

# Math-Works Activity Guide

## California Preschool Curriculum Framework

### Guiding Principles

Build on children's natural interest in mathematics, their intuition and informal knowledge.

Encourage inquiry and exploration to foster problem solving and mathematical reasoning.  
Promotes problem solving.

Use everyday activities that naturally develop mathematical knowledge: putting toys away, playing with blocks, playing with buckets in different sizes.

Introduce math concepts through intentionally planned activities, presented in a logical sequence.

Provide an environment rich in mathematical materials.

Introduce preschool children to the language of mathematics: numbers, shapes, comparing words, quantity, size, position.

Support Dual Language learners in developing mathematical knowledge as they acquire English; simplify terms, use words, and model actions.

Observe and listen to children to identify thought provoking moments throughout the day; mathematical concepts can be clarified, extended, and reinforced.

Establish a partnership with parents/ caregivers. Share with parents about age appropriate expectations and what preschool math is all about!

Respond to each child individually; children with disabilities, like all children, benefit from multiple opportunities to experience hands-on math activities using a variety of materials.

# Mathematics

## California Curriculum Framework: Guiding Principles

The following principles will guide teachers' classroom practices in establishing a high-quality, challenging and sensitive early mathematics pre-school program. These principles are based on the ten recommendations in *Early Childhood Mathematics: Promoting Good Beginnings* set forth by the National Association for the Education of Young Children and National Council of Teachers of Mathematics (NCTM).

- **Build on preschool children's natural interest in mathematics and their intuitive and informal mathematical knowledge.** Young children are mathematically competent, motivated and naturally interested in exploring mathematical ideas and concepts.
- **Encourage inquiry and explorations to foster problem solving and mathematical reasoning.** The most powerful mathematics learning for preschool children often results from their own exploration. Teachers should maintain an environment that nurtures children's inquiry and exploration of mathematical ideas that values problem solving.
- **Use everyday activities as a natural vehicle for developing preschool children's mathematical knowledge.** Putting toys away, playing with blocks, setting the tables for meals, playing with buckets in various sizes are all opportunities for children to learn concepts such as sorting, geometry, number, and measurement.
- **Introduce mathematical concepts through intentionally planned experiences.** Math activities planned in advance allow teachers to present concepts in a logical sequence, link mathematical ideas, and build on knowledge. Teachers can foster children's understanding of mathematical concepts over time through intentionally planned activities.
- **Provide a mathematically rich environment.** A high-quality environment is arranged to offer children opportunities to explore and learn about math concepts throughout the day.

- **Provide an environment rich in language and introduce preschool children to the language of mathematics.** During the preschool years children learn number words, names of shapes, words to compare, quantity (more, less) size (big, small) position (in, on, under). Language helps children to become aware of their mathematical thinking and express it in words.
- **Support English Language learners in developing mathematical knowledge as they concurrently acquire English.** Teachers should simplify the terms they use, use manipulatives, illustrate the meaning of words by acting and modeling whenever possible and encourage children to use their home language whenever possible. Repetition, paraphrasing, and elaboration by the teacher helps children who are English learners understand the content of the conversation.
- **Observe preschool children and listen to them.** Close observation allows teachers to identify thought provoking moments through everyday play, where mathematical concepts can be clarified, extended and reinforced. Children can be prompted to make new discoveries. Observing also allows teachers to learn children's interests and assess children's mathematical knowledge and skills.
- **Recognize and support the individual.** Young children may understand mathematical concepts in very different ways, at varying rates, and with different materials. To be effective, teachers should respond to each child individually. Children with disabilities, like all children, benefit from multiple opportunities to experience math concepts through playful activities that build on their interests. They particularly benefit from hands-on activities using a variety of manipulatives and verbal descriptions.
- **Establish a partnership with parents/caregivers in supporting children's learning of mathematics.** When parents get involved in their children's mathematics education, children become more engaged and excited. Teachers should communicate to parents what preschool math is all about, and age appropriate expectations.

# Math-Works

The purpose of the "Math-Works" resource guide is to inspire and enrich preschool mathematical strategies and activities. Ultimately the goal is to increase children's understanding of math concepts, ensure individual goals are met, and that School Readiness outcomes are achieved.

"Math-Works" was developed based on the following resources:

- California Preschool Curriculum Framework Desired Results Developmental Profile (DRDP)
- The Creative Curriculum/Mathematics
- High-five Mathematize; developed by the National Head Start Family Literacy Center for the Office of Head Start
- Carolyn Pratt; The Origin of Blocks / Homegrown Friends website

The guide was designed to be used with the Desired Results Developmental Profile (DRDP). It is organized into six Measures within the Cognitive Domain: Classification, Number Sense of Quantity, Math Operations, Measurement, Shapes, and Patterning.

Each Measure includes an outline of the developmental sequence of learning math concepts and research information, as well as environmental and classroom strategies.

The Math-Works guide was intentionally designed to be "teacher-friendly" and illustrated activities accompany each of the Measures. Activities are organized developmentally from simple to more complex. Teachers will choose and plan activities based on goals identified through the DRDP assessment process.

Additional sections of the "Math-Works" tool include: A Summary of the California Preschool Curriculum Framework/Guiding Principles; Meeting the Needs of All Children: English Language Learners, Advanced Learners, and Children with Disabilities; The Value of Blocks; and a Glossary of Math Terms.

To ensure that all children take part in experiences that promote mathematical learning, a minimum of one Math-Works activity must be planned and recorded on the lesson plan each week. To support "Best Practices," the activity should be repeated and available to children at least two times during the week.

# Meeting the Needs of All Children

## English Language Learners/Advanced Learners/Disabilities

Based on California Preschool Curriculum Framework

The Creative Curriculum: Volume 4, Mathematics

SETA Head Start Assessment Idea Book

Preschool programs should provide opportunities for all children to be actively engaged in mathematical experiences that are challenging yet achievable. All children learn through active involvement with materials and other people, but not all children learn in the same way or at the same pace. The teacher's role is to determine what individual supports a child needs in order to participate fully. It is important to observe children carefully and continually to see if current strategies are working, and to make changes as necessary.

All Children benefit from the following strategies:

- Careful, continual observation of current skill level, interests, and whether current strategies are effective.
- Individualized teaching that responds to each child's strengths, interests, and learning style, as well as making changes as needed.
- Access to a variety of materials.
- Multiple opportunities to experience math concepts through hands-on activities that build on their skills and knowledge.
- Teacher's support and verbal descriptions of what they are doing throughout the day.
- Daily counting, number use, and math related concepts at home as well as school.

# Supporting English Language

The teacher's role is to provide a positive classroom climate where children can feel comfortable and accepted while they develop and learn. Teachers do this when they provide cultural, social-emotional, and family partnerships, as well as supportive classroom strategies.

Language plays a central role in teaching and learning mathematics. Words can help to anchor concepts, and questions can lead children to explore mathematical ideas.

Ideally, teachers support children learning math concepts in the child's home language, but this is not always possible. While children cannot be expected to learn concepts from materials alone, a high quality classroom environment provides many nonverbal mathematical experiences. Interactions with English-language learners can also support their mathematics learning.

## Language Supports

- Keep your language simple, use short sentences, pronounce words carefully.
- Determine in advance a few mathematical terms you want the children to learn and repeat these terms often.
- Use gestures and physical actions along with speech; show big, small, fast, slow with hand and body gestures. Modify your voice to facilitate understanding; a loud voice for "big" a soft voice for "small."
- Show and talk. Use manipulatives, pictures, and objects (show a circle when talking about a circle; hold up four fingers when you say the word four).
- Sing, chant, and recite simple rhymes with the class. Repeat counting songs, finger plays, and chants.
- Let children respond in nonverbal ways (pointing, drawing, gesturing, acting).
- Encourage children who speak the same language to work together, communicating their thoughts in their home language.
- Open-ended questions may be difficult for English-language learners. Ask questions that can be answered with one word. Also ask questions that include the word needed for the answer: "Is this large or small?"
- Include English-language learners in conversations regardless of whether or not they respond verbally.

- Talk while doing. Describe what you are doing while you are doing it and what you see the child doing: "You're putting the red pegs in the red bowl, and the blue pegs in the blue bowl."
- Listen closely. Make every effort to understand and check for understanding: "Do you want to put some of the blocks in the box and the other blocks on the shelf?"
- During story time, if possible have someone who speaks the child's language read the book before the activity. Learn and use a few mathematical terms or phrases in the child's language. Read short books with lots of repetition and use gestures to support understanding.

## Cultural Support

- Provide books, charts, and materials that are related to the family's experiences, culture, and language.
- Learn and speak a few terms in the child's home language.
- Encourage the child to talk with other children who speak the same language.
- Post the daily schedule, signs, and labels in the children's home language, in English, and in pictures.
- Sing or listen to audio recordings in the children's home languages.
- Teach or use the child's home language in whole group activities. English speakers will benefit from these experiences as well.

## Social-Emotional Supports

- Establish and follow regular routines so children gain confidence, knowing what comes next and what to do.
- Smile and speak often to children who are learning English, but do not demand participation or a reply until they are ready to respond.
- Recognize that the amount of time it takes to feel at home in a new situation varies from child to child. Allow English-learners to watch from a distance that is comfortable for them.
- Provide many nonverbal ways for children to participate, such as through art, music, dance, dramatic play, and outside play.

## Family Partnership Supports

- Foster partnerships with families, respecting their practices, inviting them to spend time in the classroom, asking for their advice on how to support their children, and keep them informed about their children's activities, using interpreters if necessary.
- Help families understand how valuable it is for their children to speak two languages. Encourage them to support their children's home language by speaking and reading to them in their language.
- When possible, send home books and learning materials in the children's home languages, so that families can read to children and do learning activities in their own languages.



# Supporting Advanced Mathematics Learners

Some preschool children are advanced in one or more areas of mathematics. These children do not simply use mathematical terminology or recite facts. The advanced mathematics learner is one who may create complex patterns; build intricate, delicately balanced block structures; or love to analyze problems. While it is important to acknowledge and challenge their abilities, as well as keeping in mind that these children are not always advanced in all areas of mathematics.

All children need challenges tailored to their abilities and learning styles. Teachers need to plan for advanced learners just as they do for those who need more time and support to master skills.

## Introduce data collection and analysis activities.

- Pose a question.
- Design a survey.
- Create charts or graphs.
- Interpret and then report results.

## Introduce symbolic or more abstract math materials.

- Use dice and dominos.
- Introduce symbolic graphs and graphs with numerals along with graphs with concrete materials.

## Introduce advanced computer programs.

- Preview computer programs for preschoolers and provide some that require a higher level of skill.

## **Integrate math with other content areas.**

- Pose math problems in other areas, as teachable moments, throughout the school day: "If the construction workers you see outside work 4 hours before lunch and 4 hours after lunch, how many hours do they work in a day?"
- Look for patterns in songs and books to talk about with children.

## **Focus on process skills.**

- Pose more complex and meaningful problems: "How could you use the blocks to design a play yard for the guinea pig, so that he can exercise but not run away?" "How many chairs do we need so that everyone can see the puppet show?" "How can we divide the pizza so that everyone has equal amounts?"
- Challenge children to think of new or multiple solutions to a problem: "Can you find another way to do it?" "How else could the man in the story solve his problem?"
- Encourage children to represent their thinking and learning through drawing, writing, or construction: "Here are four bears, and here are six cats. If I put them all together, I'll have ten animals."
- Pose mathematical problems that enable children to make connections among the components of math: "Can you find a pattern in the numerals between 10 and 30?" "If our work packets go home every Friday, how many times will your families see your work this month?" "Where might you look to figure that out?"

# Supporting Children with Disabilities

Supporting the active participation of a child with a disability may mean adapting the environment or materials, adjusting routines, or modifying instructions.

## Environmental Supports

- Offer alternative seating options, such as sitting on an adult's lap or next to an adult.
- Use tape or carpet squares to help children identify the boundaries of their personal space.
- Provide appropriate assistive devices so all children can use the computer: alternative table/desk placement, screen enlargement, and different types of mouse control.
- Select software that includes auditory as well as visual feedback.
- Equip electronic devices, such as CD players and audio recorders, with switches that all children can use independently.
- Make sure that books and other literacy materials are placed where all children can reach them and put them away.
- Provide a range of manipulatives, puzzles, and other math materials that are interesting and accessible to all children.

## Schedule and Routine Supports

- Preview activities with children who need help with transitions or new experiences.
- Break tasks and activities into smaller parts and provide verbal and other cues as necessary.
- Encourage children to participate to the degree that they are able.
- Use consistent, predictable routines to help children feel comfortable and secure. Introduce change gradually to encourage adaptability and flexibility.
- Use photographs of the children to create a visual daily schedule. Use pictures for directions, behavior reminders, and daily routines, such as tooth brushing and hand washing.

## Tactile and Visual Supports

- Provide manipulatives that relate to the topic or theme; for example, provide a set of shapes for a child to hold while the class is talking about the shapes on the flannel board; provide a large and small block to hold while the class is discussing size.
- Attach textured material to the letters on a child's name card, so that he/she can identify by touch. Let the child choose a special shape for his or her card (a circle if the other children's cards are rectangles).
- Introduce and reinforce math vocabulary while the child handles related manipulatives.
- Modify numeral cards or game pieces by adding raised dots to represent numbers.
- Include books with large print.

## Language Supports

- Articulate clearly and monitor the rate of your speech.
- Repeat important directions.
- Use pictures. Create or purchase picture/symbol cards for basic mathematical concepts such as number (cards with a numeral and/or dots), shape, and size.
- Use pictures or objects to represent important concepts.
- Encourage children to talk about what they are doing as they manipulate objects.

Many of the same strategies for supporting English-language learners may also assist children with language delays.

## Sensory and Physical Supports

- Select books and make or purchase charts with clear simple pictures and simple concepts.
- Observe to see what manipulatives the child finds easiest to handle. Some children may find it easier to manipulate magnetic numbers, shapes, and objects on a magnetic board.
- Determine what body position makes it easiest for a child to handle manipulatives and writing tools.
- Place large dots made with glue in the upper right hand corner of book pages; this will separate the pages, making them easier to turn.
- When possible, have children use their bodies to experience mathematical concepts (have children hold hands around a tree trunk to make a circle).
- Offer a variety of writing tools, including markers, crayons, and pencils in various sizes. Place a piece of rubber band/tubing over the pencil or marker to make it easier to grasp.

## Cognitive 4: Classification

### Key Points: California Preschool Framework

#### Developmental Sequence of Algebra and Functions

1. Recognizing similarities and differences in people (boys/girls) animals (cats/dogs) and objects (trees/flowers).
2. Sorting, grouping, and classifying objects.
3. Recognizing ordering relationships from large to small.
4. Identifying patterns in the environment.
5. Developing the ability to make predictions.
6. Recognizing similarities and differences in pictures of people, places, or things.
7. Learning to recognize similarities and differences in symbols (alphabet and numerals).
8. Forming generalizations and deriving rules.

*Experiences with classification and patterning allow for the development and practice of algebraic thinking and reasoning—skills essential in learning mathematics and science. These foundational concepts evolve and gradually develop and deepen over time.*

#### Strategies to promote classification and patterning skills:

- Materials that belong together are stored together. Organize the classroom into different categorized storage areas to facilitate classification (wood blocks arranged by size and shape; cars, trucks, and airplanes in different containers in the block area; crayons, pencils, and markers in the art area; manipulatives stored together by type).
- Include materials for sorting and classifying: rocks, shells, seeds, buttons, beads, wheels, plastic counters, shapes, cubes. Rotate these items to reflect the current topic. Add trays, containers, and egg cartons or cups to help facilitate these experiences.
- Identify opportunities for sorting in everyday routines. A well-organized classroom turns clean-up time into a sorting experience! "All of the crayons go together." "Here is a basket for the farm animals." Meals and choosing activities are times when sorting and classifying are a natural part of the daily routine.
- Recognize sorting in play and engage children in conversations about their sorting and classifying. Make these experiences more meaningful and rich with language. Ask questions: "It seems that you have two groups of animals. Why did you put those animals together?"
- Help children label the groups, verbalize, and come up with their own criteria for sorting: "How can you sort these into groups?"
- Plan specific sorting and classifying activities. Choose appealing objects; offer a variety of items on a tray, and provide containers with corresponding picture labels on it. Begin by using objects that vary by one attribute (e.g. crayons that differ only in color). Continue with items of various colors, shapes, and sizes.
- Integrate sorting into children's current topic of interest and study. Sorting activities can be an integral part of children's exploration of topics; sort pumpkins, apples, leaves, animals, etc. When children sort objects that they currently study and explore, it becomes more interesting and meaningful.

## COG 4: Classification

Child shows an increasing ability to compare, match, and sort objects into groups according to their attributes

Mark the latest developmental level the child has mastered:

Responding		Exploring		Building		Integrating									
Earlier <input type="radio"/>	Later <input type="radio"/>	Earlier <input type="radio"/>	Later <input type="radio"/>	Earlier <input type="radio"/>	Middle <input type="radio"/>	Later <input type="radio"/>	Earlier <input type="radio"/>								
<p><b>Attends to people, objects, or events</b></p>		<p><b>Interacts differently with familiar people and objects than with unfamiliar people and objects</b></p>		<p><b>Associates a person or object with another person or object, based on a similarity or relationship between them</b></p>		<p><b>Selects some objects that are similar from a collection of objects</b></p>		<p><b>Sorts objects into two groups based on one attribute, but not always accurately</b></p>		<p><b>Sorts objects into two or more groups based on one attribute, then puts all the objects together and re-sorts the entire collection into new groups</b></p>		<p><b>Sorts objects into groups based on at least two attributes, sometimes sorting by one attribute and then subdividing those groups based on a second attribute</b></p>			
<p><b>Examples</b></p> <ul style="list-style-type: none"> <li>Looks at people's faces.</li> <li>Quiets in response to an adult's voice.</li> <li>Closes hand around an adult's finger.</li> </ul>		<ul style="list-style-type: none"> <li>Smiles at a familiar adult's face or voice.</li> <li>Reaches for own special blanket or toy from home.</li> <li>Turns face away from an approaching unfamiliar adult.</li> </ul>		<ul style="list-style-type: none"> <li>Looks for the hammer that goes with the pounding bench.</li> <li>Looks at another child when the child's parent walks into the room.</li> <li>Looks for baby bottle when playing with baby doll.</li> </ul>		<ul style="list-style-type: none"> <li>Selects the shovels from among toys in the sandbox.</li> <li>Takes some apples out of a basket that contains apples and bananas while helping an adult prepare a snack.</li> <li>Picks out some train cars from a box of toys.</li> </ul>		<ul style="list-style-type: none"> <li>Separates blocks into a blue pile and a green pile, leaving a few green blocks in the blue pile.</li> <li>Sorts rocks into two piles, big and small, after a neighborhood walk.</li> <li>Picks out toy trucks from a basket of toys and sets them on a nearby shelf, and then picks out toy cars from the basket and sets them on a different shelf.</li> </ul>		<ul style="list-style-type: none"> <li>Separates a pile of toy animals by kind (e.g., dogs, cats, and birds).</li> <li>Puts crayons, pencils, and markers into different containers.</li> <li>Sorts a group of big squares and little squares into two piles by using eye gaze to indicate where an adult should put each square.</li> </ul>		<ul style="list-style-type: none"> <li>Sorts buttons by color, and then sorts all of them again by shape or size.</li> <li>Sorts shoes based on color, and then re-sorts by type (e.g., slippers, boots, tennis shoes).</li> <li>Sorts flannel-board pieces by type (e.g., shoes, pants, and shirts), and then separates them by adult items and baby items.</li> </ul>		<ul style="list-style-type: none"> <li>Separates tiles into four groups: blue circles, blue squares, red circles, and red squares.</li> <li>Removes utensils from the play kitchen and sorts them into groups: big spoons, small spoons, big forks, and small forks.</li> <li>Sorts the bin of interlocking blocks into several piles, first by color, then by shape (e.g., squares and rectangles).</li> </ul>	

- Child is emerging to the next developmental level
- If you are unable to rate this measure, explain here:

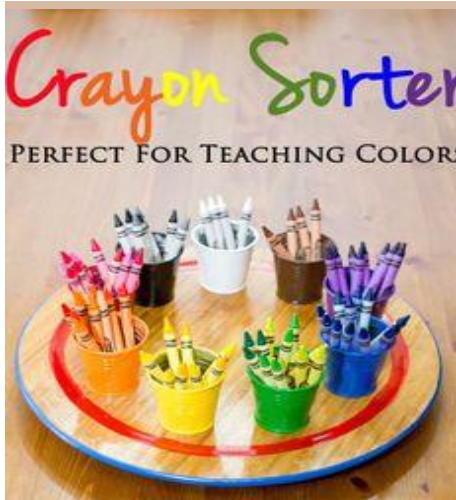
## COG 4

## Classification



## COG 4

## Cognitive 4: Classification



**Crayon Sort:** Organize the classroom to promote sorting. Store and display crayons in color matching cups for classification to take place during clean-up time. Learning is intentional and meaningful to children's daily routine.



**Well Stocked Blocks:** Provide an assortment of blocks, organized for daily classification experiences. Outline the blocks for children to match shape to correct shelf. Discuss how certain blocks "belong" together.



**Enhanced Block Play:** Add natural items to the block area. These items will enrich the block building experience. In addition, they are more items for children to sort and classify. Picture labels enable all children to put things away successfully.



**More Variations in Blocks:** Provide even more diverse materials in the block area. "Can you sort these into groups that belong together?" "Can you sort them in another way?" "How would you do it?"



**Simple Sorting:** Provide appealing objects that are easy for children to hold and manipulate. Use a combination of familiar and new words to describe the items. Children will look at, touch, and describe each item as they sort.



**Theme Sort:** Sorting is a "hands-on" way to explore a current topic/theme. Use materials that reflect children's environment, culture, and interests. Introduce sorting activities by using small objects; eventually use pictures for classification activities.

## Cognitive 4: Classification



**Paper Sort:** Provide a variety of different colors and textures of paper for sorting activity. Have children tear paper into scraps. Encourage them to sort (and collage) by size or color. Encourage children to explain their sorting criteria as they take part in the activity.



**Color Sorting Fun:** Find unusual types of containers to promote sorting activities. Label each area with a color or shape to guide the sorting experience. Children may bring small items from home to add to the experience, or gather small items around the classroom.



**Flannel Board Sort:** Use simple familiar felt characters or theme related items for sorting activities. Children can make up songs or stories, as well as sort the items by color, shape, function, etc. "How should we group these items?" "How did you come up with that idea?"



**Autumn Walk:** Take a nature walk with children and have them collect a variety of leaves. Discuss their similarities and differences: size, shape, color. Sort and use these for a group collage activity. "How should we group/sort these?"



**Sorting Shells:** Provide children with a variety of shells to explore and sort by type. Discuss how they are the same/different, texture, shape, etc. Use a magnifying glass and discuss the variations of each one.



**Flowers In a Row:** Gather a variety of flowers (florists, grocery stores, or nurseries may donate unsellable ones). Use a magnifying glass to explore their similarities and differences. Discuss and brainstorm with children how they could be sorted by color, size, or type.



## Cognitive 4: Classification



### Natural / Handmade:

Children explore an interesting variety of items. The use of a magnifying glass enhances the experience. Discuss and describe each item to build vocabulary. Ask questions: "Why do you think this is natural / manmade?" "Can you sort these another way?"



**Simple Sort:** Provide items to sort that are interesting but also familiar (cats/dogs). Discuss similarities and differences. "How are they the same?" "How are they different?" "How can you tell them apart?" Link this activity to children's lives by asking questions: "Do you have a dog/cat?" "Tell me about him."



**Three Kinds:** Increase the complexity of classification by sorting animals in different ways. Gather a group of animal figures to sort by where they live (habitat): farm, the sky, or the sea. "How are they the same?" "How are they different?" "What makes you think so?" "When/where did you see one of these?"



**Size Sort:** Use different size buttons for sorting activity. Enhance the experience by providing different size containers to sort them into. "How do you know that's one of the big buttons?" "How can we tell the small from the medium buttons?"



**Size & Shape Necklaces:** Trace different size circles (or any shape) on construction paper. Have children spend time cutting out the shapes. Once they are cut out, provide children with hole-punches and yarn. Children can then sort, discuss sizes, and create their own necklaces.



**Fun Size Sort:** Use die-cut to create shapes in different sizes. Provide sorting trays, dishes, or baskets to promote sorting experiences. Place all of the shapes together and have children come up with ideas on how the items can be sorted: color/size.

## Cognitive 4: Classification



**Paint Chip Sort:** Use paint chip color samples for sorting game. Children are able to sort variation of the same "hues" and place on the chart from lightest to darkest. Use comparison words; light, lighter, lightest, dark, darker, etc.



**Nuts & Bolts:** Collect real items to classify. Children can sort by type and organize by size. "What are these used for?" "How are they alike /different?" "Can you sort these in another way?"



**Weigh It:** Add a scale and label columns to sort rocks by size/weight. Build advanced vocabulary by using variations of descriptive words: heavy, weighty, hefty, enormous, medium, middle, moderate, light, weightless, tiny, petite, miniature, etc.



**Magnet Sets:** Divide and label sections on wipe board. Use magnetic numbers for matching, counting, and creating sets. Vocabulary: sort, classify, match, add, increase, include, subtract, deduct, take away, remove, equal, same, total, etc.



**Magazine Picture Sort:** Children can use magazine pictures for many kinds of classification activities. They can sort by color, furniture, food, clothing, and classroom materials.



**Picture Card Sort:** Brainstorm with children categories for classification activities: summer clothes/winter clothes, things to do outside/inside, types of transportation, plants/animals, etc. Label and group like items together.

## Cognitive 5: Number Sense of Quantity

### Key Points: California Preschool Framework

#### Developmental Sequence of Counting

1. Saying number words in sequence. May omit some numbers: "One, two, three, seven, eight, ten."
2. Counts a small set of objects but may have trouble keeping one-to-one correspondence. The child may point to more than one object when saying one number or say a number word without pointing to an object.
3. May count correctly a larger set of objects keeping track of counted and uncounted objects by pointing and moving objects while counting.
4. Understands that the number name of the last object counted represents the total number of objects (e.g. the number five when counting five objects). (Cardinality) The child provides the correct number when asked, "How many?"
5. Knows to say the number words one-to-ten in the correct order.
6. Create a set with a certain number of objects. For example, when a child counts out three beads from a larger pile of beads.
7. Knows to say the number words up to twenty correctly.

#### Young children need many opportunities to count during everyday interactions and routines.

- Model counting; touch or move each object aside as it is counted.
- Read counting books. Look at the pictures and encourage children to count aloud together.
- Ask questions that encourage purposeful counting: "I wonder how many stars are in this picture? One, two, three; there are three stars."
- Include home language in counting activities; this shows value for the child's home and culture and reinforces counting skills.
- Foster one-to-one correspondence within context of daily routines; a shovel for each bucket, a chair for each child, etc.
- Start with small sets of objects that are uniform in size, shape, and color so that children can focus on counting without the distraction of other attributes.
- Set out objects in a line to facilitate counting.
- Sustain and promote interest in counting; as children gain skills, provide a larger variety of interesting objects.
- Encourage children to self-correct their counts: "Let's count again, more slowly."
- Make, use, and play number related games.
- Plan group activities that focus on counting.

#### Beyond Counting: Recognizing and naming written numerals.

- Integrate numerals into different areas of the classroom.
- Point out and discuss numerals in print in a meaningful context.
- Expose children to quantities represented in different forms. For example, "three" can be represented with three objects, three fingers, a picture, a (3), or tally marks (III).

## COG 5: Number Sense of Quantity

Child shows developing understanding of number and quantity

Mark the latest developmental level the child has mastered:

Responding		Exploring		Building			Integrating
Earlier <input type="radio"/>	Later <input type="radio"/>	Earlier <input type="radio"/>	Later <input type="radio"/>	Earlier <input type="radio"/>	Middle <input type="radio"/>	Later <input type="radio"/>	Earlier <input type="radio"/>
<b>Responds to people or objects in basic ways</b>		<b>Demonstrates awareness of quantity</b>		<b>Identifies small quantities without counting, up to three</b>		<b>Shows understanding that the last number counted is the total number of objects in the group</b>	
<b>Examples</b> <ul style="list-style-type: none"> <li>Looks at objects that are hanging from a mobile.</li> <li>Calms in response to a familiar adult's touch.</li> <li>Turns toward a familiar adult's voice.</li> </ul>		<ul style="list-style-type: none"> <li>Communicates, "More," during lunch.</li> <li>Dumps small cars out of a bucket.</li> <li>Gestures for more when playing with play dough.</li> <li>Shows excitement when an adult offers another book.</li> </ul>		<ul style="list-style-type: none"> <li>Communicates a desire for two apple slices after noticing that a peer has two apple slices.</li> <li>Communicates, "Three dogs," while looking at a picture of three dogs.</li> <li>Communicates, "Now I have one bear and you have one," while giving a peer a stuffed bear.</li> </ul>		<ul style="list-style-type: none"> <li>Counts ducks in a storybook, "One, two, three, four, five," and then communicates that there are five.</li> <li>Communicates that there are six rocks after counting a collection of six rocks.</li> <li>Counts four pencils and says, "Apat," ["Four," in Tagalog] when asked how many pencils there are.</li> </ul>	
<ul style="list-style-type: none"> <li>Attends to one moving toy on a mobile, then to another.</li> <li>Grasps one toy, and then lets go of it while reaching for another toy that has been introduced by a familiar adult.</li> <li>Holds an object in each hand, and then touches the two objects together.</li> </ul>		<ul style="list-style-type: none"> <li>Communicates, "Dos," ["Two," in Spanish] and holds up two cups in the play kitchen.</li> <li>Communicates, "One, two, five, one, two," while pointing randomly to objects in a group.</li> <li>Signs, "Two," in response to the question of "How old are you?"</li> </ul>		<ul style="list-style-type: none"> <li>Counts out loud, "一, 二, 三, 四, 五," ["One, two, three, four, five," in Chinese] saying the next number as the next cup is placed on the table.</li> <li>Chants numbers from one to 10 in order while waiting for a tricycle.</li> <li>Counts, "One, two, three," out loud while pointing to each of three squares on a light box.</li> </ul>		<ul style="list-style-type: none"> <li>Counts six chairs, then counts seven children, and communicates, "We need one more chair."</li> <li>Counts accurately to 20 while marching.</li> <li>Counts on fingers to determine how many napkins to get so that each child at a table of six has one.</li> </ul>	

- Child is emerging to the next developmental level
- If you are unable to rate this measure, explain here:

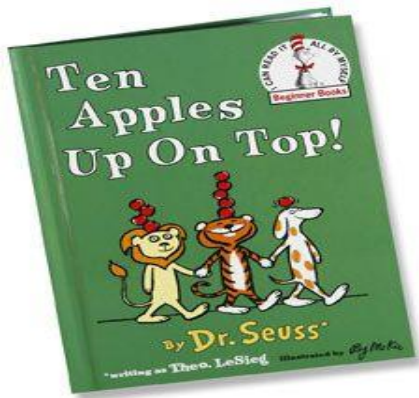
## COG 5

## Number Sense of Quantity



## COG 5

## Cognitive 5: Number Sense of Quantity



### Ten Apples Up on Top:

Introduce the story to children. Read and re-read at their request. Keep a copy on the library bookshelf for children to "read" during small group time.



**Act it Out:** Make "Apple Hats" with different a number of apples on each. Use the hats during large group time. Read the story as children "act out" their parts. All children take part in choral counting.

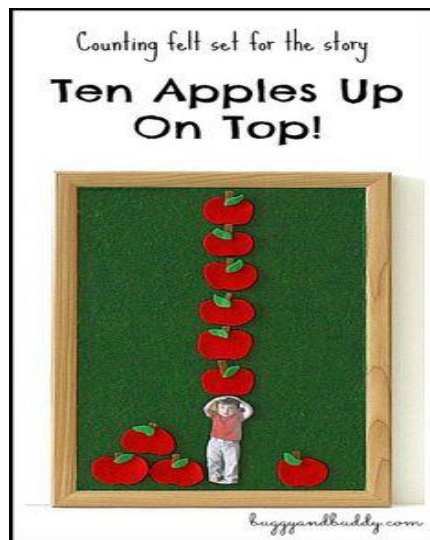


**Apple Play-dough:** Make "apple" red dough, add circle or apple shaped cookie cutters and baking sheets. Promote counting by asking questions; "I wonder how many apples are in each row?" "Which tray has the most apples?" "How many apples do we have altogether?"



### The Counting Tree:

Draw a simple tree, add circles and numbers. Provide red bottle caps with numbers for counting and matching game



### 10 Apples on Me:

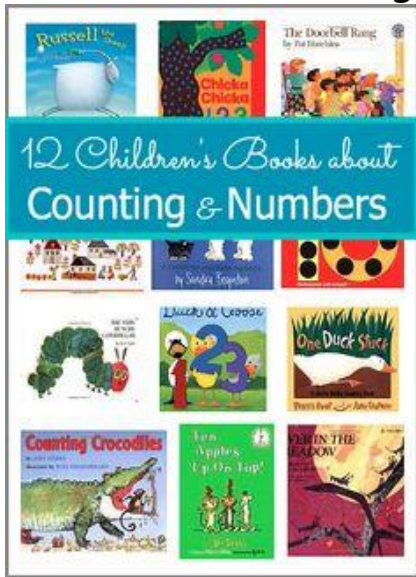
Use children's photos and felt apples as props to retell the story. Or extend the story in a small group counting activity.



### My Apples on Me:

Have children draw self-portraits. Provide small red apples or red circle stickers for counting. Use with/without numbers. Children can count their own number of apples to individualize. Could be to 5 or 20!

## Cognitive 5: Number Sense of Quantity



**Counting & Number Books:** Read simple math books to small groups of children. Count aloud slowly and point to each item. Touch each picture and encourage children to count out loud together. Count, then pause and allow children to say the next number on their own.



**Counting Sticks:** Introduce counting by using uniform objects. Children can focus on counting without distraction of other attributes. Set items up on a line to promote counting. As children count, they can be placed in cups or stacks.



**Sing Counting Songs:** Introduce children to counting songs, such as "Five Little Monkeys," "Five Little Ducks," etc. Once they are familiar, encourage children to act out the parts. Stop, count, and recount as you sing each verse. Use flannel board characters, puppets, or other props.



Fun Block Maths for Kids

**Object Counting:** Provide a variety of small objects to facilitate counting. Model and allow children to self-correct. "Let's count again more slowly." Ask, "How many yellow cubes do you have?" "Let's count them and find out."



**Endless Opportunities:** Count through the day, during activities and in the environment. Intentionally add materials for children to count as they sort, use, and play. Ask, "How many shirts did you wash?" "How many babies got their bath?"

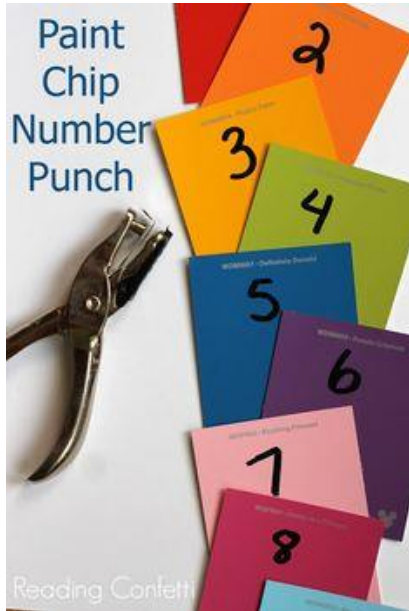


**Set It Up:** Set up opportunities for children to practice one-to-one correspondence; setting the table for meals or in dramatic play, passing out a piece of paper to each child, putting a shovel in each bucket. Ask, "Do you have enough for everyone? How many more do you need?"

## Cognitive 5: Number Sense of Quantity



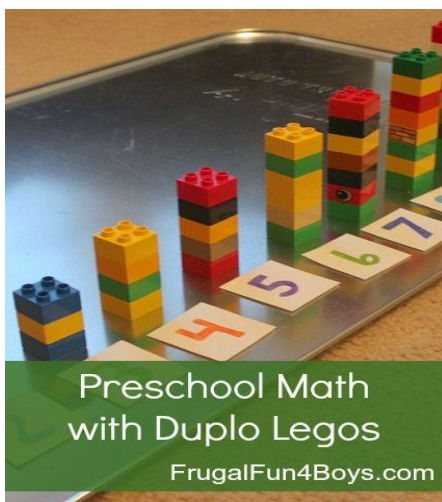
**Large Motor Math:** Post number cards around yard and attach clothes pins. Provide children with stamp or sticker counting cards. Brainstorm game ideas with children on ways to match the correct card to the number.



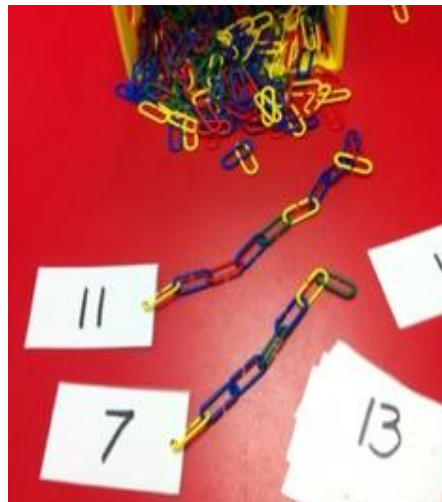
**Paint Chip Math:** Collect discontinued paint chips from hardware stores. Print numbers on the cards and provide children with hole-punches. Encourage children to count aloud as they work.



**Line-Up Sticks:** Print numbers on tongue depressor sticks and add them to the play-dough area. Have children line them up in the correct order. "How did you know that one is first/second/third/last?"



**Lego Number Line:** Provide number cards. Encourage children to count the correct number of Legos to match the number, and place in order. Discuss addition/subtraction/more/less/tallest/shortest.



**Paperclip Number Chains:** Make number cards and add a hole-punch to each. Children count and make chains for each number. "How many more do you need?" "Why do we need to count?"



**Popsicle Sticks Number Line:** Have children paint (many) popsicle sticks for counting activities. Count out correct number and place on number line. Brainstorm with children other math game ideas w/ the sticks.

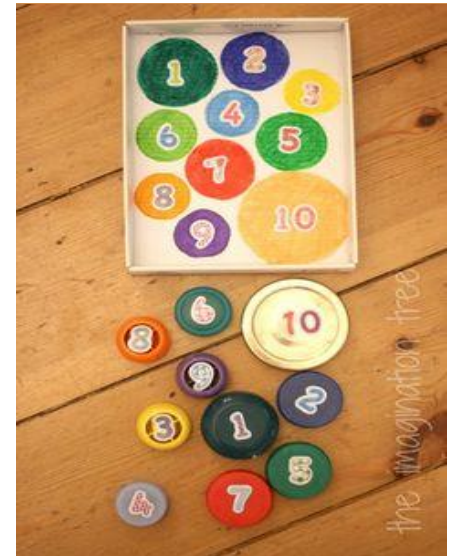
## Cognitive 5: Number Sense of Quantity



**Large Number Count:** Use large puzzle or paper numbers. Provide counting cubes for children to make sets. Discuss quantity, height, stacked, balance. "How did you know that is five?" "Why is this number bigger/smaller?"



**Number Cards:** Make simple number cards out of dot stickers. "How many lady bugs are there?" "Which card has more/less?" "How did you know that?" These can be kept in the math, literacy area or displayed on a wall.



**Box Top Math:** Reuse gift box lids to make a number matching game. Collect different size caps and lids, & trace them on same color paper and glue to box top. Add number stickers. "Which one is the smallest/largest?"



**Counting Friends:** Photograph children with different friends. Label each group with correct number shown in picture. Display in classroom, or use to make photo counting cards or book.



**Simple Counting Game:** On a large piece of butcher paper draw sets of dots. Provide children with large puzzle, magnet, or paper numbers. Children count up the dots and match the numbers to sets.



**Birthday Cake Game:** Use muffin tins, magnet numbers, and birthday candles to promote counting. "Why do we need to count?" "Why do we get older every year?" "Why is this number bigger/smaller?"



## Cognitive 5: Number Sense of Quantity



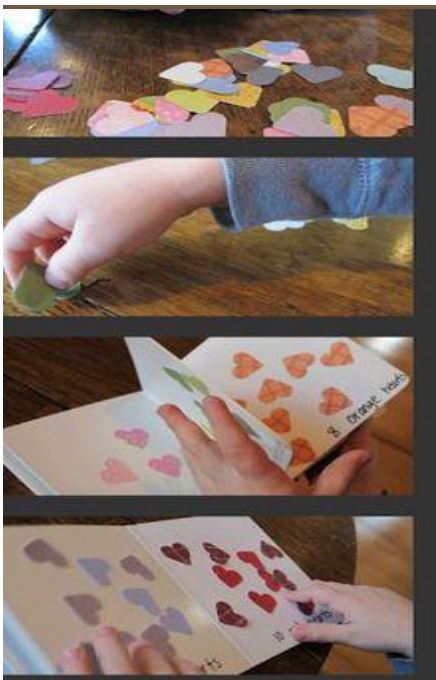
**Counting Trees:** Make bare limb tree cards. Provide die-cut leaves, blossoms, pinecones, or birds, to vary and add interest to promote counting.



**Sea Shell Math:** Print numbers onto clam shells and provide a box of beads as counters. "Which shell has more/most/few/less?"



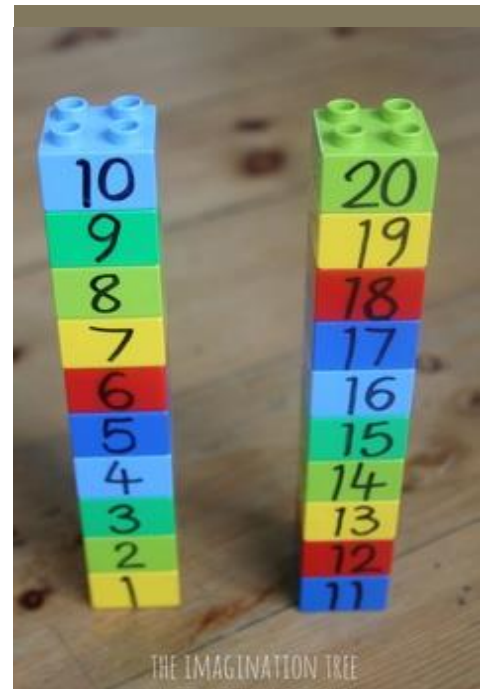
**My Number Sticks:** Provide each child w/ numbered tongue depressor sticks. Add interesting tiny items for children to count and glue, create their own number sticks.



**Counting Books:** Use wallpaper books for interesting die-cut shapes. Have children sort, count, and make their own color/number books. Discuss sorting, classifying, addition.



**How Many Fingers:** Take photos of hands and counting fingers. Use these photos for matching games using clothes pins or game chips. Brainstorm with children other ways to use the materials.



**Lego Math:** Use a permanent marker to print numbers on to old Lego squares. Encourage children to explore, count and put into counting order. "How high can you count?" "How did you know that number?"

## Cognitive 6: Number Sense of Math Operations

### Key Points: California Preschool Framework

#### Developmental Sequence of Number Relationships and Operations

1. Reasoning about numbers starts as early as infancy.
2. Five-month-olds show sensitivity to the effects of addition or subtraction on a small collection of objects.
3. Toddlers viewing three balls put into a container and then one being removed know to search for a smaller number of balls, and many search for exactly two balls.
4. Preschool children use a variety of strategies to solve simple addition and subtraction problems.
5. They use their fingers or small objects to represent numbers in a problem and count out loud to find the answer.
6. Older preschoolers solve addition problems such as  $4+2$  using concrete objects: counting out "one, two, three, four" objects, then continue with the second set of objects "five and six" to find out there are a total of six.
7. At a later stage they may "count on"; knowing that the number of objects in the first set is "four" the child starts with "four" and continues to "five, six" to find out the total number.

#### Strategies to promote an understanding of Number Relationships and Operations:

- Use comparison terms through everyday interactions (more, same as, fewer, less). "We have more boys than girls."
- Discuss and illustrate addition and subtraction transformations to help children understand that "adding" will result in more, and "taking away" will result in less. "You have three cars; can you give James one? How many cars do you have now?"
- Present concepts of addition and subtraction through literature, songs, and games. Include visual props, such as flannel board characters, or children can act out parts of the story or songs. Stop and ask questions: "Now how many monkeys are left jumping on the bed?" Then count, "One, two, three--that's right! Let's sing more of the song."
- Make the most out of teachable moments. During meals, "You have two crackers; if I give you two more, how many will you have all together?"
- Make estimations with children. "How many cotton balls are in this jar?" "How many seeds in this apple?" Record their estimates and then count "to find out." This is a powerful and effective way to facilitate children's understanding of number and quantity.
- Use graphing with children. Collect data, graph, and tally the results. Introduce by using real objects, then graph with pictures and eventually add numbers. Graphs lead naturally to making comparisons; "Which group has more?" "Which group has fewer?" "Can you tell without counting?"

## COG 6: Number Sense of Math Operations

Child shows increasing ability to add and subtract small quantities of objects

Mark the latest developmental level the child has mastered:

Responding		Exploring		Building		Integrating
Earlier	Later	Earlier	Later	Earlier	Middle	Later
Earlier	Later	Earlier	Later	Earlier	Middle	Later
	<i>There are no earlier levels for this measure</i>	<b>Demonstrates awareness of quantity</b>	<b>Manipulates objects and explores the change in the number in a group</b>	<b>Demonstrates understanding that adding objects to a group makes more or that taking away objects makes fewer or less</b>	<b>Identifies the new number of objects after one object is added to or removed from a set of two or three objects</b>	<b>Uses counting to add or subtract one or two objects to or from a group of at least four objects</b>
<b>Examples</b>	<ul style="list-style-type: none"> <li>• Gestures for more when playing with play dough.</li> <li>• Dumps small cars out of a bucket.</li> <li>• Communicates, "All gone," after noticing that there is no more fruit in the bowl.</li> </ul>	<ul style="list-style-type: none"> <li>• Puts objects in a dump truck or container, dumps them out, then puts them back in one at a time.</li> <li>• Moves toy farm animals into and outside of a toy barn while playing with the farm set.</li> <li>• Takes objects from two different piles to create a new pile by using a touchscreen tablet or computer.</li> </ul>	<ul style="list-style-type: none"> <li>• Notices when another child's bowl has more crackers than own bowl, and asks an adult to add crackers to own bowl.</li> <li>• Communicates, "Ahora tenemos más," ["Now we have more," in Spanish] when an adult combines markers from the shelf with some on the table.</li> <li>• Communicates, "They're almost gone," after taking the next-to-last unit block out of the basket.</li> </ul>	<ul style="list-style-type: none"> <li>• Communicates, "Now we have three," when adding a third snail to the two collected from the yard.</li> <li>• Communicates, "Only two left," when an adult removes a broken wagon from a group of three wagons.</li> <li>• Gives one of two cars to another child, and then communicates, "Tôi có một cái và bạn có một cái," ["I have one and you have one," in Vietnamese].</li> </ul>	<ul style="list-style-type: none"> <li>• Counts out five small crackers, "One... two... three... four... five." After eating two, counts, "One... two... three," and communicates, "Now, I've got three."</li> <li>• Removes two of seven ducks from a flannel board and counts the remaining ducks, and then communicates that there are five left.</li> <li>• Adds two cars to a train with four cars, counts the number of cars, and communicates that there are now six cars.</li> </ul>	<ul style="list-style-type: none"> <li>• Communicates, "I had four hair clips, but I gave one to my sister. Now I have three."</li> <li>• Brings six napkins to the table after an adult communicates, "We usually have four children, but today we have two visitors, so how many napkins do we need altogether?"</li> <li>• Holds up five fingers and then one finger, counts them, and communicates, "Six," when asked, "If you had five crackers, and you took one more, how many crackers would you have?"</li> </ul>

Child is not yet at the earliest developmental level on this measure. Explain here:

Child is emerging to the next developmental level

If you are unable to rate this measure, explain here:



## COG 6

## Number Sense of Math Operations

## COG 6

## Cognitive 6: Number Sense of Math Operations



**Counting Jars:** Draw simple jar outlines to use to promote counting sets of items. "How many buttons can you put in your jar?"



**Treasure Hunt Math**  
Place small items into the sand table for children to dig and discover. Place in small bags or boxes to make sets.



**Counting Bags** Collect small bags and various items; bottle caps, plastic lids, etc., for counting and making sets. Build math vocabulary: more, less, equal.



**Stick Sets:** Have children help gather and make counting sticks (same size). Use for counting, or add colorful rubber bands to make sets.



**Fill It Up:** Provide cups, small items, and dot/number dice. Children take turns rolling the dice, counting objects, and placing them into their cup. When one cup is full, they dump their cups out and count how many in each cup.



**Flower Pot Math:** Make flannel flower pots and flowers. Children can count, add, and subtract flowers. "Which pot has the most?" "How many is that?" "Which has the least?"

## Cognitive 6: Number Sense of Math Operations



**Ice Cream Math:** Provide different colored circle "ice cream scoops" and triangle "cones". Count, share, and make sets. Ask, "Which cone has the most ice cream?" "Which has least?" "How can we make them equal/same?"



**Pom-Pom's For All:** Provide children with an assortment of pom-pom balls to sort, compare, and share with each other. Have them spill their bowls out, count and compare. "Who has the most/least of each size/color?" "How can we find out?" "Let's count!"



**Three Bear Math:** Provide each bear with small, medium, and large bowls. Serve pom-poms in each. Have children guess/estimate how many in each bowl. Let's count to find the answer. Discuss which bear has the most, least. Why?



**Sort Stuff Sets:** Gather various unrelated small items as above. Have children sort and group like items. Ask, "Which group has most/least?" "Why is it more/less?" "How can we know for sure?" "How can we make the groups equal?" Extend by placing items on a graph.

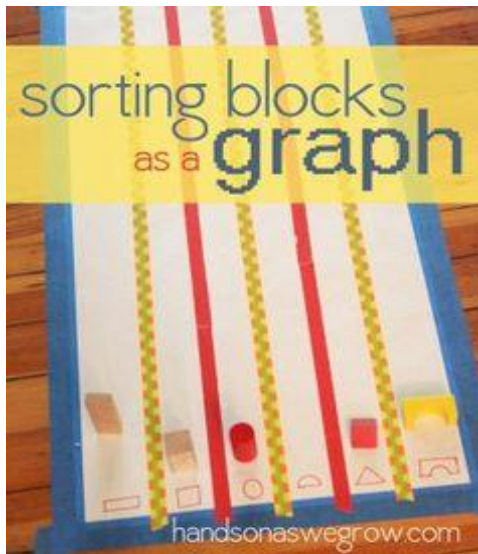


**Circle Sort:** Cut circles out of different colors of wallpaper samples and provide buttons (ribbon/small blocks, etc.) in coordinating colors. Have children match and group by color. Then estimate which has the most/least, etc. Count and graph the items to find out.



**Sand Search:** Collect a variety of small items and place them into the sand table. Children dig for their "treasures" and items can be grouped into sets. Count items as they are discovered. Tell children, "Let's 'add' one more to the group. Now how many do we have?"

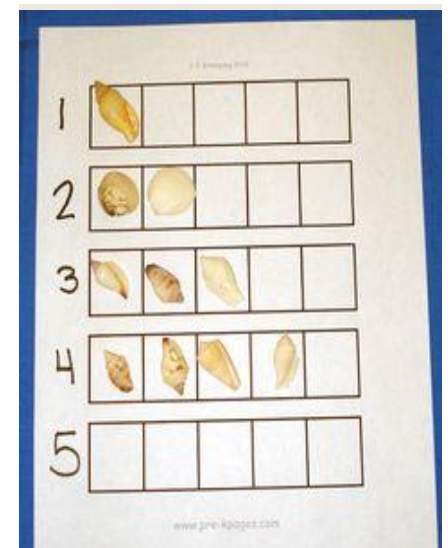
## Cognitive 6: Number Sense of Math Operations



**Block Graph:** Children collect familiar objects to represent numerical information. Make comparisons about information in graph: "Which group has more?" "Which group has fewer?" "Can you tell without counting?"



**Big Shape Graph:** Make large columns on the floor and label each with a simple shape. Children bring items from home or use items in the classroom to match under the correct shape. Estimate, compare, count, and discuss findings.



**Nature Graphs:** Collect items from nature: shells, leaves, rocks, etc. Use these items to sort by shape, size, or color, then use to graph by type. "Which is there more of?" "What makes you think that?" "How many more are in the largest group?"



**Autumn Leaves:** Each child chooses a fall leaf to share on the graph. Glue leaves on paper squares and place of the graph by color or shape. Discuss "How are they the same?" "How are they different?" "What color are most of the leaves?" "How can you know?" Count the leaves throughout the activity and practice adding "one more."



**Boys & Girls:** Use children's self-portraits to create an attendance graph illustrating the number of boys and girls at school. "Can you tell without counting what group has more people in it?" "Which group has fewer?" "Tell me why you think this." Advanced vocabulary: add, combine, whole, total.



**Our Monthly Weather:** The weather helper "draws" the weather each day. Display in a place where it can be discussed and referred to daily. "What kind of weather did we have the most of this month?" "Which type of weather was there the least of this month?"

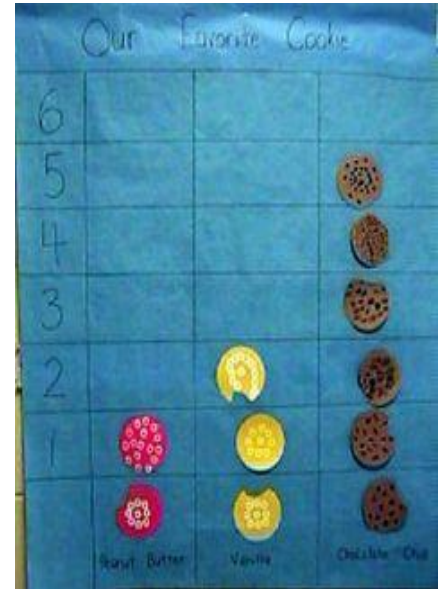
## Cognitive 6: Number Sense of Math Operations



**Group Weather Graph:** After checking the weather for the day, make a simple graph. Ask children, "Do you like the weather today?" Children create individual pictures to represent them and their vote. "Which has most/least?" Count together and find the answer.



**Story Graphs:** Look for simple questions in a story or ask children to name their favorite part/character/place in a story. Have children vote and discuss the results. "Which side has most/least?" Count each column, total, and then add both numbers together.



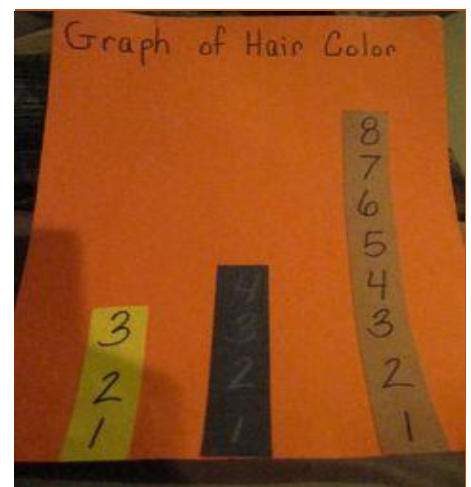
**Our Favorites Graph:** Make a simple graph and choose a topic that children are familiar with and interested in: food, toy, area in the classroom, etc. Then they vote on their "favorites". Discuss most, least, equal. Count each column, total, then add all the numbers together.



**Our Favorite Colors:** Create a more complex graph by adding additional categories. Print children's name under each symbol that represents their vote. "Can you tell which one has the most before you count?" "Tell me how you know?"



**Ribbons of Color:** Children clothes pin their photo on to ribbon of their choice. Name each color and count each child's photo, add up each column. "What number is the largest, smallest?" Discuss same/equal.



**Number Graph:** Introduce number graphing by choosing a familiar topic such as hair/eye color, boy/girl, etc. Then begin to use numbers to represent each child. "Which column has most?" "What is the difference between each column?"

## Cognitive 7: Measurement

### Key Points: California Preschool Framework

#### Developmental Sequence of Learning Measurement Concepts

1. Look, touch, and compare objects to recognize the attributes of weight, size, volume, length.
2. Sort items by small and large.
3. Learn some vocabulary words to describe objects: heavy, light, big, small, short, and long.
4. Sort and classify objects by size, length, or weight.
5. Orders objects by one measurable property (size, length, weight, or capacity).
6. Acquire a larger vocabulary that includes descriptive and comparison words: tall/taller/tallest, etc.
7. Explore principles of measurement; identifying a unit for measure and placing that unit end to end alongside the object without leaving space between successive units (unit iterations).
8. Uses measuring cups during cooking activity, a scale to weigh and identify items as heavy or light, as well as rulers and measuring tape.

#### Strategies to promote learning about Measurement:

- Provide opportunities to promote measurement concepts in the environment; materials children use on a regular basis, such as shovels, buckets, blocks, brushes, or cups present tangible experiences to compare and order objects by size.
- Observe children's working on measurement concepts in everyday play and routines and comment: "How do you know which train is longer?" "Let's see who is taller."
- Include non-standard materials in the environment, such as paper clips, ribbon, unit blocks, and same size blocks.
- Build descriptive and comparison vocabulary: "This is a big box. I think we need a bigger box," (tall/taller, heavy/heavier, long/longer).
- Ask questions to direct children's attention to measurement properties: "Which ribbon is longer?" "Which block is heavier, the foam block or the wood block?" Questions should be short, simple, and meaningful to the current situation or activity. Use questions sparingly and purposely; allow children time to think and respond.
- Use literature to illustrate measurement concepts, such as *Goldilocks and the Three Bears*.
- Introduce measuring tools into the classroom environment gradually (not all at once) so that children have an opportunity to explore tools, learn about their function, and apply that knowledge in their play. Provide measurement tools in different areas of the classroom.
- Plan small-group activities for children to use concrete objects using standard and nonstandard measuring tools. Teachers can model the use of measurement tools in real-life situations: planting, cooking, and measuring the children themselves.
- Encourage children to estimate measurements: "How many scoops of sand do you think we need to fill this cup?" "How many blocks will cover the distance from here to the table?"
- Encourage children to record and document what they have measured through drawings, numbers, and words. Teachers can also transcribe for children their observations and explanations.



## COG 7: Measurement

Child shows an increasing understanding of measurable properties such as size, length, weight, and capacity (volume), and how to quantify those properties

### Mark the latest developmental level the child has mastered:

Responding		Exploring		Building		Integrating	
Earlier	Later	Earlier	Later	Earlier	Middle	Later	Earlier
	There are no earlier levels for this measure	Demonstrates awareness that objects differ by properties (e.g., size, length, weight, or capacity)	Explores how objects differ by properties (e.g., size, length, weight, capacity)	Shows understanding of some measurable properties (e.g., size, length, weight, capacity) or uses words (e.g., "big," "heavy") to describe some measurable properties	Identifies differences in size, length, weight, or capacity between two objects, using comparative words (e.g., "bigger," "smaller") or showing understanding of comparative words	Orders three or more objects by directly comparing them using a measurable property (e.g., size, length, weight, capacity)	Explores the properties of objects (e.g., size, length, weight, capacity) through either the use of measurement tools with standard units (e.g., ruler, scale) or the use of nonstandard units (e.g., footsteps, blocks)
<b>Examples</b>							
	<ul style="list-style-type: none"> <li>• Gestures by holding one hand high in the air to indicate that an adult is tall.</li> <li>• Positions arms and legs far apart to "catch" a big ball while sitting on the floor.</li> <li>• Finds the big doll when asked to do so.</li> <li>• Grunts before picking up an object that might be heavy.</li> </ul>	<ul style="list-style-type: none"> <li>• Makes repeated attempts to put different-sized trucks into a small tunnel.</li> <li>• Carries an empty purse with one hand, fills the purse with blocks, and then uses both hands to pick up the purse.</li> <li>• Pours water or sand back and forth between containers of different sizes.</li> </ul>	<ul style="list-style-type: none"> <li>• Gestures to indicate how big the family dog is, when asked.</li> <li>• Communicates, "This pumpkin is so heavy."</li> <li>• Communicates, "My braid goes down my back. It's long."</li> </ul>	<ul style="list-style-type: none"> <li>• Communicates, "Este es más largo," ["This one is longer," in Spanish] when placing train tracks side by side to check which is longer.</li> <li>• Chooses the bigger of two buckets when asked to bring the one that will hold more water.</li> <li>• Communicates, "Mine is taller," when building a block tower next to a peer's block tower.</li> </ul>	<ul style="list-style-type: none"> <li>• Arranges several leaves by size while outside on the playground.</li> <li>• Lines up several stuffed animals from smallest to largest, during pretend play.</li> <li>• Arranges five shapes on an electronic tablet from small to large by touching and dragging.</li> <li>• Puts four different objects on a balance scale, then lines them up from lightest to heaviest.</li> </ul>	<ul style="list-style-type: none"> <li>• Fills a measuring cup twice to add two cups of oatmeal during a cooking activity.</li> <li>• Uses a balance scale to find out which of two fruits is heavier.</li> <li>• Uses footsteps to measure the length of a rug and communicates, "This rug is 10 steps long!"</li> </ul>	

- Child is not yet at the earliest developmental level on this measure. Explain here:
- Child is emerging to the next developmental level
- If you are unable to rate this measure, explain here:



## Cognitive 7: Measurement



**Big & Small:** Use items that are interesting to children. Introduce simple sorting by two attributes. Use large and small sorting containers to reinforce concept. "The small ones go in the small basket, and the big ones go into the big basket."



**Real Stuff:** Add real items in different sizes to children in the learning areas: blocks, dramatic play, play dough, manipulatives. These situations will naturally build vocabulary about size differences; "Give me the smallest pumpkin."



**Different Sizes Everywhere:** Collect natural items (leaves, twigs, rocks, shells) to use for sorting activities. Provide sorting props by using picture cards (as above) or using small, medium, and large containers. Promote comparisons: "Which leaf is the smallest of all?"



**Bottle Cap Math:** Involve families and the community to collect a large variety of plastic bottle caps and container lids. Use for sorting by size or color. Use picture cards or containers in different sizes/colors for successful matching/sorting experience.



**Sorting Sample:** Gather a variety of familiar objects for children to sort by size. Children can sort by size and then arrange in order from largest to smallest. Introduce size vocabulary: tiny, miniature, little, largest, bigger.



**Size Play:** Provide different size jars or other containers in the sand/seed/sensory table. Using these items will create situations for children to discuss the sizes as they play together. "Who filled the largest jar?" "Let's compare."

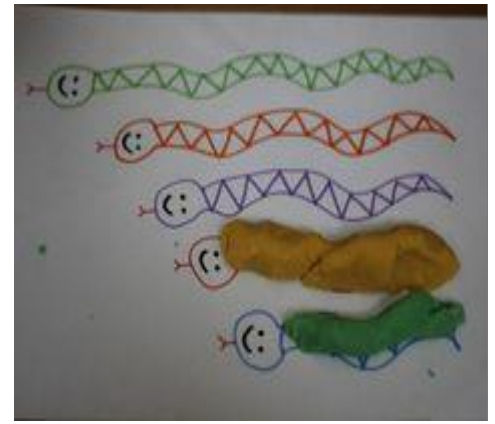
## Cognitive 7: Measurement



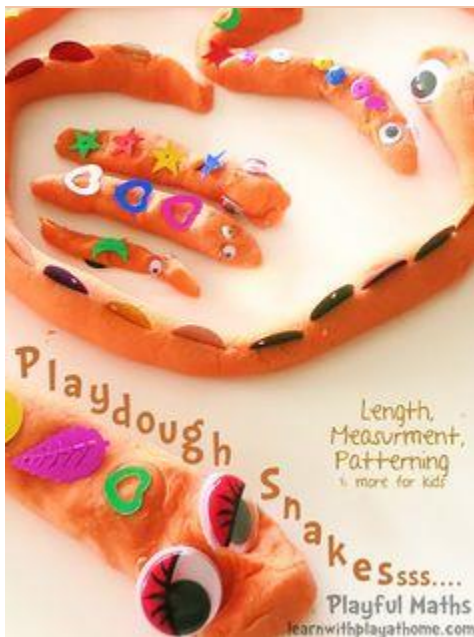
**Rock Sort:** Collect a variety of different size rocks; go on a "rock walk" or each child may bring a rock to school. Use three different size bowls or cans and label each. Children will compare the rocks and place them in the correct container.



**Stick Sort:** Gather small sticks from the play yard or on a neighborhood walk. Each child contributes one. Discuss and describe each one using advanced language: smooth/rough/long/short, etc. Children use to place in order shortest to largest.



**Lots of Snakes:** Draw simple snakes on plastic placemats or trays. Use in the play-dough area; children roll and make their "snakes", then match them by length. Use length comparison vocabulary: short, shortest, middle size, medium, long, longer, elongated. "Tell me how you made that snake so long?"



**Many More Snakes:** Add small plastic items, buttons, twigs, eyes. Children make snakes in various lengths and create patterns. This activity helps children understand the attribute of length. "Whose snake is longest?" "That snake is short, who can make a shorter one?"



**Outdoor Ordering:** During outdoor play, encourage children to collect natural items on the yard. Print the words "Longest" and "Shortest" with chalk on the cement. Children will need to look and compare where their item belongs in the group.



**Circle Necklaces:** Adults may pre-cut circles or children may cut and hole-punch their own. Provide a large quantity of choices. Place the same size circles together in stacks/baskets and line them up smallest to largest. Ask children to, "Tell me about your necklace; what size circles did you use?"

## Cognitive 7: Measurement



**High & Low Collage:** Show children paper in various sizes and colors. Brainstorm with them how to make paper rolls. List materials needed and develop a plan. Once children assemble a number of paper rolls, use them to create 3-D collages. Discuss lengths and heights.



**Measure Hunt:** Place various lengths of tape on floor or table. Have children "hunt" around the classroom for things that match the tape length: "Find something that matches the shortest tape length." "Is that the same size, or is it longer or shorter than the tape?"



**Lego Lengths:** Provide a basket of Legos and ask children to stack as many as they need to match the length of a shoe (blocks, paper strips, etc.). Continue to compare the length of Legos with the object. "How many more do you think you will need?" "How can you tell if you need more?"



**Line Up and Measure:** Collect and use a variety of natural items for measurement activities. Line up pieces of wood and ask, "How many sticks do you think we need to be 'equal' to the length of the piece of driftwood?"



**Balance Board:** Use a board to create a simple balance beam. Ask children to put some items on one side, then the other. Encourage children to explore different variations. "What do you think would weigh more/less/equal?"



**Weigh It:** Place simple scales in the sand or bird seed table. Add measuring spoons and cups. Prompt experimentation by asking questions: "How can you make them equal?" "How many cups does it take to make the scale go up/down?"

## Cognitive 7: Measurement



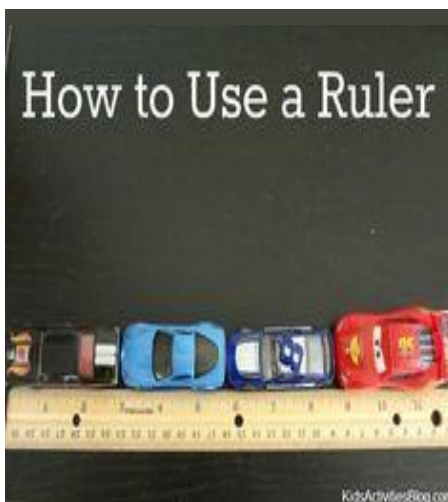
**Sandbox Scale:** Use a plastic clothes hanger, rope, and a couple of buckets to make a scale. Hang it in the sand box. As children use the sand scale ask: "Which bucket weighs more?" "How do you know?" "How can you make the buckets weigh the same or equal?"



**Sink and Float Boats:** Use clean butcher shop meat trays to add interest to water table. Have children brainstorm small items to add. Ask children; "How can you make your boat sink/float?" "Why will that work?" "Let's see!"



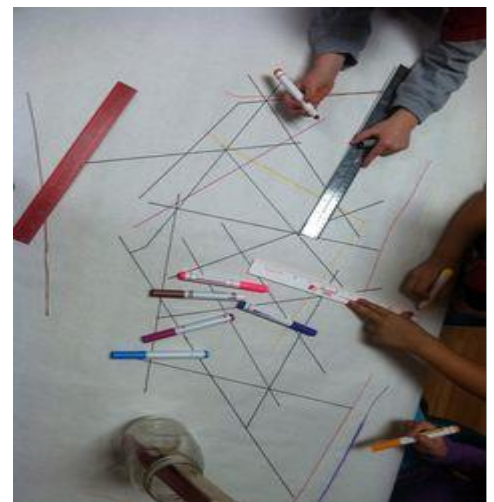
**Sand & Mud Pies:** Add measuring cups and spoons to the sand table. Make sure that the sizes are printed on each cup/spoon. "Which cup is the biggest/ smallest?" "Which cup holds the most/least?" "Can you place them in a row from largest to smallest?"



**Introduce Rulers:** Expose children to standard measurement objects by making them available for use throughout the classroom environment. Introduce by providing small objects for children to line next to it. "How many cars are as long as a ruler (or 12 inches)?"



**Measure Lengths:** Use tape measures in the math area for children to use to measure lengths of items: pipe-cleaners, straws, paper strips, ribbon, twigs/sticks, etc. Children can cut lengths then line up shortest/tallest or use to create 3-D collage. "Which one is the tallest/longest/lengthiest?" "How can you tell?"



**Ruler Work:** Provide an assortment of rulers (plastic, wood, tin), a large piece of butcher paper, and felt markers. Children will have an opportunity to develop their own plans and designs. Repeat this activity as their skills increase. Vary by using black paper and white chalk, graph paper or maps.

## Cognitive 8: Patterning

### Key Points: California Preschool Framework

#### Research Highlights:

Compared with classification, little is known about the development of patterning skills.

**The Berkeley Math Readiness Project** examined the informal patterning knowledge of low/middle-income children, and the effect of curricular intervention on their patterning skills. The study revealed some findings that can help teachers in planning ways to effectively support the patterning skills of all children.

- **Identifying the core unit of a pattern is a challenge for all children.** The majority of prekindergarten children attending preschool, regardless of socioeconomic background, experienced difficulty with identifying the core unit (red/blue/red/blue or big/small/big/small) of a pattern at the beginning of the year.
- **Pattern extension is a later development than pattern duplication.** Both middle/low income groups were significantly better on pattern duplication (e.g., using blocks to make a pattern that "looks just like this") than on pattern extension (e.g. presented with two repetitions of the pattern, children were asked to finish making the pattern).
- **Positive effect of curricular activity on patterning knowledge.** Both middle/low groups exhibited significant progress in their ability to duplicate a pattern correctly after participating in a patterning curriculum activity. Low income children had more difficulty duplicating a simple pattern correctly than did middle-income children.

**Patterning, like classification, involves the child's natural tendency to organize information in their environment.**

- Provide a daily routine that creates a pattern; young children appreciate the predictability of knowing what will happen next. Use a visual daily schedule, a calendar of events, etc.
- Introduce patterning through music and movement activities. Children can duplicate patterns in songs, such as "If You're Happy and You Know It" or "The Hokey Pokey".
- Present patterns in various formats: through movement, sound, language, objects, or pictures. Experiencing patterns through different modalities (kinesthetic, tactile, auditory, and visual) provides different learning modes, and enhances their understanding of patterns.
- Point out patterns they can see in the environment: toys, clothes, furnishings, and nature.
- Provide a variety of small objects for children to explore patterning and point out patterns that they may create accidentally.
- Provide matching activities for children to duplicate patterns using real objects.
- Begin a simple pattern and have children complete it (Red cube/blue cube/red cube... "What comes next?") Begin by using objects, and then introduce picture cards for patterning activities.
- Use paper weaving mats, egg crates, or grids to support patterning in various activities.
- Continue to provide interesting materials for children to use to create more interesting patterns.

## COG 8: Patterning

Child shows an increasing ability to recognize, reproduce, and create patterns of varying complexity

Mark the latest developmental level the child has mastered:

Responding		Exploring		Building		Integrating	
Earlier	Later	Earlier	Later	Earlier	Middle	Later	
Earlier	Later	Earlier	Later	Earlier	Middle	Later	Earlier
	<i>There are no earlier levels for this measure</i>	<p><b>Notifies and responds to simple repeating sequences</b></p> <ul style="list-style-type: none"> <li>Watches intently and waves hands while adult sings "Open, shut them" song.</li> <li>Makes "E" sound during a song of "E-I-E-I-O"</li> <li>Watches another child hit drum twice, followed by adult hitting the drum twice.</li> </ul>	<p><b>Participates in some parts of simple repeating sequences in language, movement, music, everyday routines, or interactions</b></p> <ul style="list-style-type: none"> <li>Pays attention to and attempts to follow the sequence as an adult claps, taps, claps, and taps.</li> <li>Follows snack-time routines with reminders to wash hands, go to the snack area, and sit at a table.</li> <li>Sings "E-I-E-I-O" and some animal sounds during the song "Old MacDonald's Farm."</li> </ul>	<p><b>Matches simple sequences that are seen, heard, or experienced</b></p> <ul style="list-style-type: none"> <li>Lines up farm animals in the same order as a peer does.</li> <li>Repeats series of actions of touching head, shoulders, knees, and toes during the song "Head, Shoulders, Knees, and Toes."</li> <li>Repeats the refrain, "Brown bear, brown bear, what do you see?" as an adult reads from the book <i>Brown Bear, Brown Bear, What Do You See?</i></li> </ul>	<p><b>Attempts to create simple repeating patterns (with two elements)</b></p> <ul style="list-style-type: none"> <li>Creates a simple repeating pattern using two different stamps, such as circle, star, circle, star.</li> <li>Claps, stomps, and then repeats.</li> <li>Paints pairs of green and yellow dots, making a pattern of two green, two yellow, two green, two yellow (numbers of dots may not be consistent).</li> </ul>	<p><b>Extends a simple repeating pattern (with two elements) by adding one or more repetitions of an existing pattern</b></p> <ul style="list-style-type: none"> <li>Continues a simple repeating pattern of drumbeats, started by an adult.</li> <li>Builds a fence out of blocks, continuing the pattern begun by a peer: tall block, short block, tall block, short block.</li> <li>Extends a simple repeating pattern of colors on a computer, using a touch screen.</li> </ul>	<p><b>Creates, copies, or extends complex patterns (with three or more elements)</b></p> <ul style="list-style-type: none"> <li>Adds cubes to continue red-yellow-blue pattern.</li> <li>Makes up a rhythmic sequence by clapping, patting, and stomping.</li> <li>Makes a fruit kebab in a repeating sequence of banana, strawberry, blueberry, banana, strawberry, blueberry, like a fruit kebab that another child is eating.</li> </ul>
<p><b>Examples</b></p>							

Child is not yet at the earliest developmental level on this measure. Explain here:

Child is emerging to the next developmental level

If you are unable to rate this measure, explain here:



**COG 8**

## Patterning

**COG 8**

## Cognitive 8: Patterning



### Music & Movement Patterns:

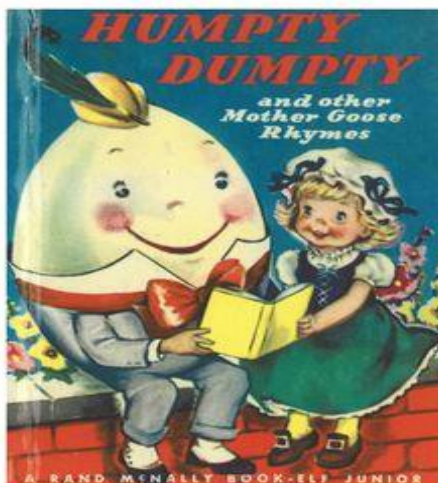
Children can experience patterns in a physical way. Duplicate patterns during songs: "If You're Happy & You Know It" or "The Hokey Pokey" or during simple games, such as "Simon Says". Traditional preschool songs are fun, age appropriate, meaningful, and promote patterning!



**Rhythm Instruments:** Use sticks, shakers, or bells to create patterns of sound. Vary volume (loud/soft/loud), speed (fast/slow), different sounds (bell/stick/bell). Brainstorm with children different ways to make patterns using instruments.



**Flowers in a Row:** Provide children with green play dough. Trim to shorten the stems of silk flowers (find at store close-outs & garage sales). Introduce by giving children a chance to explore/play with the materials. Next create patterns to duplicate. Then children can expand a pattern and create their own.

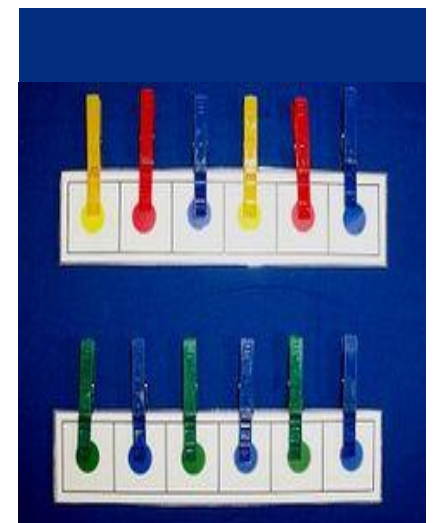


**Nursery Rhymes:** Nursery rhymes and stories have repetitive phrases that form patterns. Recite these often so that children learn the words. Add movements to reinforce the patterns in the rhymes.



The wheels on the bus go round and round, round and round, round and round, round and round, round and round...

**Repetitive Songs/Stories:** Many songs and stories have repetitive structures: "Old McDonald," and "Brown Bear". Children easily grasp the pattern and carry it to the next verse. They like predicting what comes next.



**Clothes Pin Pattern Match:** Use concrete objects to introduce children to patterning. Children can use colored clothes pin to match a pattern sequence. "What comes next?"



## Cognitive 8: Patterning



**Little Car Patterns:** Use toys that children like to create learning experiences. Provide a pattern card for children to duplicate with small colorful cars. Vary this activity with children's success: start a car pattern and have them extend or create their own patterns.



**Patterns All Around:** Gather egg cartons and baskets of small classroom materials. Make simple shape pattern card for children to match and duplicate. "What other things could we use to make patterns?" Discuss: matching, same, different, similar.



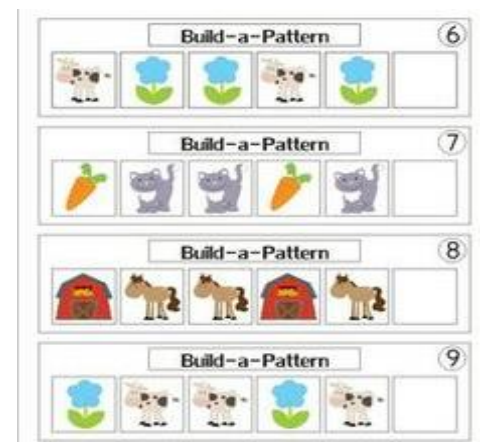
**Weaving a Pattern:** Weaving is a "hands-on" experience to learn about patterning. Introduce by providing simple construction paper for children to learn to weave. "Look at your pattern: you made red, yellow, red." "What color should you use next to extend the pattern?"



**Mitten Match:** Cut simple pairs of mitten shapes out of wallpaper or fabric. Children can find the matching patterns and attach the pair with small clothes pins. Vary by collecting real mittens for the game.



**Nature Match:** Introduce by creating a pattern with shells, sticks, rocks, etc. on one side of a ribbon. Children find matching items to duplicate the pattern. Children can begin to create their own patterns as they become more familiar with the process.



**Picture Card Patterning:** Gather simple classroom picture cards and play extend a pattern with a small group of children. Name each picture as you place it in position: "Cow, Flower, Flower, Cow..." Ask children, "What picture is next?"

## Cognitive 8: Patterning



**Paper Clip Chains:** Provide different colored paper clips and matching pattern cards. Children begin by making a "matching chain". Encourage children to look carefully at the card as they work to duplicate it. Ask, "How could you make a different pattern?"



**Stick It Patterns:** Glue magnets on to the back of tongue depressors and provide paper clips in various colors and sizes. Children create their own pattern stick with these materials. To introduce, start a simple pattern and encourage children to extend it. Then they can make their own!



**Sticker Pattern Cards:** Draw a simple grid to make patterns with stickers. Start the pattern and encourage children to complete the row. With success children can create their own. Or they can work as "team mates" to create patterns.



**Beaded Bracelets:** Provide pipe cleaners and colored beads. To facilitate patterning skills introduce this activity by limiting the colors available. Gradually increase the range of colors. "You can make up your own design for your bracelet."



**Object Print Patterns:** Introduce painting with objects as an art activity. This gives them a chance to explore the process without an end product in mind. Provide a combination of familiar, new and different objects. Use long strips of paper to facilitate printing in a line. Brainstorm, plan, and create their own!



**Sink Mat Weaving:** Cut plastic sink mats into smaller squares. Introduce patterning by providing children with two colors of ribbon. Point out when they make a pattern. "Look, you made a pattern: red, green, red!" Add a larger variety of ribbon with their success.

## Cognitive 8: Patterning



**Straw Necklaces:** Collect a variety of different plastic straws and cut into small sizes. Children can use to string their own necklaces using yarn or shoelaces. "Your necklace pattern is green, pink, green."



**Geo Patterns:** Provide children with black construction paper. Cut the paper into long strips to prompt children to line-up/make patterns with the geo shape stickers. Encourage children to create their own patterns. "Tell me about what you are doing?" "How did you get that idea?"



**Tape Patterning:** Use various colors of masking tape to create patterns. Children can extend or make a pattern of their own. Combine the pattern with movement: "Clap when I say orange." Then chant: "White/orange (clap), white/orange (clap). Make the chant game more difficult with their success."



**Pattern Tape Patterns:** Use various patterned tape for children to create patterns on cards. Discuss the patterns within the pattern. Ask questions, such as, "How did you come up with that idea?" Encourage children to take part in this activity more than once to build on pattern making skill.



**Foam Sticker Patterns:** Use foam stickers to match, extend, or create patterns. Increase the complexity of the pattern with children's success. Encourage children to brainstorm different ways to create a pattern, and then develop a plan to carry out. Encourage children to tell you about their work.



**Nature Weaving:** Attach ribbon to the back of a wood frame or packing crate. Have children gather items from nature to add to the group weaving activity. Encourage children to work together to create a pattern as they work. Have children talk about the patterns they see in their project.

## Cognitive 9: Shapes

### Key Points: California Preschool Framework

#### Developmental Sequence of Shapes and Geometry

1. Form shape concepts as they explore their environment, observe shapes, and play with different objects.
2. Match and classify objects based on shape.
3. Recognize the attributes of two- and three-dimensional shapes.
4. Name shapes.
5. Create and represent shapes.
6. Compose and decompose shapes from other shapes (two squares will make a rectangle, two triangles can make a diamond).
7. Learn that there are many different examples of a shape (rectangles and triangles can be long, thin, short, wide).

*Learning about shapes goes beyond merely knowing the names of common shapes. It involves exploration, investigation, and discussion of shapes and structures.*

#### Strategies to promote learning about Shapes and Geometry:

- Refer to shapes and encourage the use of shape names in everyday interactions. In the block area: "I see you used the rectangle block to make a wall." During snack time: "We are having crackers that are circles."
- Engage children in conversations about shapes. Draw children's attention to the attributes of different shapes by discussing the parts of a shape. While pointing to a rectangle, count, "One, two, three, and four." "How many straight sides do we have in a triangle?"
- Encourage children to observe and compare shapes: "Can you find another rectangle around the room?" "Here is a triangle and here is a square; how are they different?"
- Provide materials that encourage exploration and manipulation of shapes: a variety of blocks in different shapes, colors, size, thickness, texture. Interlocking plastic shapes, shape containers for sand and water play, sponges, cookie cutters, stickers, magnets, shape templates, geo boards and beads.
- Introduce books about shapes. As teachers read aloud, point to pictures and discuss the names and attributes of shapes.
- Match, sort, and classify shapes using games: lotto, bingo, puzzles. Use computer software designed for children to perform action on shapes: flipping, sliding, and turning shapes at different angles.
- Create and represent shapes using sticks, string, play dough, straws, pipe cleaners. Draw shapes using templates, tracing, or copying.
- Provide many opportunities for children to use paint, chalk, pencils, crayons, and paper. Children naturally create shapes when drawing people (self-portraits, family or friends drawings) or houses.
- Compose, decompose shapes and provide different examples of shapes. Using paper and plastic shapes or blocks, put them together to construct new shapes.

## COG 9: Shapes

Child shows an increasing knowledge of shapes and their characteristics

Mark the latest developmental level the child has mastered:

Responding		Exploring		Building			Integrating
Earlier	Later	Earlier	Later	Earlier	Middle	Later	Earlier
	There are no earlier levels for this measure	Explores shapes of objects	Manipulates objects based on shape	Matches similar shapes and distinguishes them from dissimilar shapes without necessarily naming them	Identifies or names several shapes in the environment (e.g., circles, squares, triangles)	Recognizes shapes when they are presented in different orientations or as parts of other objects	Describes several shapes and the differences between them
<b>Examples</b>	<ul style="list-style-type: none"> <li>Feels along the edges of a triangle.</li> <li>Puts one or two rings on a ring stack.</li> <li>Takes out a puzzle piece with a knob and tries to fit it back into a hole of the puzzle, before setting it back down on the table.</li> <li>Moves along a line of a circle painted on the pavement in an outdoor play area.</li> </ul>	<ul style="list-style-type: none"> <li>Puts a square-shaped puzzle piece into the correct hole of a form board.</li> <li>Tries a variety of solutions to fit lids on boxes and other containers.</li> <li>Puts a circle piece into the correct hole of a shape sorter.</li> </ul>	<ul style="list-style-type: none"> <li>Places different-shaped blocks on shelves labeled with matching shapes.</li> <li>Uses ink stamps to make a row of circles and a row of squares.</li> <li>Chooses blocks of the same shape to build a tower with a peer.</li> </ul>	<ul style="list-style-type: none"> <li>Points to a clock in the room when asked to find a circle during an "I Spy a Shape" game.</li> <li>Communicates, "Ahora haré el triángulo," ["Next, I'll do the triangle," in Spanish] after placing a square in a puzzle.</li> <li>Communicates, "My sandwich is a square," while holding up a sandwich at lunch.</li> <li>Names "square," "circle," and "triangle" after exploring each shape piece with hands.</li> </ul>	<ul style="list-style-type: none"> <li>Finds embedded shapes in a picture book, such as <i>Bear in a Square</i>.</li> <li>Communicates that the face in a figure drawing is a circle.</li> <li>Communicates, "It's an upside-down triangle," after noticing a yield sign.</li> </ul>	<ul style="list-style-type: none"> <li>Communicates, "This one has a pointy part. This one is curvy," when examining a triangle and a circle.</li> <li>Communicates that a triangle has three sides and a square has four sides.</li> <li>Communicates that two sides of a rectangle are longer, but the sides of a square are all the same.</li> </ul>	

Child is not yet at the earliest developmental level on this measure. Explain here:

Child is emerging to the next developmental level

If you are unable to rate this measure, explain here:



## Cognitive 9: Shapes



**3-D Circle Collage:** Gather or collect from families, an plastic lids/caps. These recycled lids can be used for sorting, object painting, play-dough, & sand-play, etc. Use for a group collage and give children the chance to focus on one shape, "circles"!



**Play-dough Math:** Use a variety of wood block shapes with play-dough. Name and describe the different shapes as children use to stamp the dough. "It looks like you are using the square." "Can you find another square in the group?" "This one is a rectangle, how is it similar to the square?"



**Building Blocks:** There are endless opportunities to learn about shapes in the block area. Children get to explore and use three dimensional shapes from different angles. Add books about shapes and buildings to enhance the experience. Name and discuss shapes and how they are the same or different.



**Chalk Blocks:** Use chalk board paint on old/worn out blocks. Provide children with chalk to draw doors, windows, etc. These simple "houses" can enhance block building. Discuss the size, shapes, and similarities and differences.



**Foam Blocks Paint Prints:** Use old foam blocks as stamps to make shape art. Show, name & discuss each block. Provide large pieces of paper for more elaborate designs. Repeat this experience as children develop more awareness of spatial relationships which will impact their designs, greatly.



**Tape Shapes:** Use tape in different colors to make shape outlines on butcher paper. Children will use foam blocks in coordinating colors to play match the shape games. "Let's find out how many sides there are in a rectangle?" Count while pointing to each side. How are they the same/different?

## Cognitive 9: Shapes



**Shape Hop-Scotch:** Use painters tape to create simple shapes on the floor. Provide bean bags for children to toss and jump/hop to. The floor shapes can also be used for line-up and transition times. Encourage children to name the shapes.



**Simple Shape Paintings:** Use cups, lids or small boxes (squares) to paint with. Vary the sizes, shapes and colors to add interest to the activity. (White paint on black paper creates a high contrast design.) Discuss and describe different shapes.



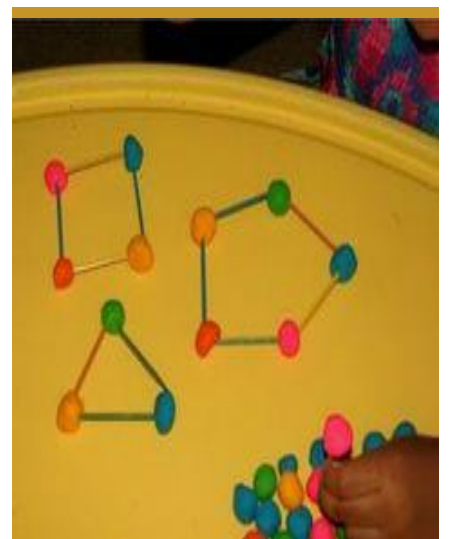
**Shape Match:** Provide shape matching games. Children are able to match the shape object to the outline. "Can you find the other rectangle?" "Here is a triangle and here is a square. How are they different?" Use shape objects for counting, sorting and graphing.



**Magnetic Cubes:** Attach magnets to the back of cubes and provide cookie sheet/magnet board. Children can explore and make shapes. "What other shape can you make?" "Tell me about your ideas."



**3/D College:** Collect a variety of boxes and paper rolls. Children paint, glue, & construct using basic shapes. When complete ask children to tell you about their ideas and thoughts about their work.



**Making Shapes:** Provide small sticks/tooth picks and play-dough for children to make 3/D shapes. Discuss shapes as they work and ask how many sides and corners.

## Cognitive 9: Shapes



**Shape Game:** Use a square box to make a shape dice. Children roll the dice and choose the matching shape link. Encourage children to make predictions about what shape they will get next. "Who has the most triangles?" "Who has the fewest circles?"



**Make a Shape:** Make simple shape card patterns. Provide children with pipe cleaners for children to bend into shapes. Ask children questions: "How did you figure out how to make that circle?" "Tell me about how you made the square?"



**Window Panes:** Mount clear contact paper inside a window. Children use Magna Tiles to design a shape display. Discuss the different shapes and how to place them to make additional shapes. This activity can be varied by using tissue paper shapes.



**Big Shape Collage:** Adults (or children with scissor skills) will need to pre-cut out a "box-full" of basic shapes. Hang clear contact paper on the easel to create a poster size shape collage. "One, two, three; how many sides does a triangle have?" "Can you point to all of the circles?"



**Shape Hunt:** Hide basic shapes in the play yard or classroom. Provide children with paper bags and have them "hunt" and collect the shapes. Use their "findings" for counting, sorting and graphing. Increase the number of shapes in the hunt to match children's skill level.



**Shape Sort:** Make simple shape sorting bags for children to use for sorting activity. These bags can also be used during a Shape Hunt. Children will need to hunt for the shape that matches their bag. Then use for counting and graphing activities. "How many squares do you have?"



## Cognitive 9: Shapes



**Craft Stick Shapes:** Attach magnets to the back of craft sticks. Children can use to make shapes. Ask children to make certain shapes. "Can you make a square?" "Let's find out how many straight sides are in a triangle?"



**Tape It:** Use brightly colored tape on black paper to create and represent shapes. "How are your squares similar?" "How are they different?" "Tell me about what you are doing?" "What other shapes can you make?" "How did you come up with that idea?"



**Shapes All Around:** At home/school collect magazine pictures of different shapes. Discuss the attributes of picture to determine each shape as it is placed. "How do you know this is a circle?" Display in a place where children can see and discuss often.



**Pattern Blocks:** Introduce making different shape designs using pattern blocks w/ cards Children can then use these to compose (make) or decompose (take apart) shapes from other shapes.

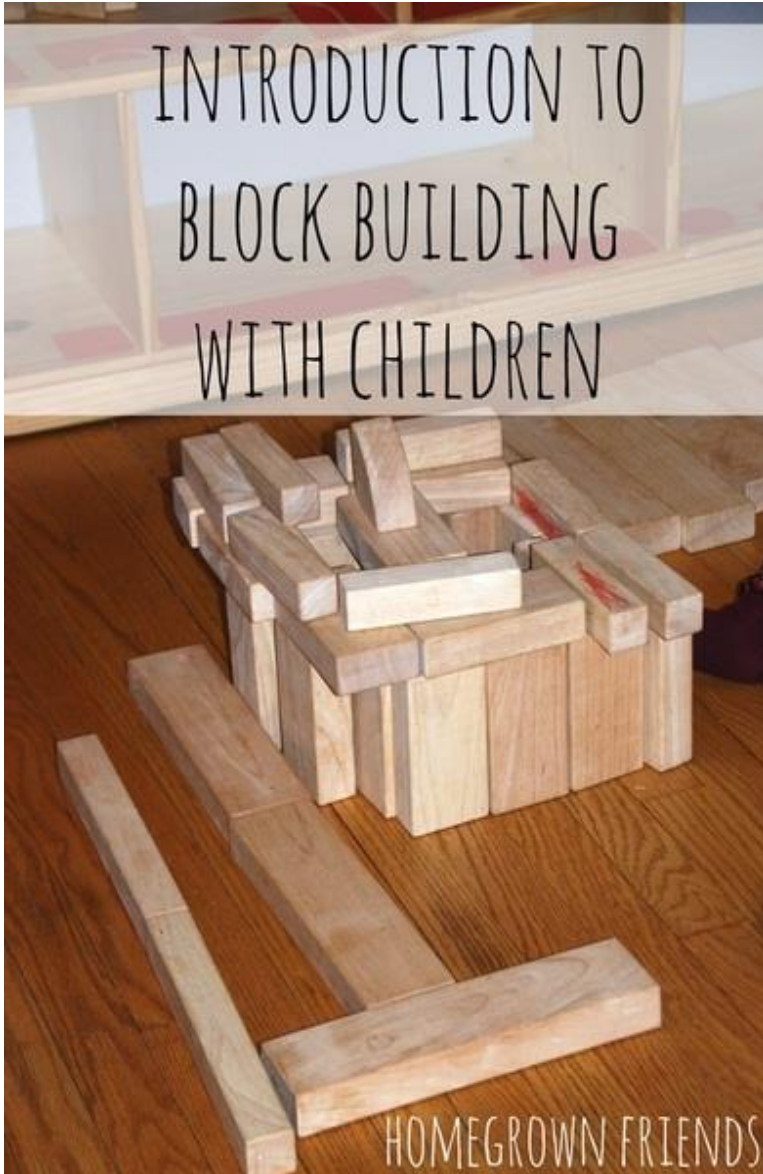


**Paper Shape Designs:** Provide children with clear contact paper and a large variety of different shapes. Children can create their own patterns and shapes from other shapes.



**Our Own Designs:** Children paint a representation of their original shape patterns. Have children construct a simple foam or wood block design near the easel and create still life paintings.

# The Value of Blocks



## The Foundation of Blocks

In the early 1900s, Caroline Pratt invented the unit blocks we still use today. Pratt understood the importance of open-ended materials as the center of a child's education. The block building area in a preschool classroom supports many areas of a child's development. There are specific stages in block building, strategies for an ideal environment, and using accessories to enhance the block building experience.

## Block Building Promotes

### Math

Shape recognition  
Symmetry  
Measurement  
Counting  
1:1 Correspondence  
Fractions  
Size

### Language Arts

Sharing ideas  
Naming buildings  
Creating stories  
Creating signs  
Labeling  
Social Studies  
Mapping  
Symbolic representations

### Science

Balance  
Experimentation  
Inclined ramps  
Stability  
Gravity

### Physical Development

Gross motor development  
Hand-eye coordination

### Social-Emotional Development

Sharing  
Patience  
Cooperation  
Pride in one's work  
Respecting peer's work































### Art

Patterns  
Symmetry

# Classroom Unit Blocks

Shape

Description

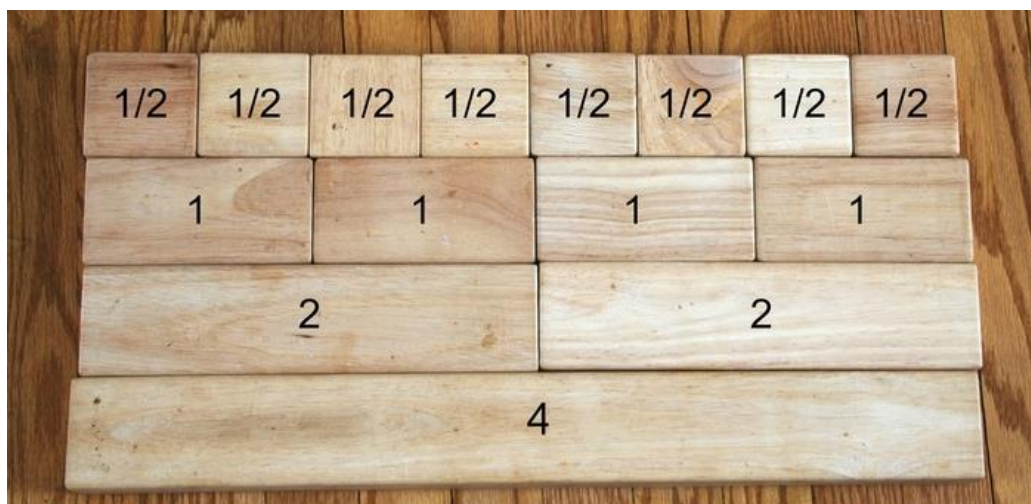
	1/2 UNIT
	UNIT
	DOUBLE UNIT
	QUADRUPLE UNIT
	1/2 PILLAR
	PILLAR
	DOUBLE PILLAR
	1/2 COLUMN
	COLUMN
	DOUBLE COLUMN
	ROMAN ARCH
	SMALL 1/2 CIRCLE
	SMALL TRIANGLE
	LARGE TRIANGLE
	RAMP
	1/2 GOTHIC ARCH
	SMALL BUTTRESS
	1/2 CIRCLE CURVE
	CIRCLE CURVE
	LARGE 1/2 CIRCLE
	CROSS ROAD
	GOTHIC ARCH DOOR
	SIDE ROAD
	1/4 CIRCLE
	ROOF BOARD
	FLOOR BOARD
	RIGHT ANGLE
	GOTHIC ARCH
	DOUBLE TRIANGLE
	SMALL CUBE

# THE BLOCK SHAPES

The specific shapes, lengths, widths and heights of the wooden blocks are crucial to the success of the block building experience. Pratt designed the unit blocks in an incredibly thoughtful manner through years of experimentation and direct observation in the early 1900s. A basic block set begins with the unit block and then expands with blocks two and four times as long but with the same width and thickness, cylinders, curves, and half units.



All blocks except for the cylinders and curves can be created from the unit block via multiplication or division.



## THE STAGES OF BLOCK BUILDING

Repetition is the key to a successful education. Children need time, space and security to explore materials without any end product in mind. You can begin to introduce block building as soon as children are capable of picking up the smaller blocks.



### Stage 1

Children will carry blocks from one place to another without any real thought of building.

### Stage 2

Stacking blocks in rows or small irregular towers.



### Stage 3

Bridging is used. Two blocks are used with a space in between and another block connecting at the top.

### Stage 4

Enclosures are created.



### Stage 5

Increased use of blocks, height, pattern and balance.



### Stage 6

Dramatic play begins to appear. Children begin to name structures.

### Stage 7

Building structures that represent everyday life.

## THE BLOCK BUILDING ENVIRONMENT

Ideally, a block building area should have a great deal of space. Hardwood floors are easier to build on than a rug. Yes, it does make a bit of noise if the blocks fall, but play spaces and classrooms were not meant to be quiet places.



How you store the wooden blocks is also part of the learning process. A large shelving unit like the one above is very useful. Look for one that has separate compartments. This will make the sorting process easier. Blocks are sorted by type. You can trace the shapes on colored contact paper (sticky back paper) and attach to your shelf. This will help the children become independent during block clean up. It is also a natural way to explore shape recognition and sorting skills.



## BLOCK BUILDING ACCESSORIES

In the early stages of block building, we focus solely on the wooden blocks. As children become more adept at building, add a few accessories to build interest. Accessories are a great way to tie in a unit of study or a recent experiential trip. For a study of backyard bugs, add a basket of pretend bugs. Please keep in mind to limit the amount of accessories as the focus should be on the block building.



Rocks & Sticks



Artificial Plants & Tiles



Wood Spools & Sticks



Various Size Tree Stumps



Baskets of Nature



Sea Glass & Fabric



House/Store Photos



Tin Cans



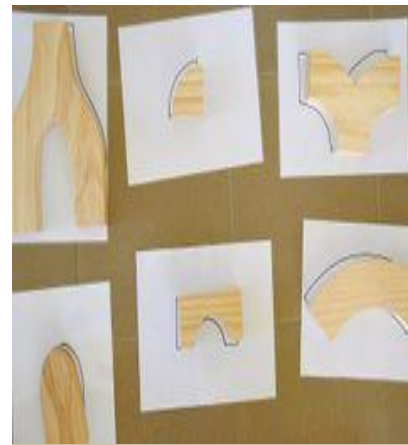
Small Baskets

## THE CLEAN-UP PROCESS

The clean-up process can be overwhelming to children when they look at how many blocks need to be sorted back on the shelves. Cleaning up needs to be part of the learning process and consistently practiced. Teach children to start from the top of their structures and work their way down to the bottom. Blocks are not to be crashed into. This is overwhelming and does not show respect for the materials. Do not assume that children understand that blocks should be sorted according to the labels. This is a teachable moment. Gather your children or students and model how to clean up. *"I have a triangle block. Hmm, where does it go? I need to find the red triangle shape! Here it is! The triangle block goes behind the red triangle shape."* Have children come up and try to do the same with another block.

Do you have reluctant cleaners? Make it a game! Draw pictures of the block shapes on pieces of heavy paper and keep in a basket. At cleanup time have each child choose a shape. The child is responsible for cleaning up just that shape. This helps make the process less overwhelming. To practice counting and 1-to-1 correspondence, have a basket full of numbers; children pick a number and clean up the corresponding number of blocks.

The clean-up process is a great opportunity to point out the benefits of working cooperatively as a team.





## Glossary of Math Terms

**Addition:** A mathematical operation in which two or more numbers are summed to yield a single number (the total).

**Attribute:** A property or characteristic. In geometry, this refers to shape attributes. For example, attributes of triangles include three sides and three angles or corners. In measurement, attribute refers to a measurable dimension such as length, weight, or temperature.

**Cardinal number (Cardinality):** The number that describes the total quantity of objects (or other elements) in a group. In counting a group of objects, the cardinal number is the last number spoken. This number answers the question "how many?"

**Comparing and ordering (in measurement):** Process of comparing two or more objects by attributes such as length, weight, area, or capacity to determine which is longer or shorter, heavier or lighter, covers more or covers less, or holds more or holds less. See **Direct comparison**.

**Comparing and ordering numbers:** The process of determining which of two groups of objects has more or if they are the same, or determining which of two numbers is greater than the other (e.g., 6 is greater than 5). Understanding the relationship (more than, fewer/less than, same as or equal to) between quantities of objects or spoken numbers is an important aspect of young children's developing number sense.

**Composing and decomposing numbers:** Discovering the many ways that a number can be put together (composed) and taken apart (decomposed). For example, 5 objects can be decomposed to make a group of 2 objects and a group of 3 objects (or 4 and 1).

**Composing and decomposing shapes:** Discovering the ways that shapes can be combined or divided to make other shapes. For example, two congruent right triangles can be put together to compose a square. A square can be decomposed into two triangles by drawing a line diagonally from corner to corner.

**Concrete object:** A visible, touchable thing.

**Continuous quantity:** An amount that is **not** made up of discrete, countable items. We measure continuous quantities like length, weight, or time by applying countable units like inches, pounds, or minutes.

**Dimension:** A measurable attribute such as length, width, depth, or height.

**Direct comparison:** A measurement strategy for comparing the length, area, weight, or capacity of two or more objects. For example, two pencils can be directly compared to determine which one is longer by placing them side by side with the ends aligned.

**Discrete quantity:** Refers to an amount that is made up of individual, countable items such as blocks, drumbeats, or words.

**Division:** A mathematical operation that involves grouping or sharing a quantity into equal parts. The quantity that remains (if any) after equal groups are made is called the remainder. Children practice early division skills when they share snack or toy items fairly with their classmates.

**Geometric shapes:** Two- and three-dimensional shapes whose attributes, such as number of sides, number of angles, and number of dimensions, are described and studied in geometry. There are many examples, including triangles, circles, squares, prisms, spheres, and cubes.

**Geometry:** The area of mathematics that concerns space and shape.

**Growing pattern:** A pattern in which there is a predictable change in number or size. An example is the "plus one" pattern in which each unit in the sequence has one more element than the one preceding it (e.g., A, AA, AAA, AAAA).

**Learning environment:** Any setting or situation in which a child might be learning—during play, daily routines, planned experiences, and social interactions at home, school, or in the community. A mathematics learning environment is any setting or situation in which a child might be learning math.

**Manipulatives:** Concrete objects used to support math learning. For example, counting bears are manipulatives that can be used for practicing counting, sorting by color and size, duplicating and creating patterns, simple addition and subtraction with objects, and for supporting many other mathematical concepts and skills.

**Mathematize:** To highlight mathematical concepts in everyday experiences.

**Multiplication:** A mathematical operation in which a quantity is added to itself a certain number of times. For example, 3 times 2 ( $3 \times 2$ ) is three 2s added together ( $2 + 2 + 2$ ).

**Non-standard measurement:** Measuring that does **not** involve a standardized unit (inch, pound, etc.). For example, children might measure their heights using non-standard units such as blocks, or they might use lengths of string to measure and compare the size of two pumpkins.

**Non-standard measurement tool:** Any item used as a non-standard unit for measuring. See **Non-standard measurement**.

**Number:** Describes a countable quantity.

**Number word:** Spoken, written, or signed word that represents a quantity, such as "one," "two," or "three."

**Numeral:** A written symbol that represents a number, such as 1, 2, or 3.

**One-to-one correspondence:** Matching one object, word, or action to another object, word, or action (one for one). In counting objects, one-to-one correspondence refers to matching one and only one number word to each item being counted.

**Operations:** Addition, subtraction, multiplication, and division of numbers.

**Ordinal number:** A number word that describes the order of objects, for example, "first," "second," or "third."

**Part-whole relations:** The relationship between a whole number and its parts (the smaller numbers that compose it). See **Composing and decomposing numbers**.

**Pattern:** A regular, predictable arrangement of things. Objects, numbers, sounds, actions, or events can make a pattern. (See **Repeating pattern** and **Growing pattern**.)

**Repeating pattern:** A pattern in which a sequence of elements (see **core unit**) is repeated again and again without change, such as "red stripe-white stripe, red stripe-white stripe, red stripe-white stripe."

**Representing number:** Showing numerical information using concrete objects such as blocks, dice, and fingers; spoken number words such as "four"; or written symbols such as a numeral (4) or tally marks (/ / / /).

**Sequencing:** Arranging a set of items in order, according to a rule. For example, stones or other collected objects can be put in order from smallest to largest or largest to smallest. Numbers in the counting sequence are ordered by increasing value.

**Spatial relations:** The direction, position, order, or orientation of objects in relation to other objects. See **Spatial reasoning**.

**Spatial reasoning (spatial thinking; spatial sense):** Thinking about how objects fit together and can be moved in space, as well as how one's body fits and moves in relation to objects in the environment. Spatial concepts include directionality, position, order, and location of people and objects in space and the words that describe these concepts.

**Standard measurement:** Measuring with standardized or standard units such as inches, pounds, or degrees using tools like rulers, scales, and thermometers.

**Standard measurement tool:** A device that is used to apply standardized units to an attribute. For example, a ruler is used to measure the length of an object in inches or a scale is used to measure a person's weight in pounds. See **Standard measurement**.

**Subitizing:** Identifying the number in a very small group of objects perceptually, by looking or touching, without needing to count.

**Subtraction:** A mathematical operation in which a quantity is removed or taken away from another. The resulting number is the difference between the starting number and the number taken away. For example, subtracting 2 from 5 leaves 3, which is the difference between 5 and 2.

**Symmetry:** An object is symmetrical when dividing it in half produces two parts that are mirror images of each other.

**Three-dimensional (3-D) shapes:** In geometry, shapes that have height, width, and depth dimensions. 3-D shapes can be measured with units of volume like cubic inches. Examples include spheres, cubes, and prisms. More information about 3-D shapes is provided in the handout, "Two- and Three-Dimensional Shapes, Attributes, and Properties."

**Two-dimensional (2-D) shapes:** In geometry, shapes that have length and width dimensions, but no depth. 2-D shapes can be measured with units of area like square inches. Examples include triangles, circles, squares, and parallelograms. More information about 2-D shapes is provided in the handout, "Two- and Three-Dimensional Shapes, Attributes, and Properties."