

The Hexagon Card Game

Lesson Type	Time	Age Range	Groupings
Exploratory activity/game	20 minutes initially; 10–15 minutes as children gain familiarity with the game	JK–Grade 2 (with variations provided)	Whole-class introduction; pairs or small groups (could be set up as a centre)

Math and Spatial Reasoning Focus

composition and decomposition of 2D shapes (especially the hexagon); properties of 2D shapes; visualization; mental rotation

Materials

- One Hexagon Card Game board (LM B01) per group (2–4 children), photocopied and glued on card stock
- One deck of Build A Hexagon cards (LMs B02a to B02d) per group, copied and glued on card stock. *Note:* For scaffolding, consider colouring the pattern block images on the cards to match the block colours.
- Set of pattern blocks for each group: at least 6 hexagons (yellow) and at least 15 each of the equilateral triangles (green), regular rhombi (blue), and trapezoids (red). (The beige rhombi and orange squares are not used in this game.)
- Hexagon Card Game board and set of cards, as well as a handful of pattern blocks, for the initial demonstration of the game
- Optional for the Quick Challenge extension: photos of pattern block combinations from photo bank

Overview

In this card game, a special deck of cards with pictures of pattern blocks is placed in a pile face down in front of the children. Children take turns selecting a card from the deck, choosing the corresponding pattern blocks, and using them to cover the outlines of the 6 hexagon shapes on the game board.

FIGURE B.10



Game Rules

The object of the game is to work together to completely cover each of the 6 hexagons with pattern blocks, according to the cards chosen. The game ends when all 6 hexagons are completely covered.

Player 1 chooses a card from the deck, picks up the corresponding pattern blocks, and places them on a hexagon on the game board. If the card chosen has enough pattern blocks to cover more than one hexagon, the player does so.

Player 2 takes a turn, following the same process as the first player and working on the same board. If the pattern blocks will not fit in the available space on an already-started hexagon, the player moves on to the next empty hexagon on the board.

The players continue taking turns, playing until all of the hexagons are completely covered.

TASK SEQUENCE

1. Introduce the game to the whole class by showing children the game board and the special deck of cards. Ask children what they notice about the shapes on the game board (6 hexagons). Briefly explain the object of the game.
2. Model how the game is played with the whole class. Choose a child to be your playing partner. Begin by choosing a card from the deck. Show the card to the children and ask: *What shapes do you see on my card? How many triangles [use name of whatever shape(s) are on the card drawn] do you see?* Then ask for help in choosing the corresponding pattern blocks to place on the Hexagon Card Game board. If the card chosen has enough pattern blocks to cover more than one hexagon, do so.
3. The other player then selects a card from the deck, and with help from the class, names the shapes and finds the corresponding pattern blocks to place on the outline of a hexagon on the game board. Encourage children to visualize and predict which shapes are needed to complete the hexagon.
4. For your next turn, choose a card, name and select corresponding shapes, then deliberately place the shapes incorrectly on the hexagon (or choose incorrect pattern blocks). The intent is to check for children's understanding of the game and to see whether children will "catch the error." If they are not picking up on the error, do a think-aloud: *Hmmm, does this shape fit here?*

Key Questions

- [When the hexagon is partially covered, point to the empty space and say:] What shape could fit in here, I wonder?
- [Depending on the card chosen, ask:] How many triangles [trapezoids, rhombuses] do you think it will take to cover one hexagon?
- What do you notice about the hexagon? [Prompt for number of sides, colour, and other attributes.]

5. Continue taking turns, playing until all of the hexagons are completely covered. In the last few turns, a specific block may be required to cover a hexagon. Rather than keep drawing to find a card with this shape, children can predict which shape will be needed, pick it up, and use it.
6. Provide each pair or small group of children with a game board, the special deck of cards, and a pile of pattern blocks. Allow children approximately 10 minutes to complete one or two rounds of the game. As they play, encourage children to visualize and predict which shapes are needed to complete the partially covered hexagons on the board.
7. Introduce variations depending on the age and interest of the children. You can make the game more competitive or co-operative depending on the group of children and their age level. By the time they are in Grade 2, children may want to play a more competitive version of this game, such as the variations “Team Up” and “One-Pointers” on page 124.

What to Look For, What to Listen For: Ongoing Assessment of Student Learning

Notice children’s geometric understanding of shape. Are they able to identify and name the various geometric shapes? Can children identify attributes of shapes such as the number of sides?

Watch for children’s strategies in the placement of blocks. Are there signs that children are able to move beyond trial and error? With experience as they play, children should be able to move towards being able to visualize which shape fits in the empty space when a hexagon outline is partially filled. Are children able to predict possible shapes or combinations of shapes that will work to complete the hexagon? This ability to predict which shape will fit in the empty space demonstrates spatial visualization and mental rotation as a player determines by visual inspection how a shape will need to be rotated in order to fit in the space before moving the

block. You might, for example, notice children turning a piece in the air as they place it correctly in an empty space; this move shows they are performing mental rotations. The ability to predict the result of a transformation such as a rotation is an important aspect of spatial thinking. Do children seem to have a plan in placing the pattern blocks? When children can anticipate the blocks needed and place them deliberately, they reveal that they are at an important stage in developing spatial understanding (Clements, 1999).

Supporting Learners

Pattern blocks provide important opportunities to help children explore, compose, and decompose geometric shapes. Provide children with opportunities to hold and manipulate the pattern blocks. Encourage children to name the shapes, count the shapes, and predict what shape(s) they will need to complete the outline. Encourage children to communicate their reasoning using spatial language, for example, “I just got three triangles. I hope you get a trapezoid! Then you can cover the hexagon!”

Help children who find the game challenging to gain better familiarity with the shapes. Have them practise filling hexagons with one type of pattern block at a time.

Other children may struggle to complete the hexagon. Help them to notice important features for filling in the missing pieces. For example, you might point out how the empty space of half of the hexagon could be filled with the trapezoid.

Encourage children to visualize which shapes create a hexagon and to apply their geometric understandings to solve new puzzles.

Extensions and Variations

Team Up

The game can be played competitively, with each team of children covering one side of the game board (3 hexagons per side). The game is over when one side is completely covered.

One-Pointers

The game can be played competitively with a point being scored whenever a player places a block that results in a hexagon being completely covered. Children begin to see combinations that will make up a hexagon. For example, if a hexagon is partially covered with a trapezoid and a rhombus, children soon learn that a triangle is needed to fill the empty space.

Hexagon Towers

Once round 1 is completed with each hexagon outline covered, leave the pattern blocks on the game board and keep the game going for round 2 by building on top of the existing hexagons. The game can end after round 2; however, we have seen students enthusiastically play on past the second round. As they build up on the hexagon shapes, children begin to notice further ways that shapes make up other shapes. Round 3 allows for opportunities to further compose and decompose shapes—not only the hexagon but for the trapezoid and rhombus as well. In round 3, for example, children may have the opportunity to place 3 triangles on top of a trapezoid, thus discovering further compositions of shape.

Go Fish

Small groups of children can play Go Fish with geometric shapes. Deal 4 cards to each child. Game begins with player 1 revealing one card in hand and choosing corresponding pattern blocks to cover a hexagon on the board. The next player can either place a card in hand or ask another player for a card with a specific shape and number of shapes. If the player does not have the requested card, the child can “go fish,” or choose from the cards that are face down in the centre of the table. This way, players can resupply their hands.

Find All the Ways

Challenge children to create and record as many different ways to compose a hexagon as possible, using their own set of pattern blocks and building up from the hexagon base (either on the game board or on top of the actual hexagons). Create a visual record of each child’s hexagon compositions. Draw attention to combinations that make up a hexagon. Call on children to share some of these combinations, for example, 3 triangles and 1 trapezoid. Create a visual record of how many triangles, rhombi, and trapezoids make up a hexagon. A table (Table 1) showing all possible combinations can be accessed on the website.



Quick Challenges

Create a series of quick challenges based on the game. For example, flash an image of 3 triangles and a trapezoid and ask children to use those pattern blocks to create a hexagon. This activity will strengthen children’s visual-spatial working memory. Sample photos are provided in the photo bank.

