

Math Topics

Preschool children are learning math all the time!

This guide explains the math topics found in *PEG+CAT*. You also will find tips to help your child recognize and practice these math concepts as she or he watches videos and plays digital games, and tips to help you and your child do hands-on activities together.

Ordinal Numbers and Counting

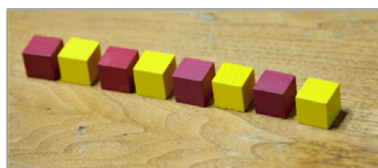
Counting is probably the most common way your preschooler uses numbers. You count to know how many, how much, and how far. You can count to figure out how many people there are on the bus, or how many fingers you have.

Ordinal numbers tell you about the position of something or someone (what order they are in)—like the floors in a building: first (1st), second (2nd), third (3rd) and fourth (4th) or, when watching a race, you can discuss who came in 1st, 2nd, and 3rd place.

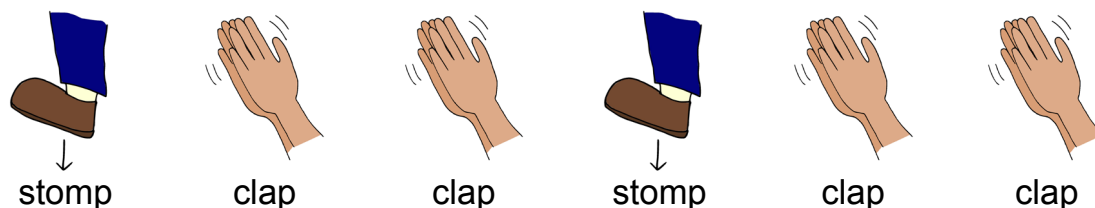
Patterns

A **pattern** contains a repeating unit, and can be described by a rule. Patterns let you predict what comes next. You can use objects, sounds, and movements to make different kinds of patterns. Here are a few examples of patterns.

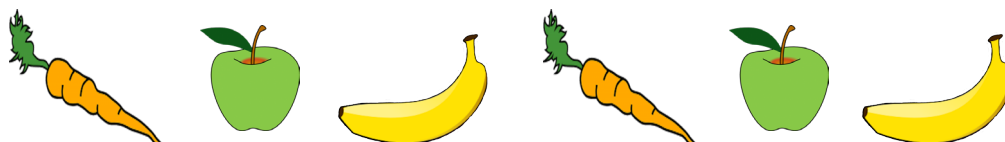
- **ABAB pattern**: a red cube (A), a yellow cube (B), a red cube (A), and a yellow cube (B)



- **ABBABB pattern**: stomp (A), clap (B), clap (B), stomp (A), clap (B), clap (B)



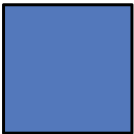

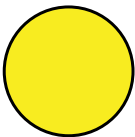



- **ABCABC pattern**: carrot (A), apple (B), banana (C), carrot (A), apple (B), banana (C)



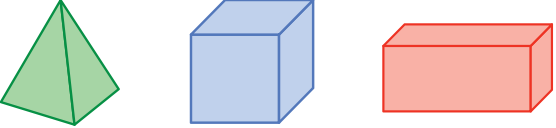
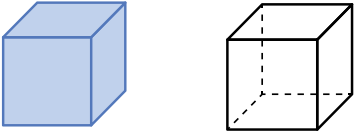


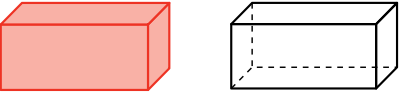


Two Dimensional (2D) and Three Dimensional (3D) Shapes

There are two different kinds of shapes that children often see and play with.

- **2D shapes**, like a circle, triangle, and rectangle, are flat shapes that have only two axes: length and width.
- **3D shapes**, like a sphere, pyramid, and cylinder, are objects that have three axes: height, width, and length.

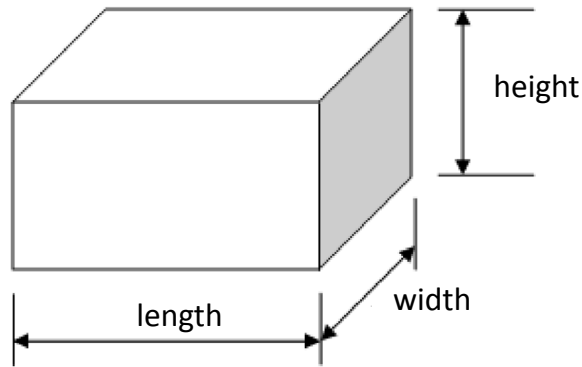
2D Shape	Mathematical Description
Square 	A shape that has four sides (quadrilateral), four right angles (corners), and all the sides have equal length
Triangle 	A shape with three sides and three angles (corners)
Circle 	A round shape with no sides and a closed curve
Rectangle 	A shape that has four sides (quadrilateral), four right angles (corners), plus opposite sides are parallel and equal in length
Trapezoid 	A shape that has four sides (quadrilateral) and one pair of parallel sides
Rhombus 	A shape that has four sides (quadrilateral) of equal length, in which the opposite sides are parallel

Two Dimensional (2D) and Three Dimensional (3D) Shapes (continued)

3D Shape	Mathematical Description
	<p>One flat side of a 3D shape is called a "face."</p> <p>The surface a solid object stands on, or the bottom line of a shape such as a triangle or rectangle, is called its "base."</p>
<p>Cube</p> 	<p>A solid shape with six faces, and each face is a square</p>
<p>Pyramid</p> 	<p>A solid shape with two forms: a square base and four triangle faces, or a triangle base and three triangle faces</p>
<p>Sphere</p> 	<p>A solid and perfectly round circular object that resembles a ball</p>
<p>Rectangular Prism</p> 	<p>A solid shape with a rectangle on all six faces</p>
<p>Cylinder</p> 	<p>A solid shape with one curved surface and two identical flat ends that are circular or elliptical</p>
<p>Cone</p> 	<p>A solid shape that tapers smoothly from a circular base to a point called the "vertex"</p>

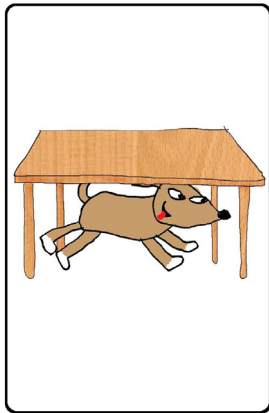
Measurement and Position Words

Measurement is finding out how long something is (length), how wide something is (width), how high or tall something is (height), or how much something weighs (weight). You can talk about the height of a block tower your child built or the weight of how heavy a rock is.



Position words, like *over*, *under*, *around*, *in front*, *next to*, and *behind*, describe the location of a person or object. For example, the dog is *under* the table, or the child is *next to* the tree.

The dog is *under* the table.



The child is *next to* the tree.



Images retrieved from ARTiculation360 at <https://articulation360.files.wordpress.com/2012/04/flip-flop-prepositions-1.jpg> and <https://articulation360.files.wordpress.com/2012/04/flip-flop-prepositions-3.jpg>

Tip Sheet for Watching and Playing Together

Tip 1: Watch and play together!

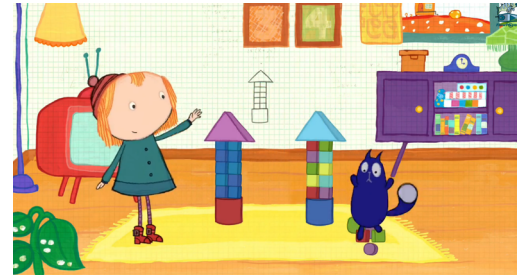
We know that you have busy lives, and it's not always possible to sit down to watch a video or play a digital game with your child. But we hope that you'll **find some time each week to watch a video and/or play a digital game** with your child.

Tip 2: Chat it up!

Talk to your child about what's going on in the show or the game, and **ask questions**. **Give your child a few seconds to respond** to your questions. If it helps and it's possible, **pause** the show while you're watching it to allow time for talking.

Things to talk about and questions you can ask:

- **Make predictions.** *What do you think is going to happen next? Why?*
- **Retell the story.** *Tell me what happened in the show. What was Peg and Cat's problem? How did they solve the problem?*
- **Ask your child's opinion.** *What did you think about the show (or game)? What was your favorite part? What part didn't you like?*



Video Clip: The Baby Problem



• **Ask about games.** *What was going on in Peg's Pizza Place? What did you do to help Peg?*

• **Ask about math.** In the Chicken Dance game, ask your child to tell you about the patterns he or she is making. During *The Ring Problem* video, pause and practice counting ordinal numbers together: first, second, third, fourth, fifth!

Full Video: The Ring Problem

- **Check for understanding.** Check that your child understood everything that happened in the show or game. Ask your child if he or she has questions for you. See if he or she knows the meaning of new words that come up in the show or game.



Tip 3: Make connections!

One of the best ways you can bring the math and other skills in *PEG+CAT* to your preschooler's attention is to help your child make connections between what he or she sees in the show or plays in the games and what's going on in his or her life.

- **Connect to everyday events.** Perhaps your child has had an experience like Peg's in *The Play Date Problem* video: Everyone at the play date wants to play a different game or play a different way. How did your child and his or her friends resolve their problem? How did Peg and her friends solve their problem?



Full Video: The Play Date Problem

- **Connect to the world around you.** When you are out walking, try to **use words like *behind, over, under, and in front of*** to describe people, animals, or objects that you and your child see. For example, you might say, *“Look at the bird flying over the tree! That person is standing in front of the store.”*
- **Connect to math ideas.** Next time you are going up stairs, try using **ordinal numbers** to count “First floor! Second floor! Third floor!” like Peg does in *The Beethoven Problem* video. If your child wears a striped shirt, point out that it has a pattern, and practice repeating the **pattern**, such as red, blue, red, blue.
- **Connect to what's important to you.** Draw your child's attention to features of the show or game that you think are important for your child to learn. Maybe you're focusing on **positive behavior** with your child. When you notice good behavior in a show or game, point it out. Perhaps—like most preschoolers—your child is having trouble cleaning up toys. Watch *The Messy Room Problem* video and talk about why we clean up our toys and ways we can make cleaning up more fun.
- **Connect to what's important to your child.** If there's something in a show or game your child particularly likes, **find other opportunities to talk about, play with, or learn about that concept.**



Video Clip: The Messy Room Problem

Tip Sheet for Math Talk

What is “math talk,” and why is it important for your child?

“Math talk” is talking to your child about the different types of math he or she experiences in his or her life. Children love to compare sizes of objects, figure out how many items they see, identify shapes, and locate objects in a room. These topics are all opportunities for math talk. Adults can draw out the mathematical ideas and vocabulary in these everyday play activities and build on them to help children better understand mathematical ideas.

How do Peg and Cat use math talk?

Peg and Cat use math talk when they solve problems. They talk about strategies for counting, identifying shapes such as triangles or spheres in their environment, and comparing objects. In the final song at the end of each episode, they also sing about the math they used to solve their problems.

How can I use math talk at home with my child?

Preschool children are able to do some amazing mathematical thinking. You can help by asking your child questions during everyday activities and while your child interacts with games and videos.

Here are some examples of math talk you might use with your child.

Tip 1: Use Math Talk in Everyday Life

- Find and talk about the math in your surroundings at home, the grocery store, the train, or anywhere!
 - At home: *“Look around the room. What patterns do you see?”*
 - At the grocery store: *“Can you find the largest or smallest vegetable? Which of these loaves of bread costs more?”*
 - On the train/bus: *“This is the first station. This is the second/third/fourth/last station.”*
- Think out loud as you play a digital game, do a hands-on activity, or watch a video with your child.
 - PBS KIDS Lab Activity—PEG+CAT Stick Puppets: *“Hmm. I need to find a circle. A circle is perfectly round—look, I’m drawing one in the air! Let’s draw one in the air together!”*
 - Sound pattern play: *“I see a red, yellow, red, yellow pattern. I wonder if I can make a similar pattern, but using sounds. One tap for the red cube. Two taps for the yellow cube. One tap for the red cube. What comes next? Two taps for the yellow cube!”*



- Pause the video/game to talk about the math you see:

- *“What is the round shape Ramone is floating in? Do you know the name of the shape? It looks like a circle but it’s not a circle. It’s called a sphere. A sphere is round like a ball and has no sides.”*



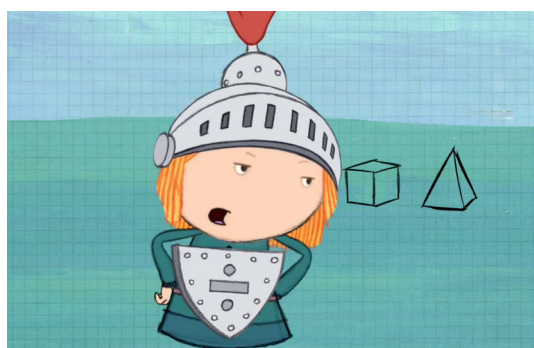
Full Video: The Sparkling Sphere Problem

Tip 2: Ask Open-ended Questions

- Invite your child to explain his answers by saying more than just “Yes” or “No.”
 - You can ask your child to explain his thinking by saying, *“How do you know?”* or *“Why do you think that?”*
 - Your child is still forming his math ideas. It’s OK if he doesn’t give you a correct answer. The important thing is that your child begins to think logically. If your child gives an incorrect answer, instead of correcting or interrupting him, you might say, *“I like the way you’re thinking about that! Are there other ways to think about that as well?”* or, *“Can you show me?”* These questions give your child the chance to find his errors on his own.

Tip 3: Encourage Your Child’s Use of Math Talk

- Encourage your child to share her math thinking and observations with siblings, peers, and adults.
 - Measurement: *“How can you use your feet to measure how long and how wide the rug is?”*
 - Position Words: *“I’m going to look around and pick something, and you have to try to guess what it is. Ask me questions like, ‘Is it in front of me? Is it behind me? Is it underneath me? Is it next to me?’.”*
- Ask your child to describe some of the math in PEG+CAT.
 - The Sparkling Sphere Problem video: *“How did Mermaid describe the rhombus?”*
 - The Golden Pyramid Problem video: *“How did Peg know that the cubes Toad tried to give her and Cat weren’t the same as pyramids?”*
- Wait! Give your child a minute to think through her math ideas and respond to your questions.
- Be an attentive and interested listener when your child is talking.



Full Video: The Golden Pyramid Problem