Physical Science Curriculum for 3-6 year olds in a Montessori Classroom

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Contents

Introduction

Those who study physics say physics is everywhere and is everything. It is the study of how the world (matter and energy) behaves and why. Our world is changing so fast that the only certainty for educators is the fact that whatever is taught now will be obsolete by the time the young children of today grow up. Providing young children with experience in observing natural phenomena, talking about it, making predictions and guesses, as well as seeking possible explanations is one way we can get them ready for the future.

From Piaget we learn that the three to six year old child is pre-operational. This child learns and forms concepts by interacting with the environment. Only after the child has had the sensory-motor *experience* is it appropriate to affix language, or move into the abstract world of print.

From Vygotsky we have the idea of the zone of proximal development. That is, a "tool" used at the right moment, such as during or after an experience will aid cognitive growth. Language "scaffolding" can be such a tool, as can be the materials used to demonstrate new ideas.

The goal of this curriculum is to present the basic concepts of physics in a systematic and comprehensive way, empowering teachers to include physics in their classrooms, even though they themselves may not have a strong background in the subject. The ultimate goal is to enable more children to have experience with physics activities.

Just as subjects in a Montessori classroom are integrated so are the different areas of physics. The following activities are grouped together according to general topic, but it is wise to be aware of overlap.

The best way to use this manual is to prepare the activities at the beginning of the year, thus being ready to introduce them to an individual or small group of children at the 'teachable moment'. Begin a lesson with an invitation to the child or by obtaining consent. Give the child the name of the activity and/or the material being used. Recall that the language given with a presentation depends on the child's development and the amount of experience that child has had with the material. Always keep the materials clean and in perfect repair. If something needs cleaning or repair remove it from the environment and make the necessary adjustments.

Please note that these activities are best suited to extended day children from ages four and a half to six. Younger children will probably want to perform these activities after seeing their older classmates do so. This is fine. There is always something a child can do with these

activities and still get something out of it. You might demonstrate how to hold and carry various apparatus, or to name the pieces of equipment. Apparatus often needs washing or filling which require the practical life skills all young children need to exercise.

Forms of Matter

Matter has three forms: solid, liquid, and gas. A fourth form, plasma, is very rare.

Solid/Liquid/Gas Activities

1) Solid/Liquid/Gas

Materials:

Children and an open space

Procedure:

Children gather in a circle holding hands. Have them squeeze very tightly together and say, "Solids are made of molecules that are very close together".

Next have them stretch out arms while continuing to hold hands. Say, "Liquids are made of molecules that are further apart".

Finally have them stand with fingertips barely brushing one another. Say, "Gases are made from molecules that are barely touching one another".

*Note: It is neither necessary nor desirable to define molecule at this time. Should a child ask you might say molecules are little tiny things that we can't see with our eyes. We need a microscope to see them. They make up solids, liquids, and gases.

Point of Interest: Touching the fingers of the children.

Control of Error: Maintaining the circle.

2) Solids/Liquids/Gases

Materials:

A basket containing 9 identical bottles:

three bottles of gases (may be empty)

three bottles of liquid (water, tea, colored water)

three bottles of solids (wood, clay, cloth etc.)

The bottom of the bottles should be marked with colored dots of the universal color symbol: solid - black; liquid - blue; gas - red. Caps should be permanently fixed to the bottles so they cannot be opened.

Three labels saying solid, liquid, gas with appropriate universal symbols.

Procedure:

Lay out the labels on a rug.

Take one bottle at a time, examine the contents carefully, and place it under the appropriate label, saying the name of the label clearly (e.g.. "solid").

Continue until all bottles are sorted.

Turn the bottles over to 'check' that they match the universal symbols.

Return the bottles to their basket.

Invite the child to repeat the exercise.

Point of Interest: The interesting contents of the bottles.
Control of Error: The colored universal symbols.

Extensions:

Encourage an informal discussion about the characteristics of solids, liquids, and gases.

The child may bring items from the environment and sort them under the appropriate labels.

The child may make a 'book' by using red, blue, and black stickers, or by drawing the symbols, or by using red, blue, and black colored paper for the pages. The pictures may be cut from magazines or drawn by the child and placed on the appropriate page.

3) Solid/Liquid/Gas

Materials:

ice cube tray

juice

Procedure:

Have children help pour juice into the ice cube tray. Comment on the juice being wet. Say, “juice is a liquid”. After the tray is filled with juice place it in the freezer. When the juice has frozen solid remove the tray from the freezer and eat the popsicles. Comment on the juice being now solid. Say, “popsicles are solid”.

4) Solid/Liquid/Gas

Materials:

a hot plate, or stove
a whistling teapot

Procedure:

Place a small amount of water in the teapot, commenting on the fact that the water is a liquid. Place the teapot on the hot plate and wait until it boils. The children will see the steam (water vapor) coming from the teakettle. Point out that the heat has changed the water into a gas. We call it water vapor. Allow the water to boil until dry. Demonstrate that the teapot is empty by tipping it over. Ask the children where they think the water went.

Activities with Liquids - Water

1) Water

you need:

- **a collection of objects**
- **a bowl of water**
- **a towel**
- **tongs**
- **cards that say *sink* and *float***

1. Place an object in the water.

2. Observe whether it sinks or floats.

3. Remove the object with the tongs, dry it off and put it under the appropriate card.

4. Do the same thing with all the objects.

What do you observe?

Some objects float; other objects sink.

2) Water

you need:
- **two clear pots of water**
- **a plastic tube**
- **a water pitcher**
- **a two-inch platform like a block**

1. Put the pots next to each other.

2. Pour water half full in one pot and three-quarters full in the other.

3. Fill the tube with water and place one end in each pot.

4. Put the two-inch platform under one of the pots.

What do you observe?

The water levels become the same. We say they "equalize".

3) Water

you need:

- **a plastic tube**
- **a sprinkling bottle top**
- **a funnel**
- **a pitcher of water**
- **a pan to catch the water**

1. Put the sprinkling bottle top on one end of the tube.

2. Put the funnel in the other end of the tube.

3. Slowly pour the water into the funnel.

What do you observe?

Water will flow out through the sprinkler like a spring or fountain.

4) Water

you need:
a basin

1. Fill the basin with water.

2. Dip your hands in the water.

3. Keep one hand still.

4. Wave the other hand in the air.

5. Check to see which one dries first.

What do you observe?

When water changes from liquid to gas we call it water vapor. We say the water evaporates. The faster the water evaporates, the cooler your hand feels.

5) Water

you need:

- **a water wheel (purchased where bath or sand toys are sold**
- **a pitcher of water**
- **a basin**

1) pour the water onto the wheel.

What do you observe?

Water has the power to turn the wheel.

6) Water

you need:
a glass of water
a straw

1. Put the straw in the water

2. Blow gently and observe the bubbles.

3. Blow strongly and observe the bubbles.

4. Recycle the straw when you are finished.

What do you observe?

When blowing gently, small bubbles rise to the surface.

When blowing strongly, large bubbles rise to the surface.

7) Water

you need:
- **a pitcher**
- **a glass**
- **an eyedropper**
- **a sponge**

1. Fill the pitcher with water.

2. Pour water into the glass until it can hold no more.

3. Add more water with the eyedropper drop by drop.

4. Count how many drops you add until it the water overflows.

What do you observe?

If you overfill the glass slowly you will see the water form above the rim of the glass. We say surface tension is keeping the water from overflowing.

8) Water

you need:
a deep clear pan of water
a small bottle

1. Hold the bottle upside down in the water.

2. Slowly raise the bottle higher in the water.

What do you observe?

Bubbles rise as the bottle is raised in the water.

Activities with Gas - Air

1) Air

you need:

- **a deep clear pan of water**
- **a small bottle**

1. Put the bottle upside down in the pan of water.

2. Tip the bottle slightly to one side.

What do you observe?

Air remains inside the bottle. When the bottle is tipped, the air bubbles rise to the surface.

2) Air

You need:
bicycle pump
dish pan w/ water
sponge

1. Use the bicycle pump by itself.

2. Try it again with the end of the tube under the water.

What do you observe?

Air can be felt coming out of the pump.
Air can be seen coming out of the pump under water.

3) Air

you need:
bicycle pump
a balloon

1. Pump air into the balloon.

What do you observe?

The balloon gets bigger as air is pumped into it.

4) Air

you need:

- **walnut shell boat**
- **paper sail**
- **toothpick**
- **a small piece of clay**
- **bowl of water**
- **sponge**

1. Set the boat in the bowl of water.

2. Blow against the sail of the boat.

What do you observe?

The air has the power to move the boat.

5) Air

you need:
- **candle**
- **wooden matches**
- **bowl**
- **clay**
- **bottle**
- **pitcher of water**
- **sponge**

1. Fix the clay to the bottom of the bowl.

2. Set the candle in the clay.

3. Pour water into the bowl.

4. Light the candle.

5. Place the bottle over the candle. (Make sure the bottle does not touch the flame).

What did you observe?

The candle goes out.

6) Air

you need:
- **a piece of paper**
- **a glass**
- **a basin of water**

1. Stuff the paper into the glass.

2. Turn the glass upside down.

3. Place it in the water.

4. Lift up the glass.

5. Try it again with the glass tilted.

What do you observe?

The air keeps the water out.

7) Air

you need:
- **a basin of water**
- **a glass**
- **a toothpick**

1. Float the toothpick on the water.

2. Put the glass over the toothpick and push down.

3. Notice what happens.

4. Lift the glass.

What do you observe?

The air in the glass pushes the toothpick down. It comes back up to the surface when you lift the glass.

Forms of Energy

Energy is the ability to do work.

Light Activities

1) Light

you need:
- **large paper**
- **pencil**
- **sunlight**
- **a friend**

1. Have your friend stand near the paper so as to cast a shadow on the paper.

2. Trace the shadow on the paper.

What do you observe?

The sunlight casts a shadow on the paper. The shape is the same but the size is different. The changes depending on the angle of the sun.

2) Light

you need:
candle or a lamp without its shade
white cardboard
small object

1. Hold the object between the light source and the white cardboard.

2. Move the object.

3. Look at the shadow.

What do you observe?

The shadow changes when you move the object.

3) Light

you need:
magnifying glass
white paper

1. Move the magnifying glass close to the paper.

2. Move it away from the paper.

What do you observe?

When you move the magnifying glass the light on the paper changes size.

4) Light

you need:
sunlight
a large spoon

1. Look at the light on the inside of the spoon. This is "concave."

2. Turn the spoon over and look at the light on the other side. This is "convex".

What do you observe?

The reflection is upside down on the concave side of the spoon.

5) Light

you need:
clear bowl of water on a tray
sunlight
sponge

1. Put the bowl of water in the sunlight.

2. Push it gently so the water moves.

3. Look on the ceiling.

What do you observe?

The light will be reflected on the ceiling. It will dance as the water moves.

6) Light

you need:
prism
sunlight

1. Hold the prism in the sunlight.

2. Move it.

What do you observe?

A rainbow of color appears. It moves as the prism moves. The white sunlight is separated into a spectrum of colors. They are red, orange, yellow, green, blue, and violet. A rainbow in nature appears when rain or mist acts like many tiny prisms, reflecting sunlight.

7) Light

you need:
- **rectangular pan**
- **water**
- **small mirror**
- **sunlight**

1. Put the pan in bright sunlight.

2. Lean the mirror on an inside edge of the pan.

3. Move it until a color spectrum appears on a nearby surface.

What do you observe?

You have made your own prism.

8) Light

you need:
a glass
water
pencil

1. Fill the glass half way with water.

2. Put the pencil in the glass.

What do you observe?

The pencil looks bent.

9) Light

you need:
- **quart milk carton**
- **2 pocket mirrors**
- **masking tape**
- **scissors**

1. Cut the side of a milk carton so it is still attached at one side, and can be folded back like a door.

2. Tape two pocket mirrors inside, on a slant, facing each other.

3. Cut two peep holes in the carton.

4. Tape the flap back into place.

5. Look through the peepholes.

What do you observe?

You have made a periscope. You can see around corners or over things while you remain hidden. This is because light travels in a straight line, and reflects off the mirrors. A submarine periscope works the same way.

Heat Activities

1) Heat

you need:
- **sunlight**
- **a magnifying glass**
- **a piece of paper**

1. Let the sun shine through the magnifying glass onto the piece of paper.

2. Stop when the paper turns brown.

What do you observe?

The paper will get hot, scorch, and even burst into flames because of the sun's heat.

2) Heat

you need:

- **a small (birthday) candle**
- **a candle holder**
- **a match**
- **a glass**

1. Light the candle.

2. Place the glass over the candle.

3. Light it again.

4. Watch it burn down until the wick is gone.

What do you observe?

Fire is a source of heat.
Three things are needed for fire: heat, fuel, and oxygen. The match supplies the heat. The candlewick supplies the fuel. The air supplies the oxygen.
If you take one thing away the fire will stop.

3) Heat

you need:
your hands
2 wood sticks

1. Rub your hands together quickly.

2. Notice how they feel.

3. Rub the two sticks together.

4. Touch the place where the sticks were rubbing together.

What do you observe?

Rubbing things together causes friction.
The more friction, the more heat is made.

4) Heat

you need:
black paper
white paper

1. Place the two papers where the sun can shine on them.

2. Let the papers lie in the sun for a bit.

3. Touch the papers. How do they feel?

What do you observe?

The black paper becomes hotter. This is because black absorbs the sun's heat.

5) Heat

you need:

- **a white mug**
- **a black mug**
- **2 thermometers**

1. Set both mugs in the sunlight.

2. Put a thermometer in each glass.

3. Check the thermometers after 1 hour.

What do you observe?

The thermometer in the black mug will be higher. This is because dark colors absorb heat.

Sound Activities

1) Sound

you need:

- **a hose**
- **a ticking clock or timer**
- **a friend**

1. Stretch out the hose and put it to your ear.

2. Have your friend speak softly into the hose.

3. Have your friend put the ticking clock up to the hose.

What do you observe?

The sound is audible at the end of the hose.

2) Sound

you need:
- **a table**
- **a friend**

1. Put your ear on the table.

2. Have your friend knock softly at the other end of the table.

What do you observe?

The sound is carried through the table to your ear. The table is a good conductor of sound.

3) Sound

you need:
a tin can telephone
a friend

1. Stretch out the phone so the string is taut.

2. Have your friend talk softly into one can while you listen to the other can.

What do you observe?

The sound is audible when the string is taut.

4) Sound

you need:
a small box
rubber bands of different sizes

1. Stretch the rubber bands around the box.

2. Pluck the rubber bands.

3. Look to see how they move.

What do you observe?

The rubber bands move back and forth very fast. They vibrate.

Fast vibrations make high sounds.
Slow vibrations make low sounds.

The rubber bands make musical tones when you pluck them. Higher tones come from taut rubber bands. Lower tones come from loose rubber bands.

5) Sound

you need:
tuning fork
block of wood
bowl of water

1. Tap the tuning fork on the wood block.

2. Put the tuning fork by your ear.

3. Tap the tuning fork and hold the end on the wood.

4. Tap the tuning fork and place the vibrating tines in the water, straight up and down.

What do you observe?

The tuning fork emits sound when you tap it. You can hear it near your ear.

The block of wood is a sounding board for the tuning fork.

The water moves. You can see the sound waves in the water.

6) Sound

you need:
- **a spoon**
- **a string**

1. Tie the string to the spoon handle.

2. Wrap the other end around your finger.

3. Put your finger in your ear and let the spoon hang.

4. Hit the spoon.

What do you observe?

The sound is audible.

7) Sound

you need:

- **a crystal glass**
- **a small pitcher of water**
- **a sponge**

1. Fill the glass half way with water.

2. Dip a finger in the water and rub the rim of the glass.

3. Drink some of the water and rub the rim again.

What do you observe?

The glass emits a sound. The glass makes vibrations. The amount of water affects the sound.

8) Sound

you need:
- **4 glasses the same size**
- **water**
- **a spoon**

1. Fill 3 of the glasses with different amounts of water. Leave one empty.

2. Tap the glasses with the spoon.

3. Place them in order from low to high.

What do you observe?

When the glass is hit the water inside vibrates.
Each glass has a different pitch because the amounts of water are different. The more water the lower the tone.

9) Sound

you need:
- **8 identical glass bottles**
- **water**
- **a spoon**

1. Leave the first bottle empty and fill each bottle with a little more water than the last.

2. Blow across the tops of the bottles to make a tone.

3. Try to "tune" your bottles to an eight-tone scale.

What do you observe?

Blowing across a bottle top makes the air column inside the bottle vibrate.
The less water in the bottle, the longer the air column.
The longer the vibrating air column, the lower the tone.

Chemical Activities

1) Chemical

you need
colored construction paper
Q-tip
small container of bleach
safety glasses

1. Put on the safety glasses.

2. Dip the Q-tip into the bleach.

3. Use the Q-tip to "draw" on the construction paper.

4. Wait a minute and look at the paper.

What do you observe?

You will see drawing appear on the construction paper. This is because the bleach removes the color in the paper.

2) Chemical

you need:
- **lemon juice**
- **old pennies**
- **a Q-tip or small cloth**

1. Rub the lemon juice on a penny.

2. Continue to rub hard.

3. Look at the penny.

What do you observe?

The penny changes color. Copper becomes tarnished when exposed to air. Acid in the lemon juice removes the tarnish from the copper.

3) Chemical

you need
a shallow dish
vinegar
baking soda

1. Put some vinegar in the dish.

2. sprinkle some baking soda on the vinegar.

What do you observe?

When vinegar and baking soda are mixed together there is a "chemical reaction". They give off a gas called carbon dioxide. The gas is inside the bubbles.

4) Chemical

you need:
a jar with a lid
oil
vinegar

1. Pour some oil in the jar.

2. Pour some vinegar in the jar.

3. Screw the lid on tightly. Do you see the layers?

4. Shake up the jar until there are no more layers.

5. Watch how long it takes for the layers to return.

What do you observe?

The layers disappear when the jar is shaken. Water and oil are different. Scientists say they have different "densities". Shaking the oil makes it break into little droplets that are suspended in the water. Scientists call this an "emulsion".

Magnet Activities

1) Magnetism

you need:
a magnet
a group of objects
cards saying *magnetic* and *non magnetic*

1. Try each object with the magnet

2. Place all the objects that the magnet attracts under the card that says *magnetic.*

3. Place all the objects that are not attracted to the magnet under the card that says *non-magnetic.*

What do you observe?

The magnet attracts some objects; the magnet does not attract others.

2) Magnetism

you need:
a magnet

1. Walk around the room with the magnet. Experiment to see which objects are attracted to the magnet and which are not.

2. Make a list of the objects attracted by the magnet. Use the moveable alphabet or a pencil and paper.

What do you observe?

Some objects are attracted to a magnet; others are not.

3) Magnetism

you need:

- **a magnet**
- **a paper clip**
- **a piece of paper in a picture frame**

1. Put the paper clip on top of the paper.

2. Put the magnet under the paper.

3. Move the magnet around under the paper.

What do you observe?

The metal paper clip follows the movement of the magnet.

4) Magnetism

you need:

- **a magnet**
- **a small boat (paper or plastic)**
- **a paper clip**
- **a bowl of water**

1. Attach a paper clip to the boat.

2. Put the boat in the bowl of water.

3. Use the magnet to move the boat through the water.

What do you observe?

The movement of the magnet controls the paper clip and the boat.

5) Magnetism

you need:

- **a magnet**
- **a needle**
- **a cork**
- **a bowl of water**

1. Put the needle in the cork.

2. Put the cork in the water.

3. Use the magnet to make the cork move in the water.

What do you observe?

The movement of the magnet controls the needle and the cork.

6) Magnetism

you need:

- **a bar magnet**
- **a needle**
- **a bowl of water**

1. Magnetize the needle by rubbing it over and over in the same direction against the magnet.

2. Put the needle in the side of the cork.

3. Put the cork in the water.

What do you observe?

The needle will point north like a compass.

7) Magnetism

you need:

- **a magnet**
- **a small container of iron filings**
- **a small container of sand**
- **a plastic box with a lid**

1. Mix the iron filings with the sand in the plastic box.

2. Run the magnet over the lid of the plastic box.

What do you observe?

The iron filings are attracted to the magnet.

8) Magnetism

you need:
- **a bar magnet**
- **a small container of iron filings**
- **a piece of paper in a picture frame**

1. Put the iron filings on the paper.

2. Put the magnet under the paper.

3. Tap the paper gently.

4. Move the magnet around under the paper.

What do you observe?

The iron filings form a pattern.

9) Magnetism

you need:
two magnets

1. Put the magnets next to each other.

2. Turn the magnets over and try again

What do you observe?

In one position the magnets are attracted to each other, in the opposite position they are repelled.

Activities with Electricity

1) Electricity

You need:

- **a dry cell battery**
- **two pieces of insulated copper wire**
- **a light bulb**
- **a screw driver**

1. **Scrape the plastic off the ends of the wires.**
2. **Wrap the end of one wire around one of the battery terminals. Wrap the other end of it to the screw on the light bulb stand.**
3. **Wrap one end of the second wire to the other screw on the light bulb stand.**
4. **Touch the other end of the second wire to the other terminal of the battery.**

What do you observe?

When the circuit is complete, the bulb lights up.

2) Electricity

you need:

- a dry cell battery
- two pieces of insulated copper wire
- an electric bell or buzzer
- a screw driver

1. Scrape the plastic off the ends of the wires.
2. Wrap the end of one wire around the center post of the battery (positive). Wrap the other end of it to a post on the bell.
3. Wrap one end of the second wire to the other post on the bell.
4. Touch the loose end of the second wire to the other (negative) post on the battery.

What do you observe?

The bell rings when the circuit is complete.

Mechanical Energy Activities – Simple Machines

A machine is something that helps us work. The six simple machines are the wheel and axle, the inclined plane, the lever, the wedge, the screw, and the pulley.

1) Simple Machines – Wheels

you need: a wagon

1. Turn the wagon upside down.

2. Ask a friend to sit on it.

3. Try to pull your friend.

4. Now turn the wagon the right way.

5. Ask your friend to sit on it again.

6. Pull.

What do you observe?

It is easier to pull a load on wheels.

2) Simple Machines – wheels

you need:
a block with a string tied around it
some straws

1. Place the block on a flat table.

2. Pull the block across the table with the string.

3. Lay the straws in a row at the edge of the table.

4. Place the block on top of the straws.

5. Pull.

What do you observe?

The straws act like wheels. It is easier to pull the block over the straws.

3) Simple Machines – Inclined Plane

You need:
- **a board**
- **a chair**
- **heavy books tied together**

1. **Kneel backwards on a chair.**

2. **Try to pull the books up to the top of the chair by the string.**

3. **Now lay the flat board on the top of the chair.**

4. **Try pushing the books up the ramp you have made.**

What do you observe?

The board is an inclined plane. It is easier to push the books up the board.

4) Simple Machines – Lever

You need:
- **a ruler**
- **a toilet paper tube**
- **some blocks**

1. Cut the toilet paper tube in half. This is your "fulcrum".

2. Put the ruler on the fulcrum like a see saw.

3. Put a block on each end.

4. Put more blocks on one end.

5. Try moving the pile of blocks on the ruler or the cardboard tube.

What do you observe?

One block can balance several blocks depending on the length of the lever.

5) Simple Machines – Screw

you need:

- **a wood peg**
- **a golf tee**
- **a nail**
- **a slab of styrofoam**

1. Try pushing the wood peg into the styrofoam.

2. Now try pushing the golf tee into the foam.

3. Push the nails into the styrofoam.

What do you observe?

A wedge has one wide end and a sharp pointed end. It is used to split or separate things. The nails and golf tee are wedges. They go into the styrofoam more easily than the peg.

6) Simple Machines – Screws

you need:
a board with pre-drilled holes in it
some screws and a screw driver
some wood pegs
(screws, pegs, and holes should be the same size)

1. **Put the screws into the board with the screwdriver.**

2. **Now try putting the pegs into the holes.**

What do you observe?

The screws are easier to put in than the pegs.

7) Simple Machines – Pulleys

you need:
an empty spool
a bucket with a long ribbon tied to the handle
a piece of string

1. **Thread the string through the hole in the spool and tie it.**

2. **Hang the spool by the string to a hook on the ceiling, or the top of a door.**

3. **Lace the ribbon through the spool.**

4. **Fill the bucket with something heavy.**

5. **Pull down on the ribbon.**

What do you observe?

When you pull down the load moves up.

Examples of Simple Machines in the Environment:

Wheels:
- Egg beaters
- Sand or water wheels
- Cars and bikes
- Gears

Levers:
- Bottle opener
- Shovel
- Scissors
- Nutcracker
- Tweezers
- Pliers
- Teeter totter

Inclined Planes:
- Ramp

Screws:
- Jar lid
- Toothpaste cap
- Light bulb
- Corkscrew
- Vice

Pulleys:
- Flag pole
- Clothesline
- Sailboat rigging

Wedges:
- Toothpicks
- Knives
- Pin
- Teeth

Force

A force is a push or pull that causes a change. The change can be in direction, or can make something start or stop.

The Four Fundamental Forces

The four fundamental forces that scientists recognize are 1] gravity, 2] the weak nuclear force, 3] electromagnetism, and 4] the strong nuclear force.

The weak and strong nuclear forces are in the nuclei of atoms and so will not be appropriate for the child of three to six years. The electromagnetic force holds molecules together and so is also inappropriate at this level.

The preschool age child can have a lot of fun with gravity, however, and so the following activities are included. The concepts of friction and inertia are associated with force and movement, and so, are also included.

Activities with Gravity

1) Gravity

you need:
a pencil

1. Hold the pencil in your hand.

2. Drop the pencil.

What do you observe?

The pencil falls to the ground.

2) Gravity

you need:
- **a group of objects**
- **a friend**

1. Have a gravity race with the objects. Drop two things at the same time.

2. Ask a friend to watch to see what hits the ground first.

What do you observe?

Everyone sees things differently. Sometimes even scientists don't agree.

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