DISCOVERY
SCIENCE CENTER

3rd GRADE

Third Grade Science Content Standards: Physical Sciences

Energy and matter have multiple forms and can be changed from one form to another.

1. A. Energy comes from the Sun to Earth in the form of light.

   B. Sources of stored energy take many forms, such as food, fuel, and batteries.

   C. Machines and living things convert stored energy to motion and heat.

Teachers: Energy Defined

Energy is the ability or capacity to do work or to produce change. Some forms of energy include heat, light, sound, electricity, and chemical energy. Some energy is stored, such as in batteries, food, and fuel. For example, you need to eat food to grow strong and have energy. Our body's energy comes directly from the food we eat ~ a cracker stores energy our body needs and as our body begins to digest the cracker, energy is released from the cracker through a chemical process. This release of energy powers our muscles and therefore, we are able to maintain a constant body temperature (the stored energy is converted into heat) and to move our arms (the stored energy is converted to motion).

We use energy everyday! Energy is everywhere in nature, such as in sunlight, wind, water, plants, and animals. Solar energy is any form of energy coming from the Sun. Some forms of solar energy are light, radio waves and X-rays. The Sun warms our planet every day, providing light, and is necessary for life on Earth. The Sun is a star.

Activity: Solar S'Mores

Guiding Question: Can I use the Sun instead of a bonfire to make S'Mores?

Concepts:

- Solar energy is the energy given off by the Sun.
- When objects absorb light, some of the light is changed into heat energy. In this activity, the marshmallows and chocolate bars take in energy from the Sun.

- Dark-colored objects absorb more light and store more heat from sunlight than light-colored objects.

Skills: Making observations, comparisons, inferences and drawing conclusions

Materials: Every two people will need:

- ❑ 4 graham crackers
- ❑ 16 mini marshmallows
- ❑ 2 plain milk chocolate candy bars
- ❑ double-stick tape (optional)
- ❑ 8 X11-inch glass baking pan
- ❑ clear glass lid for the pan
- ❑ 1 thermometer

This is an outdoor experiment: Find an undisturbed place in direct sunlight (no shade). Use your thermometer to see what temperature it is outside. The temperature must be at least 85° F.

Procedure:

1. Ask the students: Can you cook food outdoors? What makes food cook or things melt outside? How can and do we use the sun's energy to help us in our lives?

2. Start a discussion about outdoor cooking. Talk about how marshmallows melt over a bonfire, or how the inside of a hot dog on a stick heats over a fire, or how hamburgers cook on a grill. Then think about what makes the melting, warming and cooking happen—heat. Talk about what happens when we are in sunlight. Share how the heat from the Sun can be used for cooking, melting and warming food.

3. Divide the students into teams of two. Have each pair of students put four graham crackers side by side in the bottom of the glass-baking pan. Have the students label the pan so they can identify their own pan.

4. Have each pair of students place a chocolate bar on top of two of their graham crackers.

5. Have each pair of students put 8 mini-marshmallows on top of the other two graham crackers and then cover the baking pan with the clear glass lid.

6. Put all of the pans on a table in an area where they will get full sunlight—no shade! If insects, such as ants, are a concern, place a border of double-stick tape around each of the pans to capture any insects headed for the tasty treats.

7. Let the pans sit until the chocolate bars and marshmallows melt. To make a S'More, put one chocolate and one marshmallow graham cracker together to make a sandwich. You should have two sandwiches. Enjoy!

8. In closing, explain that the Sun provided energy in the form of light which the food absorbed. This energy heated and melted the marshmallows and chocolate. Once in our body, the energy stored in the food will provide energy for the students to continue their activities the rest of the day.

Third Grade Science Content Standard: Physical Sciences

Light has a source and travels in a direction.

2. A. Sunlight can be blocked to create shadows.

Third Grade Science Content Standard: Earth Sciences

Objects in the sky move in regular and predictable patterns.

4. E. The position of the Sun in the sky changes during the course of the day and from season to season.

Activity One: Me and My Shadow!

A shadow is a dark figure or image cast on the ground or some surface by a body intercepting light. The shadows cast outdoors will change according to the position of the Sun in the sky. Following this activity, is a second activity with a continuing look at how the Sun's position changes during the day. The Sun's apparent movement is due to the Earth rotating on its axis, not to the actual movement of the Sun (since the Sun remains stationary). It is important to remind the students during this activity that while the Sun appears to move across the sky, it is actually the Earth on which we are standing that is moving, so we are at times facing the Sun and at other times turned away from the Sun.

Materials:

- Compass (optional)
- butcher paper
- colored pencils or crayons
- tape
- Globe or US map

Procedure:

1. Brainstorm ideas about shadows with students to discover what they already know.
2. In the morning, divide the students into teams of two and go outside to a black top or concrete area. Have a student stand on a piece of butcher paper and face north (Tape two pieces of butcher paper together and use the compass to orient north if necessary). Trace the student's feet and cast shadow as a group demonstration. Label the traced shadow with student's name and time of day.

3. Talk about what the shadows look like. Then have the students repeat this activity with their partners, so each student will have a labeled diagram of his/her shadow.

4. Return to classroom and write the words “shape” and “direction” on board. Ask students if they know what these words mean. **Shape** is the pattern and size of the shadow and **direction** is the placement of the shadow in relationship to the Sun’s position in the sky. Mention that the Sun rises in the east and sets in the west. Explain that as the Sun changes position in the sky, shadows will change shape and direction. Ask the students to predict what the shape and direction their shadows will be at lunchtime or at the end of the school day.

5. Have them trace their partner’s shadows on the same papers at morning recess and lunch recess to see how their shadows look. Make sure they label the times of day for each new tracing of the shadows. Use a different color of pencil or crayon each time. Also, make sure they are oriented northward each time.

6. Repeat this activity at the end of the day. Trace the shadows again using a different color of pencil or crayon and labeling the time of day. Discuss the results. Talk about how the Sun moves and how it affects the shadow. Look at predictions from the morning and discuss the differences to what actually happened.

Activity Two: Movement of the Earth

This activity explores the concept of the Earth’s rotation around its axis which is why we experience daytime and nighttime ~ this motion also can create the misconception that the Sun is moving around the Earth.

1. Explain that while the Sun appears to travel around the Earth, it is actually the Earth that is moving and the Sun stays still. Have the students imagine that you (the classroom teacher) are the Sun and each of them (their heads) is the Earth. Have them pretend that their noses represent California (or their school). While they are facing you, tell them that California is receiving a lot of the Sun’s light and so, it is noon in California at that time of day.

2. Show the students how to slowly spin in a counter-clockwise direction. Explain that this is the direction in which the Earth spins. After the students have practiced their slow spinning, have them stop when their backs are to you. Ask the students if they can see the Sun. *(Answer: No, not without turning around again.)* What time do they think it would be in California at that moment if their noses still represented California? (*Answer: midnight)* Reinforce the difference of nighttime and daytime in relation to the direction that the California is facing.

3. Next show the students a globe or a map of the United States. Point to where California is and where New York is. If their heads represent the Earth, explain

that if their noses represent California, their left ears would represent New York. Have them resume their slow counter-clockwise spinning. Ask them: Where does the Sun hit first ~ in California or New York? *(Answer: New York)* Ask: Is New York east or west in the United States? *(Answer: East)* Therefore, the Sun hits first in New York or the east and later in California or the west. Because of this counter-clockwise turning of the Earth, the Sun appears to rise in the east and set in the west.

Third Grade: Earth Sciences

Objects in the sky move in regular and predictable patterns.

4. A. Patterns of the stars stay the same, although they appear to move across the sky nightly, and different stars can be seen in different seasons.

Activity: Constellations

This activity engages students in a look at constellations and the fact that the stars have apparent motion, just as the Sun seems to have apparent motion. Continue your discussion of the Earth rotating on its axis and that since the stars are stationary (just as the Sun, since the Sun is a star), the stars will appear to move from the perspective of someone standing on the Earth.

Ask the students if they have seen constellations, or patterns of stars in the sky. Ask if they have seen the Big Dipper? [Discovery Science Center has a portable planetarium, the StarLab, that can visit your classroom for a small fee to help students get a solid understanding of constellations ~ call 714-5012 for more information.]

Materials:

- book about constellations
- glue
- chalk
- large sheets of black paper
- small marshmallows

Procedure:

1. Use a book that explains constellations or invite Discovery Science Center to deliver a StarLab program to your students. Have the students research a constellation and the myth that may have developed about that constellation.
2. Give each student a black piece of paper and have them drop 6-7 small marshmallows onto the paper to see how they land. Once they have what they

consider an interesting pattern, have the students glue the marshmallows onto the black paper.

3. Have the students each create a story about an imaginary constellation using the pattern that they have made with the marshmallows. Let them use chalk to either "connect the dots" or to draw an outline around the marshmallows depicting the source of their story (For example, the Big Dipper is made of 7 stars in a particular pattern ~ the 7 stars can be connected to form a ladle-shaped figure or you can draw around the stars to form a picture of a Great Bear).

4. Once the stories are complete, have the students read their stories and display their constellation pictures.

Third Grade Science Content Standards: Earth Sciences

Objects in the sky move in regular and predictable patterns.

4. B. Students know the way in which the Moon's appearance changes during the four-week lunar cycle*.*

Teachers: The Moon's Phases

The lunar month is how long it takes to go from one new moon to the next. It takes 29.53 days to complete a lunar month. During the lunar month, the moon goes through all of its phases. In ancient times, before calendars were used, people looked at the phases of the moon to measure weeks and months. They knew that four weeks passed between one full moon and the next. Just like the Earth, half of the moon is lit by the Sun while the other half is in darkness. The phases we see result from the relative position of the Moon to the Sun and Earth, as viewed from Earth. It is important to remember that the moon only reflects the Sun's light; the moon has no light of its own.

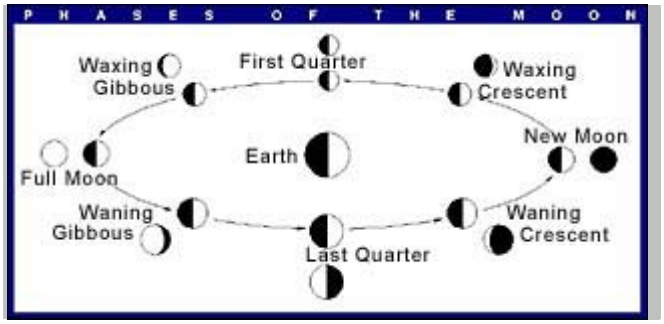
At **New Moon,** the moon is positioned between the Earth and the Sun. We see no moon at all.

As the moon moves counter-clockwise around the Earth, we see a bit more of the sunlit side of the moon each night. A few days after New Moon, we see a thin crescent in the evening sky. The crescent moon appears to grow larger each night. When half of the moon's disc is illuminated**,** we call it the **First Quarter Moon.** This name comes from the fact that the moon is now one-quarter of the way through the lunar month.

Once more than half of the moon's disc is illuminated, it has a shape we call gibbous. The gibbous moon appears to grow fatter each night until we see the full sunlit face of the moon. We call this phase the **Full Moon.** The moon has now completed one half of the lunar month.

During the second half of the lunar month**,** the moon appears to grow thinner each night. As it reaches the three-quarter point in the lunar month**,** the moon once again

shows us one side of its disc illuminated and the other side in darkness. However, the side that we saw dark at the First Quarter Moon is now the lit side. This phase is called the **Third Quarter Moon.** As it continues its journey toward approaching the New Moon phase again, the moon can be seen as a crescent once again.



Activity: Moon Phase Flipbook

Materials:

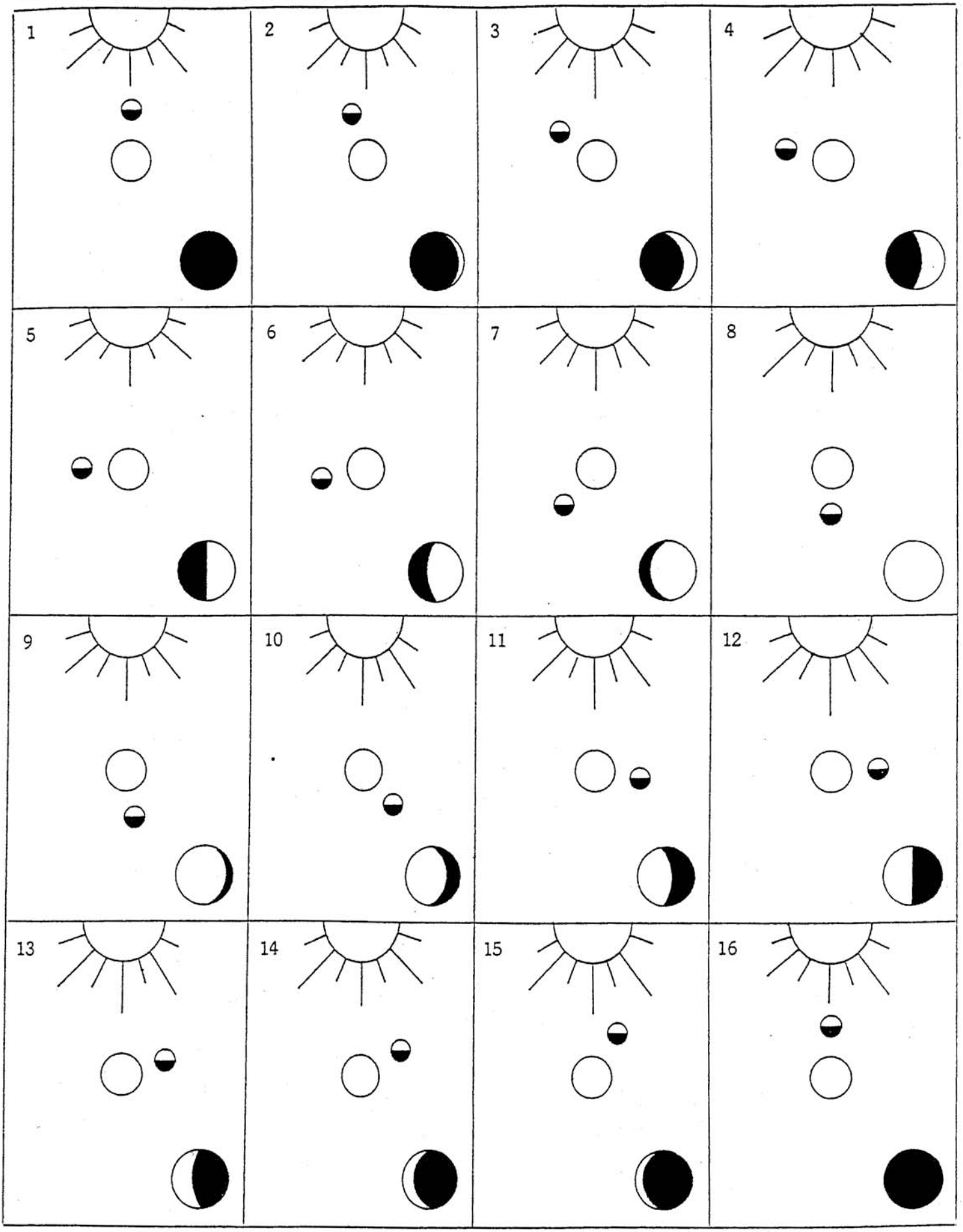
- One copy of the Moon Phase flipbook (included in this packet) per student
- Sixteen 3 X 5 index cards per student
- Scissors
- Glue sticks
- One rubber band per student (optional)

Procedure:

1. Distribute a copy of the Moon Phase flipbook to each student.
2. Have the students cut out all sixteen moon phase pictures and glue each picture onto the lower right-hand corner of an index card.
3. Put the index cards onto which the moon phase pictures have been glued into sequential order with number “1” on the top and number “16” on the bottom.
4. Hold the stack of cards in one hand and flip the edges of the cards with the other hand in order to create an animated flipbook in which the moon will appear to move around the Earth and the moon phases will appear to change.
5. Band the cards together with a rubber band if you like.

COPYCAT PAGE

MOON MADNESS



Resources:

- **http://www.factmonster.com**
- **http://www.howstuffworks.com**
- **http://solarviews.com**