# Fostering Children's Math Development

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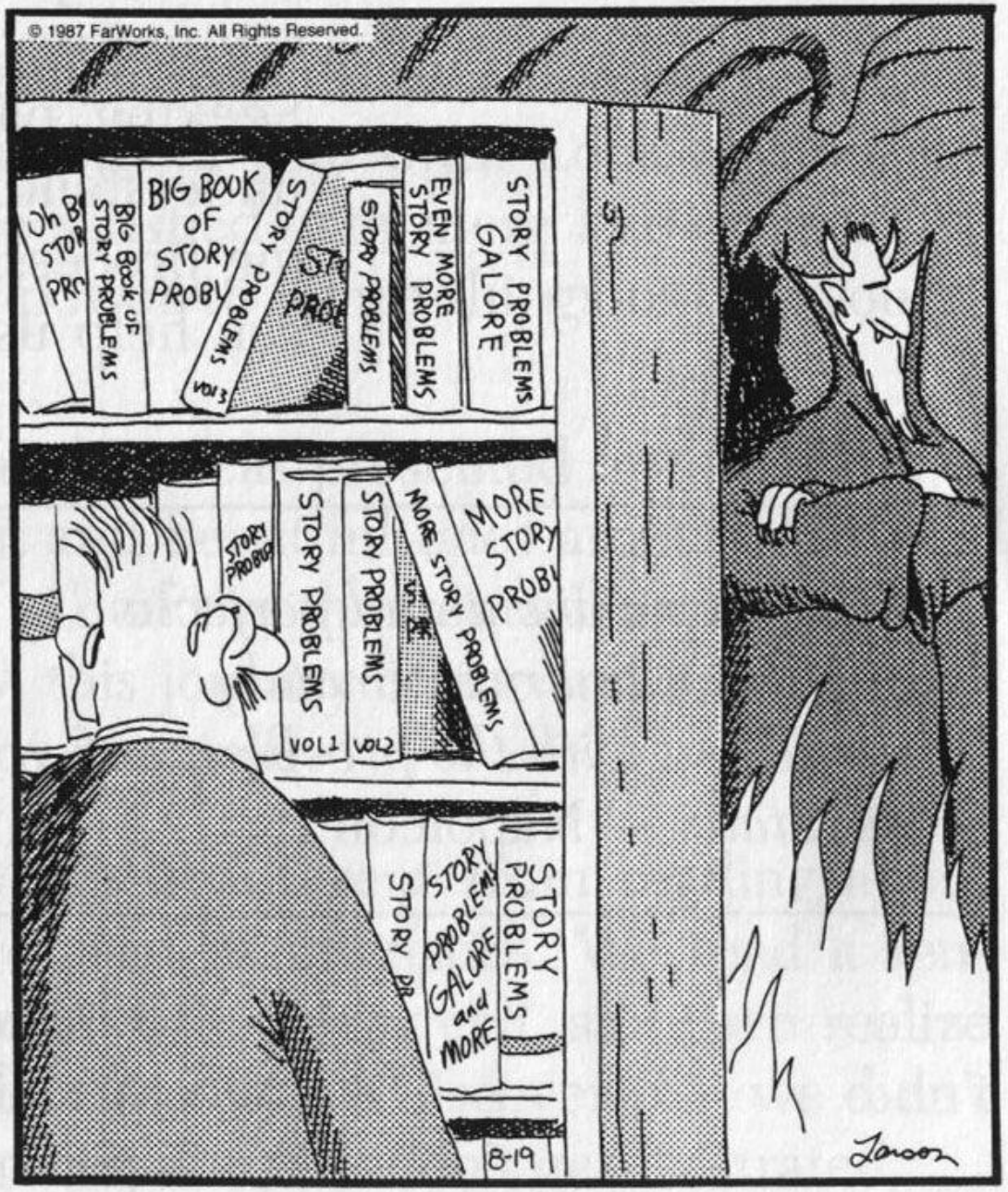
UMBC
AN HONORS UNIVERSITY IN MARYLAND

# THE FAR SIDE

By GARY LARSON




Hell's library

# Overview

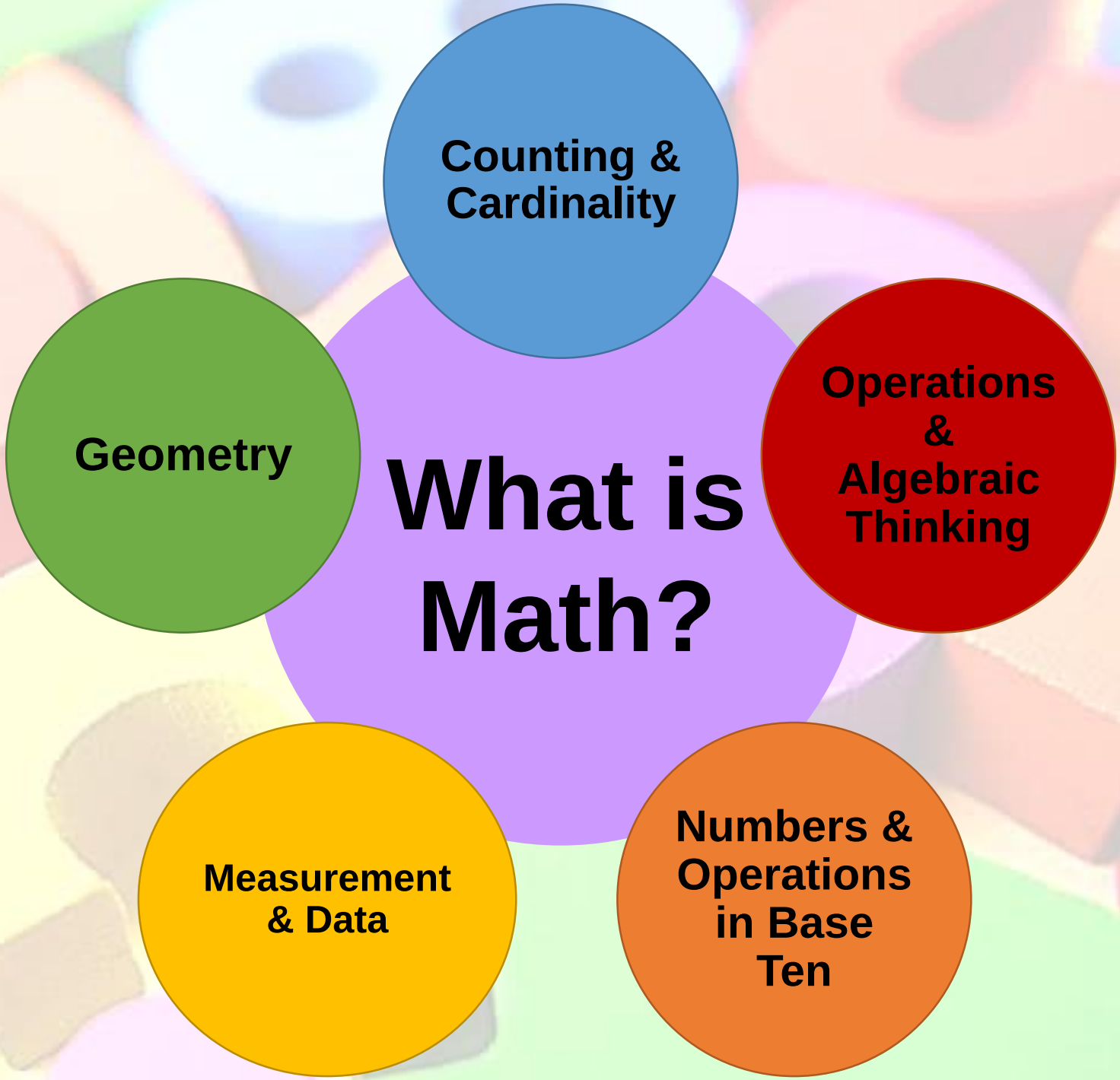
- **Why** is early math important?
- **What** is math?
- **How** can parents support children's math learning at home?

# Why is Early Math Important?

- **Children's early math skills (kindergarten) predict their later math/reading skills**
  - **Math skills are needed for future jobs in STEM fields**
- **Many children do not have age-appropriate math skills**
  - **U.S. children regularly score below children from other countries on math tests**
  - **Math receives less attention than reading in school and at home**

# What is Math?

- **Maryland College and Career Ready Standards for Mathematics (MCCR, Common Core)**
- **Kindergarten Readiness Assessment (KRA) Standards**
  - **Teacher assessment**
  - **Beginning of kindergarten (by November)**


Counting & Cardinality
Geometry
What is Math?
Operations & Algebraic Thinking
Measurement & Data
Numbers & Operations in Base Ten

# Supporting Math Learning at Home

- Parents are role models
- Make learning engaging/interesting
- Language used in interactions

# Supporting Math Learning at Home

- Daily Living Activities
- Card/Board Games
- Computer Games/Apps

# Learning Kindergarten Readiness Math Skills at Home

Counting & Cardinality

Operations & Algebraic Thinking

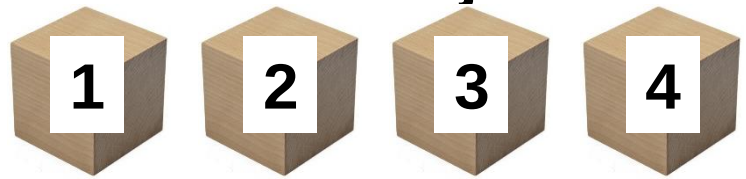
Numbers & Operations in Base Ten

Measurement & Data

Geometry

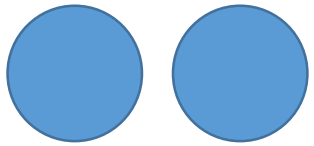
# Math at Home: Counting & Cardinality

- **Kindergarten Readiness Skills**
  - **Count to 20**
  - **Count objects, matching one number word with each object and saying each number in the correct order**




  - **Use number cards to count and determine what number comes before or after a specific number**


  - **Identify, without counting, small numbers of objects (1-3)**



**= 2**

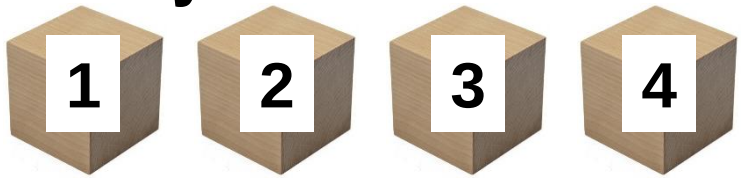
**= 3**

# Math at Home: Counting & Cardinality

- **Kindergarten Readiness Skills (continued)**
  - **Understand that the count is the same even if objects are in a different order**

**= = 3**

  - **Understand that the last number spoken tells the number of objects- can correctly answer "how many?" after counting**




**= 4**

  - **Name written numbers and match them with objects**

**5 = "Five" =**

# Math at Home: Counting & Cardinality

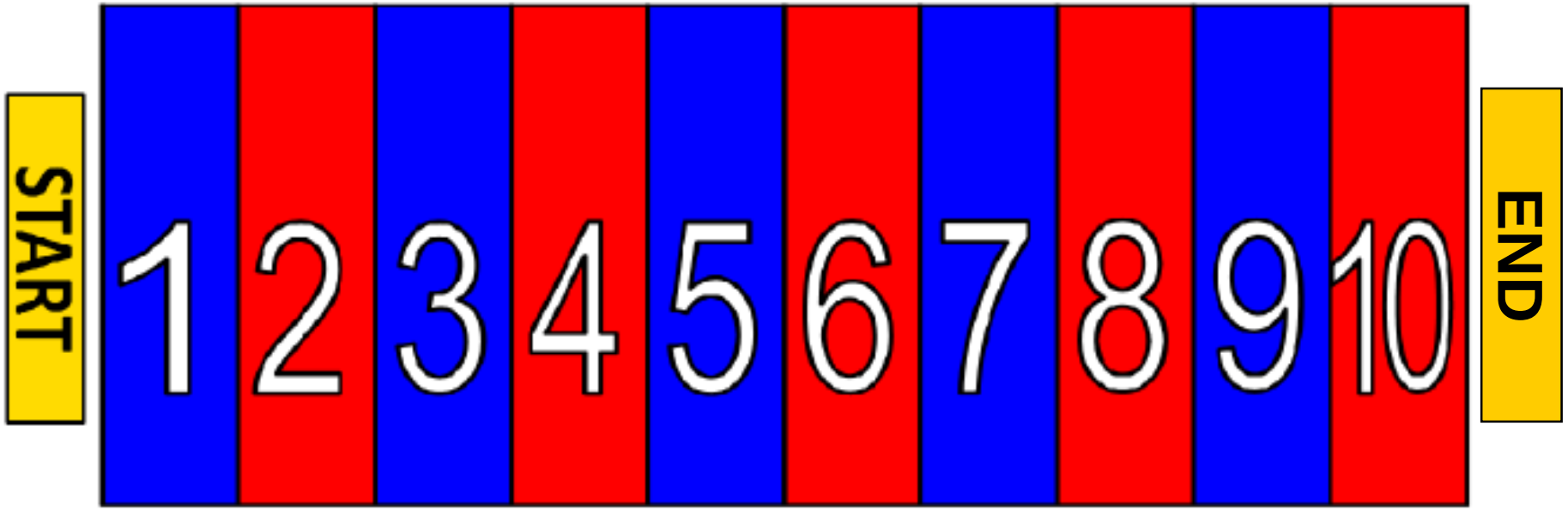
- **Daily Living Activities/Math Language**
  - **Around the house**
    - *Ask, "How many plates do we need to put on the dinner table?"*
    - *Say, "Let's count how many potatoes we will need for dinner."*
    - *Say, "You need two socks. One for each foot. Let's pick two socks to wear today."*
  - **At the grocery store**
    - *Say, "Look, we're in aisle 2. Do you see the 2? Let's find some other numbers."*
    - *Say, " We should have 5 apples in our cart. Let's count to make sure."*
  - **Throughout the day**
    - *Ask, "How many _____?"*
    - *Say, "Let's count _____."*

# Math at Home: Counting & Cardinality

- **Board Games**
  - Trouble
  - Hi Ho Cherry-O
  - The Great Race (see handout, pgs. 2-3)
  - Chutes and Ladders (see handout, pg. 4)
- **Card Games**
  - Go Fish
- **Dice Games**
  - Apple Tree (see handout, pgs. 5-6)
- **Other games**
  - Bingo
  - Hand Games
  - Jump Rope
  - Hopscotch

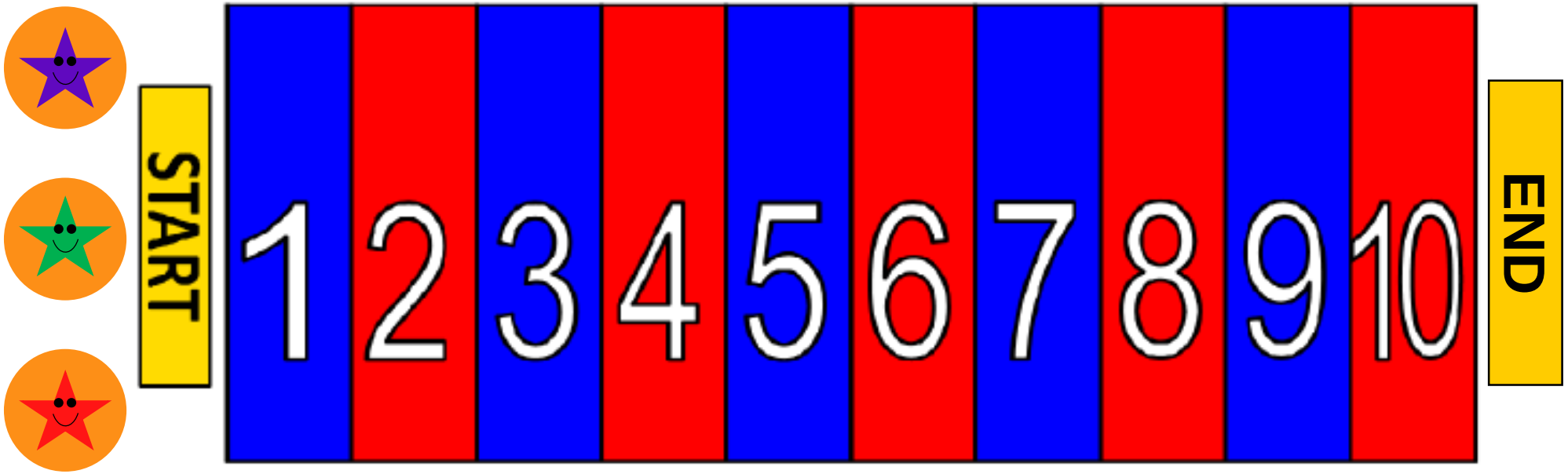

Time to Play!

# The Great Race (Ramani & Siegler)

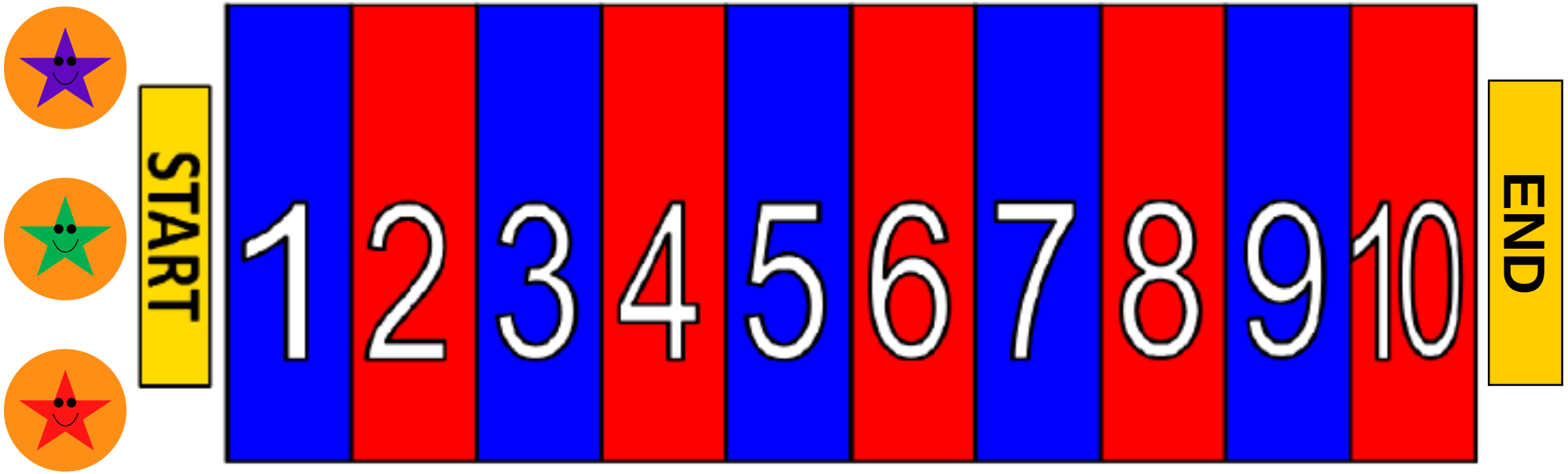



- **Early Counting Skills, Number Recognition**

# The Great Race



# The Great Race



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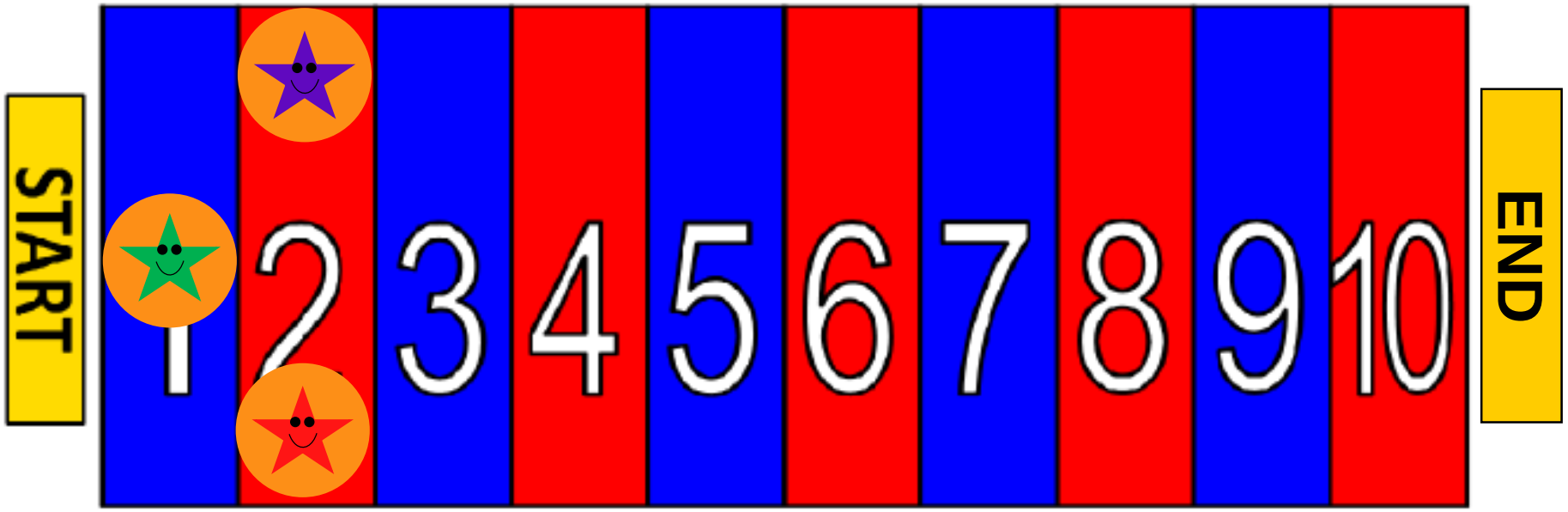
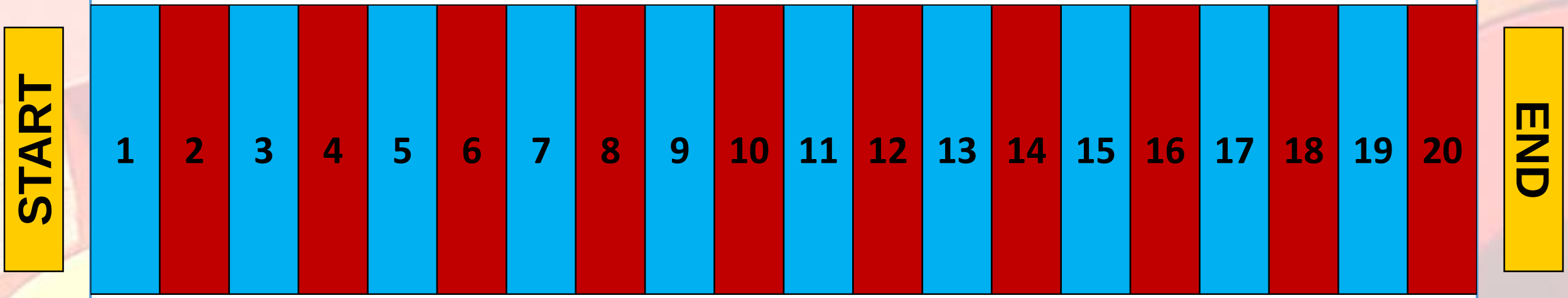


# The Great Race

# The Great Race

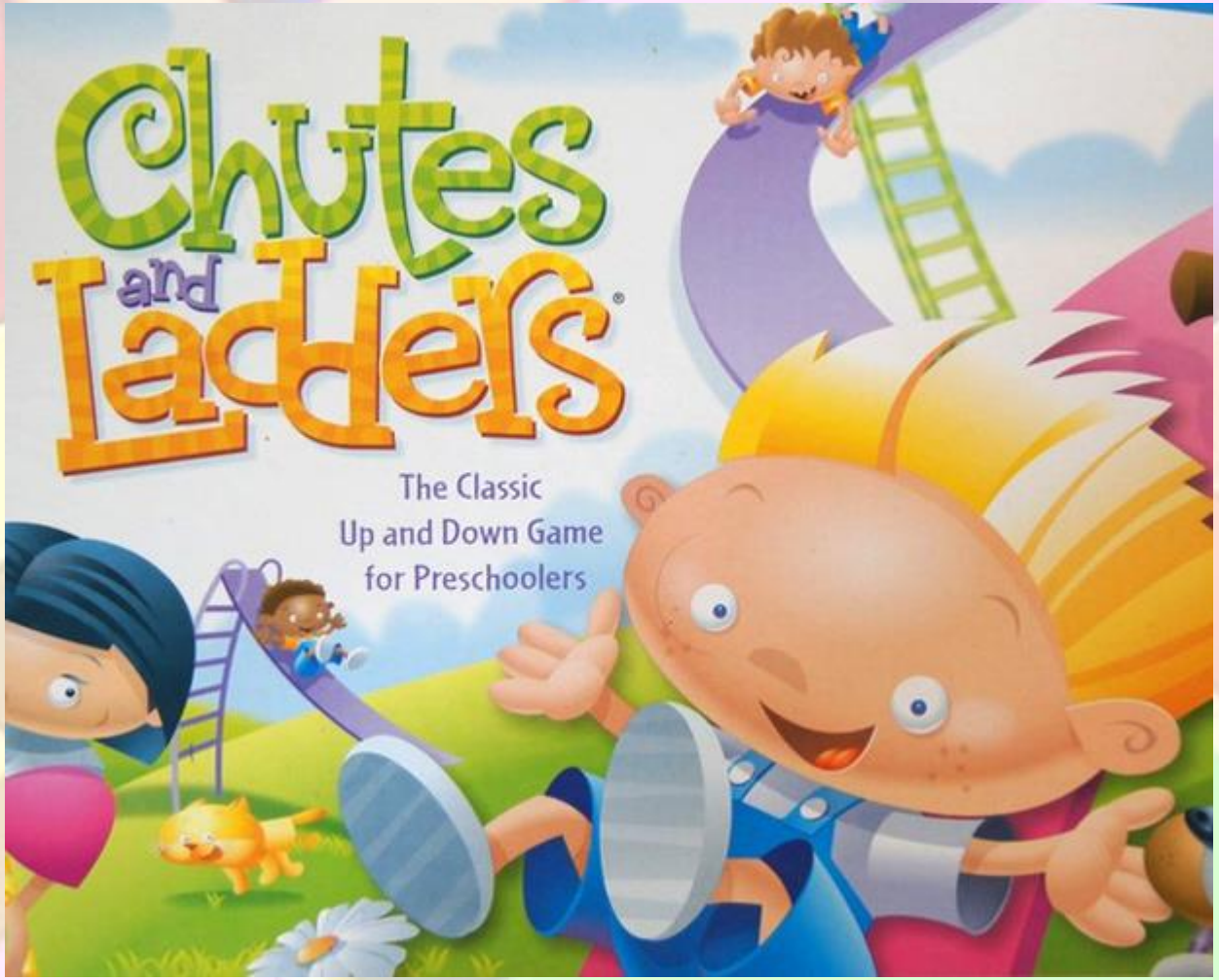
# Playing The Great Race with Older Children

- Make the board go up to 20 or 30
  - Change the die or spinner to have the numbers 1, 2, *and* 3




- Start at 10 (or 20 or 30) and move backwards to 1

# Chutes and Ladders



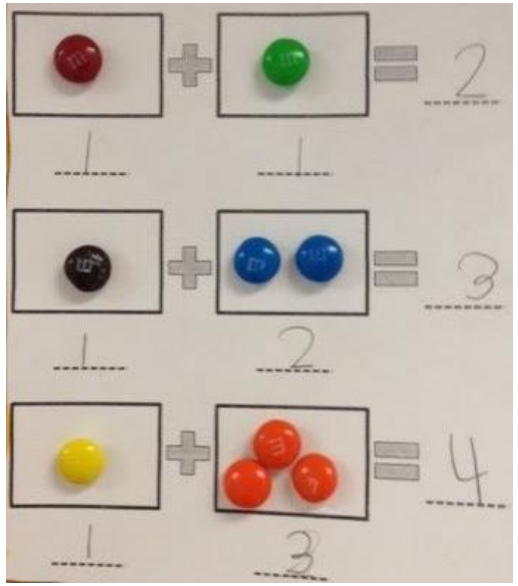
# Chutes and Ladders

- Play for as long as your child is engaged- whichever player is on the highest number wins
- Play to 20 or 30 or however high your child can count or stay engaged
- Ignore the chutes, so the game does not last as long (child stays engaged)
- Remember to use the special counting rule

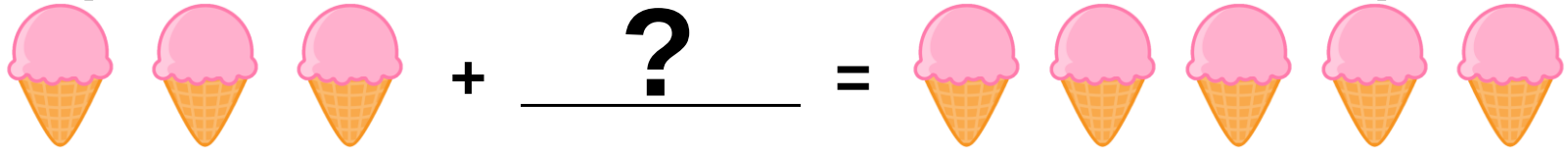

More Skills!

# Math at Home: Operations & Algebraic Thinking

- **Kindergarten Readiness Skills**
  - **Solve simple addition and subtraction problems with totals less than 5 (1+2, 2+3, etc.), using objects**
  - **Manipulate sets of objects to breakdown numbers (1 and 2 objects = 3 objects, 1 and 3 objects = 4 objects, etc.)**




  - **Use manipulatives to find the amount needed to complete a set**

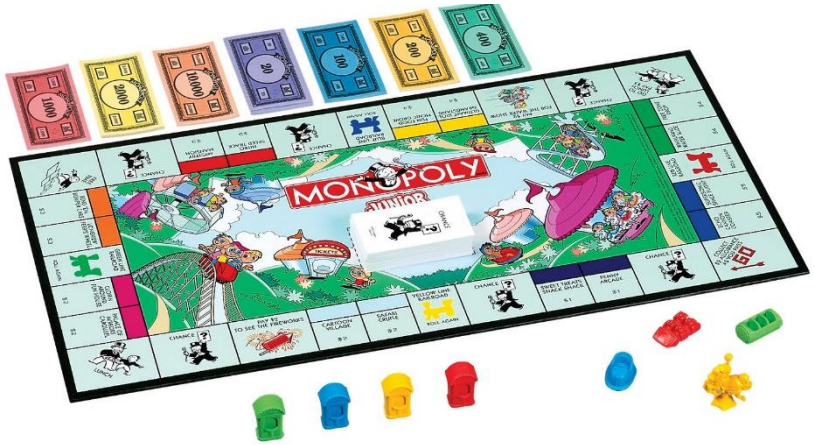


# Math at Home: Operations & Algebraic Thinking

- **Daily Living Activities/Math Language**
  - **In the kitchen**
    - *Say, "We ate 2 eggs for breakfast. Let's count how many eggs we have left."*
    - *Ask, "We need 3 spoons to eat our dessert. If we have 2 spoons, how many more do we need?"*
    - *Say, "You ate one of my crackers! Now I have 3 crackers left."*
  - **During play**
    - Use small toys or blocks. *Say, "You have two blocks. If daddy gives you one block, let's count how many blocks you have now."*

# Math at Home: Operations & Algebraic Thinking

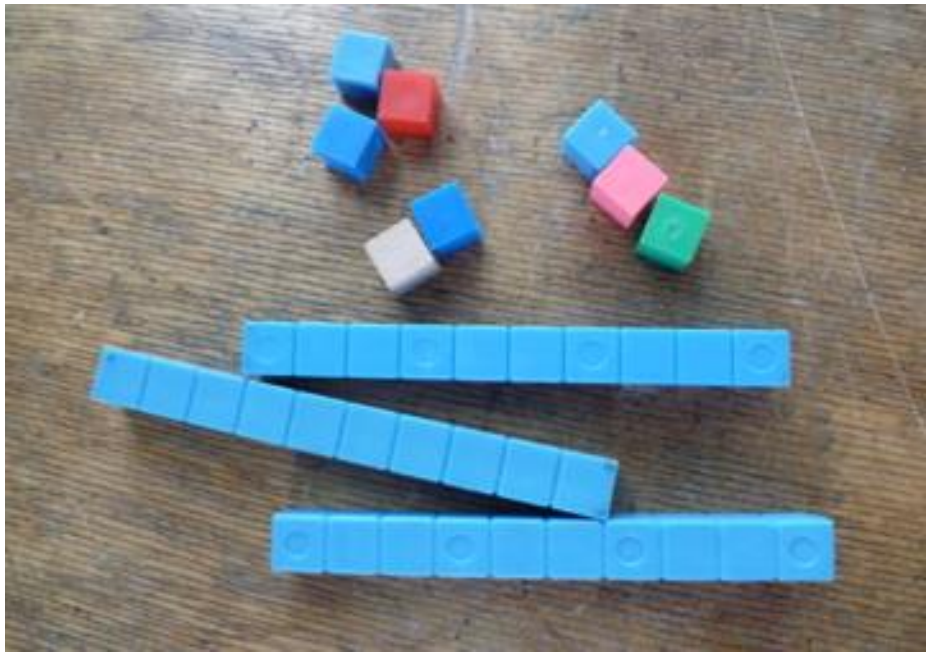
- **Games**
  - Monopoly Jr.
  - What's One/Two More? (see handout, pgs. 7-10)
  - Simple Subtraction Game (see handout, pgs. 11-12)




- **Songs & Rhymes** (see handout, pg. 13)
  - Five in the Bed
  - Teasing Mr. Crocodile

# Math at Home: Numbers & Operations in Base 10

- **Kindergarten Readiness Skills**
  - **Begin to investigate the relation between ten ones and ten (place value)**
  - **Understand that the numbers 0-10 are made up of 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, or 10 ones**



# Math at Home: Numbers & Operations in Base 10

- **Daily Living Activities/Math Language**
  - *Say, "You have 10 fingers. Let's count each one of your fingers."*
  - *Ask, "How many toes do you have? Let's count them."*
  - *Ask, "Did you know our phone number has 10 numbers in it?"*
  - *Ask, "Did you know that 10 pennies are the same amount of money as 1 dime?"*

# Math at Home: Numbers & Operations in Base 10

- **Games**
  - Ten-Frame Cards (see handout, pgs. 14-20)
  - Unscramble! (see handout, pgs. 21-23)
  - Money Math

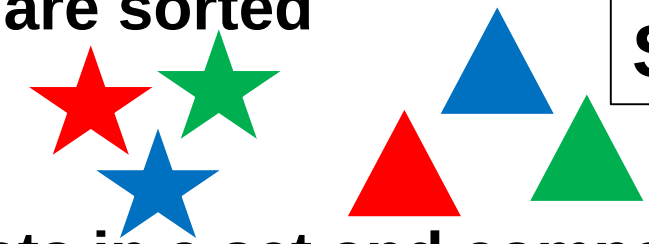
# Math at Home: Measurement & Data

- **Kindergarten Readiness Skills**
  - **Sort objects by one feature (red vs. not red, round vs. not round) and sort multiple groups by one feature (all blue, all red)**

  - **Identify the feature by which objects are sorted**

**Color**

**Shape**



  - **Count to identify the number of objects in a set and compare them using “greater than” and “less than”**

# Math at Home: Measurement & Data

- **Kindergarten Readiness Skills**
  - **Compare and describe two objects with a measureable feature (length, size, volume, weight) using words like “longer/shorter” and “heavier/lighter”**


**is longer than**


  - **Order objects by a measureable feature (bigger to smaller)**

  - **Measure length and volume using non-standard measurement tools (blocks, candy, paper clips)**

# Math at Home: Measurement & Data

- **Daily Living Activities/Math Language**
  - When cooking dinner, a*sk, "How many cups of water do we need to fill up this pot to make our pasta?"*
  - *Say, "Let's put our shoes away in a line from biggest to smallest."*
  - *Ask, "How many hands tall are you?"*
  - *Say, "Let's put away the silverware. See how we sort forks and spoons."*
- **Throughout the day**
  - *Ask, "Which one is heavier? Lighter?"*
  - *Ask, "Who is taller?"*
  - *Ask, "Which is less?"*

# Math at Home: Measurement & Data

- **Card Games**
  - War
  - UNO
  - P.I.G.
  - Spoons


- **Other games**
  - Ready Sets Go!
  - Ready Set Woof
  - Dominoes
  - “I Have the Greatest” dice game (see handout, pgs. 24-25)


Time to Play!

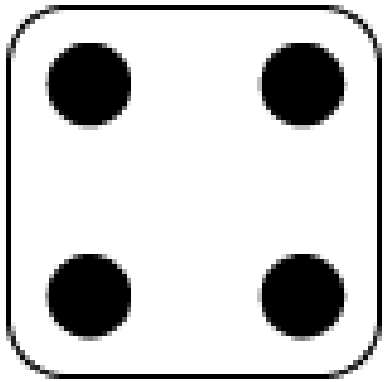
# Dice Games- What's Two More?

| | | | |
|---|---|---|---|
| 3 | 4 | 5 | 6 |
| 4 | 5 | 6 | 7 |
| 5 | 6 | 7 | 8 |
| 6 | 7 | 8 | 3 |

- Counting, Simple Addition, Subitizing

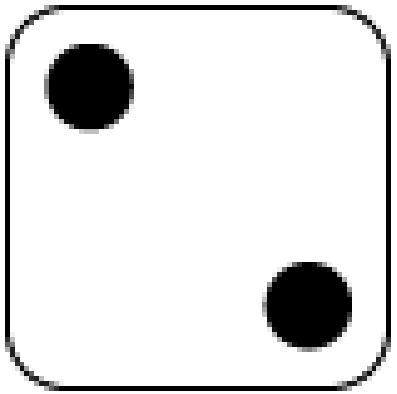
# Dice Games- What's Two More?

**Player 1**



| | | | |
|---|---|---|---|
| 3 | 4 | 5 | |
| | 5 | 6 | 7 |
| 5 | 6 | 7 | 8 |
| 6 | 7 | 8 | 3 |

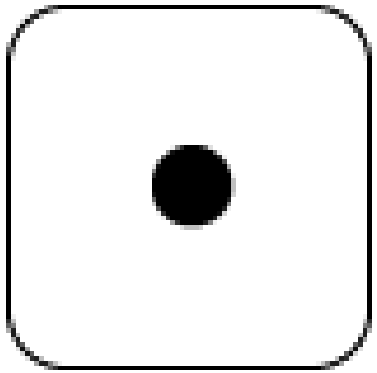
**Player 2**



- *"What's two more than 4? 6 is two more than 4"*
- *"What's two more than 2? 4 is two more than 2"*

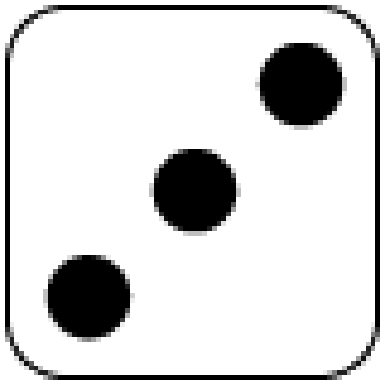
# Dice Games- What's Two More?

**Player 1**



| | | | |
|---|---|---|---|
| 3 | 4 | 5 | |
| | 5 | 6 | 7 |
| | 6 | 7 | 8 |
| 6 | 7 | 8 | |

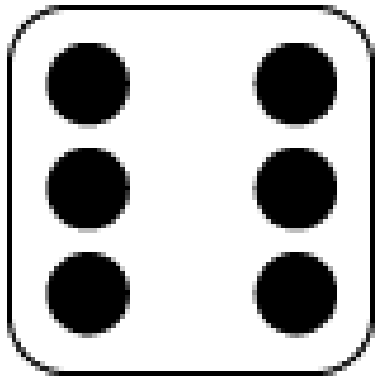
**Player 2**



- *"3 is two more than 1"*
- *"5 is two more than 3"*

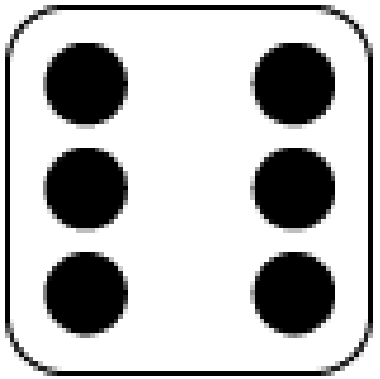
# Dice Games- What's Two More?

**Player 1**



| | | | |
|---|---|---|---|
| 3 | 4 | 5 | |
| | 5 | 6 | 7 |
| | 6 | 7 | |
| 6 | 7 | | |

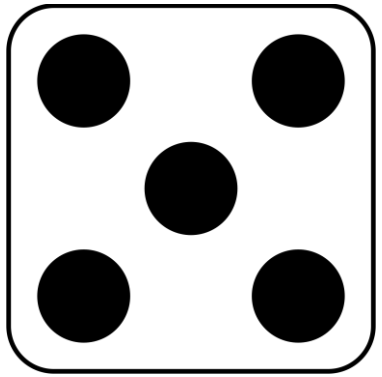
**Player 2**



- *"8 is two more than 6"*
- *"8 is two more than 6"*

# Dice Games- What's Two More?

**Player 1**



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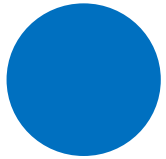
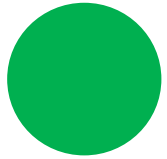
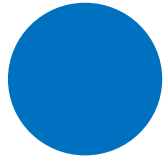
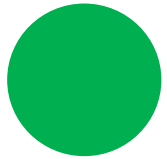
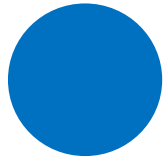
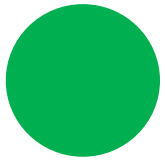
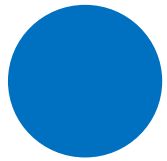
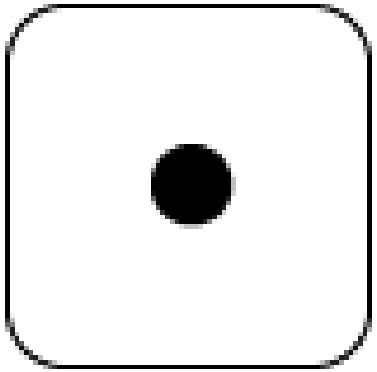
|---|---|---|---|
|  | 4 | 5 |  |
|  | 5 | 6 |  |
|  | 6 | 7 |  |
| 6 | 7 |  |  |

**Player 2**



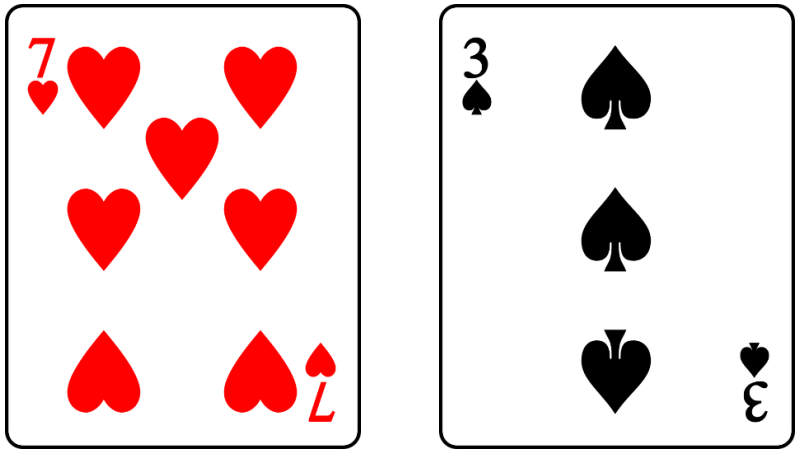
- *"7 is two more than 5"*
- *"3 is two more than 1"*

**Player 1 wins!**

# Card Games- War

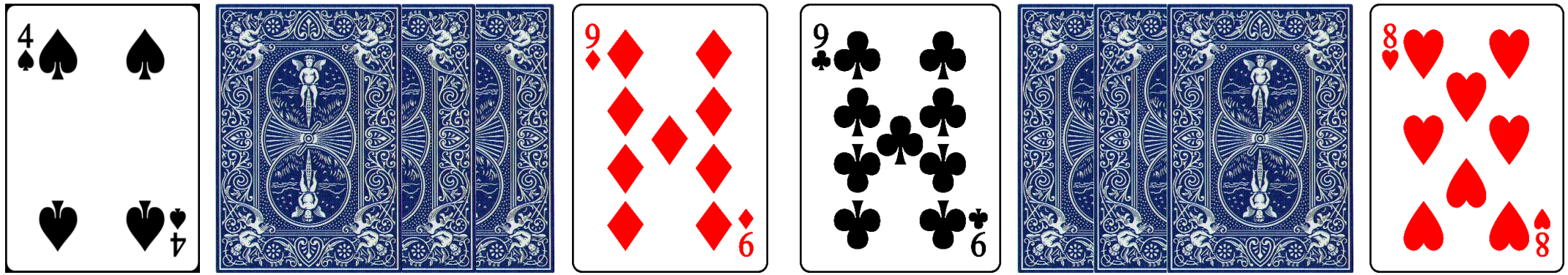
- **Magnitude Comparison, Counting, Number Recognition**

# Card Games- War



- **Things to ask while playing:**
  - *“What number do you have?” “What number do I have?” “Which number is higher?”*
  - *“How many hearts/diamonds do you see? Let’s count them.”*
  - *“Whose stack of cards is bigger?”*

# Card Games- War



- **When cards are equal:**
  - *Say, “They have the same number, even though they have different symbols.”*
  - *Count “1, 2, 3” cards facedown, then the last one is face up.*
  - *Once you uncover the cards underneath, discuss which cards were gained/lost.*

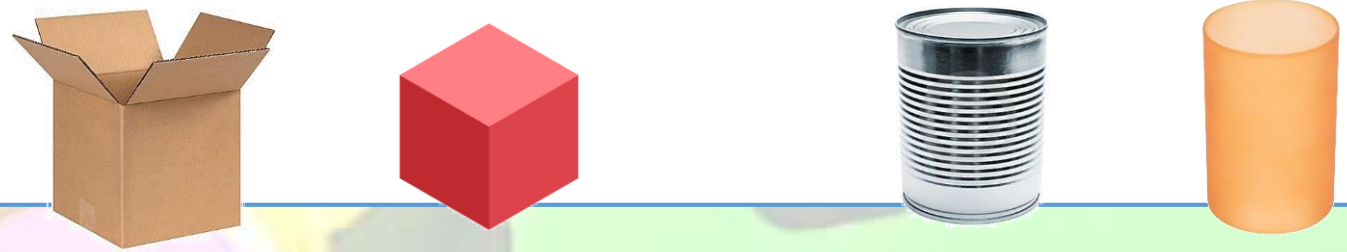

More Skills!

# Math at Home: Geometry

- **Kindergarten Readiness Skills**
  - **Identify objects using 2-dimensional shape names (square, triangle)**

  - **Match similar shapes when given a variety of 2- and 3-dimensional shapes**

  - **Use informal language to describe 3-dimension shapes (box for cube, ball for sphere, can for cylinder)**

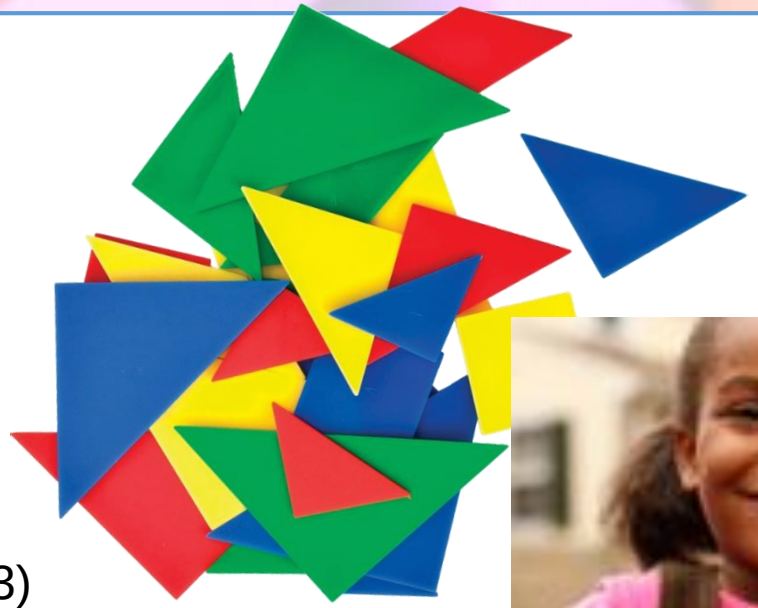


# Math at Home: Geometry

- **Daily Living Activities/Math Language**
- **At home**
  - *Say, “Look, your sandwich is a square. Your cookies are circles. Look at all the shapes you have.”*
  - *Ask, “What lid will fit on this container? Let’s find a small, round lid.”*
  - *Talk about patterns (e.g. clapping rhythms, sequences of shapes, or stripes on a shirt).*
- **Outside**
  - *Ask, “What shapes do you see?”*
  - *Say, “Look at that sign. That sign is a triangle.”*
  - *Say, “Look, those wheels looks like circles.”*

# Math at Home: Geometry

- **Games/activities**
  - Perfection
  - Tangrams (see handout, pgs. 26-29)
  - Puzzles
  - Blocks/Legos, etc.
  - Shape Bingo (see handout, pgs. 30-33)
  - Drawing/coloring
  - Making shapes with fingers or bodies
  - Apps



# Math at Home: Computer Games/Apps

- **Interaction is key for learning!**
  - **Be present**
  - **Ensure that apps are not too easy or too difficult for your child**
  - **Provide feedback and encouragement**
  - **Have fun!**

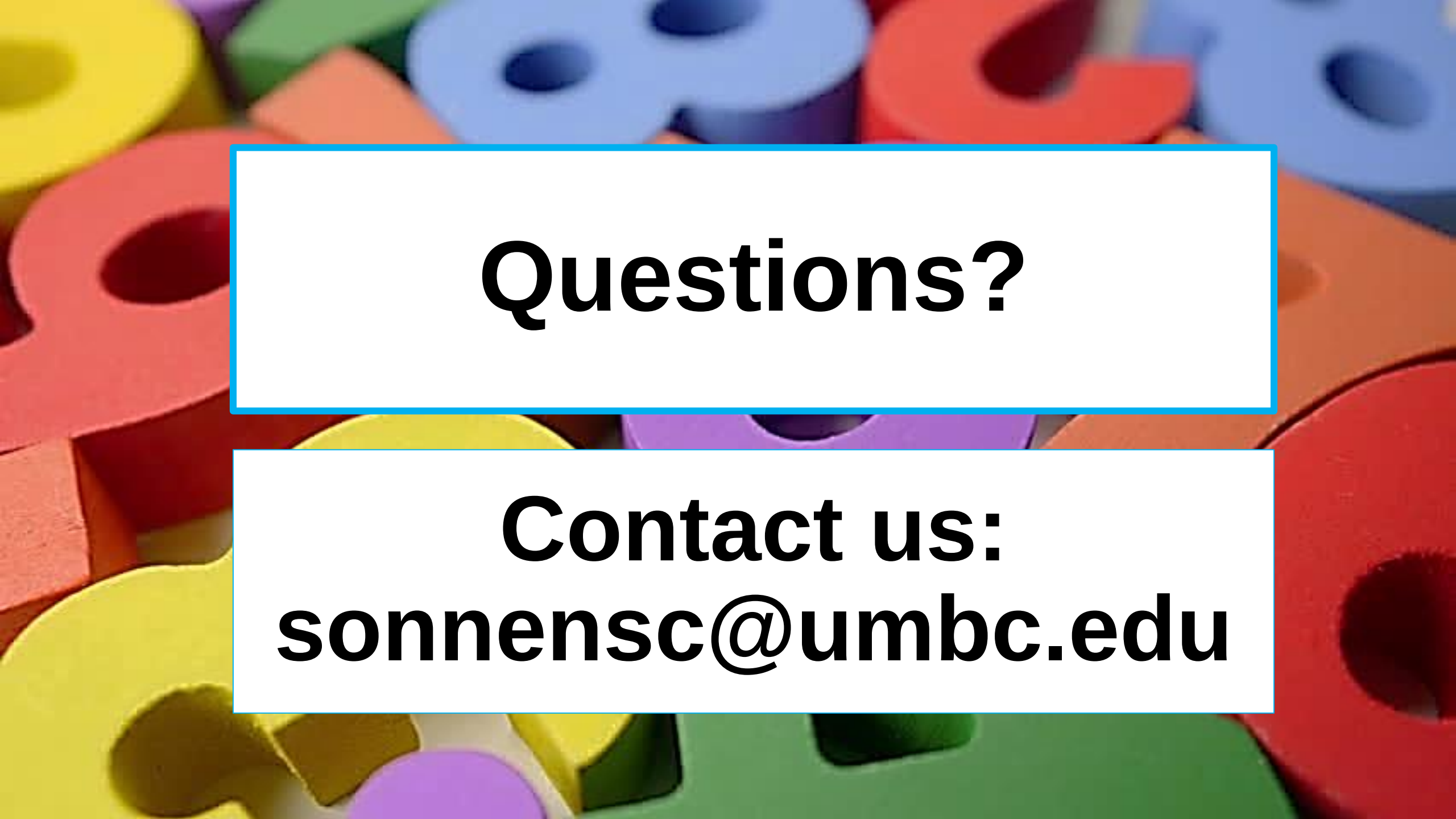
See handout pages 34-35 for app suggestions

# Math at Home: Computer Games/Apps

- **Questions to ask about an app:**
  - **Are there a variety of math tasks?**
  - **Is there a combination of chance and choice?**
  - **If the child gets stuck, are there hints?**
  - **Are there ways to incorporate what they learn with things they see and do around the home?**
  - **Is feedback provided to the child to help him or her learn from successes and errors?**

# Summary

- Children's early math skills are important for future math skills and future jobs
- Children can learn math skills at home
  - Parents can include math in what they already do at home
  - Use more math language at home to help children learn
  - Making math fun will help children learn the math they need to be ready for kindergarten


Questions?
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