**Lesson 1 – Session 1 (Part 1) (45 minutes)**

1. Page 61 – “Engage”

40 minutes

* + Formative Assessment:
    - “Energy is Everywhere!” worksheet (problems 1-5 only), or something similar (i.e. K-W-L, Think-Pair-Share, Anticipation Guide, etc.).
  + Discuss the ideas of “Energy in Action” and “Stored Energy.” Go over the terms on the “Vocabulary Wall.”
    - Have students work alone or with neighbors to complete the T-Chart on their worksheet.

1. Introduce the Technology integration for this lesson: “Energy Collage.”

5 minutes

* + The directions are at the bottom of the worksheet. They will be searching for images on clipart.com or in magazines that can be sorted into two categories: “Energy in Action” and “Stored Energy.”

**Lesson 1 – Session 1 (Part 2) (60+ minutes)**

1. Not in Teacher’s Manual – “Technology Integration”

60+ minutes

* + Teach the following technology skills:
    - Sign in using their student sign-ons.
    - Make three new folders on the desktop.
    - Name the folders:
      * Energy in Action
      * Stored Energy
      * Both
    - Open Microsoft Word.
      * Title the top “Energy is Everywhere!” (size 36 font)
      * Subtitle it “An energy collage by (Name)” (size 16 font)
      * Bold and underline both the title and subtitle.
      * Hit two returns after the subtitle so images are not bunched up against the title.
      * Save the document as “Energy Collage.”
    - Open Firefox and go to schools.clipart.com.
      * Username: westudent
      * Password: 25student
      * Search for images of energy in action and stored energy. Try to use search terms that are more specific than “energy in action” and “stored energy” (i.e. batteries, runner, windmill, etc.).
      * Drag images from the website onto their Energy Collage in any order.
    - Once all images are on the page (or they’ve run out of space), they can print to the color printer or save it as a PDF and upload it to their ePortfolio.
      * Use artsy scissors to cut the four sides off of their collage.
      * Mount collages on construction paper frames.
      * Save them for discussion during the next session.

**Lesson 1 – Session 2 (45 minutes)**

1. Page 62 – “Reflect and Discuss”

45 minutes

* + Share collages as a whole class.
  + Discuss any images that were hard to classify into the three categories.
  + Display the collages in the hallway or on a bulletin board in the classroom.

1. Page 63 – “Synthesizing”
   * Discuss the search for images. What was easy/hard?
   * Discuss how energy is everywhere!
   * Display the overhead transparency: “Energy Talk.”
     + Allow students time to read the cartoon bubbles.
     + Challenge them to come up with additional examples of how people use the term “energy” in conversation.
2. Explain the Science Center (if you choose to have one).
3. Hand out the Parent Letter.
4. Exit Cards or Journal Entry:
   * Where is energy found?
   * Why is energy important?
5. After class: Grade Energy Collages using Rubric 1/Criterion A.

**Lesson 2 – Session 1 (Part 1) (60 minutes)**

1. Page 71 – “Explore”

15 minutes

* + Group kids into 8 groups.
  + Hand out energy cards, 3 paperclips, and a pad of small Post-Its.
  + Have the kids write the following categories on Post-Its: “Energy in Action,” “Stored Energy,” and “Both.” Meanwhile, draw a Venn Diagram on the board and label each part.
  + Have them do a “Quick Sort” where groups put each card into one of the three categories: “Energy in Action,” “Stored Energy,” or “Both.”
    - Everyone needs to agree on a placement before it is decided. If there is polite disagreement, a discussion needs to take place.
  + Clean up by putting cards in bags with paperclips and Post-Its. Let kids know, that we will use them again during the next lesson.

1. Pages 196-199 – “Skill Building Activity 1”

45 minutes

* + Go over the new Vocabulary Wall words (yellow posters).
  + Do the Skill Building Activity: “SRB: Reading Science Books” Lesson.
    - Hand out the textbooks (make sure student numbers are inside). If you want, also hand out their Science Notebooks.
    - Allow them time to Preview the text and do all Before Reading Strategies. They may discuss it with their tables.
    - Let the class know that this book (like most nonfiction books) has patterns in the way it presents information.
      * Ask students to find those patterns.
      * “Once you find the patterns, it will become easier to understand what you read.”
    - As a whole class, find all of the text features (i.e. chapters, headings, subheadings, Table of Contents, vocabulary words, reference tools, visuals, Appendices, Index, Glossary, etc.). (They are clearly defined on pages 196-197.)
      * Discuss each and define them or explain their purpose.
    - “Turn to today’s reading (pages 1-12).”
      * “Predict what the section will be about.”
      * “How do you know that?”
      * “How is it related to what we are learning?”
      * “What do you think the author’s purpose is in this reading?”
      * “Always do this before beginning to read a textbook chapter. It improves comprehension.”
    - Go over “During Reading Strategies” on page 198.
  + “Read Textbook pages 1-12, but while you do, write down one strategy that you used while reading to help understand the material.”
    - Share strategies used.
  + Show how these specific categories might fit under the “Energy in Action” category or the “Stored Energy” category or both using the Venn Diagram on the board. Use the answers on pages 72-73 to help.

**Lesson 2 – Session 1 (Part 2) (45 minutes)**

1. Page 70 – “Engage”

20 minutes

* + Hand out the energy cards that are paper-clipped and labeled with Post-Its in a bag.
  + Have the kids label eight new Post-Its and then sort the cards according to the eight forms of energy taught in the previous lesson.
    - Kids should keep track of which cards may fit into multiple categories.
    - If students finish early, have them discuss how the objects in their Energy Collages fit into the eight categories.

1. Page 72 – “Reflect and Discuss”

20 minutes

* + Have groups report to the class on how and why they sorted the cards the way they did.
  + Ask:
    - What did this activity reveal to everyone about energy?
    - Does energy exist in just one form, or many?
    - Did some cards seem to fit in more than one group? What does this mean? Do some things contain more than one form of energy?
  + Show the children the answers (pages 72-73) on the overhead (with the transparency cards). Do this by showing the four cards and having the class tell you the name of the energy form.

5 minutes

1. Hand out the Family Link Homework “Energy Log” (Teacher Master 30).
   * Explain directions.
   * It is needed for the next session, so assign a due date.

**Lesson 2 – Session 2 (60 minutes) (Need Parent Volunteers)**

1. Page 74 – “Explore”

50-60 minutes

* + Go over homework – “Energy Log.”
  + Explain the “Energy Walk” that they will be doing next.
    - They will be looking for as many examples of different forms of energy as they can find.
    - They will each need their Science Notebooks, a pencil, and one digital camera per group.
      * They will record their answers on pages 2-3 in their Science Notebooks.
      * They need to take photographs of the examples that they find during their walk.
        + Take turns and help each other.
        + Photos should be close-ups to avoid having to crop images, but not so close that it is blurry.
        + Once they have three photographs for a category, they don’t need any more for that category.
    - It is very important to look for examples of each type of energy forms, not just several of the same kind.
    - Assign an adult to each group and tell them where to start their walk. Encourage them to walk around the school (inside and out) and return to the classroom at a specific time.
    - Groups should try to avoid each other if possible, so they don’t end up combining.
    - Group leaders can assist or give ideas, but children need to be the ones to find most of the examples.
    - Group leaders should review photos to make sure each came out.
    - Go over behavior expectations.
    - Group children into 4-8 groups (depending on number of adults and digital cameras). Then, send them off!

1. If students finish early, they should spend extra time in the classroom looking for more examples, especially those they didn’t find outside of the classroom (i.e. elastic or gravitational, etc.). If necessary, they may pose for some staged shots.
2. If there is time, debrief a little, just to provide closure (more to come in the next lesson).
3. In order to return any borrowed cameras or SD cards, get the kids to download the photos to iPhoto and delete the pictures on the card. Make sure it is done in their “Other” accounts so that the pictures aren’t lost.

**Lesson 2 – Session 3 (2 Days) (120 minutes)**

1. Pages 74-75 – “Reflect and Discuss” (and Technology Integration)

120 minutes

* + Go to the LMC.
  + Get into groups from the Energy Walk and have the digital camera and everyone’s Science Notebooks.
  + Teach the class how to download the photos from their cameras onto their computers (or do it yourself ahead of time).
  + Teach the class how to use Keynote to make a digital Energy Wheel (use the Template entitled, “Energy Wheel.key”).
    - Label each of the eight sections with the name of a form of energy by inserting a text box. It might be best to place it outside of the Energy Wheel.
    - Choose three images to place into each wedge.
      * Images chosen should be thought-provoking or unusual examples (if possible).
      * If images fit into more than one category, it is best to use each image only once.

1. It should be necessary to need another lab day to finish these. Plan for a second day. If students finish early, they may choose to research energy-related events or scientists and create a digital newspaper to report on it. They may share these with others when they are finished.
2. When everyone is finished, invite groups to share their Energy Wheels with each other.
3. Have a group discussion:
   * Where is energy found? [*Everywhere!!!]*
   * What forms of energy are easiest to notice?
   * Which ones are hardest to notice?
   * Do some items possess more than one form of energy? Which ones?
   * Why is energy important?
4. Assessment:
   * “Lighting up the Sky” writing piece and “What is Energy?” Quick Check. (Assessment Book – pages 30, 40, 50, and 51).

**Lesson 3 – Session 1 (60 minutes)**

1. Page 85 – “Engage”

15 minutes

* + Solar Propeller Demo.
    - Don’t explain it, just show it.
    - Try different things to see if it still will work.
    - Discuss where the energy comes from and where it doesn’t come from.
  + Vocabulary Wall: “Energy Transfer”
    - Tell them how this week, they will be observing energy transfers using toys!!!

1. Pages 86-87 – “Introductory Discussion”

20 minutes

* + As a class, analyze the components of the solar panel and fan.
    - What forms of energy are apparent here?
    - Does energy change from one form to another? In what order?
    - Use the overhead transparency to write the answer the way you want the kids to write their answers. Have the kids write it in their science notebooks (page 4) at the same time.
      * Answer: **Light energy** from the light bulb travels through the air to the solar cells in the solar panel, and is *transferred* into **electrical energy**.
      * The **electrical energy** travels through the wires to the motor, where it is *transferred* into **motion energy**.
    - If you want to take the time, have students come up and map other energy transfers on the overhead (otherwise do the hammer/nail example teacher-led). Try to explain what to do if it has alternative interpretations.
      * Hammer driving a nail: Gravitational energy to Motion energy. Or chemical energy (energy inside us) to Motion energy. Sound energy should also be included.
      * There isn’t always only one way to answer a problem!

1. Page 87 - Have kids read Chapter 2 of the textbook.

25 minutes

* + Have kids take notes in their Notes Spirals. Ask them to include the important concepts that might be what a teacher would put on a test.

**Lesson 3 – Session 2 (60 minutes)**

1. Page 88 – “Explore”

5 minutes

* + Go over the directions for visiting all of the stations.
    - Carefully, take turns playing with the toy at your station (1-2 minutes). Don’t be a “toy hog!”
    - Now, discover and analyze how this toy works. Really watch what is happening! Operate the toy and figure out what kinds of energy transfers make the toy work.
    - Create a map of those transfers with the group in your science notebook on pages 5-10. In order to do this successfully, it is important that you have a discussion and really analyze it. Let everyone talk and listen to each other!
      * Remember to fill in the name of each toy at the top!
      * Use the Vocabulary Wall or the Glossary in the science notebook if needed to remember the descriptions of each energy form.
  + Describe how groups will rotate between each station.

1. Divide the class into 13 partnerships (one for each station).

53 minutes

* + Direct each partnership to their appropriate starting station as you pick sticks.
  + Allow them to start. Start a timer that divides up the remainder of the period into 13 blocks of time (with time for rotating and closing the lesson). Clean up time may also be necessary.
    - Listen to the conversations and take notes for assessment purposes. You can revisit these topics during the next period.

1. Send home the Family Link “Toy Box Science.” They will apply this process to a toy of their choice at home.

2 minutes

* + Announce that this is due by the next science session.

**Lesson 3 – Session 3 (Day 1) (60 minutes)**

1. Page 89 – “Reflect and Discuss”

7 minutes

* + Have the class take out their science notebooks and open to pages 5-10.
  + Discuss their experiences from the last session.
    - What was their favorite toy? Why?
    - Which toy was most difficult to figure out? Why was it hard to figure out what kinds of energy transfers made this toy run?
    - When was it most clear that energy was being transferred? What made it so obvious?
    - See the rest of the questions in the teacher’s manual page 89.

1. Page 90 – “Synthesizing”

8 minutes

* + Have the class reflect on the exploration and answer the following questions to reach the conclusion that every time something happens, energy is being transferred:
    - Can energy make something happen without being transferred?
    - What observations support your answer?
  + Brainstorm energy transfers outside of the classroom. Have kids share their homework from last session, remember what they read in the textbook, and brainstorm more.

1. Not in the Teacher’s Manual – “Technology Integration”

45 minutes

* + Go over the answers to each toy. Most toys have several correct answers.
    - Have partnerships from yesterday sit together for this activity. They need their science notebooks.
    - Have students use the MimioVote to tell you if they got the answer right for each toy.
    - This will help for the next session.

**Lesson 3 – Session 3 (Days 2-5) (142 total minutes)**

1. Not in the Teacher’s Manual – “Technology Integration”

7 minutes

* + Choose new partnerships.
  + Assign each partnership a toy.
    - If you want to, choose groups that got the answer right for that toy.
  + Explain that students will be creating videos that explain the energy transfers that they mapped for a given toy.
  + We will use Garage Band, Photo Booth, and/or iMovie.
  + These will be put onto the classroom website for families to watch.
  + Explain that this lesson will be completed during “Stations, Small Groups, etc.” time.
  + They will have 60 minutes to prepare for their video, gather their props, and write their scripts (or what they will say approximately).

60/30/45 minutes

* + They will have 30 minutes to record their video.
  + They will also have two 45-minute periods to edit and save their recordings in iMovie.
  + Directions will be posted online.

1. Not in the Teacher’s Manual – “Technology Integration”

0 minutes

* + During each partnership’s station time, students will follow directions (see website: [www.sd25.org/~psolarz/page15/page15.html](http://www.sd25.org/~psolarz/page15/page15.html)).
  + If any editing is needed, students need to use one of our video editing programs.
  + Once all recordings are finished, transfer them to a single spot for students to be able to edit them on iMovie.
  + Once all recordings are edited and saved, put them onto the classroom website for families to see!

**Lesson 3 – Session 3 (Day 6) (60 minutes)**

1. Page 92 – “Extending the Lesson”

15 minutes

* + Demonstrate the chemical-to-heat energy transfer that occurs when baking yeast and hydrogen peroxide are mixed during “Station time.”
    - **Use safety goggles during this lesson.**
    - Have students use the temperature probes to measure the heat given off during this reaction.
    - See notes on page 92 for specific directions.

**Lesson 5 – Session 1 (50-60 minutes)**

1. Page 121 – “Engage”

10 minutes

* + Volunteer puts hand near a turned off light bulb.
    - How do their hands feel?
  + Volunteer puts hand near a turned on light bulb.
    - How do their hands feel?
      * How did their hands get warm?
      * What did the light bulb do to their hand?
  + What is heat?
    - If you add heat to an object, what happens to it?
    - Does heat move?
    - Is heat a form of energy?
  + Heat moves from warmer objects to colder objects.
    - How do we know when something is gaining heat?
      * Thermometers

1. Page 122 – “Introductory Discussion”

5 minutes

* + The bag and the bottle both contain the same amount of water, but the water in the bag is warm and the water in the bottle is cold.
  + What might happen if we put the bag into the bottle?
    - Let’s explore what happens when objects with different temperatures come into contact with each other.
    - Do page 16 in your Science Notebook.

1. Page 123 – “Explore”

35-45 minutes

* + Go over pages 16-18 in their Science Notebooks
    - Any questions?
  + Assign groups and get into them.
  + Assign roles:
    - Timer
    - Data recorder
    - Data reader(s) (one for each thermometer)
  + Kids need to get their materials:
    - 2 thermometers per group
    - Plastic cup
    - Cold & warm water
    - Soda bottle
    - Permanent marker
    - Plastic bag with red food coloring added
    - Stopwatch
  + Fill out table.
  + If they finish early, they should read chapter 4 in their SRB’s.

**Lesson 5 – Session 2 (45 minutes)**

1. Page 124 – “Explore”

35 minutes

* + Graph the data on [www.createagraph.com](http://www.createagraph.com).
    - Choose a line graph.
    - Walk students through all of the labeling of axes, etc.
    - If they finish early, they should read Chapter 5 in their SRB’s.

1. Page 125 – “Sharing”

5 minutes

* + See the page for questions to discuss.

5 minutes

1. Page 126 – “Synthesizing”
   * See the page for questions to discuss.

**Skill Building Activity 4 – Session 1 (45 minutes)**

1. Page 227 – “Engage”

40 minutes

* + Select two balls to bounce.
    - Predict which will bounce higher.
  + Bounce both balls, but purposely make the test unfair.
    - Discuss its fairness.
  + Discuss elements of a fair test:
    - Discuss variables and how only one should change each test.
      * (see page 229 for examples)
    - Write clear procedures so that the test can be replicated.
  + Do these with the ball bounce activity.
    - Brainstorm variables for this activity.
    - Write a procedure for the experiment.
  + Hand out the “Setting up a Fair Test” packet.
    - Put kids into partnerships.
    - Assign a variable to each group.
      * Have kids follow the procedure on page 230 to do their experiment.

1. Page 231 – “Sharing”

5 minutes

* + Share results as a class.
  + What did you learn about variables?
    - Change only one at a time.
  + What did you learn about conducting a fair test?
    - It needs to be organized/planned effectively.
  + Use the “I Wonder” Circle to point out all of the processes used in class.

**Lesson 6 (75 minutes)**

1. Page 136 – “Engage”

15 minutes

* + Show students the rods & describe their properties/make-up.
    - Pass rods around.
    - Examine and note observations in science notebook (pg. 22).
  + We will use these rods to determine whether heat energy transfers at the same speed through different materials.
  + Go over new definitions (2 new definitions) (Avoid conductor/conduction, etc. until later).
  + Do the materials matter? Will heat transfer more quickly in one of these objects?
    - What variable should we change if we want to find out whether heat energy transfers at the same speed through different materials?
    - What variables should not be changed during this investigation? (possible answers on 137)

1. Page 137 – “Explore”

30 minutes

* + Prepare to demonstrate the lesson.
  + Explain each step as you set up.
  + Have kids do page 22 in their science notebooks while watching.
    - Have them predict which rod will make the butter melt fastest.
    - Remind them to have a reason for their prediction – they should think about their background knowledge on each material.
  + Demonstrate the lesson.
  + Explain each step as you go.
    - Students will test their predictions.
  + Discuss variables:
    - Should each butter pat be the same size?
    - Does it matter where on the rod I place the butter? Why?
    - Why will chilled butter help us answer the question?
  + Use the online stopwatch to keep track of time for this demo.
  + Kids record data on page 23 of science notebook.
    - Announce when butter slides down, time, type of rod.
    - Let a volunteer feel if the rod was warm/cool, etc.
  + Fill out page 24 when demo is over.

1. Page 140 – “Reflect and Discuss”

10 minutes

* + Go over page 140 with the class.
  + Go over new definitions (4 new definitions).

20 minutes

1. Partner students up and have them read Chapter 6 to help synthesize the information learned in today’s lesson.

**Lesson 7 – Session 1 (60 minutes)**

1. Page 150 – “Engage”

8 minutes

* + Review “conductor.”
    - Metal spoon vs. Wooden spoon in hot soup.
      * Why metal spoon gets hotter?
        + Better conductor
        + Heat transfers more easily through metal
      * Might anything do the opposite? Slow down heat transfer?
        + Don’t give answers here.
  + Introduce “insulator.”
    - Clothing is an insulator of heat energy.
    - Read/discuss questions (#3 on page 150).
  + Our experiment will be to try to keep the heat energy inside our plastic bottles filled with warm water.
    - We will be answering: “Do some materials slow the transfer of heat energy better than others?”

1. Page 151 – “Explore”

40 minutes

* + Distribute materials.
  + Direct attention to the container filled with ice water.
  + Let students examine possible insulator materials.
    - Ask students when they have seen each material used in the past. Are any used for insulation purposes?
    - Predict how well each will slow heat energy transfer, and write these predictions on **page 25** of their science notebooks.
  + Assign each group one material.
  + Give them enough material to form one layer around their bottle.
  + Refer to pages 26-28 in their science notebooks.
    - Review how to record their data.
  + Discuss variables, controls, etc.
    - Students: Identify one variable that will change.
    - Students: Identify some variables that won’t change.
    - Students: What is the control?
      * I will have a bottle with no insulation being tested.
    - What if we didn’t have a control?
  + Do the experiment!
    - Measure the temperature of the water in the bottle.
      * Use an old-fashioned thermometer so it can stay inside the bottle for the experiment.
    - Place the bottle inside of a Ziploc bag.
      * Seal it carefully and remove all of the air inside.
    - Complete page 29 on the projector with the control bottle, as the kids experiment.
    - Students: Calculate the change in temperature for page 28.

1. Page 153 – “Sharing”

12 minutes

* + Overhead Transparency: “Exploring How Well Different Materials Slow Heat Energy Transfer.”
  + Discuss page 29 reflection question.
  + Compare predictions from page 25 with the results.
  + Speculate about other materials.
  + Partner students up and have them read SRB pages 69-82.
  + Distribute Family Link: “Criteria for Insulators.”
    - Go over these criteria with the children.
    - ADD: All materials must fit inside the Ziploc bag.
    - Have kids bring in materials from home.

**Lesson 7 – Session 2 (30-40 minutes)**

1. Page 154 – “Explore”

30-40 minutes

* + Display materials from class and from home.
  + Go over pages 30-31 in Science Notebooks.
  + Divide class into eight groups of 3-4.
    - Give 25 minutes to plan, design, and assemble their insulated bottles.
    - Each group member needs to fill out their science notebook pages.
    - I need to approve their designs before they build them.
    - If they make any changes to their design, they must change their drawings as well.
  + Have groups store their bottles in the gallon size bags until next session.

**Lesson 7 – Session 3 (60 minutes)**

1. Page 155 – “Explore”

30 minutes

* + Groups test their bottles in ice water using temperature probes.
  + Kids complete page 32 as they do the experiment.
  + Have a control bottle (could be done by kids/parents?).

1. Page 156 – “Sharing”

20 minutes

* + Groups display and explain their insulator bottle to the class.
    - Look at data on the board (line graph).
    - What material was most effective?
    - Kids complete page 33 in their science notebook.

1. Page 156 – “Synthesizing”

10 minutes

* + Go over questions on page 156 with the class.

**Lesson 9 – Session 1 (45 minutes)**

1. Page 184 – “Engage”

45 minutes

* + Look at pages 148-149 in SRB.
  + Look at overhead of “Automatic Sunscreen Applicator & Alarm”
    - Discuss each step.
    - Identify energy transfers at each step (see answers on Teacher Master).
  + Compare and Contrast invention with a more typical household machine like a toaster.
    - See points to make on page 184 (#3).
    - “What makes an inventive mind?”
      * Read quotes in margins on pages 114-119 of SRB.
  + Read page 121 together.
    - “Which is your favorite?”
    - “Why?”
    - “How do you think it could be made?”
  + Explain Family Link: “My Invention.”
  + Read pages 113-120 in SRB.

**Lesson 9 – Session 2 (60 minutes)**

1. Page 185 – “Explore”

60 minutes

* + “If you would like to design your chain reaction invention alone, raise your hand. You may not change your mind later.” Take out those sticks from the can. Pull sticks for the rest to form partnerships.
  + Kids should discuss their ideas with each other.
  + Go over page 38 in science notebook.
    - Make sure students understand the goal, know what types of parts they should and should not include, and are aware of the guidelines they need to follow.
  + Circulate – do students know what they will be making? If not, suggest one of these:
    - Keep a pet’s water bowl full
    - Make buttered toast
    - Turn off the water when the tub is full
  + Have students explain how their invention will work to me.
    - Review checklist on page 39 and have them complete 40-41.
  + Encourage discussion.

**Lesson 9 – Session 3 (35 minutes)**

1. Page 186 – “Explore”

35 minutes

* + Give these materials to each student:
    - Chart paper
    - Colored pencils, markers
    - Ruler
  + Have them complete page 42 in science notebook.
  + Use the rest of the time to illustrate the invention based on their descriptions.

**Lesson 9 – Session 4 (20 minutes)**

1. Page 187 – “Sharing”

20 minutes

* + Have each group share their invention with the class.

1. Page 187 – “Synthesizing”
   * Reflect on this lesson and on the entire unit.
     + Ask questions on page 187 in Teacher Manual (#1-2).
   * I would skip the part about making another Energy Wheel.