

math
expressions

Early Learning

Resources

SAMPLER



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Early Learning
Resources

Building Blocks to Math Success



Math Expressions Early Learning Resources is designed for children in Pre-K, Transitional K, and 4K classrooms. The program provides a solid foundation that prepares them for success in Kindergarten math.

The newest addition to the *Math Expressions* program, *Math Expressions Early Learning Resources*, builds on the highly successful, research-based instructional strategies and conceptually aligned resources used in *Math Expressions* Kindergarten. This program gives Pre-K children the background and confidence to begin their journey into the world of mathematics.

Based on Research

The content of *Math Expressions Early Learning Resources* was guided by the National Research Council Report: *Mathematics learning in early childhood: Paths toward excellence and equity*. The author of *Math Expressions*, Dr. Karen Fuson, served as a member of the committee that contributed to this publication. As recommended in this report, the program has a strong focus on Number and Geometry—the content areas that are particularly important for mathematics instruction in the early years. *Math Expressions Early Learning Resources* uses research-based teaching-learning paths and provides the structure and repetitive experiences recommended by the National Research Council report.



National Research Council. *Mathematics learning in early childhood: Paths toward excellence and equity*. Committee on Early Childhood Mathematics, Christopher T. Cross, Taniesha A. Woods, and Heidi Schweingruber, Editors. Center for Education, Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academies Press, 2009.

Classroom Structures Support Understanding and Math Talk



Daily Routines

Through Daily Routines, children work on learning the counting word sequence and relate it to number symbols and quantities through the use of patterns, fingers, and actions. Children take turns as Student Leaders, building confidence and understanding over time.



The Puzzled Penguin puppet is an engaging character that encourages communication skills.

Math Centers

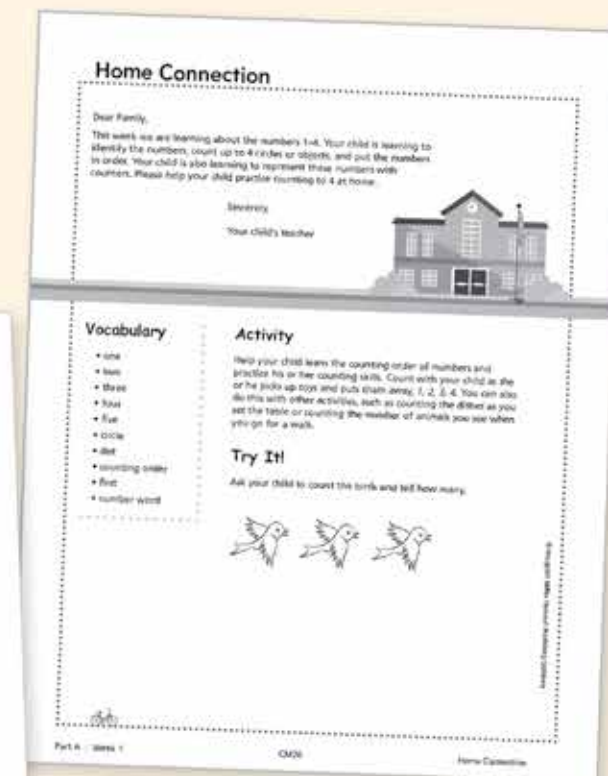
Children work with partners and in small groups as they interact with materials for exploration and practice. Exploratory play, problem solving, and repetitive experiences build understanding and fluency. Suggestions for advanced learners are included to extend math center activities.



The OSMO gaming system for iPad devices can be used to practice and extend concepts.

Home Connection

Ongoing communication with families is critical in Pre-K. Weekly Home Connection letters explain what children are learning and provide opportunities for children to demonstrate what they have learned.



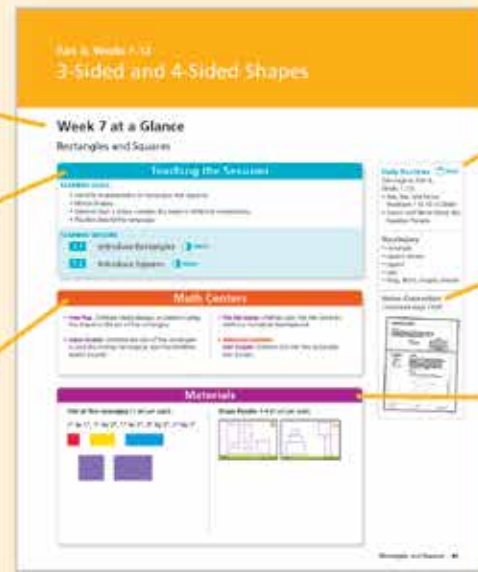
Learning Sessions

Learning Sessions focus on crucial aspects of Number and Geometry that Pre-K children can learn and need to know deeply to do well in Kindergarten. Knowledge builds gradually by repeating activities and also by adding small extensions. The program materials and lesson activities help children see, discuss, and use mathematical structures. With a strong focus on Math Talk, children learn to explain their thinking.



Organized for Successful Teaching and Learning

The Teacher Guide for *Math Expressions Early Learning Resources* is organized into weekly plans that provide comprehensive support for building a deep understanding of concepts.



Week at a Glance clearly outlines the activities and resources for the week.

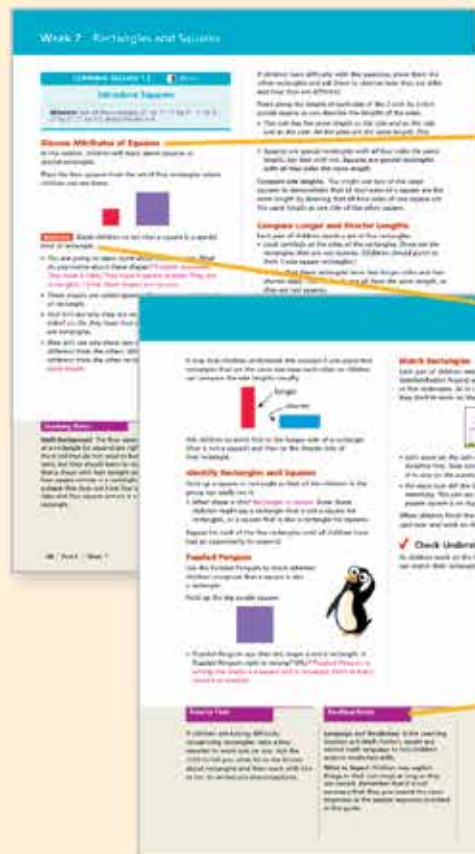
Teaching the Sessions lists the Learning Goals and Sessions for the week.

Math Center activities allow for exploration and practice.

Daily Routines are short activities that build understanding over time.

Home Connections provide for ongoing communication to the family.

Materials show and list the manipulatives and resources used in the Learning Sessions.



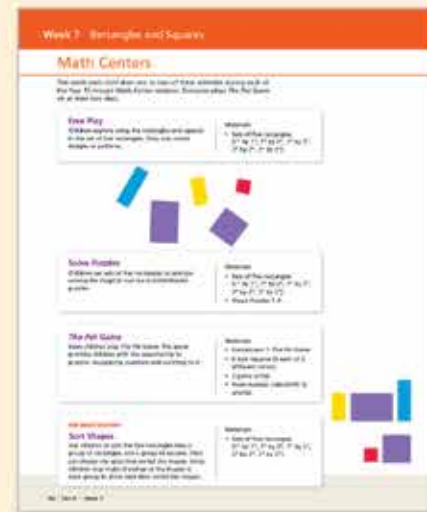
Activities with questions and visuals make teaching support easy to follow.

Math Talk is part of every lesson and promotes inquiry and deep understanding.

Check Understanding provides on the spot formative assessment.

Teaching Notes include helpful suggestions for Tutorial Time, Math Throughout the Day, and English Learners.

Math Center activities for each week also include Advanced Learner suggestions.



Research Background for *Math Expressions Early Learning Resources*



Dr. Karen C. Fuson, Math Expressions Author

Children who enter Kindergarten with high levels of math knowledge do better both in math and in reading in later grades (Duncan, et al., 2007). Being well-prepared for Kindergarten is crucial for later success and enriches children's daily lives.

The National Research Council's Committee on Early Childhood Mathematics released a summary of research and recommendations to address the crucial national need to prepare all children to do well in Kindergarten. This report, *Mathematics learning in early childhood: Paths toward excellence and equity* (National Research Council, 2009), provides the major research basis for *Math Expressions Early Learning Resources*. Some of its major recommendations are summarized and exemplified in *Focus in Prekindergarten* (2010), published by the National Council of Teachers of Mathematics and the National Association for the Education of Young Children.

Math Expressions Early Learning Resources implements the position of the National Council of Teachers of Mathematics (2016) on early childhood learning. Major foundational and achievable goals and approaches in these materials are:

- experiences that emphasize number and geometry (including measurement and spatial reasoning)
- perceptual and conceptual subitizing of small groups
- emphasis on working with shapes, including right triangles
- experiences with visualizing and verbalizing mathematical concepts

A survey of recent research (for example, Clements and Sarama, 2014) was made to ensure that the program includes the latest research-based learning activities. Two important learning activities included in the program are learning path games (Ramani and Siegler, 2008) and higher levels of repeated patterning (Rittle-Johnson, et al., 2015).

References:

Clements, D. H. and Sarama, J. (2014). *Learning and teaching early math: The learning trajectories approach* (2nd ed.). New York, NY: Routledge.

Duncan, G.J., Dowsett, C. J., Claessens, A., Magnuson, K., Huston, A.C., Klebanov, P., Pagani, L. S., Feinstein, L., Engel, M., Brooks-Gunn, J., Sexton, H., and Duckworth, K. (2007). School readiness and later achievement. *Developmental Psychology*, 43, 1428-1446.

Focus in Prekindergarten (2010). Reston, VA: National Council of Teachers of Mathematics and the National Association for the Education of Young Children.

National Research Council (2009). *Mathematics learning in early childhood: Paths toward excellence and equity*. Committee on Early Childhood Mathematics, C. Cross, T. Woods, and H. Schweingruber (Eds.). Center for Education, Division of Behavioral and Social Sciences and Education. Washington, DC: National Academies Press.

Ramani, G. B. and Siegler, R. S. (2008). Promoting broad and stable improvements in low-income children's numerical knowledge through playing number board games. *Child Development*, 79, 375-394.

Rittle-Johnson, B. Fyfe, E. R., Loehr, A. M., and Miller, M. R. (2015). Beyond numeracy in preschool: Adding patterns to the equation. *Early Childhood Research Quarterly*, 31, 101-112.

Part A: Building Foundations

NUMBER: UNDERSTAND NUMBERS 1-4

Week 1 Count and Show Numbers 1-4

Week 2 Count and Match Numbers 1-4

Week 3 Arrange and Describe Cubes for Numbers 1-4

Week 4 Introduce Partners for Numbers 2-4

Week 5 Make Partners of Numbers 2-4 and Introduce The Pet Game

Week 6 Play The Pet Game and Introduce Animals Hiding in the Barn

GEOMETRY: 3-SIDED AND 4-SIDED SHAPES

Week 7 Rectangles and Squares

Week 8 Compose Rectangles

Week 9 Triangles

Week 10 Compose Rectangles with Right Triangles

Week 11 Recognize and Describe Triangles and Rectangles

Week 12 Recognize, Describe, and Match Shapes

Part B: Deepen Understanding

NUMBER: MATCH, COMPARE, AND ADD NUMBERS THROUGH 5

Week 13 Find Partners of 5 and Find More/Less

Week 14 Partners, Addition, and Repeating Patterns

Week 15 Addition, Patterns, and the Favorite Fruit Game

Week 16 Add and Compare Numbers to 5

Week 17 Add, Make Patterns, and Compare Numbers

GEOMETRY: AREA PATTERNS, 3-DIMENSIONAL SHAPES, AND SHAPES WITH RIGHT TRIANGLES

Week 18 Rows and Patterns

Week 19 Make Buildings with Cubes

Week 20 Compose Shapes with Square Corners

Week 21 Compose with Right Triangles and Rectangles

Week 22 Cubes, Cones, Cylinders, and Spheres

Part C: NUMBER: Add, Subtract, Compare, and Make Patterns

NUMBER: ADD, SUBTRACT, COMPARE, AND MAKE PATTERNS

Week 23 Add and Subtract to 5 and Make Repeating Patterns

Week 24 Adding and Subtracting Stories and Patterns

Week 25 Adding and Subtracting Stories and Compare Within 10

Week 26 Patterns and Compare Within 10

GEOMETRY: MEASURE, COMPOSE SHAPES, AND LOOK BACK

Week 27 Measure Lengths and Make Shapes

Week 28 Make Shapes and Discuss Attributes

Week 29 Solve Picture Puzzles

Week 30 Look Back at What Was Learned



Understand Numbers 1–4

Week 6 at a Glance

Play *The Pet Game* and Introduce *Animals Hiding in the Barn*

Teaching the Sessions

LEARNING GOALS

- Identify numbers 1 to 4 in the *Animals Hiding in the Barn* activity.
- Play the number concepts game *The Pet Game*.
- Find partners of numbers on the *What Do I See at the Farm?* card.
- Expand descriptive language using Math Talk opportunities throughout the activities.

LEARNING SESSIONS

- 6.1** Play *The Pet Game* and Identify Numbers 1 to 4 30min
- 6.2** Find Partners of Numbers on the *What Do I See at the Farm?* Card 30min

Math Centers

- The Pet Game** Children play *The Pet Game*.
- Advanced Learners** *Animals Hiding in the Barn* Children identify partners using the *Animals Hiding in the Barn* materials.
- Free Play** Children explore with the Two-Color Counters, Inch Squares, and/or Inch Cubes.

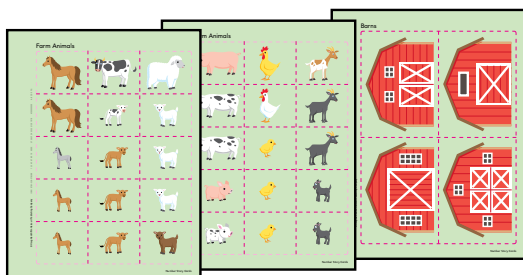
Materials

- Gameboard 1: *The Pet Game*** (1 per pair)
- Inch Squares** (8 per pair; 4 each of 2 colors)
- number cube** (1 per pair; the number 1 written on 4 faces and 0 written on 2 faces)
- game circles** (2 per pair)
- Number Story Cards** (1 barn and 4 cards of one type of animal per pair)

- Workmat 1: 5-Parade** (1 per child)
- Inch Cubes** (8 per child; 4 each of two colors)
- Discussion Card 2: *What Do I See at the Farm?*** (1 per pair)



- Number Noticer Cards** (3 each of numbers 1–5)
- Number Noticer Badge**



Daily Routines 5min

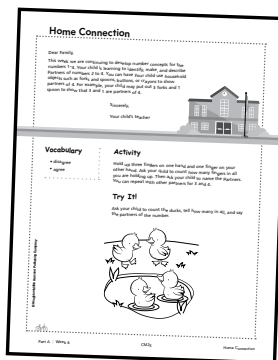
- (See page xx, Part A, Weeks 1–12)
- Count 1 to 10 on the Number Parade
 - Count with Creative Movements and Sounds
 - See, Say, and Show Numbers 1 to 5

Vocabulary

- gameboard
- game circle
- number cube
- agree
- disagree

Home Connection

Copymaster page CM25



Big Book

Read *On Our Street*.

Week 6 Play *The Pet Game* and Introduce *Animals Hiding in the Barn*

LEARNING SESSION 6.1 30min

Play *The Pet Game* and Identify Numbers 1 to 4

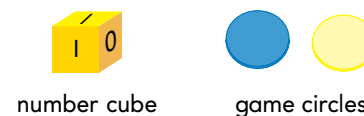
Materials: Gameboard 1: *The Pet Game*, foam number cube, game circles, Inch Squares, Number Noticer Cards, Number Noticer Badges, Number Story Cards, Workmat 1: 5-Parade, Inch Cubes

Play *The Pet Game*

See the full instructions for the game on *The Pet Game* Instructions Copymaster (CM16).

Pairs of children need a gameboard to share, the foam cube labeled with 0s and 1s, two game circles, and eight Inch Squares (4 each of 2 different colors; children in a pair use different colors).

Remind children to play the game 3 times in the Math Center, and check that they remember the steps for playing the game.



number cube game circles

- Last week we played The Pet Game. Who remembers how to start the game?* Possible response: First, we have to decide what kind of pet we want.
- Who knows what we do next?* Possible response: We each take 4 squares for our pets and then roll to see who goes first.
- What does Player 1 do first?* Possible response: predicts which spaces the game circle will move to if the roll is a 0 or 1
- What does Player 1 do next?* Possible response: rolls the number cube, says the number, and moves 1 or 0 spaces
- What happens after you move your game circle 1 space?* Possible response: First, I put one of my squares above the game circle. Then I tell what happened. I had 1 pet and got 1 more, so now I have 2 pets.

Remind children that the person who collects 4 pets first must wait until the other child continues to roll the cube to reach the goal of 4 pets. Reverse roles to play again.

Once children have played the game at least twice, tell them they can continue to play it in the Math Center.

Check Understanding

Observe as children play the game to determine if they can relate the numbers 1–4 on the path to the number of pets collected.

Math Throughout the Day

Number Noticer and Number Hiders

Materials: Number Noticer Cards (3 each of the numbers 1–5), Number Noticer Badge
The Number Noticer takes any 5 cards and then finds groups of those numbers of things in the classroom and leaves a number card there (see Week 5). Now the Number Noticer will have help from two Number Hiders.

During Math Center time, the Number Hiders each make drawings of 2 to 5 things on ¼ page of paper and hide them (not too well) in the classroom. The Number Noticer then locates the drawings and places the appropriate number cards with the drawings.

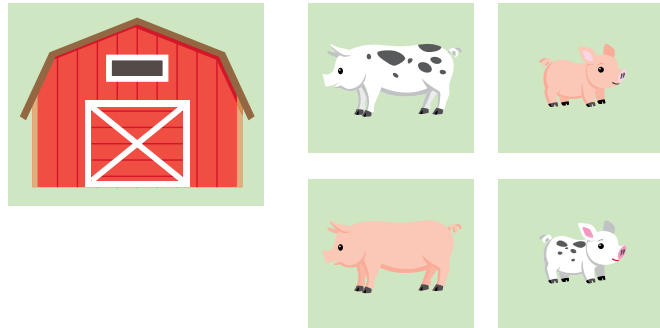
This activity can be done during snack time or any other non-lesson time.

Introduce *Animals Hiding in the Barn*

This activity further develops children’s counting skills and their ability to “see” a number (subitize) as well as their social skills involving communication and cooperation with each other.

Materials for Each Pair of Children

- 1 barn
- 4 of one kind of animal (Different pairs of children will have different animals: horses, cows, sheep, pigs, chickens, or goats.)



Doing the Activity

1. To begin, Player 1 closes her or his eyes and says, “Ready!”
2. Player 2 then hides some animals under the barn and asks, “How many are hiding in the barn?”
3. Player 1, with eyes opened, lifts up the barn and spreads out the animal cards to discover how many were “hiding.” Player 1 may just “see” how many or may count the number of animals. Then the child says, for example, “There are four horses.”
4. Player 2 says, “I agree” or “I disagree.”
5. Both children check the answer by counting.
6. The children then reverse roles and play again.

Continued ►

MathTalk in Action

Madison, which animals did you hide in the barn?

Madison: Cows. Some tan cows.

So you hid tan cows in the barn. Julian, how many cows did Madison hide?

Julian: Madison hid 3 tan cows in the barn. Look: 1, 2, 3 tan cows.

Yes, I see 3 tan cows. Ella, what did you do when you opened your eyes?

Ella: I lifted the barn and saw 2 pigs. One big and one small.

Great! You saw one big pig and one small pig hiding in the barn.

We had fun hiding animals in the barn. We counted or we just saw how many were hidden. You helped each other find how many animals were hiding in the barn. Good job!

5-Parade Activities

Collect the materials for *Animals Hiding in the Barn*, and if time allows, have children do some of the activities on the 5-Parade Workmat. Each child needs eight Inch Cubes (4 of one color and 4 of another color). Children can:

1. Count 1 to 5 loudly and softly on the 5-Parade.
2. Make partners of numbers 2 to 4 using two different color cubes.
3. Match partner arrangements that another child makes.
4. Visualize the arrangement and number of cubes.
5. Talk about how children’s arrangements are alike or different from other classmates’ arrangements.

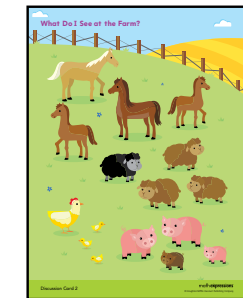
LEARNING SESSION 6.2 30min

Find Partners of Numbers on the *What Do I See at the Farm?* Card

Materials: Discussion Card 2: *What Do I See at the Farm?*, Number Story Cards, Workmat 1: 5-Parade, Inch Cubes

What Do I See at the Farm?

Each pair of children needs the *What Do I See at the Farm?* card.



MathTalk Guide children to look at the card.

- *Let’s all look at the farm. Who can tell me what you see at the farm? Possible responses: I see a barn; some animals; I see a tree and a fence.*
- *Look at the different animals. What can you tell me about the animals? Possible responses: I see big and little horses. Here, there are big and little pigs. Oh, the sheep are all the same size. There’s one big brown horse here. There’s another big horse. I don’t know what to call the color.*
- *I see that big horse, too. The color could be called golden. Let’s everyone say, “The big horse is golden.”*

English Learners

Help children understand the difference between the **big** animals and the **small** animals.

Emerging

Show 1 chestnut adult horse and 1 chestnut foal.

- 1 big horse, 1 small horse

Have children repeat.

- *How many horses? 2 horses*

Expanding and Bridging

Display 2 chestnut adult horses and 1 chestnut foal.

- *What are these? horses How many horses are there? 3 horses*
- *There are 3 horses: 2 big horses and 1 small horse.*

Have children repeat.

Math Throughout the Day

Find Numbers and Number Partners

Children can look for 1 to 5 animals in books in the classroom or talk about animals they have seen on television.

They can also identify partners of numbers 2 to 4 using any colored objects in the classroom.

Snack Number At snack time, ask a child to pick the Snack Number of the Day. Children can show fingers for the Snack Number if that number is larger than the number of snacks they have.

- Who can find partners of 2? Possible response: I can! I found 1 big brown horse and 1 big golden horse.
- Great! You found partners of 2, 1 and 1. Now let's try partners of 3.
- [Malik], tell me about your partners of 3. Possible response: There's 1 little pink pig and 2 big pink pigs.
- Everyone check that [Malik] found partners of 3. Is 1 little pink pig and 2 big pink pigs correct? yes
- Who can find partners of 4? Possible response: I found 1 big chicken and 3 little chickens.

Describe partners. Have individual children continue to describe partners of numbers 2 to 4 that they see on the card. Ask other children to determine if the partners are correct. Encourage everyone to use full descriptive sentences in talking about what they see.

✓ Check Understanding

As children identify partners, observe if they are able to name two partners of 4.

Puzzled Penguin

Tell children that Puzzled Penguin found partners of 3 on the card.

- Puzzled Penguin says that the sheep are partners of 3 because there are 3 brown sheep. Is Puzzled Penguin right? No, Puzzled Penguin is wrong! The sheep show partners of 4 because there are 3 brown sheep and 1 black sheep. 3 and 1 are partners of 4.
- Yes! The partners are the two smaller numbers that make up the bigger number.



Animals Hiding in the Barn

Children will continue this activity in the Math Center, but before they do, have them work in pairs so you can observe how well they remember the steps. (See Learning Session 6.1, page 39 for a full description of the activity.)

5-Parade Activities

See Learning Session 6.1, page 40 for the list of activities. Observe children who may still have difficulty showing partners, and provide more Tutorial Time for them.

Math Centers

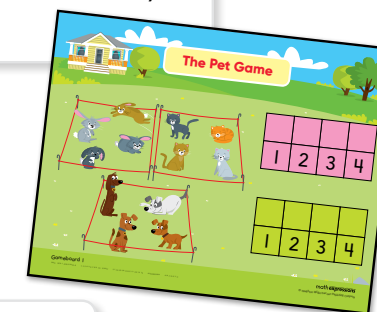
This week each child does one or two of these activities during each of the four 15-minute Math Center sessions. Everyone plays *The Pet Game* on at least two days.

The Pet Game

Have children play *The Pet Game*. This game will reinforce numerical development. During the game, children will recognize numbers and count the number of spaces and Inch Squares. Play continues until each child has finished the game.

Materials:

- Gameboard 1: *The Pet Game*
- 8 Inch Squares (4 each of 2 different colors)
- 2 game circles
- foam number cube (with 1s and 0s)



Free Play

Provide Two-Color Counters, Inch Squares, and Inch Cubes (a variety of colors when possible) for children to work with. While exploring, children might count, create designs, discover different partner arrangements, or compare numbers.

Materials:

- Two-Color Counters
- Inch Squares
- Inch Cubes



Advanced Learners

Animals Hiding in the Barn

Ask pairs of children to use the *Animals Hiding in the Barn* materials with 5 of one kind of animal. The two children agree on a number of animals and put that many in front of the barn. Then children take turns finding partners for that number. For example, a child may say:

- I see 4 and 1.
- 4 horses are brown and 1 is gray.

The other child then identifies partners in a different way that can include moving the animals to different locations to use a spatial arrangement to show partners.

Materials:

- Number Story Cards

Tutorial Time

The Pet Game Some children may need help learning and remembering the steps of the game. Help pairs play the game, giving prompts along the way.

Partners of Numbers For children who may have difficulty seeing partners on the *What Do I See at the Farm?* card, guide children to point, touch, and name the animals. You may also help children represent the animals using Inch Squares or Inch Cubes. Practice the names for different animals so using them becomes easier.

Week 10 at a Glance

Compose Rectangles with Right Triangles

Teaching the Sessions

LEARNING GOALS

- Review characteristics of triangles and right triangles.
- Compose rectangles and other geometric shapes with right triangles.
- Develop observational and spatial skills.
- Practice descriptive language.

LEARNING SESSIONS

10.1 Explore with Right Triangles 30min

10.2 Compose Rectangles 30min

Daily Routines 5min

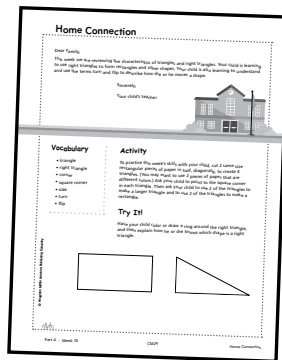
- (See page xx, Part A, Weeks 1–12)
- Count and Show Using the Number Parade
 - See, Say, and Show Numbers 6–10 in Random Order

Vocabulary

- triangle
- right triangle
- corner
- square corner
- side
- turn
- flip

Home Connection

Copymaster page CM29



LEARNING SESSION 10.1 30min

Explore with Right Triangles

Materials: 4 right triangles of different sizes; sets of two right triangles (with legs 2" and 3"), purple rectangle (2" by 3")

Identify Triangles and Right Triangles

Place four right triangles of different sizes where children can see them.



MathTalk Review what children recall about triangles.

- You worked with these shapes in the last lesson. What is the name for these shapes? **triangles** Say the name together: **triangles**.
- How do you know these shapes are triangles? **The shapes have three sides and three corners.** Let's count the sides and corners just to be sure.
- First count the sides of this shape (point to the sides of a triangle): **one, two, three** How many sides does a triangle have? **three**
- Now count the corners of this shape (point to the corners of a triangle): **one, two, three** How many corners does a triangle have? **three**
- Triangles have three sides and three corners. Say that together: **Triangles have three sides and three corners. So, these shapes are triangles.**

MathTalk Continue the discussion with a focus on right triangles. Point to the square corner of one of the triangles.

- What is the name for this special kind of corner? **square corner**
- Look for something in our room that has a square corner. Tell us what the thing is and point to the square corner. Possible responses: door; table; book

Children take turns naming objects and pointing to the square corners.

- Now I would like all of you to use your arms to show me what a square corner looks like. (Model if all children do not respond.)

Hold up one of the right triangles.

- Tell me the special name for a triangle like this one. **right triangle**
- Yes, the triangle is a right triangle because it has three sides, one square corner, and two other corners. Say that together: **A right triangle has three sides, one square corner, and two other corners.**

MathTalk in Action

Look for something in our room that has a square corner. Point to the square corner and tell us what the object is.

Maria: The corner of this picture is a square corner.

Jackson: Our blocks have square corners.

Jane: The purple Number Tiles have four square corners.

Square corners are all around us. You are finding many of them!

Math Centers

• **Solve Puzzles** Children use rectangles and triangles as they work on Shape Puzzles 1–8.

• **The Pet Game** Children will play *The Pet Game* with a partner.

• **Advanced Learners**
Sorting with a Rule Children sort shapes using their own sorting rules.

Materials

Sets of two right triangles, with leg lengths 2" and 3" (1 set per pair)



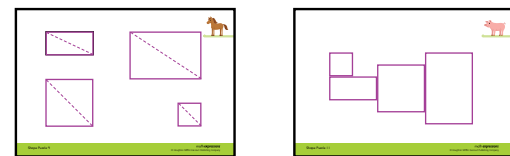
Sets of eight right triangles, two of each size with leg lengths: 2" and 2", 1" and 1", 2" and 3", 1" and 2" (1 set per pair)



Sets of 5 rectangles: 1" by 1", 1" by 2", 1" by 3", 2" by 2", 2" by 3" (1 set per pair)



Shape Puzzles 9–12 (1 set per pair)



English Learners

Help children use the terms **turn around** and **flip over** to describe motions.

Emerging

Hold up a teddy bear or other toy. Turn the teddy bear around several times.

- The teddy bear turns around.

Have children repeat. Then flip the teddy bear over several times.

- The teddy bear flips over.

Have children repeat.

Expanding

Ask children to finish each sentence. Demonstrate with a teddy bear, if needed.

- The teddy bear turns ____ around
- The teddy bear flips ____ over

Bridging

A teddy bear goes around and around.

What is it doing? **turning**

A teddy bear goes over and over. What is it doing? **flipping**

Compose with Right Triangles

Each pair of children now needs a set of the two largest right triangles, with leg lengths 2" and 3".

- You have two big blue and green triangles. Put them together to make another shape. Flip or turn the triangles if you need to. You can find many ways to make new shapes.

Encourage children to make several different shapes as they explore putting the triangles together. They don't have to put sides exactly together for this part of the exploration. They may make shapes that look like these:



Continue to develop vocabulary use by modeling how to describe flipping or turning a shape:

- I have to turn this triangle to make the square corner point up.
- When I flip this triangle, I change the way the small corner is pointing.

This exploration helps children see the many possibilities for putting the triangles together and provides practice in flipping and turning the triangles.

Tell children about a new rule you want them to use for putting the triangles together.

- Now try to make new shapes by putting two sides that are the same length together. The two sides should line up exactly end to end.

Guide children to make each of these compositions, one at a time. The green and blue triangles may be interchanged in these compositions.



MathTalk Discuss these compositions. Encourage children to tell what they notice about each one. For each composition, ask how many sides the new shape has. For the two compositions that form triangles, ask whether children know the name of that shape. For the composition that forms a rectangle, ask children to say its name. Then place the largest purple rectangle (2" by 3") over it to show that they are the same.

✓ Check Understanding

As children discuss their compositions, observe whether they are able to identify shapes as rectangles or triangles.

Puzzled Penguin

Use the Puzzled Penguin to check how well children understand the difference between *turn* and *flip*.

- Puzzled Penguin is going around and around and is saying, "I am flipping over. See me flip over." Is Puzzled Penguin using the right words? Why? **Puzzled Penguin is using the wrong words; elicit as many reasons as possible.**



LEARNING SESSION 10.2 30min

Compose Rectangles

Materials: Sets of eight right triangles, two of each size leg lengths: 2" and 2", 1" and 1", 2" and 3", 1" and 2"; sets of five rectangles: 1" by 1", 1" by 2", 1" by 3", 2" by 2", 2" by 3"; Shape Puzzles 9–12

Use Right Triangles to Compose Rectangles

Each pair of children needs sets of right triangles and rectangles and Shape Puzzles 9–12.

- We will do more work with triangles today. Look at the eight triangles. Find the triangles that match each other in size and shape. They will be the same size and their shapes will be the same, but they will not be the same color. Then put them next to each other.

Demonstrate with the largest triangles.



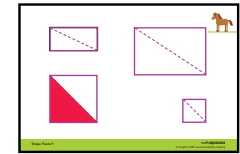
Help as needed until all pairs have made four pairs of matching triangles. Children can check that two triangles match exactly by stacking.

Ask children to find the Horse puzzle (Shape Puzzle 9).

- What do you notice about shapes on this puzzle? How are they different from other puzzles? **They are rectangles, but there are dotted lines inside the rectangles.**
- Today, you are going to build the rectangles on the puzzle by putting two right triangles together. The dotted lines help you see how to make the triangles fit together.
- Each time you put a triangle on the puzzle, tell Horse what you are doing. Watch me.

Put a large red triangle in the large square.

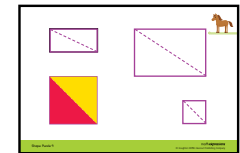
- Horse, I am putting a triangle in a square so it matches one of the triangles. See, the dotted lines help me get it in the right place.



- Horse, now I will use another triangle to finish the square.

Place the matching yellow triangle to complete the square.

- Look, Horse, I put two right triangles together to build a square.



Ask children to work in pairs to complete their puzzles. If they need help to build a rectangle, model doing it as you did for the square. Guide children as needed with placing the right triangles and with modeling how to tell Horse about their work.

Math Throughout the Day

Suggest that children look for triangles, especially right triangles, at home and be ready to tell the class about them tomorrow. When they do, be sure that children use their math vocabulary correctly.

- triangle
- right triangle
- corner
- square corner
- side
- turn
- flip

Learning Community

MathTalk Encourage children to talk about their thinking and ideas even if they are different from what other children have said. All children need to recognize that their thoughts and ideas are important. All members of the class must show respect and consideration for other children's ideas. They can do this by listening quietly and carefully and by asking questions.

When children help each other to express and explain their thoughts and ideas, your classroom begins to be a place of collaboration and cooperation. Fostering these habits now will help children be successful learners and leaders throughout their lives.

Use Rectangles to Check Work

When children finish the Horse puzzle, ask them to find the four rectangles that match the rectangles they have built on the puzzle. Then ask them to cover each pair of matching right triangles with the rectangle that fits over them exactly.

- Each rectangle fits exactly over a rectangle made with two triangles. This shows that you can use two matching right triangles to build a rectangle.

Compose Rectangles

When pairs complete the Horse puzzle, have them turn to the Cow side (Shape Puzzle 10).

- Now use your right triangles to build shapes on the Cow puzzle and tell Cow what you are doing.

MathTalk When children finish, ask them to take the triangles off the puzzle card and to work in groups of four (two pairs) to examine both the Horse and the Cow puzzles at the same time.

- How are the two puzzles the same? How are they different?

Discuss how the rectangles are the same and in the same positions but the dotted (slanted) lines go the opposite way or connect different corners.

Compose Rectangles Without Dotted Lines

Ask each pair of children to find their Pig puzzle (Shape Puzzle 11).

- The Pig puzzle is the next one we will do. Notice that there are no dotted lines to help you place the right triangles. You will still use two right triangles to make a rectangle but you have to think about how to place them inside the rectangle.

Provide help as needed. Ask children who quickly see how to do these puzzles to help anyone who is struggling with the compositions as they may be better able to explain the work.

Compose Rectangles in Slanted Positions

Ask children to find the Sheep puzzle (Shape Puzzle 12).

- The Sheep puzzle is the last puzzle in this lesson. Notice that the rectangles are in slanted positions. As you use your right triangles to make them, you can use the dotted lines to help place the right triangles.

MathTalk When children finish all four puzzles, ask them to work again in groups of four (two pairs) and examine all four puzzles at the same time.

- How are the four puzzles the same? How are they different? Possible responses: All four puzzles have the same four rectangles so the same right triangles can be used to cover the rectangles; Three puzzles have dotted lines that help in placing the triangles, but the Pig puzzle does not have dotted lines; In the Sheep puzzle, the rectangles are slanted on the puzzle card so you have to think a different way about how to place the triangles.

- If you turn the puzzle cards, do the rectangles change? Possible responses: They change how they look on the card, up and down or slanted; The rectangles are still the same even though they look a little bit different.

Check Understanding

Observe children as they work on the puzzles to determine whether they choose matching right triangles to build the rectangles and are persistent in finding the correct pair of triangles for a given rectangle.

Math Centers

This week each child does one or two of these activities during each of the four 15-minute Math Center sessions. Everyone plays *The Pet Game* on at least two days.

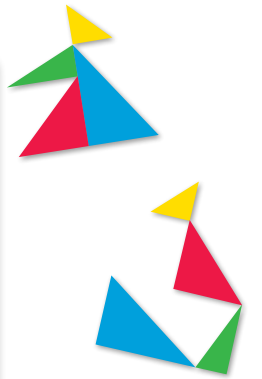
Solve Puzzles

Children use the set of five rectangles with Shape Puzzles 1–4 (Dog, Cat, Goldfish, Rabbit cards) or the set of four right triangles with Shape Puzzles 5–8 (Cardinal, Sparrow, Crow, Bluebird cards).

As children work on the puzzles, encourage them to use longer sentences or more than one sentence to describe the shapes and how they move and position the shapes.

Materials:

- Shape Puzzles 1–8
- Sets of five rectangles (1" by 1", 1" by 2", 1" by 3", 2" by 2", 2" by 3")
- Sets of four right triangles (leg lengths: 1" and 1", 2" and 2", 1" and 2", 2" and 3")



The Pet Game

Have children play *The Pet Game*. The game helps children practice recognizing numbers and counting to 4.

Materials:

- Gameboard 1: The Pet Game
- 8 Inch Squares (4 each of 2 different colors)
- 2 game circles
- foam number cube (with 1s and 0s)

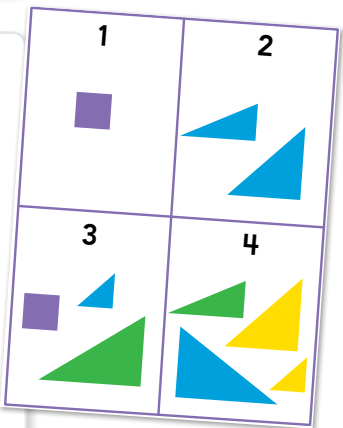
Advanced Learners Sorting with a Rule

Tell children they will put as many shapes in each box on the sorting page as the number in the box, but they must use this rule: *The shapes must be the same in some way.*

When children finish this sorting task, they may describe how they chose the shapes for each column to a partner. For example, "I put 3 shapes with square corners in the 3 part."

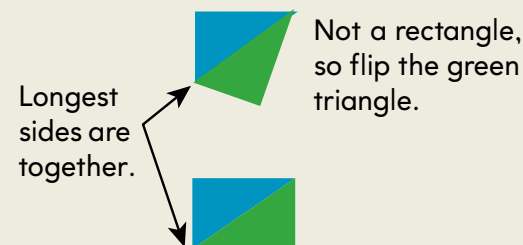
Materials:

- A sorting page: divide a sheet of paper into four parts with labels 1, 2, 3, and 4. See the example to the right.)
- Sets of five rectangles (1" by 1", 1" by 2", 1" by 3", 2" by 2", 2" by 3")
- Sets of four right triangles (leg lengths: 1" and 1", 2" and 2", 1" and 2", 2" and 3")



Tutorial Time

If children are having difficulty recognizing how to put two right triangles together to form a rectangle, take a few minutes to work with one or two children at a time. Ask each child to show you how he or she would put the two shapes together. As the child works, lead him or her to see that the two longest sides go together and that if a rectangle is not formed, one of the two triangles needs to be flipped.



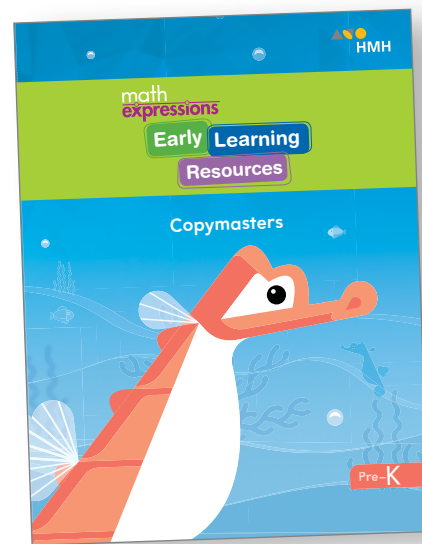
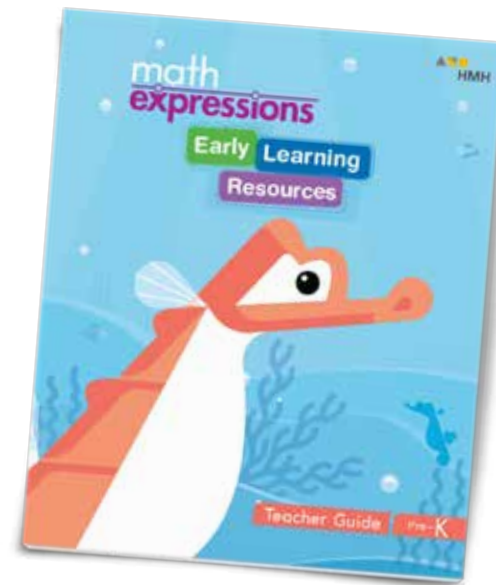
Teaching Note

Early Finishers Let children who finish the puzzles successfully free play with the sets of right triangles and rectangles. Encourage them to make designs that have patterns.

Program Components

TEACHER GUIDE

The Teacher Guide is organized into weekly plans that provide comprehensive support for building a deep understanding of concepts.



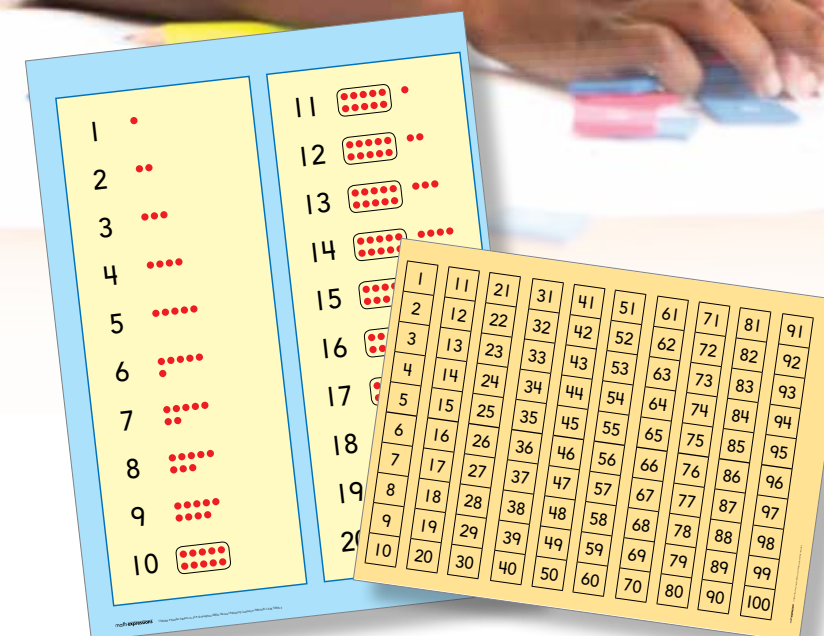
COPYMASTERS:

- Activity Masters
- Numeral Writing
- Activity Cut-outs
- Game Instructions
- Home Connection Letters
- Teacher Observation Checklists
- "Look What I Can Do!" Progress Reports

PROGRAM RESOURCES:

- Posters and Manipulatives
- Gameboards
- Draw How Many Boards
- Picture Puzzles
- Grid Cards
- Comparing Mats
- Punchout Measurement Strips
- Discussion Cards
- Shape Puzzles
- Number Story Cards
- Number Noticer Cards
- Big Books

Math Expressions Early Learning Resources Purchase Options



**PROGRAM KIT:

- Teacher Guide
- Copymasters (Home Connection Letters, Observation Checklists, "I Can" student progress lists)
- Student Materials (Games, Activity Cards, and Workmats)

**MANIPULATIVE KIT:

- Posters
- Manipulatives used in Learning Sessions and Math Center activities

*PUZZLED PENGUIN PUPPET

- Plush puppet encourages Math Talk
- Used with activities in the Learning Sessions

*BIG BOOK SET

- Three Big Books that relate to number and geometry

AVAILABLE FOR ADDITIONAL PURCHASE:

TRAYS

- Useful for organizing materials

*Included in the Comprehensive Package

**Included in the Basic Package

math expressions

Early Learning

Resources



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