BECOMING A MATH DETECTIVE

STRUCTURE

- Activity Overview & Preparation (10-20 MIN)
- Introduction (2 MIN)
- Activity & Discussion (20-30 MIN)
- Closing (5-10 MIN)

OBJECTIVES

At the end of this activity, participants will be able to:

- Notice opportunities in everyday life to talk about math with their children

TIME

40-60 MINUTES

This activity helps caregivers to become "math detectives" by practicing finding math in everyday scenes.

MATERIALS

Printout (or digital link to) the activity

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BECOMING A MATH DETECTIVE

GETTING READY

FACILITATOR NOTES

ANSWER GUIDE

Use the answer guide to provide caregivers with additional details on responses to the activity prompts.

BUILDING CAPACITY

This activity builds on the **Revealing the Math in Everyday Life** module, but does not require module completion. (Module 3, Segment 2)

ADAPTATIONS

Use these ideas to modify the activity based on:

- child age,
- time and resources available for implementation
- caregiver needs.

TIPS

Blue text indicates something that facilitators might say (e.g.,"**Today we are going to learn how to be math detectives**"). Regular text is information for facilitation.

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BECOMING A MATH DETECTIVE

GETTING READY

ACTIVITY OVERVIEW

In this activity, you will help caregivers develop skills to become "math detectives" — to find opportunities to talk about math with their children during common family activities. You will do this by presenting images featuring scenes of everyday life, and asking caregivers to find the math opportunities in them.

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GETTING READY

PREPARATION PART 1

10-20 Minutes

Select Example Scene 1 (preschool cubbies) or Example Scene 2 (front doors) that you will use at the beginning of the activity to introduce caregivers to the idea of becoming "Math Detectives". Review the image carefully, as well as the accompanying table featuring opportunities to discuss math prompted by the image, and select the one that will be most familiar with the caregivers you support.

Review the scenes in the Caregiver Materials, as well as the accompanying examples of math questions and comments prompted by each image.

To prepare for this activity, boost your knowledge of key early math topics by reviewing these short DREME materials.
https://familymath.stanford.edu/toolkits/

As you review the scenes, note that some of the scenes might not be familiar to every caregiver. For example, if a caregiver's child does not go to a childcare setting, the preschool cubby scene might be less familiar. Rather than providing explicit scripts to follow in these scenes, the goal of the activity is to instead think about the opportunity based on actions that occur (e.g., hanging up a coat on the lower hooks, and putting lunch boxes above them in the upper cubbies) and the materials that are available (e.g., look at the shapes of the cubbies).

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GETTING READY

PREPARATION PART 2

10-20 Minutes

Arrange caregiver seats in a way that caregivers can see the screen, whiteboard, or wall where you will project the images.

Be ready to project the images and/or share a link with caregivers so that they may access the images on their own devices. Be sure to only share the images end not the examples provided for facilitation purposes only.

If you decide to implement the activity as a competition game, make sure caregivers have the required materials (e.g., paper and pencil, or Google docs).

INTRODUCTION

2 Minutes

Introduce the activity. For example, you might say: **"There are many opportunities in everyday life to talk about math with our children. Today we are going to learn how to be 'math detectives'. That means we will practice noticing the opportunities to talk about math that are all around us!"**

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ACTIVITY

ACTIVITY & DISCUSSION

Part 1: 20-30 Minutes

Introduce Example(s)
Show participants the scene that you selected ahead of time (Example Scene 1 or Example Scene 2) and ask them to examine it carefully. Help caregivers take on the role of a "math detective".

"Take a look at this scene. It shows a common setting or situation where you can find yourself with your child. Do you see any opportunities to talk about math?"

Use the questions below to help caregivers find the math in the shared example scene:

"In this scene, where could you find a way to talk about math?"

"In this scene, what types of math topics do you think you could point out to your child? By math topic, I mean counting, shapes, measurement, patterns, and numbers."

"What questions might you ask your child to get them to talk with you about a math topic you reveal for them?"

"What are some phrases a child might say to show they are thinking mathematically? What would that tell you about how your child understands the math idea?"

- For example, a child might say: "This cubby looks bigger than that cubby — it's longer," or the child might comment, "That cubby is big enough for me to sit in." Both of these comments show that the child is thinking about shapes and spatial relations.

As they are talking through the example scene, display the table provided right below the image noting items or elements in the scene and the math revealed. As they discuss opportunities to talk about the math in the scene, use the suggested "Math Revealed" column to highlight the various ways math is present in the selected scene.

ACTIVITY

ACTIVITY & DISCUSSION

Part 2: 20-30 Minutes

Option 1: Non-competitive Activity
After working through the example scene, share the scenes in the Caregiver Materials. You can share multiple images for small group discussion, share one or two images for large group discussion, or distribute the images individually for self-reflection.

For each scene, examples are included of math-related questions and comments prompted by the image. Use these examples to keep the discussion going with caregivers if needed. It is important to note that these examples are not meant to be exhaustive — your participants may be able to uncover many other ideas not listed here!

To expand upon this activity, show caregivers that part of being a "math detective" is to recognize when their child is thinking mathematically, and respond accordingly. You can build this skill by repeating a previously used scene, but this time have the caregivers use a third column labeled, *Child says or does this.*

ACTIVITY & DISCUSSION

Part 3: 20 - 30 Minutes

Option 2: Seek-and-Find Competition Activity
An alternate approach for this activity is to make it a competitive, game-like seek-and-find activity.

Divide the whole group into small groups of caregivers (2 or 3 persons each). Share a pre-selected scene with the groups.

Have each small group draw two columns on a piece of paper, or create two columns in a shared Google document, and label them, "Items or Elements of the Scene" and "Math Revealed."

Then, ask the caregivers to list as many items in the scene as they can where math can be revealed. To get started, use one of the scenes as an example and work through it as a model. Give the group a time limit, such as 5 minutes.

After the 5 minutes have passed, have small groups share their lists and identify which group listed the most math revealed opportunities that were not duplicated by other groups.

ACTIVITY

As you go through their lists, you can use these prompts to facilitate the conversation:

- "Who else thought of this idea? How would you do it?"
- "Did anyone think of anything else similar to this idea?"

CLOSING
5-10 Minutes

Incorporate these key takeaways in how you close the session with caregivers. You can state them as written, or paraphrase based on the caregiver's experiences.

- Caregivers can reveal math in everyday scenes to support their children's early math talk and to support their mathematical thinking.
- Becoming a "math detective" is an easy way to support the development of young children's math skills.
- Revealing math in everyday scenes includes math talk, and also includes helping your child think mathematically.

To help solidify learning, ask families to share one thing they learned about early math from this activity.

BECOMING A MATH DETECTIVE

ADAPTATIONS

CHILD'S AGE

Consider the ages of the children in the families you work with. If the children are very young, such as toddlers, help caregivers to think about how they might reveal different kinds of math opportunities as compared to an older child.

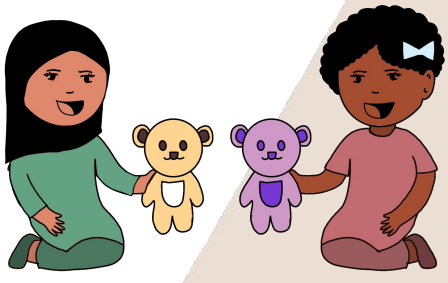
CHILD'S AGE

If you have limited time to share the activity with caregivers, consider reducing the activity to focus on discussing one or two scenes.

CAREGIVER NEEDS

If the caregivers you work with require accommodations to participate, be sure to support their needs by:

- Offering closed captioning
- Providing all materials in caregivers' native language (with translations when relevant)
- For caregivers who prefer to interact with materials using methods other than reading, or have low literacy skills, provide audio (you can record audio files or read materials aloud) and engage in discussion rather than requiring reading.
- Consider how each scene might be interpreted by the caregivers you support, and determine which may be the best fit. For example, if the caregivers in your group live in a community or space without any parks or access to nature, the first scene might be less relevant for them. Align your scene selection with your caregivers' beliefs and experiences whenever possible.



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ACTIVITY

EXAMPLES FOR DEMONSTRATIONS AND SUGGESTED RESPONSES

In this scene, showing school drop-off cubes, I might list:

ITEMS OR ELEMENTS OF THE SCENE	MATH REVEALED
Cubbies	Talk about the shape of the cubbies and hooks (rectangles and ovals)
Shoes on the Bench	Ask my child to organize them in sets of two, or "pairs"
Backpacks with books inside	Ask my child to estimate how many books the bag can hold
Backpacks on hooks	Ask my child to point to the backpacks from largest to smallest
Lunchboxes on top	Ask my child to measure if their lunchbox is longer or shorter than their shoe, and if the lunchboxes are above or below shoes

ACTIVITY

EXAMPLES FOR DEMONSTRATIONS AND SUGGESTED RESPONSES

In this scene, showing where after school drop-off occurs at the front door, I might list:

ITEMS OR ELEMENTS OF THE SCENE	MATH REVEALED
Front Door	**Child**: "That's our door!" **Caregiver**: "Yes, that's right. What shape is the window above our door? How did you know it's a rectangle? How many shapes do you see on the door?"
Steps	**Child walks up the stairs**: "Let's count the stairs as we go up. How many steps do you think there will be?"
Plants on Porch	**Child says**: "This plant needs water. It is smaller than that plant." **Caregiver**: "Yes, this plant is smaller. How many cups of water do you think we should get for each plant?"

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CAREGIVER MATERIALS

SCENE 1

SCENE 2

SCENE 3

SCENE 4

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CAREGIVER MATERIALS

SCENE 5

SCENE 6

ACTIVITY 3.3

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ANSWER GUIDE

TIPS & EXAMPLES FOR REVIEWING SCENES

Scene 1

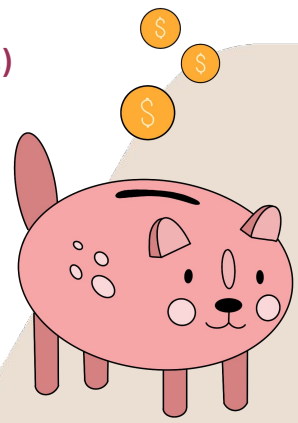
1. Which tree is the tallest? I wonder how tall it is. (measurement)
2. What shapes are these plates? What else is the same shape? (shapes)
3. There is a pattern on your shirt: pink, white, pink, white, pink, white. (patterns)
4. How is the pattern in the table cloth different from the pattern on your shirt? (patterns)
5. Which cooler is closer to us, the red one or the blue one? (spatial relations)
6. How many trees are there in this part of the forest? (counting and numbers)

Scene 2

1. Which slices are longer, the banana or orange slices? How many slices will fit alongside the length of a whole banana? (measurement)
2. Some of the fruit is in the bowl. What fruit is under the bananas? (spatial relations)
3. Let's make a pattern of fruit slices on our plate, going around the edge of a whole circle! Orange, apple, banana, orange, apple, banana. (shapes and patterns)
4. About how many bananas are in this bowl? (counting and numbers)
5. What shape is this blender lid? (shapes)
6. How many orange slices have we cut so far? Do we have more banana pieces or more orange pieces? (counting and numbers)

Scene 3

1. Which book is the widest? The tallest? (measurement)
2. Which of these books is nearest to us? (spatial relations)
3. What pattern is in the colors of these pages? (pattern)
4. How many pages are in this book? Which book has more pages? How do you know? (counting and numbers)
5. What's the shape of this page? (shapes)
6. What patterns of shapes do you see on this page? (patterns)



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ANSWER GUIDE

TIPS & EXAMPLES FOR REVIEWING SCENES

Scene 4

1. Are these containers of apples the same length? (measurement)
2. Which fruits and veggies are close to us, and which are far away? (spatial relations)
3. Can you make a pattern of colors with the fruits and veggies in the basket? (patterns)
4. Let's count out five apples to take home with us. (counting and numbers)
5. What is the shape of this basket? (shapes)
6. Look at how long this cucumber is relative to this apple. Nearly two apple lengths are needed to match the cucumber length! (measurement)

Scene 5

1. How many steps does it take to cross this bridge? (measurement)
2. Are you taller or shorter than this tower with a roof? How do you know? (spatial relations)
3. What shapes are on the walls of this netted bridge? Are all the shapes the same? (patterns)
4. How many children are in this playground? (counting and numbers)
5. What shape is the opening of this tunnel? What else is the same shape? (shapes)
6. How many squares can you find in the playground? (shapes and counting)

Scene 6

1. If we line up all the shoes in one row, will the row of shoes be shorter or longer than the row of coats we have hanging? (measurement)
2. Which are higher, the shoes or the coats? Which are lower? (measurement and spatial relations)
3. Please put the shoes that look the same together, to make pairs of shoes. Then, let's line them up from tallest to shortest! (patterns and measurement)
4. How many coats are hanging up? How many shoes are right side up and how many are lying on their sides? (counting and numbers; and spatial relations)
5. What shape is in the center of these flowers on your coat? (shapes)
6. Which coat is closest to the door, and which is farthest away? (spatial relations)

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ACTIVITIES FOR FAMILY SUPPORT PROFESSIONALS:
EXPLORING EARLY MATHEMATICS

"Everyone Succeeds" was developed for Family Support Professionals to use with the families they serve. All activities are available at no cost, on the Institute of Child Development Math and Numeracy Lab website, for private use with families and caregivers. These materials may not be reproduced or distributed for any for-profit effort without explicit permission from lead developers, Drs. Wackerle-Hollman and Mazzocco.

Module 1: How Attitudes and Dispositions May Affect Early Math

- Activity 1.1 Everyone Succeeds
- Activity 1.2 Flipping the Script
- Activity 1.3 Mathitudes
- Activity 1.4 Learning from Math Mistakes
- Activity 1.5 Comments, Questions, and Conversations (CQC's)
- Activity 1.6 Attitude Adjustments
- Activity 1.7 We Are All Math People

Module 2: Math is Numbers and More: Exploring Early Math Topics

- Activity 2.1 Math Kaleidoscope
- Activity 2.2 Early Math Topics
- Activity 2.3 Picturing Math
- Activity 2.4 Measuring Up!
- Activity 2.5 Toddlers Under Construction

Module 3: Finding Math in Everyday Life

- Activity 3.1 Early Math Success Stories
- Activity 3.2 Math Snacks
- Activity 3.3 Becoming a Math Detective
- Activity 3.4 Make a Statement with Math
- Activity 3.5 Everyday Math in Action
- Activity 3.6 Routines Roadmap

These activities were developed by the Math and Numeracy Lab, directed by Michèle Mazzocco, Institute of Child Development (ICD), in collaboration with Alisha Wackerle-Hollman, Director of the IGDIlab, Department of Educational Psychology, both at the University of Minnesota. Contributors include ICD doctoral students Sarah E. Pan and Jasmine R. Ernst. This work was supported by Heising-Simons Foundation DREME Network Awards 2018-0670 and 2020-1777. We thank members of the Math and Numeracy Lab that contributed to this work, family support professionals who provided feedback or welcomed us (and our activities) into their classrooms, and our community partner consultants who provided insight on language selection and delivered illustrations to make this work meaningful to the Latine and Somali communities.

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