

Dots & Polygons

Object of the Game

Players draw lines to connect the dots and make polygons (closed shapes with 3 or more sides). They score points equal to the area of their shape. They also earn bonus points by meeting a goal. The winner is the first player to score 20 or more points.

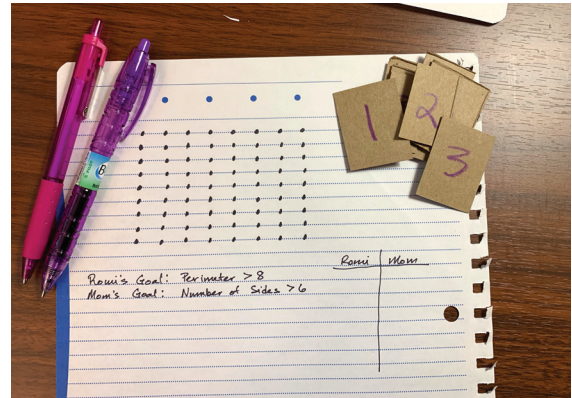
Materials

- 1 set of Number Cards (4 each of the numbers 1–3)
Print the cards or make your own.
- Dots & Polygons Record Sheet
Print the record sheet or make your own.
- Pencils or pens in 2 different colors

Skills

This game helps us practice

- Finding area
- Finding perimeter
- Drawing shapes with a given perimeter

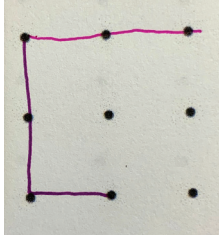


How to Play

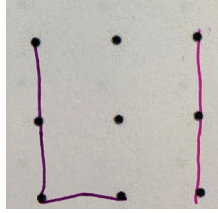
1. Mix up the Number Cards and place them facedown in a stack.
2. Players each draw a card. The player with the greater number goes first.
3. Player 1 draws a card. The number on the card indicates the length of the line to draw. Then the player draws lines to connect dots.
 - » Players can connect dots horizontally, vertically, and even a combination of the two. Lines do not have to connect with lines already drawn. Players must draw the line without lifting their pen or pencil, and without retracing any lines already drawn.

Romi drew a card that shows 2. Romi's color is pink. Here are three different plays Romi could make:

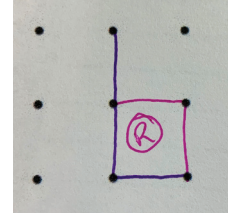
✧ Horizontal line



✧ Vertical line

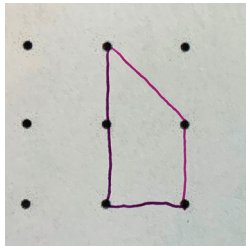


✧ Combination

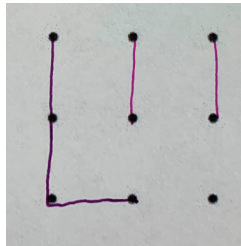


Here are three different plays Romi could **not** make.

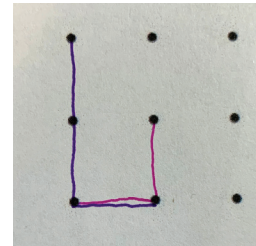
✧ No diagonal lines



✧ No disconnected lines in the same turn

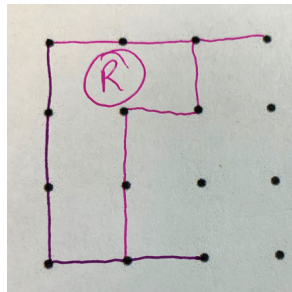


✧ No retracing a previously drawn line.



4. Player 2 takes a turn, turning over a Number Card and then drawing lines.

- » Players try to be strategic when drawing lines.
 - ✧ They might be able to complete one polygon and start another.
 - ✧ They could close a polygon that their opponent started and steal those points.
- » When the lines drawn enclose a polygon, the player scores 1 point for each square unit inside the shape.



The area of the polygon is 4 square units. Romi earned 4 points for making this polygon.

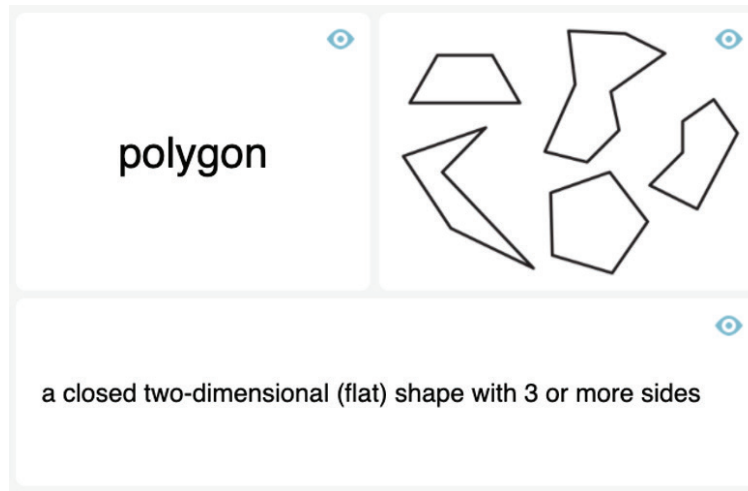
- » After a shape is scored, no one can draw more lines inside that shape.

5. Players continue alternating turns. Remix the cards if you run out before the game ends. The first player who earns 20 points is the winner.
6. Have fun!

Tips for Families

Before you play:

- Review the term *polygon* using the math vocabulary card. When a player completes a polygon, they earn points equal to the area of their shape.



- Draw some shapes and determine their areas. Keep in mind that the greater the area, the more points you earn.

As you play:

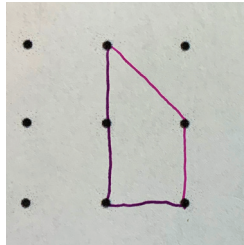
- You may find that you can close a polygon before the area is very large. Is it worth it? Or should you add on sides to create a polygon with a greater area.

Change It Up

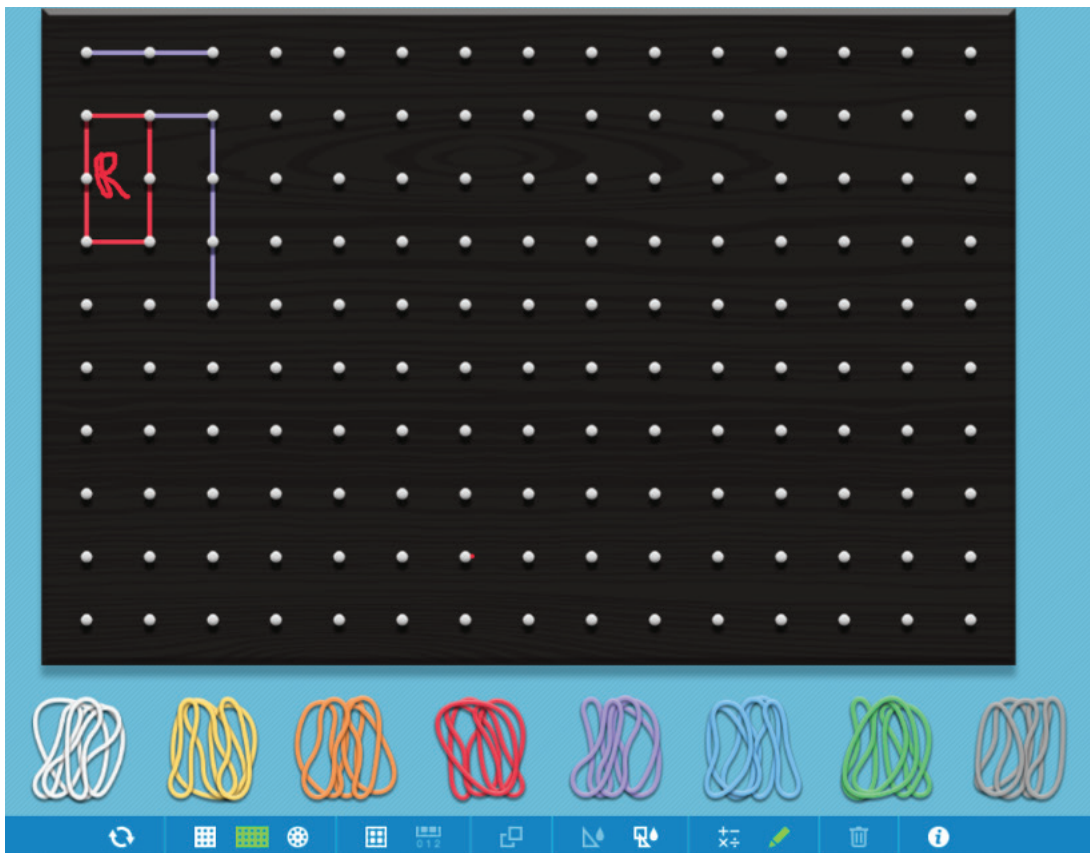
Making even small changes to a game can invite new ways of thinking about the math. Try making one of the changes below. How did it change your strategy for winning the game?

- Player 1 chooses one of the following goals and records it on their record sheet. Player 2 chooses one of the remaining goals. Each time a goal is met, the player earns a bonus point. Each time you play, try a different goal.
 - » Perimeter > 8
 - » Perimeter $= 10$
 - » Number of sides $= 4$
 - » Number of sides > 6

- Continue the game until no more lines can be drawn. The winner is the player with the greater score.
- Play with 3 or 4 players. Each player chooses a different goal.
- Create more goals for players to choose from.
- Allow diagonal lines. The area of this polygon is $1\frac{1}{2}$ square units. Can you see why? The player who made this polygon would earn $1\frac{1}{2}$ points.



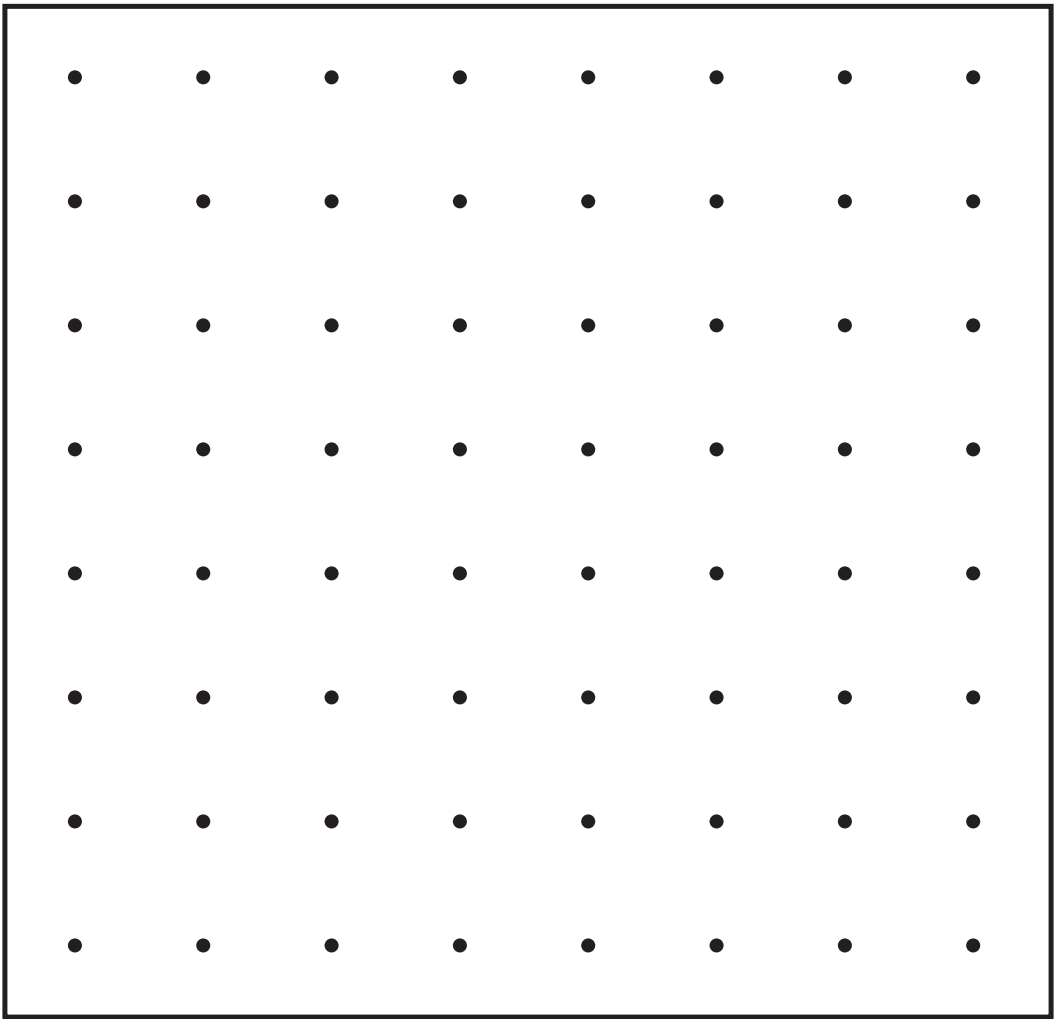
- Try playing the game using the free Geoboard app, available at www.mathlearningcenter.org/resources/apps/geoboard.
 - » Players choose their color of digital rubber bands to draw their lines. They can also choose to show the unit squares (as shown) making it easier to determine the area.





1	1	1
1	2	2
2	2	3
3	3	3

Dots & Polygons Record Sheet



Score

Player 1	Player 2