

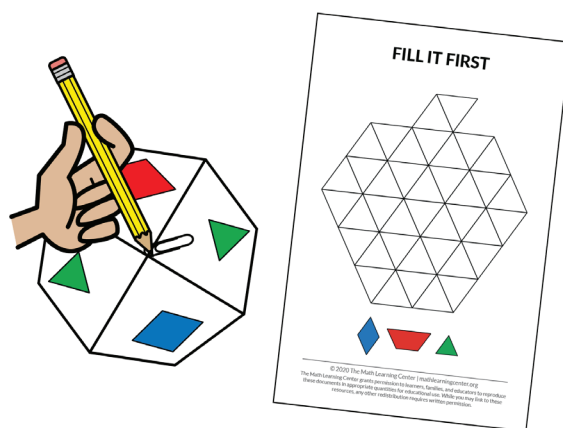
Fill It First

Object of the Game

Players take turns spinning the spinner and coloring in shapes on their Fill It First game board. The winner is the first player to fill their game board exactly.

Materials

- Crayons, markers, or colored pencils in green, blue, and red. If you don't have the exact colors, it's okay. Just agree on a color for each shape: triangle, rhombus, and trapezoid.
- 1 Fill It First Spinner
- Pencil and paper clip or safety pin
- 2 Fill It First Game Boards



If you don't have copies of the Fill It First Game Board or can't print copies right now, you can still have lots of learning fun with the free Pattern Shapes app at www.mathlearningcenter.org/resources/apps/pattern-shapes.

Skills

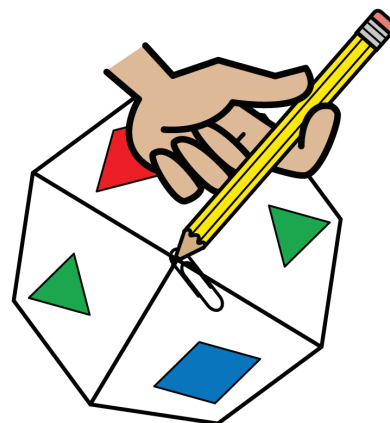
This game helps us practice

- Identify shapes
- Combining shapes to make new shapes

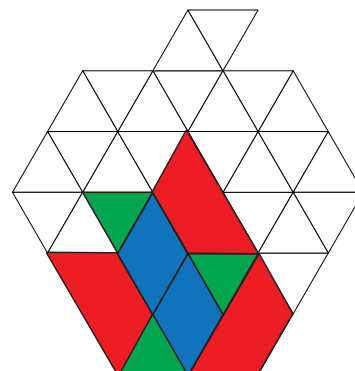
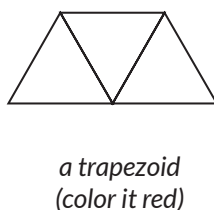
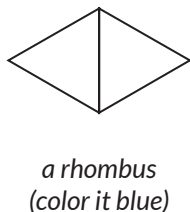
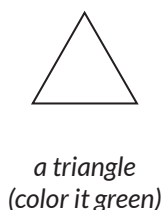
How to Play

You might have played a game like this one at school with pattern blocks. At home, you can color in the shapes instead.

1. Play with a partner. Each of you will need a game board.
2. Decide who will go first.
3. Take turns using the pencil and paper clip or safety pin to spin the spinner.



4. Each time you spin one of the 3 shapes (triangle, rhombus, trapezoid) you can color it in anywhere on your game board.



5. The winner is the first player to fill their game board. The catch is, you have to fill it exactly. If you only have room at the end for a blue rhombus, and you spin a red trapezoid, you have to try for a rhombus or a triangle on your next turn. Keep playing until one player fills their board entirely.
6. Have fun!

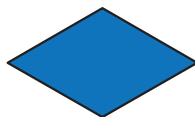
Tips for Families

Before you play:

- Talk about the shape names. Not sure? Let's say the names together. The green shape is a *triangle*. The blue shape looks like a diamond, but it's called a *rhombus*. The red shape is called a *trapezoid*.



Triangle



Rhombus



Trapezoid

During the game:

- Talk about your strategies and how you're choosing where to color in the shapes:
 - » *I see you just spun a trapezoid. Do you see a good place to put it on your board? How many of the little triangles will you be able to cover with that trapezoid?*
 - » *What shape do you hope to spin next? Why?*
 - » *It looks like we're getting close to the end. What shapes do you need to finish filling your game board? You say you need 3 blue rhombuses? Is there anything else you could use to fill those spaces?*

After the game:

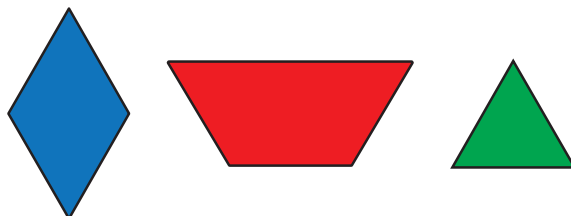
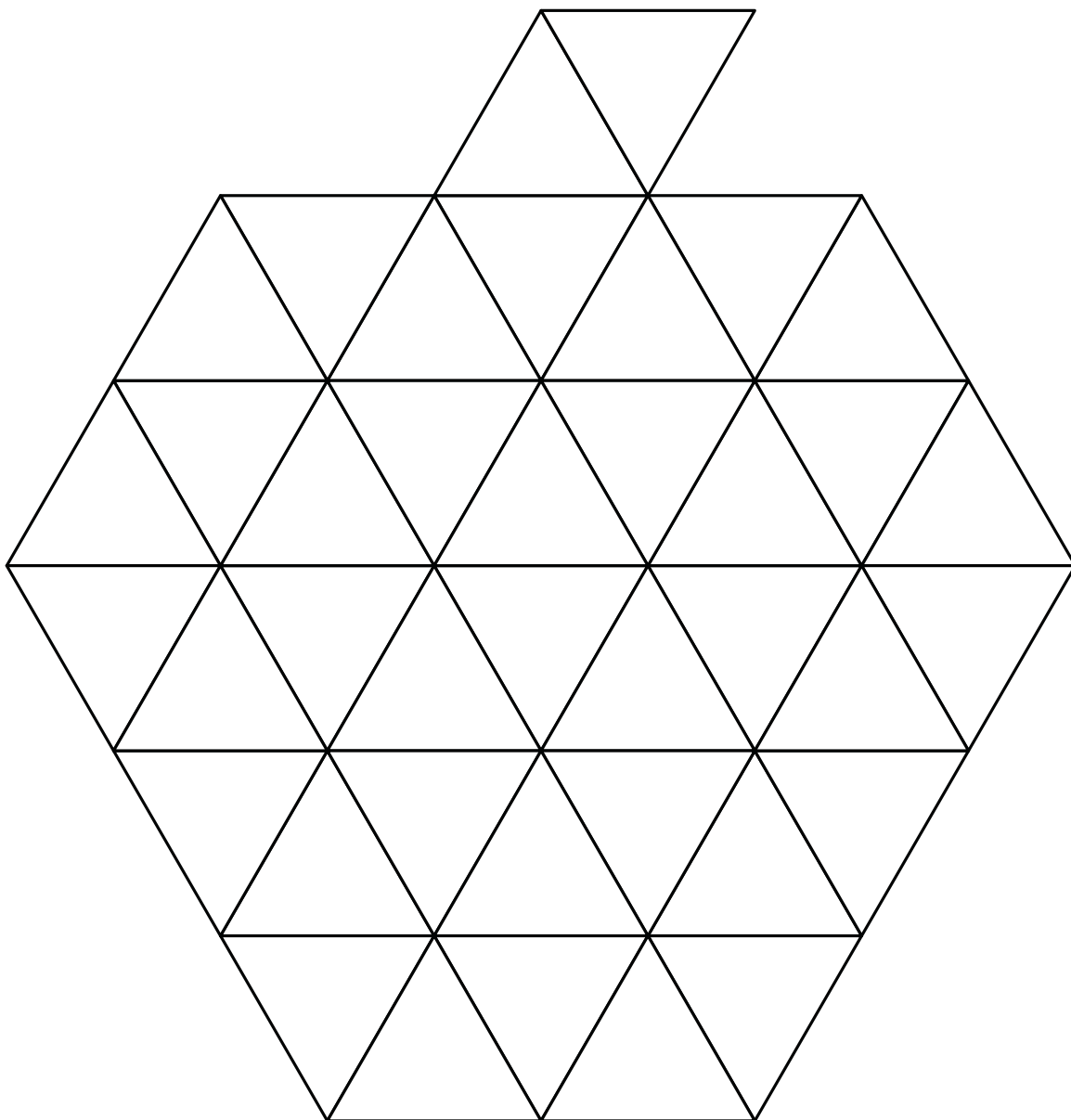
- Ask questions:
 - » *How many pieces did you color to fill your game board?*
 - » *What do you think is the smallest number of pieces needed to fill the board?*
 - » *What would be the most pieces needed to fill the board?*

Change It Up

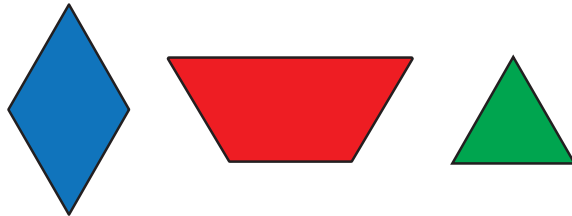
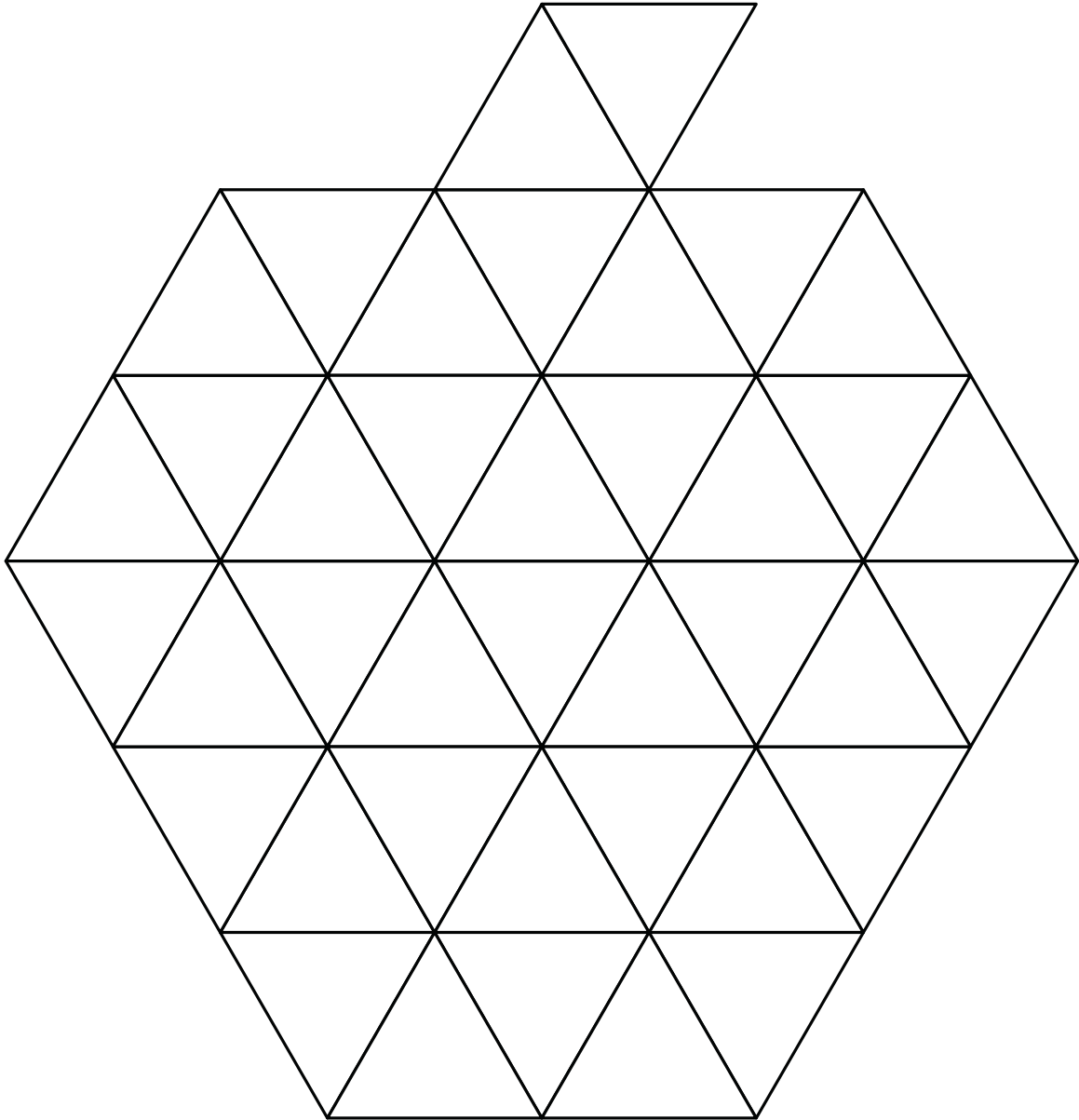
Making even small changes to a game can invite new ways of thinking about the math. Try making one of the changes below.

- Play with 1 game board. In this version players take turns coloring shapes on the same game board. The winner is the player to color the last shape.
- Play as usual, but use just 2 shapes (triangles and rhombuses, for example, or trapezoids and rhombuses). If the spinner lands on the shape not being used, the player gets to choose which shape to use. Is it possible to fill the entire board?

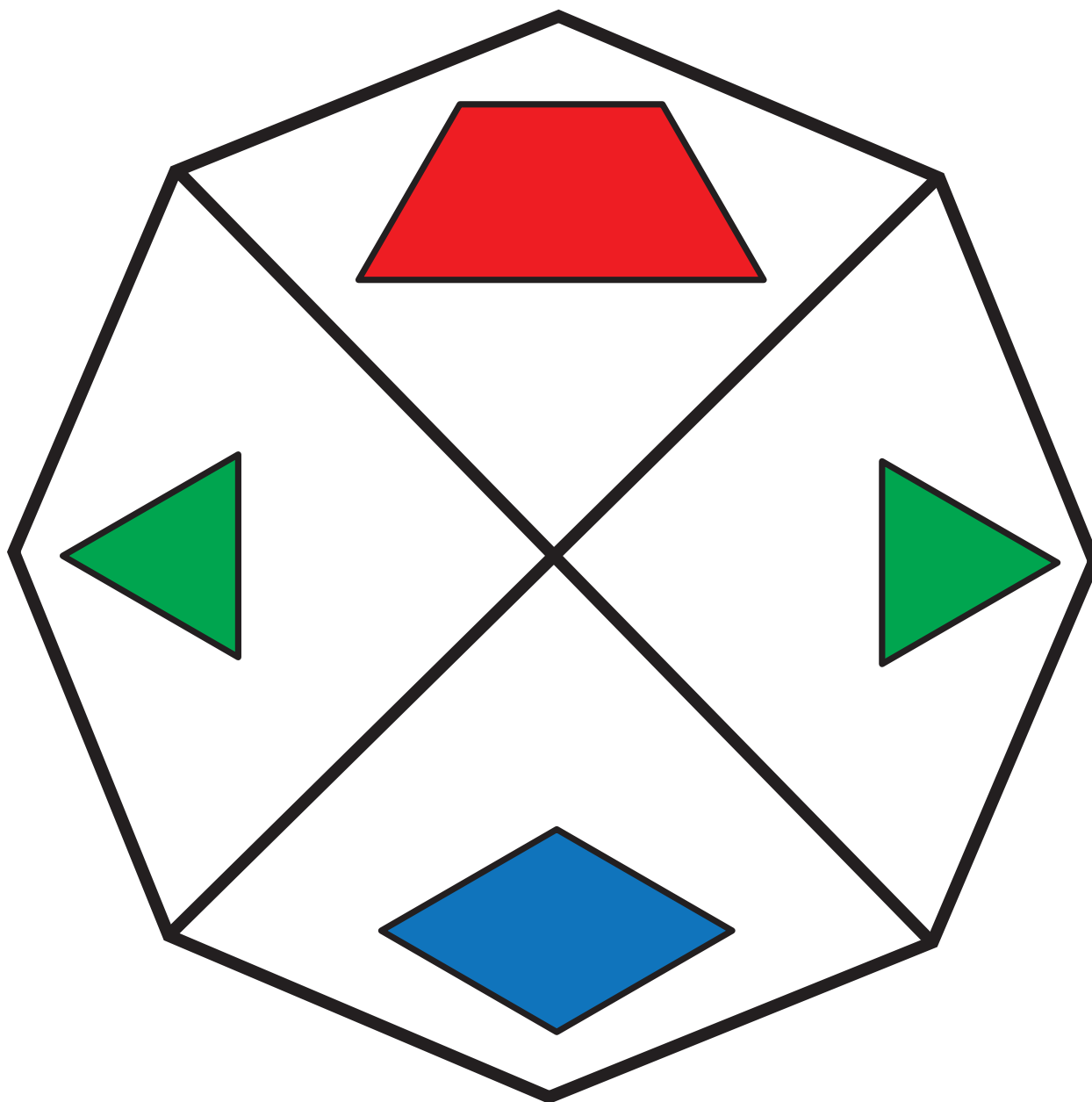
FILL IT FIRST



FILL IT FIRST



FILL IT FIRST SPINNER



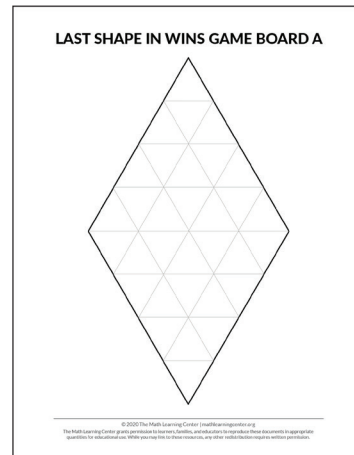
Last Shape in Wins

Object of the Game

Players take turns coloring in different shapes. The winner is the player to color in the last shape that completely fills the shape on the game board.

Materials

- Crayons, markers, or colored pencils in green, blue, red, and yellow. If you don't have the exact colors, it's okay. Just agree on a color for each shape: triangle, rhombus, trapezoid, and hexagon.
- 1 Last Shape in Wins Game Board A or B



If you don't have a copy of the Last Shape in Wins Game Board or can't print a copy right now, try playing the game on the free Pattern Shapes app at www.mathlearningcenter.org/resources/apps/pattern-shapes.

Skills

This game helps us practice

- Identifying shapes
- Combining shapes to make new shapes
- Thinking about a strategy that will help us win

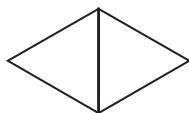
How to Play

You might have played this game at school with pattern blocks. At home, you can color the shapes instead.

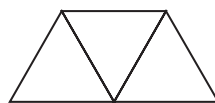
1. Play with a partner. Agree on which game board to use and decide who will go first.
2. Take turns coloring in shapes on the gameboard. You could just go back and forth coloring little green triangles, but it might be kind of boring. Instead, try combining triangles to form one of the other shapes shown below:



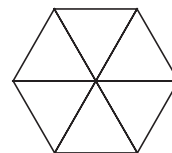
*a triangle
(color it green)*



*a rhombus
(color it blue)*

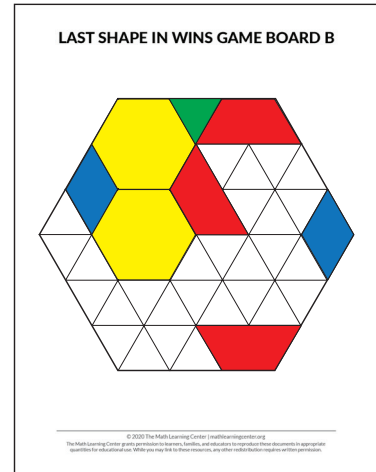


*a trapezoid
(color it red)*



*a hexagon
(color it yellow)*

3. You can color in any one of the 4 shapes (triangle, rhombus, trapezoid, or hexagon) anywhere on the gameboard each time it's your turn.
4. You must take your turn every time, down to the very end.
5. The winner is the person who gets to complete the game board by coloring in the last shape.
6. Have fun!



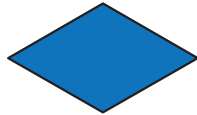
Tips for Families

Before you play:

- Talk about the shape names. Not sure? Let's say the names together.



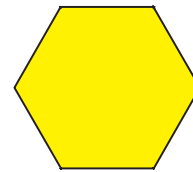
Triangle



Rhombus



Trapezoid



Hexagon

During the game:

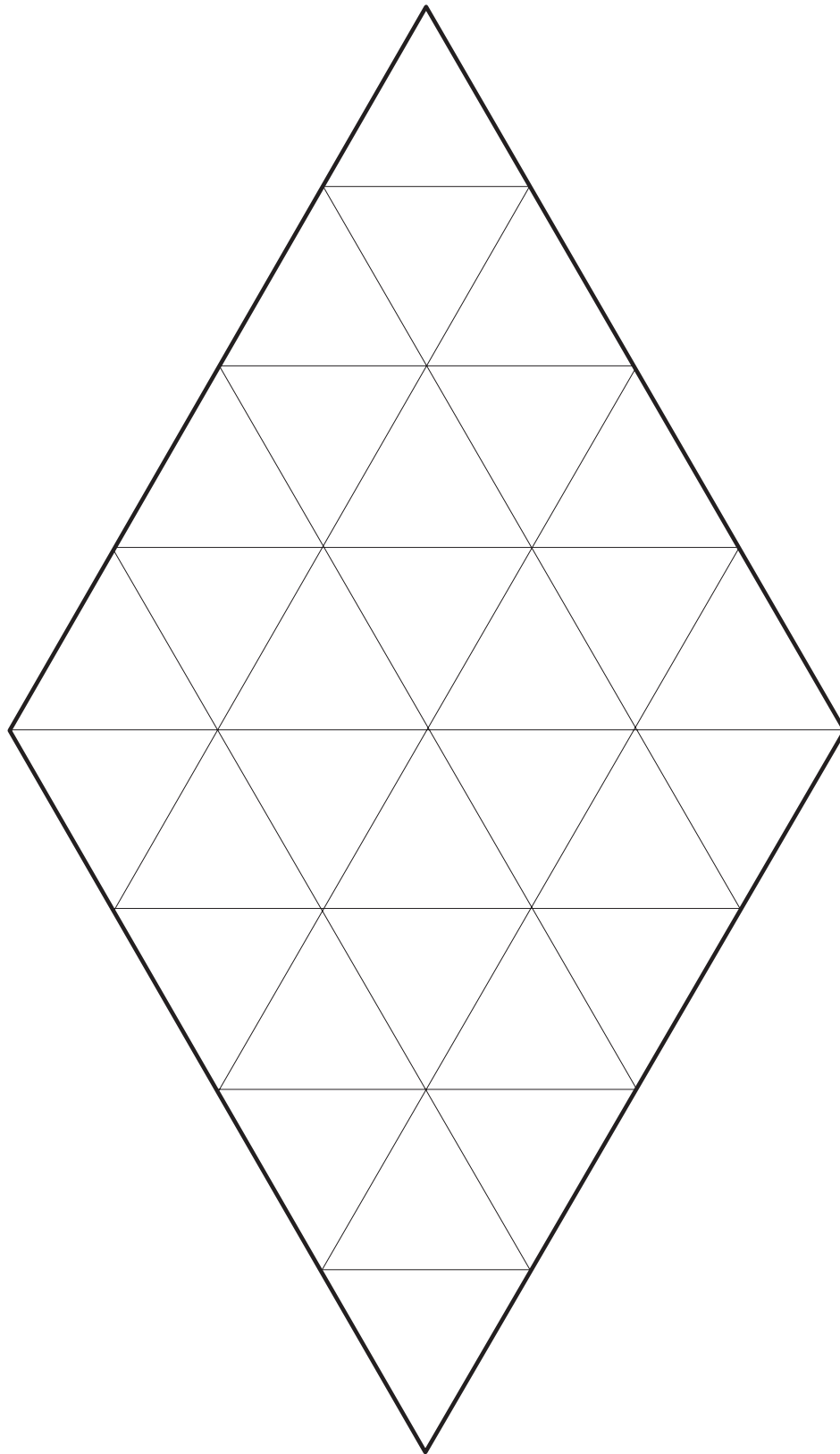
- Talk about how you're choosing which shape to color in. There is a lot of strategy involved! Here are some ideas to get you talking about strategy:
 - » *We've almost filled the game board, and it's your turn. What would happen if you put a triangle in now? What do you think I would do then? What if you put in a rhombus?*
 - » *Now that we're down to the last few moves, can you figure out what you need to do to win? Is there a shape you could use that would force me to fill a space but still leave enough room for you to color in the very last shape?*

Change It Up

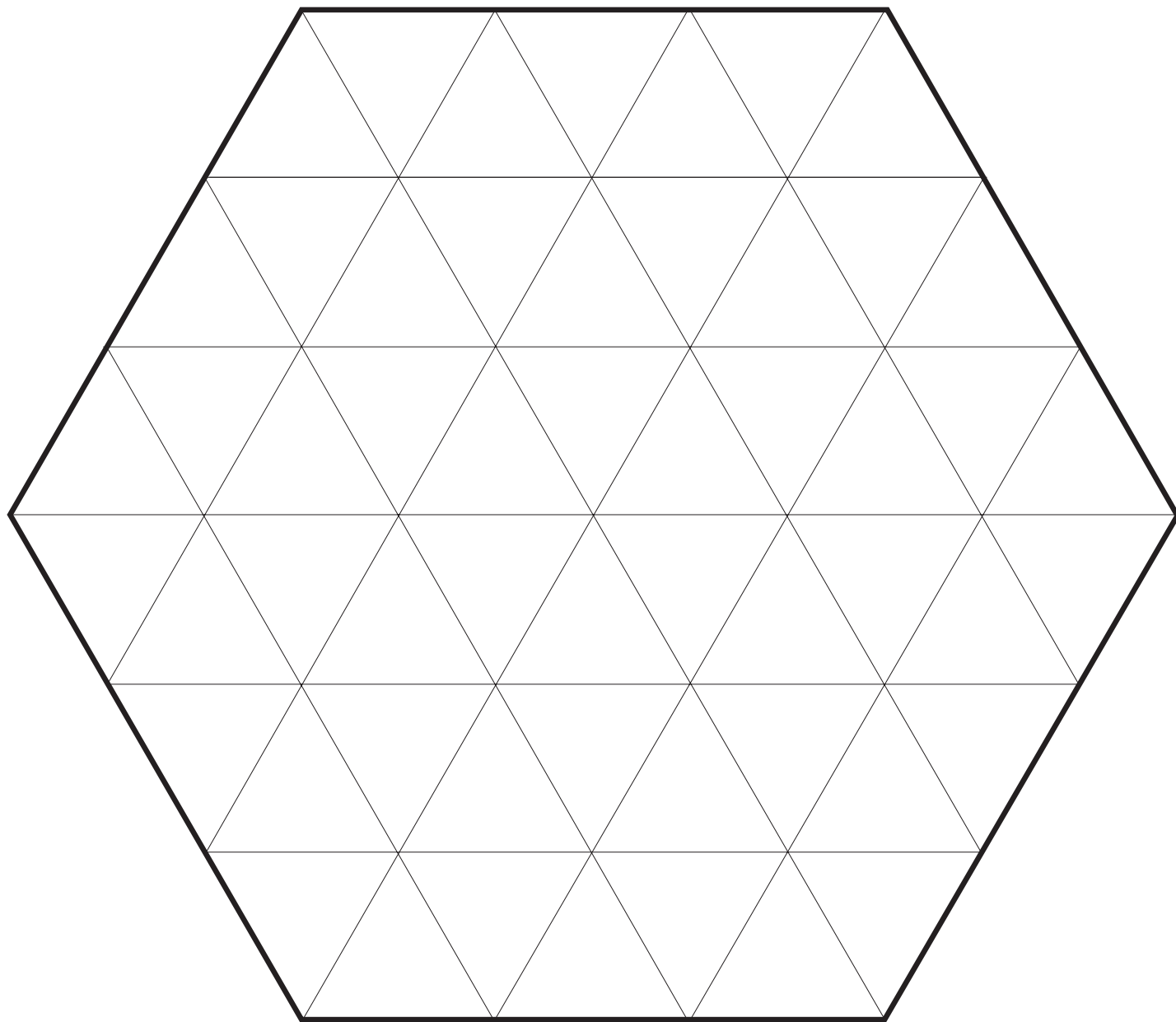
Making even small changes to a game can invite new ways of thinking about the math. Try making one of the changes below.

- Try a different game board. There are 2 to choose from, or make your own!
- Play as usual, but only use 2 of the 4 shapes (hexagons and triangles, for example, or trapezoids and rhombuses). Is it possible to fill the entire board?
- Try playing the game on the free Pattern Shapes app at www.mathlearningcenter.org/resources/apps/pattern-shapes. With the app, you can choose from several different shapes or pictures. You can even make your own shape to fill!

LAST SHAPE IN WINS GAME BOARD A



LAST SHAPE IN WINS GAME BOARD B



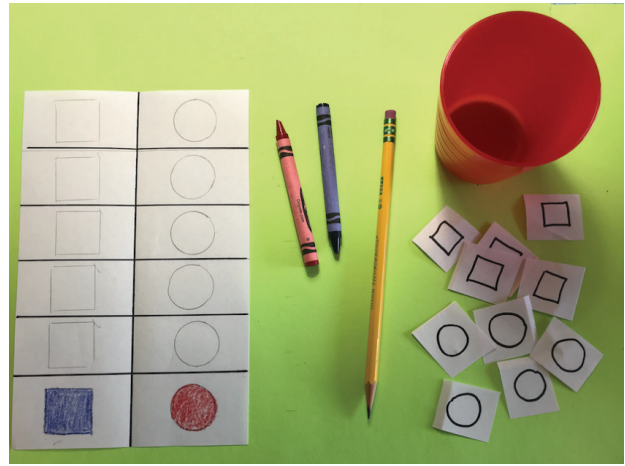
Which Shape Will Win?

Object of the Game

Spin the shape spinner and color in the shapes on your Which Shape Will Win Record Sheet. The winner is the shape that fills its column to the top first.

Materials

- Which Shape Will Win? Record Sheet
Print the record sheet or draw your own on a sheet of paper.
- Circle and Square Spinner
Print the spinner or make your own. You could instead cut 10 small pieces of paper. Draw circles on 5 pieces and squares on the other 5 pieces. Place all 10 pieces in a cup. Players draw a shape randomly from the cup instead of using the spinner.
- Pencils, crayons, markers, or colored pencils
- Paper clip or safety spin and a pencil, if using a spinner.



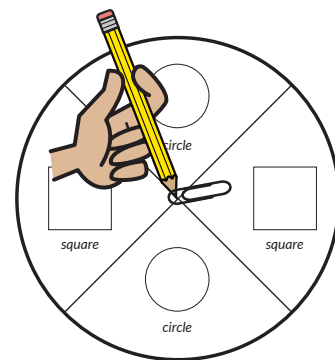
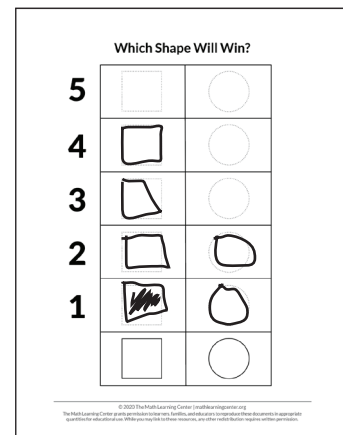
Skills

This game helps us practice

- Identifying shapes
- Counting from 1 to 5
- Comparing quantities (Which is more?)

How to Play

1. Spin the spinner or pull a shape from the cup.
2. Trace the shape you get in the correct column.
3. Working from the bottom to the top of the graph, continue to spin and trace until one column is filled.



Tips for Families

Before you play:

- Talk about the shape names. Not sure? Say the names together.

During the game:

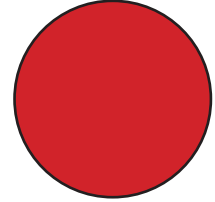
- Ask questions:
 - » *How many squares do you have? How many circles do you have?*
 - » *Which shape is ahead? How do you know?*
 - » *How many more (name shape) are needed to catch up?*
 - » *Do you have more circles or more squares?*
 - » *What shape do you hope you get next? Why?*

After the game:

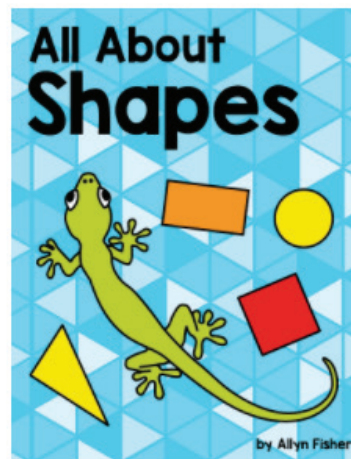
- Ask questions:
 - » *Which shape came in first? Which shape came in second?*
 - » *Do you think the same shape will always win? Why or why not?*
- Some children like to play until both shapes get to 5. Encourage your child to find a solution when 1 column has been filled but that shape is chosen again. Some might choose to add more than 5 shapes to the record sheet. Others will simply keep going until they get the shape they need.
- Read one of the stories from *BB's Bot Shop* or *All About Shapes*. You'll find these free digital story books and others in the Math Learning Center Pre-K Story Collections at www.mathlearningcenter.org/resources/lessons/pre-k-story-collections.



square



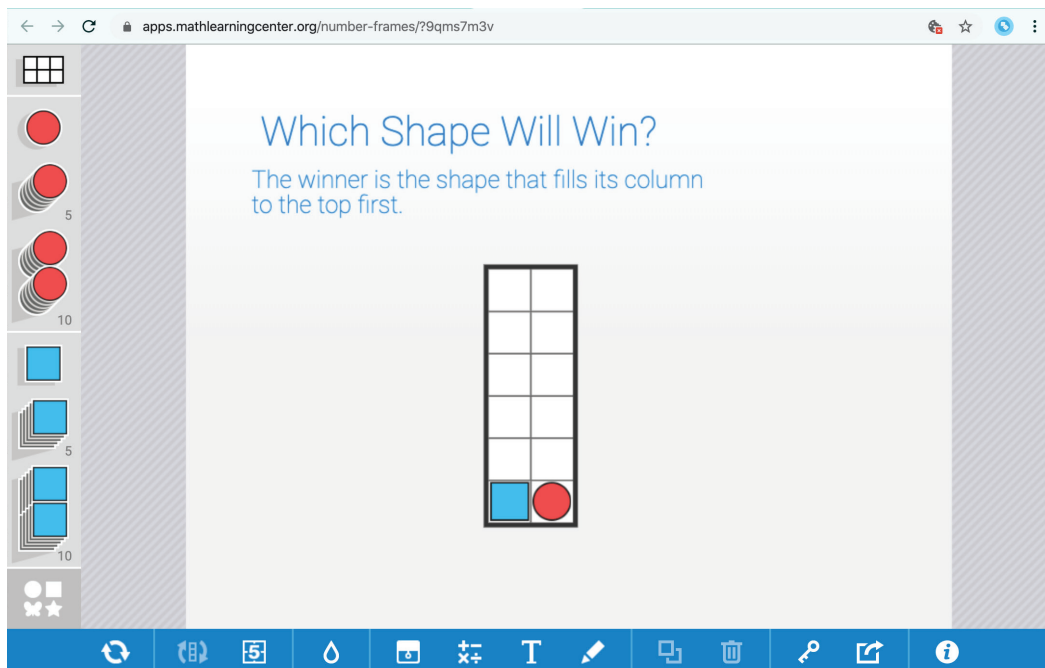
circle



Change It Up

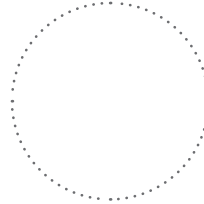
Making even small changes to a game can invite new ways of thinking about the math. Try making one of the changes below.

- Play another round using the same record sheet. This time color in the shapes until 1 shape is filled to the top or both columns have filled to the top again.
- Play with a partner. In this version each player needs a record sheet. Players take turns spinning or drawing paper pieces and tracing the shape on their record sheet. The first player to fill one shape to the top wins.
- Play with a partner and use 1 record sheet. In this version, players take turns spinning or drawing paper pieces shapes and tracing the shape on the same game board. They work cooperatively to fill 1 or both columns.
- Instead of using a spinner, use a cup with 5 circles and 5 squares on pieces of paper, as described in the Materials section. The game could be played in two different ways: by leaving a piece of paper out of the cup after it's selected; or, by returning pieces of paper to the cup after the piece is drawn so it can be selected again. Ask students how the different options might change the game.
- You could also try playing the game on the free Number Frames app. You'll need to use the spinner or pull shapes from a cup, but you can use the app as a record sheet. You can even make up your own game by changing the counters and the size of the frame. The Which Shape Will Win? game is ready to play at apps.mathlearningcenter.org/number-frames/?9qms7m3v!

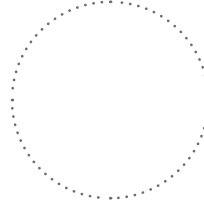


Which Shape Will Win?

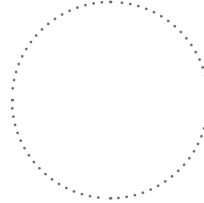
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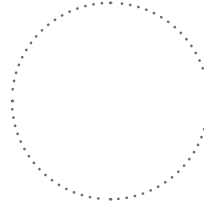
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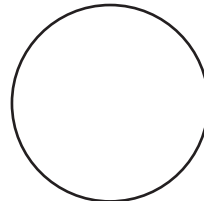
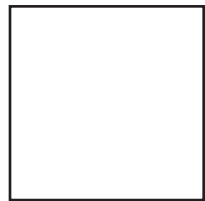
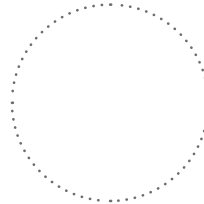
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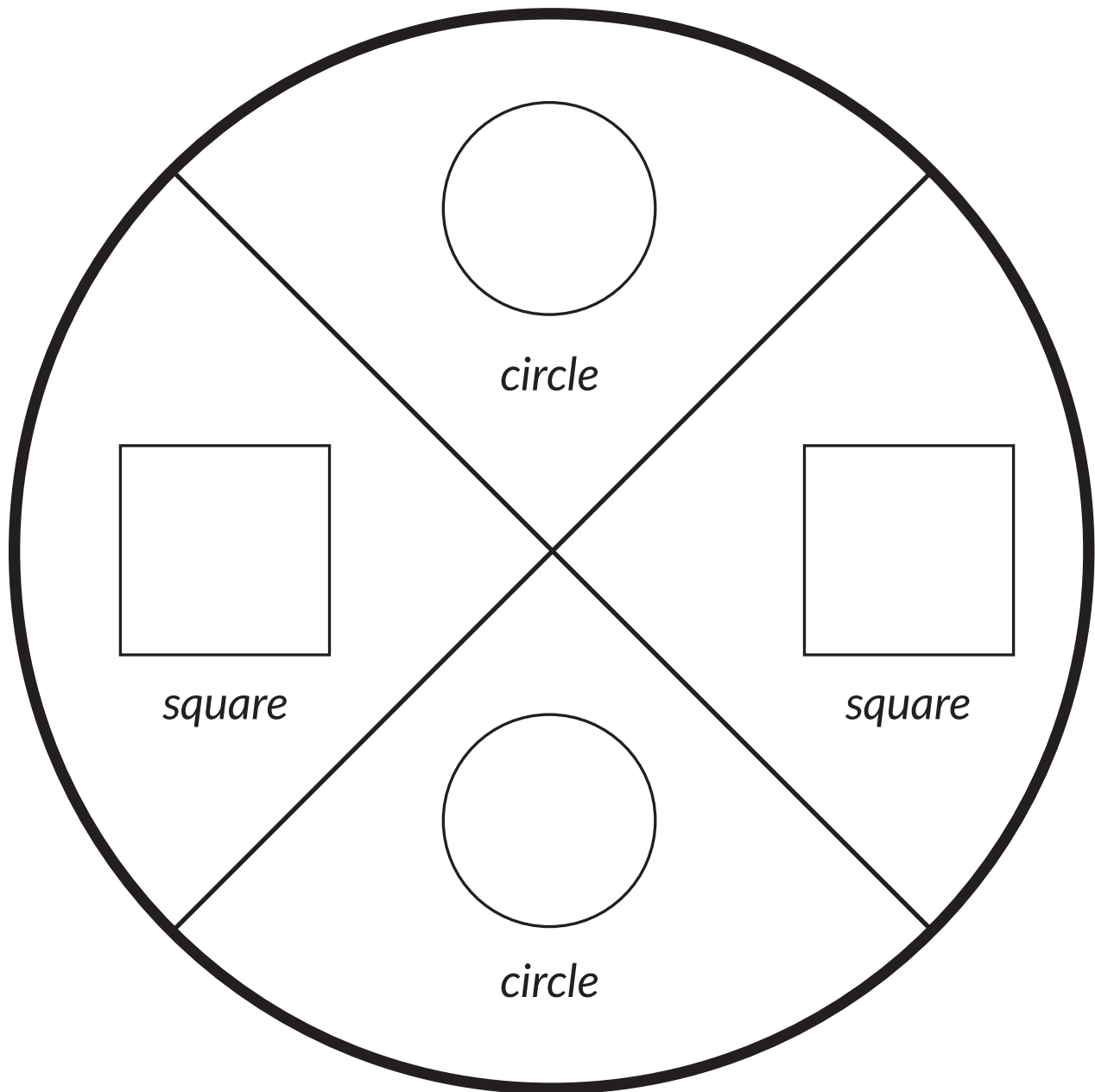
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1



CIRCLE & SQUARE SPINNER





Glow-in-the-Dark Geometry

The Big Idea:

Students explore the attributes of shapes and make them glow!

Students Will Need:

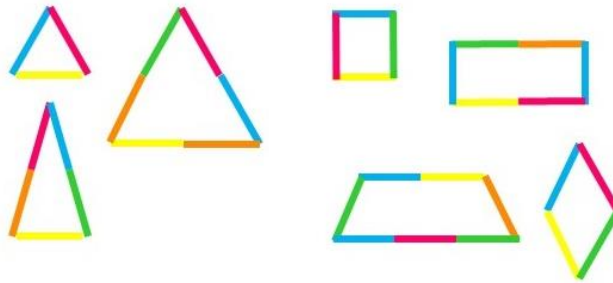
- ★ Glowsticks: 20-25 per person, or more if you have them!
- ★ If you don't have glowsticks on hand, try whole crayons, markers, pencils, straws, chopsticks, toothpicks or any other set of objects that are roughly the same length.
- ★ An area that can be made dark

The Math Behind the Scenes:

- ★ Geometry: K.G.B.4, K.G.B.6, 1.G.A.2, 2.G.A.1, 3.G.A.1, 4.G.A.2, 5.G.B.3
- ★ Angle measurement: 4.MD.C

Introducing... Shapes that Glow!

1. Invite students to try these challenges using the glowsticks as line segments.
 - ★ Make different sized triangles.
 - ★ How many different 4-sided shapes can you make and name?
 - ★ How about shapes with 5 or 6 sides?

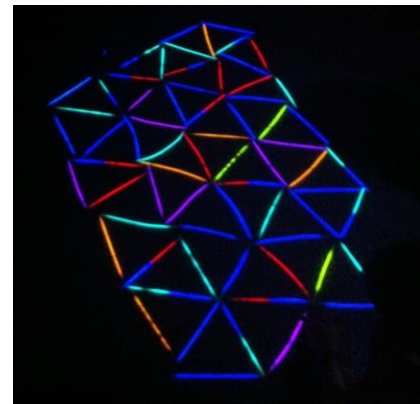


2. Flick off the lights briefly to show off the shapes!

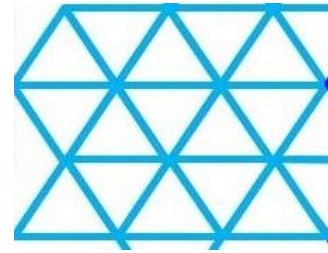
Hit the Floor

Explain to students that flat shapes with straight sides are called **polygons**. And if all sides and angles are equal, they're **regular polygons**. Now they're going to cover the floor with **repeating polygons**. See if they can figure out which shapes fit together with no gaps or overlaps.

1. Each student experiments to see what shapes fit together. They pick one that works, and lay sticks on the floor to repeat that shape over and over to create a lattice.
2. You (the teacher) can **build triangles to start**, since it's easy to morph from that lattice to the other two shapes.
3. **Flick off the lights** to see everyone's floor patterns glow! Ask students to angle their cameras to show off their work.
4. Now discuss the lattices kids discovered.



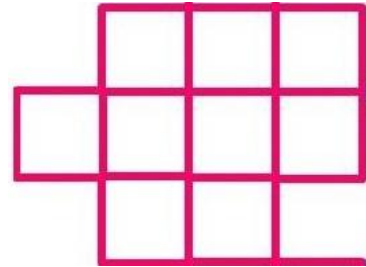
5. One is the **equilateral triangle**. Ask why triangles can tile like this ...discuss how each angle must be **60 degrees**, so 6 triangles neatly come together to fill 360 degrees.



6. Now show students how we can remove a few sticks slanting to the right to make **rhombi** (plural of **rhombus** - diamonds).

★ Ask: Is this rhombus a regular polygon?...No! It has equal sides, but does not have equal angles.

★ What do you call a rhombus where the angles are all equal? Let students think about this until they realize: it's a **square**. See if anyone made squares.

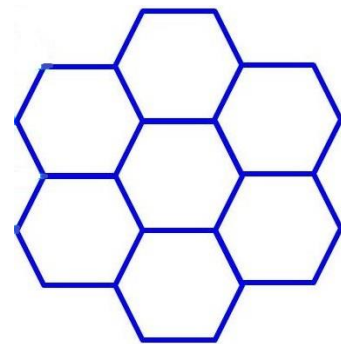


★ Why do squares fit together so well? Each angle is now 90 degrees, and 4×90 is 360!

7. Add back the sticks you removed, and now ask what 3rd shape you can make. Show how if you remove 6 sticks that come together in a point, you make a **hexagon**. Remove a few more each hexagon in the lattice.

★ See if students can figure out the degrees in each angle, knowing it came from equilateral triangles.

★ Why do those angles fit together well? Each angle is now 120 degrees, and 3×120 is 360!



8. See if regular pentagons, octagons, etc. can fit together – and discuss!

Students can then practice and review on Khan Academy!

3rd Grade - Quadrilaterals (video and practice problems):

<https://www.khanacademy.org/math/cc-third-grade-math/quadrilaterals-3rd>

4th Grade - Measuring angles (video and practice problems):

<https://www.khanacademy.org/math/cc-fourth-grade-math/imp-geometry-2>

5th Grade - Properties of shapes (video and practice problems):

<https://www.khanacademy.org/math/cc-fifth-grade-math/properties-of-shapes#properties-shapes>