



***Global Energy: The Musical  
Teacher Guide***



Stepping Stones Museum for Children

### **Global Energy The Musical Teacher Guide**

If you have any questions regarding  
*Global Energy The Musical*, please contact:

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# Introduction

## Help Conserve Energy!

**Stepping Stones** Museum for Children invites you to create and submit a play wherein the characters learn about energy and energy conservation. Your submissions will be reviewed as possible content for *Global Energy: The Musical* 2013 script!

As they explore where energy, this thing that comes out of the wall and powers our televisions, games and household appliances comes from, they meet a series of whacky characters who tell, dance and sing stories of the caveman's discovery of fire, the awesome powers of wind and sun energy, the dangers and damage caused by global warming, the meaning of carbon footprint and the need for and ways of energy conservation.

### Area Objectives

- To introduce what energy is
- To explore renewable and non-renewable sources of energy
- To investigate energy production and consumption around the world

### Primary Topics

- Science of Energy
- Energy Sources
- Energy Uses at Home and around the world

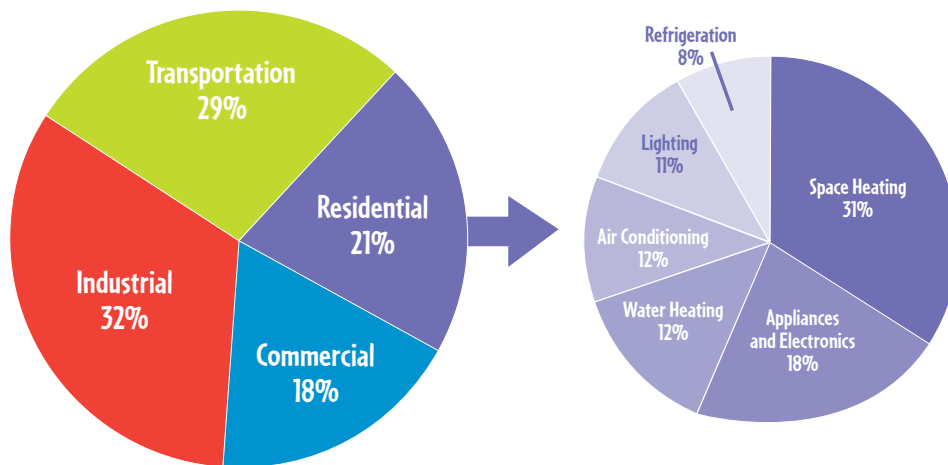


# Energy and Conservation Content

## What is energy?

Energy is the ability to do work and is something we use every day. Energy is all around us and is found in many different forms, such as light, heat, sound and motion. The food we eat makes our bodies work, gas helps our cars move and electricity powers up our homes.

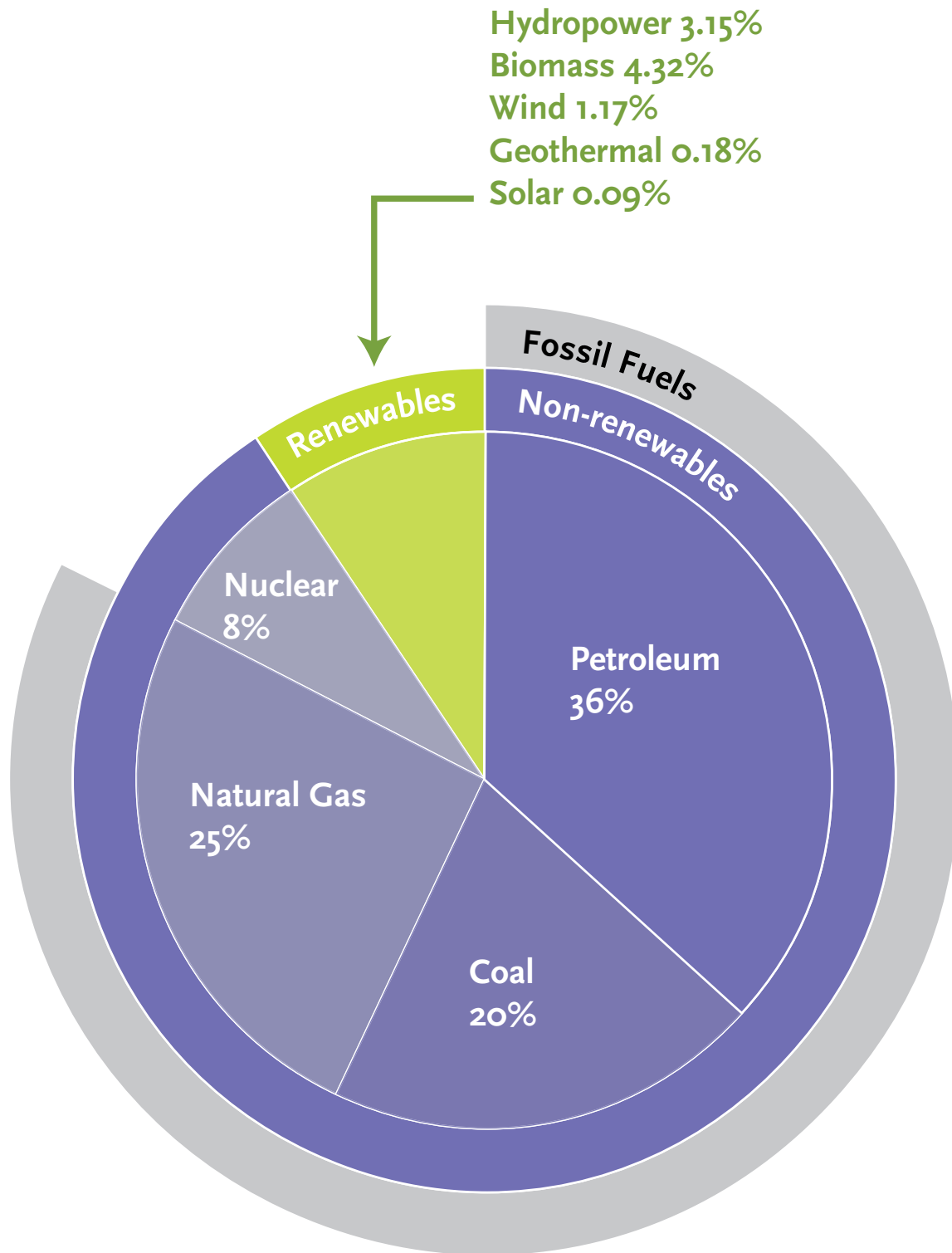
At home, heating and appliances use the most energy.



All of the energy we use can be put into two groups: non-renewable and renewable. **Non-renewable resource** means that the energy source that cannot replenish quickly. **Renewable resource** is an energy source capable of being replaced quickly by natural cycles

Where does energy come from? Most energy comes from the sun. Energy from the sun reaches the earth everyday.

# Energy Consumption in the United States





# Non-renewable Energy

Most of the energy we use comes from non-renewable sources. They take a long time to form and don't replenish quickly. It's important to conserve them so we don't run out. 91% of the energy we use every day comes from non-renewable sources such as oil, natural gas, coal and nuclear.



Oil



Natural Gas



Coal



Nuclear

## Fossil Fuels

Oil, natural gas, and coal are non-renewable sources and are fossil fuels. They come from buried remains of plants and animals that lived millions of years ago –when the dinosaurs were around.

**Oil** The gas we use to power vehicles comes from oil. Oil is also called petroleum—oil from the earth.

**Natural Gas** Natural gas is pumped from underground to storage areas through pipelines. It's odorless, so a smelly chemical is added to make it detectable.

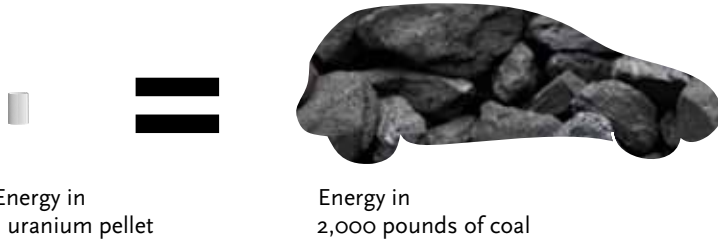
**Coal** More than 90% of coal is used for generating electricity. We mine coal from the ground.



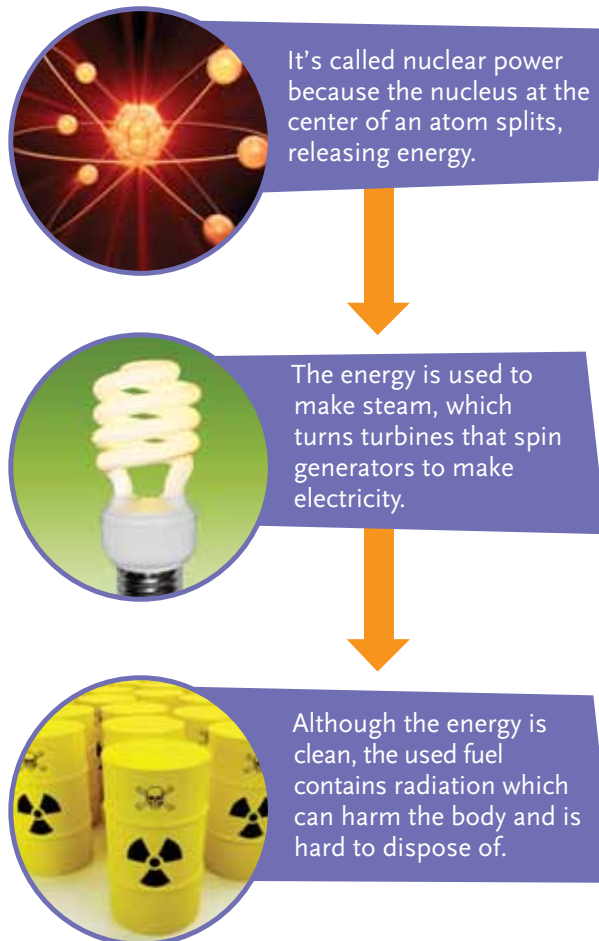
*Burning fossil fuels releases gases that heat up the planet and pollute the air. Removing fossil fuels from the ground also disturbs land and ocean habitats. It's important to save energy so we don't run out of non-renewable sources.*

## Nuclear Energy

Nuclear energy is energy in the nucleus of an atom. The energy is released when an atom splits and is used to make electricity. Uranium is nuclear fuel. It's mined from deep in the earth and used in nuclear power plants to make electricity. One uranium pellet contains as much energy as 1 ton (2,000 pounds) of coal.



## How Nuclear Energy Works



# Renewable Energy

Sun, wind and moving water contain energy. Most renewable sources are clean energy sources. They don't release pollutants into the air— better for our health and the planet. 9% of all the energy we use comes from renewable sources, such as biomass, geothermal, water, wind and solar. These sources replenish quickly. We can use them over and over and they won't run out. 150 years ago, 90% of all our energy came from renewables! Some renewable sources of energy are called clean energy—they don't pollute. They're better for the planet and our health. Small things, like turning off lights when you leave a room and walking to school save energy and keep resources available for the future. Choosing clean, renewable sources of energy also saves energy. Biomass, hydropower, geothermal, wind and solar are renewable sources.



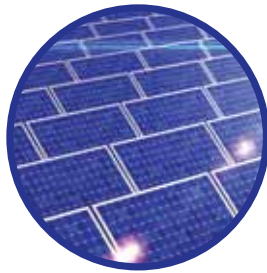
Wind 1.17%



Hydropower 3.15%



Geothermal 0.18%



Solar 0.09%



Biomass 4.32%

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**Solar Energy**

Energy from the sun is called solar energy. It's renewable which means it replenishes quickly and won't run out.

Solar photovoltaic (PV) cells change sunlight into electricity. Solar panels contain many PV cells.

*Did you know?* We use solar panels on homes and buildings and in calculators and road signs.

*How a Photovoltaic Cell Works*

1. The sun's energy causes electrons to travel to the top layer.
2. Electrons travel to the outside circuit, carrying electrical energy.
3. Electrons flow through the bulb, lighting it.
4. Electrons travel back to the bottom layer, completing the circuit.

*Other Effects*

The sun also causes weather. When it warms some parts of the earth more than others, it creates wind and storms. We can use energy from the sun to heat rooms and to produce electricity which makes light bulbs, televisions and refrigerators work.

**Wind Energy**

Moving wind turns turbine blades that spin a generator to produce electricity.

*How Wind is Made?* Warm air rises, cool air replaces warm air and creates wind.

**Hydropower**

Moving water turns turbine blades to spin a generator to make electricity.

Hydropower is clean energy. It doesn't pollute the water or the air, so it's good for our health.



*Big dams can be harmful to fish and other wildlife. Low-impact hydropower is used on rivers and streams and is better for the environment.*

**Geothermal**

Geothermal power plants use heat energy from the earth to create steam, which turns turbines that spin generators to make electricity. These power plants don't burn fuel, so geothermal is clean energy.

**Biomass**

Stored energy in plants and other materials can be used for heating, electricity and transportation. Wood, crops, garbage, landfill gas and biofuels are types of biomass.

# Children's Submissions from Rwanda and Jordan

As part of the development of *Global Energy: The Musical*, writing from children around the globe were reviewed and incorporated into the production.

## Example A

### Energy and its Important

Nowadays humans consumes a lot of the energy that is supposed to be saved for the future, like we have to save in consuming the electricity around us and the fuel, when we light up all the house while all the family is sitting in one room, or when we go to sleep while we are watching TV and it stays turned on all night long, this way we waste energy. In the near future when energy runs out and the world has no electricity or fuel people will say with regret we wish we didn't waste a lot of energy. But we can stop this if we start to use the solar power, water energy, and wind energy, also we can save a lot of energy specially fuel energy if we reuse materials in a very useful way.

*Yazdan AL kurdi, 11 years*

*In collaboration with The Children's Museum of Jordan*

## Example B

### Solar Energy

Environment is now free  
Good air spreads everywhere  
No more burning of grass and garbage  
As to illuminate the house,  
No more forest destruction  
As we did before you came

*Nzayisenga*

*In collaboration with Rwindalectric Inc of Rwanda*



# The Process for Writing a Play

## **“Why write a play?”**

There are no wrong answers: what is important is the process of discussion. Treat each person’s view with seriousness and respect – students will sense that their responses are important. Writing a story or a play is a fun way to express yourself!

## **“Where does a story behind the play come from?”**

The writer’s imagination!

## **“How do we learn to use our imaginations?”**

By exploring ourselves.

## **“What is a 'self' made of?”**

Lots of answers including body, soul, mind etc. For our purposes, we focus on:

- Body
- Senses
- Feelings

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**Characters:** For character 1, the students are told to pick their favorite animal. Character 2 will be a source of energy (wind, water, solar or a non renewable source). Students may write more characters in their classroom.

**Writing a Profile:** Students open their writing workbooks. They are going to write a profile of the character they selected. The profile consists of six categories:

Name  
Age  
Family  
Want  
Fear  
Habitat

**Most Important Being:** The Most Important Being is an entity that is more important to the character than any other.

**Job:** The workbook contains these categories. The workbook provides for the creation of 4 characters but students can create as many characters as they desire. The teacher may need to guide the students through the meaning of the categories. The students imagine what might be true of their characters and begin to write.

This profile format intrigues students and provides an easy way to begin writing. Students can draw a picture of their characters when they finish writing.

After the profile is written the students will either (1) read their profiles aloud to the class (if time permits) or (2) work with a partner and read their characters to each other. The class or partner should applaud after each reading. Everyone experiences their first writing success.

At a later date or with future characters, students can mime or act out the character for the group. Before performing, each student closes his/her eyes for 5 seconds to imagine the character. Then the student gets into position, says “curtain” when ready, and walks, eats and makes the character’s sounds. The other students have to guess who or what the character is. This exercise allows students to physically connect with their characters and supports kinesthetic learning.

Another way to help students develop and connect with their character is the “Interview Game”. Each student picks a character. The character can be an animal, human, a man made object or an element found in nature. Each student takes a turn coming to the front of the room and assuming a characteristic pose of the object. They introduce themselves as the character speaking as the character might speak. The character takes questions from the class in the manner of a press conference. Students are encouraged to think of the items from the Profile when asking questions. Usually the teacher ends the interview by asking what the character wants most.

Additionally, students are really able to broaden and deepen their character’s development through the “Day-in-the-Life” exercise. The students sit down and write a description of the day in the life of one or all of their character(s). They are encouraged to provide specific details. It is better to describe five events in great detail than 20 events briefly. Detail makes all the difference. Upon completion, the students read their descriptions aloud to the group or to a partner.



## Creating A Play

The students must create at least two characters. If they create more than 2 characters, they must select two characters for their story. One of the characters must be based on an energy source. Next the process of creating a play begins.

## Play Structure

- Both characters want something
- Character 1, meets character 2, (one of the characters must be the selected source of energy.
- The two characters come into conflict (disagree or have trouble with each other)
- The characters react or change (through interaction, there is a change in the way the characters feel about each other).
- The characters find a resolution.

Working with a partner, the students can share their characters. Next the students can pretend to be characters they created. They improvise what happens when they come together.

## Format

When the improvised play is complete, the students write up the play as performed. Before they begin, they teacher explains how to put the dialogue on the page. It starts with TIME, PLACE and AT RISE. Time usually includes era and season as well as time of day. PLACE is usually a fairly detailed description of the setting. AT RISE (a phrase uses when stage curtains lifted straight up instead of opening from the sides) sets forth what is happening when the curtain opens.

### *Example*

Time: The present. Springtime. 4 pm  
Place: A grocery store in Norwalk, Connecticut  
At rise: The characters are sitting on a bench in front of the store.

When writing dialogue, the character's name appears on the line above the speech. This will make it easier to see and read the lines. The students may also choose to underline the name.

### *Example*

Mary: Hello John.  
John: Hello Mary.  
Mary: Where are you going?  
John: I can't tell you.  
Mary: Why?

The pair of students agree on the first five lines. Then each student is asked to "finish" the play or take it until there is a "change in feeling" (resolve). Each student must resolve the conflict through the dialogue. While the students must understand that their imagination is the primary thing, they must also communicate their feelings and ideas clearly. If time allows, read plays aloud to the class or to a partner.

## Writing the Play

Review “want”, “conflict” and “change of feelings.” Every dramatic play is composed of these three elements.

To start the play, the teacher instructs the students to choose two of the characters that they have created and decide a time when they will meet (TIME), where they will meet (PLACE) and what they will be doing at the beginning of the play. The students might wonder how these characters could ever come in contact. They must use their imagination and invent a solution. Next the students choose one of their characters as protagonist, or hero, of the play. The second character becomes the antagonist, the character that stands in the way of the hero and what he/she wants. Then they start writing; they let the characters lead.

As the students work, they may get stuck. Try the following questions: “What happens next?”, “What should he/she say now?” “What does the character want?” “What is the character afraid of?” Refer the student to the character’s profile. When the student is clear about the want or the fear, he/she looks at the text to see how it applies. This approach emphasizes the importance of character.

This method can serve as an antidote to the television shows most students watch. Students can equate dramatic writing with plot and special effects. However, the character is often lost in all the activity. The emphasis on character encourages the concept of “action” as a “change in feelings.”

Furthermore, when referring the student to his/her profile, the student begins to sense the importance of his/her impulses and work, both past and present. The work isn’t just to please a grown up or someone else. It is based on the student’s choices, feelings and thoughts. The process offers the student a sense of ownership and power.

## Dialogue

Dialogue is different from every day speech because good dialogue condenses life. The end of a friendship in real life might take months but may only take one page of dialogue. Most good dialogue has a strong emotional life running beneath it. It is spoken in the voice of, and in some ways reveals, the individual character.

## Abbreviated Plays

Often students will rush to resolve a conflict. They set up a conflict where one character wants to do one thing and the other character wants to do something else. If there is an immediate resolution, the play ends. Encourage the students to think about how the characters feel. Is a character willing to give up without a fight? Will there be some negotiation or deal? When the students consider various options, they can develop interesting plays with genuine conflict.

## Developing Conflict

The teacher should talk to the students about how a play escalates. Character exchanges in the play should become more and more important as the play develops, leading finally to a “climax” which completes the play. The play will end because an emotional climax has been reached.

Conflict should not degenerate into a yelling match. Ask the student why a character is arguing. Often the student will respond by revealing the character’s “deeper wants” --- the underlying reason for the argument. When the student determines how the character’s “immediate wants” and “deeper wants” are tied together, the student can develop the conflict of the play. When the student probes and examines the “deeper wants”, they often write something honest and deeply felt. When the student writes from the heart, consciously or unconsciously, the experience is extraordinarily powerful. At this point, the student becomes an artist.

**Ending** “Why” is important at the end of the play. Students will often end their plays quite abruptly. The “abrupt” ending will fail to tell the “why” of the play. Explore the following questions with the students: “Why did this all happen?”, “What do you want the audience to think will happen to the character? What their lives will be like?”, “Did the characters change?” “Will they ever change?” “Do they need to change?” The students must consider their characters’ destinies.

**Title** The title should evoke the play’s feelings and spirit.

**Re-Writing and Spelling** When the students finish the draft it is time to check and edit for any re-writes. The student must make sure that the characters and the action of the play is clear to the audience. The students might work in pairs to read over and edit the plays. When the plays are revised, the students should copy them over or type them.

# Submission for Review

## Submit your plays now!

After a play is written, the student may submit the play for possible workshop and inclusion in **Stepping Stones** Museum for Children's upcoming production of *Global Energy: The Musical*. The full production will take place in October of 2013.

The student should create a cover sheet and include the following:

Name  
Title of Play  
Mailing address  
School  
Grade  
Teacher  
Teacher's e-mail  
Teacher's telephone number

**All submissions must be typed and may not exceed 8 pages in length.** All submissions must include a release form signed by the student's legal parent or guardian. All submissions must be received on or before **May 31, 2013**. Early submissions will be eligible for a workshop and/or staged reading at the museum.

Mail or e-mail the submissions to:

**Stepping Stones** Museum for Children  
Global Energy – The Musical Writing submission  
Attn: Hyla Crane, Director of Education  
Mathews Park, 303 West Avenue  
Norwalk, Connecticut 06850  
Email [hyla@steppingstonesmuseum.org](mailto:hyla@steppingstonesmuseum.org)



# Physical, Sensory and Emotion Exercises

Whether you have ever played theater games or not, these exercises are a great way for your students to relax and connect with their personal creativity.

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## Body Exercises

**Yoga Breathing:** Stand in a circle with hands at sides. Raise hands overhead and inhale. Slowly bring down hands to the floor and begin to exhale. When half way down, continue to drop hands and exhale. When hands hit the floor, let the last bit of air out. Now inhale with head down, hands on the floor and knees bent. Begin to exhale and straighten knees but leave all other muscles loose. Inhale and bend knees and slowly raise arms overhead as one comes to a standing position. On last exhale, arms come down to side without slapping. Repeat cycle two times to be relaxed and focused.

**Alternative breathing:** Stand in a circle with arms at side. Lace fingers and take a deep breath and stretch hands above head. Slowly exhale and bring hands down and hands on head. On second inhale, raise hands again with palms toward the ceiling, allowing the motion to carry all onto their toes. On exhale, bring hands to chest and set feet flat on the floor. Repeat the cycle three times.

**Inventory:** Focus on muscles by taking “inventory”. Have students lie on the ground with their eyes shut. The leader asks the students to sense their toes, to focus on them and to think about how they feel. Work up the body—ankles, calves, thighs—all the way up to the head—becoming aware of how each part feels. Alternatively, students can tense and relax each muscle group.

**Stretching:** Stretching, shrinking, expanding, contracting. The group stands in a circle and the embers are asked to imagine that they are seven feet tall. To reach this height everyone must focus their attention on their spines as the vertebrae separate and elongate. No standing on toes! The change is achieved through the spine. The group comes back to center (neutral, standing arms at side). Next they must imagine that they are three feet tall. No crouching! Again, the change is achieved by imagining shortening the space between the vertebrae. Return to center and try to imagine being at wide as possible, focusing on the muscles of the body. Return to center and try to imagine being as skinny as possible by contracting all the muscles of the body. Return to center.

**Hang out:** Begin by standing straight. The students are instructed to release the vertebra at the base of the skull. They continue dropping vertebra by vertebra until they hang completely down from the waist. Once down, everyone takes a deep breath and exhales. Everyone slowly returns to standing, starting at the base of the spine and lifting one vertebra at a time.

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## Sensory Exercises:

**“Statues” game:** Everyone chooses a space on the floor where one can jump, hop, twist and move about freely. No one can step off the spot or make noise. When the leader says ‘freeze’, the leader will ask everyone to use their imagination and pretend that their statute is made of a particular substance (metal, mud, cotton candy, silk etc.) Repeat the cycle several times. A student can be chosen as the leader to select the substance. A variation on the exercise has everyone walk around the room and imagine various substances on the floor (i.e. Leaves, snow, hot sand, water).The goal is to become open to your senses.

**Standing Circle:** The students stand in a circle. The leader asks the students to imagine that their favorite aunt has just arrived in her new car. The students must imagine what type of car, color, number of doors, etc. They must imagine what their aunt is wearing. The students then imagine getting into the car and putting on their seat belt. The imagine turning on the radio and listening to a song. The open a window or turn on the air conditioner. Their aunt gives them a candy bar. The students must image the feel of the air, hearing the music and the taste of the candy bar. At the end of the exercise the students should be focused and relaxed.

**Standing Group:** Standing in a group, the students are asked to remember the car trip with their aunt. The journey continues as the leader talks the students through the experience. Example: They drive to the beach –walking barefoot on the hot concrete, feeling the warm sand, digging their feet into the wet sand, building sand castles, going in the water, diving, falling in the sand and feeling the sand in their bathing suits, feeling the hot concrete, walking on the white lines in the parking lot to not burn feet, burning behind on the hot car seat...etc.

**Handling imaginary objects:** The group sits in a circle on the floor. The leader asks the students to construct a bookcase of any size and shape using imaginary wood, saw, hammer and nails. The leader then lists five imaginary objects and asks the students to put them on their bookshelves. The objects can be anything but should be of different sizes and weights. The leader than selects one student to remove the objects, in any order, from his/her selves while the other students watch and try to guess the order of the objects being removed. Repeat with different students if time permits. The game offers the students the chance to focus their imagination and practice mime skills.

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## Emotion Exercises:

**Sound and Motion:** Form a circle and ask one student to walk to the center. As the student is moving suggest a situation i.e., “Your mommy just kissed your cheek.” The student must respond with a sound (not a word) and a physical action. The response must be spontaneous or the student is told to continue moving and is given another situation. Once the sound and motion are clear, the student keeps repeating it and then “gives” it to another student by repeating the sound and notion together three times. The first student takes the second student’s place in the circle and the second student moves toward the center of the circle. The leader suggests a new situation and the exercise continues.

**Machines:** The leader asks someone to go the center of the circle and begin a sound and motion. This becomes the first part of the machine. Everyone is encourages to come forward and add a sound and movement to the synchronization of the machine. Once everyone is involved, the leader picks a “switch” person who invents a gesture that will stop and start the machine --- an on/off switch. The switch person stops and starts the machine several times. If one part is slow to stop or start, the leader picks a mechanic to fix the part with an imaginary oil can or screwdriver. Soon everyone focuses and cooperates with each other to create a well oiled machine.

# Common Core Language Arts Standards Grades 3, 4, and 5

## **CCSS.ELA-Literacy.W.3.3**

Write narratives to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences.

### **CCSS.ELA-Literacy.W.3.3a**

Establish a situation and introduce a narrator and/or characters; organize an event sequence that unfolds naturally.

### **CCSS.ELA-Literacy.W.3.3b**

Use dialogue and descriptions of actions, thoughts, and feelings to develop experiences and events or show the response of characters to situations.

### **CCSS.ELA-Literacy.W.3.3c**

Use temporal words and phrases to signal event order.

### **CCSS.ELA-Literacy.W.3.3d**

Provide a sense of closure.

## **CCSS.ELA-Literacy.W.4.3**

Write narratives to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences.

### **CCSS.ELA-Literacy.W.4.3a**

Orient the reader by establishing a situation and introducing a narrator and/or characters; organize an event sequence that unfolds naturally.

### **CCSS.ELA-Literacy.W.4.3b**

Use dialogue and description to develop experiences and events or show the responses of characters to situations.

### **CCSS.ELA-Literacy.W.4.3c**

Use a variety of transitional words and phrases to manage the sequence of events.

### **CCSS.ELA-Literacy.W.4.3d**

Use concrete words and phrases and sensory details to convey experiences and events precisely.

### **CCSS.ELA-Literacy.W.4.3e**

Provide a conclusion that follows from the narrated experiences or events.

## **CCSS.ELA-Literacy.W.5.3**

Write narratives to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences.



**CCSS.ELA-Literacy.W.5.3a**

Orient the reader by establishing a situation and introducing a narrator and/or characters; organize an event sequence that unfolds naturally.

**CCSS.ELA-Literacy.W.5.3b**

Use narrative techniques, such as dialogue, description, and pacing, to develop experiences and events or show the responses of characters to situations.

**CCSS.ELA-Literacy.W.5.3c**

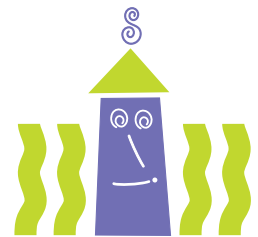
Use a variety of transitional words, phrases, and clauses to manage the sequence of events.

**CCSS.ELA-Literacy.W.5.3d**

Use concrete words and phrases and sensory details to convey experiences and events precisely.

**CCSS.ELA-Literacy.W.5.3e**

Provide a conclusion that follows from the narrated experiences or events.



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