

FAMILY CARD GAMES THAT SUPPORT FAMILY MATH SKILLS: A RESEARCH-PRACTICE PARTNERSHIP

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ACKNOWLEDGEMENTS

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Along with Kaitlin Young from Tandem: Partners in Learning

We want to thank Heising-Simons very much for funding this project through Grant # 0571, 2017, making it possible to produce the card games and booklet

We especially want to thank all the children and families that generously provided their time and energy to allow us to work with them to pilot-test these materials



OVERVIEW OF OUR PROJECT:

A STORY OF SERENDIPITY AND CO-DEVELOPMENT

- The serendipity: a study of mothers and daughters playing with origami leads to research and development on card games
- The co-development: we wanted our work to be guided by practice partners working in the field with families...we needed their expertise on family hopes, goals, strengths, and challenges



PARTNERSHIP WITH A LOCAL ORGANIZATION



- History of serving diverse, low-income families
- Goal of supporting Kindergarten Readiness
- Boston College has research, Tandem has reach

MATH CONCEPTS

- **Rationale**

- PBS Math Frameworks: Numeracy
- Family math activities requiring easily available and cheap materials – regular playing cards
- Math games appropriate for medium of 2-dimensional cards

- **Math Concepts**

- Magnitude Estimation: Comparing larger and smaller numbers
- Numerical Ordering: 1 to 10
- Adding Numbers
- More Advanced Arithmetic: Subtraction, Missing Addend Problems, Problem Solving Strategies



CARD GAMES DEVELOPMENT, EVALUATION, & REFINEMENT

- **Team of 10:** Child development experts, school math specialists, school psychologists, graduate/undergraduate students, family expert
- **Process**
 - Identified appropriate age range: Older preschooler to early elementary students
 - Generated many card game ideas based on key math concepts
 - Repeatedly played games to identify problems, modify, or drop games
 - Pilot-tested using evaluation form with 62 diverse, low-income grade PreK, K, 1, and 2 children – designed and used diagnostic tool to select right game for child

TESTING THE MATERIALS

- Card Game Booklet Focus Group
- Workshop Pilot
- Workshop Focus Group



FAMILY MATH CARD GAME BOOKLET

Play with the Royal Family and Sneeze the Dragon:

Family Card Games for Building Young
Children's Math Skills



For Older Preschool Through Early Elementary Grades

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OVERVIEW FOR FAMILIES

- Introduction
- How to pick a card game with instructional video
- What math skills do the games teach?
- General directions, hints, possible game variations, information about card playing
- Each game contains instructional video and display of cards for game
- Introductory story with story links in card games



THE ROYAL FAMILY AND SNEEZE THE DRAGON



Picking a Card Game



VIDEO LINK: <https://bit.ly/2ZrSfXg>



START HERE



The goal is to help your child learn and have fun. You will want to pick a game that challenges your child but isn't so challenging that they get frustrated and give up. The games in this packet are ordered from basic math skills to more advanced. Below we have a simple tool to help you and your child decide which game to start with. **Note:** To use the chart, first take out all the numbered cards from the deck that you will need to ask your child the questions.

MATH SKILL: Compares Larger and Smaller Numbers

Ask Your Child:

1. "Can you tell me which number is larger?" (Hold up cards 3 and 9)
2. (If right) try it with cards 4 and 7
3. (If right) try it with cards 9 and 7

Child answers all questions easily without help



MATH SKILL: Orders Numbers 1-10 From Small to Large

Ask Your Child:

1. "Can you put these numbers in order from the smallest to the largest?" (Put down cards in the order 3, 2, 1, 4)
2. (If right) put down cards in the order 6, 9, 8, 5, 7 and try again with these cards.

Child answers all questions easily without help



MATH SKILL: Adds Numbers

Ask Your Child:

1. "How much is $3 + 5$?"
 2. "How much is $5 + 6$?"
- *Note: Go to Easy Counting Game if your child mainly counts with fingers.*

Child answers all questions easily without help



MATH SKILL: More Advanced Arithmetic

Ask Your Child:

1. "What do you need to add to 8 to get 10?" ($8 + ? = 10$)
2. (If right) "What do you need to add to 4 to get 9?" ($4 + ? = 9$)

Still Learning?



Play
Count Jack is Highest

Still Learning?



Play
Line Them Up!
Then
Sneeze Orders the Cards
Then
Number Neighbors

Still Learning?



Play
Easy Counting
Then
The Queen of 10s
Then
The King Pops Up

Still Learning?



Play
Jack Subtracts
Then
What's the Secret Number
Then
Hidden 10s

PICKING A CARD GAME

The goal is to help your child learn and have fun. You will want to pick a game that challenges your child but isn't so challenging that they get frustrated and give up. The games in this packet are ordered from basic math skills to more advanced. Below we have a simple tool to help you and your child decide which game to start with. Note: The first step is to take out all the cards you will need to ask the questions below.

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Still Learning?



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Still Learning?



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Part 2: Card Games





GOALS

MATH GOAL: PUTTING NUMBERS 1 TO 10 IN THE CORRECT ORDER.

GAME GOAL: TWO PLAYERS MAKE A NUMBER LINE TOGETHER.

SET UP

- Take out all face cards. Aces count as 1.
- Be sure to shuffle the cards.
- Pass out all the cards in deck so that each player has an equal number.
- Two players sit side by side so the number line they make together faces the same way for both players.

HOW TO PLAY

HOW A TURN BEGINS. Players take turns. On each turn, they take a card from the top of their own deck and put it where it would belong on a number line that goes from 1 to 10. The cards go in order with the lowest number (1) on the left and the highest number (10) on the right.

HOW A TURN ENDS. Each player in turn places their card in the correct spot on the same number line. If they draw a card that is already in the line-up, they place it on top of the card that is already in the correct spot.

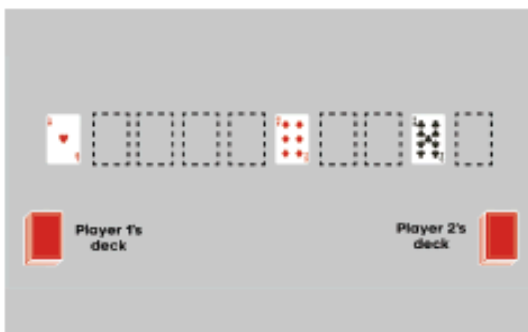
HOW THE GAME ENDS. The game is over when the number line from 1 to 10 is completed. The person who puts down the final card to finish the number line wins.

Line Them Up

STORY

The King likes to line up the numbers from the lowest to the highest.

Do you want to see if you can do it as well?



For video card game instructions, please visit:

<https://bit.ly/2ZmHyoU>



STORY ENDING: *The King thanks you for playing the card game with him.*

HINTS FOR HELPING

- Suggest counting from 1 to 10 when your child is stuck. This will help them to remember the order of the numbers.
- Ask whether one card number is larger or smaller than another card number.
- Ask what numbers they are looking for. This helps them find the gaps in the order.
- Ask what number comes before another number, or what comes after.
- You can also ask, "Are there any numbers missing?" or suggest "We already have that card in the number line. What are we missing?"
- Model for your child how you figured out where to place the number in the correct order.

VARIATIONS

MAKE IT EASIER

- Make a short number line using only numbers 1 to 5, and remove the higher numbers from the deck.

MAKE IT HARDER

- If this game is too easy, you may want to go to the harder ordering game called **Sneeze Orders the Cards**.

WHAT GAME TO PLAY NEXT

- When your child can play this game easily, you can go to the chart called **Picking a Card Game** in the booklet.
- Ask your child the next set of questions on the chart, and it will help you find the next card game to play.
- It takes many months for a child to learn a new math skill. So, if your child isn't ready, just have fun playing the games. Use the Variations to make the game harder. Use the Hints to help your child try out new ways to solve the math.



GOALS

MATH GOAL: PRACTICE FINDING PAIRS OF NUMBERS THAT ADD UP TO 10.

GAME GOAL: WHOEVER FINDS THE MOST CARDS ADDING UP TO 10, WINS THE GAME.

SET UP

- Take out all face cards except the Queens. Aces count as 1.
- Be sure to shuffle the cards.
- Give 4 cards to each player.
- The 4 cards are put in a row with numbers showing.
- The rest of the cards are put in a pile in the center.

HOW TO PLAY

HOW A TURN BEGINS. A player finds 2 cards in their row that add up to 10, or they can choose a 10 card. **The Queen of 10 card** is special because it can be used as any number from 1 to 10. So, the Queen can be combined with any other card to add up to 10. BUT you have to say out loud what number the Queen is pretending to be.

HOW A TURN ENDS. After choosing the cards, the players put them in their own pile of saved cards. When the player does not have any way of making 10, the player discards one card from their row of 4, and puts it at bottom of the center pile of cards. At the end of each turn, the player fills in any empty spaces in their row of 4 cards by taking cards from the top of the center pile.

HOW THE GAME ENDS. The game ends when the center pile of cards is gone or when there are no more ways to make 10 for any of the players. At the end of the game, each player counts their own pile of saved cards. The player with the most saved cards wins.

Queen of 10's

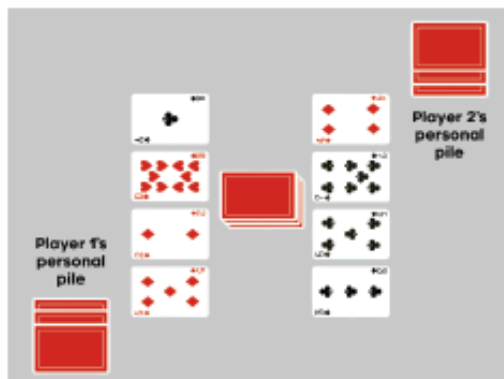
STORY

10 is such a beautiful number.
The Queen loves **10**.

She is always thinking of
different ways to make **10** from
smaller numbers.

When she can't think of a way she
sometimes pretends to be a certain
number just so she can make **10**.

You'll see when you play this game.



For video card game
instructions, please visit:

<https://bit.ly/2KbPGTK>



STORY ENDING: The Queen thanks you for playing the card game with her.

WORKSHOPS

- Hour long workshop
- Adults only, then children
- First time attending a math focused training
- Loved that the learning was fun
- Group learning increases motivation to engage



ADDITIONAL RESOURCES

- Development and Research in Early Math Education
blog: <https://dreme.stanford.edu/blog>
- Education Development Center's Games for Young Mathematicians: <http://youngmathematicians.edc.org/>
- Erikson Institute Early Math Collaborative:
<https://earlymath.erikson.edu/>

