Book Unit for *Ben And Me* by Robert Lawson, 1939 Read aloud (2 hrs. 55 min

49 Vocabulary Words

Manuscript: a paper or document
Hoax: a trick or joke, not real
Lament: to moan, cry for or weep for
Ill-informed: not notified, unaware
Severity: harshness or difficulty
Encounter: to come across or an event
Disreputable: not respectable
Andirons: metal supports that hold up logs in a fireplace
Recollect: to remember
Succor: to help or comfort
Congest: to clog, block, or fill
Inclement: stormy or thunderous
Indulge: to spoil or treat
Unsanitary: unclean or unhealthy
Yokels: a person from the back woods who may be gullible
Surmount: to overcome or conquer
Procession: parade or march
Dissemination: to give out or spread
Maxim: a proverb or wise saying
Insomnia: a problem with sleeping
Idle: inactive or to not work or do anything
Almanac: a manual or book of information
Wit: humorous or funny
Contemptible: disgraceful or shameful
Ignorant: unaware or unintelligent
Lenient: soft, relaxed
Sufficient: plenty or enough
Rectify: to make right or mend
Manifestation: to demonstrate or show
Tarnished: flawed or discolored
Nuisances: a pest or irritation
Spectacle: a scene or demonstration
Deceit: dishonesty, scam, or trick
Incessant: never-ending, constant
Render: to make or turn into
Grievances: complaints or gripes
Solemn: sad, glum, or serious
Adjourn: to delay or put off
Quaint: old fashioned or strange
Thwart: to stop, block, or slow down
Aristocrat: a person of high power like the wealthy or royalty
Dissolute: poor, low, immoral

Gout: problem in the body that may result from too much eating or drinking that may make your feet or hands sore.
Uncouth: impolite or rude
Fickle: picky or fussy
Boisterously: active, energetic, and noisy
Frivolous: playful, perky, or loose
Innumerable: countless or untold
Exquisite: wonderful, very fine and delicate

Art Assignments (painted, penciled, chalk draw, etc.):

- Create the design for the hat of Ben's that Amos made additions to.
- Draw a picture of the scene when Ben Franklin is discovered by the townspeople after he takes a swim.
- Draw a picture of the scene when the governor gets a surprise during Ben Franklin's electricity demonstration.
- Create the diagram plans for what you think the kite coop and kite cart might have looked like.
- Create the diagram plans for what you think Sophia's house may have looked like in Madame Brillon's giant hair.
- Draw the funny new hairdo that Madame Brillon has in chapter 13.
- Make a shoebox scene when the young relatives of Amos are in Ben Franklin's new hat doing what they like to do.

Recreating the Scene:

Recreate the fighting scene from the point where the mice charge out of Ben Franklin's jacket to the point when Red says, "I am done, Amos." Allow the students to make the scene as dramatic and exciting as they can imagine. Use as many mice as possible.

Creative Writing:

- Rewrite the ending to the exciting mouse battle any way you choose except that John Paul Jones and his great army never come to save the day.
- Create another wild short adventure that Ben and Amos have in colonial times and this time Amos can look like the fool if you choose.

History topics:

- Write a report on the amazing Benjamin Franklin.
- Write a report on the Revolutionary War.
- Write a report on the French Revolution.
- Memorize the first part of the Declaration of Independence.

Science topics:

Write a report on lightning.
Static electricity.

You walk across the rug, reach for the doorknob and.....ZAP!!! You get a shock.Or, you come inside from the cold, pull off your hat and.....BOING!!! All your hair stands on end. What is going on here? And why does it only happen in the winter? The answer is:
STATIC ELECTRICITY

To understand what static electricity is, we have to learn a little bit about the nature of matter. Or in other words, what is all the stuff around us made of?

EVERYTHING IS MADE OF ATOMS

Imagine a pure gold ring. Divide it in half and give one of the halves away. Keep dividing and dividing and dividing. Soon you will have a piece so small you will not be able to see it without a microscope. It may be very, very small, but it is still a piece of gold. If you could keep dividing it into smaller and smaller pieces, you would finally get to the smallest piece of gold possible. It is called an atom. If you divided it into smaller pieces, it would no longer be gold.Everything around us is made of atoms. Scientists so far have found only 112 different kinds of atoms. Everything you see is made of different combinations of these atoms.

PARTS OF AN ATOM

So what are atoms made of? In the middle of each atom is a "nucleus." The nucleus contains two kinds of tiny particles, called protons and neutrons. Orbiting around the nucleus are even smaller particles called electrons. The 112 kinds of atoms are different from each other because they have different numbers of protons, neutrons and electrons. It is useful to think of a model of the atom as similar to the solar system. The nucleus is in the center of the atom, like the sun in the center of the solar system. The electrons orbit around the nucleus like the planets around the sun. Just like in the solar system, the nucleus is large compared to the electrons. The atom is mostly empty space. And the electrons are very far away from the nucleus. While this model is not completely accurate, we can use it to help us understand static electricity.

(Note: A more accurate model would show the electrons moving in 3- dimensional volumes with different shapes, called orbitals. This will be discussed in a future issue.)

ELECTRICAL CHARGES

Protons, neutrons and electrons are very different from each other. They have their own properties, or characteristics. One of these properties is called an electrical charge. Protons have what we call a "positive" (+) charge. Electrons have a "negative" (-) charge. Neutrons have no charge, they are neutral. The charge of one proton is equal in strength

to the charge of one electron. When the number of protons in an atom equals the number of electrons, the atom itself has no overall charge, it is neutral.

ELECTRONS CAN MOVE

The protons and neutrons in the nucleus are held together very tightly. Normally the nucleus does not change. But some of the outer electrons are held very loosely. They can move from one atom to another. An atom that looses electrons has more positive charges (protons) than negative charges (electrons). It is positively charged. An atom that gains electrons has more negative than positive particles. It has a negative charge. A charged atom is called an "ion."

Some materials hold their electrons very tightly. Electrons do not move through them very well. These things are called insulators. Plastic, cloth, glass and dry air are good insulators. Other materials have some loosely held electrons, which move through them very easily. These are called conductors. Most metals are good conductors.

How can we move electrons from one place to another? One very common way is to rub two objects together. If they are made of different materials, and are both insulators, electrons may be transferred (or moved) from one to the other. The more rubbing, the more electrons move, and the larger the charges built up. (Scientists believe that it is not the rubbing or friction that causes electrons to move. It is simply the contact between two different materials. Rubbing just increases the contact area between them.)

Static electricity is the imbalance of positive and negative charges.

OPPOSITES ATTRACT

Now, positive and negative charges behave in interesting ways. Did you ever hear the saying that opposites attract? Well, it's true. Two things with opposite, or different charges (a positive and a negative) will attract, or pull towards each other. Things with the same charge (two positives or two negatives) will repel, or push away from each other.

A charged object will also attract something that is neutral. Think about how you can make a balloon stick to the wall. If you charge a balloon by rubbing it on your hair, it picks up extra electrons and has a negative charge. Holding it near a neutral object will make the charges in that object move. If it is a conductor, many electrons move easily to the other side, as far from the balloon as possible. If it is an insulator, the electrons in the atoms and molecules can only move very slightly to one side, away from the balloon. In either case, there are more positive charges closer to the negative balloon. Opposites

attract. The balloon sticks. (At least until the electrons on the balloon slowly leak off.) It works the same way for neutral and positively charged objects.

So what does all this have to do with shocks? Or hair full of static? When you take off your wool hat, it rubs against your hair. Electrons move from your hair to the hat. Now each of the hairs has the same positive charge. Remember, things with the same charge repel each other. So the hairs try to get as far from each other as possible. The farthest they can get is by standing up and away from the others. Bad hair day!

As you walk across a carpet, electrons move from the rug to you. Now you have extra electrons. Touch a door knob and ZAP! The door knob is a conductor. The electrons move from you to the knob. You get a shock.

We usually only notice static electricity in the winter when the air is very dry. During the summer, the air is more humid. The water in the air helps electrons move off you more quickly, so you can not build up as big a charge.

LEARN MORE ABOUT: STATIC ELECTRICITY

TRIBOELECTRIC SERIES

When we rub two different materials together, which becomes positively charged and which becomes negative? Scientists have ranked materials in order of their ability to hold or give up electrons. This ranking is called the triboelectric series. A list of some common materials is shown here. Under ideal conditions, if two materials are rubbed together, the one higher on the list should give up electrons and become positively charged. You can experiment with things on this list for yourself

TRIBOELECTRIC SERIES

your hand
glass
your hair
nylon
wool
fur
silk
paper
cotton
hard rubber

polyester
polyvinylchloride plastic

CONSERVATION OF CHARGE

When we charge something with static electricity, no electrons are made or destroyed. No new protons appear or disappear. Electrons are just moved from one place to another. The net, or total, electric charge stays the same. This is called the principle of conservation of charge.

COULOMB'S LAW

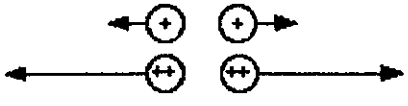
Charged objects create an invisible electric force field around themselves. The strength of this field depends on many things, including the amount of charge, distance involved, and shape of the objects. This can become very complicated. We can simplify things by working with "point sources" of charge. Point sources are charged objects which are much, much smaller than the distance between them.

Charles Coulomb first described electric field strengths in the 1780's. He found that for point charges, the electrical force varies directly with the product of the charges. In other words, the greater the charges, the stronger the field. And the field varies inversely with the square of the distance between the charges. This means that the greater the distance, the weaker the force becomes. This can be written as the formula:

$$F = k (q1 \times q2) / d^{**}2$$

where q is the charge, and d is the distance between the charges. K is the proportionality constant, and depends on the material separating the charges.

double the distance, force drops to 1/4



double the charge,
force increases by factor of 4

What is static electricity?

Everything we see is made up of tiny little parts called atoms. The atoms are made of even smaller parts. These are called protons, electrons and neutrons. They are very different from each other in many ways. One way they are different is their "charge." Protons have a positive (+) charge. Electrons have a negative (-) charge. Neutrons have no charge.

Usually, atoms have the same number of electrons and protons. Then the atom has no charge, it is "neutral." But if you rub things together, electrons can move from one atom to another. Some atoms get extra electrons. They have a negative charge. Other atoms lose electrons. They have a positive charge. When charges are separated like this, it is called static electricity.

If two things have different charges, they attract, or pull towards each other. If two things have the same charge, they repel, or push away from each other.

So, why does your hair stand up after you take your hat off? When you pull your hat off, it rubs against your hair. Electrons move from your hair to the hat. Now each of the hairs has the same positive charge. Things with the same charge repel each other. So the hairs try to move away from each other. The farthest they can get is to stand up and away from all the other hairs.

If you walk across a carpet, electrons move from the rug to you. Now you have extra electrons. Touch a door knob and ZAP! The electrons move from you to the knob. You get a shock.

Projects:

SAFETY NOTE: Please read all instructions completely before starting. Observe all safety precautions.

Tip: Try to use the part of the charged object that has the biggest charge (the part that was rubbed the most) when doing these experiments. Also, Projects 1-3 work best on dry days.

PROJECT 1 - Swinging cereal

What you need:

a hard rubber or plastic comb, or a balloon
thread, small pieces of dry cereal (O-shapes, or puffed rice of wheat)

What to do:

1. Tie a piece of the cereal to one end of a 12 inch piece of thread. Find a place to attach the other end so that the cereal does not hang close to anything else. (You can tape the thread to the edge of a table but check with your parents first.)
2. Wash the comb to remove any oils and dry it well.
3. Charge the comb by running it through long, dry hair several times, or vigorously rub the comb on a wool sweater.
4. Slowly bring the comb near the cereal. It will swing to touch the comb. Hold it still until the cereal jumps away by itself.
5. Now try to touch the comb to the cereal again. It will move away as the comb approaches.
6. This project can also be done by substituting a balloon for the comb.

What Happened: Combing your hair moved electrons from your hair to the comb. The comb had a negative charge. The neutral cereal was attracted to it. When they touched, electrons slowly moved from the comb to your hair. Now both objects had the same negative charge, and the cereal was repelled.

PROJECT 2 - Bending water

What you need:

a hard rubber or plastic comb, or a balloon
a sink and water faucet.

What to do:

1. Turn on the faucet so that the water runs out in a small, steady stream, about 1/8 inch thick.
2. Charge the comb by running it through long, dry hair several times or rub it vigorously on a sweater.
3. Slowly bring the comb near the water and watch the water "bend."

4. This project can also be done with a balloon.

What happened: The neutral water was attracted to the charged comb, and moved towards it.

PROJECT 3 - Light a light bulb with a balloon

You Need:

hard rubber comb or balloon
a dark room
fluorescent light bulb (not an incandescent bulb)

SAFETY NOTE: DO NOT USE ELECTRICITY FROM A WALL OUTLET FOR THIS EXPERIMENT. Handle the glass light bulb with care to avoid breakage. The bulb can be wrapped in sticky, transparent tape to reduce the chance of injury if it does break.

What to do:

1. Take the light bulb and comb into the dark room.
2. Charge the comb on your hair or sweater. Make sure to build up a lot of charge for this experiment.
3. Touch the charged part of the comb to the light bulb and watch very carefully. You should be able to see small sparks. Experiment with touching different parts of the bulb.

What happened: When the charged comb touched the bulb, electrons moved from it to the bulb, causing the small sparks of light inside. In normal operation, the electrons to light the bulb come from the electrical power lines through a wire in the end of the tube. (Fluorescent and incandescent light bulbs will be discussed in a future issue.)

PROJECT 4 - Static in the Summer

What you need:

a balloon, and a watch or clock

What you do:

1. Rub the balloon on your hair or sweater. Stick it to a wall and time how long it stays before falling down.
2. Repeat step (1) in the bathroom, just after someone has taken a hot, steamy shower.

What happened: In the bathroom, water in the air and on the walls helped move electrons away from the balloon more quickly. In the summer, the air is more humid, and static electricity does not build up as much as during the winter, when the air is very dry.

Questions for Discussion (with teacher while reading, in groups, as homework, etc.):

1. What years were considered the colonial period?
2. How can the accounts written by historians be different then the one written by Amos?
3. Why is it funny that Amos describes his family to be "...as poor as church mice..."
4. Explain "...waste not want not..."
5. Name and describe the occupations of Benjamin Franklin.
6. Do you think Ben Franklin needed all of the metal and parts that he brought in to the room to make the franklin stove?
7. Why did Ben put sand and bricks under the stove instead of wood or more metal?
8. Explain "...the laborer is worth his hire..."
9. Does it surprise you to hear that one founding fathers of our country liked to jump and splash in the river? Why or why not?
10. Explain "...the cat in gloves catches no mice..."
11. Whose fault was it that the boats in the harbor ran aground?
12. What was Ben Franklin really doing when he says, "...always insist on the genuine and accept no substitute..." and, "...which has never been questioned..."
13. Whose fault was it that the electrical display created so many problems?
14. Are lightning and electricity the same thing?
15. Why did Ben not claim to have invented the lightning rod?
16. Do you think it was a good idea to keep Amos in the kite without the permission of Amos? Explain.
17. Define compromise and explain what this has to do with the end of chapter eight.
18. How does a lightning rod work?
19. What was the name of the war that started in chapter nine?

20. Why would France want to help the colonies?

21. Would you describe Ben as very social? Why or why not

22. Explain "...fools make feasts and wise men eat them..."

23. Like Sophia's family, what kinds of things upset people in Europe so much that they would move across the Atlantic Ocean?

24. What similarities are there between the French Revolution and Sophia's situation and the war that followed?

25. Why was Amos upset with Ben just before the mouse fight?

26. Why is it funny that Ben looked for fireworks at the return to America?

27. Explain the difference in the relationship between Ben and Amos at the refusal to sail to France and the part where Amos gives Ben the hat.

28. Did Amos enjoy the lyrics of the song Sophia sung to Ben? Explain your reasoning.

29. Do you think that Ben Franklin was anything like the Ben Franklin in the book? Explain.

30. God gave Ben Franklin many blessings, what blessings has he given you?