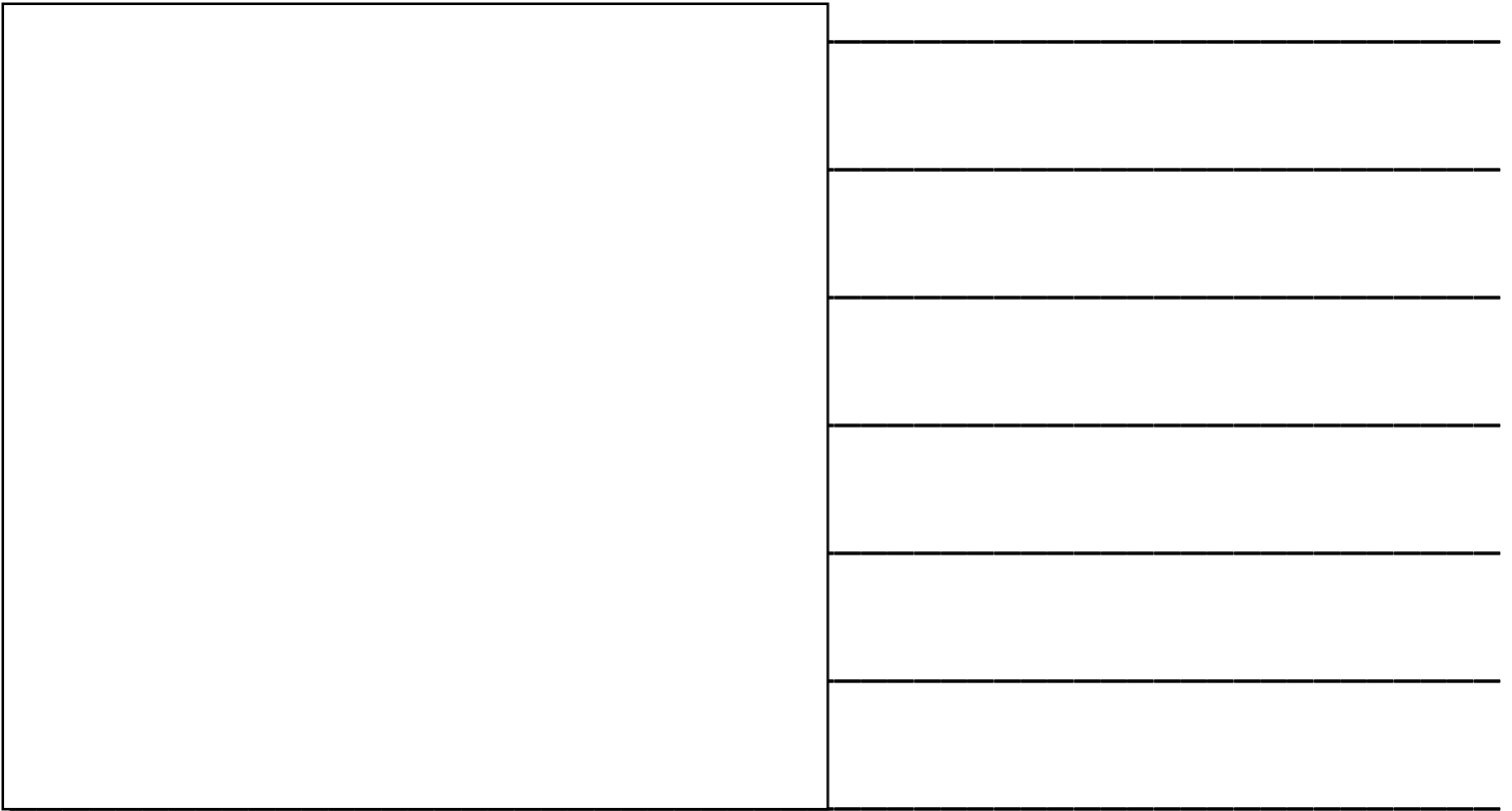


The red block at the top is a magnet. It has made the coins magnetic, so that they attract one another. That means the coins are ferromagnetic.

Author: Kentfrayn  
License: CC 3.0

Lesson 81

1. Make a drawing like the one on page 249. Use it to explain what an equilibrium is.



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2. Which of the two processes in the drawing speed up when temperature is increased?

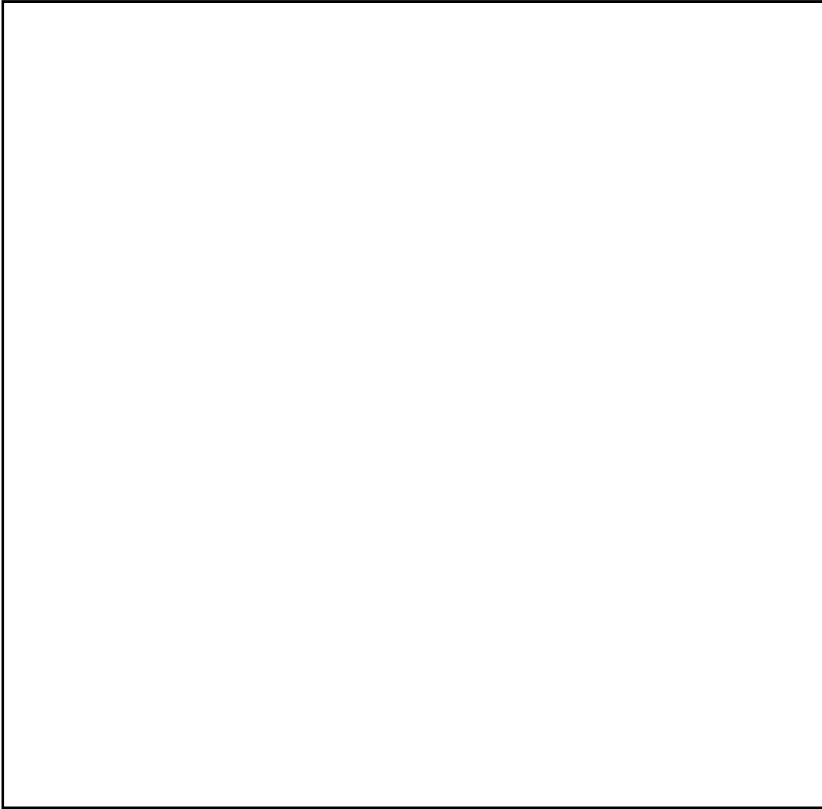
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Lesson 82

This is a challenge lesson, so I want to challenge you to make your own notebook page for it!

Lesson 83

1. Make a drawing like the one on page 256 that shows how salt dissolves in water. Explain the process using the terms “electrolyte” and “ion.”



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Lesson 85

This is a challenge lesson, so I want to challenge you to make your own notebook page for it!







## Lesson 88

1. Describe how Becquerel showed that uranium naturally makes something with charges.

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2. Why did this tell him that uranium was not emitting X-rays?

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Lesson 89

1. What does a radioactive atom do?

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2. Who invented the term “radioactive”

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3. What part of Dalton’s atomic theory did Curie demonstrate was wrong?

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4. How did she do that?

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Lesson 90

1. Explain how ionizing radiation can kill cells or make mutant cells.

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2. Why is a small amount of ionizing radiation is nothing to be worried about.

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