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Science — Phys/Chem

Chemistry and Physics

Science — Year 4

Levels:

L 1st through 4th

M 5th through 8th

Course Description — Students will study chemistry and physics through experimentation, demonstration, readings, videos and a variety of online activities. They will learn about the periodic table and many of the elements, studying their structure and use. Students will model the structure of atoms and molecules and will explore the states of matter, discovering the properties of solids, liquids and gases. They will create and observe different types of chemical reactions and experiment with acids and bases. Physics topics include: light, sound, aerodynamics, forces, the Three Laws of Motion, energy, heat, electricity, magnetism, simple machines and engineering. Students will learn but also apply their learning by building a roller coaster, bridge and dome as well as circuits and solar oven.

Materials:

- Basic Supplies
- Science, Year 4, Level L
- Science, Year 4, Level M

- Consider buying goggles and rubber gloves (disposable gloves they use in hospitals). The most dangerous thing they will be using household cleaners, but they are chemicals and it would be good to be protected against splashes and spills as well as to build a good habit.

Atoms, Molecules, Steam Engines, Matter, States of Matter

Day 1 (Materials L and M: small piece of aluminum foil)

L*

1. Take a small piece of aluminum foil. Rip it in half. Again. And again and again and again until you can't any more. If you could keep ripping it until it was the smallest piece of aluminum in the world, that would be an **atom**, an aluminum**atom**. Everything in the world is made up of atoms. Different types of atoms come together in different combinations called **molecules** to make up everything you see in the world.
2. Take a look at how small atoms are. (Click on Nanolab and Zoom. We'll do more on this site later. If it's not working, you can watch this video. Get permission to watch it on youtube.)
3. Atoms are so small that five million million hydrogen atoms would fit on the head of a pin. That's 5,000,000,000,000 atoms.
4. *Print out Elements Lapbook (M is using this too) You can cut out H and the hydrogen pocket if you can make sure to not lose them before tomorrow.

M*

1. Take a small piece of aluminum foil. Rip it in half. Again. And again and again and again until you can't any more. If you could keep ripping it until it was the smallest piece of aluminum in the world, that would be an **atom**, an aluminum**atom**. Everything in the world is made up of atoms, or atoms make up the **matter**that everything is made of. Different types of atoms come together in different combinations called **molecules** to make up everything you see in the world.
2. Take a look at how small atoms are. (Move the slider to the right and left. If it's not working, you can watch this video. Get permission to watch it on youtube.)
3. Atoms are so small that five million million hydrogen atoms would fit on the head of a pin. That's 5,000,000,000,000 atoms.

4. *Print out Elements Lapbook (L is using this too) Cut out H and hydrogen pocket. Place it on the alkali metals page and put it in your notebook.

Day 2

L*

1. *Here is a periodic table to look at or to print out in color with picture examples. (Print it out if you can and put it in your notebook.) This is called the **periodic table of elements**. Each box is one element. Everything in the world, including you, is made up of these elements. They are listed on this table in order of their weights. Number one is hydrogen. It is a gas. It is the lightest element.
2. Read about hydrogen.
3. Draw a picture or write about hydrogen inside booklet and place in pocket.

M

1. Watch hydrogen video. (Here's an alternate link if that isn't working.)
2. Fill in Hydrogen booklet. Need an idea of what to put inside about hydrogen? Read this.
3. *Look at this example of a periodic table (or a list of all the atoms we know about). (You can print it if you like. It is in color.)

Day 3

L

1. Do first mystery interactive about the disappearing city. Stop when it starts second mystery.
2. Describe what makes a steam engine work in writing or by telling a parent or older sibling.

M

1. Watch video about how steam engines work.
2. Watch this animation of steam engines.
3. Explain how a steam engine works.

Day 4

L

1. Draw a diagram of the inside of a steam engine. Color where the water is blue. Color where the steam is red. Include a firebox, boiler and steam box. If you don't remember, go back to yesterday's mystery railroad lesson.
2. If you want more information on a steam engine, you can read this article. This is a more complicated explanation. (Note: There's a lot of info on that page, but in there it mentions coal forms over millions of years. I don't believe that and you don't have to either. Scientists don't agree on how old the earth is. If you believe God created the earth in six days, then you agree with the scientists who believe the earth is just several thousand years old.)

M

1. Watch and read about steam engines.
2. Draw a diagram of how it works and explain it to someone.
3. Copy this sentence about steam engines and tell what it means in your own words.

Day 5

L*

1. What makes water turn into steam? Play this game to learn.
2. Just about everything you see in this world is a **solid**, a **liquid** or a **gas**.
3. Water is a solid when it is ice, a liquid when it is water, and a gas when it is steam.
4. *Print out this worksheet on solids, liquids and gases and fill it in. Make sure you put it in your notebook.
5. Tell a parent or an older sibling what you think makes something a solid, a liquid or a gas.

M*

1. What makes water turn into steam? Play this game to learn.
2. *Print out this worksheet on water changing and fill in. Make sure you put it in your notebook.
3. Just about everything in this world is either a solid, a liquid or a gas. These are called "the states of matter."
4. You just learned that by changing the temperature of a type of matter you can change its state. For example by heating the solid ice you change it into a liquid.

Sound, Molecules

Day 6* (Materials for M: metal hanger, 2 foot-long pieces of thread — if you don't have a metal hanger, use something metal like a spoon)

1. Bell realized that the sound carried better if he used a liquid with his thin metal wire. Conduct a sound experiment. Does sound travel better through a solid or a gas (the air)? Do Table Thunder, the second experiment. Try it a few times with different tables. If you can get what you need together, you could do any of the other experiments too. In your science notebook, describe your experiment and what your **conclusion** is. Your **conclusion** is your answer, does gas travel better through a solid or a gas? Think of a way to test if sound travels better through a liquid or a gas? Try it. What's your result? Present your conclusions at the dinner table.

M*

1. *Bell realized that the sound carried better if he used a liquid. Conduct a sound experiment. Does sound travel better through a solid or a gas (the air)? Do Hang In There. Try it a few times with different tables. If you can get what you need together, you could do any of the other experiments too. Print out the science experiment page and fill it out with your experiment details. I wrote the experiment question above. Experiment worksheet Think of a way to test if sound travels better through a liquid or a gas? Try it. What's your result? Present your conclusions from today's experiments at the dinner table.

Day 7 (Materials for L : two cans and string and a nail and hammer to poke the hole — can use disposable cups and a thumbtack if you don't have cans, might want to have a paper clip on hand)

L

1. Make a play telephone.

M

1. Read about how a telephone works. Click on Next Page when you get to the bottom. And again on the next page. On this page, after you read, click on the image to see it animated.

Just a reminder not to click on anything else on these pages. The advertisements are just to get your money. They will not improve your life Have self-control and stay focused.

2. Describe how Alexander Graham Bell's telephone worked.

Day 8

L

1. Cut out your O and oxygen pocket. Oxygen is part of what we breathe. We need oxygen for our bodies to work. It is another **element** in our world and is number 8 on the **periodic table** because one atom of oxygen has 8 protons in it. We'll learn later about protons. Write or draw inside your oxygen card. And place in your pocket.
2. Not everything in the world is hydrogen or oxygen or carbon or whatever else is on the periodic table. Those are the elements that other things are made from. When different **atoms** come together to make something new, they are called**molecules**. Probably the most famous **molecule** is H2O. Have you ever heard of it? It means two hydrogen atoms and one oxygen atom getting together. When they do, they make water! All water you see are H2O molecules. Here's a picture of a water molecule.
3. Draw a water molecule and label the three parts each either H or O. Label your picture and keep it in your science notebook.
4. Build other molecules. Click on Nanolab and Build.

M

1. Watch video on oxygen.
2. Cut out your O and Oxygen pocket. Oxygen is part of what we breathe. We need oxygen for our bodies to work. It is another **element** in our world and is number 8 on the **periodic table** because one atom of oxygen has 8 protons in it. We'll learn later about protons. Write or draw inside your oxygen card. And place in your pocket.
3. Not everything in the world is hydrogen or oxygen or carbon or whatever else is on the periodic table. Those are the elements that other things are made from. When different **atoms** come together to make something new, they are called**molecules**. Probably the most famous **molecule** is H2O. Have you ever heard of it? It means two hydrogen atoms

and one oxygen atom getting together. When they do, they make water! All water you see is made up of H2O molecules. Here's apicture of a water molecule.

Day 9 (Materials for M: grape, microwave–there's a video of the experiment if you can't do it)

L

1. Remember **molecules**? A water molecule is made up of two hydrogen atoms and one oxygen atom, H2O. When molecules heat up, they get really excited and move around a lot! That's a gas. When molecules cool down enough, they barely move at all; that's a solid.
2. Read about solids, liquids and gases. Click on next and read all four pages.
3. Then you can do this game and online experiment. Make sure you answer all the questions! Tell someone what happened when you took the lids off. (You'll know what I mean after you do the online experiment.)

M

1. Remember **molecules**? A water molecule is made up of two hydrogen atoms and one oxygen atom, H2O. When molecules heat up, they get really excited and move around a lot! That's a gas. When molecules cool down enough, they barely move at all; that's a solid.
2. Do this online activity on states of matter.
3. Try this online quiz.
4. If you have a grape and a microwave, then you can create plasma. Plasma is another state of matter. It's what you get when you excite molecules even more than in a gaseous state. Slice a grape in half longways but leave a little skin so you can open it like a book. Open it and place it in the microwave. Turn the microwave on and be ready to turn it off. In 10-15 seconds you should see plasma shooting off the grape! Turn off your microwave after those 10-15 seconds. Don't let the grape cook longer. If you don't have a microwave, you can watch a video of theexperiment.

Day 10 (Materials for L: bar of Ivory soap, microwave–there's a video of the experiment to watch if you can't do it)

L

1. We've been learning about **atoms**, which make up the elements everything in our world is made up of. When atoms are combined, it is called a **molecule**. When molecules heat up,

they get excited and move around a lot. This is what happens when water turns into water vapor (or steam). When molecules cool down, they slow down to mostly stopped. This is what happens when water turns into ice. Ice, water and steam are all H2O. They are all made of water molecules. It is the same**matter**. They are just each in a different **state of matter.**

2. Watch the molecules get excited. Click on Nanolab and then Transform.
3. Write in your science notebook each of the words in bold. As best you can write what you can about what each means.
4. As a reward for writing those tough definitions, place an opened bar of Ivory soap in the microwave on a microwavable plate. Turn the microwave on for one minute. Watch what happens. You are exciting the water molecules that are inside the soap causing them to move around! If you don't have a microwave, you can watch the video to see what happens. (Ivory is special because it floats when other bars of soap sink. That's because it has a lot of air inside of it.)

M

1. In your science notebook write the following words and their definitions: atom, molecule, matter, state of matter, liquid, gas, solid, periodic table.
2. As a reward for your hard work writing great definitions, here's a video of whatfun chemistry can be.

Day 11 (Materials for M: tongue depressor, rubber band about 3 in. by 1/4 in., 2 index cards, 3 feet of string or yarn, scissors, tape or hot glue)

L

1. Another way to move molecules, other than to excite them by heating them up, is to cause them to vibrate. When there is a sound, it moves the molecules in the air, causing them to vibrate. They start crashing into other molecules and make them vibrate too and those crash into the molecules next to them so that they start vibrating and that's how sound travels from one place to another.
2. Make a sound wave. Tie a strong string to a doorknob and walk back until the string is straight or take the plug of your vacuum cleaner in your hand and stretch out the cord. Move

your arm up and down and send waves down the string or cord. That's how sound travels, in waves.

3. Draw sound waves in your notebook.

M

1. Read about this experiment, watch the video and try it if you have what you need. (It will ask for your email address before you can watch the video. Use a junk email address. She sends out experiment videos, but she sends lots of advertisements too!)
2. Write in your science notebook what you learned from the experiment. Please put the date at the top of the page.

Day 12 (Materials for M: balloon)

L

1. Explore sound in your house. **What makes sound? What is being vibrated to make the sound?** Remember that sound can travel through a gas, a liquid or a solid. When you listened to the bang on the table, it was the molecules in the table vibrating. Make a list of your observations to the two questions as you explore your house.

M

1. Play with different instruments to make different sounds. What is being vibrated to make each sound? You need to drag the different instruments onto the screen to play them. You can also do the sound sorting activity.
2. Read this experiment.

Day 13

L

1. Today create sound. Create sound that vibrates through a solid (bang something). Create sound that vibrates through a liquid (fill a glass with water and tap the glass.) Create sound that vibrates through the air (blow over the top of a bottle, swing something fast through the air, or cheat and just talk

2. Try filling glasses up with water to different heights. Which gives a higher sound? The one with the least amount of water because the molecules can vibrate back and forth through it faster. If you have a bottle that you can blow over the opening to make a sound, fill the bottle with different amounts of water. It will produce a higher sound if you have more water (because there is less air) and the molecules can vibrate back and forth through the smaller amount of air faster, making the sound higher.
3. Record in your science notebook the different ways you vibrated molecules to create sound. Please write the date on the page.
4. Watch vibrations caused by sound. Skip to 1 minute. This is a mixture of cornstarch and water on a cookie sheet sitting on top of a speaker.

M

1. Watch this video of sound experiments and then figure out some of your own special effects sounds. What sounds can you make with things around your house?

Day 14

L*

1. Roll up as large a piece of paper as you can find into a cone shape. Leave a little opening at the end. Talk regular into the air and then through your cone. What's the difference? Listen to someone talking regularly and then with the small opening of the cone to your ear. What's the difference? Your cone is spreading out and collecting sound waves. Fill in your science experiment worksheet. Question: Can sound waves be amplified (made louder)?

M

1. Read about the speed of sound and traveling faster than the speed of sound.
2. Watch a video about breaking the sound barrier. Then listen to a plane breaking the sound barrier.

Day 15

L

1. Read about the phonograph. Here's a picture of an original.

2. Draw a phonograph. What is being vibrated.
3. If you have a record player at your house, observe it in action.
4. Watch the Edison Phonograph video. While records are flat, Edison's played from grooves in a spinning cylinder.

M

1. Read about the phonograph.
2. If you have a record player at home, observe it in use. You can also watch thevideo. While records are flat, Edison's played from grooves in a spinning cylinder.
3. Draw a diagram of how a phonograph works.

Light

Day 16

L

1. Let's learn a little more about light and the light bulb. The light in the bulb basically is a fine wire, called a filament, that gives off light because it is heated up and gets hot. It's actually atoms that are giving off light. Remember how they get excited when they heat up? The electricity travels into the bulb, heats up the atoms in the filament, causes them to jump around which gives off the light. To make the bulb shine as it does, it is filled with a gas to help it. The gas is called argon.
2. Watch the video below on how a light bulb is made in a factory today.
3. Then cut out argon and its pocket. Draw or write inside it and place it with your others.

M

1. The light in a bulb basically is a fine wire, called a **filament**, that gives off light because it is heated up and gets hot. It's actually atoms that are giving off light. Remember how they get excited when they heat up? The electricity travels into the bulb, heats up the atoms in the filament, causes them to jump around which gives off the light.
2. Watch video on argon. Argon is the gas used in most light bulbs. Thomas Edison learned that leaving air in the bulb would cause the filament (the thin carbon wire inside) to burn up. He used a vacuum to take out the air. Now we remove the air and put in argon.

3. Read about the group of noble gases.
4. Cut out and fill in your argon piece.

Day 17*

L*

1. Read these three pages (click on next page) about light.
2. Do this activity about light.
3. *Draw on this worksheet to show how light travels to an object and then reflects to our eyes.

M

1. We see because light travels from the light source to an object, reflects off that object and hits our eye.
2. Watch this video about how light travels.
3. Try this quiz about light.
4. (If you can't answer the questions, go and read here.)

Day 18 (Materials for L: hand-held mirror or anything reflective; for M: coin, bowl)

L*

1. You've learned that light travels in a straight line. You've also learned that you can change the direction that light travels by reflecting it.
2. Take a hand-held mirror (or something else reflective–watches and rings might work) and find a light to reflect. Make a light dance around the ceiling by reflecting it off your mirror.
3. Get a glass of water. Use a clear glass if you can so you can see inside well. Place a pencil or straw inside the cup. Does it look the pencil is bent? The light bends when it hits the surface of the water. It doesn't stop the light like a wall does, but it bends it enough to send a bent reflection back to our eyes.
4. *Write up an experiment worksheet. Question: Can light bend?

M*

1. Watch this video about how light bends and slows.

2. Then try this experiment on bending light. (If you don't have blu tac, just pour the water carefully so you don't disturb the coin. It won't float!)
3. *Write up an experiment worksheet. Question: Can light bend?

Day 19 (Materials for L and M: metal spoon)

L

1. Get a metal spoon. Look at yourself in it. Turn it over. What do you observe? Remember, what you see is the light reflecting off of something. Because the top of the spoon is curved down the light bounces off and heads down, so we see our forehead at the bottom. The light that hits the bottom part is bounced up by the curve, so we see our chins at the top. On the other side we see ourselves stretched out. Why? In what direction does the light bounce?
2. Draw a picture of light hitting a spoon from both sides. Where does the light bounce to?

M

1. Read this page about reflection.
2. Read this page about light refraction.
3. Place a glass of water on the end of a white sheet of paper near a sunny window. Let the light shine through the water. What do you see on the paper?
4. Light is made up of colors. The light waves of different colors travel at different speeds and so bend in different ways going through the water. The water demonstrates **light refraction**, the change in direction due to a change in speed. The water slows the light waves and causes them to bend.
5. Play with this color mixer. Make sure you observe mixing all three at their highest levels. You can see how light is white, but it is really made up of many colors.

Day 20

L

1. Because of what we know about how our eyes see light and how our brains receive those signals, people have developed many optical illusions. We think we see what we don't see. Want to see?

2. Here is one. The pictures on the right and the left are the same. The blocks A and B are the same color.
3. Here is another.
4. Want more?

M*

1. Read about the structure of a light bulb.
2. The "electrical foot contact" is what **conducts**, or carries, the electricity into the bulb. Play this game to experiment with different conductors and receivers.
3. Play this electrical circuit game.
4. Write circuit, conduct and filament in your science notebook and write definitions for the words.

EXTRA — if you want to and are able to… How to make a periscope.

Atoms and Molecules

Day 21

L*

1. *****Print out page ONE of this worksheet on atoms.
2. Watch the video on atoms and molecules. It's okay if you don't understand everything.
3. Fill in the blanks on the worksheet.
4. Draw a Hydrogen atom on the back of the worksheet. It's the simplest one. It is number 1 on the periodic table so it has one proton and one electron. It doesn't have any neutrons. Draw a circle for the nucleus and a + sign inside of it for your proton. Draw a circle around that for your electron to travel on. Draw a – sign for your electron on that circle.

M*

1. Watch this video and take notes of any new vocabulary. When you hear a new word, jot it down on this notebooking page. (You just need page one.) After the video is done fill in more about each word you wrote down. Also write in your notes the explanation as to why atoms join together. Watch it again if you can't remember!

2. *Print out just page one of this worksheet on atoms. Read it and fill it in. Keep it in your science notebook.

Day 22 (Materials for L: salt, sugar, magnifying glass, 3 cups of sugar, jar;Materials for M: Epsom salt 1/2 cup — if you don't have it, you can use a small piece of cardboard and table salt and do this experiment. You can buy Epsom salt at a drug store or in the medicine section of a grocery store. It's cheap. You can save the rest for a later experiment.)

L

1. Let's go back and learn some more about molecules. Go back in your science notebook and read what molecules are if you are unsure. Molecules have different shapes. Take some salt and sugar and look and them with a magnifying glass. Do you see their shapes? If you don't have a magnifying glass, here are some pictures.Salt Sugar
2. With adult permission and help heat one cup of water on the stove and add three cups of sugar. Add a little at a time, stirring to dissolve. You are making a**saturated solution** — so full it can't take in any more sugar. When it is all dissolved, pour it into a clean jar. Tie a string to the middle of a pencil. Tie a paper clip to the other end. Make sure the string is short enough so that the paper clip doesn't touch the bottom of the jar. (You don't want it to touch the sides either.) Lay the pencil across the top of the jar so that the paper clip and string hang in the liquid. Let it sit a few days and watch the sugar crystals grow. The sugar crystals are just sugar molecules attaching together.
3. Write up your experiment. You can use this experiment worksheet to help you. Your question is, "What do sugar crystals look like?"
4. Look at this picture of enormous crystals.

M

1. In a small, deep container (small jam jar would work well) pour 1/2 cup of the hottest water that comes from your faucet. Stir in 1/2 cup of Epsom salt. Stir for one minute (there should be some Epsom salt crystals at the bottom still) and then place in the refrigerator. In three

hours you should have crystals. (In case you can't grow them, here's a picture of Epsom salt crystals. You can click on it to see it bigger.) 

2. Epsom salt is magnesium sulfate, MgSO4 That means that each molecule of magnesium sulfate is made up of one atom of magnesium, one atom of sulfur and 4 atoms of oxygen. The crystals are lots and lots of molecules joining together.
3. Draw a picture of what a magnesium atom might look like. It is number 12 on the periodic table so it has 12 protons and electrons. Draw a nucleus with 12 + signs in it for the protons. Now draw a ring around it with two electrons (-) on it. That's all the first level can hold. Now draw a second ring around that. The second level can hold 8 electrons, remember? Draw eight electrons on the second ring. That's 10 electrons. Now draw a third ring around the atom. How many electrons should you draw on this one? It needs 12 and you've only drawn 10 so far. This last level or its **valence shell** needs 2 more drawn in, but it wants 18! That's why it will bond with the other atoms.
4. Look at this picture of enormous crystals.
5. Have Epsom salt left over? Try this! (You can save some for later as well, a tablespoon should do.)

Day 23

L

1. The next element on the periodic table you will work on is helium. Helium is a gas. You may have heard of helium balloons. Those balloons that float away if you let go of them are filled with helium. They float because they are lighter than air. Remember the lighter the element, the earlier it is on the chart. Helium is number 2. So if helium floats, do you think hydrogen balloons float too? Of course! Hydrogen is lighter than helium. That's why it is number 1 on the chart. So helium is number 2 on our periodic table. That means it has 2 **protons** in its **nucleus**, center. That means it also has 2 **electrons** flying around it.
2. Cut out helium pieces. Write or draw inside about helium. You could also draw a helium atom inside.

M

1. Read about helium. Page 1 Page 2
2. Watch the video on helium. Helium is number 2 on the periodic table because it has 2 protons.
3. Check out this site on helium. Use the different links on the right.
4. Cut out the helium pieces. Write inside about helium. Draw a helium atom inside as well.
5. Helium belongs to the group of noble gases. Every element in a group has the same number of electrons in its valence shell, except for helium, which only has 2. How many electrons do they each have in their valence shell? Use neon to figure it out. How many are in it's outer shell? First shell 2, second shell 8, right? Now check it with argon, number 18. Does it work? Remember argon? It's what is put in regular light bulbs.

Day 24*

L

1. Draw a picture of your sugar crystals. You can use the back of your experiment worksheet. (You can eat them if you have permission.)

M*

1. *Fill in this chart for helium. We know that the atomic number is 2. We also know that the atomic number is also the number of protons. Fill in that information on your chart. Periodic table charts tell us that its atomic mass is 4.002602. Fill that number in. It's mass number is 4. Now protons are the positive charge in the nucleus. There has to be an even negative charge to balance it out. That means there the same number of electrons (the negative) as protons (the positive). Fill in the number of electrons on your chart. Now to find the neutrons take the mass number and subtract the number of protons to see what's left over. So in this case 4-2=2. There are 2 neutrons in a helium atom. Fill in the number of neutrons on your chart.

Day 25* (Materials for L: as many pennies as you can find–20 would be great — or any coin you have the most of, or something like checkers would work too)

L

1. Take your coin collection (all the same coin) and lay them flat on a table and push them together so that they are all the way touching.
2. Look for patterns. Do you see how they line up? Do you see how they surround each other in the same shape even though you put them together randomly?
3. Draw a picture of your coins all together. This is similar to your crystals. The molecules formed a pattern when they grew together as crystals because of the structure of each molecule. (Put today's date on your picture.)

M*

1. *Print out pages 1 and 2 of this worksheet. Fill in page one. Save page two. You can check your answers later by scrolling down, but there are errors. It should say atomic mass where it says, "symbol." Also, the answers for W, Tungsten, are incorrect because the atomic mass is not 36 but 184.

Day 26 (Materials for L: cup of water, coins — or something small you can drop a lot of in water)

L

1. We've looked a little at how molecules bond together. Let's do an experiment to watch it in action.
2. Fill a cup with water to the very top. Guess how many coins you'll be able to drop in before it spills. Start dropping in coins (or something else). How many did you get in? What is holding the water in place is called **surface tension**. What's happening is that the water molecules on top are attracted to the water molecules under them and cling to them.
3. Write "surface tension" in your notebook and explain what it is.

M

1. Fill in page two of the worksheet from day 25. Skip the "Lewis Structure." Check your answers.

Day 27 (Materials for L: O or ball shaped cereal, milk, bowl, water, oil, dish detergent; Materials for M: paper clip or pin, wax paper or other water proof surface — some book covers, rain coat…, tablespoon or just a spoon)

L

1. Want to watch molecules attract again? Get a bowl milk. Sprinkle in a hand full of O shaped cereal or ball-shaped cereal. Do they race towards each other and touch each other? This is a big picture of how molecules attract each other.
2. Now let's watch molecules repel or run away from each other. Pour a spoonful of water into a bowl. Add food coloring if you like. Add drops of oil to the water. What happens? The water seems to run away. What is happening is that the water molecules are attracted to the water molecules and the oil molecules are attracted to the oil molecules, so they stay separate. Add some dish detergent. What happens? The water and oil molecules are both attracted to the dish detergent molecules. That's how grease gets off your dishes and into the water.
3. Draw a picture of molecules attracting.

M*

1. Drop water onto a water proof surface. What shape does it sit in? Water **cohesion**, or how water molecules are attracted to each other, is why the water beads up. Do you think it's also why rain falls in drops? (picture of how water beads up)
2. Fill a tablespoon with water. Fill the tablespoon so that the water seems to mound up over the top of the spoon. Why doesn't the water spill over? **Cohesion**. The molecules on top are attracted to those underneath and hold onto each other. This creates **surface tension**.
3. Fill a cup with water. Place a paper clip or pin on top of the water. It's heavier than water, but it floats. Why? The cohesion builds up a strong **surface tension**. It holds the water in place and the paper clip on top.
4. Read about water cohesion on the first page of this (don't need to print unless you want to). (We did a different experiment than they did so don't worry about the first paragraph.)
5. *Print out this water cohesion notebooking page and write why a too full cup of water doesn't spill. Make sure you start with an introduction sentence that says what you are going to write about. (Example: Did you ever wonder why you can fill a cup to the brim and it doesn't spill?) Use all the words/phrases listed.

Day 28

L

1. Read about carbon. It's another element that makes up our world.
2. Cut out your carbon pieces and write or draw about carbon.

M

1. Watch this video on carbon.
2. Read about carbon.
3. Cut out your carbon pieces and write about carbon inside.

Day 29 (Materials L: container–empty 20oz. plastic bottle will work, 3% hydrogen peroxide, packet active yeast, liquid dish washing detergent, warm water, food coloring-optional, M: balloon — mouth of balloon needs to fit over mouth of bottle, small bottle, baking soda 2 tablespoons, at least 1/2 cup of vinegar)

L

1. We've talked about water molecules being attracted and repelled and getting exciting by heat and turning into steam, etc. But it's not just water molecules that get excited or attract other molecules, etc.
2. Let's do an experiment that shows how the molecules are changing.
3. What happens? Hydrogen Peroxide is H2O2. It changes to H2O and O, water and oxygen. The yeast makes the change happen more quickly. The dishwashing detergent mixes with it creating the foam. (If you notice it says O2 and want to know why, highlight the answer: , oxygen, never is alone as a single atom. Never. It will always pair up with something. So oxygen really only exists as O2 because it will always pair up. It will find always another O!)
4. You just witnessed a **chemical reaction, or a change in a chemical.**
5. Explain the chemical reaction in this experiment.
6. Here's the video of the experiment if you can't do it.

M

1. We've talked about water molecules bonding and being attracted and getting exciting by heat and turning into steam, etc. But all molecules do these things.

2. If you have younger siblings, they're doing this experiment today too. Put vinegar in a small bottle, like a drinking water bottle. Fill it up halfway or at least get a significant amount in there. If you just have a small balloon, you'll need less. Put two tablespoons of baking soda into the balloon. A funnel would be an easy way to do that. Without spilling any baking soda into the bottle, stretch the balloon opening over the bottle opening and let the balloon hang down to one side. Ready? Take hold of the top of the balloon and hold it up so that all of the baking soda falls into the bottle.
3. What happens? The molecules in the baking soda (NaHCO3) and the molecules in the vinegar (CH3COOH) react together. They atoms bond in different ways. Look at those molecules. They are more complicated than H2O, but it is the same idea. The atoms, the hydrogen, the oxygen, etc. find new ways to bond, or come together, once added with different types of molecules.
4. Look at the baking soda molecule. The Na (sodium) gets separated. An H (hydrogen) from the vinegar joins with the H in the baking soda and steals an O (oxygen). That makes H2O, right? That leaves CO2.
5. CO2 is carbon dioxide. That's the gas that is filling your balloon and is also what's making the fizzing and bubbling.
6. This is called a **chemical reaction**, or simply a change in a chemical.
7. Chemical reactions can be described by chemical equations. We're not going to be working with these. I just want you to take a look at one for this experiment.
8. Explain the chemical reaction in this experiment. Here are somenotebooking pages to choose from if you like.

Day 30

L

1. Let's look at another **chemical reaction**. Fill a glass halfway with seltzer water. (If you don't have what our family calls, "bubble water," then just use regular water. The reaction just takes a bit longer. Add a drop of food coloring. Pour in bleach and watch the color disappear.
2. The color disappears because the oxygen molecules in the bleach and the oxygen molecules in the water bond together.

3. If you can't do it yourself, watch the video.
4. Watch this video of a neat chemical reaction. This is sulfuric acid being poured into sugar. The acid reacts with the sugar and takes all the H2O out of the sugar. That leaves only carbon!
5. Write **chemical reaction** and a simple definition. Here are some notebooking pages you could choose from to use.

M

1. Let's look at another **chemical reaction**. Fill a glass halfway with seltzer water. (If you don't have what our family calls, "bubble water," then just use regular water. The reaction just takes a bit longer. Add a drop of food coloring. Pour in bleach and watch the color disappear.
2. The color disappears because the oxygen molecules in the bleach and the oxygen molecules in the water bond together.
3. If you can't do the experiment, here's a video.
4. Write a definition of chemical reaction.
5. Watch this video of a neat chemical reaction. This is sulfuric acid being poured into sugar. Sugar is C12H22O11. Do you see that H22 and O11 could make 11 water molecules (H2O)? The acid reacts with the sugar causing the atoms to bond in a new way and the hydrogen and oxygen combine to make water (you'll see it as smoke in the video). That leaves only carbon! You'll notice the black carbon in the video!

Aerodynamics

Day 31

L

1. Read this page on flight and look at the images.
2. What are two types of flight?
3. How are airplanes similar and different from flying animals?

M

1. Read this page on flight and look at the images.
2. Explain the different kinds of flight.

3. How are airplanes similar and different from flying animals?
4. Watch this video of the world record paper airplane throw. It starts falling but then goes up again. What's happening? How is it flying?

Day 32

L*

1. Read about the principles of flight. Click on next to keep reading. Stop when you get to "How Air Moves."
2. *Write on this page and answer, "What is aeronautics?" (answer: You can word this any way, but aeronautics is the science surrounding flight.)

M(*)

1. Read about the principles of flight. Click on next. Stop when you get to "How Air Moves."
2. Take notes on the aeronautics page.
3. (*)Here's a notebooking page with no lines if you want it.

Day 33* (Materials for L: piece of string, just like 12 inches, and a straw, you can make substitutions for these)

L*

1. Read this page on how air moves.
2. Read this page on properties.
3. Read this page on forces in flight.
4. *Make a paper airplane. Put a little hole in the middle of it. Pull the string through the hole so that half is up and half is down. Tape it in place. Lay the straw along the middle of it. If it doesn't stick out both ends, cut it in half and tape each half so that each sticks out one end. Cut out these labels, flight forces, and tape them onto the string and straw. Here's a completed plane.
5. Here's a picture as to where the forces go. We are going to learn about each of these forces in flight.
6. Hang your plane somewhere if you can.

M

1. Read this page about how air moves.
2. Read this page on forces in flight.
3. Draw a diagram of the four forces which control an airplane. We'll learn about each of these forces separately. This is an overview. (Okay, if you want, you can make a paper airplane like the elementary school kids are doing.)

Day 34 (Materials L: coin, bag of coins; Materials for M: 2 coins, ruler)

L

1. The first force in flight we are going to look at is **gravity**. Now you are thinking, that's not even on my airplane I made! It is, you called it weight. Gravity is what gives us weight. It is actually gravity pulling down on our **mass** that makes the scale go down showing how much we weigh.
2. Your **mass** is how much matter you are made of. Gravity pulls on all mass with the same force. Gravity is always pulling everything at the same speed.
3. Hold a small coin in the air. Let go. It fell right? Well, actually, gravity pulled it down to the earth.
4. Now do the same with the bag of coins. Same thing?
5. Now, your bag of coins should feel heavier than the one coin. Which will fall faster?
6. Drop both at the same time.
7. Did they hit the ground at the same time? Why? Because gravity is always pulling everything at the same speed.
8. Now test a bunch of other things. Do you have a golf ball or tennis ball in the house? Try dropping other things together.
9. Now, air can get in the way sometimes. Air pressure will push up on objects that are more spread out than others. Here is this experiment done on the moon where there is no air to get in the way. Watch the video (Now go tell someone all about it.)

M

1. Watch this video.
2. Describe what happened.
3. Did you expect something dropped and something shot out to land at the same time?

4. Do you want to try it?
5. Place a coin on the edge of a table. Place your ruler half on / half off the table. Put a finger in the middle of it to hold it to the table. Place the other coin (same type of coin) on the edge of the part of the ruler that is hanging off the table. (Works best where you can hear the coins hitting the floor.)
6. You are going to quickly hit the very end of the ruler that is hanging off the table. When you do that, you will be knocking it out from under the one coin so that it drops and you will be striking the other coin so that it flies off. Try it several times.

Day 35

L*

1. Yesterday we learned that gravity makes all masses speed up at the same rate.
2. Gravity doesn't pull at everything in the same way though. The more mass, the more gravity pulls on it which is why we all weigh different amounts (even if we all fall at the same speed).
3. Also, every object has a gravitational force. You have a gravitational force attracting everything to yourself! It's such a tiny, itty, bitty force that it doesn't really show up though. The earth, since it's so big, has a big gravitational force which is what makes your ball fall down when you throw it and keeps you from floating away.
4. Astronauts can float in space because they get too far away from the earth's gravitational force. The don't float right off the moon because it, like everything, has a gravitational force. The moon pulls things towards itself too. It's big enough that it's gravitational force the astronauts down and keeps them from floating away. BUT, it's a lot small than earth so that its gravitational force isn't as strong as earth's. Watch this astronaut jump around showing that there is less gravity on the moon.
5. For the next one skip to :45 and watch him jump two times. Does it seem like it's in slow motion? He's falling slowly because there is less gravity on the moon, less gravitational pull.
6. You are going to fill in a worksheet that shows how much you would weigh on each planet. Each planet is a different size so it pulls down on your mass with a different amount of gravitational pull. Write your weight on earth in the box and use a calculator to multiply.
7. *Print out this worksheet and use a calculator to fill it in.

8. Explain to someone why you would weigh less on Venus.

M*

1. *Print out page one, read it and fill in the chart.
2. Here's a video of an astronaut falling "in slow motion." He falls more slowly in space because the moon is smaller than earth so it has less of a gravitational pull. His mass is the same, but his weight (gravity pulling on his mass) is different. He is pulled to the moon with less force than on earth. Since the force, the speed at which gravity pulls is less. Makes it seem to us like it is slow motion.
3. Explain to someone why you would weigh less on Venus.
4. Explain in writing how mass, weight and gravity are connected. Mass / Weight Notebooking Page.

Day 36 (Materials for L: straw, cup of water, Materials for M: cup of water, index card or cardboard or stiff paper)

L

1. We learned about gravity which pulls airplanes down. Now we're going to learn about the opposite, lift. It's what lifts airplanes up.
2. Do this lesson on lift.
3. Take a strip of paper. Hold it up to your lips. Blow. Does the air hold the paper up. When you throw a frisbee, what is holding it up in the air?
4. Does air pressure really hold things up? Stick a straw into water and hold your finger over the open end. Take the straw out of the water. Is the air holding the water into the straw? Yes! That's air pressure at work and it's very strong.

M

1. Read this lesson on lift.
2. You can try some of the suggested activities. Can air really hold things up? Do the experiment below.

3. Experiment: fill a glass 2/3 full of water and cover with an index card (or cardboard or stiff paper). Hold the card in place securely and flip the cup over. Remove your hand. The 14.7 pounds per square inch of air pressure will hold the water in it's place.
4. Take a look at this lift explanation with animation. Click on "launch interactive." Keep going until you get to "Drag." What are the two ways described that create lift? (answer: One is that the air pressure is less above the wing so that the greater air pressure below the wing presses up. The other is that the curved wing directs air downward which creates an opposite flow upward, lifting up on the wings.)

Day 37 (Materials for L and M optional: balloon, 2 liter bottle — empty ; also M — ziplock bag-or other plastic bag you can seal super well)

L

1. Watch the video below on air pressure.
2. Try this experiment: stretch a balloon over the opening of an empty 2 liter bottle. Place the bottle in a pan or bowl of super hot water. The air inside the bottle will heat and expand creating more air pressure. It will press on the rubber of the balloon and expand it a little. Place the bottle in a pan or bowl of ice water and the balloon will deflate. The air in the bottle will cool down and the air pressure will lower and stop pressing on the balloon.

M

1. Try this experiment. Blow a ziplock bag. Seal it almost all the way. Give it another big puff and seal it closed. Put it in the freezer. Check on it in 10-15 minutes. Did it deflate some? Why? Air expands when it is hot, increasing the pressure it's putting on the bag. Air pressure is lower when the air is cooler.
2. Fill out an experiment worksheet.
3. Watch the video below on air pressure. (You can try it if you like.) Can you answer the questions?

Day 38 (Materials for M: 2 paint stirrers and two rubber bands, may be able to use popsicle sticks or even paper folded over and over on itself to make a stiff "stick")

L*

1. We've learned that lift is caused by creating high air pressure under the wings of the plane. The air lifts the plane up.
2. A helicopter works in a similar way. The airplane drives forward pushing the air over and under the wings creating the change in pressure so it can lift off. A helicopter twirls its blades to move the air over them. They are also creating higher air pressure under its blades which causes the lift.
3. *Make a motor rotor. Don't worry about all the extras. Just use the template (page 6) to make the paper blades.
4. Tell how lift is created with your motor rotor.

M

1. Make a boomerang.

2. Tell how lift is created with your boomerang.
3. Here is a youtube video with directions for an origami boomerang. Get permission before going to youtube.

Day 39 (Materials for L: balloon, straw, fishing line or strong thread or something similar; Materials for M: paper towel tube, flexible straw, paper cup, aluminum foil)

L

1. Take a straw and hold it in the air. Let go of it. It falls. Right? What needs to happen to make it fly (at least a little bit)? It needs **thrust**, a push in the right direction.
2. Do this experiment and read through the steps, questions and answers. Do the extra experiments if you like.
3. Here's a video of the experiment.

M

1. Today you will learn about thrust, the push that moves the plane forward.
2. Read through part 1. You don't have to try the experiments, but you can.
3. Build an engine (part 2 of the booklet).

Day 40

L

1. Do this lesson on the forces involved in flight. Click on “To learn how planes fly.”
2. Go ahead and play the game afterwards.

M

1. Do this lesson on the forces involved in flight. Click on “To learn how planes fly.”
2. Go ahead and play the game afterwards.

Day 41 (Materials for L: Styrofoam tray, paper clips — buy the econo pack of meat for a bigger foam tray — you need to trace and cut something about 10 inches long)

L

1. Do you remember the four forces of flight? What are they?
2. Build a glider. Read and follow the directions. Answer the questions. Experiment. Find the proper weight and balance.

M

1. Review flight forces.
2. Build a glider. Read and follow the directions. Answer the questions. Experiment!

Day 42

L

1. Review flight forces.

M

1. Go to the different learning stations, build a plane, test it to see if it flies.

Day 43

L

1. Learn about different types of engines
2. Learn about the body of the plane, the fuselage.

M

1. Click on PlaneMath Enterprises. Click on the “students” links on the first two pages. Click on PlaneMath Enterprises. Click on training department. Complete the training.

Day 44

L

1. Build a plane.
2. Test your plane. And learn about flight testing

M

1. Click on PlaneMath Enterprises. Click on the “students” links on the first two pages. Click on PlaneMath Enterprises. Click on the design department. Complete a design that works!

Day 45

L

1. Watch the short Amelia Earhart movie.
2. Read about sodium.
3. Cut out your sodium piece and add it with your others.

M

1. Watch the short video on Amelia Earhart.
2. Read about sodium. Use this link as well.
3. Cut out your sodium piece and add it with your others.
4. If you want, you can watch the sodium video.

Acids and Bases

Day 46 (Materials for L: baking soda — 1/2 cup or more, you don’t have to have all of these, but if you use them anyway, now might be a good time to have them on hand–ketchup, lemon – or lemon juice, tomato – or tomato juice, mustard, pickle juice, orange – or orange juice)

L*

1. Okay, we look at the chemical reaction (or change in the chemical) that took place when we combined baking soda and vinegar. Vinegar reacts with baking soda because it is an **acid**.

2. Let's see what else reacts with baking soda. Gather some supplies: ketchup, tomato juice, honey, water, lemon juice, mustard, pickle juice, orange juice, whatever else you want to try that you have in the house)
3. Count up how many things you have. Get a cup for each one.
4. Put some baking soda into each cup.
5. Put some ketchup (or whatever) into the first cup and place the ketchup bottle behind the cup so you know what you put in that cup.
6. Observe the reaction.
7. *Record the reaction on your sheet, acid testing sheet.
8. (You may want to ask your mom if she can help you make the red cabbage indicator today to be ready for tomorrow. See tomorrow's lesson.)

M

1. Read about chemical reactions.
2. Take the quiz. It's okay if you get some wrong. Read about the correct answer and try and understand.
3. Write another definition of chemical reaction in your binder with your previous one.
4. (You may want to ask your mom if she can help you make the red cabbage indicator today to be ready for tomorrow. See tomorrow's lesson.)

Day 47* (Materials for L: red/purple cabbage, disposable cups; Materials for M: red/purple cabbage, coffee filters)

L

1. Help a parent make red cabbage juice indicator.
2. Try the experiment. Get your disposable cups. Put a small amount of several different types of liquids in there. Hydrogen peroxide, window cleaner, water, vinegar, try some drinks from the fridge, egg white, whatever else you want to try (with permission). Always be SUPER CAREFUL when using cleaners. They can use powerful and harmful chemicals. Wear goggles and rubber gloves if you have them.
3. Put a little indicator into each cup.
4. *Record the results. PH test sheet

5. If you can't do this at home, here's a video of the experiment.

M

1. Read about acids and bases.
2. Take the quiz.
3. Make ph testing strips.

Day 48 (Materials for M: disposable cups)

L*

1. Watch the movie on acids and bases.
2. *Fill in this worksheet, acids and bases.

M*

1. Use your paper to test a series of liquids in your home: cleaners, drinks from the fridge, egg whites, sauces, whatever else you can think of (with permission). Use goggles and rubber gloves if you have them.
2. Pour the different liquids into disposable cups. Place the liquid behind the cup or label it so you know what you are testing! (You could test things like sugar, cream of tartar, baking soda, just put a teaspoon in the cup.
3. Dip the test paper into each one.
4. *Observe the color change and record the result. PH test sheet
5. If you can't do this at home, here's a video of a similar experiment.

Day 49

L

1. Play at the juice bar. Do the first challenge.
2. Read about neon. You see neon in many lit up signs.
3. Cut out your neon piece. Draw or write inside and add it with your others.

M

1. Play at the juice bar. Do all three challenges.

2. Read about neon; read here too.
3. Cut out your neon piece and fill it in and add with your others.

Day 50

L

1. Do the second and third challenge at the juice bar.

M

1. Watch the movie on acids and bases.
2. *Fill in this worksheet, Acids and Bases.

Day 51 (Materials for L: hard-boiled egg, chicken bone–for tomorrow, vinegar–at least one cup, jar or container for vinegar)

L

1. Watch this video on fireworks.
2. Explain to someone how a firework works.
3. Read this and do the experiment (Do part one — egg in vinegar.)

M

1. You are going to keep reading about chemical reactions. I know this isn't easy stuff. Take your time and get what you can from it.
2. Take the quiz.
3. Watch this video on fireworks.
4. Do concentration, temperature and pressure contribute to the reaction? How?

Day 52 (Materials for L: diet coke or other carbonated drink, salt; Materials for M: liquid glue–you can halve the recipe, laundry detergent — this uses powdered, if you have liquid at home you can use it, just add more because it already has water in it)

L

1. Pour a cup of soda. Place the cup on a tray or in a bathtub or sink. Add a lot of salt (1/4 at least), but you could try it with differing amounts. Observe.

2. Read and watch the Diet Coke and Mentos experiment.
3. These both work the same way. The salt and Mentos attract the CO2 (Carbon Dioxide–what makes the bubbles in a fizzy drink) and pulls it all out of the soda at once instead of little by little like it usually comes out.
4. Take your egg out of the vinegar and put in the chicken bone.

M

1. Here's another page on chemical reactions.
2. Take the quiz.
3. Let's combine reactants to make a new product!
4. Do this experiment.
5. If you can't do it, here's a video to watch.
6. The experiment in this link was done with borax which is a type of laundry detergent. Listen to her explanation.

Day 53 (Materials for L: piece of liver, piece of potato, hydrogen peroxide — small amount, liquid dish soap; Materials for M: clean plastic 16 oz. soda bottle (best but not only size), one packet dry yeast, liquid dish washing soap, 1/2 c. hydrogen peroxide — can get it at a pharmacy, tray or do it somewhere it can overflow onto)

L

1. Read this page and do the experiment.
2. Explain to someone what is making the bubbles? (The oxygen being released is mixing with the soap. Have you ever made more bubbles in a bath tub by mixing in air? — in other words, by moving the water around really fast?)
3. Chicken liver recipes
4. Take your chicken bone out of the vinegar and try and put it in a shape. Leave it out to dry and absorb the carbon dioxide from the air you breathe out.

M

1. Here's another page on chemical reactions.
2. Find someone else and act out being their **catalyst** and **inhibitor**.

3. Do this experiment. The yeast is the **catalyst.**
4. If you can't do it, watch this video.

Day 54*

L*

1. Watch these cool chemical reactions.
    - Some of the videos are missing.
        - Sodium, Water, Chlorine Gas
        - Magnesium and Dry Ice
        - Potassium Chlorate and Candy Reaction
        - Meissner Effect
        - Sodium Acetate Super Saturation
        - Super Absorbent Polymer
        - Floating on Sulfur Hexafluoride
        - Superfluid Helium
        - Thermite and Liquid Nitrogen
        - Briggs-Rauscher Reaction
2. *Check on your chicken bone. Fill in this worksheet, Knotted Bones.
3. What was removed from the chicken bone?
4. Now do you see why your mom wants you to drink milk

M

1. See how much of this chemical reactions worksheet you can fill in.
2. Check your answers.
3. Watch the top ten chemical reactions.
    - Some of the videos are missing.

Day 55

L

1. Magnesium is a metal and is found in the earth's crust and in seawater. It is used in building airplanes.

2. Read about magnesium.
3. Cut out your magnesium piece and fill it in and add it to your collection.

M

1. Watch the video on magnesium.
2. Read about magnesium: here and here.
3. Cut out your magnesium piece and fill it in and add it to your collection.

Properties of Liquids

Day 56

L

1. We're going to go back and look at the different states of matter. Specifically we're going to look first at solids.
2. Read about solids.
3. Take the quiz on solids.
4. Play the game. You'll use each material once in the game.

M

1. We're going to go back and look at the different states of matter. Specifically, we're going to look first at solids.
2. Read about solids.
3. Play the game. I think you are supposed to use each material once in the game.

Day 57* (Materials for L: fizzy drink in a bottle, Materials for M: candle, glass, baking soda, vinegar)

L

1. Read about solids, liquids and gases and look at the pictures of how the molecules (or particles) behave in each.
2. Do this activity.

Speaking

1. A soda or pop bottle has a solid, liquid and gas. Describe to someone the three states of matter in a bottle. What happens when you tip the bottle? What type of matter is affected? What happens when you open the bottle? What type of matter is affected? Take a bottle in front of an audience and answer these questions with a demonstration.

M*

1. Today you're going to read about gases.
2. Take the quiz.
3. *This experiment shows gas being produced and taking up space. Read and do theexperiment and write it up. experiment worksheet

Day 58

L

1. Now we are going to be looking at liquid. You have learned how liquid moves and fills containers and can't really be compressed (or pushed down) much.
2. We're going to look at some specific things about liquid. The first is **viscosity**. (Click on the little speaker next to the word to hear it pronounced.)
3. **Viscosity** is the measure of how a liquid flows. Actually, it measures how much it resists flowing. Liquids move right? You put them in a container and they spread out and fill it. If you poured water in a bowl, it would spread out quickly and fill the space. Water has **low viscosity**. Honey you got from the fridge and poured into a bowl has a **high viscosity**. It resists flowing. It moves slowly.
4. Watch this video. Which one has the lowest **viscosity**? The one at the end on the right or left? (answer: right)

5. Design an experiment to test the viscosity of at least five different liquids. Based on your observations rate them from the lowest to highest viscosity. Here's an experiment sheet to record on: experiment worksheet

M

1. Today you are going to read about liquids.

2. Take the quiz.
3. **Viscosity** is the measure of how a liquid flows. Actually, it measures how much it resists flowing. Liquids move right? You put them in a container and they spread out and fill it. If you poured water in a bowl, it would spread out quickly and fill the space. Water has **low viscosity**. Honey you got from the fridge and poured into a bowl has a **high viscosity**. It resists flowing. It moves slowly.
4. Watch this video. Which one has the lowest **viscosity**? The one at the end on the right or left? (answer: right) There is one more activity below the video.

Day 59 (Materials for L: 1 c. cornstarch, 1/2 c. water)

L

1. Do you remember yesterday's big word? **Viscosity**.
2. A liquid's viscosity can change. If you heat up honey, it would get less viscous and flow more quickly.
3. Today you are going to change the viscosity of a liquid with force.
   - Combine 1/2 cup of cornstarch with 1/2 cup of water, **slowly adding the water**in until it stirs like a stiff liquid but feels like a solid when tapped.
   - When you push on it, does its viscosity get lower or higher, does it flow more easily or not.
   - You can see it in the first minute of this video.

M

1. Yesterday you were introduced to **viscosity**.
2. Design an experiment similar to these to test the **viscosity** of different liquids. (My kids used a cookie sheet.) Record your experiment. experiment worksheet
3. Do you think temperature would affect the viscosity of a liquid? (Hint:
) Test your hypothesis, test a liquid at two different temperatures to see if its **viscosity** changes.

Day 60

L

1. Read about aluminum.
2. Look at aluminum.
3. Find aluminum in your home. Ideas: aluminum foil, drinking cans, pots and pans, knitting needles, crochet hooks, light fixtures, hamster cages, camera tripod and the metal bands around your coffee pot
4. Cut out and draw/write inside your aluminum piece.
5. Add it with the others.

M

1. Watch the video on aluminum.
2. Cut out and write inside your aluminum piece.
3. Add it with your others. It is in the Boron Group, Group 13.

Day 61 (Materials for L: slice of bread, water, cooking oil, dish detergent, jar or tall clear glass, three glasses; Materials for M: salt, 3 clear glasses, food coloring)

L

1. Take a slice of bread (no crust). Squash it. Your slice of bread became **denser**when you squashed it. **Density** is the measure of how much something weighs for the space it takes up. Your bread didn't change it's weight, but it changed how much space it took up. It became **denser**. The bread was less **dense** to begin with.
2. A rock is **denser** than water. It is heavier for the space it takes up than water is. So a rock sinks in water.
3. We can compare the **density** of liquids by seeing if one sinks into the other.
4. Experiment:

- Set up three glasses.
- Combine the three liquids two at a time. Make sure you know which liquid you put in first and second. Put the first liquid in. Then slowly put in the second.
- Does the second sink through the first or sit on top?
- If it sits on top, it is less dense. If it sinks, it is more dense.
- Make a list of your liquids from the most dense to the least dense.
- Now pour them all into the jar slowly, one at a time, the most dense first, the least dense last.

- You can test another liquid and try and make a taller tower of liquids.
- Get a tall glass or jar that you can see through or a skinny glass flower vase would work well. Put the most dense on the bottom, then the next and so on. If there is more than one clear liquid, color one with food coloring.
- Here's a video of an experiment like this.

M

1. Take a slice of bread (no crust). Squash it. Your slice of bread became **denser**when you squashed it. **Density** is the measure of how much something weighs for the space it takes up. Your bread didn't change it's weight, but it changed how much space it took up. It became **denser**. The bread was less **dense** to begin with.
2. A rock is **denser** than water. It is heavier for the space it takes up than water is. So a rock sinks in water.
3. We can compare the **density** of liquids by seeing if one sinks into the other.
4. The official formula for density is mass divided by volume. One gram of water takes up one mililiter. One divided by one is one. Water's density is one.
5. Gather three glasses you can see through. Fill one with hot water, one with cold water and one with salt water. Put a few drops of food coloring into each glass. Make observations. Which is the densest? Which is the least dense? How are density and viscosity related? Explain.
6. Video if you need it.
7. Do the first page of this density worksheet. You can use a calculator. Density = Mass (grams) / Volume That means that means that Volume = Mass / Density and also that Mass = Density * Volume
8. Density Worksheet Answers.

Day 62 (Materials for L: bowl of water, 10 things you can drop in that bowl of water; M: plastic bottle, eye dropper or pen cap and oil-based clay — maybe you could use a piece of crayon instead of clay?)

L*

1. Play with this buoyancy explorer. You can click on the different choices under "Blocks." **Buoyancy** is the ability something has to float. If something is **buoyant**, it can float. If you want to hear this word read to you, click on this and then the little speaker icon next to the word.
2. Something is **buoyant**, or can float, if it is less **dense** than water.
3. *Try out things from your home. Fill a bowl with water and drop things in. Check off on your list if they are **buoyant** or not.

M

1. Do the experiment.
2. Read what is going on.
3. You may be thinking, don't people sink? Water's density is 1. Salt water's density is 1.025. The average human body's density is 1.01. Can you see why people can float and sink?
4. The experiment page talked about a "buoyancy compensator." **Buoyancy** is just a word that means the capability to float.

Day 63 (Materials L and M: cups, food coloring–optional, paper towels; M can use books or something else instead of the blocks in the picture–just don't spill!)

L

1. **Capillary action** is water being drawn along a solid. It happens because the molecules of the liquid are attracted to the molecules of the solid and that pulls the liquid along.
2. Read and do this experiment to see it in action.

M

1. **Capillary action** is the movement of a liquid along the surface of a solid caused by the attraction of molecules of the liquid to the molecules of the solid. (from thefreedictionary.com)
2. Read this and do the experiment to see it in action. Start at step 3.

Day 64

L*

1. Draw pictures to define the terms we've learned – Properties of Water.

M*

1. Define each of the terms – Properties of Water.

Day 65

L

1. Read about silicon. The circuits in your computer are made from silicon.
2. Look at silicon.
3. Cut out your silicon piece and draw/write inside of it and include it with your others.

M

1. Watch the video on silicon.
2. Cut out your silicon piece and write about silicon inside. Add it to your others. Silicon is in the carbon family.

Science Fair

Day 66 – Day 70

L

1. Choose a question to answer.
2. Design an experiment to answer the question. You can use an existing experiment, but think of a way to expand it and try it with new things or in a new way.
3. Do the experiment.
4. Record the experiment.
5. Present your experiment. You could make a video, a poster, a book or use thisexperiment book to write and draw in for your project.
6. Upload your experiment. Take pictures of your project and put them on your computer. Email your pictures and description to me and I'll add them to our Hall of Fame page. Write to me through the contact page and I'll send you my email address. (By sending me pictures you are giving me permission to make a video out of your pictures and post it online.)
7. Take a look at other kids' experiments.

8. Here are some experiment ideas based on what we've just been learning.

M

1. Choose a question to answer.
2. Design an experiment to answer the question. You can use an existing experiment, but think of a way to expand it and try it with new things or in a new way.
3. Do the experiment.
4. Record the experiment.
5. Present your experiment. Make a video, poster, book…show others what you did. Include your question, your hypothesis, best guess as to what the answer will be, and a complete list of materials. Include as many detailed steps as possible for how you did it. Include as many observations as possible. Make a chart of any data you collected, measurements you took. Write a great paragraph explaining your conclusion.
6. Upload your experiment. Take pictures of your project and put them on your computer. Email your pictures and description to me and I'll add them to our Hall of Fame page. Write to me through the contact page and I'll send you my email address. (By sending me pictures you are giving me permission to make a video out of your pictures and post it online.)
7. Take a look at other kids' experiments.
8. Here are some experiment ideas based on what we've just been learning.

Chemical Reactions

Day 71 (Materials for L: vinegar 1 liter/.25 gallon, baking soda; M: baking soda, vinegar, if you can: Epsom salt, smelling salt, calcium chloride–see below)

L

1. Here's an experiment that is **exothermic**. What is that? It gives off heat. Chemical reactions create different products. Some reactions create energy, heat! Go to the link to see the experiment, Hot Ice, and to try it.
2. Watch this exothermic reaction.
3. Explain to a parent what exothermic means.

M*

1. Exothermic/Endothermic — **Exothermic** reactions give off heat–the chemical reaction makes heat. **Endothermic** reactions lower the temperature of the product. You are going to combine different materials and test to see if the reaction is **exothermic** or **endothermic**.
2. Print out this worksheet for one experiment.
3. Print out this worksheet for the second experiment. To make the baking soda solution combine 1/2 cup of water with 1 Tablespoon of baking soda. Calcium chloride — can be found as a laundry booster, road salt–check to make sure it is only calcium chloride, or as DampRid at a hardware store–if you use that, you need to increase your amount you use)
4. If you have them, you can test epsom salt (magnesium sulfate) and smelling salts (ammonium carbonate). Remember chemicals are toxic. Use your goggles and gloves if you have them and be careful. Don't smell the ammonium carbonate! If you can get nothing except vinegar and baking soda, then try that and regular table salt in water. Try something!
5. Fill in/make charts of your observations.
6. Write a paragraph stating your conclusions about what produces either an exothermic or endothermic reaction.
7. Watch this exothermic reaction.

Day 72 (Materials for L: 1/2 c. milk and heavy cream and salt, 1/4 c. sugar, vanilla, 2 c. ice, qt. size ziplock bag, gallon size ziplock bag)

L

1. An **endothermic** reaction is one where the temperature lowers.
2. Try this yummy experiment.
3. While you are eating, tell someone the difference between an endothermic and an exothermic reaction.

M

1. Watch "How to Make Cotton Candy."
2. Write out the steps or draw a diagram of the process.

Day 73

L

1. Read about chlorine.
2. Cut out and fill in your chlorine piece.

M

1. Watch the video on chlorine.
2. Cut out and fill in your chlorine piece.
3. Chlorine is part of the halogens or florine family

Day 74 (L: baking powder, ingredients for any quick bread if you like; M: yeast, ingredients for baking bread if you like)

L

1. Do you remember what element the C is the symbol of? If not, go look on your periodic table .
2. What does O stand for?
3. O2 shows dioxide. “di” is latin for two.
4. So what is CO2? (answer: Carbon Dioxide)
5. CO2 is the chemical compound released when you mixed baking soda and vinegar.
6. Is CO2 a liquid, solid or gas? (answer: gas, it’s what’s making the bubbles when you combined baking soda and vinegar)
7. Baking *powder* is an acid and a base together. (vinegar is an acid, baking soda is a base) You can make something similar by combining the base, baking soda, with the acid, cream of tartar.
8. When you add any liquid to baking powder, it causes the acid and base to react, and CO2 is made.
9. The gas bubbles get caught in the batter or dough you are making and fill it with gas. This filling is what we call rising.
10. Put a spoonful of baking powder in a small amount of water and watch what happens.
11. Bake some quick bread. Don’t stir too much or you will release all the gas!

M

1. Read about yeast and bread making. Go ahead and “explore gluten.”

2. Yeast releases CO2 (what's that? carbon dioxide, the same thing we release when we breathe out).
3. The gas gets trapped in the dough, filling it. We call it rising.
4. **If you want to make bread**, here's a recipe to follow. You don't need to use a mixer. After step five, punch down the dough, divide it in half, and put it in the shape you want. Skip to step 8. After step two–after adding the warm liquid –stop and observe for awhile. Observe the CO2 being released.
5. **If you don't want to make bread**, mix together a packet or tablespoon of active dry yeast, 1 c. of very warm water and 2 tablespoons of sugar. Observe the release of CO2.

Day 75 (Materials for science: lemons M, potatoes L, tiny light bulb or small LED clock, galvanized nail — coated with zinc, copper pennies or nails or wire, at least 3 alligator clip wires — with clips on each end of a wire — FOOD WILL BE INEDIBLE AFTERWARDS)

L

1. Make a battery. Read through all four pages first.
2. Experiment with different things.
3. Draw a diagram of anything you get to work.
4. Watch a video of this experiment. If an ad pops up, click on "No thanks, just play the video."

M

1. Make a battery.
2. Experiment with different things.
3. Write an experiment report — experiment worksheet.
4. Watch a video of this experiment. If an ad pops up, click on "No thanks, just play the video."

Electricity

Day 76

L

1. Play a science review game.

M

1. Play a science review game.
2. Play this circuit game you played when you were learning about the light bulb.

Day 77

L*

1. *You are going to be completing this lapbook. Print it out.
2. Look through it to see what you will be learning about. Look ahead to see what materials you will need.
3. Here is an electricity website to look at to get you started learning about electricity.
4. We will be doing more experiments after the lapbook is complete.

M*

1. *You will be completing this lapbook. Print it out and read through it. You don't have to do the last two pieces.
2. Look ahead to see what materials you need. We will do more experiments after the lapbook is complete.
3. Today explore "How Plants Work" and get a little understanding of where our electricity comes from.

Day 78

L

1. Do your timeline piece today.
2. Here's some information you could include. You don't have to use every bit of information!

M

1. Do your timeline piece today.
2. Here's some timeline information. You don't have to use every bit of information!
3. There are also timeline dates and events included in the lapbook printout.

Day 79 (Materials for L: two alligator clips, 9 volt battery, mini light bulb — like from Christmas decorations)

L

1. Connect two alligator clips to a 9 volt battery, one to each terminal (part sticking out). Connect the other end of each wire to a little light bulb. This is a **closed circuit**. When you detach one wire. This is an **open circuit**.
2. Play this circuit game.
3. Do your circuits piece today.

M

1. Use this site to learn the basics of circuits.
2. Read this one page about series and parallel circuits.
3. Do your circuits piece today.

Day 80 (Materials for L: comb, tissue; M: balloon, tissue)

L

1. Do this static electricity experiment.
2. Do your types of electricity piece today.
3. Do you want to play your science review game again?

M

1. Do your static electricity piece today. (Do the experiment.)
2. Do you want to play your science review game again?

Day 81

L

1. Do your famous people piece.
2. Here's a website to get information.

M

1. Do your magnets piece.
2. Here's an online compass and bar magnet.
3. You can add in other magnet observations. Play this magnet game to make some more observations about magnets!

Day 82

L

1. Do the electricity is shocking piece.
2. Here's a website to learn about it.

M

1. Do your AC/DC piece.
2. Take a look at this website. Make sure you scroll down to the animated picture and see how the alternating current changes the poles so that the rotor is attracted to the north than the south and in that way keeps spinning.

Day 83

L

1. Do the safety piece.
2. Here's an activity to learn about electrical safety in your home.

M

1. Do your electrical outlet piece.
2. You can read about GFCI outlets on this page.

Day 84

L

1. Do your vocabulary piece.
2. Look up definitions for these words: Energy Source, Conductor, Electron, and Energy.

M

1. Do your vocabulary piece.
2. Find words from your other pieces and fill in at least five light bulbs with the word and definition.

Day 85 (Materials for L: long iron nail, copper wire, 9 volt battery, paper clips, aluminum foil; M: 9 volt, copper wire, magnetic compass, metal thumbtacks, paper clips –it says lid of small cardboard box and block of wood but could be substituted–)

L

1. Try and build this experiment. A dry cell is just a regular battery like A and 9 volt batteries. You can use aluminum foil for your switch.
2. Do your experiment piece.
3. Here's a video of the experiment.

M

1. Try and build this experiment.
2. Do your experiment piece.
3. Here's a video related to this experiment.

Magnetism

Day 86

L*

1. You created a magnet. Now let's learn some more about magnets and **magnetism**. We think of magnets as being what's on the refrigerator, but really magnets and electricity go together.
2. Here's a website to get information.
3. Complete these magnet pieces: Attracted/Not Attracted, field strength, natural magnets.

M

1. You saw in your last experiment how magnets and electricity go together. Now let's learn more about magnetism.
2. Here's a website to get information.
3. Today do the magnet vocabulary. You may search online for the definitions or use a dictionary.

Day 87

L

1. Today you will do these magnet lapbook pieces: Attract or repel, atom domains, magnetic poles.
2. Use the link and scroll down and look for the information needed.

M

1. Today you will do the pieces: temporary magnets, electromagnets
2. Use this site to find information.

Day 88

L

1. Today you will do the alternating currents and simple motors pieces.
2. Use this link scroll down to the animated picture and use that info and what's a bit underneath it — AC means alternating current, the current alternate, goes back and forth causing the poles of the magnet to switch so the green side in the picture is pulled to the south then to the north to keep it spinning.

M

1. Do the Grippers piece.
2. I can't find good information on this, but you can see what it is, using magnets for lifting. You can watch the video in the row of pictures.
3. Below you can see robot grippers. How would making them magnetic help?
4. The force is the strength of the magnet–the stronger the magnetic force, the more weight it could lift.
5. "Industrial" use means in factories and things like that.
6. Here are magnetic gripper videos.

Day 89

L

1. Do the everyday magnets piece.
2. What can you think of or what can you find your hour house?
3. Here's a link about where magnets are used in your home.

4. Take a picture of your lapbook or put the whole thing in your portfolio.

M

1. Do the earth's magnetic field pieces ("magnets fan").
2. You can use these two pages to learn about the earth's magnetic field: one two.

Day 90 (Materials for L: 7-9 in. balloon, yard/meter stick, large spoon–tablespoon works; M: three of the same magnets, optional: aluminum cookie sheet)

L

1. Read this page and try the experiment. The video on the page isn't working, but here it is from youtube.
2. Explain how electrons and magnets can work to make things rotate.

M

1. Read this page and try the experiment. (The video is not working now. Can you design an experiment to answer the questions and observe what she's talking about?)
2. Explain what you learned.

Day 91

L

1. Magnet activity
2. Draw a picture that explains how magnets work.

M

1. Magnet activity
2. Draw a diagram of how magnetism works.
3. If you want to explore electricity and magnetism more, go to this website.

Circuits

Day 92 (Materials: battery, mini light bulb, 3 alligator clip wires, aluminum foil, paper clip–plain metal; M+ motor, wires, batteries)

L

1. Draw a circuit with a battery, a light bulb and two wires. (If you need a circuit review, play this.) Make sure it is a **closed** circuit. Electricity has to flow. It can't just travel from the battery to the light bulb; it has to be able to flow back through the battery.
2. Now create the circuit.
3. Now draw a circuit with a battery, a light bulb, a switch and three wires.
4. Build the circuit. You can use aluminum foil and paperclip for your switch. Fold a piece up into a small rectangle. Clip one end into one of the wires. Clip the paperclip into the other wire. What happens when you press down on the aluminum foil to touch it to the paperclip? It should turn on the light.
5. If for some reason you can't build circuits, you can do this little circuit course for the next few days. You can do it just for fun too.

M

1. Draw a circuit with a source of electricity, a switch and at least two small things that use electricity like a mini light bulb and motor or small LED clock. Make sure the electricity will go all the way around the circuit. If you need a circuit review,play this game.
2. Build the circuit. Does it work? If not, change it. Does it need more power?
3. Draw a circuit with two electrical objects, two sources of power and two switches so that you can turn on and off each thing (like a lightbulb)
4. Build the circuit.

Day 93

L*

1. Build a simple circuit with one battery and one mini lightbulb (or something similar).
2. Add in an extra wire on one side to make the wire on one side extra long.
3. Gather materials from around the house: ideas…piece of clothing, key, spoon, pencil, paper, piece of cheese…)
4. Try each one in between the two wires on the long side of the circuit.
5. Fill out this experiment worksheet on which ones **conduct** or carry electricity.

6. Water conducts electricity very well which is why you have to get out of a pool during a lightening storm and why you should never be in the bath when there is an electrical item plugged in near you.

M*

1. Build a circuit.
2. Add in an extra wire so you can test **conductors.** You are going to experiment like this game did.
3. Gather up items to test. Get a variety. Try some foods.
4. Test each one and record the results. Which ones conduct, carry, electricity?

Day 94

L

1. Review how circuits work.
2. What difference does changing the power source (here it's a battery) make?
3. Guess whether each item will be a **conductor** or not before you try it. Were you right?

M

1. Read about series and parallel circuits.

2. Draw a circuit of each kind. (Series: the electricity flows to one and then the other; Parallel: the electricity flows to both at the same time)
3. Build them.
4. Did they work?
5. What's the difference in power levels between the two circuits?

Day 95

L

1. Watch this video on circuits and human conductors.
2. Why not try and make a circuit with you in it!

M

1. You decide what to do. You could…
2. Build some more circuits.
3. Play some circuit games.
4. Try another experiment.

Day 96 (Materials for L: salt, pepper, cornstarch, flour, oil, juice/milk, a clear cup, spoon — just a small amount of each)

L*

1. Today you are going to test for ability to **dissolve** or disappear into a liquid.
2. Take a clear cup and fill it halfway with cold water.
3. Take a regular spoon and fill it with one of your test items.
4. Dump it into the water and stir.
5. Did it disappear into the water? Did it **dissolve**?
6. Mark it on your Does It Dissolve worksheet.
7. We already know sugar dissolves in water because we stir it into our tea — hot and cold.

M

1. Read through these Chemistry Review pages. (It's okay if some of it is new.) Click on the right arrow. Watch the salt and sugar dissolving videos (put your mouse on the picture and a play button will appear.)
2. Write down all the words that are a different color and their definitions. (Put your mouse on the words and a definition will pop up.)

Day 97 (salt, sugar, flour, cornstarch, small pot, spoon for stirring in pot, clear cup, spoon)

L*

1. Today you are going to test to see if temperature effects the ability to dissolve.
2. You already tested these items in cold water and saw them dissolve (except for sugar).
3. Heat up one cup of water on the stove.
4. Stir in a spoonful of one of your test substances.
5. Did it dissolve?
6. Did it dissolve more easily or with more difficulty than when in cold water?

7. Record your observations. Does it dissolve in hot water?
8. Go ahead and mix sugar in cold water to compare the two.
9. Write a sentence describing your conclusion about how temperature effects how things dissolve.

M

1. Read through these Chemistry Review pages. Click on the right arrow.
2. Write all the colored words and their definitions.

Day 98 (Materials for L: at least 1/2 cup of salt on hand, small pot, measuring spoons)

L

1. Today we are going to find the **solubility** of salt. That means we're going to see how much salt we can dissolve into a liquid before it just can't hold anymore.
2. Did salt dissolve better in hot or cold water?
3. Put one cup of water in a small pot. Stir in salt one tablespoon at a time until it is dissolved. Keep track of how much you are putting in.
4. When you can't get any more dissolved, the water is **saturated**; it can't hold any more.
5. The salt water is called a **saturated solution.**
6. What is the **solubility** of salt in water? It's the amount of salt you put in. How much? Now…
7. Heat up the salt water in the small pot.
8. Add in more salt a teaspoon at a time and stir until dissolved. Keep track of how much you are putting in.
9. Stop when there are a few grains of salt in there that just won't dissolve.
10. The quantity of salt you put in is its **solubility** in hot water. What is it?
11. The water is now a ***super*saturated solution**. It's completely full and will be too full when it cools.
12. Soak a piece of cardboard in your **supersaturated solution**. Set it on a plate in a sunny place to dry. What happens?
13. What happened to the salt water in your pot when it cooled?
14. Tell someone all about **saturated solutions**.

M

1. Read through these Chemistry Review pages.
2. Write all the colored words and their definitions.

Day 99

L

1. Draw a picture of making a **saturated solution** with salt and water.
2. Label the water with this word, **solvent**.
3. Label the salt with this word, **solute**.
4. The **solute** is what **dissolves** in the **solvent** to make a **saturated solution.**

M

1. Read through these Chemistry Review pages.
2. Write all the colored words and their definitions.

Day 100

L

1. Do you know what is a solute and what is a solvent?
2. Play this liquids vocabulary game.
3. Watch this video on a saturated solution.

M

1. Read over your words and definitions.
2. Play this definition game.

Day 101 (Materials for M: balloon, strip of plastic from grocery store plastic bag)

L

1. Play your vocabulary game.

M

1. Play the definition game.

2. We're going to do some more chemistry review. Let's go back and look at atoms again.Remember they have neutrons and protons in the nucleus and electrons in the outer shells. The electrons have a negative charge and the protons have a positive charge–like magnets and electricity.
3. Read through these pages and click on the numbers on the pictures to see the different images. Click on the "Start" and "Play" buttons. The one with the faucet should have a play button–you don't need to download anything. Click on the arrows to turn the pages. Try rubbing the plastic bag between your fingers and the balloon on your hair and watch how you can see the electrons have moved causing the attraction.
4. Draw or write explaining the attraction either between the water and balloon or the plastic and your fingers.

Day 102

L*

1. We're going to go back and look at atoms and molecules again.
2. An atom is made up of three particles: **protons** +, **electrons** – and **neutrons**. The positively charged **protons** are attracted to the negatively charged **electrons**. The**neutrons** have no charge and are neutral. There is always the same number of**electrons** as **protons** in an element. The **protons** and **neutrons** are in the center of the atom, called the **nucleus**. The **electrons** spin around the **nucleus** in an orbit. Their opposite attraction (like magnets) keeps the atom together.
3. Build atoms. You only have 5 minutes. Click on all the boxes to the right. Create different elements by adding protons, neutrons and electrons using the arrows on the left. Keep the number of the particles the same–same number of electrons and protons.
4. *Label the drawing of an atom. Do you need a helping picture? Write the name of this atom — which has 2 electrons? What do you remember about atoms?

M

1. Read these pages. All of the pictures with a science experiment are videos. There should be a play button.
2. Draw a 2-D model of a sodium atom.

Day 103

L

1. Atoms make up everything in our world. When atoms come together and **bond** or attach to each other. They make **molecules**. H2O is a water **molecule** made up of two hydrogen atoms and one oxygen atom.
2. Build molecules. Click on nanolab and build.
3. Click on home and now click on transform. Heat up the molecules to get them moving to turn the solid into a liquid and then a gas.

M

1. Read these pages about covalent bonds. Click on all the numbers and start and play buttons and arrows.
2. Draw two oxygen atoms bonded. Write the type of bond and describe what is happening in the picture.
3. Oxygen basically never exists alone. It is always found bound to another oxygen atom.

Day 104 (Materials for M: two colors of gummy candy, toothpicks)

L

1. Build water molecules with gummy candy and toothpicks. Two hydrogen (same color) and one oxygen (different color). Here's a picture.
2. Now make 4 more water molecules.
3. Now attach them all together. The hydrogen needs to attach to the oxygen. Here's a diagram– scroll down, 3rd picture from the bottom.
4. This is how drops of water are formed and hold together.

M*

1. Read these pages about ionic bonds. Click on the numbers and start and play buttons and arrows.
2. *Print out these worksheets. Answer the questions. See below for the activities.
3. Here is an image of sodium chloride.

4. Use your candy to build a model like described. Use one color for positive and one color for negative.
5. Here is an image of what you built.
6. Answers to the worksheet. Check to make sure you understand.

Day 105

L

1. Play this atoms game.
2. Play your vocabulary game.

.

M*

1. Read about diagramming atoms.
2. *Print and complete these worksheets.
3. When you are finished, check your answers and make sure you understand.

Forces

Day 106

L

1. Remember these words? **thrust, lift, drag, weight** Thrust pushes the plane forward. Drag is the air pushing back on the plane. Lift is the air pushing up on the plane. Weight is gravity pulling down on the plane. When thrust is greater than drag, the plane moves forward. When lift is greater than weight, the plane goes up. When all these **forces** pushing on the plane in every direction are equal. The plane is still.
2. Put your hands together. Push harder with your right hand. What happens? Push harder with your left hand. What happens? Push the same with both hands. What happens?
3. Describe to someone or draw a picture about how when **forces** are equal on an object they stay the same but when one is larger the force moves the object.

M

1. Remember these words? **thrust, lift, drag, weight** Thrust pushes the plane forward. Drag is the air pushing back on the plane. Lift is the air pushing up on the plane. Weight is gravity pulling down on the plane. When thrust is greater than drag, the plane moves forward. When lift is greater than weight, the plane goes up. When all these **forces** pushing on the plane in every direction are equal. The plane is still.
2. Put your hands together. Push harder with your right hand. What happens? Push harder with your left hand. What happens? Push the same with both hands. What happens?
3. Play this little game. It involves weight, drag, thrust.

Day 107

L

1. Play this game. Weight provides the thrust when you combine it with the hill. Drag is created by the parachute. How do the forces work together and against each other.
2. After you play the game, tell someone how to make the car go farthest and how to make it go the shortest distance.
3. Here's a little reminder about gravity.

M*

1. Play this cannonball game. You will consider weight (gravity pulling on an object's mass), thrust (size of the charge/explosion), drag (air resistance)
2. *Read and fill in the first five pages of this forces worksheet. Print out the whole thing. You will finish it tomorrow.

Day 108

L*

1. Learn about friction. What is **friction?**
2. Take the quiz.

M

1. Play this forces in action game.
2. Read and fill in the last three pages of this forces worksheet. The answer to number 1 is **4n right**. You can do this. It's a diagram of your two hands pushing against each other. Your left hand pushes and your right hand pushes more. Which way do your hands move? Do they move more when you push harder? Yes. That's all these diagrams are showing.

Day 109

L*

1. Fill in this worksheet on different things that cause friction. **Friction** helps us walk, but it makes moving heavy furniture across the room harder. List examples of **friction** and decide if it is helpful or not.
2. Can you image a world without friction? What if you plopped yourself down on the couch and it slid across the room? What else would happen if there were no friction?

M

1. Play this friction game.
2. Write about how friction effects your life everyday. What would your world be like without friction?

Day 110

L

1. Read about potassium. Read more about where to find it.
2. Fill in your potassium mini book. (Eat a potato or banana

M

1. Read about potassium.
2. Watch the potassium video.
3. Fill in your potassium mini book.

Laws of Motion

Day 111 (Materials for L: rubber band, pretty strong plastic spoon, balled up aluminum foil or mini marshmallows or something else little and light, 2 thumbtacks, base — small wood block or something firm and heavy)

L

1. Read the first page on this site about Newton's First Law of Motion.
2. Watch the first video, then build a catapult to demonstrate this law. Get permission before you stick thumbtacks into something.
3. If for some reason you can't build that one, here's an alternative catapult with a different supply list. (You have to get on their email list.)
4. Watch the second video and explain how it demonstrates Newton's First Law of Motion.

M

1. Read about motion and forces. Take the quiz at the end of each lesson.
2. Read about vectors.
3. Write a word problem and solve it with vectors.

Day 112

L

1. Read about Newton's Second Law of Motion.
2. Demonstrate this law. Find two things of unequal weight. Push them the same speed across the floor. Which one did you need a greater force to push? The heavier one because force equals the mass times acceleration. That means, the heavier the object is, the more work it will take to get it going.
3. If you have chairs you can slide on a floor, push an empty chair and a chair with someone sitting in it. The one with the greater mass (the heavier one) will be harder to push.
4. If you are really excited about this, figure out your acceleration by figuring out how many meters you go in 1 second. That's your acceleration. Acceleration is measured in meters per second (m/s). Weigh the object you pushed. That's the mass. Mass is measured in kilograms (kg). Use an online converter to figure out kilograms if you need to. Multiply the mass and

acceleration (use a calculator) to find out the force you used. Force is measured in Newtons. Guess why they are called Newtons?

M*

1. Read about Newton's Three Laws of Motion.
2. Write about Newton's Three Laws of Motion. (Print 2 copies and save one for tomorrow.)
3. Explain how does this video show the first law of motion.

Day 113

L

1. Read about Newton's Third Law of Motion.
2. Think of a way to demonstrate Newton's Third Law. Here are some examples. The video from day 39 is also an example. Explain how each example shows Newton's Third Law of Motion.

M

1. Think of a way to demonstrate each of the three laws. (Example: When someone is not wearing a seat belt and the car is suddenly stopped, that person will keep moving forward, right through the windshield.)
2. Demonstrate each with objects in your home. Write about each demonstration on your Three Laws of Motion paper.

Day 114

L*

1. Make a Laws of Motion book.

M*

1. Read about velocity.
2. Fill in these definition grids.

Day 115

L

1. Read about calcium.
2. Cut out and fill in your calcium piece for your lapbook.
3. Play launchball.

M

1. Read about calcium. It will tell you what family it belongs to.
2. Cut out and fill in your calcium piece.
3. Play launchball.

Day 116

L

1. Make sure your book on Newton's Three Laws of Motion is finished.
2. Take the quiz. Did you know the answers? You can click on Answers to see if you were right.

M*

1. Review the three laws.

2. Match the laws to the examples. Print out page 3. Write on each card which of the three laws it is an example of. The answers are on page 2.

Day 117 (Materials for L: balloon, spill proof bottle cap from sports drink, old CD, super glue/tape; Materials for M: box like shoe box lid, about seven index cards, masking tape, 2 marbles–after you read the directions you can figure how to make due with other materials/types of balls if you need to)

L

1. Build a hovercraft and demonstrate the three laws of motion. (You can use tape instead of super glue. Just seal it all the way around. No air can escape.) Demonstrate to your parents and show them each of the three laws of motion in action.

M

1. Build a marble maze and demonstrate the three laws of motion. Demonstrate to your parents and show them each of the three laws of motion in action.
2. Here's a really hard maze to make but only uses paper. Get permission before you choose this because it prints A LOT of pages.

Day 118

L

1. Design a roller coaster. Then click on park map and try the other rides.

M

1. Answer these forces questions. The next slide is the answer. Say your answer out loud before you click on the next slide.

Day 119

L

1. Puck Chuck!

M

1. Read about momentum.
2. Take the quiz.
3. I failed at building one of these momentum machines, but if you want to try, here are the instructions.
4. Puck Chuck!

Day 120

L

1. Read about Iron.
2. Cut out and fill in your lapbook piece.

M

1. Read about iron.
2. Watch a video about iron.
3. Cut out and fill in your lapbook piece.

Simple Machines

Day 121* (Materials for M: long rubber band, “heavy load” in small bag, meter or yard stick, books, regular ruler)

L*

1. There are seven **simple machines**. These machines help us do our work. The work these machines help us do is moving a mass over a distance. What is something in your house that is too heavy for you to lift? These machines would help you move that item.
2. The first one you are going to learn about is the **inclined plane**.
3. Watch this video about the inclined plane.
4. Look at this picture. Explain how this inclined plane make the work of getting the cart up the hill easier?
5. *Draw a picture of an inclined plane on this page.

M*

1. Watch this experiment and try it at home.
2. *Write up your experiment results. Experiment Worksheet
3. Where are some inclined planes in your world? Here’s one example.
4. *Draw a picture of an inclined plane or write examples of inclined planes on this graphic organizer.

Day 122

L

1. The next **simple machine** we will learn about is the **wedge**.

2. A **wedge** is like an inclined plane. It is slanted and comes to a point. The difference is that an inclined plane stays where it is put. The **wedge** does the moving. It is used to split things apart. Can you find the **wedges** in these pictures?
3. Watch these two short videos which each give an example of a wedge: one two.
4. Have your mother show you one of her big knives. Is it thin on the cutting edge and comes to a point? It's to **wedge** into whatever you need to cut.
5. Draw a picture of a wedge on your simple machines paper.

M

1. The next **simple machine** we are going to learn about is the **wedge**.
2. Scroll down and read the definition of wedge.
3. A **wedge** is like an inclined plane. It is slanted and comes to a point. The difference is that an inclined plane stays where it is put. The **wedge** does the moving. It is used to split things apart. How is a nail a wedge? Do you ever use your fingernail as a wedge?
4. Where else can you find wedges in your world? You can find **wedges** in these pictures.
5. Draw a wedge or list examples of wedges on your simple machines graphic organizer.

Day 123

L

1. The next **simple machine** is the **lever**.
2. Can you pick up another person as high as your head? You can with a **lever**. Watch the video to see how.
3. Try pushing open a heavy door from the edge near the door knob and from the opposite edge. Which is easier? Why?
4. Add a picture of a lever to your simple machines page.

M

1. Watch this video about levers.
2. Add levers onto your graphic organizer.

Day 124

L

1. Today's **simple machine** is the **screw**.
2. Watch this video and explain how the screw is like an inclined plane and how it helps her move the water.
3. Add **screw** to your graphic organizer.

M

1. The next simple machine is the **screw**.
2. Scroll down and read the definition of a **screw**.
3. Turn an inclined plane into a screw.
4. Examples of screws
5. Add screw to your simple machines paper.
6. Watch this video showing how a screw can help move things.

Day 125

L

1. Read about nickle.

2. Cut out and fill in your lapbook piece.

M

1. Read about nickle.
2. Watch a video about nickle.
3. Cut out and fill in your lapbook piece.

Day 126 (Materials for L: straw, thin cardboard/card stock, brass fastener; Materials for M: 10 pencils, brick/heavy wood/big book)

L

1. Today's **simple machine** is the **wheel and axel**.
2. Think of different wheels in your world. Wheels don't just help carry things. Do you have a pizza cutter in your house?

3. Another tool built like a pizza cutter (but without the sharp edge) is a surveyor's wheel, measurement tool.
4. Build a surveyor's wheel. Cut a circle out of thin cardboard or card stock. Attach it to a straw with a brass fastener.
5. Mark a spot on the circle. Put the spot on the edge of a piece of paper. Turn the wheel around one time. Measure how far it traveled.
6. A real surveyor's wheel would click each time it made one turn. If it traveled one meter each turn and clicked 25 times, then the surveyor would know that the distance was 25 meters. Why is that better than using a meter stick?
7. The **axel** on your surveyor's wheel was very small. It was the brass fastener.
8. Watch this video demonstrating wheels and axels.
9. Fill in the wheel and axel piece on your simple machines paper.

M

1. Today's simple machine is the wheel and axel.
2. Look at how a doorknob works.
3. Make a conveyor belt of pencils. The pencils are your wheels. Choose something heavy to push. (Because books are usually smooth, choose a really heavy one or a stack of a few.) How different is it pushing something heavy across a rug and pushing something across your pencil conveyor belt?
4. How is your conveyor belt make your work (your work of pushing your heavy object) easier?
5. If you take one of those pencils and poke it through two bottle caps, you have created an axel.
6. Look at these examples of wheels and axels.
7. Add wheel and axel to your simple machines graphic organizer.

Day 127 (Materials for L: spool of thread, string, pencil)

L

1. Today's **simple machine** is the **pulley**.
2. Watch this video on pulleys. It has some big words, but you will see how pulleys work.
3. Make a pulley.
4. Add a picture of a pulley to your simple machines paper.

5. Ask a parent to put your simple machines paper in your portfolio.

M

1. Watch this video on **pulleys**.
2. See examples of pulleys.
3. Make a pulley system. Here's an example with a milk jug, rope and a broom, but you can do any way you like.
4. Add pulleys to your simple machines graphic organizer.

Day 128

L

1. We're going to look at one more simple machine even though your paper is full. This is not always listed as a separate simple machine. It is a type of wheel. It's the**gear**.
2. Find a **gear** in your house to look at–a bike, an egg beater, a toy car…
3. Gears have teeth the interlock . The big gear turns a smaller gear. You turn the big gear around once, and it turns the little wheel lots of times.
4. Watch this video on **gears**.

M

1. We're going to look at one more simple machine even though your paper is full. This is not always listed as a separate simple machine. It's a type of wheel. It's the**gear**.
2. Find a **gear** in your house to look at–a bike, an egg beater, a toy car…
3. Gears have teeth the interlock . The big gear turns a smaller gear. You turn the big gear around once, and it turns the little wheel lots of times. Like the inclined plane, pulley and others, it spreads out your effort to do your work.
4. Read about gears.

Day 129

L

1. Watch this Bill Nye video on simple machines.
2. Take the simple machine quiz. Click on the link at the bottom of the page.

M

1. Take these simple machine quizzes. Quiz 1 Quiz 2

Day 130

L

1. Read about copper.
2. Cut out and fill in your lapbook piece.

M

1. Read about copper.
2. Watch a video about copper.
3. Cut out and fill in your lapbook piece.

Day 131

L

1. Learn about machines. First go to the house. Then stop by the tool shed.

M

1. First stop by the House to practice identifying simple machines.
2. Learn about compound machines.

Day 132

L

1. Design a compound machine. Draw it. Describe what it does and how it works. Can you build it? Put your paper(s) into your binder when you are done.

M

1. Design a compound machine. Draw it. Describe what it does and how it works. Can you build it? Put your paper(s) into your binder when you are done.

Day 133

L

1. Design a device that puts a marble into a cup. It must use at least 10 steps. Here is an example.
2. Here's a really fancy example of this type of device.

M

1. Design a device that puts a marble into a cup. It must use at least 10 steps. Here is an example.
2. Here's a really fancy example of this type of device.

Day 134

L

1. Build Fantastic Contraptions.

M

1. Build Fantastic Contraptions.

Day 135

L

1. Read about zinc.
2. Cut out and fill in your lapbook piece.

M

1. Read about zinc.
2. Watch a video about zinc.
3. Cut out and fill in your lapbook piece.

Day 136

L/M

1. We're going to be engineers. Engineers design and build everything man-made in your world. They don't just design airplanes and cars, but they design the cabinets in your kitchen. Here are a few design games to get you started.
2. Design a cell phone. Login with easypeasy and allin1homeschool . This login is just for Easy Peasy students to do their assignments.
3. Design a car.

Day 137

L/M

1. Now let's look at building big! First, let's look at bridges. Read about different types of bridges.
2. Play with different forces on the bridges.
3. Online bridge challenge
4. Look at how important it is to build your bridge right! Here's a physics failure bridge!

Day 138

L/M

1. Today let's build our own bridges.
2. You can use these directions and layout to build a file-folder bridge. (Under contents download learning activity 1.)
3. You can build your own out of balsa wood and wood glue or any other materials. (Don't destroy your bridge after you are done. Make sure you do tomorrow's lesson before it's damaged.)
4. You should try to build a physical bridge, but you could also try one on the computer. If you want, ask a parent to go to this site for you and download thisbridge building game. (Parents need to download this, not kids. Make sure to uncheck any extra programs they want to download along with bridge builder. Our family has downloaded this and I do believe it's safe to download from this site.)

Day 139

L/M

1. Test your bridge's strength. Create and conduct an experiment to see how much weight it will hold. Record all of your observations and results. Write up your experiment. Experiment worksheet

Day 140

L

1. Read about silver.
2. Cut out and fill in your lapbook piece.

M

1. Read about silver.
2. Watch a video about silver.
3. Cut out and fill in your lapbook piece.

Day 141

L/M.

1. Read about domes.
2. Then take the dome challenge.
3. Stop at the materials lab.
4. Gather materials for building a dome on day 142, either newspapers or gumdrops and toothpicks.

Day 142 (Materials: either newspapers and tape or gumdrops and toothpicks)

L/M Build a dome. Use either newspapers or gumdrops and toothpicks. Here's a youtube video of a newspaper dome; get permission before you watch a youtube video. Note: The directions on the youtube video are a little off. It should be 71 cm and 63 cm.

Day 143

L/M

1. Read about skyscrapers.
2. Then take the skyscraper challenge.
3. Stop by the loads lab.

Day 144 (Materials: paper clips and straws)

L/M Do this straw activity and then build a skyscraper out straws.

Day 145

L

1. Read about iodine.
2. Cut out and fill in your lapbook piece.

M

1. Read about iodine.
2. Watch a video about iodine.
3. Cut out and fill in your lapbook piece.

Day 146

1. Read about dams.
2. Take the dam challenge.
3. Stop by the shapes lab.

Day 147

1. Read these Hoover Dam facts.
2. Design a dam. Where is it going to be? How big does it need to be? Label the height, width and depth on your diagram.

Day 148

1. Read about tunnels.
2. Take the tunnel challenge.
3. Stop by the forces lab.

Day 149

1. Design a tunnel. Where is it going to be? How long does it need to be? What kind of forces will effect it?

Day 150

L

1. Read about gold.

2. Cut out and fill in your lapbook piece.

M

1. Read about gold.
2. Watch a video about gold.
3. Cut out and fill in your lapbook piece.

Day 151 (Materials: At least two 6 foot (183 cm) sections of 1-1/2 in (about 4 cm) diameter foam pipe insulation, another option: toilet and paper towel rolls marble)

L

1. Our last physics topic for this year is **energy**. Energy is what enables us to do our work. A roller coaster needs a certain amount of energy to do its work of pulling the weight of the cars from the beginning to the end.
2. Build a roller coaster. Click through the tabs. Look at the pictures. Read the questions. Play around and make observations.
3. Another option is a toilet paper roll marble run. Try to make your marble go up a little at some point.
4. Tell your observations to your parents.
5. Play this roller coaster game if you can't build one.

M

1. Our last physics topic for this year is **energy**. Energy is what enables us to do our work. A roller coaster needs a certain amount of energy to do its work of pulling the weight of the cars from the beginning to the end.
2. Read about energy.
3. Build a roller coaster. Click through the tabs. Look at the pictures. Read the questions. Play around and make observations.
4. Another option is a toilet paper roll marble run. Try to make your marble go up a little at some point.
5. Explain your observations to your parents.
6. Play this roller coaster game if you can't build one.

Day 152

L

1. Draw a diagram of your (a) roller coaster. Put numbers on your diagram to show where the roller coaster was fastest and slowest. Write a 10 for the fastest and 1 for the slowest. Mark other places with 5, etc.
2. How did the fast places help in the slow places. Explain to a parent how speed and how high your roller coaster was effected how your roller coaster worked.

M

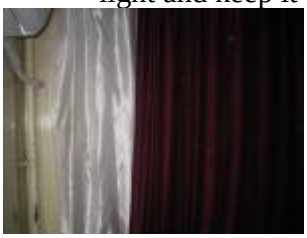
1. There is **potential energy** and **kinetic energy.** In what you read it was explained as energy stored and energy used.
2. Look at the picture toward the top of this page and read the caption about the ball and arrow.
3. Kinetic energy is the energy of an object in motion–the ball swinging or the arrowing flying through the air.
4. There is a formula to figure out the kinetic energy of an object. Physicists use this to figure out if their roller coaster will work. The formula is kinetic energy equals one half of the mass of the object times its speed squared. The equation looks likes this. KE = 1/2 mv^2 (.5 times mass times speed times speed)
5. Go to this page and try problems 1 and 2 at the bottom. You can use a calculator.

Day 153 (Materials for M: thermometer, marshmallow, candle)

L

1. Energy comes in lots of different forms. One form is heat.
2. Watch this video on heat and temperature.
3. Watch this video on heat energy.
4. Put two jars of water out in the sun (or glasses). Make sure they have the same temperature of water in them. If you have a thermometer, measure the temperature of the water and record it.
5. Wrap one jar in white paper. Wrap one jar in black paper.
6. In half an hour, feel the water in each jar. Which is hotter? (Measure the temperature if you can.)
7. Where did the heat come from?

8. Look at the picture below. It's of a room in my house. Behind the curtains are windows that go across the whole room. In the morning the sun comes right in those windows. I have a white curtain and a dark colored curtain. In the summer I have the curtains one way and in the winter I reverse them with the other on the outside next to the window. In this picture the white curtain is on the outside by the window and the colored curtain is on the inside. Think about the experiment. Why would I put the colored curtain on the outside by the window? In what season would I put the colored curtain by the window. Is it summer or winter when this picture was taken. Why? (answer: It is summer. In the winter the dark curtain is on the outside by the window to absorb the heat of the sun and bring that heat into the room. In the summer we don't want extra heat, so we put the white curtain on the outside to reflect the light and keep it cooler inside.)



M

1. Watch this video on heat and temperature.
2. Measure the air temperature about 10 cm. above the candle.
3. Light the candle and hold the marshmallow where you recorded the temperature.
4. Watch and observe the marshmallow.
5. Then record the temperature again in that same place.
6. What were your observations?
7. How did the heat from the flame effect the marshmallow without touching it?
8. Explain your observations.

Day 154

L/M

1. Watch these videos on radiation. Heat Radiation Heat Spectrum
2. The sun's heat got into the water through **radiation**.
3. Draw a diagram that shows something on earth heating up due to radiation from the sun.

Day 155

L

1. One interesting energy fact is that energy can't be created. All of the energy in the universe existed from the beginning of time. Our sun produces enough energy**every second** to meet the whole world's energy needs for 500,000 years. And our sun is small compared to other stars giving off even more energy. People guess there are about 100000000000000000000000 stars, all of which give off energy. That's an incredible amount of energy that all came into existence in an instant!
2. Read about lead
3. Cut out and fill in your lapbook piece.

M

1. One interesting energy fact is that energy can't be created. All of the energy in the universe existed from the beginning of time. Our sun produces enough energy**every second** to meet the whole world's energy needs for 500,000 years. And our sun is small compared to other stars giving off even more energy. People guess there are about 100000000000000000000000 stars, all of which give off energy. That's an incredible amount of energy that all came into existence in an instant!
2. Read about lead.
3. Watch a video about lead.
4. Cut out and fill in your lapbook piece.

Day 156

L

1. Read about heat transfer — heat moving from one thing to another.
2. How does heat transfer? (answer: from the hotter object to the cooler object)
3. Draw a picture of an ice cube in a glass of water. Use arrows to show that the heat is leaving the water and going to the ice. That's what is making the ice melt. The water cools down because its heat energy is leaving.
4. Make sure you put your picture in your binder.

M

1. Read about heat.
2. Take the quiz.

Day 157 (Materials for science: food coloring — make a colored ice cube for tomorrow)

L

1. Yesterday you read about **conduction**, when heat transfers from one object that is touching another object.
2. Try this conduction experiment. (Materials: butter or margarine; anything small to stick in it; wooden spoon, plastic spoon, metal spoon–spatula, etc. just something with a handle)

M

1. Read about **conduction**.
2. Watch this video example of conduction. You can try it if you have permission.

Day 158

L

1. Read about **convection**, another way heat is transferred.
2. Scroll down on this page to look at the moving diagram of convection.
3. Draw a diagram of convection heat. (You can cut out and glue on colored arrows if you like.)

M

1. Read about **convection.**
2. Try this convection experiment.
3. What's happening? The cold liquid is denser and moving through the warm liquid.
4. Describe how this is seen in convection air currents.

Day 159

L

1. Put on a science show about heat. Use your diagrams to teach your audience about the three different types of heat transfer. Quiz your audience to see if they learned what they were supposed to learn.

M

1. Review the three types of heat transfer.

2. Put on a science demonstration. Teach your audience about the three different types of heat transfer. Demonstrate them with visuals or by acting out what happens. Be creative. Be informative. Quiz your audience afterwards to see if they learned what they were supposed to learn.

Day 160 (Materials for L: 1 large size pizza box oven, Several feet of aluminum foil, 1 sheet black construction paper, 2 1/2 feet of clear plastic wrap, 4 feet of masking tape, 2 feet of string)

1. Cook pizza using the sun's radiating heat.

M

1. Read over this experiment, cook pizza using the sun's radiating heat. Either do this experiment or design your own oven and cook your own food. (Cook something that you can eat raw safely, like hot dog, pizza, s'mores.)

Day 161

L

1. The other day we used the sun as energy to cook. The earth is full of natural energy. People have been working to use this natural energy. One way that's been around for a long time is the water wheel. It uses the power of the water to do the work. Instead of burning coal to create steam to turn a magnet to create electricity. You can use a river's water to turn a water wheel, which can turn a magnet to generate electricity. Watch the video (at least part of it).
2. We can also use the power of waves and wind. Here are two little games to play just for fun to teach you about the different types of energy resources. Renewable means they can be used again. The wind and water never go away. Non-renewable means they get used up and are gone. Coal is non-renewable.

1. Games: Make useful energy Energy eaters

M

1. Watch this video on energy.
2. Take this quiz to *learn* more about how renewable energy is used.

Day 162

1. Do these elements flashcards. Choose more options. Choose 20 questions and select all of the elements you know about.
2. Play this science review game.

Day 163*

1. *Print out the first 2 pages *3 times each*. Play Go Fish. You only need 3 of each to get a set. Ask for the name, the symbol or any other info on the card to help you learn more about them.

Day 164

1. Choose an element from this set to learn more about. Choose one that you don't know anything about.
2. You can learn more about it here and here.
3. Teach your family all about it when you are done. Who discovered it? When? What does it look like? What is its symbol? What is it used for? What's interesting about it?

Day 165

1. Take this atom review quiz.
2. Make a quiz game for radiation, convection, conduction, energy, gear, wheel and axle, inclined plane, screw, wedge, pulley, lever
3. Give it a title. Follow the directions. Use these words for your ANSWERS. Use their definitions or descriptions for your "questions." You don't have to write questions.**Example: necessary to do work*energy**
4. **SAVE** by clicking the little computer disk in the bottom right corner (the first picture on the left). Wait. Then open the webpage. Then save the webpage address by bookmarking it. That's the only way you'll find your way back to it.
5. Play your game.

Day 166*

1. Your job for the last fifteen days of school is to make a science project. I recommend you pick a topic that you can use for your history project as well, and even English. That way you'll become an expert on the subject. The Panama Canal is one suggested topic. You could build a working model of a canal. On the history page on day 166 I listed some other ideas.
2. You are going to learn about the science and history of your topic. You are going to make a 3D project to explain or demonstrate your topic. If you want to make a poster about it, it has to contain 3D elements. On Day 180 you will present your project. You will show it to your family and/or friends and will tell them all about it, explain all about it and demonstrate it.
3. You also have to conduct at least one experiment related to your topic. If you can, do the experiment in front of the group. If you can't, explain the experiment and results. Here is an experiment worksheet and experiment book you could use.

4. Today choose a topic and do some research about what experiment you could do.

Day 167*

1. Do some research and learn about the science aspects of your topic. How does it work? Here are Research Note Taker sheets.

Day 168

1. Continue your research. If you think you are done, go explain to a parent how the science of your topic works. If you can't, learn some more.

Day 169

1. Continue your research. Is there any expert in the field that you could email and ask questions? That would be a great source of information!
2. When you are done your research, decide on what experiment or experiments you are going to do.
3. Also, you need to decide how you are going to present what you learned. It's gotta be 3D! What can you build to demonstrate your topic?

Day 170

1. Keep working on your project. Your assignment has four parts: research, 3D project, experiment (written up), demonstration

Day 171*

1. Keep working on your project. Print out this End of the Year Project checklist to make sure you are thinking about everything that needs to be done.

Day 172

1. Keep working on your project. Use your checklist.

Day 173

1. Keep working on your project. Use your checklist.

Day 174

1. Keep working on your project. Use your checklist.

Day 175

1. Keep working.
2. Make sure you have an experiment. Do you have all the things you need for it?

Day 176

1. Keep working. You should finish your project tomorrow.
2. Do your experiment.

Day 177

1. Finish your project.
2. Write down your experiment. You can use the worksheet or book or type it up. It needs to be displayed with your project. Make it look good!

Day 178

1. Use the checklist to make sure you did everything you are supposed to do. On day 179 you will write your bibliography. On day 180 you will present.
2. Today practice what you will say to explain your project. Write it down if that helps you. Practice saying it out loud.
3. Read over this grading sheet for presenting a project. You would want to score a 4 for every category. The last one is only if you are working together with siblings.

Day 179

1. Write your bibliography.

Day 180

1. Present your project and demonstrate your experiment.
2. Take pictures or videos, send them to me! I'll post them on the Hall of Fame page.
3. Here is some Edisonian inspiration to keep trying and learning new things during your break before you start Year 1.

Congratulations, You're done!