EVERYONE SUCCEEDS

STRUCTURE

- Activity Overview & Preparation (10- 15 MIN)
- Introduction (3-5 MIN)
- Activity & Discussion (20-25 MIN)
- Closing (10-15 MIN)

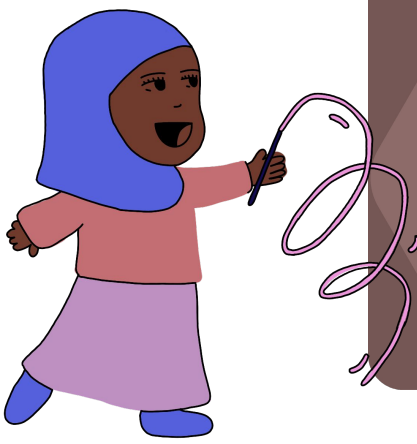
OBJECTIVES

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

- Recognize common gender stereotypes in math
- Monitor their own assumptions about math in relation to gender
- Identify opportunities to disrupt gender stereotypes about math

MATERIALS

Printout of (or link to) the activity



TIME

45-60 Minutes

ACTIVITY 1.1

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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 **Attitudes and Dispositions** module, but does not require module completion. (Module 1, Segment 1)

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 explore how stereotypes about math might affect our parenting**"). Regular text is information for facilitation.

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GETTING READY

FACILITATOR NOTES

ACTIVITY OVERVIEW

In this activity, you will first ask caregivers to individually answer the questions in the activity handout. You will then review the correct answers with caregivers, using the Answer Guide as a reference.

KEY TERMS & CONCEPTS

Stereotype: an over-generalized belief about a group of people

Advanced Placement: a type of high school course designed for academically advanced students

Spatial reasoning: skills related to understanding shapes, space, position, and locations, like recognizing objects, judging distance between objects or between objects and yourself, and figuring out how objects fit together

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GETTING READY

PREPARATION

10-15 Minutes

1. Print out copies of the activity handouts or be ready to project the digital version.

2. If you decide to project the activity, arrange the seats so all caregivers can see the questions.

3. Pre-load the file if you are using an online tool like Zoom or Meet so the activity prompts are ready to show. You can also set up the activity to be presented in a game format with tools like Kahoot.

4. Before you use this activity, be sure you have a strong understanding of stereotypes. You can learn about stereotypes in the DREME Family Support Professional modules and by reviewing the DREME resources about positive math attitudes.

Positive Math Attitudes

https://familymath.stanford.edu/for-educators/positive-math-attitudes-definitions-and-tips/

Helping both Girls and Boys Succeed at Math

https://dreme.stanford.edu/news/how-can-we-help-both-girls-and-boys-succeed-math/

Some caregivers may feel uncomfortable if their own gender identity is not represented or discussed in the activity. We encourage you to acknowledge gender identities outside the male/female binary and explain that although this activity is about male and female stereotypes, the discussion is not meant to exclude other genders. Research on math stereotypes has so far focused on only male and female math stereotypes.

It is not important whether the caregivers you work with get the "right answer." The important part of the activity is the discussion about stereotypes.

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ACTIVITY

INTRODUCTION
3-5 Minutes

Introduce the activity. For example, you might say: **"Today we are going to work through an activity on gender stereotypes about math ability."**

ACTIVITY & DISCUSSION
Part 1: 25 - 30 Minutes

As you begin the activity, introduce new terms the caregivers might not know. If there is any doubt, introduce the terms. It is very important that the caregivers know and understand what a stereotype is before engaging in this activity.

"When you hear the term stereotype, what do you think of?" or ***"What is a stereotype?"***

Help caregivers understand that a stereotype is an over-generalized belief about a group of people, not about individuals.

Ask them to think about their own experiences when thinking about examples of stereotypes.
Discuss how behavior and comments that convey a negative stereotype may lead the stereotyped group to have worse outcomes compared to a group that doesn't face the same stereotype.

Common stereotypes include gender stereotyping ("boys are better than girls at math") and stereotypes based on ethnicity ("Asian children are better at math than other ethnicities"). Both of these may be damaging stereotypes.

Next, **provide caregivers with the activity** and read each question aloud. Have caregivers select their response. You may have caregivers complete it individually if they are comfortable reading.

"Please look at the worksheet, read each statement, and select the answer you think is correct. If more than one answer seems okay, choose the one you think is the best answer."

Once caregivers have **finished responding**, review each statement with them and share the correct answer using the Answer Guide.

ACTIVITY

ACTIVITY & DISCUSSION

Part 2: 25 - 30 Minutes

As you review the answers, ask caregivers to compare their own responses with the correct responses; this helps them evaluate their underlying assumptions. Ask caregivers how these stereotypes (positive or negative) may influence how they raise their children. Here are some sample facilitation prompts:

- ***"Which stereotypes were familiar to you?"***
- ***"Did any of the answers surprise you?"***
- ***"How would you respond to someone who says boys are better at math than girls?"***
- ***"How can we change the stereotype?"***

It is important to recognize that even if caregivers say that they do not think boys and girls differ in math, they may still engage in behaviors that are consistent with these stereotypes, such as assuming that only boys will like blocks and that girls won't like blocks.

Consider using the next scenario to continue the discussion:

"Your nephew is going to turn 5 next week. You want to get him a great present that supports early math development. What are you likely to get for him?"

"What if it was your niece instead of your nephew - what gift would you get her?"

In this example, if caregivers stick to a stereotyped profile (e.g.,construction and blocks for boys but not girls) you can connect this to stereotypes by helping caregivers see that sometimes behaviors follow the stereotypes even if we say that there is no difference between girls' and boys' math skills or interests.

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ACTIVITY

ACTIVITY & DISCUSSION

Part 3: 25 - 30 Minutes

Another example to present to caregivers:

"You did better than all the boys in the class!" expressing surprise and praise.

In this example, the gender-based stereotype may still cause harm. By expressing surprise that the girl performed better than the boys, the educator or caregiver accidentally expresses the idea that boys should be better than girls at math.

To expand, you might ask, **"Can you think of any ways that you might accidentally set different math expectations for boys and girls?"**

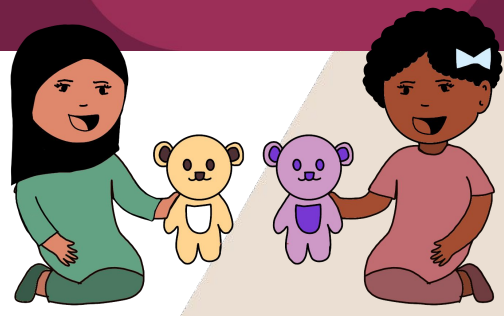
Overall, it is important to help caregivers understand that even if they don't outwardly see themselves as having stereotypes, their behaviors can influence what children think about themselves doing math.

Comments or actions that support a negative stereotype may lead members of the stereotyped group to have worse outcomes than the group that does not face a stereotype.

CLOSING
(5- 10 Min)

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' assumptions about girls' and boys' skills and interests related to math might affect their thoughts and behaviors when doing math with their children.
- There are many opportunities to challenge gender stereotypes about math when interacting with children.
- To help solidify learning, ask families to share one thing they learned about early math from this activity.



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ADAPTATIONS

CHILD'S AGE

Consider the ages of the children in the families you work with. Help the caregivers think through how stereotypes caregivers have might impact children at different ages.

TIME & RESOURCES

If you have limited time to share the activity with caregivers, or prefer to explore one topic more deeply, choose just one or two questions from the caregiver materials. Use the questions for a group discussion and focused conversation about the topic.

CAREGIVER NEEDS

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

- Offering closed captioning if you are using an online group meeting space
- Providing all materials in caregivers' native language (with translations when relevant)
- For caregivers who may not like to read, or have limited literacy skills, select a question to review as a group. Share some of the group discussion prompts aloud so that caregivers are not required to read.

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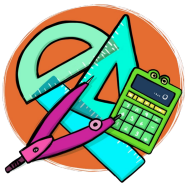
CAREGIVER MATERIALS

1. The number of degrees awarded in engineering between 2011 and 2016 grew significantly for _____.

- ❑ Men
- ❑ Women

2. Enrollment in Advanced Placement math courses is more likely to have:

- ❑ More boys than girls
- ❑ More girls than boys



3. A _____ calculated the flight trajectories for the first astronaut to go into space for NASA.

- ❑ Man
- ❑ Woman

4. Some studies show that _____ are more anxious about math than _____ in middle school and beyond*

- ❑ Boys / girls
- ❑ Girls / boys

5. No women have achieved the highest international awards in math (Fields Medal or Abel Prize).*

- ❑ True
- ❑ False

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ANSWER GUIDE

1. The number of degrees awarded in engineering grew significantly for women between 2011 and 2016. There was a 54% increase in how many women completed bachelor's degrees in engineering and computer science from 2011 to 2016. However, women are less likely than men to stay working in engineering over time. Stereotype issues in practice (peer expectations differing for women, salary differences, etc.) might be one reason they leave engineering.

2. Enrollment in Advanced Placement math courses is more likely to have more boys than girls. The 2020 program summary report shows that 134,174 males and 132,062 females were enrolled in AB calculus, and 74,211 males and 53,559 females were enrolled in BC calculus. (BC calculus is more advanced than AB calculus).

3. A woman calculated the flight trajectories for the first astronaut to go into space for NASA. That woman was Katherine Johnson.

4. Some studies show that girls are more anxious about math than boys in middle school and beyond.*

5. **False**. In 2014, Maryam Mirzakhani became the first woman recipient of the Fields Medal for her contributions to the dynamics and geometry of Riemann surfaces and their moduli spaces, and in 2019 Karen Uhlenbeck became the first woman recipient of the Abel Prize.

ACTIVITY 1.1

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ANSWER GUIDE

SOURCES & NOTES

1. Retrieved from the Society of Women Engineers: https://alltogether.swe.org/wp-content/uploads/2018/09/SWE-Research-Flyer-8_15_18-1.pdf

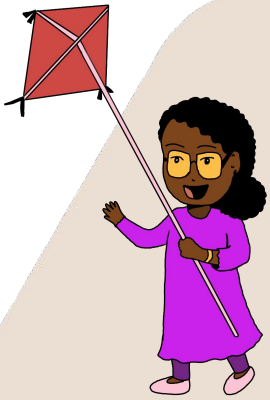
2.. Retrieved from: https://secure-media.collegeboard.org/digitalServices/pdf/research/2020/Progra-Summary-Report-2020.pdf

3. Retrieved from: https://women.nasa.gov/katherine-johnson/

4. Retrieved from:https://www.frontiersin.org/articles/10.3389/fpsyg.2019.01613/full#B43

- * However, various studies indicate that anxiety about math is not impacted by gender, at least in elementary school. [For example: Gunderson, Park, Maloney, Beilock, and Levine (2018). Reciprocal relations among motivational frameworks, math anxiety, and math achievement in early elementary school. Journal of Cognitive Development. 19, 21–46. Doi: 10.1080/15248372.2017.1421538]

5. When you talk to caregivers about these women, highlight that women have achieved very high levels of success in math. Support caregivers by reminding them they don't need to achieve a Fields Medal to be good at or enjoy math.
Being good at or enjoying math is not exceptional for women, instead it is attainable and can be common among girls and women.



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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