UBC Virtual Family Math Fair 2022

THE UNIVERSITY OF BRITISH COLUMBIA
Faculty of Education
Department of Curriculum & Pedagogy

For Curious and Inquiring Minds .....

Photo credits left and right: *Paul Joseph|UBC Brand and Marketing*

Virtual Family Math Fair

Saturday Feb 26, 2022, 10:00am - 11:30am PT

Virtual through Zoom with
UBC Faculty of Education Graduate Students and Teacher Candidates

Photo credits above: *Janice Novakowski*

Saturday Feb 26 10:00-11:30 am PT via ZOOM

Thank you for joining us for the
UBC Virtual Family Math Fair!

Your Program for the UBC Virtual Family Math Fair includes more than 20 sessions with activities for young ones **preK-Kindergarten** and for **Everyone** (mainly elementary/middle school) offered by UBC teacher candidates, faculty, and graduate students.

UBC Virtual Family Math Fair

Saturday Feb 26 10:00-11:30 am PT via ZOOM

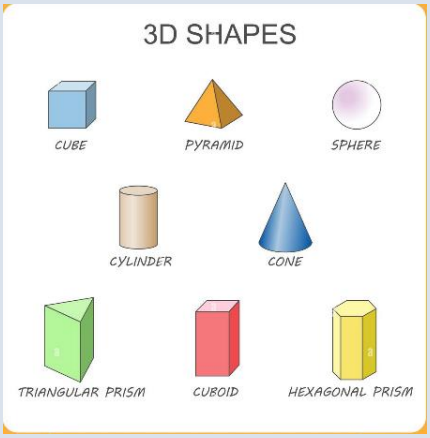
Instructions and Information

- Each session is about 25 minutes long. You can choose sessions to attend based on your family interests.
- Sessions are offered live through Zoom. Download the Zoom App.
- **In the program click on the Activity Title** or the **Zoom Link** to join the session. Each activity has its own Zoom link.
- Wait in the Zoom Waiting Room. Facilitators will open the room when the activity is ready to begin.
- For the best experience - be ready with materials at the start of your activity.
- Need help during the Event? Visit the **Math Concierge Zoom Room Help Desk (see program for link)**.
- Enjoy!!!

Materials you may need for some sessions:

3D SHAPES

SONG & SCAVENGER HUNT



WHAT ARE 3D SHAPES?

3D shapes are solid, not flat! You can hold them in your hand!

3D shapes have faces, edges, and vertices!

How many 3D Shapes can you name?

Can you count the faces, edges, and vertices of each?

Can you see any 2D Shapes in your 3D shapes? (Squares, Circles, Rectangles)

SCAVENGER HUNT

CAN YOU FIND ANY 3D SHAPES AROUND YOUR HOME? SEARCH AND SEE!

SING ALONG SONG

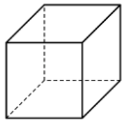
Please click the attached link to sing along to the 3D Shapes Song!

3D Shapes Song | Shapes for kids | The Singing Walrus

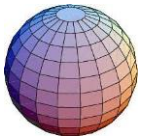
https://www.youtube.com/watch?v=guNdJ5MtX1A

Can you create your own lyrics with different 3D Shapes when the song is done?

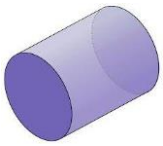
LEARNING 3D SHAPES



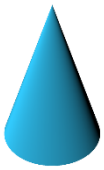
CUBE
Looks like a Dice
6 faces, 8 vertices, 12 edges



SPHERE
Looks like a Ball
1 face, 0 vertices, 0 edges



CYLINDER
Looks like a Soda Can
3 faces, 0 vertices, 2 edges



CONE
Looks like a Party Hat
2 faces, 1 vertices, 1 edge

The Math Problem:
During our Zoom session, we had families play the game “face off”. In this game, two players will play against each other to see who has the highest card!

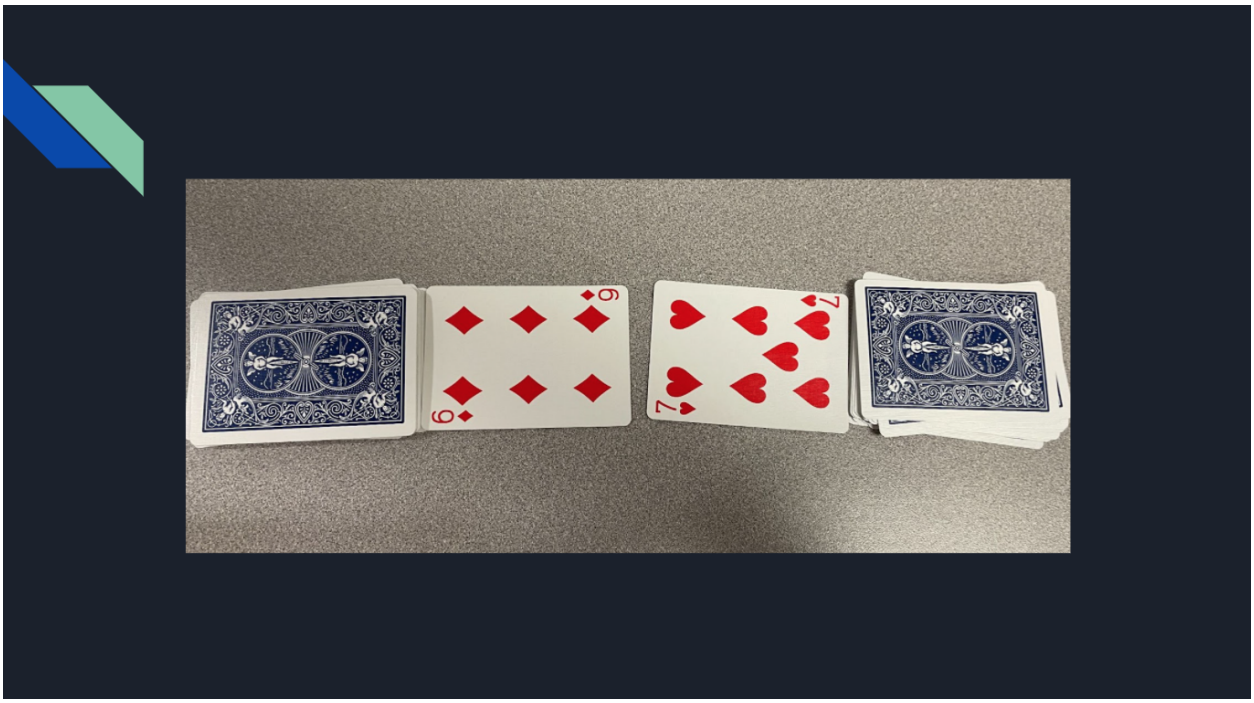
Instructions:

- Begin by removing all of the face cards from your deck of cards
- Split the deck between you and your partner, with the cards facing down
- At the same time, you and your partner, will flip your top card into the middle and see who’s card is higher
- The highest card wins and that person keeps both cards!

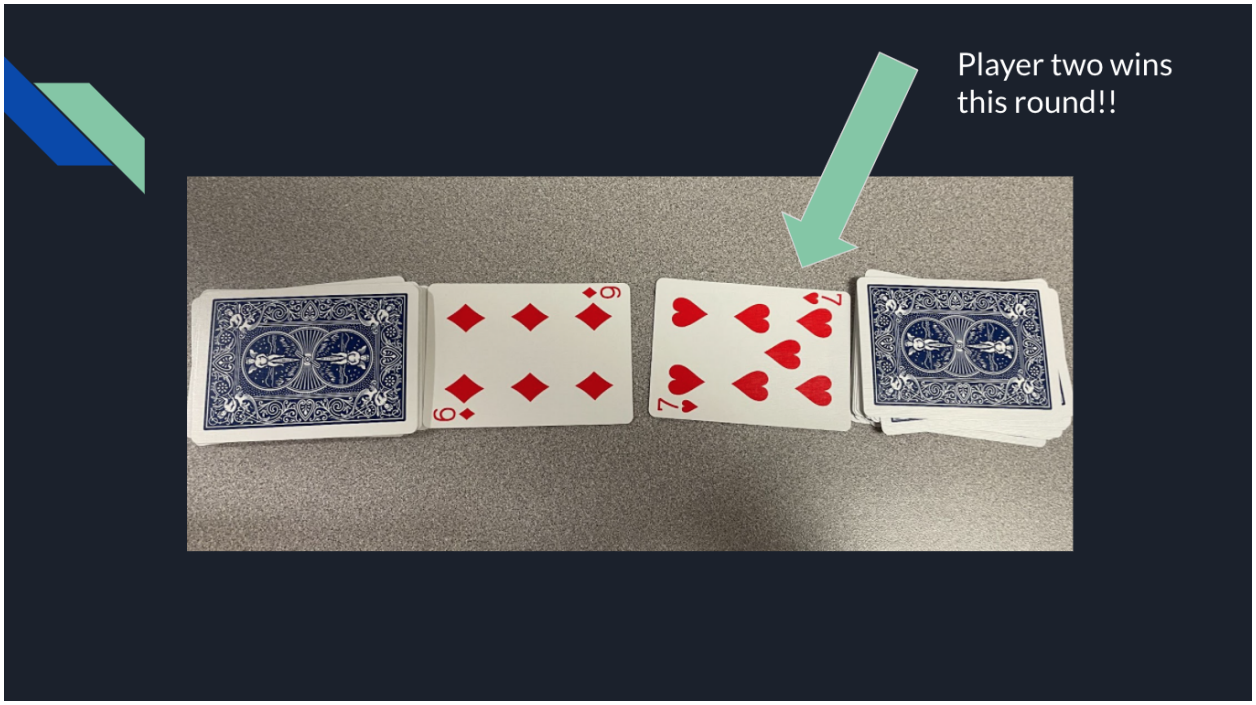
Photo Examples to Illustrate How to Play:

How to set up the game

Ask who would win this round?

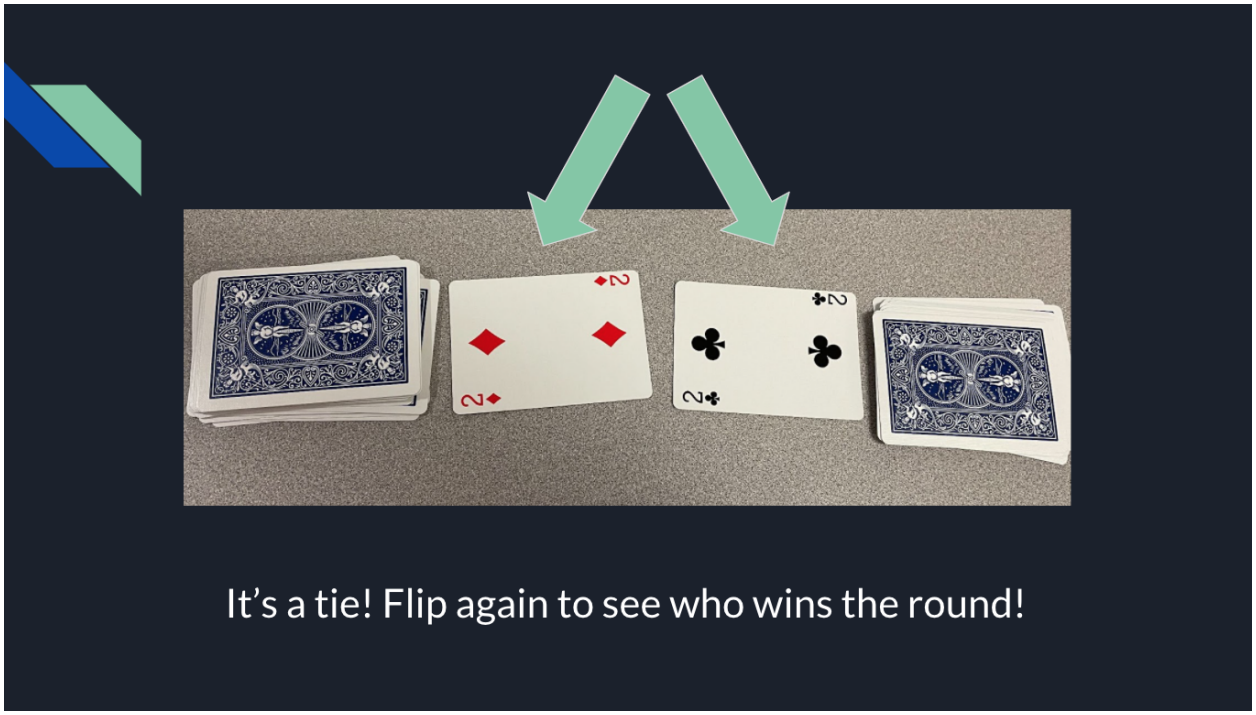


The highest card is on the right!



Again ask, who would win this round?

It’s a tie! Flip again!



Extensions:

- Addition - The first person to shout out the sum of both numbers in the middle wins the round!
- Multiplication - The first person to shout out the product of both numbers in the middle wins the round
- Place Value - Flip three cards over and try to create the largest number possible. Largest number wins all six cards

Questions to Spark Thinking:

- What did you find easy about this game? What was hard?
- Are there any strategies that you used?

Appendix 1: In 9 boxes can you put in all the numbers from 1-9 so that each row, column, and diagonal add up to the same number?

Magic Squares

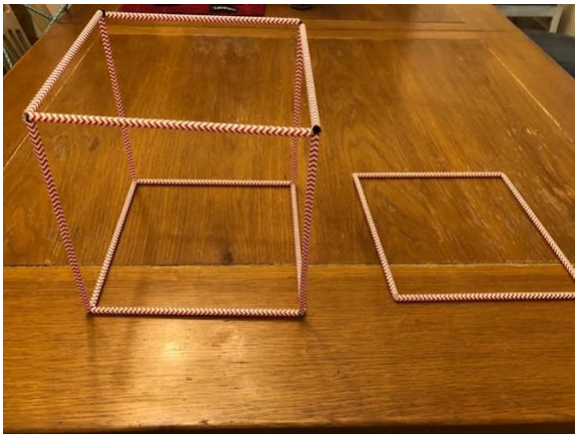
1	2	3
4	5	6
7	8	9

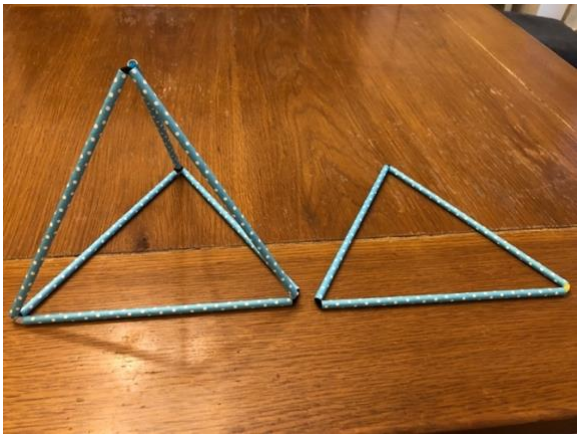
Building 2D and 3D Shapes

In this activity, students will work on building 2D and 3D shapes using straws and pipe cleaners. Students should cut pipe cleaners in half or in thirds. In order to build the desired shapes, students will insert the pipe cleaners in the ends of the straws to connect them together. The first shape students will build is a triangle (2D). Then students will build a pyramid (3D) and compare the similarities and differences between the two shapes. Next, the students will build a square (2D). Then students will build a cube (3D) and compare these shapes. As an extension, students can challenge themselves by creating more complex shapes, for example an octahedron, icosahedron, dodecahedron, or pentagonal prism. As well, students can work together by combining their shapes to explore new shapes.

Questions to Consider:

1. What do you know about 2D shapes?
2. What are some examples of 2D shapes?
3. How many sides does a triangle have?
4. What do you know about 3D shapes?
5. What are some examples of 3D shapes?
6. How many sides does a square have?
7. What are some similarities and differences you notice between 2D and 3D shapes?
8. Can you find examples of both types in your home, classroom, or outside environment?





NIM - A Strategic Math Game

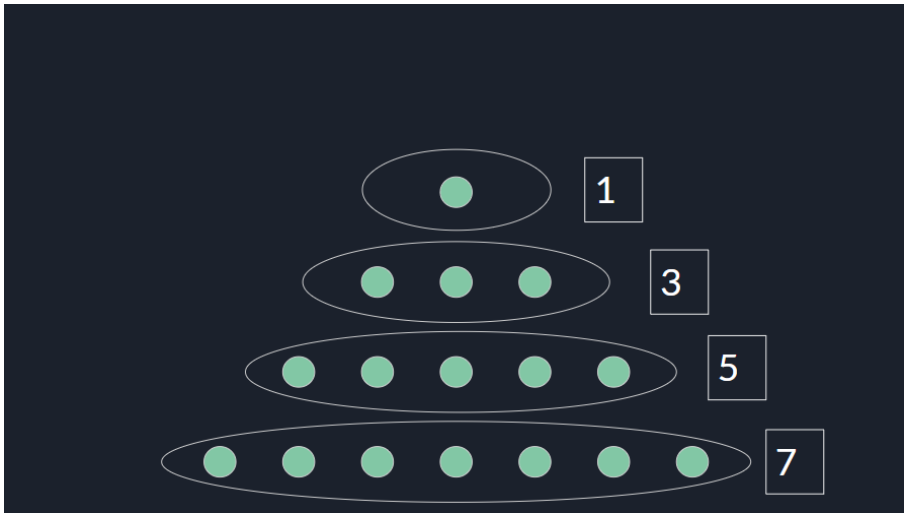
Materials

- 16 counters (small objects, beans, cheerios, sticks etc.)
- A partner to play with

How to play the game

1. Set up 16 counters into piles which contain 1, 3, 5, and 7 each
2. Decide who will make the first move
3. On your turn remove at LEAST one counter from ONE pile
4. You can remove as many counters as you want but they must all be from the same pile
5. Alternate between players to remove counters
6. The aim is to NOT be the one to remove the last counter

Sample Game Set-Up



Follow Up Questions and Discussion Ideas

- What strategy or techniques work to win this game?
- Do you think it matters who goes first? If it does, would you rather go first or second?
- Did your strategy use any math skills? (Counting, adding, dividing, logic, etc.)
- Try setting up a game halfway and have students explain their next move and justify it
- Try setting up a game close to the end and have students explain who would win at that point
- Try learning the “secret of Nim”, a strategy that sets you up to win almost every time. Watch this video to learn more. (Skip to 2:25 if you already know how to play)

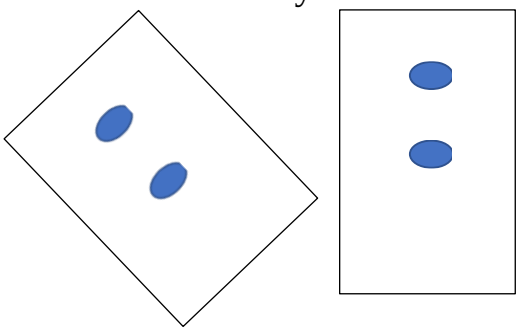
Not 3 in a line

This problem is based on an old problem that remains unsolved and there's a $1000 award for a solution!

Are you up for the challenge?

Using 8 - 10 counters, put the counters over a grid without putting 3 counters in a straight line.

Materials: 4x4 grid and 5x5 grid, 10 Counters or small buttons or any small items

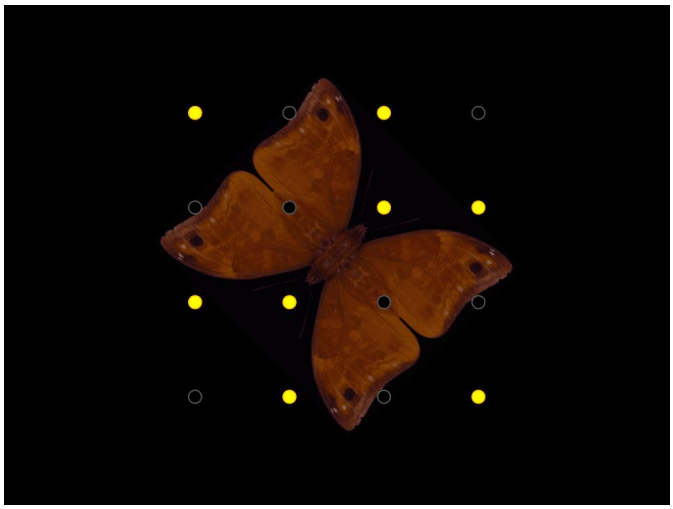


To start with:

- For the 4X4 grid, you will need 8 counters
- For the 5X5 grid, you will need 10 counters

The problem is printed on top of the paper.
Example: for the 4X4 paper:
Use all 8 counters to cover 8 dots,
You can only put 2 counters in a line – horizontally, vertically or diagonally.

Here is s a link to the website that explains the problem in detail and has videos to watch.
https://mathpickle.com/project/no-three-in-a-line/

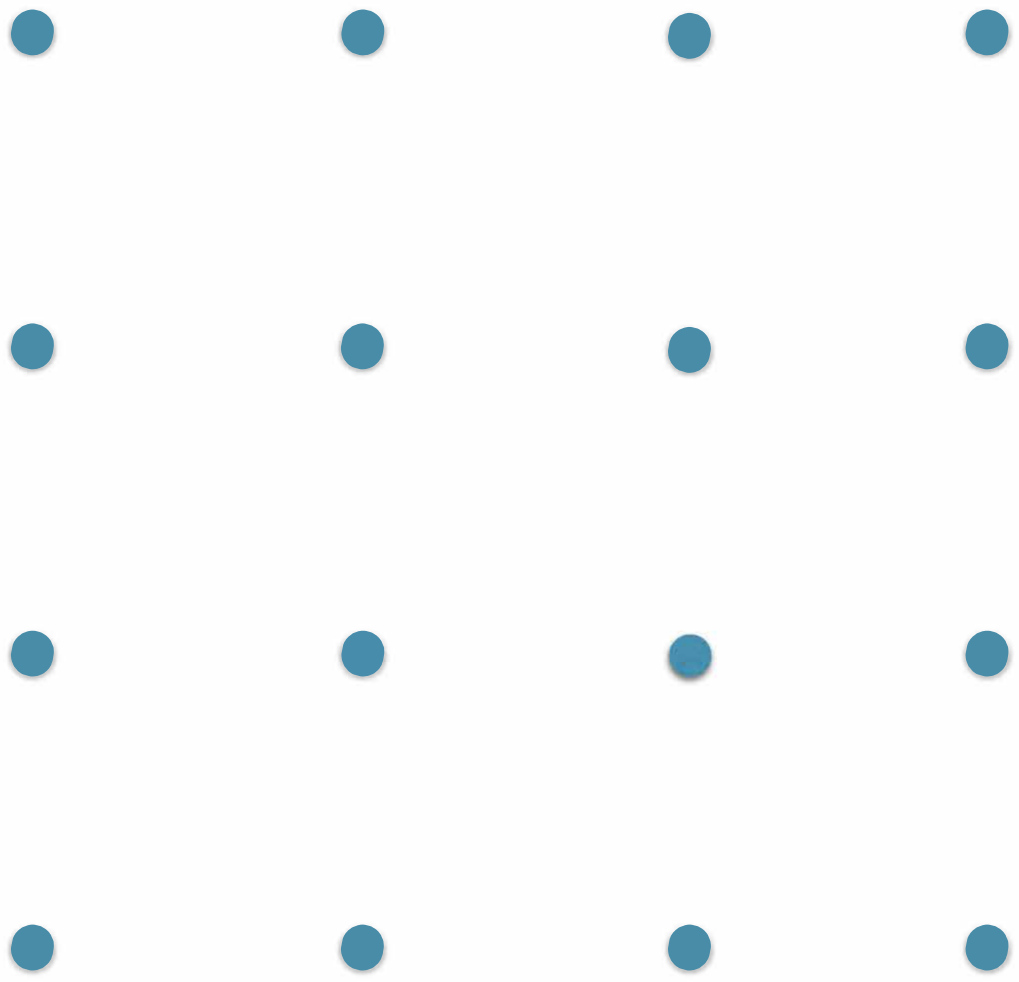


No Three in a Line | MathPickle

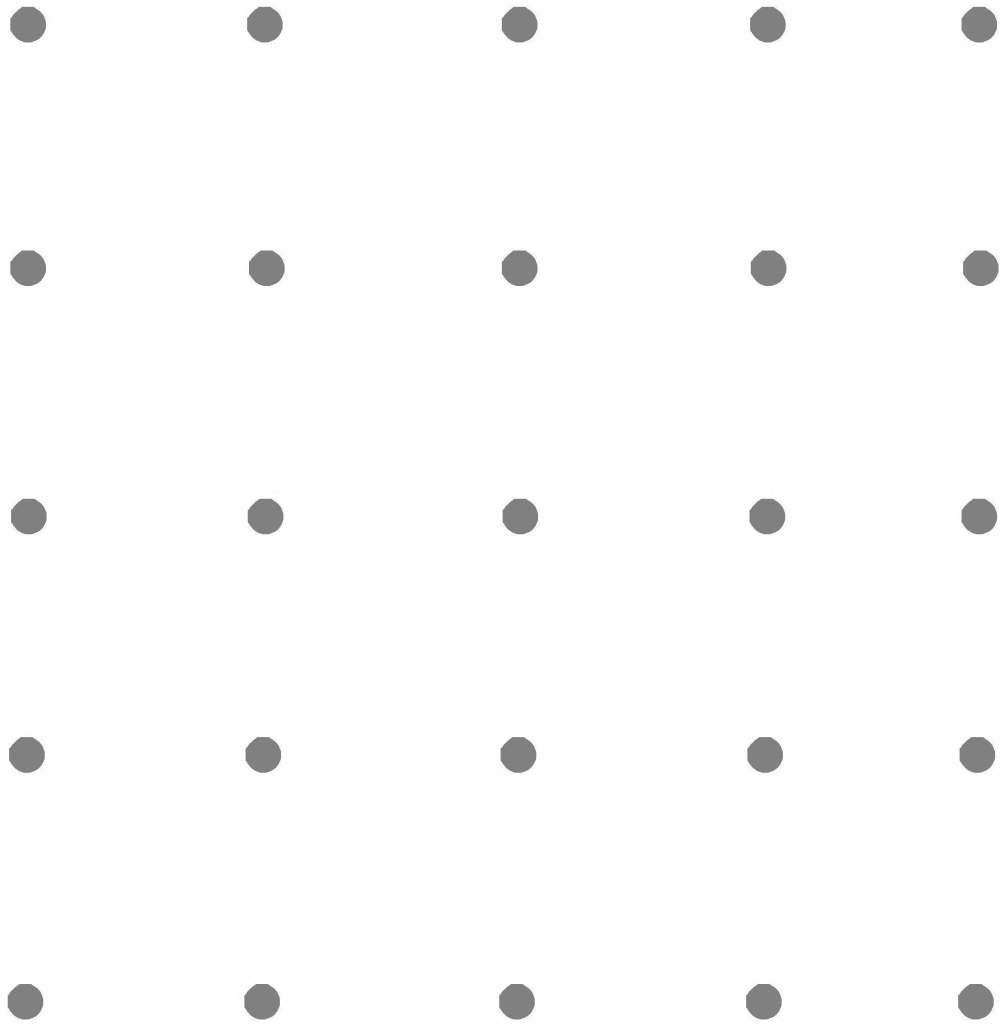
mathpickle.com

Visit the post for more.

Can you place 8 beads on the grid so that **no** three beads lie in a straight line?



Can you place 10 beads on this grid so that no 3 beads lie in a straight line?



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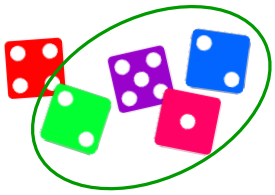
Roll & Make 10



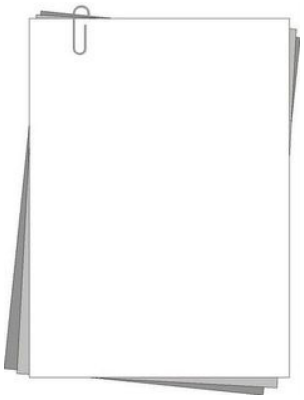
5 and 5 make 10, you see,

But so does 1 + 6 + 3,

How about 4 and 4 and 2,

Come show us what **YOU** can do!

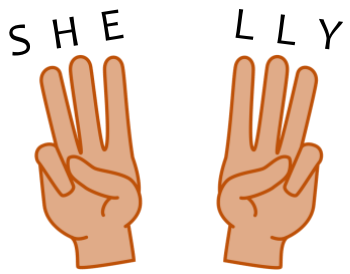
Materials



Warm Up Activity

How many letters are in your first name?

Show us with your hands.

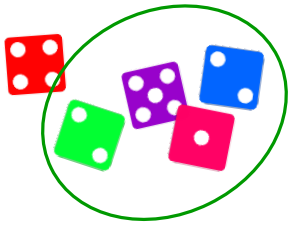


Roll & Make 10 Instructions

1. Roll 5 dice.
2. Use as many dice as you can to make 10.
3. If you use 2-3 dice, give yourself 5 points.
4. If you use 4-5 dice, give yourself 10 points.

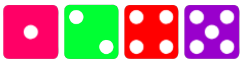
*As a team decide what score you are playing until!

5 points



10 points

Variations (from easy to hard)

1. Sort the dice by number. 
2. Put the dice in ascending  or descending  order.
4. Use 3 dice and add to 5. 
5. Use 5+ dice and add to 12, 15, 20, 25, etc. 
6. Roll 1 die. Find the number to make 10. (E.g., If you roll a  , you need a 6 to make 10.)
7. Roll 2 dice and multiply.  x  = 8

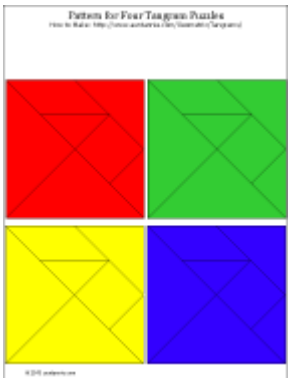
TANGRAMS

Step 1: Choose a Pattern and Print It

Choose the tangram puzzle size that you want to make—large: 7.75" (19.6cm) or small: 3.875" (9.8cm). Download and print the tangram puzzle pattern. It is best to print on cardstock. If you don't have any cardstock, print on paper. *Print the colored patterns on white cardstock or paper, and print black and white patterns on colored cardstock or paper—or you can print on white paper and color the puzzle as you like*.

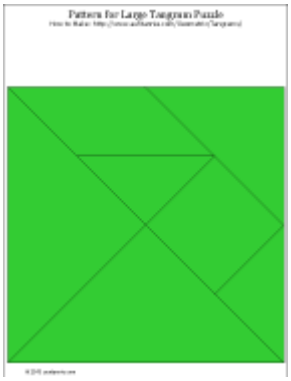
The wood grain puzzles look particularly nice when printed on glossy photo paper. Glue the photo paper to cardstock, or apply adhesive felt to the back. This is sure to be a favorite set.

Four Tangrams



B&W - Colored

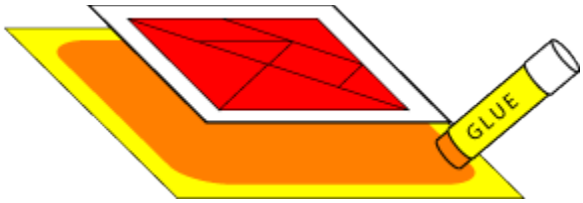
Large Tangram



B&W - Colored

Patterns are Adobe PDF files. The [Adobe Reader is available for free](#).

All of Aunt Annie's project patterns are designed to be printed on standard letter-size paper (8.5"x11" or A4). When printing from Adobe Reader, you may need to select *Auto-Rotate and Center* or *Choose paper source by PDF page size* to ensure the best fit.



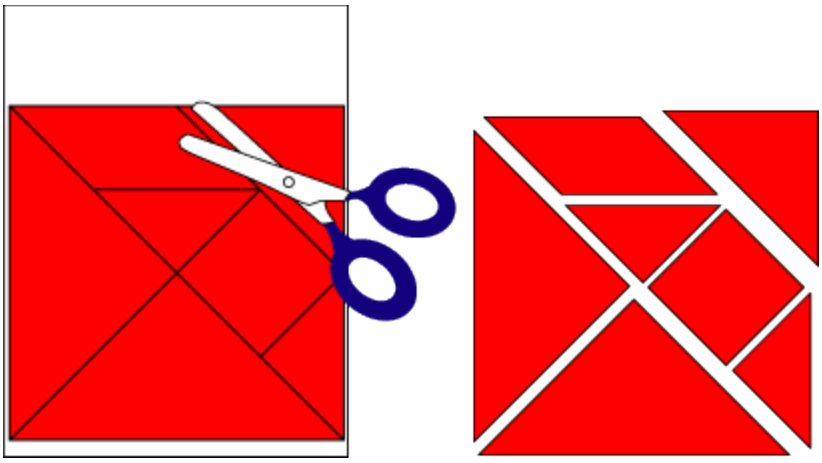
Step 2: Stiffen Paper (optional)

If you printed a pattern on paper, it will need to be stiffened. Do a rough cut of the tangram puzzle and glue it to a piece of cardboard a little bigger than the puzzle. Cereal box cardboard works well.

Be sure that the glue completely covers the back of the tangram puzzle. Also make sure that there are no loose corners or sides. To make a very nice puzzle, glue another piece of colored paper to the back of the cardboard.

Tip: For puzzles printed on cardstock, make a sturdier puzzle by gluing the printed pattern to another piece of cardstock.

Step 3: Cut



Cut the tangram puzzle into seven pieces on the solid black lines. Try to make your cuts very straight. *The tangram puzzle will work better and be more fun with straight edges.*

It is easier to make straight cuts with a craft knife and ruler. Protect your work surface with thick cardboard or a cutting mat. Place the ruler along the line to be cut, then carefully draw the craft knife along the ruler's edge. Be sure to keep your fingertips away from the knife. **Children require adult supervision when using a craft knife!**

Playing with the Tangram Puzzle

There are two ways to play with tangrams. One way is to try to duplicate shapes from a simple outline of the shape. Another way uses your imagination and sense of fun to create new designs. The most common designs are silhouettes of animals, people, and objects.

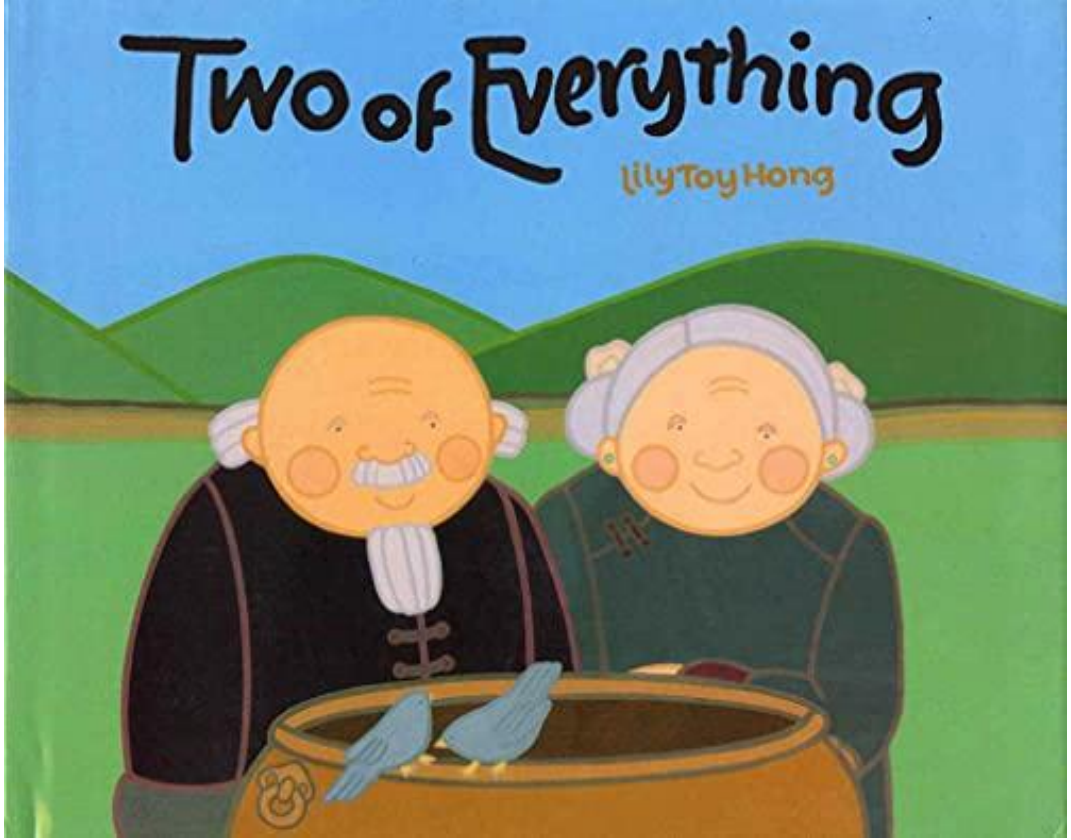
A mathematician has calculated that there are at least 1600 designs that can be made with the seven tangram pieces/tans. Use more than one puzzle set, and the possibilities grow even larger. How many designs can you create?

When playing with tangrams, keep these simple rules in mind:

- All seven tans are used in each picture (*except where noted*).
- All tans remain flat, none standing.
- Each tan may touch another, but none may overlap

Now get started playing with your tangram puzzle!

Print a puzzle sheet, and try to create the shapes with your tangram puzzle pieces. The small tangram puzzle is sized to fit the shapes on the Square and Geometric Shapes puzzle sheets.



Hong, L. T. (1993). *Two of everything: A Chinese folktale*. A. Whitman.

Angela and Anna

Activity Shared During the Math Fair

Teacher candidates shared multiple mathematical questions following the reading of the book Two of Everything by Lily Toy Hong. We had students show their answers to questions with tokens (ex. rocks, Cheerios, marbles, etc). For instance, I asked children what would happen if I put one token in the magic pot. I showed one token on the screen. Then, I showed two tokens on the screen to show that two tokens would come out of the magic pot. We concluded our session by asking students about real-life examples of doubling. We also asked what they would like to add in a pot that makes two of everything.

Questions to Provoke Student Thinking

1. How heavy do you think the pot was? How many pounds? Show how many pounds with your tokens or with your fingers.
2. This pot doubles everything. What would happen if the pot tripled?
3. What would you want to put in the pot? What would you want to be doubled?
4. What would happen if you added 2 tokens in the pot and the pot took away 1? What would happen if you added 2 tokens and the pot took away 2?
5. Now, this pot doubles chocolate chip cookies. Each cookie has 5 chocolate chips. If you put one cookie with 5 chocolate chips inside, how many cookies would come out? How many chocolate chips are there all together with your doubled cookies?
6. What are real-life situations where things are doubled?
7. What would you put in the magic pot?