Science in the Scientific Revolution

Lab and Review Book

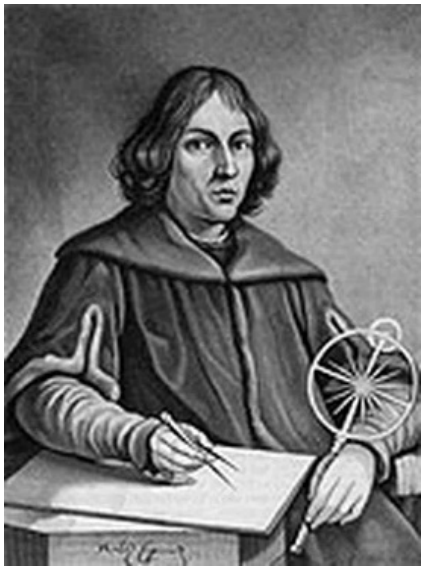
LEVEL 2

Property of:

_____

Section 1: The Revolution Begins

Lesson 1



Nicolaus Copernicus

1. Define *Heliocentric*:

_____

_____

2. Define *Geocentric*:

_____

_____

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

Level 2

Lesson 2

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

Make the four drawings explained in the book:

Geocentric System

Heliocentric System
(These are what we observe.)

In the box on the right, make a drawing like the one on page 6, which shows how the heliocentric system explains retrograde motion.

Section 1: The Revolution Begins

Level 2

Lesson 3

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?

_____

_____

_____

_____

_____

_____

_____

_____

Section 1: The Revolution Begins

Level 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.

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

Section 1: The Revolution Begins

Level 2

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?

_____

_____

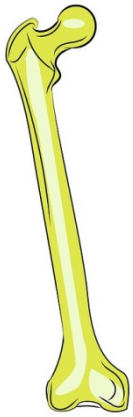
_____

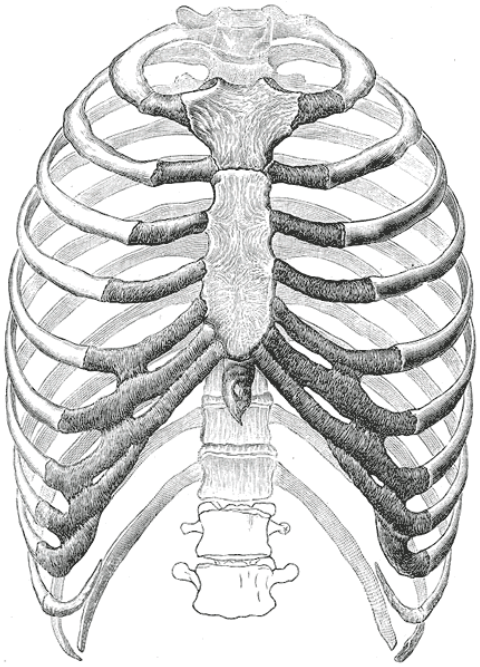
_____

Section 1: The Revolution Begins

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?

_____

What is the mandible? How did Vesalius correct Galen on this bone?

_____

_____

_____

_____

_____

Section 1: The Revolution Begins

Level 2

Lesson 7

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

Section 1: The Revolution Begins

Level 2

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 _____

_____

What are the other two types of muscle found in the body?

_____

_____

Section 1: The Revolution Begins

Level 2

Lesson 9

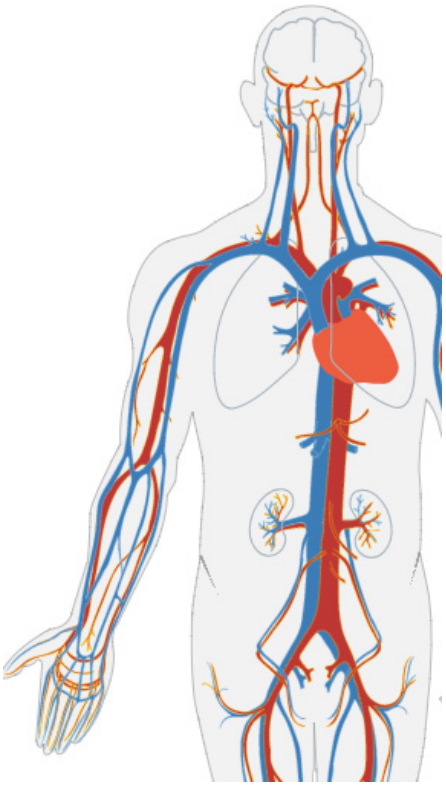
1. Which blood vessels “pulse” (you can feel the blood pumping through them)?

_____

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

Level 2

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

Section 1: The Revolution Begins

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. 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.

Section 1: The Revolution Begins

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

Level 2

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

Level 2

Lesson 14

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

_____

_____

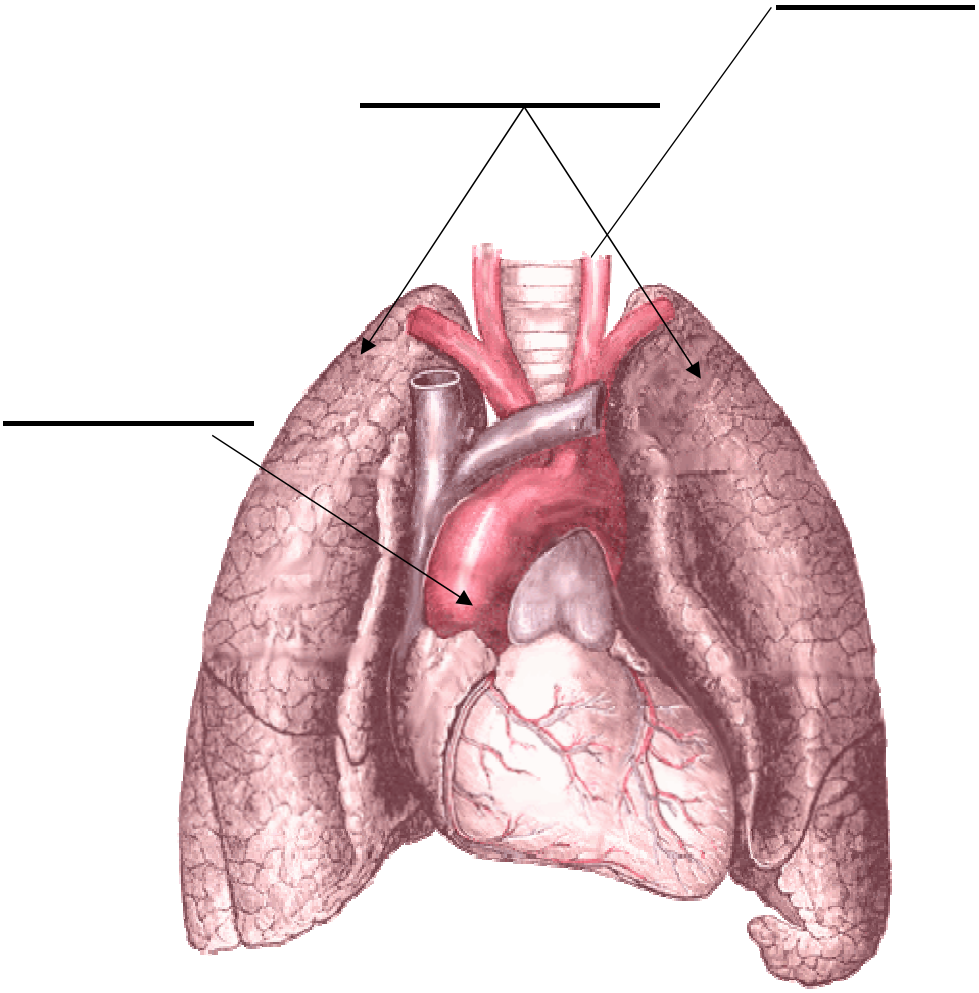
2. Why is there one less lobe on the left lung as compared to the right lung?

_____

_____

_____

3. Label the diagram below.



Why did Vesalius call the trachea the “rough artery?”

_____

_____

_____

_____

_____

_____

_____

_____

Section 1: The Revolution Begins

Level 2

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 2

Lesson 16

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?

_____

_____

_____

_____

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

Level 2

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?

_____

_____

Why did Gesner call it "plumbago?"

_____

_____

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

Level 2

Lesson 18

Draw Flower #1

Draw Flower #2

Number of petals: _____

Stalk-like structures? _____

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?

_____

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

Level 2

Lesson 19

Animal:_____

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

_____

_____

_____

_____

_____

_____

_____

Why is Gesner considered the father of modern zoology, even though his book had many errors?

_____

_____

_____

_____

_____

_____

_____

_____

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 2

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”?

4. Why do you think there are so many similarities between the cat and human skeletons?

   _____

   _____

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

Level 2

Lesson 21

Draw a picture like the one on page 64

Explain what the picture is illustrating:

_____

_____

_____

_____

_____

_____

_____

_____

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

_____

_____

_____

_____

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

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?

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

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

Level 2

Lesson 23

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

Level 2

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?

_____

_____

_____

_____

_____

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?

_____

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

Level 2

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?

_____

_____

_____

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?

_____

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

Level 2

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?

_____

_____

_____

What did you do to reduce experimental error?

_____

_____

_____

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

Level 2

Lesson 27

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

Describe your experiment

_____

_____

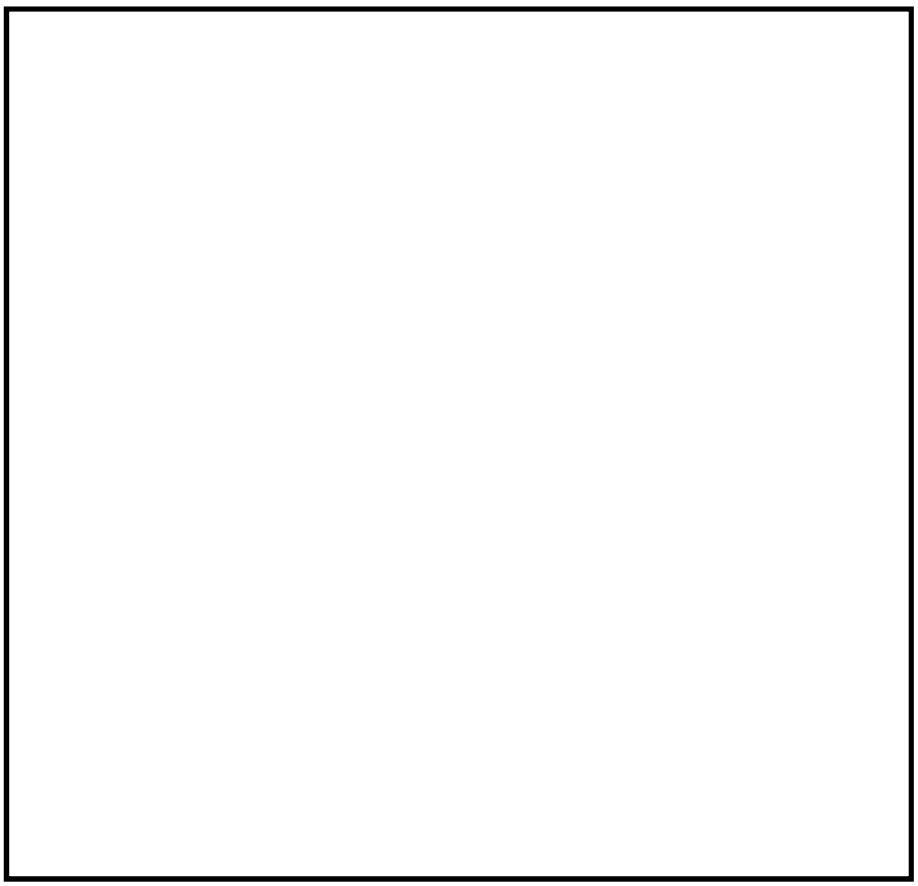
_____

_____

_____

_____

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?

_____

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

Level 2

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 2

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 2

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

Level 2

Lesson 31

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

1. _____

_____

_____

2. _____

_____

_____

3. _____

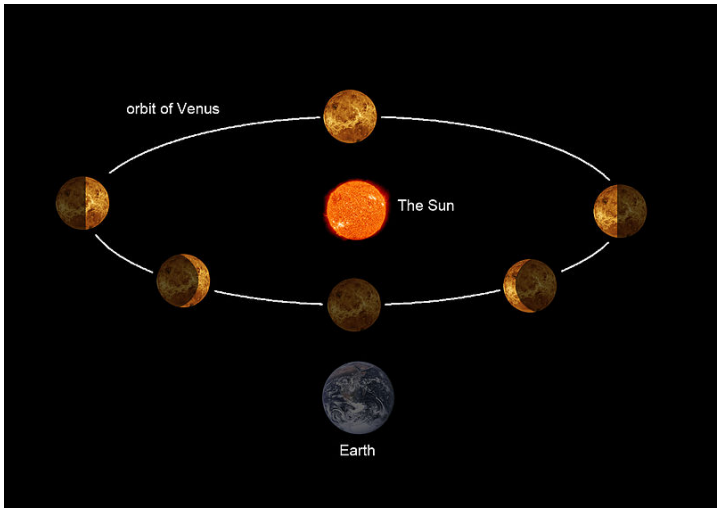
_____

_____

4. _____

_____

_____



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

_____

_____

_____

_____

_____

Section 3: The Revolution in the Early 17th Century

Level 2

Lesson 32

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.

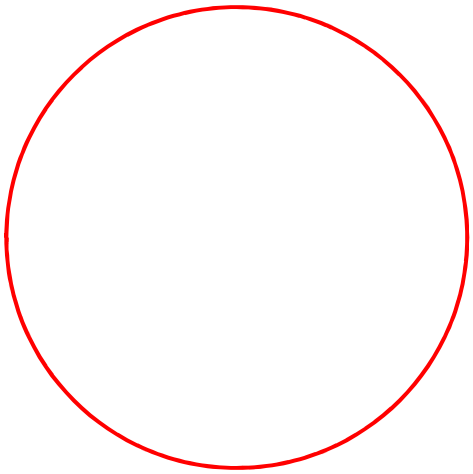
Section 3: The Revolution in the Early 17th Century

Level 2

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 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.

Section 3: The Revolution in the Early 17th Century

Level 2

Lesson 34

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

Level 2

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

Level 2

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?

Section 3: The Revolution in the Early 17th Century

Level 2

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

Level 2

Lesson 38

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

Level 2

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

Level 2

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 _____

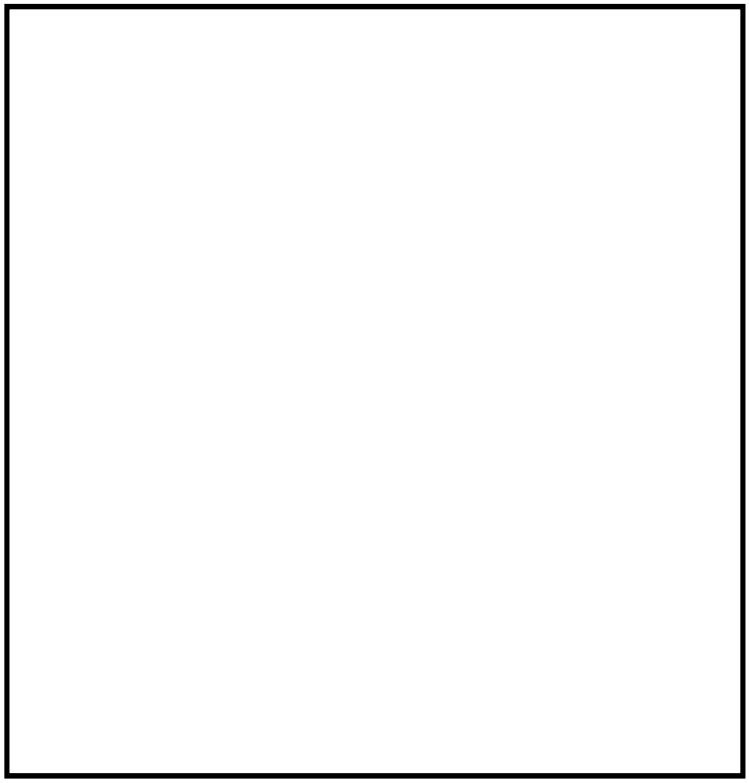
took its place. I ended up with copper (an _____) and iron sulfate (a _____).

Section 3: The Revolution in the Early 17th Century

Level 2

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

Level 2

Lesson 42

Do your best to draw the picture that your partner 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?

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?

_____

_____

Section 3: The Revolution in the Early 17th Century

Level 2

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 2

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

Level 2

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 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?

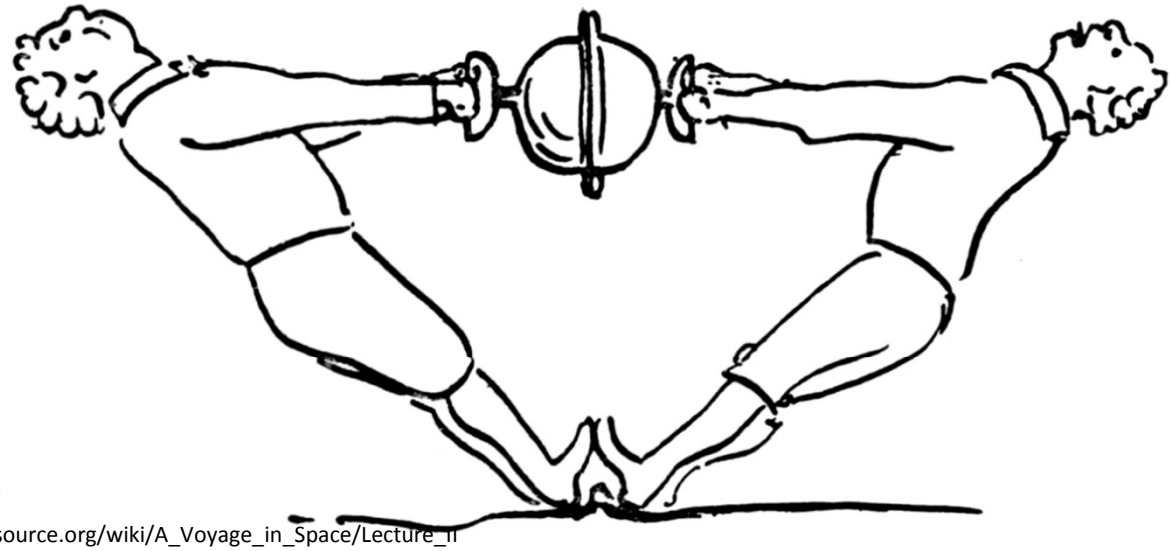
   _____

Section 4: The Revolution in the Mid 17th Century

Level 2

Lesson 47

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:



https://en.wikisource.org/wiki/A_Voyage_in_Space/Lecture_II

TRYING TO SEPARATE THE TWO "MAGDEBURG HEMISPHERES"

Why couldn't the hemispheres be pulled apart?

_____

_____

_____

_____

_____

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

_____

_____

_____

_____

Section 4: The Revolution in the Mid 17th Century

Level 2

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?

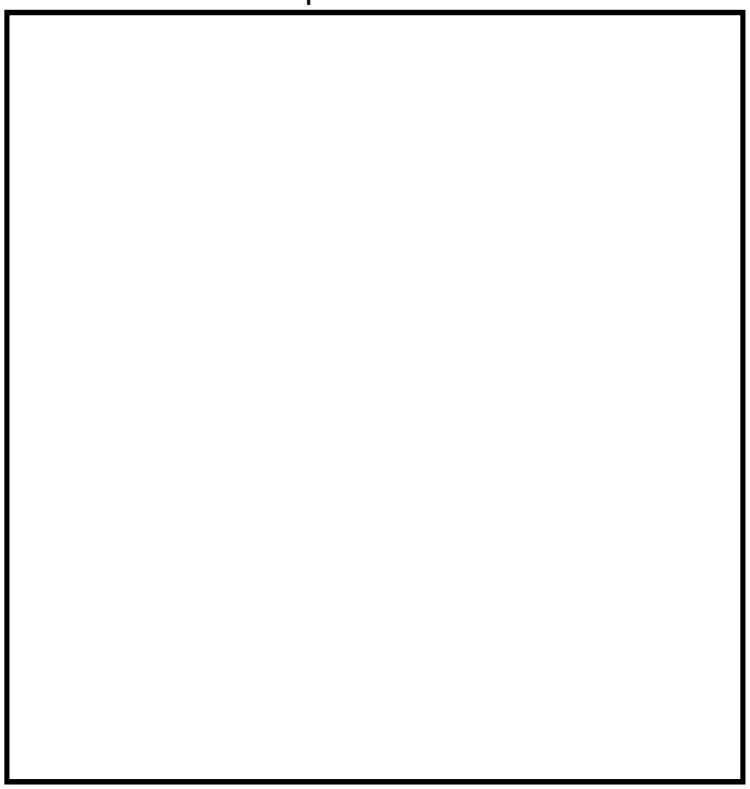
How did Otto von Guericke use electrical charge to try to explain gravity?

Section 4: The Revolution in the Mid 17th Century

Level 2

Lesson 49

Draw a picture of Saturn



Why Did Galileo describe the rings as “ears?”

_____

_____

_____

_____

Why could Huygens see that they are rings?

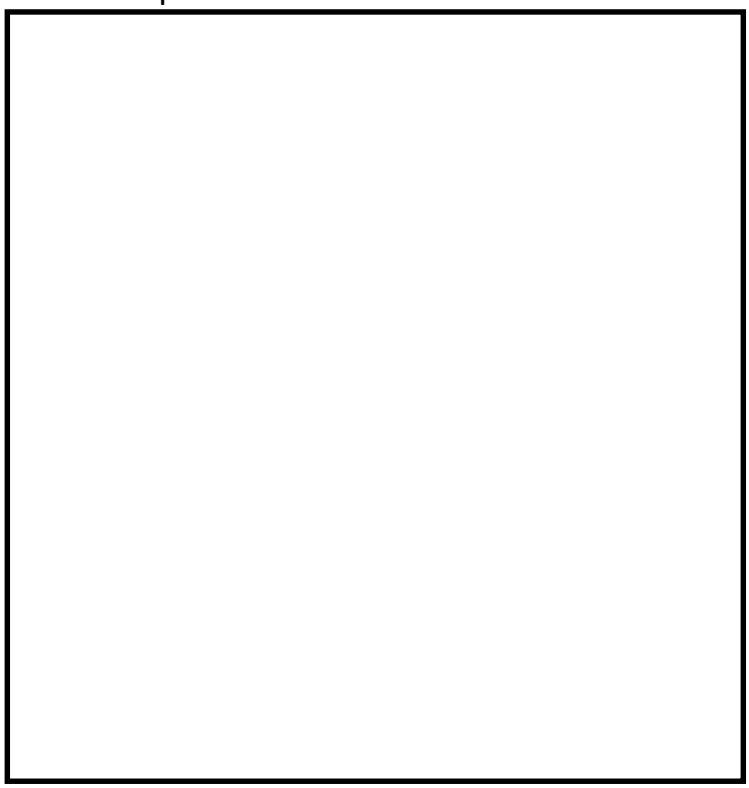
_____

_____

_____

_____

Draw a picture of Saturn with a different tilt



What are the rings made of?

_____

_____

How did the tilt make the rings harder to understand?_____

_____

_____

_____

_____

_____

_____

Section 4: The Revolution in the Mid 17th Century

Level 2

Lesson 50

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

Level 2

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 significanyly more accurate clock?

Section 4: The Revolution in the Mid 17th Century

Level 2

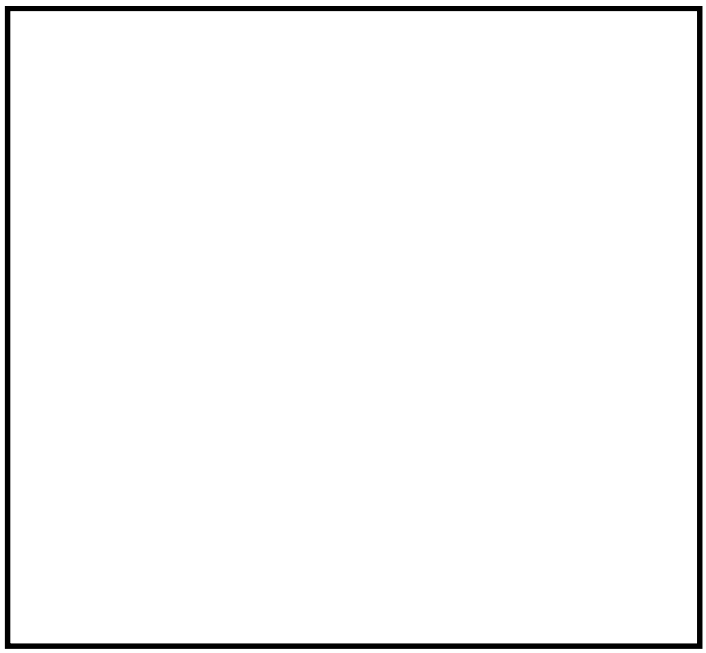
Lesson 52

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?

_____

_____

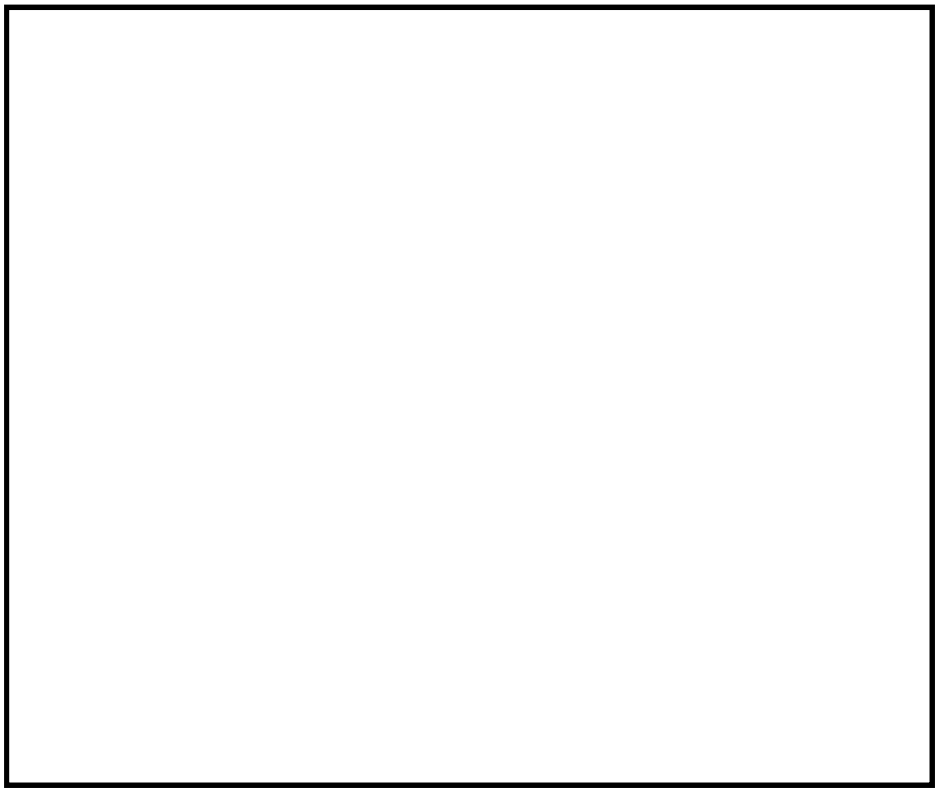
_____

_____

Section 4: The Revolution in the Mid 17th Century

Lesson 52 (cont)

Make a drawing like the one on page 158



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

Level 2

Lesson 53

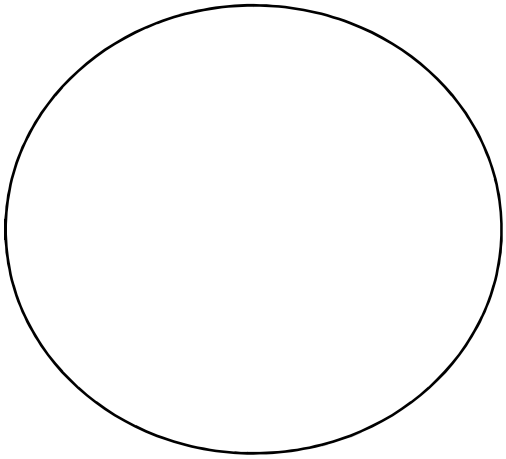
1. Robert Boyle is considered the father of modern _____.

2. Chemistry is the study of substances and how they can be _____.

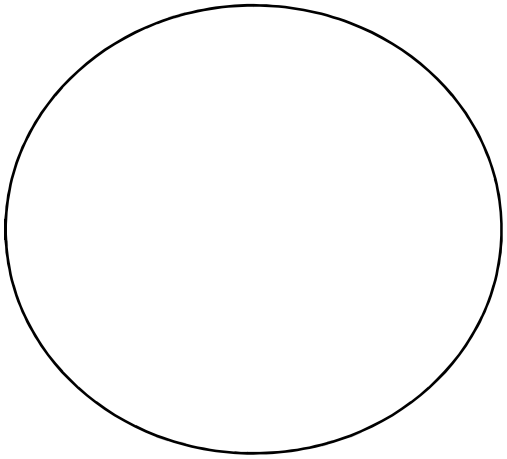
3. _____ is the pursuit of trying to turn _____ metals into _____ metals.

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 you experiment?

_____

_____

_____

_____

_____

Section 4: The Revolution in the Mid 17th Century

Level 2

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?

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

Level 2

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

Level 2

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?

_____

_____

Section 4: The Revolution in the Mid 17th Century

Level 2

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?

_____

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

Level 2

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

Level 2

Lesson 59

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

Level 2

Lesson 60

Make a drawing like the one on page 183.

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

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

Level 2

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?

_____

_____

_____

_____

_____

_____

_____

What are the two different kinds of snake venom?

_____

_____

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

Level 2

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?

_____

_____

_____

_____

What Is parasite, and what is a gall?

_____

_____

_____

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

Level 2

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

_____.

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

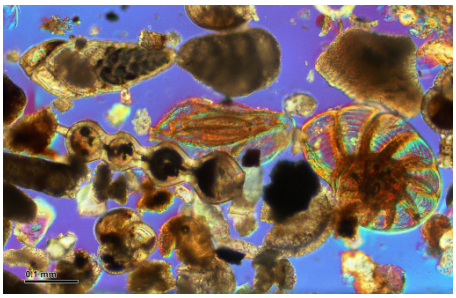
_____

_____

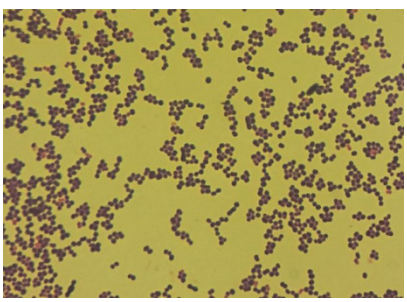
_____

_____

Doc. RNDr. Josef Reischig, CSc.



Protozoa



Bacteria

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

Level 2

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 2

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?

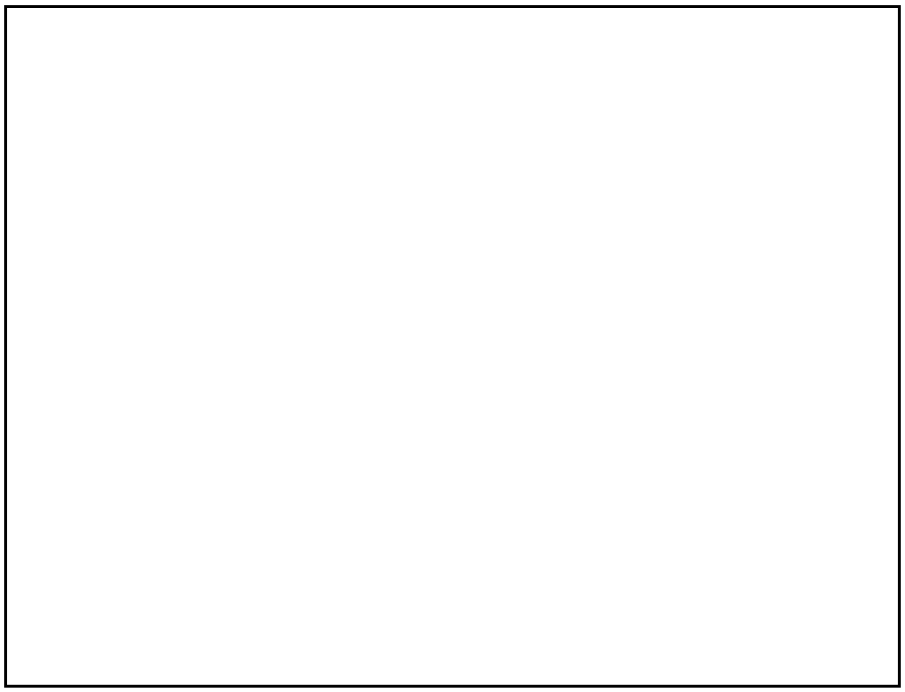
_____

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

Level 2

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?

_____

_____

_____

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

Level 2

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?

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

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

Level 2

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 2

Lesson 70

What is Newton's Law of Universal Gravitation?

Draw Your Experiment

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

Level 2

Lesson 71

Draw Your Experiment, Before and After Hitting the Pie Pan

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

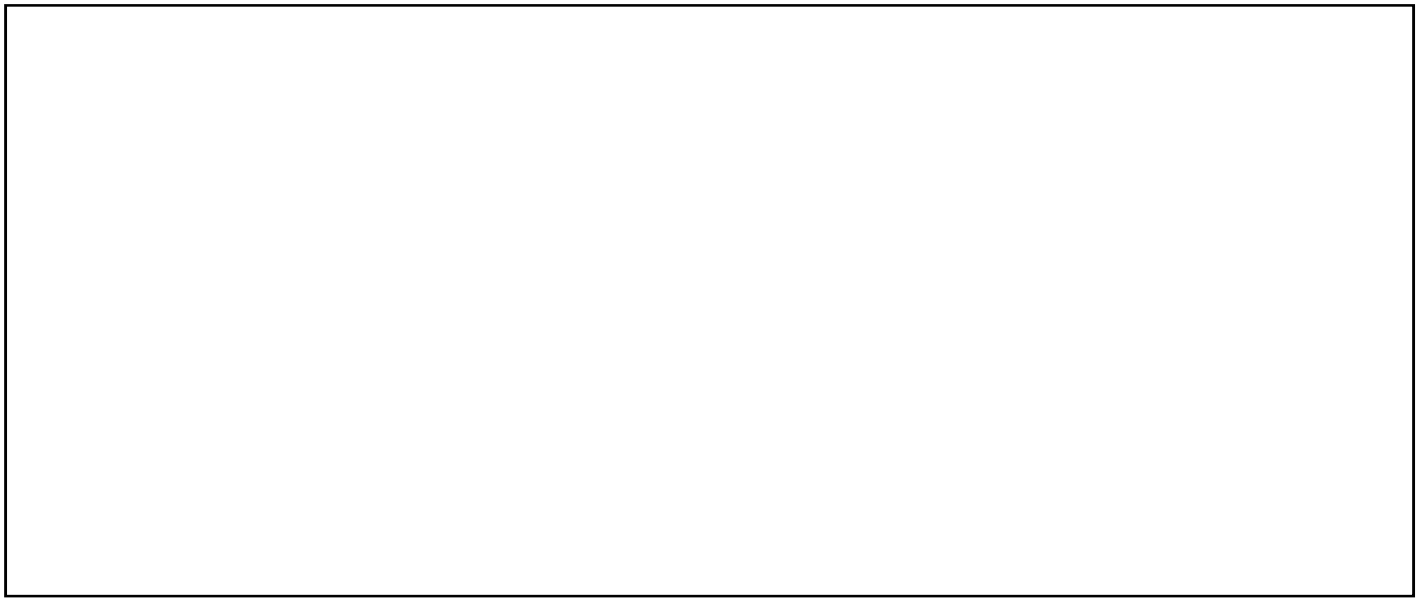
How does Newton's First Law of Motion explain the Voyager spacecraft?

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

Level 2

Lesson 72

Draw What You Made in Your Experiment



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?

_____

_____

_____

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

Level 2

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 2

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.”

What three ways can acceleration change an object’s motion?

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

Level 2

Lesson 75

Write down Newton's Second Law:

Describe your experiment and use that law to explain it.

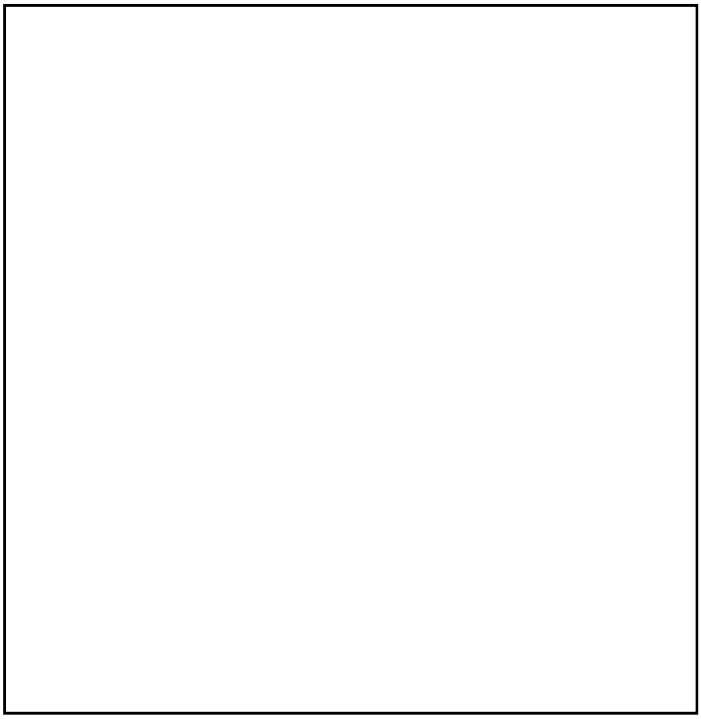
Write down the mathematical formula for Newton's Second Law:

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

Level 2

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?

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

Level 2

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

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

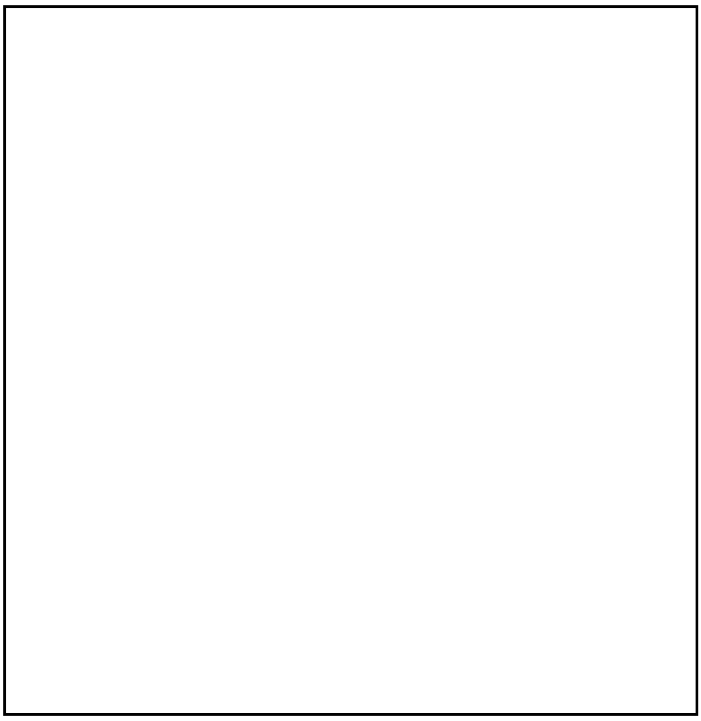
Section 6: The Revolution at the End of the 17th Century

Level 2

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.

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

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:

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

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

Level 2

Lesson 80

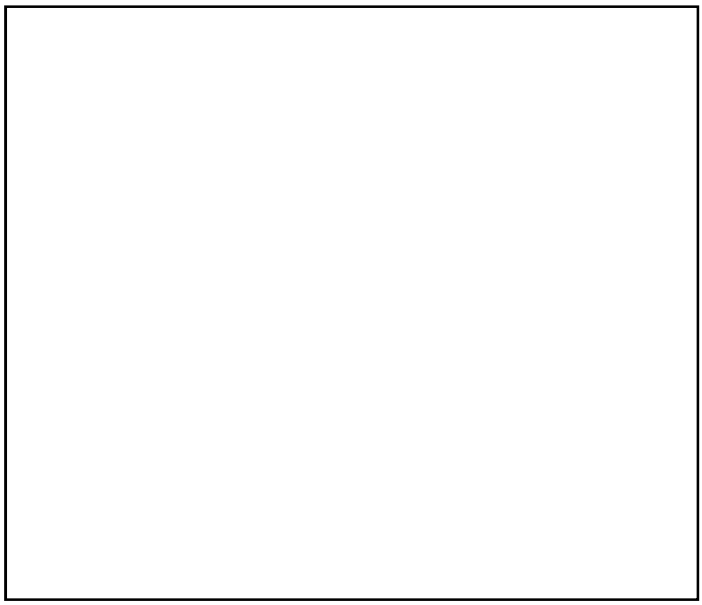
This is a challenge lesson, so I want to challenge you to make your own notebook page for it!

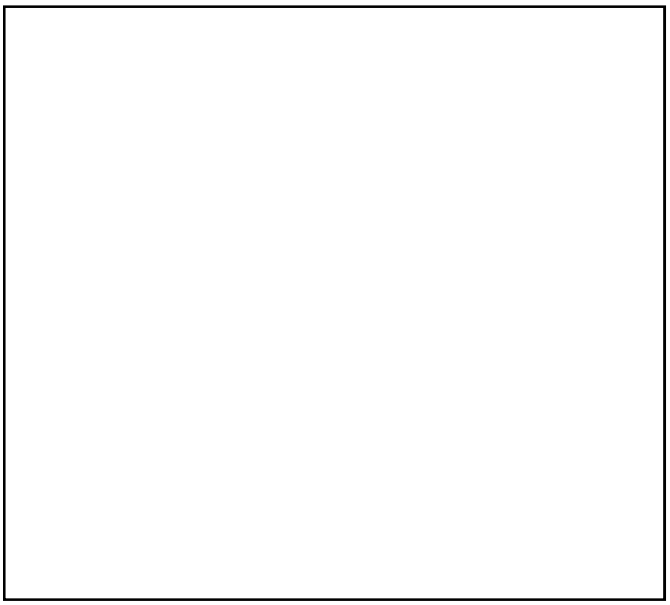
Section 6: The Revolution at the End of the 17th Century

Level 2

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?

_____

_____

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

Level 2

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

Level 2

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?

_____

_____

_____

_____

_____

_____

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

_____

_____

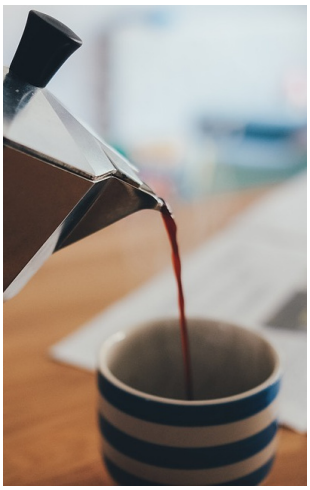
_____

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

Water

milk

syrup



coffee

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

Level 2

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?

_____

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

_____

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

Level 2

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?

_____

_____

_____

_____

_____

A scientific model _____ something that either can't be seen very well or studied directly.

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

Level 2

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?

_____

_____

_____

_____

_____

_____

_____

_____

_____

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

_____

_____

_____

_____

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

Level 2

Lesson 87

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

Level 2

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?

_____

_____

_____

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

Level 2

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

Level 2

Lesson 90

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

Griffinstorm.

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?