

The Creative Curriculum®

# Study Starters

Free sample

To purchase other *Study Starters*, go to [www.TeachingStrategies.com/StudyStarters](http://www.TeachingStrategies.com/StudyStarters) or call 800-637-3652.

A Step-by-Step Guide to Project-Based Investigations in Science and Social Studies

# Balls

Copyright © 2005 by Teaching Strategies, Inc.  
All rights reserved. No part of this book may be reproduced in any form or by any electronic or mechanical means, including information storage and retrieval systems—except in the case of brief quotations embodied in critical articles or reviews—without prior written permission from Teaching Strategies, Inc.

Written by: Cate Heroman  
Series Editors: Cate Heroman, Toni S. Bickart, Laurie Taub  
Cover, book design, and illustrations: Carla Uriona

Teaching Strategies, Inc.  
P.O. Box 42243  
Washington, DC 20015  
[www.TeachingStrategies.com](http://www.TeachingStrategies.com)

Teaching Strategies and *The Creative Curriculum* names and logos are registered trademarks of Teaching Strategies, Inc., Washington, DC.

The publisher and the authors cannot be held responsible for injury, mishap, or damages incurred during the use of or because of the information in this book. The authors recommend appropriate and reasonable supervision at all times based on the age and capability of each child.

Third Printing: 2008

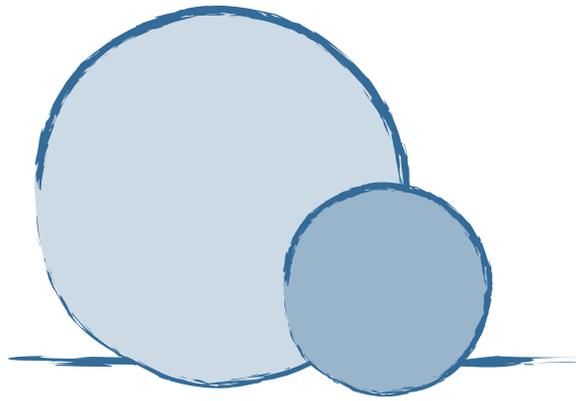
---

## Acknowledgments

We thank Lilian G. Katz and Sylvia C. Chard for the phrase “What we want to find out about...,” which will appear in the third edition of *Engaging Children’s Minds: The Project Approach*, Ablex Publishing (in press).

Download your free copy of *The Creative Curriculum Study Starters Teacher’s Guide* at [www.TeachingStrategies.com/StudyStarters](http://www.TeachingStrategies.com/StudyStarters)

# Balls



Children love balls. They play with them in many different ways: throwing, catching, kicking, and rolling them. Children make balls, marbles, and other rolling objects change speed and direction. They see how natural forces such as gravity and friction affect the movement of balls. Children play traditional games with balls and often invent their own games.

This study of balls will offer children opportunities to investigate objects from many different perspectives. They will explore important concepts of physical science and social studies as they observe, gather data, explore their community, and meet interesting people. A study of balls also offers a meaningful way for children to use skills in mathematics, literacy, the arts, and technology.

*How have you seen children and adults using balls?*

# 1

## Begin the Study

### Exploratory Investigations

Exploratory investigations give children time to talk and think about balls before they engage in more formal investigations. They also give you an opportunity to observe and listen to children so you can gauge their level of interest and existing knowledge and begin to think about whether and how to investigate balls further.

Enlist the help of children, families, and friends to create a collection of balls of different sizes, materials, and weights. A sample letter to families is included on page 28 of this *Study Starter*. Here are some suggestions of balls to collect:

Your ideas



baseball	golf ball	racquet ball
basketball	kick ball	soccer ball
beach ball	Koosh® ball	volleyball
bowling ball	marble	WIFFLE® ball
dog ball	Ping-Pong ball	
football	pool ball	

In addition to the types of balls that usually come to mind, think about balls that are not used for play such as:

cotton ball	popcorn ball	Silly Putty® ball
crystal ball	ball bearing	Magic 8 Ball®
globe	beads	ball of yarn

Think about how to store and display the collection of balls. You may want to add to the excitement by collecting the balls in a large laundry or garbage bag until they all arrive. Large, clear plastic bags give children a sneak preview of the balls and encourage curiosity and wonder.

Allow several days for children to bring the balls to school. Start talking about the balls as they arrive. You can introduce vocabulary to describe them. You can also begin to introduce math concepts related to measurement and number.

Share the collection with the children at group time. Have children sit in a circle around the balls and make sure they can be seen. Place the balls in a plastic wading pool or build a short wall out of blocks to contain them. The purpose of this initial discussion is to encourage children to talk about the balls. Use open-ended questions and prompts and write children's responses on chart paper to encourage discussion:

*Did any of you have something interesting happen while you were collecting your balls?*

*Tell me what you notice about these balls.*

*How are some of these balls the same? How are they different from each other?*

*What could we do with these balls?*

*How could we organize these balls into groups?*

Children need time to explore the properties of the balls and other materials before they engage in any formal investigations. As they explore, observe and talk with them about what they are noticing and doing.



*What other open-ended questions or prompts can you use to stimulate discussion with children?*



## Background Information for Teachers

Physical science explores the energy of objects and the way they move. Because balls bounce, spin, roll in all directions, and store and transfer energy, exploring balls is a way to learn physical science concepts. A ball is a *sphere*. This means that a ball looks like a circle from every angle.

**Mass** is the amount of matter an object contains. For example, a piece of foil has the same mass whether it is flat or rolled into a ball.

**Momentum** is the strength of an object's motion. The amount of strength depends on the ball's mass and speed. A ball has more momentum the faster it is thrown. A ball with more mass, rolling at the same speed as a ball with less mass, also has more momentum.

**Gravity** is the earth's force that attracts all things to its center. That is why a ball falls to the ground when you drop it.

- Objects fall faster and faster as they drop.
- Galileo discovered that objects fall at the same rate of speed regardless of size. He dropped two cannon balls of different sizes from the Tower of Pisa and they landed on the ground at the same time.
- Small falling objects, such as a feather or a ping-pong ball, are slowed by air and do not fall at the same rate of speed.

**Weight** is gravity pulling on an object. There is more gravity pulling on a bowling ball than on a ping-pong ball.

**Energy** is needed to move a ball. For a ball to fall, it first must be lifted up. For a ball to move, it has to be thrown, pushed, or dropped.

**Friction** is a force that resists motion when two things touch each other. A moving ball is slowed by friction whenever the ball touches something else like grass, sand, water, or air.

- When you drop a ball onto a perfectly hard floor it will rebound, but, because friction slowed it down, it will not bounce back to its starting position.

*What do you want to explore to help you learn more about this topic?*



## Pause and Reflect

At this stage, stop and think about whether this topic is worthy of being a long-term study with **your** group of children. You may wish to use the “Pause and Reflect” questions in the *Teacher’s Guide* to focus your thinking.

Think about your exploratory investigations:

- Have the children really become **engaged** in their explorations thus far?
- Did the children talk about and share their **experiences**?
- Do you think children can **explore and investigate** balls in many different ways over time?
- Do you have the **resources** (people, places, books and other publications) you need?
- Will the study of balls enable you to **teach required skills and content** in the various subject matter areas?

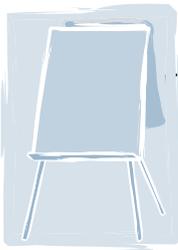
Balls are often a good study topic because children are already familiar with them and can explore them firsthand. Children can examine, explore, and play with balls without depending totally on adults. They can investigate balls in the classroom and school, on the playground, and in the community. Families can help children investigate balls at home.

Balls also provide an interesting way for children to explore **physical science** concepts as they learn about the characteristics and properties of different balls when they throw, kick, bounce, squeeze, push, drop, and roll them. They discover different kinds of motion and the force required to stop or control a ball. Children can explore **social studies** concepts about how balls are also used in transportation, jobs, and games.

As children study balls, they will develop oral and written language skills, learn new vocabulary, and read books. They will use mathematical skills, such as counting, comparing, measuring, and geometry, and they will begin to develop spatial sense. They will experiment with position and movement of objects and use positional language: *up, down, behind, in front of*. They will represent their learning through the visual arts, music, and dramatic play. They will gain an appreciation for the technology involved in making balls.

## What Children Already Know

Observe children as they explore the collection of balls. Listen to what they say as they explore. Engage children in discussions and conversations. Gather information about what children already know about balls. Record their ideas on chart paper so you can refer to them repeatedly. Rather than correcting mistaken ideas at this time, think about investigations that might help children develop more accurate understandings and reconsider their current thinking. Here are examples of what children might say about balls.



### What We Know About Balls

Most **balls** are round.

**Balls** come in many different sizes.

**Balls** come in different colors.

**Balls** bounce.

**Balls** are made of different things.

You can play with **balls**.

Keep this chart available so that you can add to it as children make new discoveries.

## What Children Want to Find Out

Children's questions will help you decide what kinds of experiences to offer. During a group time, ask, *What should we try to find out about balls?* Record their questions. They may be curious about questions such as these.

### What We Want to Find Out About Balls

What's inside a *ball*?

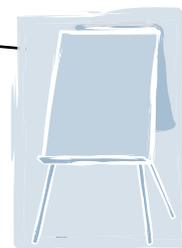
Do all *balls* bounce?

Which *balls* bounce better than others?

How far can I throw different kinds of *balls*?

Which *balls* roll the fastest?

Can I make a *ball*?



Add to this list of questions as the study progresses.

Model your own curiosity by wondering aloud. *I wonder how far this heavy ball will roll.*

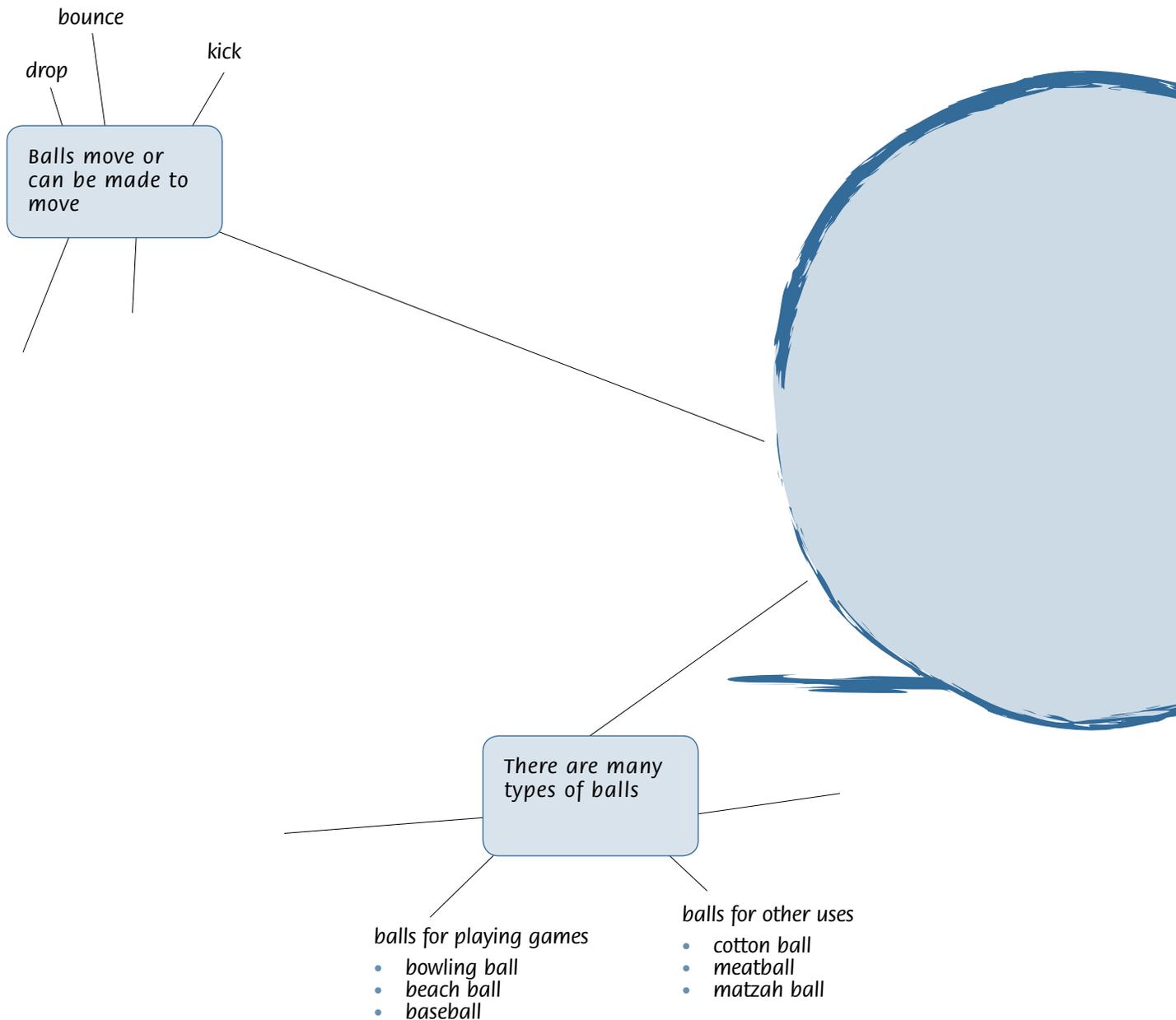
Verbalize other questions children may be thinking about. *It looks like you're trying to figure out which balls bounce higher than others. Let's add that to our list of questions.*

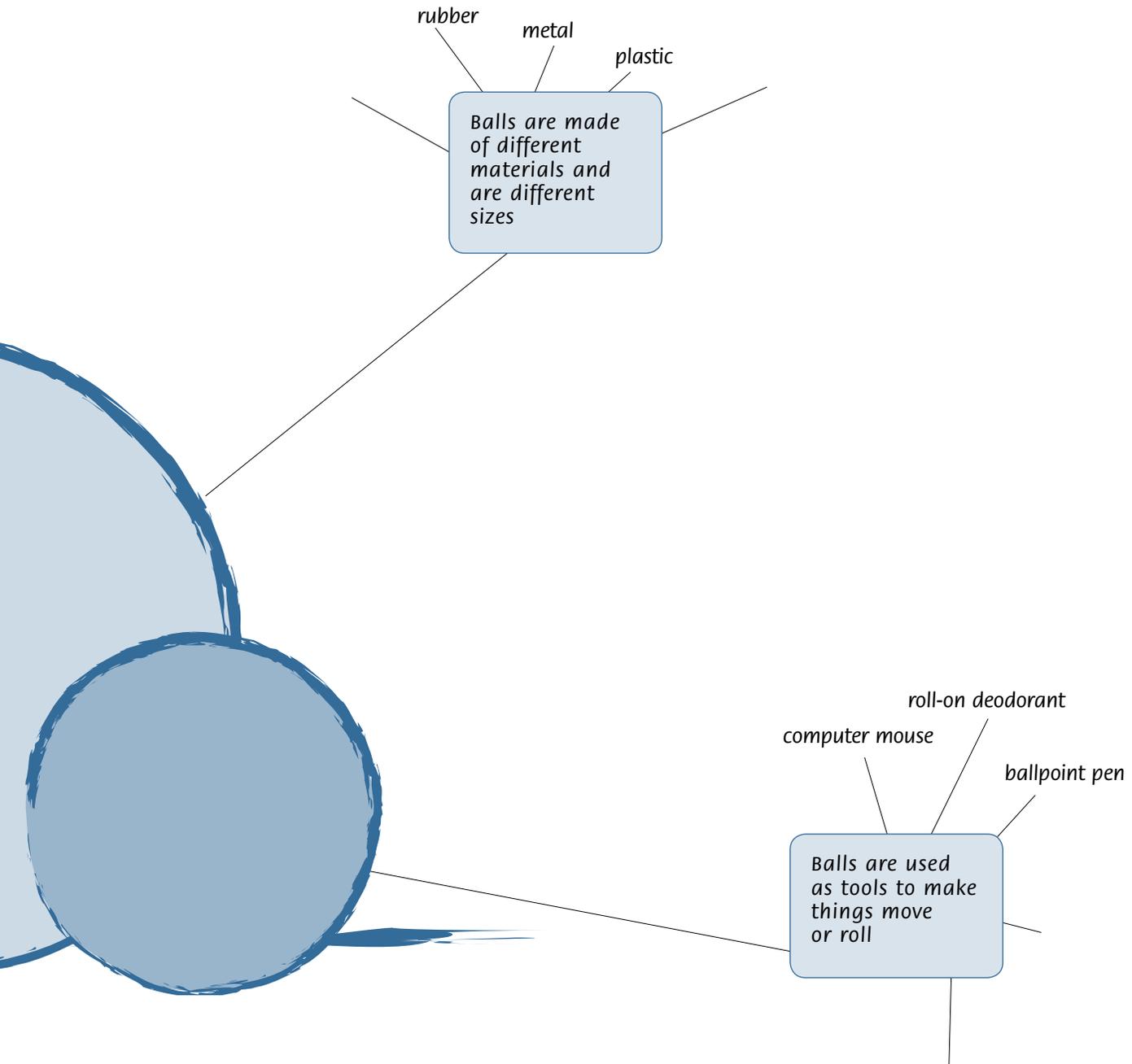
More questions will emerge during investigations. Help children learn the meaning of the word *question*. *That's a good question, Sarah. Let's write it on our chart and try to find the answer.*



## Create Webs of Important Ideas and Content

The **idea web** below is a visual map to help you brainstorm and organize your thinking about balls. Use this as a tool to show relationships among ideas. Expand this web by adding your own ideas, particularly those unique to your community.







## What Children Learn by Studying Balls

This study has learning goals related to specific *process* skills as well as to *science and social studies content*. Process skills are the methods used to learn content. Content includes the knowledge and understandings that children should learn. Children practice and use skills in literacy and math during a study to gain deeper understanding of a topic.

The following pages help you record what children are learning during this study and give you the standards-based terminology to communicate with parents, administrators, and other teachers. The first three charts show the process skills and content in science and social studies addressed in each of the investigations. The additional column in each chart gives you space to record skills and concepts that children explore as they work in interest areas or during daily routines and other investigations that you pursue. The fourth chart (pages 14–15) shows the goals and objectives of *The Creative Curriculum® for Preschool*. As you assess children’s learning during this study, highlight or check the relevant objectives.

### Process Skills Used During the Balls Study

	Investigation					Other Experiences
	1	2	3	4	5	
<b>Observing and Exploring</b> (Noticing objects, events, or conditions and considering how, when, and why they change; wondering and asking questions about them; manipulating objects to understand their properties and how they work)	•	•	•	•	•	
<b>Connecting Information</b> (Thinking of ways to find information; linking new information to prior knowledge)	•	•	•	•	•	
<b>Problem Solving</b> (Identifying a problem, thinking of ways to solve it, and trying solutions)	•	•	•	•	•	
<b>Organizing Information</b> (Knowing how to break a whole idea or problem into parts, how to classify, and how to compare)	•	•	•	•	•	
<b>Communicating and Representing</b> (Drawing, writing, dramatizing, explaining, making graphs and models to share with others what they know and understand)	•	•	•	•	•	

## Science Concepts for Balls

	Investigation					Other Experiences
	1	2	3	4	5	
<b>Physical Science</b>						
Objects have observable features (e.g., color, shape, size, temperature) that can be examined, described, and measured.	•	•	•	•	•	•
Objects are made of one or more materials, such as metal, wood, or paper.	•	•	•	•	•	•
Physical properties of objects and materials can change (e.g., when ice melts, it becomes liquid).				•	•	
There are various natural forces (e.g., wind, gravity).	•	•	•	•	•	
Objects can move or be moved in space in a number of ways (e.g., pushing, pulling, rising, sinking).	•	•	•	•	•	
<b>Life Science</b>						
All things are either living or nonliving.						
Living things have observable characteristics.						
Living things grow, change, and reproduce.						
Living things have similar basic needs (e.g., animals need nutrients, air, water; plants need air, light, water, and nutrients).						
Living things can be grouped in different ways (e.g., appearance, behavior, plant, animal).						
Living things exist in different environments.						
Living things have similarities and differences in their appearance and behavior.						
Living things depend on each other.						
Living things go through a growth cycle.						

## Science Concepts for Balls

	Investigation					Other Experiences
	1	2	3	4	5	
<b>Earth and the Environment</b>						
There are different kinds of weather; weather changes from day to day and, in some places, over seasons.						
Weather can be described and measured.						
The environment changes from one season to another in some places.						
The Earth's surface is made of different materials (e.g., rocks, sand, dirt, water), and each material has properties that can be described.	•	•				
The surface of the Earth changes, sometimes slowly (e.g., erosion) and sometimes suddenly (e.g., earthquake or volcano).						
Different objects can be seen in the sky.						
We can affect the world around us in positive and negative ways.						

## Social Studies Concepts for Balls

	Investigation					Other Experiences
	1	2	3	4	5	
<b>Spaces and Geography</b>						
The place where each of us lives has geographical features (e.g., mountain, desert, lake, river).						
We each have personal geographic information (e.g., where each lives, our addresses).						
Our location describes where we are in relation to other people and objects.						
Regardless of where we live, we depend on people far away for many necessities and information.	•			•	•	
Maps are tools with symbols that help us find where we are and where we are going.						

## Social Studies Concepts for Balls

	Investigation					Other Experiences
	1	2	3	4	5	
<b>People and How They Live</b>						
Each person has unique characteristics.						
There are similarities and differences among people and cultures.					●	
A family is a group of closely related persons; each family is unique.						
Respect for others, cooperation, and fairness help us get along in communities.	●			●	●	
People communicate verbally and nonverbally.						
People have basic needs that must be met in order to stay healthy (e.g., food, clothing, shelter).						
People buy, sell, and trade to get goods and services that they do not raise, make, or find themselves.					●	
People use various means of transportation to move goods and go from place to place.					●	
People have various jobs in the community.					●	
There are rules in our homes, schools, and community; each rule has a purpose.					●	
People have various rights.						
People have different ways of solving problems.	●	●	●	●	●	
<b>People and the Environment</b>						
People can affect the environment positively and negatively.						
People depend on the physical environment (e.g., food, clean water).						
People can take care of the environment in many ways.						
<b>People and the Past</b>						
Things and people change over time.						
We can measure time.						
We use special language to talk about time ( <i>yesterday, today, tomorrow, past, present, future, day, week, minute, hour, month</i> ).						

## The Creative Curriculum® Objectives for Development & Learning

### Social-Emotional

1. Regulates own emotions and behaviors
  - a. Manages feelings
  - b. Follows limits and expectations
  - c. Takes care of own needs appropriately
2. Establishes and sustains positive relationships
  - a. Forms relationships with adults
  - b. Responds to emotional cues
  - c. Interacts with peers
  - d. Makes friends
3. Participates cooperatively and constructively in group situations
  - a. Balances needs and rights of self and others
  - b. Solves social problems

### Physical

4. Demonstrates traveling skills
5. Demonstrates balancing skills
6. Demonstrates gross-motor manipulative skills
7. Demonstrates fine-motor strength and coordination
  - a. Uses fingers and hands
  - b. Uses writing and drawing tools

### Language

8. Listens to and understands increasingly complex language
  - a. Comprehends language
  - b. Follows directions
9. Uses language to express thoughts and needs
  - a. Uses an expanding expressive vocabulary
  - b. Speaks clearly
  - c. Uses conventional grammar
  - d. Tells about another time or place
10. Uses appropriate conversational and other communication skills
  - a. Engages in conversations
  - b. Uses social rules of language

### Cognitive

11. Demonstrates positive approaches to learning
  - a. Attends and engages
  - b. Persists
  - c. Solves problems
  - d. Shows curiosity and motivation
  - e. Shows flexibility and inventiveness in thinking
12. Remembers and connects experiences
  - a. Recognizes and recalls
  - b. Makes connections
13. Uses classification skills
14. Uses symbols and images to represent something not present
  - a. Thinks symbolically
  - b. Engages in sociodramatic play

### **Literacy**

15. Demonstrates phonological awareness
  - a. Notices and discriminates rhyme
  - b. Notices and discriminates alliteration
  - c. Notices and discriminates smaller and smaller units of sound
16. Demonstrates knowledge of the alphabet
  - a. Identifies and names letters
  - b. Uses letter-sound knowledge
17. Demonstrates knowledge of print and its uses
  - a. Uses and appreciates books
  - b. Uses print concepts
18. Comprehends and responds to books and other texts
  - a. Interacts during read-alouds and book conversations
  - b. Uses emergent reading skills
  - c. Retells stories
19. Demonstrates emergent writing skills
  - a. Writes name
  - b. Writes to convey meaning

### **Mathematics**

20. Uses number concepts and operations
  - a. Counts
  - b. Quantifies
  - c. Connects numerals with their quantities
21. Explores and describes spatial relationships and shapes
  - a. Understands spatial relationships
  - b. Understands shapes
22. Compares and measures
23. Demonstrates knowledge of patterns

### **Science and Technology**

24. Uses scientific inquiry skills
25. Demonstrates knowledge of the characteristics of living things
26. Demonstrates knowledge of the physical properties of objects and materials
27. Demonstrates knowledge of Earth's environment
28. Uses tools and other technology to perform tasks

### **Social Studies**

29. Demonstrates knowledge about self
30. Shows basic understanding of people and how they live
31. Explores change related to familiar people or places
32. Demonstrates simple geographic knowledge

### **The Arts**

33. Explores the visual arts
34. Explores musical concepts and expression
35. Explores dance and movement concepts
36. Explores drama through actions and language

### **English Language Acquisition**

37. Demonstrates progress in listening to and understanding English
38. Demonstrates progress in speaking English



## Integrate Content Learning

Now that you have explored the big ideas and concepts related to the topic and linked them to the content areas you are required to teach, think about some of the experiences you want to offer children. How might you integrate this topic into classroom activities? There are five sample investigations in this booklet. Consider what else you might do in interest areas, during routines, and in focused small-group times.

Content Area	Sample Experiences	Your Ideas
<b>Literacy</b>	<p>Refer to <i>Play Ball: The World's Best Ball Games</i> (Brallier, 2002) to learn new games to play with balls.</p> <p>Create a book about <i>If I Were a Ball I Would...</i></p> <p>Keep a list of words that describe balls.</p>	
<b>Math</b>	<p>Measure and weigh balls.</p> <p>Count how many times you can bounce a ball.</p> <p>Compare how far you can throw different kinds of balls.</p> <p>Notice and describe the patterns on balls.</p> <p>Learn the word <i>sphere</i>.</p> <p>Sort and categorize the ball collection in many ways.</p>	
<b>Science</b>	<p>Find out what is inside of balls.</p> <p>Experiment with balls and ramps.</p> <p>Explore bouncing different kinds of balls on different surfaces.</p>	

Content Area	Sample Experiences	Your Ideas
<b>Social Studies</b>	<p>Take a walk to find out where balls are used in the community.</p> <p>Interview parents and senior citizens to find out what kind of games they played with balls when they were children.</p>	
<b>The Arts</b>	<p>Create a marble painting to observe the paths of rolling balls.</p> <p>Use art materials such as clay, foil, or paper maché to create balls.</p> <p>Create dances that imitate different kinds of balls and ball movements.</p>	
<b>Technology</b>	<p>Investigate how a track ball or a computer mouse works.</p> <p>Try to find out about the machines used to make balls.</p> <p>Use a bike pump to inflate a ball.</p>	

# 2

## Investigate the Topic

You have already started lists of children's ideas and questions about balls. As you implement the study, you will design investigations that help children extend their ideas, find answers to their questions, and learn important skills and concepts. In this section, you will find ideas for investigating questions children might ask. Do not be limited by these suggestions. Use them as inspiration to design experiences tailored to your own group of children and the resources in your school and community. While it is important to respond to children's ideas and follow their leads as their thinking evolves, it is also important for you to organize the study and plan for possibilities.

It is often difficult to predict how long a study will last. In part it depends on the interests of the children, your resources, and the amount of time you can devote to the study. Many teachers find that children's interest in an engaging topic can last for 4–6 weeks. The specific investigations can extend over several days. Children will also be interested in repeating particular investigations, and they will learn something new each time. In addition, explorations in various interest areas can continue throughout the study.

### Weekly Planning

Use your weekly planning form to organize your study on a weekly basis. For example, children might wonder about the speed of balls. You have to think about where, when, and how children could investigate this question. You might choose to have children experiment in the Block Area using balls and block ramps. If so, on your weekly planning form, you would indicate that you are adding balls and ramps to the Block Area. You might also note that you are planning a small-group activity during which children would roll different kinds of balls and compare which ones rolled the fastest.

Remember, you do not need to incorporate balls in every interest area. Other routine activities and experiences should continue in the classroom throughout the study.

In *The Creative Curriculum Study Starters Teacher's Guide*, you will find a page to attach to your weekly planning form. Use this page to record your key ideas about what will happen next, how children will represent their learning, and how their experiences link to the objectives and content standards of your program.

## Enhancements to Interest Areas

Here are some suggestions of materials and resources for exploring your topic, along with space for you to list available resources.

Interest Area Materials for Exploration	Your Ideas
<b>Blocks</b> Small Balls Ramps	
<b>Dramatic Play</b> Sports store selling different kinds of balls	
<b>Toys and Games</b> Collection of rubber bands to make rubber band balls Collection of small balls to sort Geometric solids (spheres) Marble maze construction toy	
<b>Art</b> Marble painting Printmaking with different balls Collage or structure made with ball-shaped materials	
<b>Library</b> Informational books about various games with balls	
<b>Discovery</b> Old balls that have been cut in half Magnetic marbles Gerbil/hamster ball	
<b>Sand and Water</b> Small balls for floating and sinking Ice cream scoop for molding sand balls	
<b>Music and Movement</b> Exercise balls	
<b>Cooking</b> Scoops to make melon balls Meatballs recipe	
<b>Outdoors</b> Variety of balls Parachute or blanket to bounce balls Equipment to use with balls, e.g., Velcro mitts, hoops, foam bats	

Notes



## Are bigger balls better for rolling, kicking, and throwing?

### Materials

Balls, yarn, or string (preferably two different colors)

### Where This Might Take Place

Discovery Area, Outdoors, Toys and Games Area, Small-Group Area

### What to Do

- Hold up a flat, circular object such as a CD, a Frisbee, or a circle cut from paper. Ask children to name the shape. Then hold up a ball and ask about its shape. *How are they the same and different?* Explain to children that a ball is a *sphere* and that no matter how you look at it, it still looks like a *circle*.
- Ask: *Do you think that bigger balls are better than smaller balls for rolling, kicking, and throwing?*
- Ask the children for ideas about how to measure a ball. Discuss their ideas.
- Show them how to wrap yarn around a ball. Then, by measuring the length of the yarn, they can find out about the size of the ball.
- Ask each child to choose a ball from the collection.
- Ask each child to predict (guess) how big around his/her ball is by cutting a piece of string or yarn. Use one color of yarn for these predictions.
- Invite the children to test their predictions by wrapping the pieces of yarn that they cut around the balls.
- Using a second color of yarn, encourage each child to wrap a new piece of yarn around the ball and cut it the appropriate length. Discuss the results.
- Ask the children to compare their yarn length to different objects in the room such as a block, table, window pane, foot, hand, etc.
- Have pairs of children take a large ball and a small ball and make predictions about which one they will be able roll, kick, or throw the fastest or farthest.
- Discuss findings.

**Document Findings**

Have the children create a display of the balls and the lengths of yarn.

Guide children in taping the yarn to the wall from the shortest to the longest piece. Place the matching ball underneath the yarn.

Tape the yarn used to make the predictions next to the actual lengths.

Encourage the children to talk about what they notice.

Indicate on the display which balls were best for rolling, kicking, and throwing.

**Learning Goals and Standards**

<b>Science</b>	Exploring the physical properties of objects and objects in motion; observing, organizing information, communicating and representing information
<b>Social Studies</b>	Working collaboratively with others
<b>Literacy</b>	Engaging in conversations; asking and answering questions
<b>Math</b>	Measuring using non-standard units, estimating, making comparisons, graphing

**Additional Investigations Related to the Size of Balls**

- Weigh balls.
- Line balls up from smallest to largest.
- Find examples of very large or very heavy balls in your community (e.g., demolition or bowling balls) or find pictures on the Internet or in magazines.

**Your ideas**

## Notes



## Which balls bounce best?

### Materials

Variety of balls

### Where This Might Take Place

Discovery Area, Outdoors, Gym, Multipurpose Room

### What to Do

- Gather a collection of balls.
- Ask questions such as these:

*Which balls do you think will bounce well?  
Which ones do you think won't bounce well?*

- Sort the balls into two groups. Record predictions.
- Experiment with the balls. Record any changes in the groups.
- Try bouncing the balls on different surfaces such as grass or carpet.
- Continue with additional questions:

*What differences do you see between the balls that  
bounce well and those that don't?*

*Why do you think some balls bounce better than others?*

### Document Findings

Make a chart listing the balls that bounce well and those that do not. Invite children to illustrate.

As an alternative, take one photo of the predictions and another of the findings after the exploration. Display on a chart and have children dictate statements about the experience.

**Learning Goals and Standards**

- Science** Exploring the physical properties of objects and objects in motion; solving problems; observing; making predictions, thinking logically
- Literacy** Using print concepts and writing; understanding the purpose for writing, using expressive language
- Math** Sorting, classifying, representing data

**Additional Investigations About Bouncing Balls**

- Bounce balls made of different materials.
- Bounce a small ball onto a big ball.



**Your ideas**

Notes



## How can I make balls roll faster?

### Materials

Variety of balls  
Ramps such as boards, slides, rain gutters, cardboard tubes

### Where This Might Take Place

Large-Group Area, Art Area, Outdoors

### What to Do

- Invite children to experiment with rolling balls of different sizes and shapes on a flat surface such as the floor.
- Ask questions such as these:

*Which balls rolled the fastest?*

*How can we make them roll faster?*

- Suggest that children predict which of two balls might roll faster down a slide. Wonder aloud:

*I wonder why this ball rolls faster.*

- Ask the children if they can think of other kinds of slides (ramps) that they can make for the balls. Offer boards, planks, rain gutters, PVC pipes, and cardboard tubes.

### Document Findings

Record children's predictions and findings on a chart.

**Learning Goals and Standards**

- Science** Exploring the physical properties of objects and objects in motion; solving problems; observing; making predictions, thinking logically
- Literacy** Using print concepts and writing; understanding the purpose for writing, using expressive language
- Math** Data representation, sorting, classifying

**Additional Investigations About Rolling Balls**

- Compare rolling small balls and large balls.
- Compare rolling heavy balls and light balls.
- Compare rolling balls of similar sizes but made of different materials.
- Change the height of the ramp and find out what happens when the balls are rolled.

**Your ideas**

Notes



## What is inside balls and does it make a difference?

### Materials

Variety of old balls  
Tools for opening balls  
Safety goggles

### Where This Might Take Place

Discovery Area, Outdoors, Small-Group Area

### What to Do

- Pose the question, *What do you think is inside a ball?*
- Record children's responses on a chart.
- Introduce vocabulary words such as *hollow* and *solid*. Use objects that permit the children to see inside an object as you discuss these words.
- Ask the children to predict whether each ball is *hollow* or *solid* and sort the balls accordingly.
- Cut open the balls as children observe. Rearrange the balls into the correct categories. Create a third category titled, "Balls We Can't Open" for those balls that cannot be opened easily, such as a marble or a bowling ball.
- Ask questions such as these:

*Why do you think some balls are hollow and some balls are solid?*

*What would be different about how balls move if those that are hollow were solid?*

*How can we find out what's inside of the balls we can't open?*

- Have pairs of children compare rolling, kicking, and throwing hollow and solid balls. Try the experiment on different surfaces. Discuss findings.

**Document Findings**

Create a display of balls that are solid and hollow on the inside. Invite children to make predictions for other balls.

Indicate on the display which balls are best for rolling, kicking, and throwing.

**Learning Goals or Content Standards Addressed**

**Science** Predicting, testing hypothesis, exploring the physical properties of objects; learning concepts about solids and air

**Social studies** Working collaboratively

**Literacy** Engaging in conversations; learning and using new vocabulary; asking and answering questions

**Math** Sorting and classifying, representing data

**Technology** Understanding how things work

**Additional Investigations About What Is Inside Balls**

- Create a hollow ball with papier-mâché. Cover a round balloon with papier-mâché. When dry, make a small opening, pop the balloon and remove it.
- Compare the weight of hollow and solid balls.



**Your ideas**

## Notes



## How do people use balls in their work and play?

### Materials

none

### Where This Might Take Place

Site visit, Large- and Small-Group Areas

### What to Do

- Arrange for a site visit to a sporting goods store (or sporting goods section of a department store) to see different types of balls. Call ahead to make arrangements and explain to the manager that children will be asking questions and sitting on the floor making drawings. (As an alternative, invite a coach or an athlete to the classroom to share and discuss the many different kinds of balls used in sports.)
- Prepare children for the visit by planning and assigning questions to ask such as: *Why does a golf ball have dimples? Why is a bowling ball so heavy? What is the heaviest ball in the store? What is the lightest ball? Why is a football a ball? Which balls are solid and which are hollow? How do the balls get to the store? Does someone have to inflate the balls?*
- Have children sketch the balls they see. Take photos of the displays.
- Back in the classroom, create a sporting goods store in the Dramatic Play Area with the children. Refer to the photos and drawings. (You can create a backdrop for the store by converting a photo of the ball display into a transparency and projecting it onto the wall with an overhead projector.) Have the children create signs for their store along with price labels for their balls.

### Document Findings

Have children dictate what they learned on an experience chart.

Document children's dramatic play experiences and create a display.

**Learning Goals or Content Standards Addressed**

Science	Predicting, testing hypothesis, exploring the physical properties of objects; learning concepts about solids and air
Social studies	Working collaboratively
Literacy	Engaging in conversations; learning and using new vocabulary; asking and answering questions
Math	Sorting and classifying, representing data
The Arts	Creating visual displays
Technology	Understanding how things work

**Additional Investigations About Using Balls**

- Explore the favorite games our families like to play that use balls.
- Explore the favorite ball games our families like to watch.

**Your ideas**



### Further Questions to Investigate

You may notice that children are still engaged by the study of balls and want to find out more. Here are some examples of additional questions you might investigate to extend the study:

- What defines a ball as a ball?
- If a ball is placed in a freezer, will it bounce higher?
- How many ways can we make our own balls? Will they bounce?
- Which balls can I throw, kick, or roll the longest distance?
- How do basketball players spin balls on their fingers?
- What kinds of balls do different kinds of pets like?
- Do all balls roll?
- What kind of ball games do children in other communities play?
- How many different kinds of balls can we make?
- How does a ballpoint pen work?
- Can balls be used in decorations? In artwork? In structures?
- How are bubbles the same as or different from other types of balls?



*Are there additional questions that will help you extend your study?*

# Celebrate Learning

As you notice your children's interest begin to diminish, it is time to bring the study to a close. Plan a special way to celebrate their learning and accomplishments. Allow children to assume as much responsibility as possible in planning the activities. Here are some suggestions:

- Set up stations for children to show visitors the various ways they investigated the balls.
- Host an Olympics featuring events for visitors and children to play using balls.
- Have the children plan a meal including only those foods shaped like balls: oranges, cheese balls, sherbet balls, olives, meatballs, matzah balls. Invite family members to participate.
- Invent a new ball game and teach it to the children in another class.
- Make a class book, photo album or documentation panel about the balls study.

## Reflections

*What were the most engaging parts of the study? Did you discover any new topics that might be worthy of investigation? If you were to change any part of the study, what would it be? Do you have other thoughts and ideas about this study?*

# 3

Your ideas 

# Resources

## Children's Books

### Fiction featuring balls:

*Three Magic Balls* (Richard Egielski)

When Uncle Dinkleschmidt buys three rubber balls for his toy store, it is up to Rudy to take care of them. As soon as Rudy is left alone, he finds out these are no ordinary balls and the magic begins.

*Play Ball, Amelia Bedelia* (Peggy Parish)

Amelia Bedelia, who knows very little about playing baseball, fills in for a sick player on the Grizzlies' baseball team.

*Curious George Plays Baseball* (Margaret Rey)

Curious George's natural inclination to find out more about everything leads him to interfere with a baseball game.

*Stop That Ball* (Mike McClintock)

This book, told in a rhyming prose, tells of a boy's madcap adventures as he tries to retrieve his ball.

*Balls! Elmo's World* (John E. Barrett and Mary Beth Nelson)

In this board book, Elmo is having a ball! Peek underneath the big flaps to find bouncy balls of different sizes and shapes and watch Elmo dunk a basketball.

*Winnie Plays Ball* (Leda Schubert)

On her birthday, Winnie the dog receives several balls which she enjoys catching, hiding, and eating.

*The Snowy Day* (Ezra Jack Keats)

A small boy sees snowballs and other delights when a snowstorm transforms his city neighborhood.

*The Lost Ball, La pelota perdida* (Lynn Reiser)

In this book with English and Spanish translation, the reader discovers that children and dogs and ballplayers speak the same language (even when they don't).

**Nonfiction about balls:**

*H is for Home Run: A Baseball Alphabet* (Brad Herzog)

A letter-by-letter discussion of the game and terminology of baseball.

*This is Baseball* (Margaret Blackstone)

*This book gives a first-time look at the elements and experience of baseball.*

*My Football Book, My Basketball Book, My Baseball Book, My Soccer Book* (Gail Gibbons)

In each of these small paperbacks, Gibbons identifies the equipment, the court or field, the position of the players, and a few rules of the game.

*Baseball ABC and Baseball 123* (DK Publishing)

Through photographs in these board books, children pick up the basics of the games such as “H is for Home Plate” or “5 base runners.”

*Balls* (Melanie Davis Jones)

Rhyming text introduces the many types of balls and how they are used.

**Teacher Resources**

*Bouncing Science: No Sweat Projects* (Jess Brallier)

This small paperback book explains, in simple-to-understand terms, the science of balls. Many of the experiments can be adapted for preschool-kindergarten use.

## Letter to Families

Send families a brief letter outlining the potential scope of the study. Use the letter to communicate with families and to invite their participation in the study.

### A Letter to Families About Our Study of Balls

We have noticed children’s curiosity about balls—the different kinds of balls, how people use balls, what they are made of, what is inside them, how high they can bounce, and their uses. We’ve decided to study balls!

We need your help to get our study rolling! We want to collect many different types of balls. Here is a beginning list of the kinds of balls we have in mind, but please do not be limited by it!

baseball	crystal ball	Koosh® ball	soccer ball
basketball	doggie ball	marble	volleyball
beach ball	football	Ping-Pong ball	WIFFLE® ball
bowling ball	golf ball	pool ball	
cotton ball	kick ball	racquet ball	

As we study balls, we will be learning many important concepts and skills in literacy, math, science, social studies, the arts, and technology. We’ll also be using thinking skills to investigate, solve problems, and make predictions.

#### What You Can Do at Home

Play with balls of all shapes, types, and sizes: playground balls, tennis balls, Ping-Pong balls, Koosh® balls, volleyballs, baseballs, footballs, marbles. Talk about what the balls are made of, if they are heavy or light, or if they are big or little.

Wonder aloud with your child to encourage his or her thinking about balls. *I wonder what’s inside a tennis ball. I wonder how far you can throw a foil ball, a beach ball, or a tennis ball. How can we find out?*

Help your child use all of the senses when playing with balls. *What does it look like? Feel like? Sound like? Smell like?*

See how many types of balls you can find around the house and in your neighborhood.

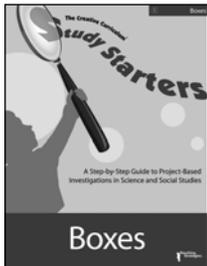
While riding in the car, bus, or train, play a game. Think of all the words that contain the word *ball* in them. Look for examples of balls around you.

At the end of our study, we’ll have a special event to show you all that we’ve learned. Thank you for playing an important role in our learning.

# **The Creative Curriculum® Study Starters**

*A Step-by-Step Guide to Project-Based Investigations in Science and Social Studies*

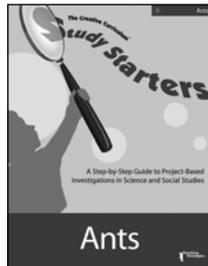
## **Volume I—Complete Set (1–6)**



*Boxes (#1)*



*Rocks (#2)*



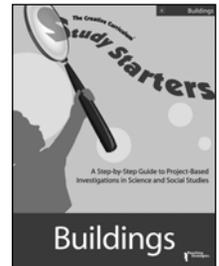
*Ants (#3)*



*Clothes (#4)*

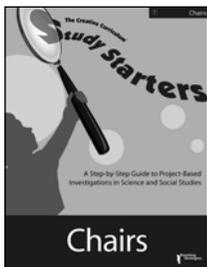


*Flowers (#5)*

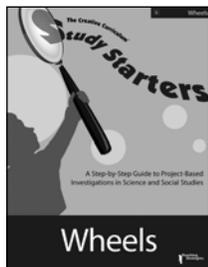


*Buildings (#6)*

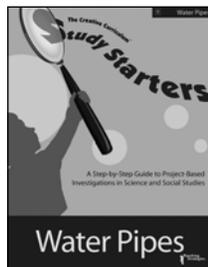
## **Volume II—Complete Set (7–12)**



*Chairs &  
Things to  
Sit On (#7)*



*Wheels (#8)*



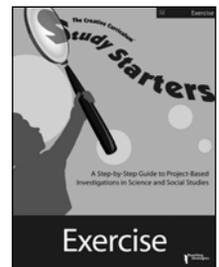
*Water Pipes (#9)*



*Trash &  
Garbage (#10)*



*Shadows (#11)*



*Exercise (#12)*

Each of the 12 *Study Starters* is available individually, or you may purchase either of the complete sets to receive a free teacher's guide and full-color binder to store the *Study Starters* and your notes. For more information, please call (800) 637-3652 or visit our online bookstore at

**[www.TeachingStrategies.com](http://www.TeachingStrategies.com)**



Studies are one of the most effective ways for children to learn science and social studies content while developing skills in literacy, math, the arts, and technology. They support children's wonderful ability to become totally engaged in topics and activities that interest them, and they challenge children to extend their thinking to ever higher levels. Studies are meaningful to children because they provide opportunities to gain information through direct observation and experimentation and then to link new ideas to what children already know.

Are you ready to engage your children with in-depth studies? *The Creative Curriculum® Study Starters* are designed with you in mind. This valuable science and social studies resource is a series of step-by-step guides that help you implement investigative, project-based learning in your classroom. *Study Starters* begin with topics that children want to explore and help you identify children's questions, learn background information and vocabulary, organize and plan the environment, facilitate investigations, incorporate content skills and knowledge, and involve families. Most important, *Study Starters* lead you to look at your own children and community to develop a study that is unique and customized for the children you teach.



P.O. Box 42243  
Washington, DC 20015  
800-637-3652  
[www.TeachingStrategies.com](http://www.TeachingStrategies.com)