CHAPTER 6

Iguanas

Building with Pattern Blocks

OVERVIEW

This lesson gives students experience with building, extending, and describing growth patterns. To begin, the students are introduced to a Stage 1 "iguana" built from pattern blocks. They predict what a Stage 2 iguana might look like and then extend the pattern to Stage 3 and Stage 4 iguanas. They record the information on a chart, look for patterns, and extend the patterns to predict the number of blocks needed for Stage 10 and Stage 100 iguanas. They repeat the experience for two other investigations with pattern blocks.

BACKGROUND

This lesson engages students in investigating growth patterns using a concrete material. The pattern blocks provide the concrete experience for the lesson, and the iguanas provide a context that helps students relate to the exploration. The focus of the lesson is on having students figure out patterns and then use them to make predictions beyond the information available to them.

The lesson described in this chapter wasn't extended to include either writing equations or making graphs to describe the patterns. However, it's possible to do both. For example, for the first iguana pattern, the total number of blocks used to build any iguana is equal to 4 (the number of blocks in the body) plus the stage number (the number of blocks in the tail). It's possible to write this relationship as an equation. Using t for the total number of blocks and s for the stage number, the equation could be $t = 4 + s$. Using other variables would result in other equations, such as $\triangle = 4 + \square$ or $y = 4 + x$. Also, plotting ordered pairs with the first number representing the stage number and the second the total number of blocks—(s, t), $(\square, \triangle)$, or (x, y)—would produce a graph of the relationship. If you're interested in including these two aspects, follow the procedures used in Chapters 1 and 5, in which students write equations and graph growth patterns for the *Two of Everything* exploration.

VOCABULARY

column, constant, variable, vary

MATERIALS

- pattern blocks, 1 bucket or plastic sandwich bag per table group
- optional: overhead pattern blocks

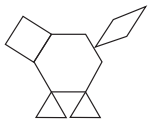
TIME

- three class periods

The Lesson

Day 1

"For this lesson, you'll need to use your imagination and try to figure out the pattern I have in my mind," I began as I carefully built a design on the overhead projector using overhead pattern blocks.



"It looks like a cat," Juan said.

"I think it looks like someone running with a kite in their hand," Karena suggested.

"It could be a puppy," Joanna said.

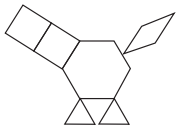
"Those are clever ideas, but I think my design is an iguana," I said.

"Oh yeah," Pete said, "I see the tail and the feet and the head."

"I have an iguana," Nancy said, "but its tail is really long."

On the overhead, I labeled the design *Stage 1* and asked, "If this is a Stage One iguana, think about what the next iguana, a Stage Two iguana, would look like." I waited to give students time to think and then called on Issac.

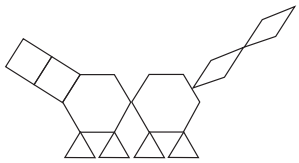
"It could have two squares for the head, a hexagon body, two triangle feet and one block for the tail," Issac suggested. I built his suggestion on the overhead underneath the first iguana.



"Like this?" I asked Issac. He nodded.

"That's a good idea for a Stage Two iguana," I said, "but it isn't what the Stage Two iguana in my mind looks like."

"Maybe it has two bodies and two heads and four feet and two tails," Tomas thought. "Every part would double." I changed what I had built for Issac's suggestion and confirmed with Tomas that I had represented his idea accurately.

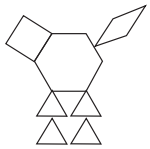


"That's another good idea," I said, "but it's not the Stage Two iguana that I'm thinking of."

Jasmine had a different idea. She said, "Maybe it would be the same as Stage One only there would be four feet."

"Where would the two extra feet go?" I asked as I removed the blocks I had used to build Tomas's suggestion.

"Underneath the other feet," Jasmine said. "It will be taller." I built Jasmine's idea and she nodded her agreement.

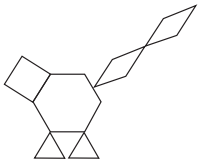


I said, "That's not it, either."

"I think since it's an iguana that the tail is what will grow," Brad said.

"Tell me how to build a Stage Two iguana using your idea, Brad," I said.

"The head and body and feet would all be the same and the tail would grow with another block," Brad explained. "Iguanas can have really long tails, so that's what I think." I changed Jasmine's iguana to reflect Brad's idea and labeled it *Stage 2*.



"This is exactly what my Stage Two iguana looks like," I said. "The other ideas were all possible, but this is the idea that I had."

To be sure that all of the students were following this discussion, I asked, "What's the same about the Stage One and Stage Two iguanas and what's different? Talk with your table group about the two iguanas I built." The students talked quietly with their partners and after a few moments I asked for their attention. Several hands were up. I called on Pete.

"The heads are both the same in Stage One and Stage Two. They're both orange cubes," Pete explained.

"The heads are orange squares in both Stage One and Stage Two?" I

asked, correcting Pete's use of the word *cubes* for *squares*. Pete nodded his agreement.

"The body is the same, too," Nina added.

"So are the feet," Wanda added.

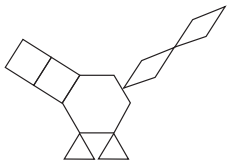
"And what's different?" I asked. Most students raised a hand.

"The tails are different," Karena said. "In Stage One the iguana has one block in its tail, and in Stage Two it has two blocks. Other than that everything is the same."

"Your idea is that the body remains the same and one block is added to the tail?" I asked to be sure I understood what Karena had explained. Karena nodded her agreement. "Put your thumb up if you agree with Karena, down if you disagree, and sideways if you're not sure," I said. Most students quickly put their thumbs up to indicate their agreement.

"So the only thing that varied from Stage One to Stage Two was the block that was added to the tail," I said. "What do you think the third-stage iguana will look like? Talk it over with your table group." I used the word *varied* because I thought that if children weren't familiar with it, they could figure out its meaning from the context of the sentence. Also, I planned to use the words *vary* and *variable* to describe the changing part of the pattern. After a few moments I asked for the students' attention.

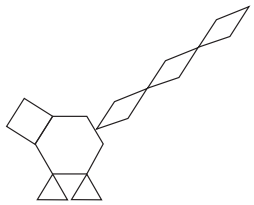
"I think Stage Three will have two orange squares for heads, one hexagon for the body, two triangles for feet, and two white diamonds for the tail," Kasey explained. There wasn't room to build Kasey's idea on the overhead, so I drew his suggestion on the board.



"Please explain why you think that," I said to Kasey.

"Well," Kasey said and paused for a moment, "I think the tail will increase one time and then the head the next time."

Joanna had another idea. She said, "I think Stage Three will be the same as Stage One and Two except you add one more white diamond for the tail. The pattern seems to be about the tail, not some other part." I drew Joanna's suggestion on the board next to Kasey's.



I said, "Kasey and Joanna have two different ideas, and both are possible. It's hard to read my mind and figure out my pattern for changing a design when you only have a little bit of information."

"What does your Stage Three iguana look like?" Jess asked.

"My idea is the same as Joanna's," I responded. A buzz of conversation broke out in the room.