PHYSICAL SCIENCE

teachers manual

Rationale

Picture a young child standing in a field feeling the wind blowing across their face. The child asks, “What is air?”

Can you see the toddler listening for the bird in the birdbath to sing again? “Why does that bird sing?”

Imagine a small child outside with their face turned up tasting the snow and ask, “What is snow made of?”

You can see from your window a young boy that stops digging with a stick in the dirt and watches an ant. He says, “Who put the ants in this hill?”

The reason for teaching young children physical science is to promote their sense of inquiry. Why, What, When, Who and How are some of the first words they learn. Young children have such a curiosity and as adults we need to help them find the answers to their questions. We need to show them how to experience the world around them. Experiencing physical science will help the children of today come up with solutions to the challenges of tomorrow which just happens to be their future!

Praying for World Peace for All of Us!

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Physical Science
Energy
Introduction - General

Materials:

A tray containing:

→ (1) Picture of a child
→ (1) Picture of a car
→ (1) Picture of a factory
→ (1) Picture of the Sun
→ (1) Picture of a television

Presentation:

1. During circle time, say to the children, "Today, we are going to start a new unit to study. We are going to talk about **energy**."
2. Ask the children, "When you go to the store and walk around, are you using **energy**?"
3. Say to the children, "Yes, we have **energy** stored in us."
4. The teacher should then ask, "When your mother and father cook dinner at home are they using **energy**?"
5. Ask the children, "Do you see the light outside the windows? Does the sun make **energy**?"
6. The teacher should then say "**Energy** helps us to do things."
7. Say, "Today we are going to learn about how **Energy** and what it helps us to do."
8. Invite the children to say, "**Energy**."
9. Invite the children to say, "**Energy** helps us to do things."
10. Hold up the picture of a child while saying, "Did you know that every time this child eats, his/her body is turning the food into energy? **Energy makes things grow**."
11. Hold up the picture of a car while saying, "Did you know that when this car goes to the gas station, the gasoline that is put into the tank becomes energy so your Mother can drive the car? **Energy makes things move**."
12. Hold up a picture of a factory while saying, "Did you know that energy is made by factories that burn fuel, like coal, in order to make electricity? **Energy gives us heat**."
13. Hold up a picture of the Sun while saying, "Did you know that the sun gives us most of our light? **Energy gives us light**."
14. Hold up a picture of a television while saying, "Did you know that it takes energy to make this television work? **Energy runs machines**."

15. Say, "Today we've learned that **energy** helps us grow, move, gives us heat, provides us with light and runs machines.
16. Remember, "**Energy** helps us to do things."

Variations and Extensions:

1. Let the children cut out pictures in old magazines that show **energy** working.

Points of Interest:

1. Energy is everywhere

Control of Error:

1. The teacher

Aims:

Introduction to **energy** and how it helps us to do things.

Age:

2 ½ and up

Language:

Energy, light, move, grow, machines, etc.

Physical Science
Light – Working as Energy
Introduction - General

Materials:

→ Books (1 for each child and the teacher)

Presentation:

1. During circle time, say to the children, "Today, we are going to start a new unit to study. We are going to talk about what kind of work **light** does as **energy**."
2. Ask the children, "Did you know that light works as energy?"
3. The teacher should say, "Without the energy that comes from light we would get up in the morning with the sun and go down to bed as the sun sets. We wouldn't have electricity so there wouldn't be any light inside our homes."
4. Ask the children, "Can you think of other jobs that light does?"
5. Light can produce heat, it helps in the making of cars, food, etc."
6. Say, "Today we are going to learn about how light works as energy."
7. The teacher should give each child a book.
8. The teacher should turn off the classroom lights.
9. The teacher should say, "Let's read our books now."
10. Say to the children, "Oh no! I can't read my book because it is too dark and I can see the words clearly."
11. Ask the children, "Can you see the words in your book clearly?"
12. Now, the teacher should turn on the light and sit back down to read.
13. The teacher should exclaim, "I can read my book now because the light is on."
14. Ask the children, "Can you see the words in your book clearly?"
15. Say, "Remember, **light** works as **energy.** Without **light** we wouldn't have electricity and we wouldn't be able to read our books right now."

Variations and Extensions:

1. Let the children count the **light** bulbs in the classroom, school, home, etc.

Points of Interest:

1. **Light** is important every day!

Control of Error:

1. Making sure that the teacher has set up the activity correctly.

Aims:

Introduction to **light** working as **energy**.

Age:

2 ½ and up

Language:

Light, energy, etc.

Physical Science
Light – Working as Energy
Activity – Microscope – Bigger

Materials:

A tray containing:

→ Scissors (child-sized)
→ A cylinder shaped box like oatmeal comes in (remove top and bottom)
→ Plastic cup
→ Plastic wrap
→ Thick rubber band
→ Small glass pitcher with water

A small basket containing:

→ (1) marble
→ (1) paperclip
→ (1) button
→ (1) penny

A control card with the objects attached to the card:

→ (1) marble
→ (1) paperclip
→ (1) button
→ (1) penny

→ Small table
→ Microscope

Presentation:

1. Invite the child or group of children.
2. Go over to where the **science** table is set up.
3. Explain to the children, "Today we are going to see light working to make images bigger."
4. Invite the children to stand behind the small table that is set up. Be sure that they can see the surface of the table.
5. The teacher should point to the **microscope** and ask the children, "Do you know what this is? Can you say **microscope**?"

6. Say, "People use **microscopes** to make objects bigger so they can study them. We are going to make our own **microscope** today!"
7. The teacher should use the scissors on the tray to punch out three holes around the side and near the bottom of the cylinder.
8. Take the cylinder and place it over the button keeping the end with the holes touching the table.
9. Take the plastic wrap and place it on top of the cylinder, making a depression.
10. Attach the rubber band carefully to make sure you leave a depression.
11. Using the pitcher of water, carefully pour some water into the depression of the plastic wrap.
12. The teacher should bend over and look into the tube and then invite each child in turn to do the same.
13. Ask the children, "Does the button look larger?"
14. Have the child compare the button on the control card to the button in the microscope.
15. Repeat the procedure with each object in the basket.
16. When you are finished, return the materials to the basket and the tray.

Variations and Extensions:

1. Repeat exercise using the real Microscope.
2. Change the objects.
3. Let the children try the experiment.

Points of Interest:

1. Notice how large the objects look once magnified.

Control of Error:

1. Making sure that the teacher has set up the activity correctly.

Aims:

Introduction to how **light** can work as **energy.**

Age:

2 ½ and up

Language:

Microscope, light, etc.

Physical Science
Light – Working as Energy
Activity – Telescope – Closer

Materials:

A tray containing:

- → (2) magnifying glass lenses (1-1½" in diameter) (1 larger than the other)
- → (1) Paper-towel tube or better yet gift wrapping tube
- → Tape
- → Scissors (teacher's)
- → Masking tape
- → Ruler (if using a paper-towel tube) or measuring tape (if using a gift wrapping tube)
- → (1) sheet of paper that has writing on it (magazine or newspaper will be fine)
- → Telescope

Presentation:

1. Invite the child or group of children.
2. Go over to where the **science** table is set up.
3. Explain to the children, "Today we are going to see light working to help you see far away objects look closer."
4. Invite the children to stand behind the small table that is set up. Be sure that they can see the surface of the table.
5. The teacher should point to the **telescope** and ask the children, "Do you know what this is? Can you say **telescope**?"
6. Say, "People use **telescopes** to help them to see far away objects look closer. We are going to make our own **telescope** today!"
7. The teacher should ask a one of the children to assist her as she builds the telescope.
8. The teacher should take both of the magnifying glasses and the sheet of printed paper and place them next to her.
9. The teacher should start with taking the larger magnifying glass and putting it between herself and the printed paper. The printed images will look blurry.
10. The teacher should take the smaller magnifying glass and put it between her eye and the first magnifying glass.

11. Now, the teacher should slide the smaller lens forwards and backwards until the image is in focus. The image will be upside down and larger.
12. Ask the child that is assisting you to measure the distance between the two magnifying glasses.
13. The teacher should use the scissors and cut a slit about 1" from the top of the tube (long enough to accommodate the larger glass but be careful not to cut all the way through the cardboard tube).
14. Now, the teacher should cut a second slot the exact distance that was measured by your child that assisted you earlier (long enough to accommodate the smaller glass but be careful not to cut all the way through the cardboard tube).
15. Place the large glass in the top slit and the smaller one in the second slit. Now using the masking tape secure them to the tube.
16. Cut off the excess cardboard tube by leaving about an inch of tube behind the smaller glass.
17. The teacher should check to see if the lenses are placed right by looking at the printed page through the telescope (the image should be large and clear).
18. Make adjustments to the distance between the lenses if necessary.
19. The teacher should invite each child in turn to look at the printed page with the telescope.
20. Ask the children, "Can you see objects that are far away closer with your telescope?"
21. When you are finished, return the materials to the tray.

Variations and Extensions:

1. Repeat exercise using the real **Telescope**.
2. Let the children try the experiment.

Points of Interest:

1. How many different faraway objects you can look at.

Control of Error:

1. Making sure that the teacher has set up the activity correctly.

Aims:

Introduction to how **light** can work as **energy.**

Age:

2 ½ and up

Language:

Telescope, light, etc.

Physical Science
Light – Working as Energy
Activity – Periscope – Around Obstacles

Materials:

A tray containing:

→ Scissors (teacher's)
→ (2) Paper-towel tubes
→ ruler
→ Masking tape
→ (2) old CD's (or mirrors)

→ Periscope

Presentation:

1. Invite the child or group of children.
2. Go over to where the **science** table is set up.
3. Explain to the children, "Today we are going to see light working to help you see around obstacles."
4. Invite the children to stand behind the small table that is set up. Be sure that they can see the surface of the table.
5. The teacher should point to the **periscope** and ask the children, "Do you know what this is? Can you say **periscope**?"
6. Say, "People use **periscopes** to help them see around obstacles. We are going to make our own **periscope** today!"
7. The teacher should take the two empty paper-towel tubes and tape the ends together to make one long tube.
8. The teacher should use the ruler to mark 3" up from each end of the tube.
9. The teacher should start with one end of the cardboard tube. She should find the nearest slanted line to the 3" mark that she made. Now she should cut a 2" line along this slanted line.
10. The teacher should repeat Step 9 with the other end of the cardboard tube (make sure that your slits are on the same side of the cardboard tube).
11. Now, the teacher should slide one of the CD's, shiny side down, into the top slit. Using the masking tape, secure it in place.
12. The teacher should slide the other CD, shiny side up, into the bottom slit. Using the masking tape, secure it in place.
13. Explain to the children, "The top CD will bounce the light down to the bottom CD. The bottom CD sends the light to your eyes and you will see an image."

14. The teacher should look through one end of the cardboard tube while keeping the other end held high.
15. The teacher should invite each child in turn to do the same.
16. Ask the children, "Can you look around objects?"
17. When you are finished, return the materials to the tray.

Variations and Extensions:

1. Repeat exercise using the real Periscope.
2. Let the children try the experiment.

Points of Interest:

1. Notice the different corners, etc. that you can look around.

Control of Error:

1. Making sure that the teacher has set up the activity correctly.

Aims:

Introduction to how **light** can work as **energy.**

Age:

2 ½ and up

Language:

Periscope, light, etc.

Physical Science
Electricity – Working as Energy
Introduction – General

Materials:

A place to walk where there are objects that use electricity as **energy**.

Presentation:

1. During circle time, say to the children, "Today, we are going to talk about **electricity** as **energy**."
2. The teacher should then say "**Electricity** is **energy** so it helps us to do things."
3. Say, "Today we are going to learn about how **Electricity** is **energy** and what it helps us to do."
4. Invite the children to say, "**Electricity**."
5. Invite the children to say, "**Electricity** is **energy** and it helps us to do things."
6. Next, the teacher should say, "Let's go and take a walk around the school/classroom/home and see where we see **electricity** working."
7. Take a trip and stop to notice the different objects that use **electricity**. First stop at a light switch and turn it off and then back on and say, "Electricity is energy and it helps us to do things. What does electricity help us to do here with this light switch? Yes, it helps us to see well."
8. Continue recognizing and verbalizing as in Step 7 throughout the walk.
9. After you return to the rug ask the children, "Where did we see electricity working?"
10. Then say, "**Electricity** is **energy** so it helps us to do things."

Variations and Extensions:

1. Let the children cut out pictures in old magazines that show **energy** working.

Points of Interest:

1. Electricity is everywhere
2. The children are too young to have you explain that electrical energy is the movement of electrical charges.

Control of Error:

1. The teacher

Aims:

Introduction to **electricity** as **energy** and how it helps us to do things.

Age:

2 ½ and up

Language:

Electricity, **energy**, light, work, etc.

Physical Science
Electricity – Working as Energy
Activity – Making a Circuit

Materials:

A tray containing:

→ (1) D-cell Battery
→ (1) Old string of Christmas lights
→ (1) Wire cutter
→ Non-Latex disposable gloves

A place to sit on the ground where the children can sit in a circle.

Presentation:

1. During circle time, say to the children, "Today, we are going to talk about **electricity** and about **circuits**."
2. The teacher should then say "A **circuit** is made when **electricity** is able to travel from one place to another and back again."
3. Invite the children to say, "**Circuit**."
4. Invite the children to say, "A **circuit** is made when **electricity** is able to travel from one place to another and back again."
5. The teacher should put on her disposable gloves and pick up the wire cutters and say to the children, "I am going to make a **circuit** for you. You will be able to see **electricity** travel from one place to another and back again."
6. Now the teacher should cut off a section on the string of lights so that you have one light with the same amount of wire on each side.
7. Next, you take off the same amount of wire insulation on each end (about ¼") so that the wire is showing.
8. Now say to the children, "Watch and you will see this tiny light bulb light up."
9. The teacher hold one wire to one end of the battery while at the same time holding the other end to the other end of the battery.
10. Ask the children, "Is this a **circuit**? Does the **electricity** travel from one place to another and back again?"
11. Now, the teacher should take one of the wires off the end of the battery and ask, "What happened when I removed one of the wires?"
12. "The **circuit** was broken when I removed one of the wires from the battery."

13. The teacher should take off the disposable gloves and put them on the tray. Now she needs to take the tray and put it up high where the children can't touch it. If the children ask why, explain about being safe and about lead).
14. Next, the teacher should invite the children to hold hands while saying, "We can make a **circuit**. I am going to gently squeeze the hand of the person next to me and tell her to pass it on. She in going to gently squeeze the hand of the next person and say pass it on. Soon, I will feel my other hand being squeezed and the **circuit** will be completed."
15. The teacher should gently squeeze the hand of the child on either side of her and say, "Pass it on."
16. When the teacher received a squeeze on her other hand she says, "The **circuit** is complete!"
17. Today, we have learned that a **circuit** is made when **electricity** is able to travel from one place to another and back again."

Variations and Extensions:

1. Let the children take turns starting the current while making a circuit with their bodies.

Points of Interest:

1. Children love to make circuits.
2. The children are too young to have you explain that technically about circuits.

Control of Error:

1. The teacher

Aims:

Introduction to **circuits** and how electricity travels.

Age:

2 ½ and up

Language:

Circuit, energy, light, work, etc.

Physical Science
Electricity – Working as Energy
Activity – Makes Your Hair Stand Up!

Materials:

→ Hot dog shaped balloons – inflated and tied (enough so that each child will have one)

A place to sit on the ground where the children can sit in a circle.

Presentation:

1. During circle time, say to the children, "Today, we are going to talk about **static electricity."**
2. The teacher should then say "**Static electricity** is made when tiny parts of energy (electrons) bounce around."
3. Invite the children to say, "**Static electricity**."
4. Invite the children to say, "**Static electricity** is made when tiny parts of energy bounce around."
5. The teacher should ask the children, "Have you ever walked across a rug and touched someone and they got a small shock? If you have, that shock was caused by **static electricity**."
6. Next, the teacher should say, "Now, I am going to give each of you a balloon to hold on your lap quietly so you can hear what I am going to tell you to do with it."
7. Pass out the balloons slowly.
8. Now say to the children, "We are going to make **static electricity**. I am going to count to 15 and as I do we are going to gently rub the balloon on our hair like this" (show the children).
9. The teacher should slowly count to 15 and everyone rubs the balloon on their hair.
10. Invite the children to turn and look at the friend next to them and see their hair stand up!
11. Say to the children, "We have made **static electricity**!"
12. Today, we have learned that "**Static electricity** is made when tiny parts of energy (electrons) bounce around."

Variations and Extensions:

1. Let the children rub the balloons on their hair and see if they will stick to the wall.

Points of Interest:

1. Children love this experiment!

Control of Error:

1. The teacher

Aims:

Introduction to **static electricity.**

Age:

2 ½ and up

Language:

Static, electricity, shock, etc.

Physical Science
Electricity – Working as Energy
Activity – Stored-Up Energy Jump!

Materials:

A place to sit on the ground where the children can sit in a circle.

Presentation:

1. During circle time, say to the children, "Today, we are going to talk about **stored-up energy."**
2. The teacher should then say "**Stored-up energy** is energy that is waiting to be used!"
3. Invite the children to say, "**Stored-up energy**."
4. Invite the children to say, "**Stored-up energy** is energy that is waiting to be used!"
5. The teacher should ask the children, "Did you know that inside your body you have **stored-up energy**?"
6. Remind the children that, "**Energy** helps us to do things!"
7. Next, the teacher should say, "The **stored-up energy** in our bodies helps us to do things!"
8. Now say to the children, "We are going to use some of our **stored-up energy**."
9. Invite the children to stand up.
10. Invite the children to jump up and down.
11. Ask the children to turn around.
12. Tell the children, "We have been using some of our **stored-up energy** to jump and turn around. We use our **energy** everyday at home, school and at play.
13. Today, we have learned that "**Stored-up energy** is energy that is waiting to be used."

Variations and Extensions:

1. Let the children find other ways to use their **stored-up** energy.

Points of Interest:

1. Children love this experiment!

Control of Error:

1. The teacher

Aims:

Introduction to **stored-up energy.**

Age:

2 ½ and up

Language:

Stored-up, energy, etc.

Physical Science
Magnets – Working as Energy
Introduction – General

Materials:

A basket containing:

→ (1) set of headphones

→ (1) electric toothbrush

→ (1) smaller basket with different types and sizes of **magnets**

Presentation:

1. During circle time, say to the children, "Today, we are going to talk about **magnets** as **energy**."
2. The teacher should then say "**Magnets** are objects made of certain materials which create **energy** that helps us to do things."
3. Say, "Today we are going to learn about how **Magnets** help us do things."
4. Invite the children to say, "**Magnets**."
5. Invite the children to say, "**Magnets** are objects made of certain materials which create **energy** that helps us to do things."
6. Next, the teacher should say, "We have been learning about electricity as **energy**. We know that electricity is used to give **energy** to many of the things we use everyday. Well **magnets** often work with electricity to make things work."
7. Now, the teacher holds up the headphones that she has in her basket and says, "Many of us have these around the house. Do you know what this is? It's a set of headphones. You can hear music through them when they are connected to a CD player."
8. These headphones work because there are **magnets** that help the electricity."
9. Then say, "**Magnets** are objects made of certain materials which create **energy** that helps us to do things."
10. Next, the teacher hold up an electric toothbrush and says, "This is an electric toothbrush. You can brush your teeth with it."
11. This electric toothbrush works because there is a **magnet** in the motor that helps the electricity."
12. Then say, "**Magnets** are objects made of certain materials which create **energy** that helps us to do things."
13. Now, the teacher reaches in her basket and brings out a smaller basket that has several **magnets** of different sizes.

14. "These are **magnets**. They come in different shapes and sizes." Hold the horseshoe **magnet** up and study it a moment and then pass it around the circle.
15. "**Magnets** are objects made of certain materials which create **energy** that helps us to do things."

Variations and Extensions:

1. Set up a picture basket with objects that use **magnets** that can be found around the house, in motors and things in a car.

Points of Interest:

1. There are **magnets** in things that we use everyday!

Control of Error:

1. Each item controls a magnet, that you could show, if you took the item apart.

Aims:

1. Introduction to **Magnets** as objects made of certain materials which create **energy** that helps us to do things.

Age:

2 ½ and up

Language:

Magnets, **energy**, light, work, etc.

Physical Science
Magnets – Working as Energy
Activity – Magnetic or Non-Magnetic?

Materials:

A tray containing:

→ (1) container holding many different items (some are **magnetic** and some are **non-magnetic**)

→ (1) magnet

Preparation:

1. The teacher needs to divide a tray down the center horizontally using masking tape.
2. The teacher needs to make a label that says "**magnetic**" using masking tape and a permanent pen. Stick this label at the top of the left section of the tray.
3. Place the **magnet** under this label.
4. The teacher needs to make a label that says "**non-magnetic**" using masking tape and a permanent pen. Stick this label at the top of the right section of the tray.
4. Place the container with objects under this label.
5. The **Magnet** Tray is ready for presentation.

Presentation:

1. During circle time, say to the children, "Today, we are going to talk about **magnets.**"
2. The teacher should then say "**Magnets** are objects made of certain materials which create **energy** that helps us to do things."
3. In order to be a **magnet**, you have to be made out of special material.
4. "I have a tray set up today for those of you that would like to sort objects. Some items will stick to the **magnet** and will be **magnetic**."
5. Bring the tray around to the front of you so that the children can see it.
6. Point to the first label that is taped on the top left side of the tray and say, "This label says **magnetic**. This is where I will put all of the objects that stick to my **magnet**."
7. Point to the second label that is taped on the top right side of the tray and say, "This label says **non-magnetic**. This is where I will put all of the objects that don't stick to my **magnet**."

8. Hold up the container that has a variety of small objects that are **magnetic** and **non-magnetic**.
9. "In this container I have small objects that I am going to sort."
10. Hold up the magnet and say, "I am going to use this **magnet** to find out which objects will stick."
11. Take an object out of the container that is **magnetic** and study it for a few seconds. Take the **magnet** and hold the object next to the **magnet** to see if it will stick to it.
12. Point to the label and read out loud, "**Magnetic**. This (name the object) is **magnetic**. I will put it under this label."
13. Continue with each object.
14. When the teacher is finished sorting, she puts the objects in the container and returns the container to the left-hand side of the tray. Then she puts the magnet on the right hand side of the tray.
15. The teacher shows the children where the tray will be kept.
16. "**Magnets** are objects made of certain materials which create **energy** that helps us to do things."

Variations and Extensions:

1. Give a presentation on how **magnets** attract on one end and repel on the other.

Points of Interest:

1. Some things stick to **magnets** and some things don't."

Control of Error:

1. **Non-magnetic** things won't stick to the **magnet**, and **magnetic** things will.

Aims:

1. Introduction to **magnets** as objects made of certain materials which create **energy** that helps us to do things.

Age:

2 ½ and up

Language:

Magnets, **energy**, light, work, etc.

Physical Science
Magnets – Working as Energy
Activity – Paper Clip Snake

Materials:

A tray containing:

→ (1) container holding paper clips (on left of tray)

→ (1) container holding a magnet (on right of tray)

Presentation:

1. During circle time, say to the children, "Today, we are make a paper clip snake using a **magnet**!"
2. The teacher should then say "Remember how we use a **magnet** to find out what objects would stick to it? Well today we are going to use paper clips which we found out were **magnetic**!"
3. The teacher should pick up the container of paper clips and place them in front of her.
4. The teacher should pick up the **magnet**.
5. Next, the teacher should pick up a paper clip with the dominant hand and the **magnet** with the non-dominant hand.
6. Now, the teacher should bring the paper clip over to the **magnet**. When the paper clip sticks to the **magnet**, let it go.
7. Pick up the next paper clip and bring it over to the paper clip that is attached to the **magnet**. When the paper clip sticks to the paper clip, let it go.
8. Continue the above process with each paper clip until the snake is long enough that a paper clip won't stick to the preceding paper clip.
9. Stop and admire the paper clip snake that you made!
10. Remove the paper clips and put them back into their container.
11. Return the container of paper clips to the left hand side of the tray.
12. Return the **magnet** to the right hand side of the tray.
13. The teacher shows the children where the tray will be kept.

Variations and Extensions:

1. Have the children measure their snakes.
2. Use different strengths of **magnets**.
3. Use different sizes of paper clips.

Points of Interest:

1. The length of the snake depends on the strength of the **magnet** and the size of the paper clips.

Control of Error:

1. The teacher

Aims:

1. Introduction to **magnets** as objects made of certain materials which create **energy** that helps us to do things."

Age:

2 ½ and up

Language:

Magnets, **energy**, clips, work, etc.

Physical Science
Magnets – Working as Energy
Activity – Magnets at Work in Our Life

Materials:

A tray containing:

→ (1) metal match box car (on left side of the tray)

→ (2) **magnets** in a container(in the center of the tray)

→ (1) rubber band in a container (on right side of the tray)

Presentation:

1. During circle time, say to the children, "Today, we are going to see **magnets** at work!"
2. The teacher should then say "I am going to take this metal match box car and put one of the **magnets** on top of the roof."
3. The teacher should then pick up the rubber band and say, "Now, I am going to wrap the rubber band around the **magnet** and the car so that they become one."
4. The teacher should pick up the last **magnet** and say, "We will now see how a **magnet** can work. I am going to take this **magnet** and put it behind the car without touching it to the car. The **magnet** is providing the energy to move this match box car!"
5. Invite the children one at a time to drive the car with the **magnet**.
6. When everyone has had a turn, return the materials to their places on the tray.
7. The teacher shows the children where the tray will be kept.

Variations and Extensions:

1. Have each child make a car and race them.
2. Use different strengths of **magnets**.
3. Use different sizes of metal cast cars.

Points of Interest:

1. The strength of the **magnet** makes it easier to move the car.

Control of Error:

1. The car won't go if the **magnet** isn't attached to the top of the car.
2. The car won't go if you don't hold a **magnet** behind the car.

Aims:

1. Introduction to **magnets** as objects made of certain materials which create **energy** that helps us to do things."

Age:

2 ½ and up

Language:

Magnets, **energy**, light, work, etc.

Physical Science
Air – Working as Energy
Introduction – General

Materials:

A tray containing:

→ (1) Picture of a windmill

→ (1) Picture of hot air balloon

→ (1) Picture of an airplane

Presentation:

1. During circle time, say to the children, "Today, we are going to talk about **air** as **energy**."
2. The teacher should then say "**Air** is everywhere. We can't see it. We can't touch it. But **air** will take the shape of the object it is in. **Air** can do work, so **air** is **energy**."
3. Say, "Today we are going to learn about how **air** helps us do things."
4. Invite the children to say, "**Air** can do work, so **air** is a form of **energy**."
5. Hold up the picture of a windmill while saying, "Did you know that windmills are powered by **air**? The wind is moving **air** and it turns the blades of the windmill. Some windmills grind wheat, raise water and make electricity. **Air** can do work, so **air** is a form of **energy**."
6. Hold up the picture of a hot **air** balloon while saying, "Did you know that a hot **air** balloon is used for travel? People take rides in hot **air** balloons! **Air** can do work, so **air** is a form of **energy**."
7. Hold up the picture of an airplane while saying, "Airplanes are used all over the world for people to travel from one place to another. **Air** works to make a plane lift and stay in the **air**."
8. Say, "Today we've learned that **air** can do work, so **air** is a form of **energy**."

Variations and Extensions:

1. Let the children cut out pictures in old magazines that show **air** working as **energy**.

Points of Interest:

1. **Air** is everywhere.

Control of Error:

1. **Air** is all around us.

Aims:

Introduction to **air** as **energy** and how it helps us to do things.

Age:

2 ½ and up

Language:

Air, energy, windmills, balloon, etc.

Physical Science
Air – Working as Energy
Activity – Occupies Space
What Does Air Look Like?

Materials:

A tray containing:

→ (1) paper lunch bag/sack, so that each child and teacher may have one.

Presentation:

1. During circle time, say to the children, "Today, we are going to see what **air** looks like!"
2. The teacher should then say "I am going to give each one of you a paper lunch bag which I would like you to place right in front of you on the rug."
3. The teacher should ask the children, "How can we tell there is **air** all around us? Can you see the **air**? Can you feel the **air** in front of you? Where is the **air**?"
4. Now the teacher should ask, "Did you know that you have **air** inside your body? You did know that? Well we do have **air** inside our lungs."
5. Invite the children to put the palms of their hands on their chest and to breath in and out. Then say, "When you breath in, **air** comes inside your body and goes to your lungs. When you breath out (exhale) the **air** goes outside your body."
6. The teacher should pick up her paper lunch bag and say, "Let's open our paper lunch bags and see if there is anything inside. I can't see anything can you?"
7. The teacher says, "Let's blow up our paper lunch bag with **air** from our lungs."
8. Everyone blows up their lunch sack and hold the top tight to keep the **air** inside. Now ask the children, "What is inside your paper lunch bag now? That's right, it is **air**!"
9. Say, "We can't see the **air** around us, but we can see the container that **air** is inside of."
10. "Today we've learned that **air** occupies space and we can see the shape of the container that is holding it."

Variations and Extensions:

1. Let the children cut out pictures in old magazines that show containers that **air** could be inside.
2. Inflate a balloon.

Points of Interest:

1. **Air** can be put inside of containers.

Control of Error:

1. **Air** is all around us.

Aims:

Introduction to **air** and how it occupies space.

Age:

2 ½ and up

Language:

Air, inflate, lungs, etc.

Physical Science
Air – Working as Energy
Activity – Moving Air – Fan

Materials:

A tray containing:

→ (1) sheet of paper

→ (1) control card (a 1" x 6" strip of paper with a line marked across the center lengthwise, with a red permanent pen, ½" from each side)

Presentation:

1. During circle time, say to the children, "Today, we are going to see **air** at work!"
2. The teacher should then say "I am going to make a fan I and put it to work. You can make one of these fans today if you would like to.
3. The teacher should then pick up the control card and point to the line and say, "This special little card is going to help me as I make my fan. This line is going to be important!"
4. The teacher should then pick up the piece of paper and laying the edge of the paper along the lengthwise line of the card, fold the paper on the 8 ½" side.
5. Now the teacher says, "I made a fold and now I need to turn the paper to the other side.
6. Continue to fold the paper back and forth until you are done.
7. When you are finished, say to the children, "I need to fold one of the long ends of the folded paper up to make a handle and keep the paper folded."
8. The teacher needs to hold onto the handle end and let go of the fan. Now she should fan herself.
9. The teacher then says, "This paper fan moves the **air** back and forth and now the **air** is working to cool the **air** down around my face!"
10. Show the children where the paper and control card are kept.
11. Invite the children to make a fan!

Variations and Extensions:

1. Have each child color/paint their fan.
2. Use different sizes/shapes of paper.
3. Use a staple or rubber band to secure the handle.

Points of Interest:

1. The larger the fan, the more **air** you move.
2. The faster you move the **air**, the faster it cools the **air** around you.

Control of Error:

1. The control card.

Aims:

Introduction to **air** as **energy** and how it helps us to do things.

Age:

2 ½ and up

Language:

Air, energy, fan, etc.

Physical Science
Air – Working as Energy
Activity – Moving Air – Wind Chimes

Materials:

A tray containing:

- → (1) child-sized plastic hanger (enough so each child and teacher may have one)
- → (1) control card (a picture of the wind chimes finished)
- → (6) objects (holes pre-drilled) to hang in a basket
- → (6) strings in a basket

Presentation:

1. During circle time, say to the children, "Today, we are going to see **air** at work!"
2. The teacher should then say "I am going to make wind chimes. They will let the **air** work to make a beautiful sound for us to listen to. You can make one of these wind chimes today if you would like to."
3. The teacher should then pick up the control card and point to the picture and say, "This picture shows me what I will need to make my wind chimes."
4. The teacher should say, "The first object in the picture is a seashell." Reach into the basket and pick a sea shell and place it on the left side of the table.
5. Now the teacher says, "The next object in the picture is a large bead." Reach into the basket and pick a bead. Place it to right of the seashell.
6. Continue until you have six objects lined up on the table (left to right).
7. Say, "Now I will need a string for each of my objects." Reach into the basket of strings and place one by each of the objects.
8. When you are finished, say to the children, "Now I just need 1 small hanger." Place the hanger above the objects and strings.
9. The teacher needs to hold up the first object and stick the end of one of the strings through the hole. The teacher says, "Now I need to tie a knot. If you can't tie knots yet, ask a teacher or older child to help you."
10. The teacher then ties the knot and then ties the other end of the string to the bottom bar of the hanger.

11. The teacher continues until all of the items have been hung from the hanger. She then says, "Let's take our wind chimes outside and hang them up."
12. Go and hang up the chimes. Say to the children, "You will soon hear the music the chimes make when the **air** moves. The wind will move the chimes so they touch each other and a musical sound will be made."
13. If the wind blows and the chimes work then say to the children, "The **air** is working as energy!" If the wind does not blow, they say, "Soon, the **air** will be working as energy!"
14. Show the children where the supplies and picture (control card) are kept.
15. Invite the children to make wind chimes!

Variations and Extensions:

1. Use different objects
2. Use different lengths of string

Points of Interest:

1. The stronger the wind the faster and longer the chimes sing.

Control of Error:

1. The picture (control card)

Aims:

Introduction to **air** as **energy** and how it helps us to do things.

Age:

2 ½ and up

Language:

Air, energy, wind, chimes, etc.

Physical Science
Air – Working as Energy
Activity – Moving Air – Windmill

Materials:

A tray containing:

- → (1) 6" square of heavy construction paper that has diagonal lines marked in pencil.
- → (1) penny
- → (1) pencil
- → (1) straight pin in a small container
- → (1) unsharpened pencil with an eraser on one end
- → (1) finished windmill

A control card made of a 24" square piece of foam core board containing:

A 6" square of heavy construction paper with lines drawn diagonally from corner to corner with a small circle that has been drawn in the center using a penny (glue square to the left side of the control card).

Another 6" square of heavy construction paper prepared as above, only now the lines have been cut part way down (glue about 2" from the right hand side of the first square being sure to leave the cut ends unattached).

Another 6" square of heavy construction paper prepared as above, only now the ends have been brought to the center and a straight pin has been stuck through and into the foam core board.

Presentation:

1. During circle time, say to the children, "Today, we are going to see **air** at work!"
2. The teacher should then say "I am going to make a windmill. This will be a small windmill. Large windmills can provide the power to grind wheat, move water and help make electricity! You can make a windmill today if you would like to."
3. The teacher should then pick up the control card and point to the first picture and say, "This picture shows me the first thing I need to do to make my windmill."

4. The teacher should say, "I need to place a penny in the center of my 6" square of paper. Now I need to take my pencil in one hand (dominant) and while holding the penny down with a finger from my other hand (non-dominant), trace around the outside edge."
5. Now the teacher says, "This next picture shows me that I need to use my scissors and cut partway down the lines from the corners in."
6. The teacher says, "The last picture shows me that I need to take each corner in turn and bring it down to the center. Then I need to take a straight pin and go through the center." Ask the children, "Am I going to stick my straight pin into this board?"
7. The teacher takes the completed windmill example and studies it. "I am going to push my pin into the eraser of a pencil just like this example."
8. The teacher folds down the outside corners to the center and takes a pin and says, "Pins are sharp on the pointy end. I need to be careful that I don't poke myself." Now, the teacher sticks the pin into the center and secures it in the eraser of the pencil.
9. Now the teacher holds up the windmill and blows gently and shows the children how the moving **air** makes the blades move.
10. Show the children where the supplies and picture card (control card) are kept.
11. Invite the children to make windmills!

Variations and Extensions:

1. Use different sized squares of paper
2. Decorate the paper with crayons or markers before making the windmill

Points of Interest:

1. Moving **air** makes the windmill move.
2. Young children might need the teachers help in securing the pin into the eraser.

Control of Error:

1. The picture (control card)

Aims:

Introduction to **air** as **energy** and how it helps us to do things.

Age:

2 ½ and up

Language:

Air, energy, windmill, etc.

Physical Science
Air – Working as Energy
Activity – Air Pressure
Pumping Up a Tire

Materials:

A tray containing:

→ (1) hand **air** pump

→ (1) bicycle tire (flat)

Presentation:

1. During circle time, say to the children, "Today, we are going to see **air** at work!"
2. The teacher should then say "I have a bicycle tire that is flat. I can't ride my bike until I inflate it."
3. The teacher should hold up the deflated tire and study it. Then she should pass around the deflated tire so the children can feel it.
4. The teacher should take the pump and hold it up so the children can see it. She should say, "This is an **air** pump. This is the bar (point to the bar) that I push down to pump **air** into this tube (point to the tube)." Now stand up and push the bar up and down so the children can see and hear the **air** being pumped into the tube.
5. The teacher should say, "This is the needle that goes into the tire (point to the needle). I am going to put this needle into this special place (point to the place on the tire). First I need to take the cap off the tire and then I can screw the needle on."
6. Next the teacher should say, "I am going to pump the **air** through this tube, through the needle, into the tire. Soon my tire will be filled with **air** and I will be able to ride my bicycle again!"
7. The teacher should slowly pump up the tire, stopping to feel the tire to see if it is full enough.
8. When the tire is full enough of **air** the teacher should say, "I can tell that the tire is full because I can feel how firm it is."
9. Invite the children to come and feel the tire.
10. Unscrew the needle from the tire and put the cap back on.
11. Today, we saw **air** at work helping us to do things!

Variations and Extensions:

1. Inflate a ball
2. Demonstrate an electrical pump
3. Older children might like to try and use the hand pump to inflate a tire or a ball.

Points of Interest:

1. **Air** pressure inflated the tire.

Control of Error:

1. Needing enough **air** to fill up the tire.
2. Securing the needle tightly so the **air** doesn't leak.

Aims:

Introduction to **air** as **energy** and how it helps us to do things.

Age:

2 ½ and up

Language:

Air, energy, pump, etc.

Physical Science
Air – Working as Energy
Activity – Air Pressure
Mashed Marshmallows

Materials:

A tray containing:

→ (1) bag of mini marshmallows
→ (1) 16 oz. empty soda bottle
→ (1) fizz-keeper pressuring pump

Presentation:

1. During circle time, say to the children, "Today, we are going to see **air** at work!"
2. The teacher should then say "I am going to show you another type of **air** pump and you will see what it can do!"
3. The teacher should then pick up the fizz-keeper pressuring pump.
4. The teacher should say, "This is a little pump. It is smaller than the pump we used to inflate the bicycle tire. Has anyone seen this pump at work before?"
5. Now the teacher picks up the empty bottle and says, "This is an empty soda bottle. This little pump fits into the opening of this bottle (show how it fits).
6. The teacher should say, "If I still had soda in this bottle, I could put this small pump into my bottle and by pushing **air** inside I could keep the bubbles and fizz in my soda."
7. The teacher picks up the bag of mini marshmallows and says, "This is a bag of mini marshmallow. Today I am going to fill my bottle half full of marshmallows."
8. The teacher then opens the bag and fills the bottle half full.
9. The teacher says, "Now, I am going to take my small pump and screw it onto my bottle."
10. After the teacher has attached the pump she says, "Watch how I push the pump up and down. **Air** is being pumped into the soda bottle. What do you think is going to happen to the marshmallows?"
11. After the children have had a few guesses, the teacher should pump up the bottle while saying, "As **air** goes into the bottle, the **air** gets closer together. That closeness is called ***air pressure.*** As the **pressure** builds what do you see happening to the marshmallows?"

12. At this point the teacher takes the bottle around to the children that are sitting down so they can see the inside.
13. The teacher should say, "Yes, the marshmallows are being pressed into one big glob! The **air pressure** is mashing the marshmallows!"
14. Explain to children that **air pressure** can be dangerous. Say, "This is an experiment that the teacher needs to do and not children because it can be dangerous. Do you know what would happen if I pumped too much **air** into this soda bottle? Yes, it could explode and we could be hurt by flying pieces of plastic from the soda bottle."

Variations and Extensions:

1. Inflate a larger soda bottle

Points of Interest:

1. **Air pressure** inflated the bottle and mashed the marshmallows.

Control of Error:

1. Needing enough **air** to fill up the soda bottle.
2. Not pumping too much **air** so that the bottle explodes.

Aims:

Introduction to **air** as **energy** and how it helps us to do things.

Age:

2 ½ and up

Language:

Air, energy, pump, pressure, etc.

Physical Science
Air – Working as Energy
Activity – Dancing Ping Pong Balls

Materials:

A basket containing:

→ Ping pong balls (enough so that each child and the teacher can have one)

→ Funnels (inexpensive plastic ones, enough so that each child and the teacher can have one)

Presentation:

1. During circle time, say to the children, "Today, we are going to see **air** at work!"
2. The teacher should then say, "I am going to show you that you can move **air** and make ping pong balls dance!"
3. The teacher should then pick up a funnel from the basket.
4. The teacher should hold the funnel up and point out the hole at the bottom to the children.
5. The teacher should say, "This is a funnel."
6. Now the teacher picks up a ping pong ball from the basket.
7. The teacher should hold the ball up so the children can see it.
8. The teacher should say, "This is a ball that is used in a game called Ping Pong. This is a ping pong ball."
9. Now the teacher should put the ball in the bowl part of the funnel and say, "I have put my ball in the bowl of my funnel. Now I am going to make the **air** move and the **pressure** is going to make my ping pong ball dance."
10. At this point, the teacher should hold up the funnel and blow through the hole and make the ball bounce up and down. The teacher asks, "Can you see my ball dancing?"
11. The teacher picks up the basket and passes out the funnels and balls and invites the children to make their ping pong balls dance.
12. After all of the children have had fun making their balls dance, ask them to put the funnel and ball down in front of them on the rug.
13. The teacher should say, "Today, we have seen **air** working."
14. The teacher gathers up the funnels and balls and takes them over to the Practical Life area so the children can wash and dry them.

Variations and Extensions:

1. Invite the children to take home their funnel and ball so they can share what they have learned about **air pressure**.

Points of Interest:

1. The realization that we can make **air** move.
2. Dancing ping pong balls!

Control of Error:

1. Teacher is the example.

Aims:

Introduction to **air** as **energy** and how it helps us to do things.

Age:

2 ½ and up

Language:

Air, energy, pressure, blow, etc.

Physical Science
Air – Working as Energy
Activity – Air Power Racers

Materials:

A tray containing:

→ (2) straws

→ (1) small play car

→ (1) piece of thin cardboard cut into a shape for a sail (i.e. rectangle). Be sure to mark to x's for where the holes should be punched for the straw.

→ (1) walnut size piece of play clay on a small dish

→ Decorations (stickers, glitter pens, markers, crayons, paints, etc.)

→ Single hole punch

Presentation:

1. During circle time, say to the children, "Today, we are going to see **air** at work!"
2. The teacher should then say "I am going to show you that you can move **air** and make an **air** power racer!"
3. The teacher should then pick up a play car from the tray.
4. The teacher should hold the play car up and studies it.
5. The teacher should say, "This is a play car." Now the teacher puts the car down in front of her.
6. Now the teacher picks up the piece of clay from the dish and rolls it into a ball and pushes it so that it sticks to the top of the play car. The teacher says, "I made a ball out of the clay and stuck it to the top of the car."
7. The teacher should pick up one of the straws and lay it down by the car.
8. The teacher should say, "Now, we need to make a sail for this is going to be a power racer!"
9. The teacher takes a pre-cut piece of light cardboard and decorates it. Then using the hole punch, she punches a hole where the first "x" was marked. Then she punches the second "x".
10. Now the teacher should say, "My sail is decorated and punched. I need to thread my straw through the holes. I am ready to stick the bottom end of the straw into the clay so it will stand up."
11. At this point, the teacher should stick the straw into the clay and then holds the car up so everyone can see it.

12. The teacher puts the car back on the floor and picks up the other straw. She then says, "I am going to make my power racer move by blowing **air** through my straw while aiming it at the sail."
13. The teacher makes the car move!
14. The teacher should say, "Today, we have seen **air** working."
15. Show the children where the supplies are kept.
16. Invite the children to make power racers!

Variations and Extensions:

1. Use larger vehicles.

Points of Interest:

1. The realization that we can make **air** move.

Control of Error:

1. Teacher is the example.

Aims:

Introduction to **air** as **energy** and how it helps us to do things.

Age:

2 ½ and up

Language:

Air, energy, pressure, blow, etc.

Physical Science
Air – Working as Energy
Activity – Personal Windsock

Materials:

A tray containing:

- → Plain (may be waxed – the glue from the stick will stay) paper cup – with the bottom cut out
- → Stickers
- → Variety of colored 1" x 6" strips of tissue paper
- → Glue stick
- → Single hole punch
- → (1) piece of yarn 12" long

A completed windsock

Presentation:

1. During circle time, say to the children, "Today, we are going to see **air** at work!"
2. The teacher should then say "I am going to show you how you can make a windsock that you can hang outside. When the wind moves the **air**, the windsock will dance around!
3. The teacher should then pick up the paper cup from the tray.
4. The teacher holds up the control chart that has 4 stickers on it and says, "This shows me that I can pick out 4 stickers to put on my cup."
5. The teacher then lays the control card down in front of her and chooses a sticker and places it on top of the first sticker on the left hand side of the card.
6. She repeats step 5 until all 4 stickers have been chosen and placed on the control card.
7. Now the teacher takes each sticker and puts it on the cup.
8. The teacher holds up the cup and admires it!
9. Now the teacher takes the lid off her glue stick and places it on the table.
10. The teacher says, "It is time to glue on the streamers."
11. She picks a strip of paper and dabs the glue stick on the rim of the cup and sticks the tissue strip to it.
12. The teacher repeats step 11 until the rim has been covered with strips.

13. Now, the teacher says, "I am taking my single hole punch and carefully punch a hole below the top rim. I am going to do the same on the other side of my cup." The teacher holds up the yarn and says, "I am going to thread the yarn through the top holes and make a knot."
14. Invite the children to go outside with you to hang up the windsock. Say to the children, "You will soon see the windsock streamers move when the **air** moves."
15. If the wind blows and the streamers move, then say to the children, "The **air** is working as energy!" If the wind does not blow, they say, "Soon, the **air** will be working as energy!"
16. Show the children where the supplies are kept.
17. Invite the children to make a windsock!

Variations and Extensions:

1. Use different sizes of cups
2. Use different lengths of streamers
3. Use fabric for streamers

Points of Interest:

1. The stronger the wind the faster and longer the streams move.
2. How pretty the streamers are in the wind.

Variations and Extensions:

1. Invite the children to take home their windsock so they can share what they have learned about **air.**

Points of Interest:

1. The realization that the wind can make **air** move.

Control of Error:

1. Teacher is the example.
2. The completed sample of a windsock.

Aims:

Introduction to **air** as **energy** and how it helps us to do things.

Age:

2 ½ and up

Language:

Air, energy, windsock, streamers, blow, etc.

Physical Science
Water – Working as Energy
Introduction

Materials:

A tray containing:

→ (1) Picture of a waterwheel

→ (1) Picture of a dam or turbine (steam engine)

Presentation:

1. During circle time, say to the children, "Today, we are going to talk about **water** as **energy**."
2. The teacher should then say "**Water** can be found in many places. We can see it. We can touch it. **Water** will take the shape of the object it is in. **Water** can do work, so **water** is **energy**."
3. Say, "Today we are going to learn about how **water** helps us do things."
4. Invite the children to say, "**Water** can do work, so **water** is a form of **energy**."
5. Hold up the picture of a waterwheel while saying, "Did you know that waterwheels are powered by **water**? **Water** turns the blades of a waterwheel.
   Some waterwheels move **water** and power other objects (i.e. boats) and some make electricity. **Water** can do work, so **water** is a form of **energy**."
6. Hold up the picture of a dam or turbine engine while saying, "Did you know that **water** can be turned into steam that can power a turbine engine. These engines can make electricity."
7. Say, "Today we've learned that **water** can do work, so **water** is a form of **energy**."

Variations and Extensions:

1. Let the children cut out pictures in old magazines that show **water** working as **energy**.

Points of Interest:

1. **Water** can be found in many places.

Control of Error:

1. **Water** is something we use everyday.

Aims:

Introduction to **water** as **energy** and how it helps us to do things.

Age:

2 ½ and up

Language:

Water, energy, waterwheels, dams, electricity, etc.

Physical Science
Water – Working as Energy
Activity – What Shape am I?

Refer to the presentation on page 31 – The Many Shapes of **Water**.

Physical Science
Water – Working as Energy
Activity – What Do I Feel Like?

Materials:

A table set up containing from left to right:

→ Paper napkins cut into fourths (enough for each child and teacher to have 1)

→ Bowl of room temperature **water**

→ Bowl of crushed ice

→ Bowl of warm **water**

→ Trash can (set on the floor by the right leg of the table)

Presentation:

1. During circle time, say to the children, "Today, we are going to see what **water** feels like."
2. The teacher should then say, "I am going to show you that **water** may be at different temperatures, but it is still just **water**!"
3. The teacher should then take the children over to the **water** table that she has set up.
4. The teacher picks up one section of paper napkin with one hand.
5. The teacher should hold up her index finger (doesn't matter which hand).
6. The teacher should say, "I am going to dip this finger into the first bowl of **water** and see how it feels."
7. Slowly, the teacher moves her finger in the bowl and then takes her finger out and dries it gently with the napkin.
8. The teacher says, "That feels like **water**. It is wet."
9. Now the teacher should say, "I am going to dip this finger into the second bowl of **water** and see how it feels."
10. Slowly, the teacher moves her finger in the bowl and then takes her finger out and dries it gently with the napkin.
11. The teacher says, "That feels like **water** that has been turned to ice! It is wet. It is cold!"
12. Now the teacher says, "I am going to dip this finger into the third bowl of **water** and see how it feels."
13. Slowly, the teacher moves her finger in the bowl and then takes her finger out and dries it gently with the napkin.
14. The teacher says, "That feels like **water** that has been made warm! It is wet."

15. The teacher puts her napkin in the trash can.
16. The teacher says, "I like the way **water** feels."
17. The teacher should say, "Today, we discovered what **water** felt like."
18. Invite the children to take turns and repeat the activity.

Variations and Extensions:

1. Pour different temperatures of **water** over your hand.

Points of Interest:

1. The realization that ice is **water**.
2. **Water** can be different temperatures and still be **water**.

Control of Error:

1. Teacher sets the table up correctly.

Aims:

Introduction to **water** as **energy** and how it helps us to do things.

Age:

2 ½ and up

Language:

Water, ice, warm, cold, etc.

Physical Science
Water – Working as Energy
Activity – What Do I Sound Like?

Materials:

A table set up containing from left to right:

→ (1) metal teaspoon

→ (4-6) **water** glasses the same size (the first glass should hold 1" of **water**, the 2nd glass 2" of **water**, etc.)

Presentation:

1. During circle time, say to the children, "Today, we are going to see **water** at work!"
2. The teacher should then say, "I am going to show you how you can make **water** music!"
3. The teacher should then take the children over to the **water** table that she has set up.
4. The teacher points to the first glass and says, "There is a small amount of **water** in my first glass."
5. The teacher points to the next glass and says, "There is more **water** in this glass."
6. The teacher points to the next glass and says, "There is even more **water** in this glass."
7. "Look at each glass of **water**," the teacher says, "Every glass has more **water** in it than the last glass!"
8. Now the teacher should pick up the metal teaspoon.
9. The teacher says to the children, "I am going to make music by tapping each glass gently with my metal teaspoon."
10. Now, the teacher should gently tap the rim of the first glass. She pauses and repeats the tap.
11. The teacher then says, "Could you hear the tone I made? It sounded beautiful to me."
12. Now, the teacher repeats adding on each glass.
13. The teacher continues with each glass in the same way until the last glass containing **water** has been tapped.
14. The teacher says, "I like the **water** music I am making."
15. The teacher should say, "Today we've listened to **water** working to make music. **Water** can do work, so **water** is a form of **energy**."
16. Invite the children to take turns and repeat the activity.

Presentation 2:

Tap the glasses in mixed order.

Presentation 3:

Place the glasses in mixed order.

Variations and Extensions:

1. Mark the **water** levels on the glasses and add a pitcher (with **water** or have the child go and fetch the **water**).
2. Use a different object to gently tap the glasses with to see if the sound changes.
3. Use different sizes of glasses that are all the same.
4. Use a mixture of different sizes of glasses.

Points of Interest:

1. The realization that you can make a musical sound with **water**.

Control of Error:

1. Teacher sets the table up correctly.

Aims:

Introduction to **water** as **energy** and how it helps us to do things.

Age:

2 ½ and up

Language:

Water, music, etc.

Physical Science
Water – Working as Energy
Activity – Downhill & Uphill Tubes

Materials:

A table set up containing:

→ (1) bricks or large blocks of wood

→ (1) rectangular plastic container (i.e. a plastic under-the-bed box)

→ (1) plastic (PVC) pipe, 3" shorter than the length of the plastic container.

→ (2) pitchers of **water**

→ (1) tray holding a small sponge on a soap dish and a washcloth

Presentation:

1. During circle time, say to the children, "Today, we are going to see **water** at work!"
2. The teacher should then say, "I am going to show you how you how **water** flows!"
3. The teacher should ask the children, "Have you ever seen **water** flowing? Yes, **water** flows in streams and rivers. Which way was the **water** flowing? Can **water** flow uphill?"
4. The teacher should then take the children over to the **water** table that she has set up.
5. The teacher says, "Let's see for ourselves how **water** flows!"
6. The teacher puts the brick/block of wood under one end of the plastic container.
7. Now, the teacher places the pipe inside of the container.
8. The teacher asks a child to assist her by holding the pipe so that the end doesn't touch the bottom of the plastic container.
9. The teacher slowly and correctly (as shown in practical life exercises) pours the **water** from the pitcher inside the pipe.
10. As the **water** flows through the pipe, the teacher says, "Is the **water** flowing uphill or downhill?"
11. The teacher says, "Do you think **water** can move uphill?"
12. The teacher says, "**Water** will always flow downhill."
13. Finally, the teacher says, "Do you think that **water** can be put to work because it flows downhill?"
14. Talk to the children about how farmers can direct the **water** that flows downhill through pipes to help **water** their crops.
15. The teacher empties the water from the basin.
16. The teacher cleans up the drips with the sponge.

17. The teacher dries the pitcher, basin and pipe with the washcloth.
18. The teacher should say, "Today we've learned that **water** flows downhill**. Water** can do work, so **water** is a form of **energy**."

Variations and Extensions:

1. Invite the children to work in small groups and repeat the experiment.
2. Invite the children to work in small groups and try to figure out how they could get the **water** to flow uphill.
3. Take a field trip to an old mill with a **waterwheel**.

Points of Interest:

1. The realization that **water** will always flow downhill.

Control of Error:

1. Teacher sets the table up correctly.

Aims:

Introduction to **water** as **energy** and how it helps us to do things.

Age:

2 ½ and up

Language:

Water, flow, etc.

Physical Science
Water – Working as Energy
Activity – Making a Waterwheel

Materials:

A tray containing:

→ (1) 6" paper plate (prepared as seen on pattern/diagram)

→ (1) pencil

→ (1) child-sized scissors

→ (1) sink with running cold **water**

→ (1) tray holding a small sponge on a soap dish and a washcloth

Presentation:

1. During circle time, say to the children, "Today, we are going to see **water** at work!"
2. The teacher should then say, "I am going to show you how moving **water** can do work!"
3. The teacher says to the children, "We are going to make a **waterwheel**."
4. The teacher should then pick up the paper plate that has been prepared beforehand and say, "I am going to use my scissors to cut on these dotted lines (see pattern)."
5. Next, the teacher folds the sections clockwise (see diagram) so that each section forms a cup.
6. The teacher pushes the point of the pencil through the center of the circle.
7. Now, the teacher says "Let's see if our **waterwheel** works."
8. The teacher invites the children over to sink and turns on the cold **water** so that a small stream of **water** is running.
9. Now, the teacher places the **waterwheel** (cup sections are pointing up) under the faucet and lets the stream of **water** fall into the cups.
10. Watch the **water** turn the **waterwheel**.
11. Ask the children, "What is making the **waterwheel** turn?"
12. Finally, the teacher says, "Do you think that a **waterwheel** can be put to work because it moves **water**?"
13. Talk to the children about how the **waterwheel** moves **water** which in turn can be used to make electricity.

14. The teacher cleans up the drips with the sponge.
15. The teacher dries the plate and pencil with the washcloth.
16. The teacher should say, "Today we've learned that **water** can move **water. Water** can do work, so **water** is a form of **energy**."
17. Invite the children to make **waterwheels**!

Variations and Extensions:

1. Have the children make different sized **waterwheels**.
2. Take a field trip to a mill with a **waterwheel**.

Points of Interest:

1. The realization that moving **water** can be put to work.

Control of Error:

1. Teacher sets the table up correctly.

Aims:

Introduction to **water** as **energy** and how it helps us to do things.

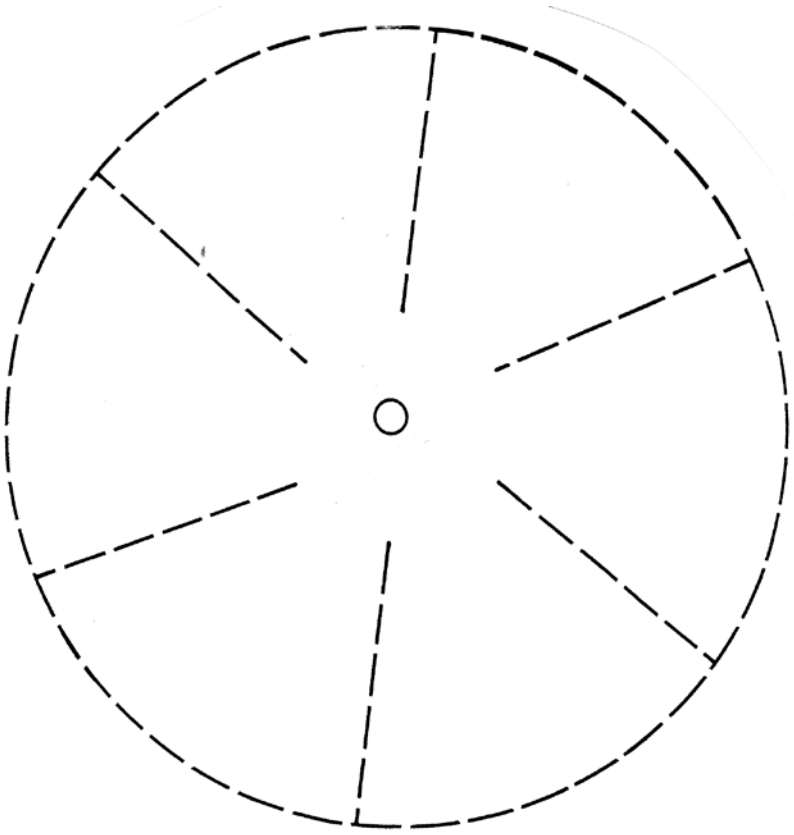
Age:

2 ½ and up

Language:

Water, waterwheel, etc.

Waterwheel Diagram



Physical Science
Water – Working as Energy
Activity – House of Plants

Materials:

A table set up containing from left to right:

→ (1) 2 liter clear plastic soda pop bottle (cut off top third)
→ small rocks or gravel
→ activated charcoal
→ household potting soil
→ small branches, moss, shells
→ small plants
→ plastic wrap
→ pitcher of **water**

→ Trash can (set on the floor by the right leg of the table)

Presentation:

1. During circle time, say to the children, "Today, we are going to see **water** at work!"
2. The teacher should then say, "I am going to show you how **water** can do work!"
3. The teacher says to the children, "We are going to make a **terrarium**. Can you say **terrarium**?"
4. Now the teacher says, "A **terrarium** is a special house for plants. It's where **water** can be used over and over again. **Water** is at work in a **terrarium**."
5. Now, the teacher says "Let's go to our science table and make a **terrarium**."
6. The teacher holds up the container and says, "This is the container that we are going to use for our **terrarium**."
7. The teacher places gravel in the bottom of the container and says, "This gravel will help the plants so their roots don't stand in **water**."
8. The teacher holds up the activated charcoal and places a thin layer on top of the gravel and says, "This is charcoal, it will help keep our **terrarium** fresh smelling."

9. The teacher holds up the potting soil and adds about 2" on top of the charcoal. She says, "This is the soil that our plants will live in."
10. Next the teacher gently puts the plants into the soil and says, "These are our plants (introduce the plant names)."
11. The teacher says, "Next we add some **water**, but not too much."
12. "Now," the teacher says, "we will decorate our new plant home."
13. The teacher places a few rocks, branches, moss, shells, etc.
14. The teacher says, "Now our **terrarium** needs a cover to keep the **water** working inside."
15. The teacher places the plastic wrap over the top and makes a few very small holes in the wrap.
16. Talk to the children about how the plants should be placed where it is light but not sunny.
17. Talk to the children about how the **water** will be working in the enclosed container.
18. The teacher should say, "Today we've learned that **water** can work by continually feeding plants in a **terrarium**. **Water** can do work, so **water** is a form of energy."
19. Invite the children to make a t**errarium** of their own!

Variations and Extensions:

1. Have the children help you to make a larger t**errarium** for the classroom.
2. Have the children make a roly-poly habitat/t**errarium**.

Points of Interest:

1. The realization that **water** can be put to work in different ways.

Control of Error:

1. Teacher sets the table up correctly.

Aims:

Introduction to **water** as **energy** and how it helps us to do things.

Age:

2 ½ and up

Language:

Water, terrarium, etc.

Physical Science
Moving Air and Water
Working as Energy
Introduction – General

Materials:

A tray containing:

→ (1) Picture of a kite
→ (1) Picture of a wind instrument (i.e. flute)
→ (1) Picture of a sailboat
→ (1) Picture of a fountain
→ (1) Picture of a tree

Presentation:

1. During circle time, say to the children, "Today, we are going to talk about **moving air and water** as **energy**."
2. The teacher should then say "**Air** is everywhere. **Water** is available. **Air and Water** can do work, so **moving air and water** can produce **energy**."
3. Say, "Today we are going to learn about how **moving air and water** helps us do things."
4. Invite the children to say, "**Moving air and water** can produce **energy**."
5. Hold up the picture of a kite while saying, "Did you know that kites are powered by **moving air**? The wind is moving **air** and it keeps our kite flying in the sky. **Moving air** can do work, so **moving air** can produce **energy**."
6. Hold up the picture of a flute while saying, "Did you know that a **moving air** is what produces the beautiful music that comes from a flute? People blow air into a flute and musical notes can be heard! **Moving air** can do work, so **moving air** can produce **energy**."
7. Hold up the picture of a sail boat while saying, "Sailboats can be found all over the world! People love to sail from one place to another**. Moving air** works against the sail to power the boat. **Moving air** can do work, so **moving air** can produce **energy**."
8. Hold up the picture of a fountain while saying, "Fountains are great fun to watch. Have you ever seen a fountain? **Moving water** works as it is directed through pipes**. Moving water** can do work, so **moving water** can produce **energy**."

9. Hold up the picture of a tree while saying, "Trees are plants and plants are fun to watch grow. Trees give us shade. Some trees give us fruit. Living plants need **water** to grow and **moving water** works as it is directed up through the roots of a tree. **Moving water** can do work, so **moving water** can produce **energy**."
10. Say, "Today we've learned that **moving air and water** can do work, so moving **air and water** can produce **energy**."

Variations and Extensions:

1. Let the children cut out pictures in old magazines that show **moving air and water** working as **energy**.

Points of Interest:

1. Sometimes we don't notice the power of **moving air and water**.

Control of Error:

1. Pictures

Aims:

Introduction to **moving air and water** as **energy** and how it helps us to do things.

Age:

2 ½ and up

Language:

Air, water, energy, etc.

Physical Science
Moving Air and Water
Working as Energy
Activity – Balloon Race

Materials:

A table set up containing:

→ (2) round balloons that have been inflated and tied off

→ (2) hand held hair dryers

Presentation:

1. During circle time, say to the children, "Today, we are going to see **moving air** at work!"
2. The teacher should then say, "I am going to show you how you how **moving air** can keep an object in the **air!"**
3. The teacher should say to the children, "We are all going to have a chance to be in a balloon race (be sure you respect any child that would like to pass and not participate)."
4. The teacher should then take the children over to the **balloon racing** table that she has set up.
5. The teacher says, "Let's see for ourselves how **moving air** can work!**"**
6. The teacher invites the child next to her to stand up and hold one of the balloons.
7. The teacher holds the other balloon and says to the other child, "Let's hold the balloons next to each other and drop them and see what happens!"
8. The balloons drop to the ground.
9. Now, the teacher says to the child holding the other balloon, "Let's drop the balloon and blow air from our lungs through our mouths and see who can keep their balloon up the longest."
10. The teacher points out how difficult it was to try and keep the balloon up in the air.
11. The teacher asks the other child if it was difficult to keep the balloon up in the air.
12. Now, the teacher says to the child holding the other balloon, "Let's use a blow dryer and see what happens if we aim moving air at our balloons."
13. The teacher helps the child turn on the hair dryer (cool air only) and she turns on hers.
14. The teacher says, "Get ready, set, GO!"

15. The teacher and the child try and keep their balloons up as long as they can.
16. Say, "Today we've learned that **moving air and water** can do work, so moving **air and water** can produce **energy**."
17. Invite the children to repeat the experiment.

Variations and Extensions:

1. Use a ping pong ball

Points of Interest:

1. The realization that **moving air** can keep objects up in the air.

Control of Error:

1. Teacher sets the table up correctly.

Aims:

Introduction to **moving air and water** as **energy** and how it helps us to do things.

Age:

2 ½ and up

Language:

Air, water, energy, etc.

Physical Science
Moving Air and Water
Working as Energy
Activity – Water Ping Pong

Materials:

A table set up containing:

→ (1) plastic tub filled with water and a ping pong ball

A tray on the table containing:

→ (1) container holding drinking straws

→ (1) small soap dish holding a small sponge (about 2" square)

→ Trash can (set on the floor by the right leg of the table)

Presentation:

1. During circle time, say to the children, "Today, we are going to see **moving air** at work!"
2. The teacher should then say, "I am going to show you how you how **moving air** can move another object across **water**."
3. The teacher should say to the children, "We are all going to have a chance to play **Water** Ping Pong (be sure you respect any child that would like to pass and not participate)."
4. The teacher should then take the children over to the **water** table that she has set up.
5. The teacher says, "Let's see for ourselves how **moving air** can work!**"**
6. The teacher picks out a straw and tries to blow **air** through the straw while aiming at the ping pong ball. She tries to blow the ball across the **water** to the other side of the tub.
7. Now, the teacher takes her straw and throws it in the wastebasket.
8. The teacher wipes up any drips with the sponge and then returns it (sponge) to the soap dish, which is on the tray.
9. The teacher invites the child next to her to take a turn.
10. After the child is finished, the teacher says, "Today we've learned that **moving air** can do work, so **moving air** can produce **energy**."
11. Invite the children to repeat the experiment.

Variations and Extensions:

1. Use a paper boat

Points of Interest:

1. The realization that **moving air** can move objects on **water**.

Control of Error:

1. Teacher sets the table up correctly.

Aims:

Introduction to **moving air** as **energy** and how it helps us to do things.

Age:

2 ½ and up

Language:

Air, energy, etc.

Physical Science
Moving Air and Water
Working as Energy
Activity – Blue Celery

Materials:

A tray on a table containing:

→ (1) stalk of celery with the wide end trimmed

→ (1) glass jar of water

→ (1) bottle of liquid blue food coloring

Presentation:

1. During circle time, say to the children, "Today, we are going to see **moving water** at work!"
2. The teacher should then say, "I am going to show you how **moving water** can move up through a plant to provide it with moisture so it can grow."
3. The teacher should then take the children over to the **science** table that she has set up.
4. The teacher says, "Let's see for ourselves how **moving water** can work!**"**
5. The teacher takes the glass jar of **water** and says to the children, "The **water** in this glass jar is going to **move** up this stalk of celery." The teacher puts the glass of water down on the tray.
6. The teacher picks up the blue food color and says, "This is blue food coloring. Cooks use it to color frosting, cookies, and other good things to eat. Today we are going to add blue food coloring to our glass jar of water.
7. The teacher removes the lid of the food coloring and adds some to the water in the glass jar.
8. The teacher picks up the stalk of celery and says, "This is celery. It is a vegetable. It is good to eat! If this celery were still growing in the ground, it would need moisture to continue growing.
9. Now, the teacher takes the celery and cut side first, she stands it up in the glass of **water**.
10. The teacher wipes up any drips with the sponge and then returns it (sponge) to the soap dish, which is on the tray.
11. The teacher places the glass jar on a shelf/table so everyone can see it. "We are going watch our stalk of celery today. Soon we will see the blue **water moving** up the plant.

12. "Today we are learning that **moving water** can do work, so **moving water** can produce **energy**."
13. Invite the children to repeat the experiment.

Variations and Extensions:

1. Use a white carnation or other white flower.

Points of Interest:

1. The realization that **moving water** can provide moisture to plants so they can continue to grow.

Control of Error:

1. Teacher sets the table up correctly.

Aims:

Introduction to **moving water** as **energy** and how it helps us to do things.

Age:

2 ½ and up

Language:

Water, energy, etc.

Physical Science
Moving Air and Water
Working as Energy
Activity – Duck, Duck, Squirt

Materials:

A table set up containing:

→ (1) plastic tub filled with water

→ (1) rubber ducky

A tray on the table containing:

→ (1) plastic bottle that squirts – filled with water

→ (1) small soap dish holding a small sponge (about 2" square)

Presentation:

1. During circle time, say to the children, "Today, we are going to see **moving water** at work!"
2. The teacher should then say, "I am going to show you how **moving water** can move another object across **water**."
3. The teacher should say to the children, "We are all going to have a chance to play Duck, Duck, Squirt! (Be sure you respect any child that would like to pass and not participate)."
4. The teacher should then take the children over to the **water** table that she has set up.
5. The teacher says, "Let's see for ourselves how **moving water** can work!**"**
6. The teacher picks up the squirt bottle and squirts water at the ducky. She tries to move the duck across the **water** to the other side of the tub.
7. Now, the teacher takes her squirt bottle and places it back on the tray that is on the table.
8. The teacher wipes up any drips with the sponge and then returns it (sponge) to the soap dish, which is on the tray.
9. The teacher invites the child next to her to take a turn.
10. After the child is finished, the teacher says, "Today we've learned that **moving water** can do work, so moving **water** can produce **energy**."
11. Invite the children to repeat the experiment.

Variations and Extensions:

1. Use a different object

Points of Interest:

1. The realization that **moving water** can move objects on **water**.

Control of Error:

9. Teacher sets the table up correctly.

Aims:

Introduction to **moving water** as **energy** and how it helps us to do things.

Age:

2 ½ and up

Language:

Water, energy, etc.