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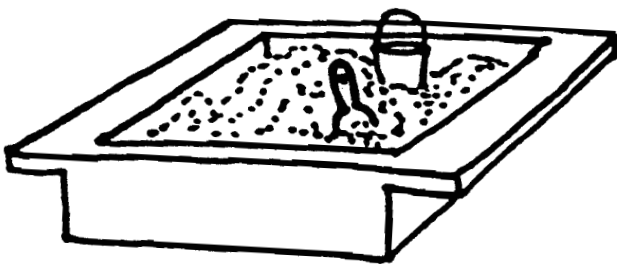
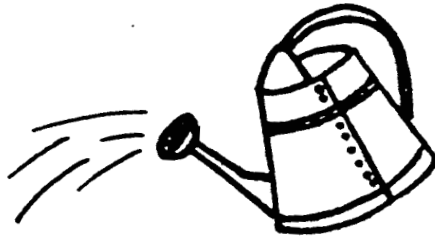
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SAND and WATER

GOVERNMENT DOCUMENTS
COLLECTION

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I SETTING UP AND GETTING STARTED

Where To Get Sand

Sterilized sand can be purchased in bags at many lumber and building supply stores. Diehls in Wellesley, Mass Hardware in Waltham, and Bicknell Pool Supply in Framingham carry it. When buying sand, be sure to buy fine grain or play sand. Play sand has the finest grains.

Health Factors

To prevent sand and water from becoming unsanitary, take these precautions.

- Use sterilized sand.
- Do not allow sand to become overly saturated with water. Allow sand to dry out occasionally.
- Empty water table each day.
- Have children wash hands before using sand or water.

Also keep sand out of drinking fountains and sinks as it easily clogs them.

Introducing A Sand Or Water Table

- Sand

First have children work with dry sand alone (no toys or tools) and then with wet sand alone. Gradually add digging, sifting and sorting tools and toys. Finally, change the items available periodically and organize them according to themes or categories, such as road building, volcano building, farms, castles, printing, molding, cake baking, etc.

- Water

Begin with water and a few toys or measuring tools, gradually adding more materials and discussing with the children their uses and possibilities for experimenting. For example, begin with boats and other floating toys; add measuring cups, tubing, funnels, beakers, bowls, water pumps, etc. As another expansion, add bubbles and bubble blowing materials. Finally, plan activities around themes, such as sink and float, making boats, water experiments. (For more detailed ideas, see section on Themes/Units.)

Things To Keep In Mind (for teachers and children)

- Placement of Table

Consider placement of sand or water table carefully. Place it out of heavy traffic areas but where children can work comfortably. Consider what other activities can successfully take place near it and make sure it is in a place where the mess won't be a problem. It is nice to have sand and water outside if there is a space with easy access.

- Clean-up Equipment

Keep a dustpan and a small broom near the sand table and a sponge and pail near the water table.

- Storage of Accessory Materials

Make sure there is a shelf or room for a large box nearby for easy storage of materials.

Establish Management Procedures

- Limit the number of children who may be at the sand or water table at one time. Have a sign-up sheet or waiting list if competition for a place at the table is keen. This is often necessary when first introducing a new activity.
- Limit the amount of water that may be added to the sand by designating the container to be used or by teacher supervision.
- Discuss lake building in the sand box. Since water quickly soaks into sand, lakes can soon cause the sand table to become water logged! If the sand is scooped away to make the lake on the table's surface, it will be more successful.
- Designate the toys that can be used in the sand and water table. Wood will warp; some metals will rust.
- Decide whether or not to have children wear smocks.
- Decide upon clean-up procedures.

Develop And Discuss Rules For Behavior

- Keep sand or water in the table. (Spills can cause slippery floors. Eventually sand and water will be all gone.)

- Table and feet need to stay on the floor. (No swimming!)
- Water is only for playing, not drinking. (It isn't clean.)
- Sand and water can be poured, sifted, molded, etc., but not thrown.

II SUGGESTED EQUIPMENT AND MATERIALS

Sand And/Or Water Table

- Traditional sand/water tables can be found in catalogues. A plastic tub is recommended as metal ones deteriorate with time. Metal tubs can be lined with heavy plastic to prevent or correct this.
- Less expensive substitutes include large see-through plastic tubs in school supply catalogues, small plastic tubs found in kitchen and cleaning sections of department and hardware stores and large plastic cement mixing tubs found at lumber supply stores.

Clean-up Equipment

- General clean-up can be done by the class if dustpan, broom, waste basket, sponge mop, bucket and sponges are provided and stored nearby.
- Newspapers can be used to soak up spills and prevent slipping.
- If there is no sink in the classroom, a bucket full of water and a package of towels can be used for rinsing and drying sandy hands.

Visual Aids-Photographs, Drawings, Posters

- Visual aids can be displayed near the sand/water table to stimulate ideas. Such pictures might include:
 - . Mountain streams, lakes, ponds; oceans, puddles
 - . Lapping or crashing waves; still, rippled or running water
 - . People or animals using water for drinking, washing, traveling, recreation
 - . Dunes, beaches, sandboxes, wet or dry sand

- . Sand with wind and water formed patterns
- . People building, drawing, playing in sand
- . Pictures to encourage themes, such as those of a farm , circus, castle, etc.

Accessories

- See the diagram for details.
- Many items can be used in both sand and water.
- Use your imagination to find other materials for filling, pouring, mixing, texturing, molding, squirting, floating or sinking, making bubbles.
- It is best to use plastic, stainless steel or aluminum tools as wood soaks up water, warps and cracks, and other metals can rust.

BUBBLES

rubber bands
egg beater, whisk
straws, string
liquid soap, glycerine
plastic strawberry or tomato baskets
plastic lids (cut shapes out)
wire for making hoops
plastic net bags
baking tins
bowls, pots

SAND

scoops, shovels
molds-cans, letters, cups,
castle forms, fish forms
objects for texturing and
printing, combs
paper and pencils for labeling
sprayer to wet sand
rakes, hoes

WATER

ladels, pumps
flexible tubing, piping
pipe connectors
clear plastic squeeze bottles
boat making materials
(clay, styrofoam, tinfoil)
cans with holes
(punch your own)
food coloring

SAND
and
WATER

sifters, funnels
sand/water wheel
size graduated containers
plastic boats, animals, cars,
fences, people, planes
hard plastic cups, plates
utensils
buckets, pitchers
balance

ACCESSORIES

III PURPOSES FOR SAND AND WATER PLAY

Relaxation

Socialization

- Working cooperatively
- Learning to express feelings
- Learning to respect others' work and ideas.

Language Development

- Expressing ideas
- Building vocabulary
- Using abstract and qualitative words
- Learning English as a second language.

Small and Large Motor Coordination

- Improving spatial relationships
- Developing muscle control through pouring, squeezing, siphoning, sifting and molding.

Dramatic Play

- Using imagination
- Developing independence

Exploration and Creation

Applying Math and Science Concepts

- Making predictions
- Measuring and comparing quantities, weight and volume
- Estimating
- Counting
- Equalizing

IV SOME TEACHING STRATEGIES

Children Explore and Experiment Independently

Teacher Encourages Observation and Develops Concepts Through Questions

- Where does the water go when it is poured on sand?
- What happens to objects made of wood, cardboard, plastic, metal, when they are used in sand or water?
- How wet must sand be in order to be molded successfully?
- What happens to a construction of wet sand as the sand dries? (predicting)
- Where does the water go when the sand dries? (evaporation)
- What's inside a bubble?
- How do objects (seem) to change when looked at through water? (distortions)
- How many small containers will it take to fill a larger container? (estimating, counting)

Teacher expands understanding of concepts by teaching specific units (e.g. sink-float, properties of water).

V THEMES, ACTIVITIES/UNITS

Themes

- Possible themes include farm, city, harbor, age of dinosaurs, age of castles and knights, cooking.
- Themes can be encouraged by:
 - . reading related books, poems
 - . viewing related films, film strips
 - . having related materials available, such as animals, people, planes, boats, fences, castle molds, etc.
 - . displaying related pictures near sand/water table.

Activities/Units

- Sink and Float Unit

- . Predict, test and record objects which sink or float. Child can draw a chart of results or can write on a teacher-made ditto sheet... S on those objects that sank and F on those objects that floated.
- . Have some objects which will sink or float depending on how they are placed in the water.

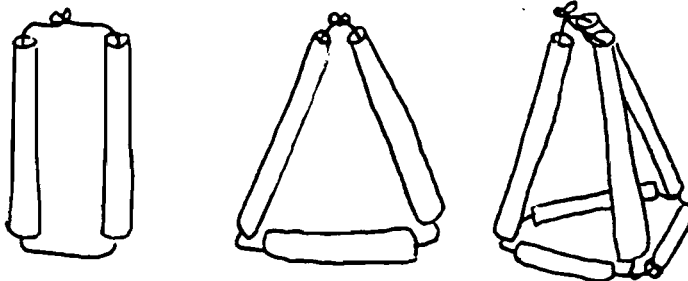
- Clay Boat Unit (ESS unit)

- . Use various materials (clay, tinfoil, styrofoam) to make boats. Add weights to see which boats can carry the heaviest loads. Encourage new shapes and continue to test with weights. Discuss which shapes work best and hypothesize why.

- Bubbles

- . Fill pots and bowls with water and detergent. Mix with whisk or beater to make bubble soup. Blow with straws to make bubble mountains. Add food coloring on top to show how bubbles are attached to one another.
- . In deep trays or in the water table, dip frames, hoops, forms, fingers, cans, netting, etc., to make bubbles.
- . Create different shapes, three dimensional and two dimensional, for bubble making.

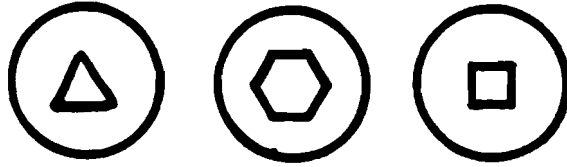
- use straws and string



- use wire to form hoops



- use plastic lids (cut shapes with matt Knife)



Helpful Hints

- Use a good liquid detergent (Joy, Ivory).
- Add glycerine to keep bubbles from evaporating instantly. Glycerine can be purchased at a drug store.
- Wet hands before using frames to blow bubbles so dry hands won't break bubbles.
- Be patient! Try blowing and waving frames and materials at different speeds. Use cans, netting, frames, etc.

VI ADVANCED CONCEPTS

Water Cycle

- Books and charts are available which describe and illustrate this concept. Suggested reading is "Water for Dinosaurs and You" by Cuffari. Once children have some understanding of the cycle, the importance of keeping our water clean can be discussed.

Importance of Water to Our Life

- Have children brainstorm ways we use water (drink, wash our bodies, clothes, water plants and crops, travel, recreation) and make a list.
- Discuss the importance of access to water in choosing a place to live.

Water and Weather

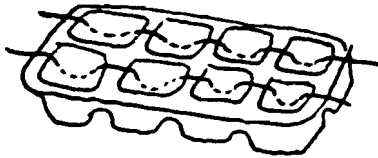
- Much of this topic can be included in the water cycle concept but here emphasis can be that most of our weather is water in different forms (rain, sleet, hail, fog, snow, clouds, dew, etc.)

Properties of Water

- The following concepts are difficult for most young children to understand. The activities listed below will help children become acquainted with the properties of water.

Water has three states: solid, liquid and gas.

- . Liquid - Pour water from one container to another. Compare with other substances. Can you pour air? Can you pour bricks?
- . Solid - Freeze water in a can. Shape of can will show that water expands as it freezes. Freeze water in different size cartons. Watch them melt. Which size melts the fastest? Why? Freeze water in an ice tray. Dip a continuous string into each cup below the water line in order to make an ice barge.

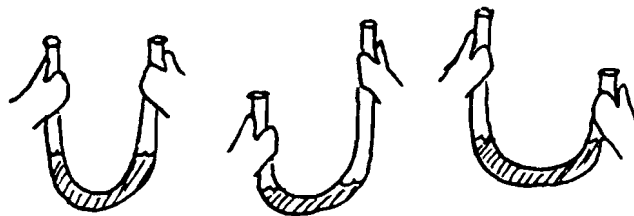


Water is cold when it is a solid. Are all solids cold? Does water have to be cold to be a solid?

- . Gas - Fill a teapot with a small amount of water measured by the class. Place on a hot plate and let it boil down. Pour remaining water back into item used to measure. Is there more, less or the same amount of water? Where did it go? This experiment can be dangerous if proper precautions are not taken. Make sure hot plate cord cannot be tripped over and that hot plate is not touched by children. Also place spout away from direction of children. Warn them that steam burns.

Water Seeks Its Own Level

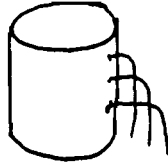
- Fill a plastic tube with colored water. Form a U-shape with tubing, lowering and raising each end. Watch the level of the water in each side. It will always remain the same if not blocked.



- Siphon water out of the water table. To start the siphon, put one end of the tubing under water and suck on the other end. In order for the water to flow, the end out of the water must be lower than the level of the water being siphoned. Siphoning can be stopped by raising the free end of tubing above the level of the water.

Water Has Weight, Water is Under Pressure

- Punch three holes in a can at different heights. Fill the can with water and observe the water streaming out. Do the streams of water go out the same distance? Why not?



Salt Water and Fresh Water Have Different Densities

- Put tap water in two clear plastic cups. Add two teaspoons of salt to one. Squirt a few drops of food coloring on the top of each cup of water. The food coloring will disperse in the plain tap water but tend to float on top of the salt water. Ask what happens. Why? Would it be easier to float in fresh or salt water?

Water Can Change the Way We See Things

- Put rods in a bucket of water and observe how they appear to bend.
- Make a water lens with a plastic bucket, a piece of plastic, twine and water. Near the bottom, cut two round holes on opposite sides of the bucket. Place a piece of plastic over the top rim and secure with twine. Fill plastic with water (should sag in shape of lens). Place object through holes in bottom of bucket and look at it through water lens. How has object changed?



ADVANCED SAND CONCEPTS

A. Properties of Sand

1. Sand is a solid at most temperatures

- a. Freeze dry sand in a jar in freezer. Does it still pour? Does it still look like sand?
- b. Put sand in water. Does it dissolve?
- c. Boil sand in water. Does it melt?
- d. Explain that at very high temperatures sand will melt and become glass.

2. Sand is Hard. It Scratches.

- a. Have children feel sand. Describe. Feel dirt. How are they different? Look at sand with a magnifying glass. Try to have different size grains so the difference between fine and coarse sand can be seen and felt.
- b. On two pieces of oak tag put liquid glue. Sprinkle sand on one and let both dry. Compare the surface of each by feeling. Scratch a piece of wood with each. What happens? Explain that the one with sand is a small piece of sand paper.
- c. Place sand in a jar. Shake. Watch it tumble. Inside is a tiny sand storm. Sand moving quickly scratches rocks, faces, buildings. People use sand "guns" to clean buildings. Sand storms erode rocks. Show pictures of western rock sculpture.

3. Sand Comes in many Colors

- a. It can be tan, yellow, white, pink, purple, red, green, gray.
- b. The rock or shells from which sand is formed determine its color.

4. Sand Comes in different Sizes

- a. Examine sand with hand lens.
- b. If you have very fine graduated sifters, sort sand by particle size.
- c. Compare different grades of sand paper.

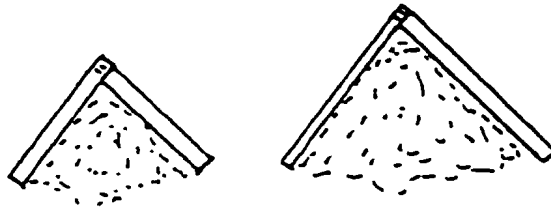
5. Sand has weight

- a. Place sand in a container filled with water. Sand will sink to the bottom. It is heavier than water.
- b. Moving water can push sand, but when water slows down, sand sinks. Demonstrate this by pouring water in a slow steady stream from a watering can or pitcher over a pile of sand which is at one end of the sand box. Watch the sand move quickly where the force of the water is great and move slowly where the force of the water is weak.

6. Dry Sand and wet sand are different

- a. Dry sand can't be piled steeply. Have children pile sand, trying to make the steepest slope (not highest) possible. Measure steepness of each pile and compare. Piles should be roughly the same (about 30 degree slope or 120 degree angle at top).

To measure each pile, take 2 strips of paper, place on the sides of the pile and staple tops together. Compare the steepness of the different piles by comparing the paper angles.



- b. Dry sand rolls, pours, blows. Watch it roll when building. Pour it through fingers, funnels. Blow it off your hand. Watch out for other's eyes.

7. Wet sand can be piled steeply

Wet sand sticks together, but very wet sand cannot be piled steeply. It becomes runny and slippery.

- a. Why? Some water between sand acts like glue. Too much water makes sand slippery. It overflows the spaces between sand particles and makes the sand slippery.
- b. Add water to sand slowly. How much water can be added before there is too much to make a steep slope?
- c. What happens when the water evaporates from sand? If you have built a sand castle what will happen to the walls when the water evaporates? Build something with wet sand and leave it up all day, over night. What happens?
- d. Drip castles that people enjoy making at a beach require sand that has a lot of silt in it. Your sand does not have silt, and as a result, drip castles cannot be made.

8. There are spaces between pieces of sand

Fill a container with sand. Pour water into it. Where does the water go?

9. Sand can hold different amounts of water depending upon the size of the spaces between sand grains.

The amount of water needed in the sand is hard to judge. It may take many attempts.

Ask if anyone has walked along a wet beach and looked at their footprints and found them to look dry? You can show this by walking your hands or fingers through shiny wet-looking sand in a sandbox. Explain that when you pressed your weight down on the sand, you made the spaces between the particles of sand larger and the water from the top of the sand went into these spaces. Therefore, the top looked dry because it dried out. The water soaked into the larger spaces.

On wet sand place your hand and shake your hand back and forth. Water will come to the surface. You have done the opposite of above. By shaking the sand you made the sand particles get closer together. The water could no longer fit in the spaces between particles so it came to the top.

You can also do this by placing wet sand in the palm of your hand and shaking.

VII Extending Sand and Water Activities

Language Arts, Poetry

- Read books that relate to water and sand.

- . Rain, Rain Rivers, Shulevitz
- . Rain Makes Applesauce, Scheer
- . Where do Butterflies Go in the Rain, Garelick
- . Water for Dinosaurs and You, Cuffari
- . A Rainbow of My Own, Freeman
- . The Rain Puddle, Duvoisin
- . The Umbrella, Yashima
- . Noah's Ark
- . Aesop's Fables, "The Cow and The Pitcher"
- . Seven Minute Tales, "Why the Hippopotamus Took to the Water", Powers

- Encourage creative writing activities.

- . Make signs to label projects at the sand table.
- . Have children draw, or take photographs of, finished projects and activities.
- . Write accompanying stories as children dictate.

- Read poems about water, rain and sand.

. Sound of Water

The sound of water is:

Rain,
Lap,
Fold,
Slap,
Gurgle,
Splash,
Churn,
Crash,
Murmur,
Pour,
Ripple,
Roar,
Plunge,
Drip,
Spout,
Skip,
Sprinkle,
Flow,
Ice,
Snow.

Sky Laundry

Last night, the rain was busy
With washing out the sky --
This morning, white and fluffy,
The clouds are out to dry.

-Marie Louise Allen

Rain

Summer rain
is soft and cool,
so I go barefoot
in a pool.

But winter rain
is cold, and pours,
so I must watch it
from outdoors.

-Myra Cohn Livingston

-Mary O'Neill

Rain Poem

The rain was like a little mouse,
quiet, small and gray.
It pattered all around the house
and then it went away.

It did not come, I understand,
indoors at all, until
it found an open window and
left tracks across the sill.

-Elizabeth Coatsworth

Mud

Mud is very nice to feel
All squishy-squash between the toes!
I'd rather wade in wiggly mud
Than smell a yellow rose.

Nobody else but the rosebush knows
How nice mud feels
Between the toes.

-Polly Chase Boyden

Upon the beach
With pail and spade,
My sandy pies and wells I made,
And people passed
On every hand
And left their footprints on the sand.

Then came a wave
With rushing tide --
And everything was washed aside.

-Ilo Orleans

At the Sea-Side

When I was down beside the sea
A wooden spade they gave to me
To dig the sandy shore.

My holes were empty like a cup.
In every hole the sea came up,
Till it could come no more.

-Robert Louis Stevenson

Jemima Jane

Jemima Jane,
Oh, Jemima Jane,
She loved to go out
And slosh in the rain.
She loved to go out
And get herself wet,
And she had a duck
For her favorite pet.

Every day
At half past four
They'd both run out
The kitchen door;
They'd find a puddle,
And there they'd stay
Until it was time
To go away.

They got quite wet,
But they didn't mind,
And every rainy day
They'd find
A new way to splash
Or a new way to swim.
And the duck loved Jane,
And Jane loved him.

-Marchette Chute

Art

- Color sand with colored chalk, powder or food coloring.
- Make sand pictures. Draw or paint a trail of glue on a piece of stiff paper and then sprinkle with colored or natural sand. Shake off excess. Use crayons or markers to add to the design before or after applying sand.
- Layer several colors of sand in a small glass container, such as a baby food jar.

Music

- Fill several soda bottles with different amounts of water. Blow across the tops to make water music.
- Listen to the Moldau by Smetana. The music portrays a gentle stream joining other streams, becoming a forceful river and then part of the ocean.

VIII TEACHER REFERENCES

Books about water

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Clay Boats, Teacher's Guide, Elementary Science Study, McGraw Hill, 1976.

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Sandcasting, Margot Batho, Learner Pub. Co., 1973.

Sandcastles, Allen et.al., Doubleday, 1981.

Sandtiquity, Architectural Marvels You Can Build, Simo, Wells, Wells, Traplinger Pub. Co., 1980.

The Quicksand Book, de Paola, Holiday House, 1977.

Wonders of Sand, McFall, Dodd, Mead and Co., 1966.

Films

Castles Made of Sand

Publisher: Pyramid

8 min.

Color, Nursery, K, 1

Children and adults build sand castles at the beach.

The Desert

Publisher: Arthur Baar Productions

10 min.

Grades 1-3

Describes the desert in south-west North America, which is created by westerlies blowing over the rockies. Shows adaptation of plants and animals.

Dunes

Publisher: Pyramid Films

7 min.

Nursery, K, 1

Film shows desert animals at sunrise, as they scurry to hide during a storm and as they re-emerge at sunset.

Catalogues

Childcraft Education Corporation

20 Kilmer Rd.
P.O. Box 3081
Edison, New Jersey 08818-3081

Constructive Playthings

1227 E. 119th Street
Grandview, Missouri 64030

Delta Education (ESS Elementary Science Study)

P.O. Box M
Nashua, New Hampshire 03061-6012
1-800-258-1302

Kaplan

1310 Lewisville-Clemmons Rd.
Lewisville, North Carolina 27023
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