Science in the Scientific Revolution

Lab and Review Book

LEVEL 2

Property of:
1. Define *Heliocentric*:

_______________________________________________________________________________
_______________________________________________________________________________

2. Define *Geocentric*:

_______________________________________________________________________________
_______________________________________________________________________________

**Nicolaus Copernicus**

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

How is that different from what most natural philosophers believed?

_______________________________________________________________________________
_______________________________________________________________________________
_______________________________________________________________________________
_______________________________________________________________________________
_______________________________________________________________________________
_______________________________________________________________________________

Use the heliocentric system to explain why Mercury and Venus never appear in the eastern sky just after sunset.

_______________________________________________________________________________
_______________________________________________________________________________
_______________________________________________________________________________
_______________________________________________________________________________
_______________________________________________________________________________
_______________________________________________________________________________
Section 1: The Revolution Begins
Lesson 2

Mars is _______________ when it appears in the eastern sky right after sunset.

Make the four drawings explained in the book:

<table>
<thead>
<tr>
<th>Geocentric System</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Heliocentric System</th>
</tr>
</thead>
<tbody>
<tr>
<td>(These are what we observe.)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

In the box on the right, make a drawing like the one on page 6, which shows how the heliocentric system explains retrograde motion.
In this lesson, you learned two arguments that natural philosophers used against the heliocentric system. Summarize them in the box below:

1. ____________________________________________________
________________________________________________________________________
________________________________________________________________________

2. ____________________________________________________
________________________________________________________________________
________________________________________________________________________

In the box on the right, make a drawing like the one on page 8 and use it to explain parallax. Why wasn’t it seen in Copernicus’s day?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
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.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

Explain in your own words the proper interpretation of Joshua 10:1-13

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Section 1: The Revolution Begins

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?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

5. What is wrong with the idea that men have one less rib than women?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
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?

What is the mandible? How did Vesalius correct Galen on this bone?
Section 1: The Revolution Begins

Lesson 7

This is a challenge lesson, so I want to challenge you to make your own notebook page for it!
Make a drawing like the one on page 24, labelling the muscles, tendon, and ligament.

List the functions of:

Skeletal muscles

Tendons

Ligaments

What are the other two types of muscle found in the body?
Section 1: The Revolution Begins
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?
   _________________________________________________________
   _________________________________________________________

Why do arteries have thicker walls than veins?
   _________________________________________________________
   _________________________________________________________
   _________________________________________________________
Section 1: The Revolution Begins
Lesson 10

1. What are the two functions of nerves, and what do scientists call the nerves that perform each function?

   _______________________________________________________
   _______________________________________________________
   _______________________________________________________

2. Please explain the difference between cranial and spinal nerves.

   _______________________________________________________
   _______________________________________________________
   _______________________________________________________

3. What is the optic nerve? Is it a cranial nerve or a spinal nerve?

   _______________________________________________________
   _______________________________________________________

Attach or draw a picture of your brain model, labelling the cerebrum and the cerebellum
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.
1. What is the difference between the organs of the digestive tract and the accessory organs?

2. Which is longer: the small intestine or the large intestine?

3. Write a story from the point of view of some food someone has just eaten. Describe, from the food’s point of view, where it travels and what happens to it as it travels.
Lesson 12

This is a challenge lesson, so I want to challenge you to make your own notebook page for it!
Section 1: The Revolution Begins
Lesson 13

1. What do the kidneys produce?

2. Fill in the blanks to describe how a filter works:

A filter (whether it’s a kidney, coffee filter, or air filter in your house) has lots of tiny _______.
The molecules that make up the water or air are _______________ than the holes, so they can pass through the holes. Things like dirt or coffee grounds are _______________ than the holes and can’t fall through. Those things get stuck on the filter.

3. How did the natural philosophers of the day think the kidney worked, and how did Vesalius show they were wrong?

4. What do the ureters and bladder do?
Section 1: The Revolution Begins
Lesson 14

1. What happens to the temperature of the air when you breathe it into your lungs?

2. Why is there one less lobe on the left lung as compared to the right lung?

3. Label the diagram below.

Why did Vesalius call the trachea the “rough artery?”
Section 1: The Revolution Begins

Lesson 15

This is a challenge lesson, so I want to challenge you to make your own notebook page for it!
In your experiment the noodles were like _______________ and the vanilla extract was like _______________.

Write a short story about a particle that wants to make people sick. Have it plan the three different ways it can spread the disease, just as Fracastoro thought.

Why should you avoid shaking hands with people during flu season?
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?

______________________________________________________
______________________________________________________
______________________________________________________
______________________________________________________
______________________________________________________

Why did Gesner call it “plumbago?”

______________________________________________________
______________________________________________________
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:

______________________________________________________
______________________________________________________
______________________________________________________
______________________________________________________
______________________________________________________
______________________________________________________

What is the name of the family that beans and peanuts are both members of?

______________________________________________________
Most science books (even ones written today) have ________________.
The only book that doesn’t have any is the ____________________.
**Similarities between the human and cat skeletons:**

1. 
2. 
3. 
4. 
5. 
6. 
7. 
8. 

**Differences between the human and cat skeletons:**

1. 
2. 
3. 
4. 
5. 
6. 
7. 
8. 

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”? ________________

4. Why do you think there are so many similarities between the cat and human skeletons? ________________
   ________________
Explain what the picture is illustrating:

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

What did Michael Servetus notice to help him figure all this out?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
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?

______________________________________________________

______________________________________________________

______________________________________________________

______________________________________________________

______________________________________________________

______________________________________________________

______________________________________________________

He said he saw a new star. What was it really, and what is it called by modern scientists?

______________________________________________________

______________________________________________________

______________________________________________________

______________________________________________________

______________________________________________________

______________________________________________________

______________________________________________________
1. Astronomers sometimes call comets ______________  ___________________.

2. Look at the picture of the comet below. Point out its tail. Draw the sun where you think it would be.

Why is the relationship between the tail of a comet and the position of the sun always like that?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

How did Brahe’s comet observations destroy the idea that the universe was made of spheres?

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

Lesson 24

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

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?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

Write your prediction about which has a shorter period: a long pendulum or a short one?

________________________________________________________________________

Test your prediction with an experiment like the one you just did. Was your prediction correct?

________________________________________________________________________
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?

______________________________________________________

______________________________________________________

______________________________________________________

______________________________________________________

If there were no friction in your experiment and the ball rolled to the very top of one trough but did not roll off, how do the heights of the two troughs compare?

______________________________________________________
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?

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

What did you do to reduce experimental error?

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
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?

________________________________________________________________________

Why did Galileo think that math is able to describe how creation works?

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

Lesson 28

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!
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. ____________________________________________________
   ____________________________________________________
   ____________________________________________________

The phases of Venus as seen from the earth are shown on the left. How did your experiment show that this supports heliocentrism?

________________________________________________________________
________________________________________________________________
________________________________________________________________
________________________________________________________________
________________________________________________________________
Draw a picture like the one on page 97

Why don’t we see the world upside down?

______________________________________________________
______________________________________________________
______________________________________________________
______________________________________________________
______________________________________________________
______________________________________________________

Nearsighted people have the image of what they are seeing form ____________ of the retina.

This is corrected with a lens that __________________ light before it hits the eye.

Farsighted people have the image of what they are seeing form ______________ the retina.

This is corrected with a lens that __________________ light before it hits the eye.
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 two ellipses on top of it to show the difference between an ellipse and a circle. The eccentricity of one ellipse should be small, and the eccentricity of the other should be large. Indicate which is which.

The planet whose orbit has the highest eccentricity is _____________

The planet whose orbit has the lowest eccentricity is _____________

Draw a picture like the one at the bottom of page 100, indicating where the planet moves fastest and where it moves slowest.
Draw a picture like the one on the right side of the illustration on page 104, pointing out the high tides and low tides.

Why does each shore on the earth experience two high tides and two low tides a day?

What is the difference between spring tides and neap tides?
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

Why was Bacon important to science, even though he did no memorable experiments?

______________________________________________________

______________________________________________________

______________________________________________________
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?

What do modern chemists typically call alkaline substances?
This is a challenge lesson, so I want to challenge you to make your own notebook page for it!
Repeat Harvey’s calculation, using what is given in the book:

Number of times the heart beats each hour:

____________________________________________________________________

Number of times the heart beats each day:

____________________________________________________________________

Number of ounces going through the heart in a day:

____________________________________________________________________

How does this show that blood must circulate in the body instead of constantly being made?

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

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

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________
Section 3: The Revolution in the Early 17th Century
Lesson 39

What is a genealogy? ____________________________________________________________

______________________________________________________

______________________________________________________

______________________________________________________

______________________________________________________

______________________________________________________

______________________________________________________

______________________________________________________

______________________________________________________

Explain the basics of how he calculated when God created the earth.

______________________________________________________

______________________________________________________

______________________________________________________

______________________________________________________

______________________________________________________

______________________________________________________

______________________________________________________

______________________________________________________

What is the Septuagint, and how does it present a problem to Ussher’s method?

______________________________________________________

______________________________________________________

______________________________________________________

______________________________________________________

______________________________________________________

______________________________________________________

______________________________________________________

______________________________________________________
Section 3: The Revolution in the Early 17th Century
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? ___________

In the experiment, I started with iron (an ___________ ) and copper sulfate (a ___________ ).

When they reacted, ___________ was pulled from the copper sulfate, and ___________ took its place. I ended up with copper (an ___________ ) and iron sulfate (a ___________ ).
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?

Air pressure is often measured in inches or millimeters of mercury? To what does that refer?
Section 3: The Revolution in the Early 17th Century
Lesson 42

Do your best to draw the picture that your partner describes to you in the box below.
How does your picture compare to the one your helper described?

How does your experiment illustrate dualism?

What did Descartes mean by “I think, therefore I am?”
Section 3: The Revolution in the Early 17th Century
Lesson 43 (cont)
Make a drawing of your experimental setup.

What happened in the experiment?

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

What does that demonstrate?

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

What does Pascal’s law say?

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
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 45

This is a challenge lesson, so I want to challenge you to make your own notebook page for it!
1. An anesthetic makes people ____________ _______________ to things like pain.

2. What system in the human body did Thomas Bartholin discover? ________________________________

3. What is the purpose of that system? ________________________________
   __________________________________________________________________________

4. What is the liquid that the vessels of that system carry? ________________________________
   __________________________________________________________________________

5. What eventually happens to that liquid? ________________________________
   __________________________________________________________________________

6. What is the difference between a local anesthetic and a general anesthetic? ________________________________
   __________________________________________________________________________

7. What did Thomas Bartholin use as a local anesthetic? ________________________________
The drawing below is based on Otto von Guericke’s Magdeburg hemispsheres experiment. Use arrows to represent what the air is doing inside and outside of the two hemispheres:

Why couldn’t the hemispheres be pulled apart?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

What does the term “vacuum packed” mean, and how is it similar to your experiment?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Describe Otto von Guericke’s machine that developed electrical charge.

What did he use it to do?

How is this similar to your experiment?

How did Otto von Guericke use electrical charge to try to explain gravity?
Section 4: The Revolution in the Mid 17th Century

Lesson 49

Why Did Galileo describe the rings as “ears?”

Why could Huygens see that they are rings?

What are the rings made of?

How did the tilt make the rings harder to understand?
What is momentum?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

An object’s momentum depends on its ________________ and ________________.

State the Law of Momentum Conservation:

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

How does that law explain the results of your experiment?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Section 4: The Revolution in the Mid 17th Century

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?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

How did Huygens use a pendulum to make a significantly more accurate clock?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
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 from of the flashlight. What was the main difference?

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

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
How does the drawing relate to light as well as the second part of your experiment?
Section 4: The Revolution in the Mid 17th Century

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

Why did you warm the milk in your experiment?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

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

What was Boyle’s bell experiment?

What did it show?

What experiment did Boyle do with fire to show that air was necessary to burn things?
Section 4: The Revolution in the Mid 17th Century

Lesson 55
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. How did the blood vessels he discovered relate to William Harvey’s work?

2. What similar things did he find in plants?

3. What is girdling a tree, and how did Malpighi use that to confirm his idea of what those things did in a plant?

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?
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?

________________________________________________________________________

Why didn’t he see the things that are inside of them?

________________________________________________________________________
________________________________________________________________________

All living organisms are made up of tiny units called ________________.
Section 4: The Revolution in the Mid 17th Century

Lesson 58

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 59
This is a challenge lesson, so I want to challenge you to make your own notebook page for it!
Based on the drawing above, why do planets orbit the sun?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

How is this similar to what you did in your experiment?

________________________________________________________________________

________________________________________________________________________

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

Lesson 61

What did you see in your experiment? (Be sure to use the term "scattered light."

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

How does that relate to Zodiacal light?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

Cassini changed his mind on at least two things. What caused him to change his mind, and why does that make him a good scientist?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
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?

   ____________________________________________________
   ____________________________________________________
   ____________________________________________________
   ____________________________________________________

What are the two different kinds of snake venom?

   ____________________________________________________
   ____________________________________________________
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?

What is a parasite, and what is a gall?
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 ________________.

4. If a person makes a microscope just like Antoni van Leeuwenhoek’s, why might he or she see only protozoa and not bacteria?

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

Lesson 65
This is a challenge lesson, so I want to challenge you to make your own notebook page for it!
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.

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?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

Horses and donkeys can reproduce to make mules, but mules cannot reproduce. Are horses and donkeys part of the same species?

________________________________________________________________________
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?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

Why is the pollen from one species of plant more likely to cause allergies than another?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
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?

What three colors of light do computers use to generate millions of colors? How do they do it?
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

Lesson 70

What is Newton’s Law of Universal Gravitation?

______________________________________________________
______________________________________________________
______________________________________________________
______________________________________________________
______________________________________________________

Why did the candle rock back and forth?

______________________________________________________
______________________________________________________
______________________________________________________
______________________________________________________
______________________________________________________

Jupiter has more mass than the earth, but less gravitational attraction to the sun? Why?

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

Lesson 71
Draw Your Experiment, Before and After Hitting the Pie Pan

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

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

How does Newton’s First Law of Motion explain the Voyager spacecraft?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
What happened in the experiment?

______________________________________________________
______________________________________________________
______________________________________________________
______________________________________________________
______________________________________________________
______________________________________________________

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

Why would NASA use inertial balances to measure the mass of objects?

______________________________________________________
______________________________________________________
______________________________________________________
Lesson 73
This is a challenge lesson, so I want to challenge you to make your own notebook page for it!
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.”

What three ways can acceleration change an object’s motion?
Write down Newton’s Second Law:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Describe your experiment and use that law to explain it.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Write down the mathematical formula for Newton’s Second Law:

________________________________________________________________________
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.

What would happen if you used a wadded-up piece of paper in the experiment?
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

You are in free fall and drop a penny. What would you see the penny doing?
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.

When you push a car on an icy road, you move backwards. Why?
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:

______________________________________________________

What insight allowed Newton to analyze the motion of the planets?

______________________________________________________

______________________________________________________

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

Lesson 80

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

If you rolled two marbles into a group of three and only one rolled out, how could momentum still be conserved?
Lesson 82
This is a challenge lesson, so I want to challenge you to make your own notebook page for it!
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?

____________________________________________________

____________________________________________________

____________________________________________________

____________________________________________________

____________________________________________________

Why should it have a viscosity that is high, but not too high?

____________________________________________________

____________________________________________________

____________________________________________________

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

- Water
- milk
- syrup
- coffee
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?

________________________________________________________________________

In the picture, is the reflecting telescope on the left or on the right?

________________________________________________________________________
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?


A scientific model ________________ something that either can’t be seen very well or studied directly.
Rewrite the statement in the green box on page 263 in your own words:

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

How did your experiment demonstrate that to be true?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

Why was it important to release the bag gently in your experiment?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
How do a car’s wheels use friction to produce the car’s motion?

Why do car tires have treads?

What friction must be overcome to get a car moving?
Section 6: The Revolution at the End of the 17th Century
Lesson 88

What is mechanical energy? ______________________________________________________

____________________________________________________________________________

Explain your experiment and how it demonstrates the Law of Energy Conservation.

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________

Where does most of the heat in a car engine come from?

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________
Lesson 89
This is a challenge lesson, so I want to challenge you to make your own notebook page for it!
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?

How many times around the earth can light travel in one second?