

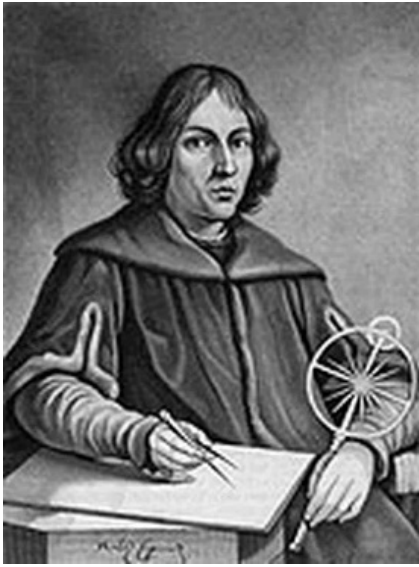
***Science in the
Scientific Revolution***

*Lab and Review
Book*

LEVEL 1

Property of:

Lesson 1



Nicolaus Copernicus

1. Heliocentric means _____-centered
2. Geocentric means _____-centered.
3. Copernicus put the planet _____ closest to the sun.

Draw Copernicus's view of how the sun, planets, and stars are arranged

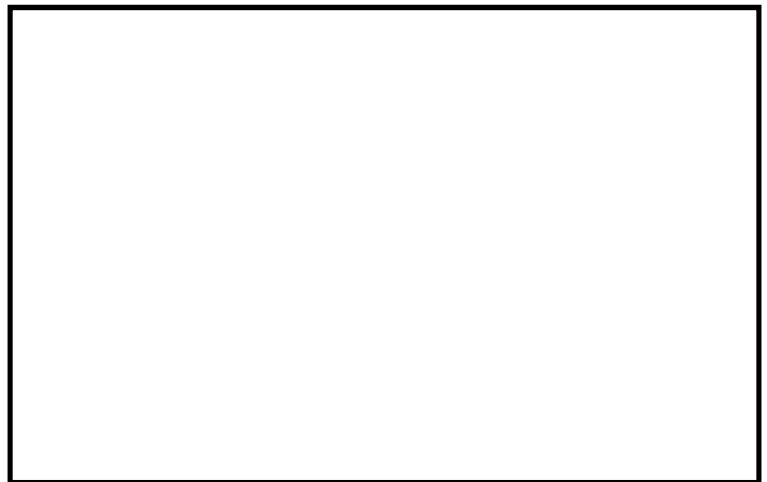
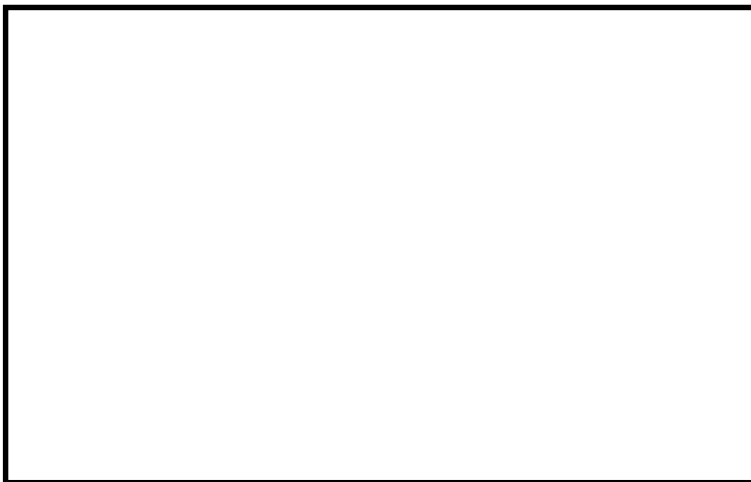
How is that different from what most believed?

Lesson 2

1. Mars is _____ when it appears in the eastern sky right after sunset.
 2. What do we call it when a planet appears to be moving one direction in the night sky, then changes direction, and then later on changes direction again?
-

Make the four drawings explained in the book:

Geocentric System



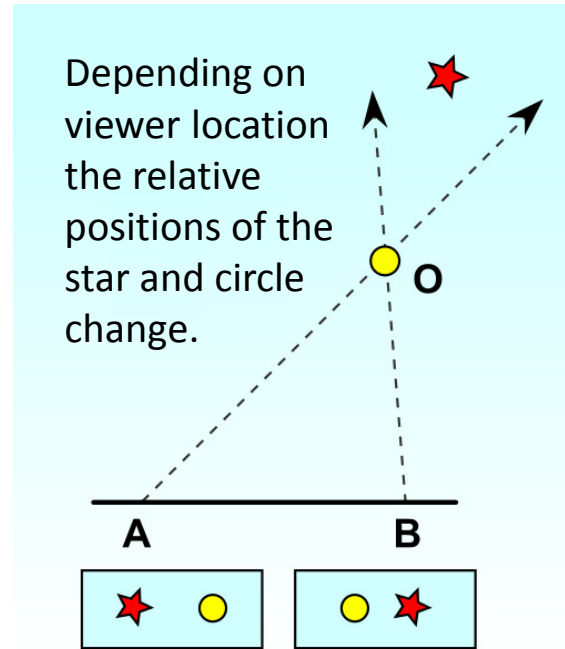
Heliocentric System

(These are what we observe.)



What word is used for the situation shown in the diagram on the right?

In this lesson, you learned two arguments that natural philosophers used against the heliocentric system. Summarize them in the box below:



1. _____

2. _____

Lesson 4

Explain in your own words why the Bible doesn't teach that the earth is stationary in space.

Explain in your own words why the center of the universe probably isn't important to God.

Lesson 5

1. Order the following bones in terms of length in the human body, starting with the shortest: femur, humerus, tibia

_____ , _____ , _____

2. Men and women have the same number of ribs.

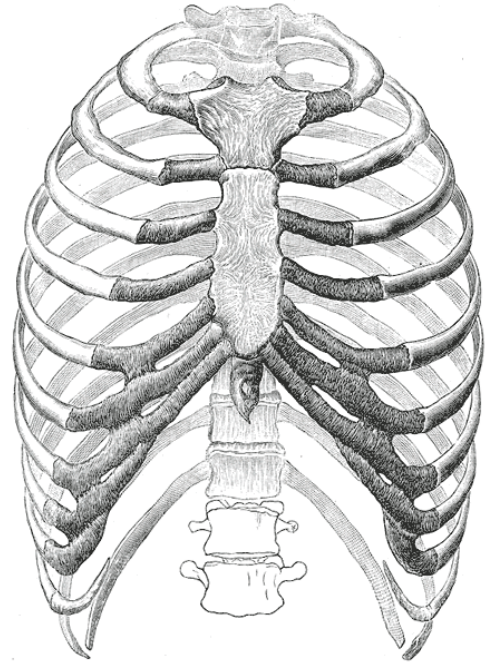
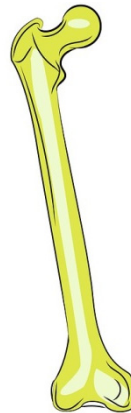
TRUE or **FALSE**

3. How did Vesalius correct Galen on the length of the humerus and the number of bones in the sternum?

4. Why did Galen get those facts wrong, and why did Vesalius get them right?

Lesson 6

In the drawings below, point out where you would find elastic cartilage, hyaline cartilage, and fibrocartilage.



Cartilage can be turned into bone. What is that process called?

Lesson 7

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

Lesson 8

Make a drawing like the one on page 24, labelling the muscles, tendon, and ligament.



List the functions of:

Skeletal muscles _____

Tendons _____

Ligaments _____

Lesson 9

1. Which blood vessels “pulse” (you can feel the blood pumping through them)?

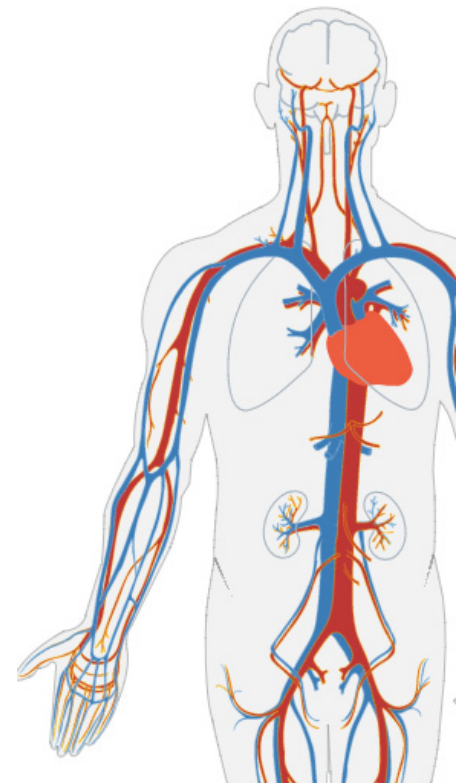
2. Which is usually found more superficial (closer to the surface) in the body: arteries or veins?

Using the diagram on the right, point out where you felt your pulse and name the blood vessels you were feeling.

Why couldn't you see those blood vessels pulsing?

Why can you see some of your veins?

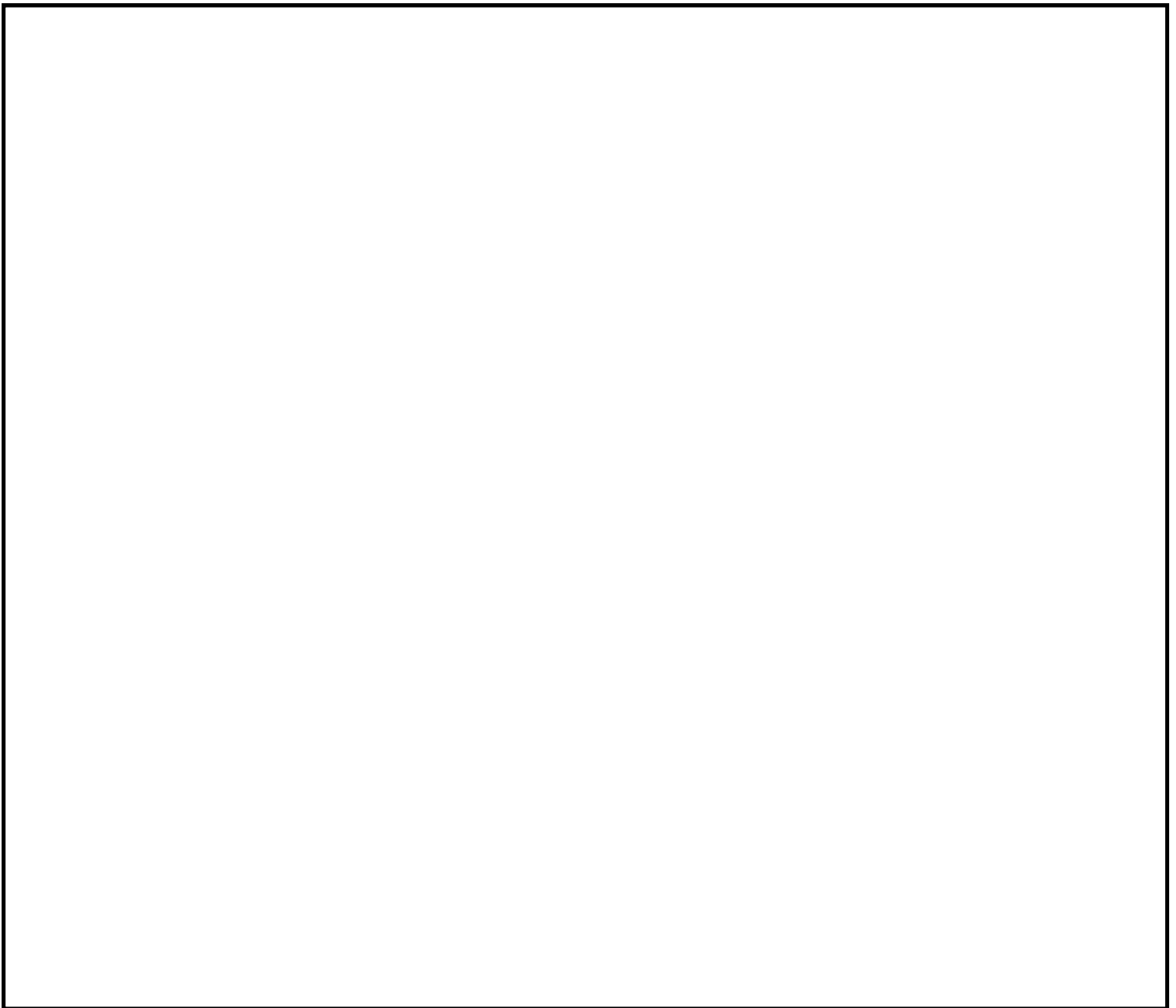
Why don't you see your veins pulsing?



Lesson 10

1. Motor nerves are nerves that control _____.
2. Sensory nerves are nerves that allow us to _____ things around us—like temperature, smell, light, etc.

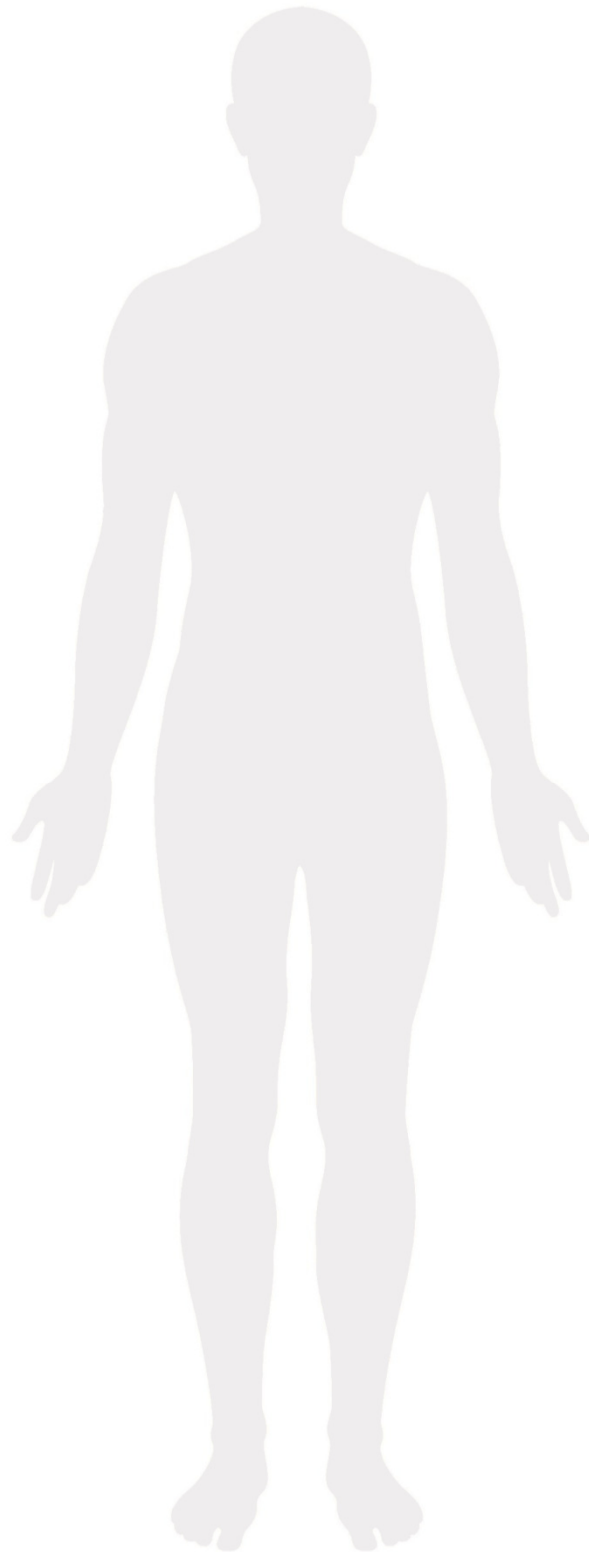
Attach a picture of your brain model or draw a picture of it, labelling the cerebrum and the cerebellum



Lesson 11

The Digestive System

Glue the organs onto this body outline, as discussed in the activity. After you are done with the lesson, label the organs. Indicate which are part of the digestive tract and which are accessory organs.



Lesson 11 (cont.)

1. The parts of the body that the food moves through is called the _____.
2. The digestive organs that the food DOES NOT pass through are called _____.
3. Which is longer:

the small intestine

OR

the large intestine

Lesson 12

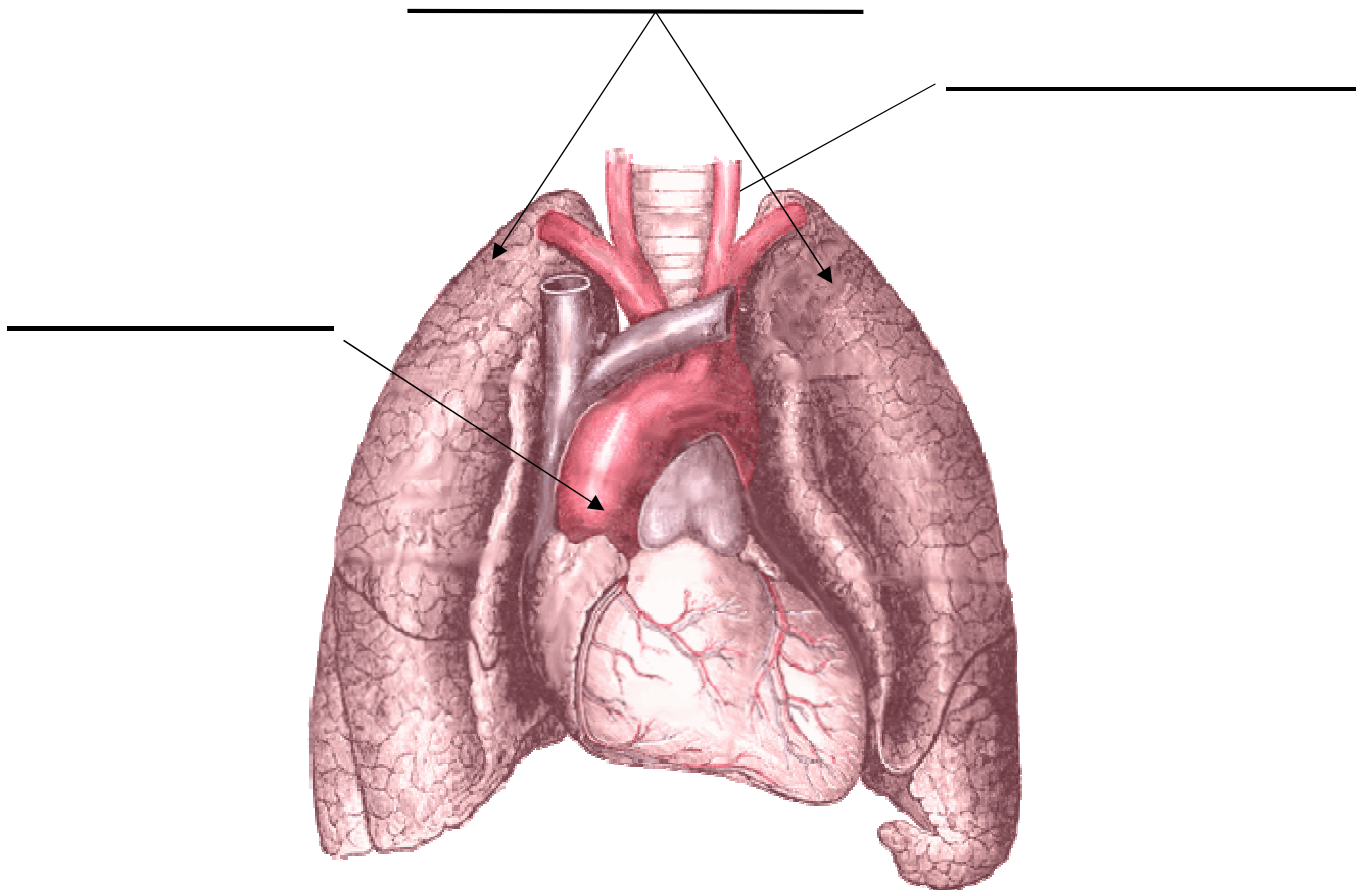
This is a challenge lesson, so I want to challenge you to make your own notebook page for it!

1. When you breathe air into your lungs, the temperature of the air

Heats up or Cools down

2. There is one less lobe on the left lung as compared to the right lung because it has to make room for the _____.

3. Label the heart, lungs and trachea in the diagram below.



Lesson 15

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

Section 2: The Revolution from the
Mid-1500s to the Early 1600s

Level 1

Lesson 17

1. Conrad Gesner was fascinated by the natural world. He is an example of a _____.

Draw a pencil, pointing out the pencil lead



Why is that part of the pencil called the “lead?”

What is that part of the pencil really made out of?

Section 2: The Revolution from the
Mid-1500s to the Early 1600s

Lesson 18

Draw Flower #1



Number of petals: _____

Stalk-like structures? _____

Draw Flower #2

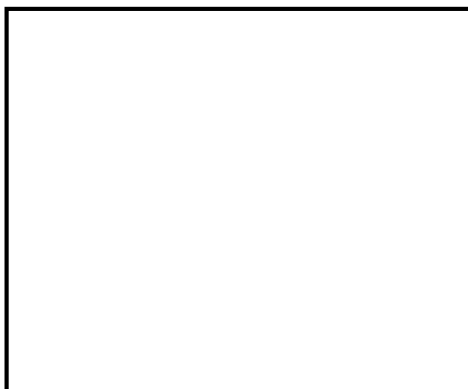


Number of petals: _____

Stalk-like structures? _____

A list of the differences between the two flowers:

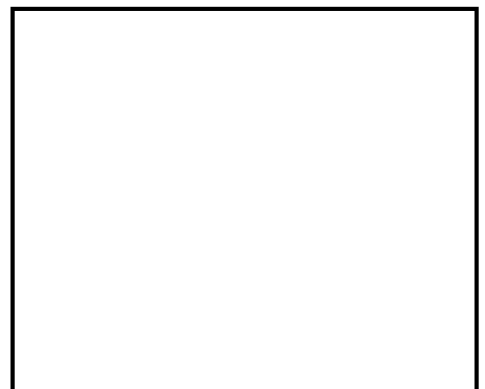
Sketch the whole
AND halved
peanut.



Sketch the whole
AND halved bean



Sketch the whole
AND cracked
sunflower seed.



Section 2: The Revolution from the
Mid-1500s to the Early 1600s

Lesson 18 (cont)

A list of the differences between the peanut, bean and sunflower seed:

1. What do scientists call a peanut's shell? _____

2. Every seed has a pod. **True OR False**

Why it makes sense to classify plants based on flowers and seeds:

Section 2: The Revolution from the
Mid-1500s to the Early 1600s

Level 1

Lesson 19

Animal: _____

Write as many words as you can that describe the animal.

1. Conrad Gesner was the first in history to try and describe all the _____ that were known in his time. Because of this he is known as the “Father of Modern _____.”
2. Because Gesner relied on information from _____, he could write about a lot of animals. However, because he couldn’t verify the information, there were many _____ in his book.
3. Most science books (even ones written today) have _____. The only book that doesn’t have any is the _____.

Section 2: The Revolution from the
Mid-1500s to the Early 1600s

Level 1

Lesson 20

Similarities between the human
and cat skeletons:

Differences between the
human and cat skeletons:

1. Comparative anatomy examines very different living things and looks for their _____ and _____.

2. Why is it important in science? _____

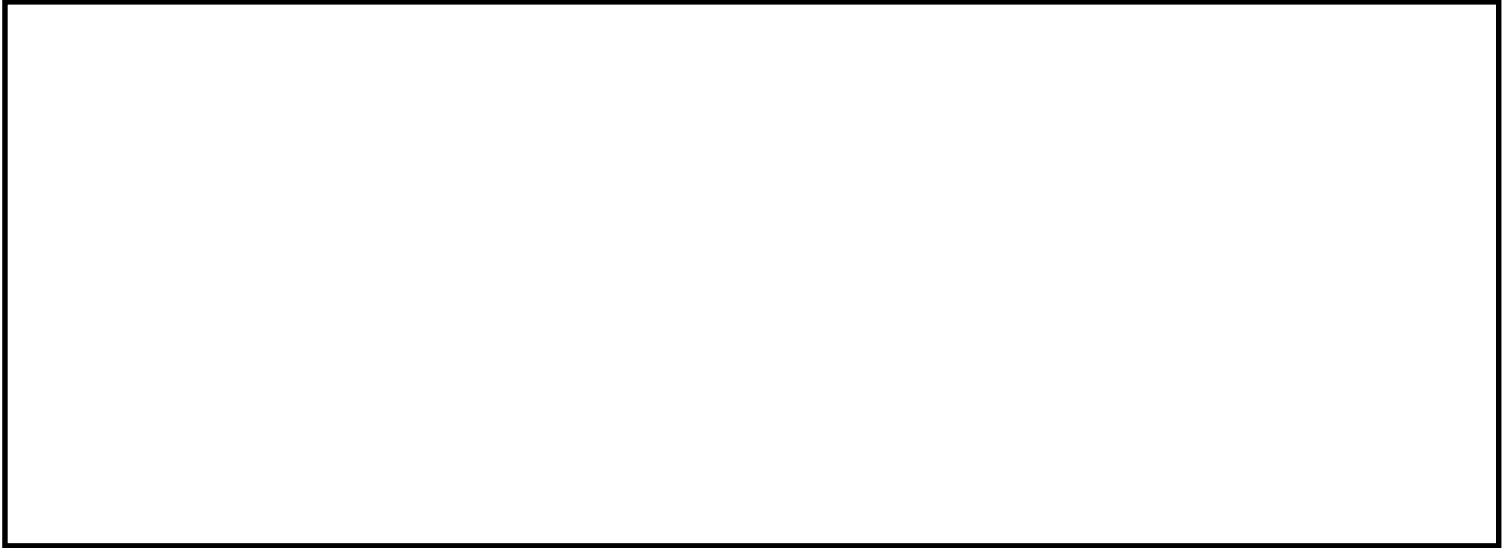
3. If you see a bluegill (a type of fish) and a bass (another type of fish) swimming in a pond, would you call them “fish” or “fishes”?

Section 2: The Revolution from the
Mid-1500s to the Early 1600s

Level 1

Lesson 21

Draw a picture like the one on page 64



Explain what the picture is illustrating:

Why was Michael Servetus so interested in blood?

Section 2: The Revolution from the
Mid-1500s to the Early 1600s

Level 1

Lesson 22

What did Tycho Brahe see and how did he show that it was related to the stars and not the moon or earth?

How did that show the heavens are not immutable?

Section 2: The Revolution from the
Mid-1500s to the Early 1600s

Level 1

Lesson 23

1. Astronomers sometimes call comets _____
_____.
2. In your experiment the hunk of frozen flour/water represented
a _____ and the hair dryer represented the _____.
3. The tails of comets always face _____ from the sun.
4. Tycho Brahe used his observations of the comet to destroy
Aristotle's idea that the universe was made of
_____, each of which held a planet.
5. Look at the picture of the comet below. Point out its tail. Draw
the sun where you think it would be.



Section 2: The Revolution from the
Mid-1500s to the Early 1600s

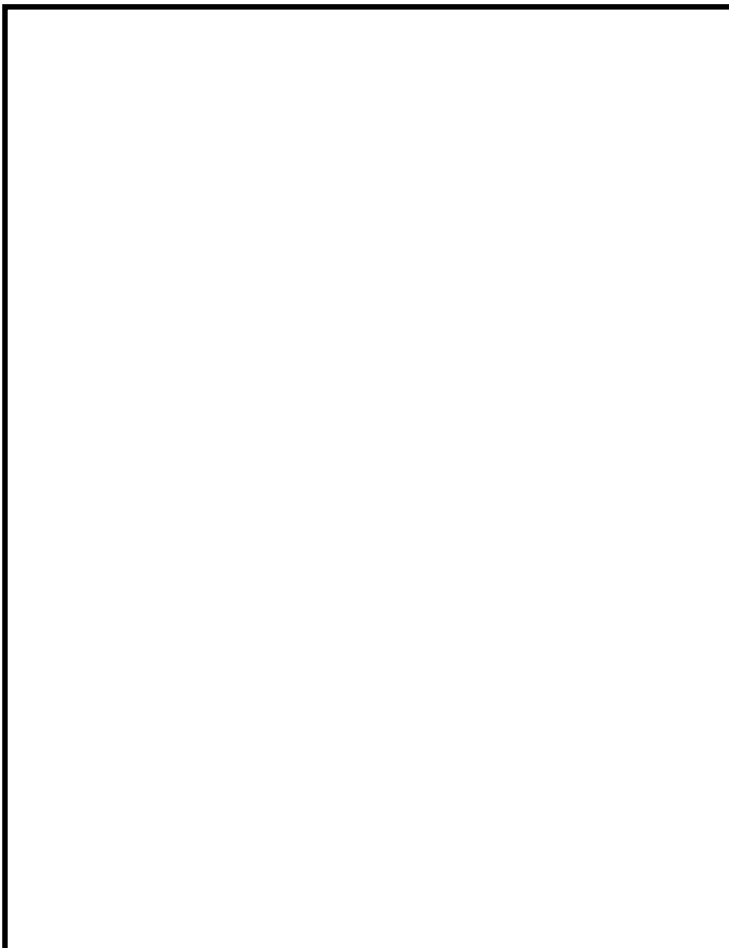
Level 1

Lesson 24

Write your prediction about the difference between the times it takes the two washers to swing back and forth.

A pendulum is a _____ that hangs from a fixed point and
_____ back and forth.

Draw a picture like the one on
page 73



What is the period of a pendulum?

What did Galileo show about the
period of a pendulum?

Section 2: The Revolution from the
Mid-1500s to the Early 1600s

Level 1

Lesson 25

Draw a picture of your experiment



What happened to the ball when you let it roll down a trough?

What is friction?

Why did the ball eventually come to a stop in your experiment?

Section 2: The Revolution from the
Mid-1500s to the Early 1600s

Level 1

Lesson 26

1. Another name for a ramp is an _____.
2. Acceleration happens when an object's speed _____.

Describe your experiment

What were the results?

What do the results show about falling objects?

Section 2: The Revolution from the
Mid-1500s to the Early 1600s

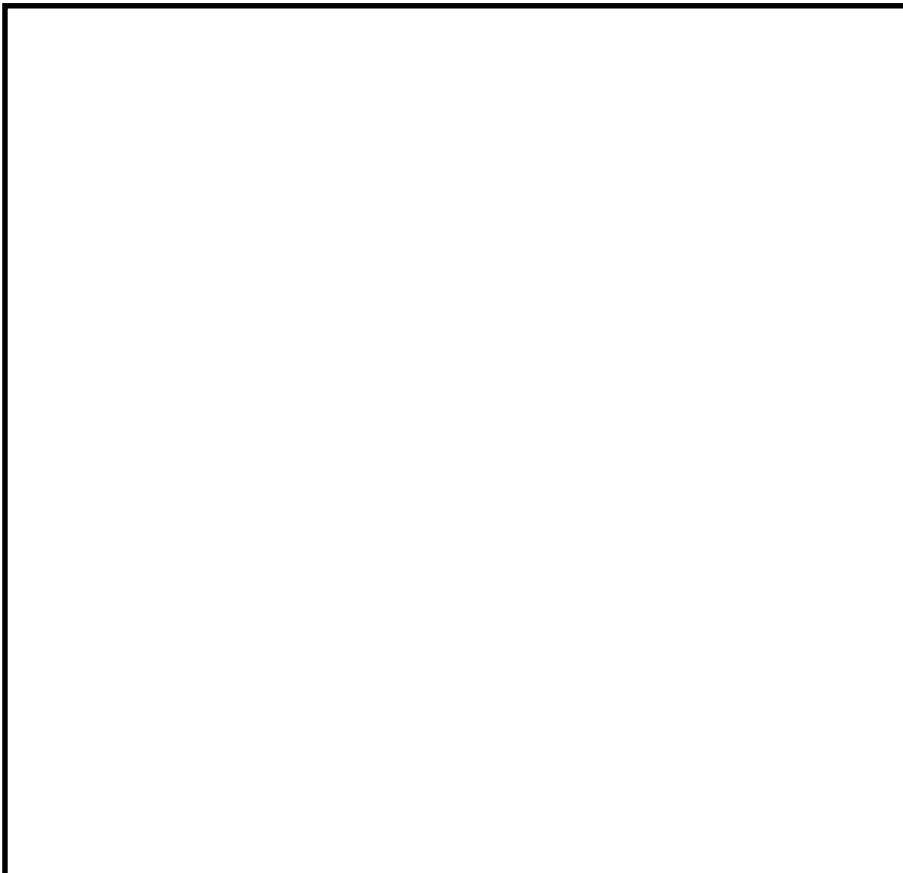
Level 1

Lesson 27

A projectile flies through the air without anything _____
its motion.

Describe your experiment

Draw a picture like the one on page 81



What force is acting on
the ball?

Which way does it push?

Is there a force pushing
the ball away from the
table?

What do
mathematicians call the
curve the ball follows?

Section 2: The Revolution from the
Mid-1500s to the Early 1600s

Level 1

Lesson 28

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

Section 2: The Revolution from the
Mid-1500s to the Early 1600s

Level 1

Lesson 29

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

Section 2: The Revolution from the
Mid-1500s to the Early 1600s

Level 1

Lesson 30

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

Section 3: The Revolution in the
Early 17th Century

Lesson 31

What did Galileo see with his telescope and how did those observations support heliocentrism?

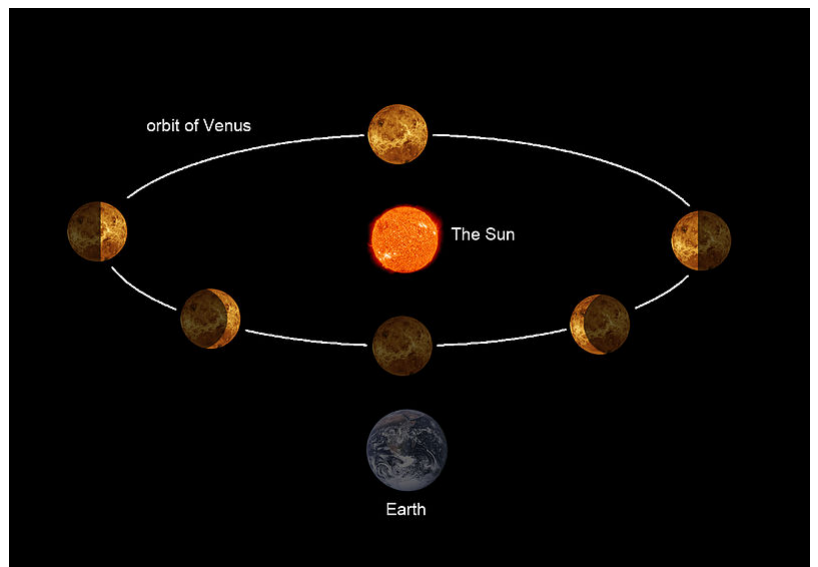
1. _____

2. _____

3. _____

4. _____

This drawing shows the phases of Venus as viewed from the earth. These phases can only be explained if Venus and the earth both orbit the sun.

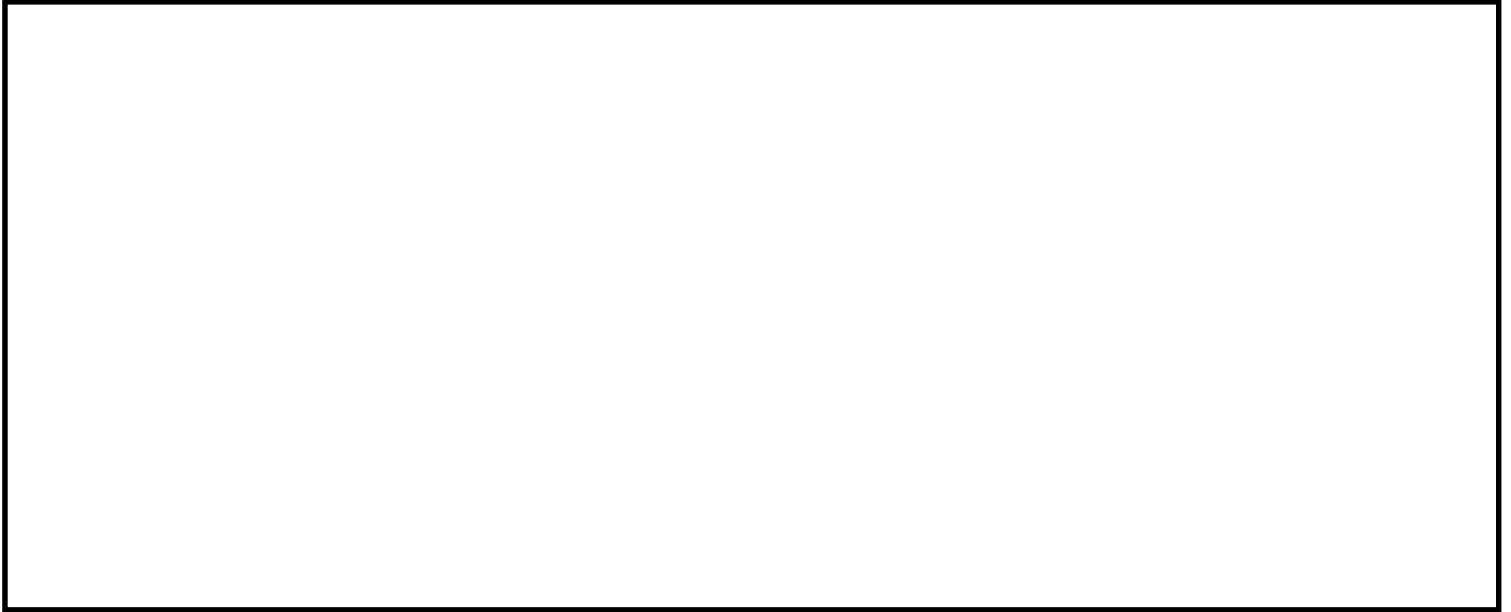


Section 3: The Revolution in the
Early 17th Century

Level 1

Lesson 32

Draw a picture like the one on page 97



Does the image really appear upside down, as shown in the drawing above?

Why don't we see the world upside down?

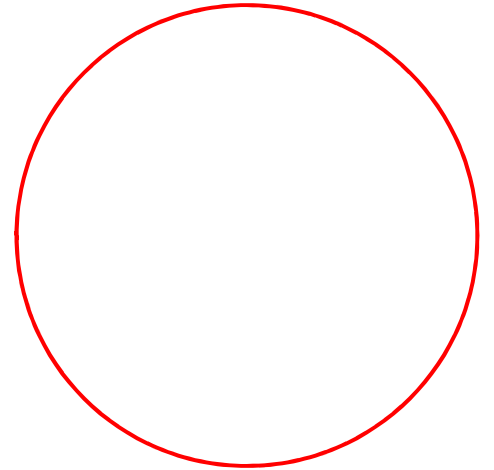
Section 3: The Revolution in the
Early 17th Century

Level 1

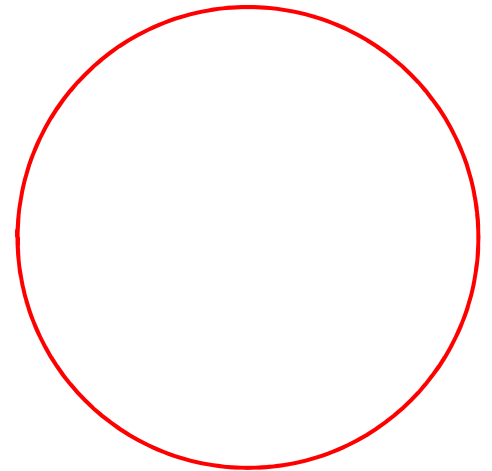
Lesson 33

Kepler's First Law says: All planets orbit the sun in an _____,
with the _____ at one focus.

The drawing on the right is a circle.
Draw an ellipse on top of it to show
the difference between an ellipse
and a circle. The eccentricity of the
ellipse should be small.



The drawing on the right is a circle.
Draw an ellipse on top of it to show
the difference between an ellipse
and a circle. The eccentricity of the
ellipse should be large.



The planet whose orbit has the highest eccentricity is _____

The planet whose orbit has the lowest eccentricity is _____

Section 3: The Revolution in the
Early 17th Century

Lesson 35

What is your prediction about what will happen in the experiment?

What actually happened?

1. Empiricism is the idea that the only way we can learn anything is through _____ or _____.
2. Sir Francis Bacon thought that the world behaved in a _____ way, so the best way to learn about it was through _____.
3. What things did Bacon think you shouldn't learn about with experiments? _____

4. Sir Francis Bacon believed in heliocentrism: **True OR False**

Section 3: The Revolution in the
Early 17th Century

Lesson 36

What happened to the vinegar in your experiment?

How is that similar to what happens when the pancreas adds a liquid to what is leaving the stomach?

Section 3: The Revolution in the
Early 17th Century

Level 1

Lesson 37

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

Section 3: The Revolution in the
Early 17th Century

Lesson 38

How did Harvey use math to show that blood circulates?

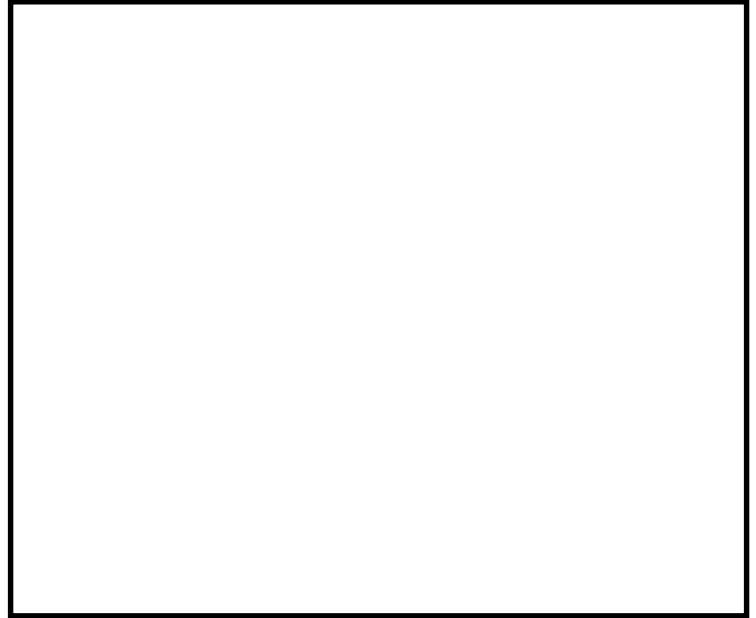
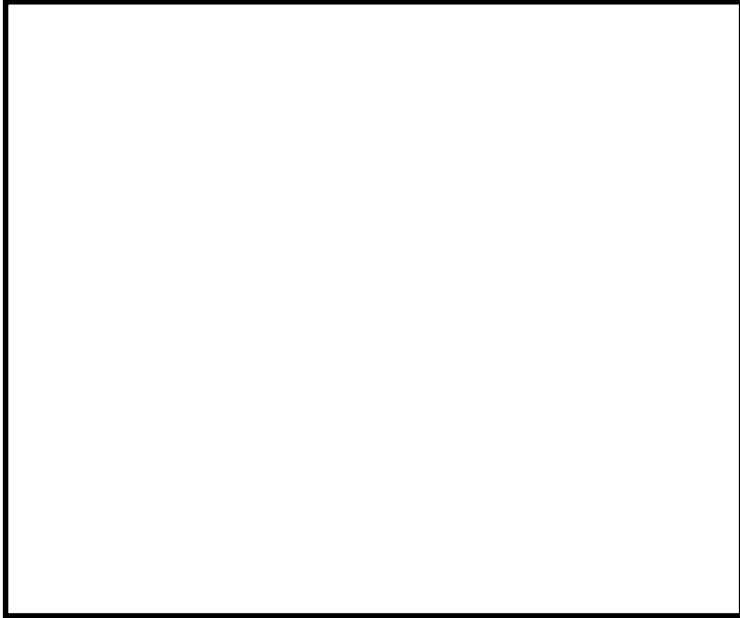
What other pieces of evidence did Harvey use support that idea?

Section 3: The Revolution in the
Early 17th Century

Level 1

Lesson 40

Draw two pictures that illustrate the difference between heterogeneous and homogeneous substances.



What is an element? _____

What word (homogeneous or heterogeneous) would Jungius apply to elements? _____

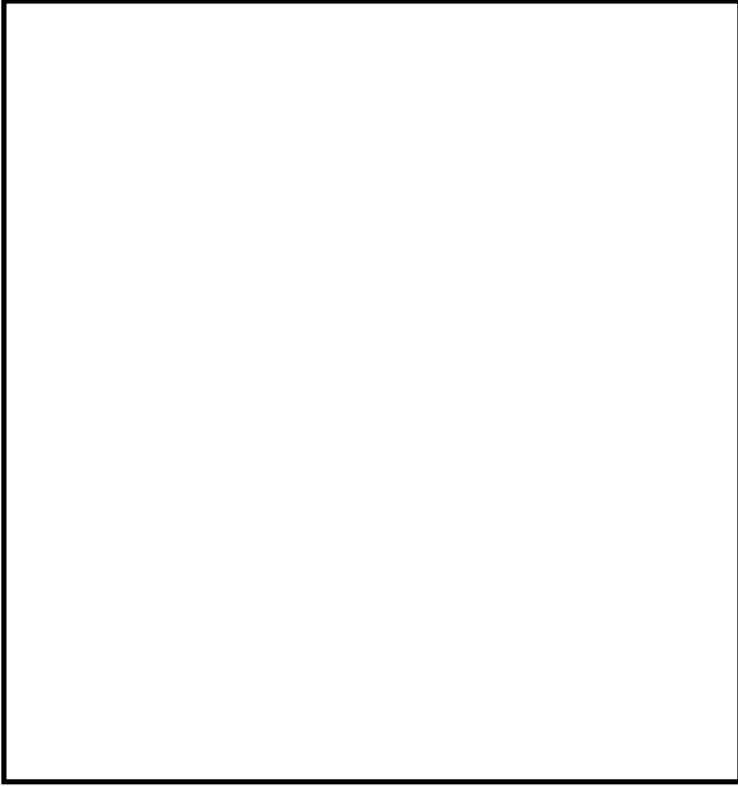
What is a compound? _____

What word (homogeneous or heterogeneous) would Jungius apply to compounds? _____

Section 3: The Revolution in the
Early 17th Century

Lesson 41

Draw a picture like the one on
page 125.



What is this a drawing of, what
does it measure, and how does it
work?

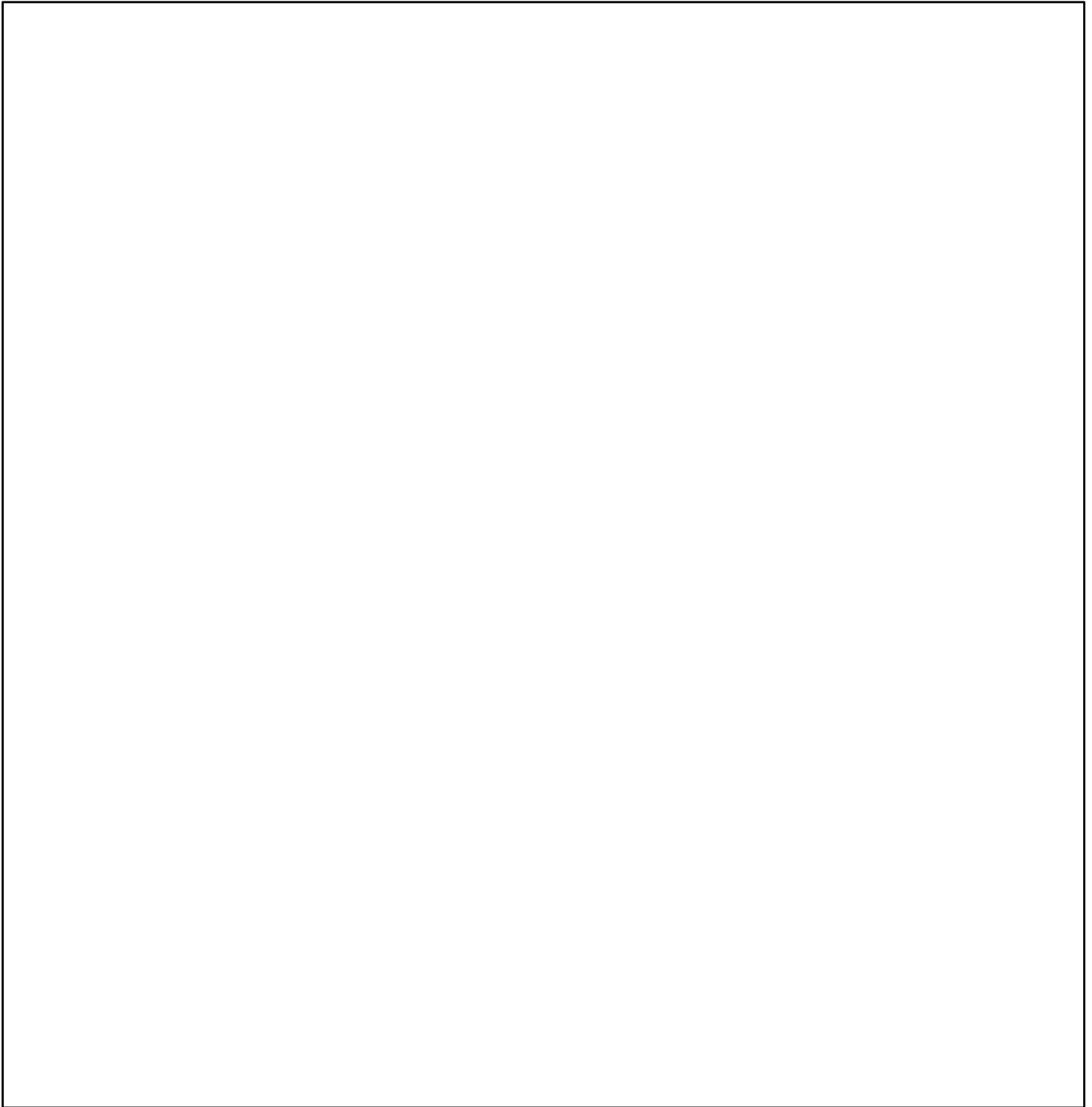
Which two of Aristotle's ideas does this show to be wrong?

Section 3: The Revolution in the
Early 17th Century

Level 1

Lesson 42

Do your best to draw the picture that your helper describes to you in the box below.



Section 3: The Revolution in the
Early 17th Century

Lesson 42 (cont)

How does your picture compare to the one your helper described?

How does your experiment illustrate dualism?

Section 3: The Revolution in the
Early 17th Century

Lesson 43

Make a drawing of your experimental setup.



What happened in the experiment?

What does that demonstrate?

Section 3: The Revolution in the
Early 17th Century

Level 1

Lesson 44

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

Section 3: The Revolution in the
Early 17th Century

Level 1

Lesson 45

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

Section 4: The Revolution in the
Mid 17th Century

Lesson 46

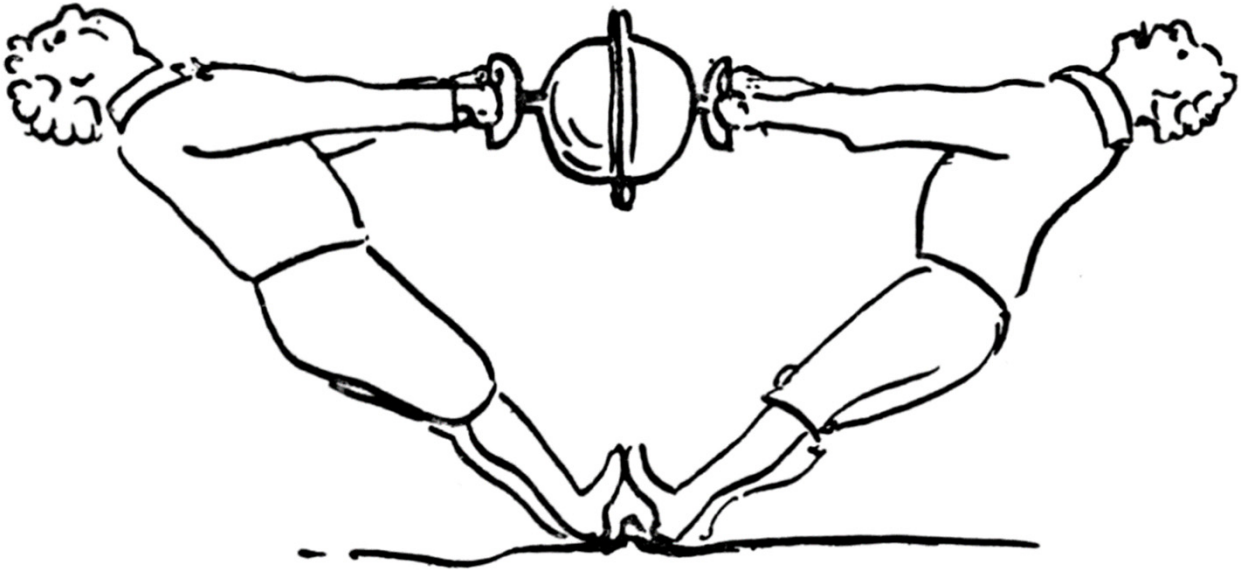
1. An anesthetic makes people _____
to things like pain.
2. What system in the human body did Thomas Bartholin
discover? _____
3. What is the difference between a local anesthetic and a general
anesthetic? _____

4. What did Thomas Bartholin use as a local anesthetic?

Section 4: The Revolution in the
Mid 17th Century

Lesson 47

The drawing below is based on Otto von Guericke's Magdeburg hemispheres experiment. Use arrows to represent what the air is doing inside and outside of the two hemispheres:



TRYING TO SEPARATE THE TWO
"MAGDEBURG HEMISPHERES"

Why couldn't the hemispheres be pulled apart?

Section 4: The Revolution in the
Mid 17th Century

Lesson 48

Describe Otto von Guericke's machine that developed electrical charge.

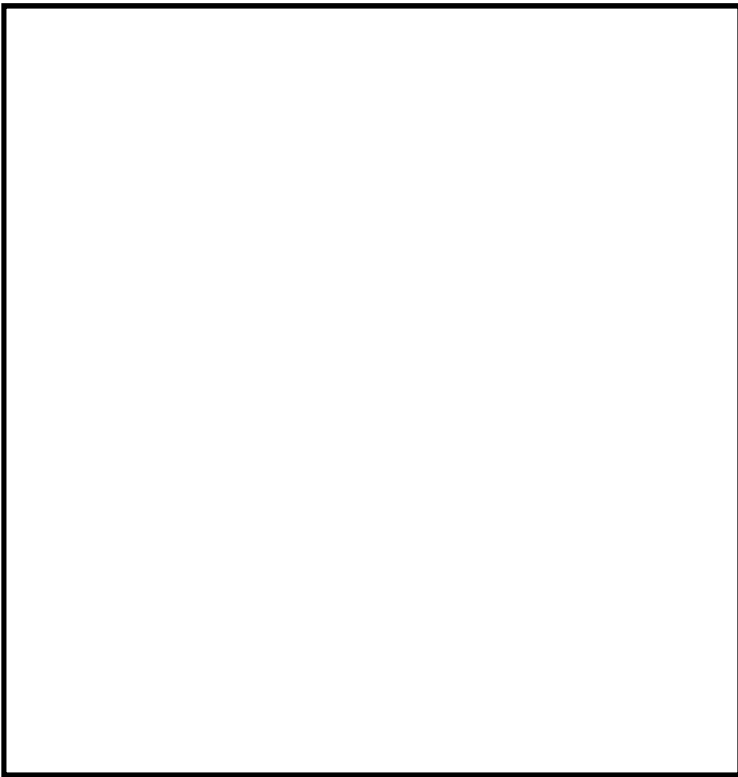
What did he use it to do?

How is this similar to your experiment?

Section 4: The Revolution in the
Mid 17th Century

Lesson 49

Draw a picture of Saturn



Why Did Galileo describe the rings as “ears?”

Why could Huygens see that they are rings?

What are the rings made of?

Section 4: The Revolution in the
Mid 17th Century

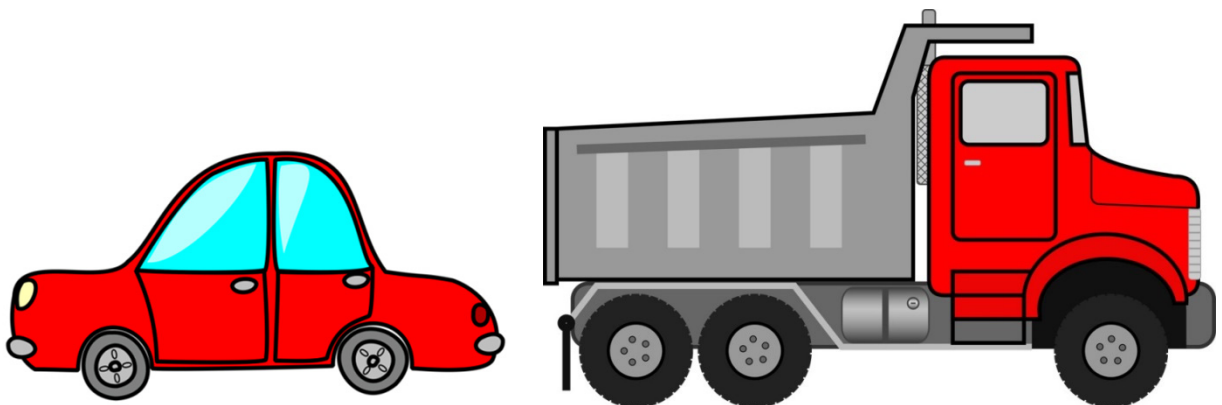
Lesson 50

What is momentum?

An object's momentum depends on its _____ and _____.

State the Law of Momentum Conservation:

If the two vehicles pictured below are moving with the same speed, do they have the same momentum? If not, which has more?



Section 4: The Revolution in the
Mid 17th Century

Level 1

Lesson 51

Why is the time of day different in different parts of the world?

What is the period of a pendulum?

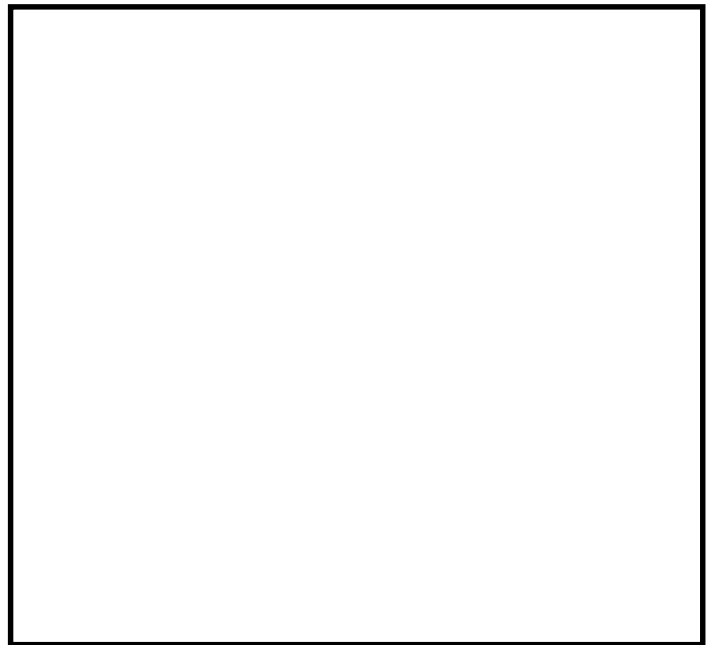
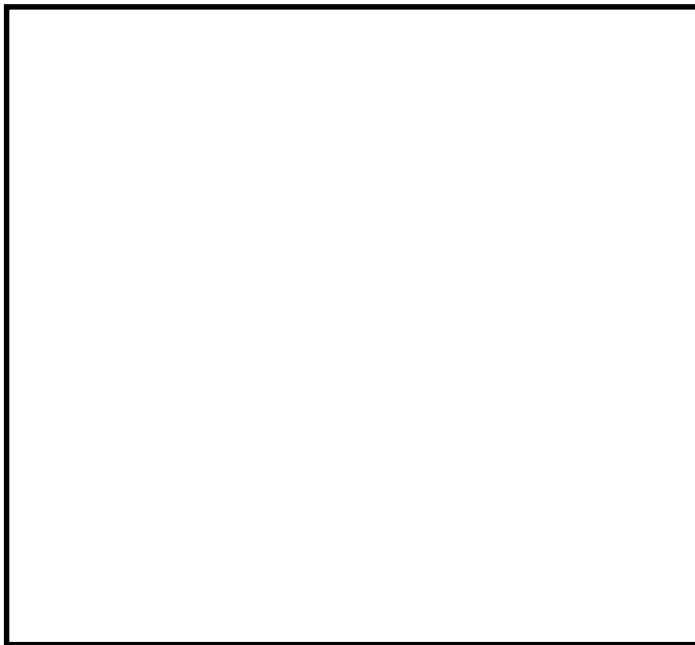
What does it depend on?

Section 4: The Revolution in the
Mid 17th Century

Lesson 52

Write down the prediction you made about what you would see in the first part of your experiment:

In the left box, draw what you saw before putting the slotted cardboard in front of the flashlight. In the right box, draw what you saw after putting the slotted cardboard in front of the flashlight. What was the main difference?



How did Huygens think light must act in order to explain that?

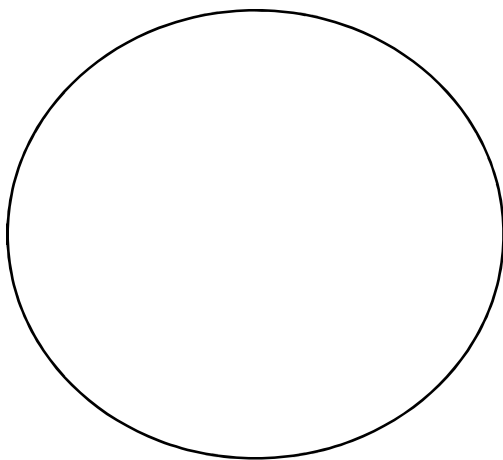
Section 4: The Revolution in the
Mid 17th Century

Level 1

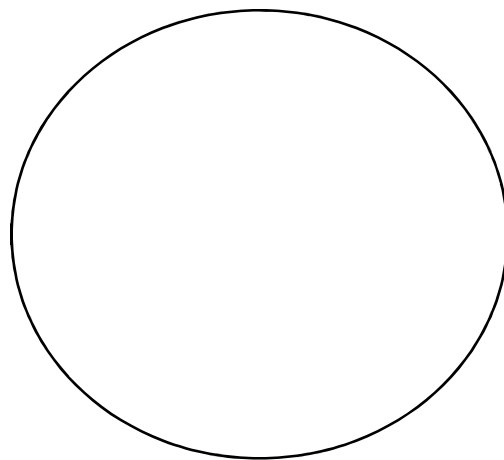
Lesson 53

1. Robert Boyle is considered the father of modern _____.
2. Chemistry is the study of substances and how they can be _____.
3. _____ is the pursuit of trying to turn _____ metals into _____ metals.
4. Boyle correctly understood that all matter is made up of particles that come in different _____ and sizes and are in constant _____.

Draw/color the plates below to show what happened in your experiment.



Right Before Adding Soap



A while after Adding Soap

Section 4: The Revolution in the
Mid 17th Century

Lesson 54

Why did the nut make noise in the experiment and not the penny?

What was Boyle's bell experiment?

What did it show?

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

Section 4: The Revolution in the
Mid 17th Century

Lesson 56

1. What type of blood vessel did Marcello Malpighi discover?

2. What similar things did he find in plants?

3. How did the blood vessels he discovered relate to William Harvey's work?

4. Even though he didn't discover them, what was Malpighi the first to discuss in the context of human anatomy?

5. What do we now know about each person's fingerprints?

Section 4: The Revolution in the
Mid 17th Century

Lesson 57

Examine pictures A, B & C on pg. 173 of your book. Draw each picture in a box below. Write your guesses about what they are in the blanks below.

--	--	--

A: _____ B: _____ C: _____

What did Hooke see when he looked at cork under a microscope?

What did he call them?

All living organisms are made up of tiny units called _____.

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

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

Section 4: The Revolution in the
Mid 17th Century

Lesson 60

Make a drawing like the one on page 183.



Based on the drawing above, why do planets orbit the sun?

Section 5: The Revolution Near the
End of the 17th Century

Level 1

Lesson 62

A _____ is something used to restrict how the blood is flowing when a patient is being treated.

What 2 things did Francesco Redi say should be done to treat a venomous snake bite?

1. _____

2. _____

Why is sucking snake venom out of a wound not dangerous to the person doing it?

Section 5: The Revolution Near the
End of the 17th Century

Level 1

Lesson 63

Spontaneous generation is the belief that _____ things
can come from _____ things.

How did Redi show that maggots don't come from decaying meat?

What was the control in Redi's experiment?

What did Redi do to show that maggots are just baby flies?

Section 5: The Revolution Near the
End of the 17th Century

Level 1

Lesson 64

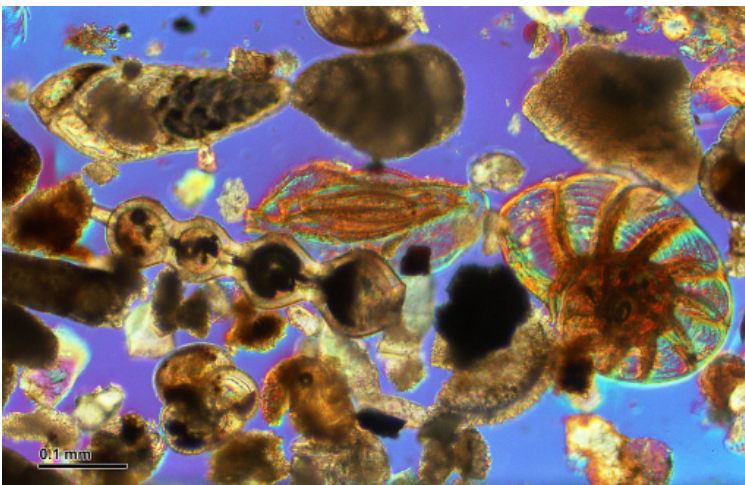
1. What did Antoni van Leeuwenhoek make that allowed his microscope to magnify things so well?

2. Van Leeuwenhoek discovered all sorts of tiny creatures that he called _____, or “little animals”.

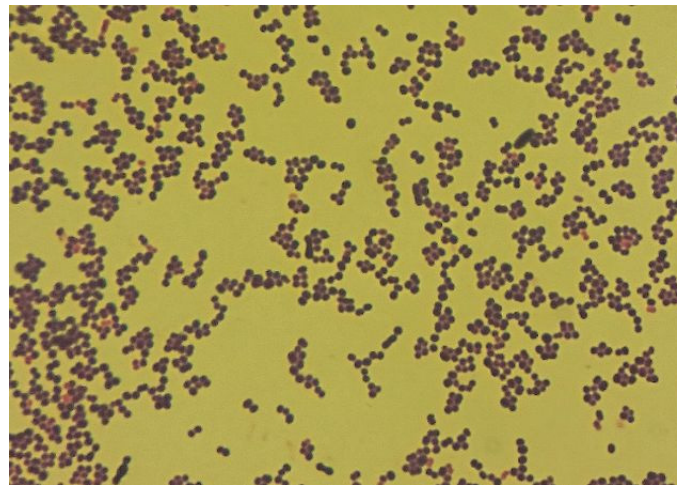
3. Instead of “little animals”, they are called

_____ and _____.

Doc. RNDr. Josef Reischig, CSC.



Protozoa



Bacteria

Section 5: The Revolution Near the
End of the 17th Century

Level 1

Lesson 65

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

Section 5: The Revolution Near the
End of the 17th Century

Level 1

Lesson 66

Draw/color a picture of your flower before the experiment in the box on the left. Write a few words or a short sentence describing its color. Record the same information about the flower in the box on the right AFTER your experiment has gone for at least 12 hours.

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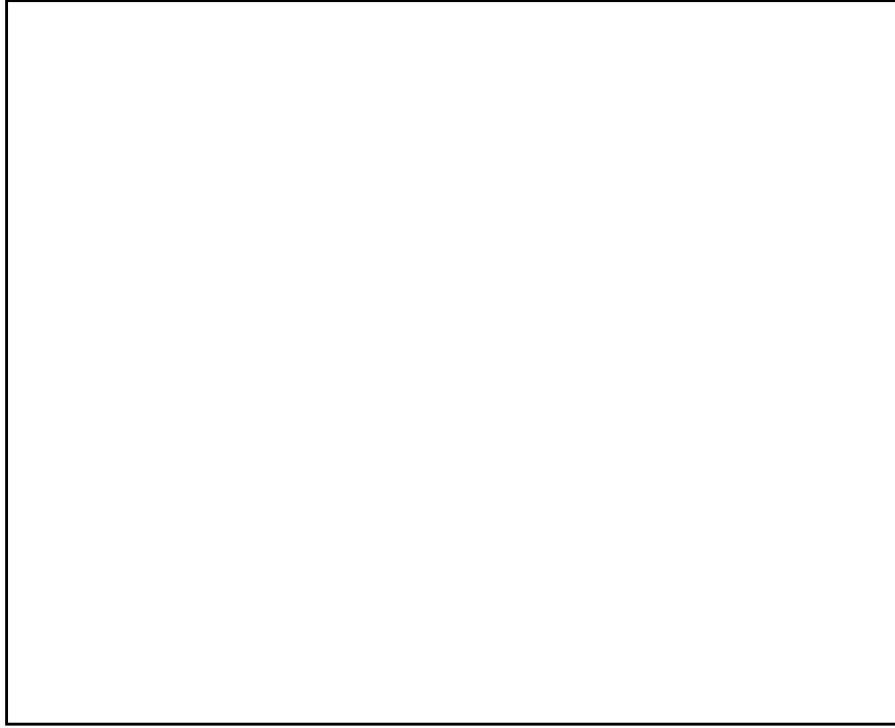
How does your experiment show that plants shouldn't be classified by their flowers?

What two ways did Ray classify plants that are still used today?

Section 5: The Revolution Near the
End of the 17th Century

Lesson 67

Draw a picture of the flower you examined. Label the parts you studied.



What does a flower do for a plant?

What do the stamens and carpel do for a plant?

Section 5: The Revolution Near the
End of the 17th Century

Level 1

Lesson 68

The three additive primary colors are _____, _____, and _____.

An object appears green. What color of light does it reflect? What colors does it absorb?

Draw a picture of Newton's double prism experiment.



How does this show that a prism separates light into colors rather than adding colors to light?

Section 5: The Revolution Near the
End of the 17th Century

Level 1

Lesson 69

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

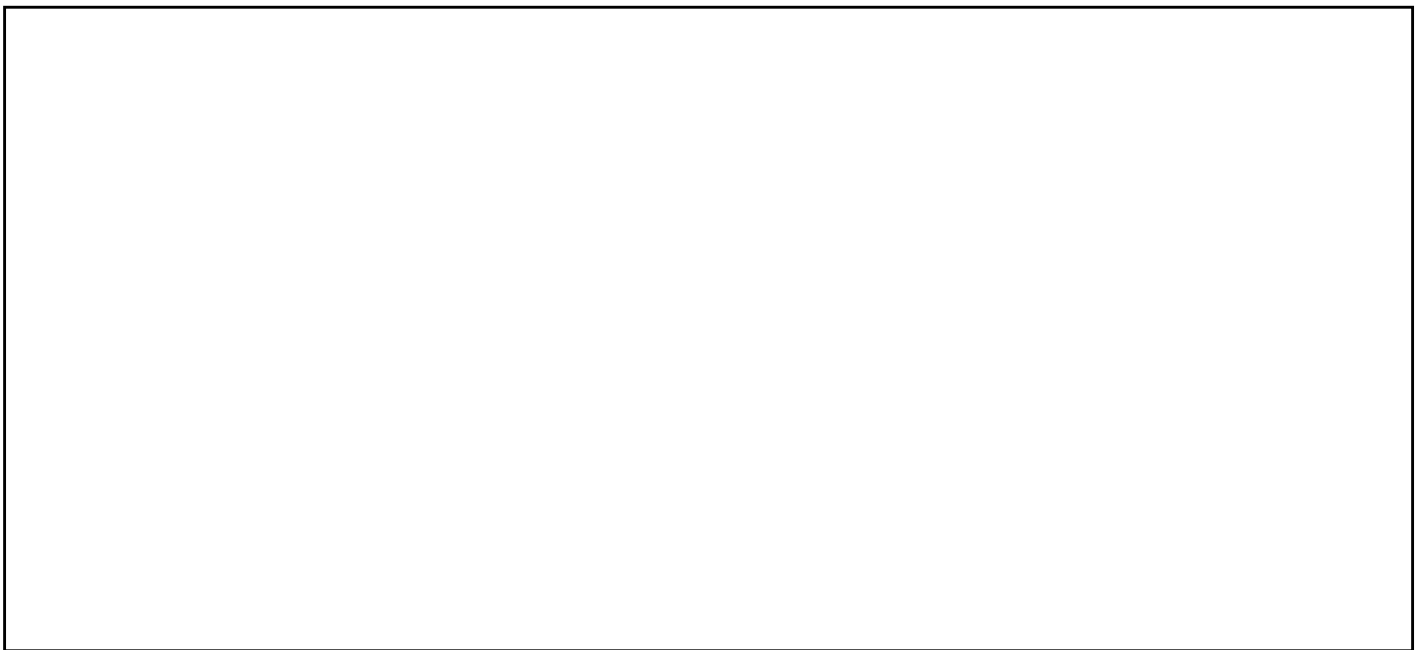
Section 5: The Revolution Near the
End of the 17th Century

Level 1

Lesson 70

What is Newton's Law of Universal Gravitation?

Draw Your Experiment



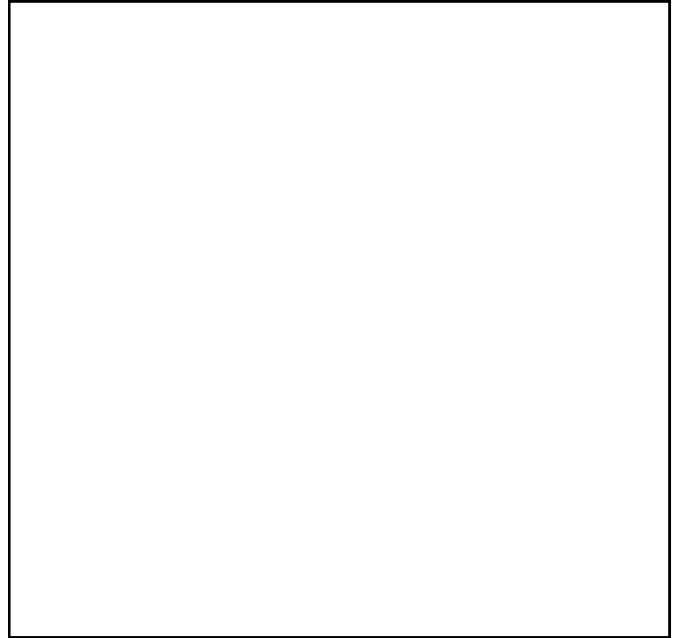
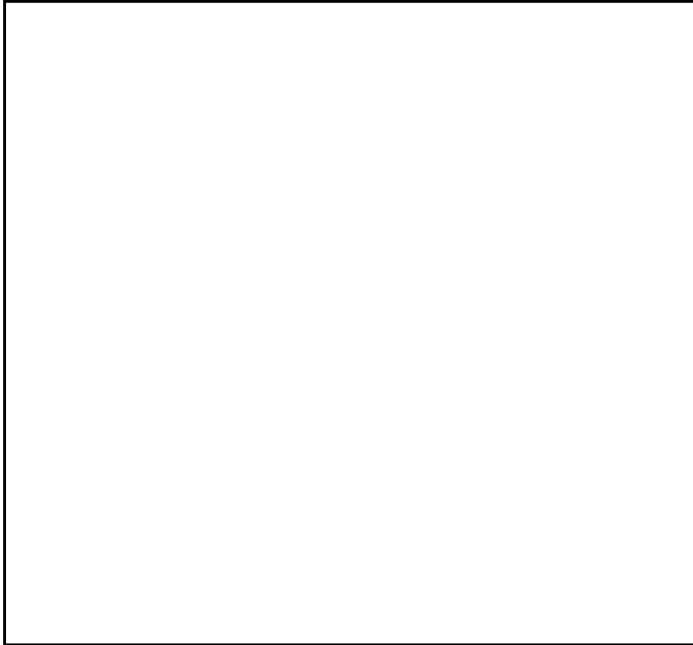
Why did the candle rock back and forth?

Section 5: The Revolution Near the
End of the 17th Century

Level 1

Lesson 71

Draw Your Experiment, Before and After Hitting the Pie Pan



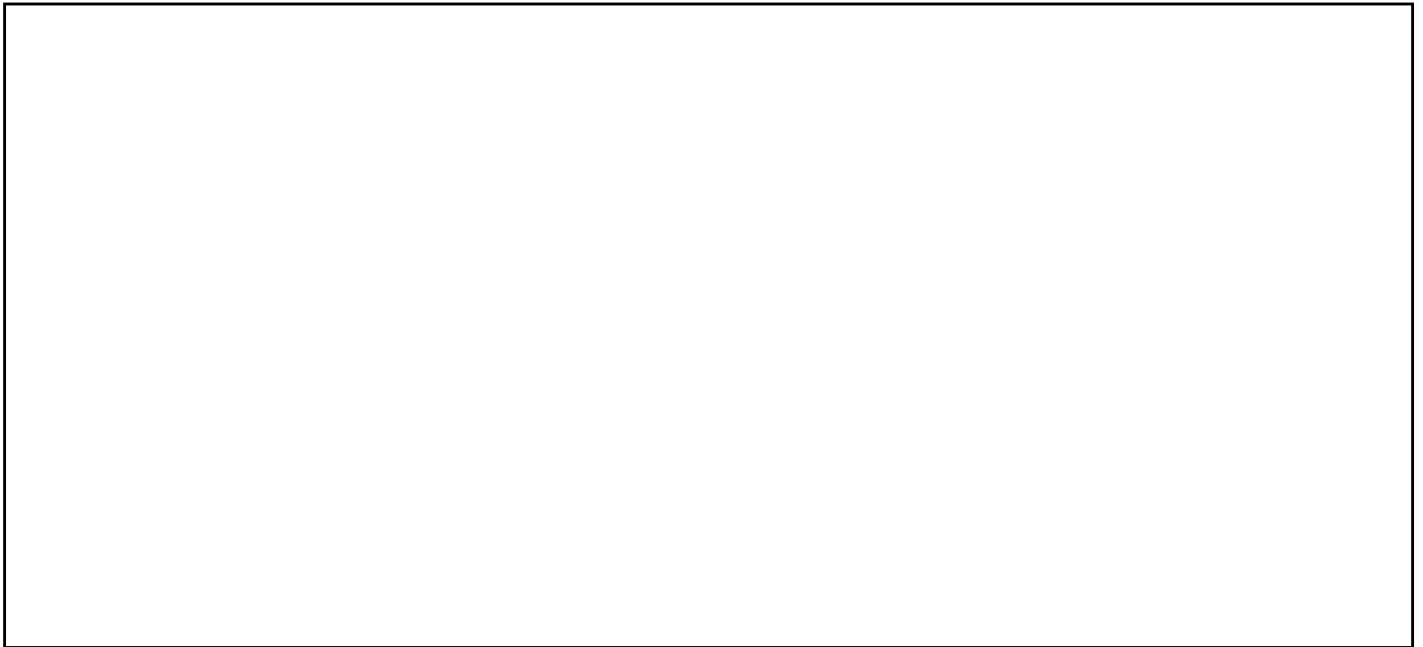
How does Newton's First Law of Motion explain this?

Section 5: The Revolution Near the
End of the 17th Century

Level 1

Lesson 72

Draw What You Made in Your Experiment



What happened in the experiment?

The more mass an object has, the _____ its inertia.

Section 5: The Revolution Near the
End of the 17th Century

Level 1

Lesson 73

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

Section 5: The Revolution Near the
End of the 17th Century

Level 1

Lesson 74

What is the difference between velocity and speed?

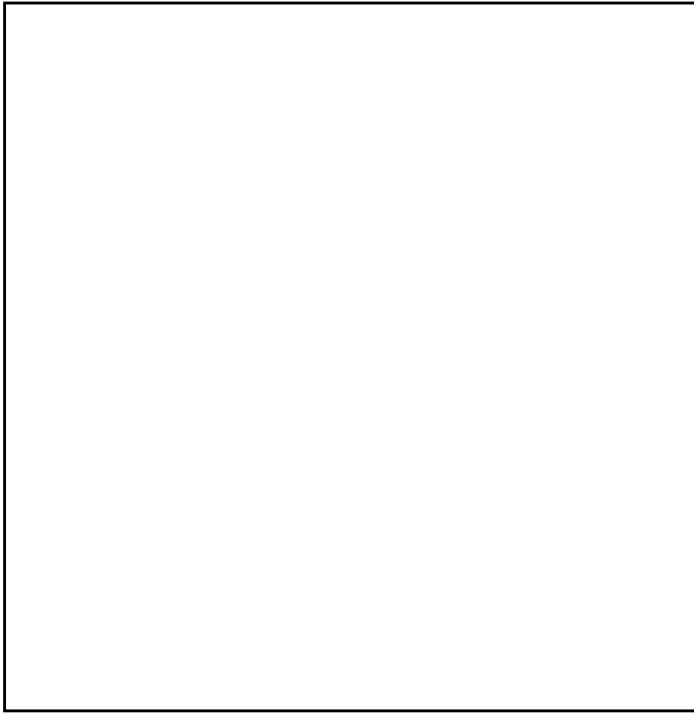
What is acceleration?

Why did the marble in your experiment travel faster the longer it had to drop? Remember to use “gravity” and “acceleration.”

Section 6: The Revolution at the
End of the 17th Century

Lesson 76

Draw Your Experiment,
labeling the forces on the ball



What is a net force?

Use Newton's Second law to explain your experiment.

Section 6: The Revolution at the
End of the 17th Century

Lesson 77

Why do objects fall with the same acceleration from gravity, even though gravity pulls heavier objects more strongly?

Circle the two pictures below that represent free fall



Gabriel Christian
Brown



John Fowler



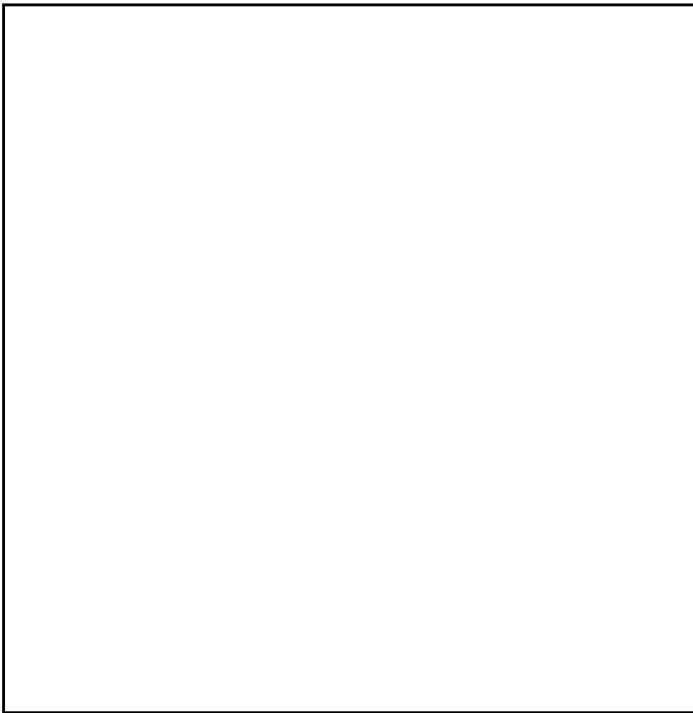
Section 6: The Revolution at the
End of the 17th Century

Lesson 78

Write down Newton's Third Law of Motion:

Draw a picture of a rocket
launching

Use Newton's Third Law to
explain how this works.



Section 6: The Revolution at the
End of the 17th Century

Lesson 79

Explain your experiment:

Which of Newton's Laws governs each of the following:

a. The fact that the bottom coin slid out of the stack:

b. The fact that the other coins didn't move out of the stack:

c. The fact that the other coins fell down to the counter:

d. The fact that the shooter coin changed its motion when it hit the stack:

Section 6: The Revolution at the
End of the 17th Century

Level 1

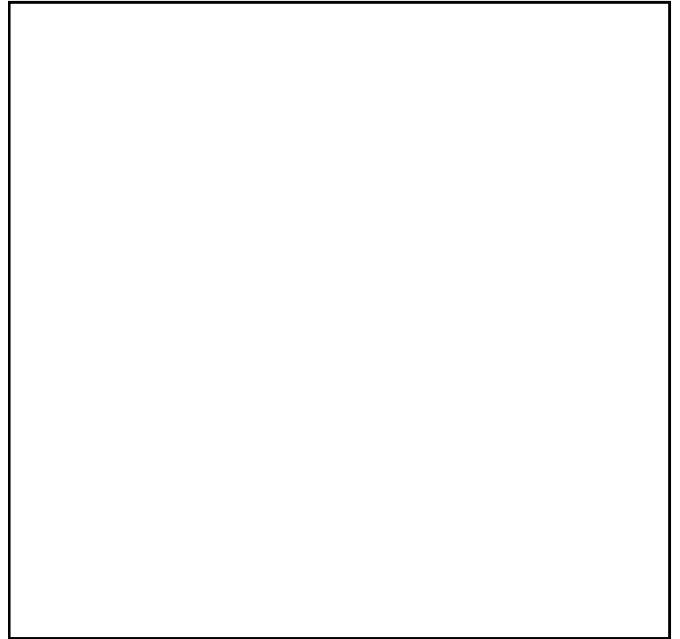
Lesson 80

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

Section 6: The Revolution at the
End of the 17th Century

Lesson 81

Make “before” and “after” drawings of your experiment.



How does the Law of Momentum Conservation explain this?

What happened when you started with two marbles, and how does the Law of Momentum Conservation explain that?

Section 6: The Revolution at the
End of the 17th Century

Level 1

Lesson 82

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

Section 6: The Revolution at the
End of the 17th Century

Lesson 83

1. Viscosity is a measure of how a fluid _____
motion.

2. When most fluids are heated, what happens to their
viscosity? _____

What does motor oil do in an engine?

Circle the picture that has the liquid with the highest viscosity.



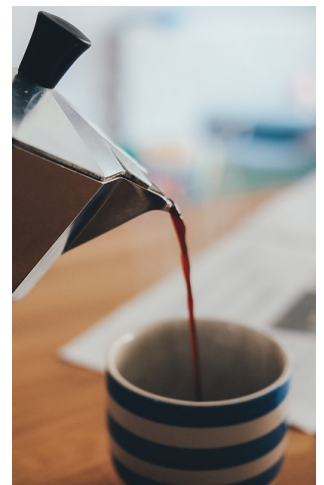
Water



milk



syrup



coffee

Section 6: The Revolution at the
End of the 17th Century

Lesson 84

Why did some natural philosophers dislike Newton's Universal Law of Gravitation?

How did Leibniz see God working in His creation?

How did Newton see God working in His creation?

Who was probably more correct?

Section 6: The Revolution at the
End of the 17th Century

Lesson 85

Explain what you did in your experiment.

Why is it easy to slide one page across another but hard to slide all the pages of a book across one another at once?

What did Amontons think causes friction?

Section 6: The Revolution at the
End of the 17th Century

Lesson 86

Rewrite the statement in the green box on page 263 in your own words:

How did your experiment demonstrate that to be true?

Section 6: The Revolution at the
End of the 17th Century

Level 1

Lesson 89

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

Section 6: The Revolution at the
End of the 17th Century

Lesson 90

Griffinstorm.

Why do you often see lightning before you hear the thunder it makes?



Why did most natural philosophers at this time think that light traveled instantly? _____

What did Rømer do to show that this was wrong?
