CHAPTER SIX
17 KINGS AND 42 ELEPHANTS

Overview

Margaret Mahy's book *17 Kings and 42 Elephants* employs playful, rhythmic language in the context of a royal procession through an exotic jungle. In this activity, students enjoy the book for its vibrant batik illustrations and semantic delights. The story then becomes a springboard for a division problem with remainders: The students figure out how seventeen kings can share taking care of forty-two elephants.

Materials

- *17 Kings and 42 Elephants*, by Margaret Mahy (New York: Dial Books for Young Readers, 1987)

Time

- one class period

Teaching Directions

1. Read the story aloud to the class.

2. Introduce the problem. Ask students to work individually or in pairs to determine how many elephants each king would get if the kings shared them equally. Tell students to write about how they solved the problem.

3. In a class discussion, have students share their solutions with the class.

Teaching Notes

Children especially enjoy *17 Kings and 42 Elephants* for its vibrant batik illustrations and semantic delights. The book describes a royal procession of seventeen kings and forty-two elephants through an exotic jungle. The language is infectiously rhythmic and the illustrations are a visual delight.

The students must figure out how seventeen kings can care for forty-two elephants. This is an example of a sharing problem. The students know the total number and the number of groups and they must determine how many elephants will be in each group. What to do with the remainder, or leftover elephants, poses an interesting challenge for the students.

The Lesson

I gathered the students on the floor in the front of the room so they would be able to see easily the illustrations as I read aloud *17 Kings and 42 Elephants*, by Margaret Mahy. I held the book up and the colorful cover caught the children's attention immediately. Holding the book so the students could see the illustrations, I began reading aloud. I encouraged the children to savor the language and the art as I read aloud.

Cindy noted that "baggy ears like big umbrellaphants" sounded like the words in "Eletelephony," a poem she had read. I agreed that poets like to play with words and even invent them.

The class giggled with delight when I read, "Big baboonsters, black gorillicans / Swinging from the branches by their hairy knees."

When I finished reading the book, and the children shared their reactions to the language and art, I focused the class on the mathematical potential in the story. I asked, "How many kings were there?"

"Seventeen!" the children chorused.

"How many elephants?" I asked.

"Forty-two!"

"Subtraction!" exclaimed a half dozen children, confident they were anticipating my next question.

"We could do that," I agreed. "We could ask: How many more elephants are there than kings?" I paused for a moment, as I noticed some children starting to solve that problem. Several figured quickly that the answer was twenty-five.

"There's another problem we can consider," I commented as I started writing on the board:

If the kings divide up the elephants equally, how many elephants would each king get?

"Uh oh." This classroom murmur was followed by individual speculations: "Seventeen plus seventeen." "Five each." "No, six."

To focus the children on making sense of the problem, I asked, "How many elephants are there altogether?" The class responded with "forty-two." "How many kings?" They responded with "seventeen."

I asked, "Will each king get an elephant?"

"Yes, five," Addie responded.

"No, seven each," Robby quickly corrected her.

I didn't comment about whether either student was right or wrong. Instead I said, "You'll need to decide and then show on paper how you figured it out. The problem is to figure out how many elephants each king would get if they shared them equally. Your solution should explain how you reasoned."

I paused to give students time to ask questions, then continued, "If you think you want to discuss this with someone else, then you can work with a partner. Or you may work alone if you'd prefer."

OBSERVING THE CHILDREN

Afton and Derryl decided to work together. Afton got a calculator and punched in 42 ÷ 17. When he saw 2.4705882 for an answer, he was startled.

"What does it mean?" he asked Derryl. Derryl shrugged his shoulders.

Afton and Derryl then came to me. "We have no idea what the answer means," Afton said, showing me the calculator.

"If your answer doesn't make sense," I replied, "then try doing it another way."

Afton sighed. I decided to take this opportunity to talk with the boys about the frustrations sometimes provided by calculator answers.

"Show me what you did," I said. Derryl punched in 42 ÷ 17 and again got 2.4705882. Both boys groaned.

"Does any part of this number make sense?" I prodded.

"Nooo," the boys chorused.

"Hey wait, the two makes sense!" Derryl exclaimed.

"What do you think the two tells you about the problem?" I asked.

"I know," Afton said. "It means that forty-two divided by seventeen is two."

"What else does the two mean?" I asked, wanting to encourage both boys to make sense of what they were figuring.

Afton paused a moment and thought, then said hesitantly, "I think it means each king will get two elephants."

"Is there a way you can check to see if that makes sense?" I probed.

Both boys looked pensive as they thought about what I asked. "Well," Afton began, "if the two means each king gets two elephants and there are seventeen kings, then I could count by twos seventeen times and see how many elephants."

"But that's not right," Derryl said, "or else the calculator would just say two."

Meanwhile, Afton was counting by twos. "It's thirty-four elephants and there's forty-two in the story."

"Hey," Derryl said, "if each king gets three elephants then that would be . . . thirty-four and ten is forty-four, that means seven more, . . . , um, . . . fifty-one elephants."

"That's too many," the boys said together. They both paused and then Derryl said, "All those numbers after the two must be the leftover elephants!"

"That's weird, because really there are eight leftover elephants, not that funny number," Afton said.

I explained, "The decimal on the calculator represents a number that's bigger than two but less than three. You must learn how to interpret these numbers in order to use them. In the meantime, you'll need to think about another way to solve the problem." Afton looked glum.

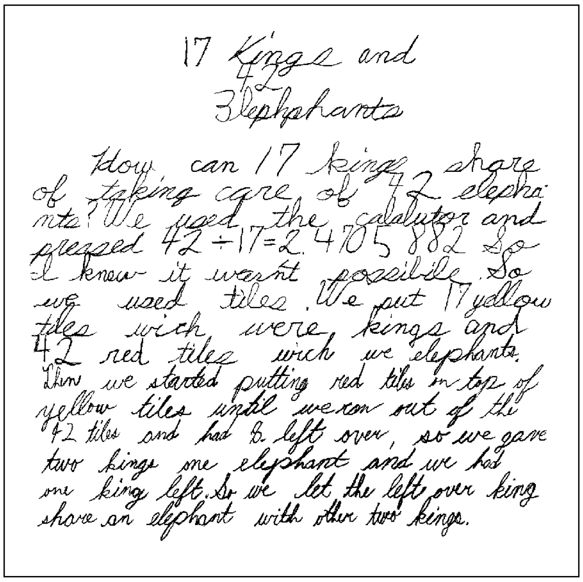
"I know!" Derryl said. "Let's get tiles." The boys returned to their seats. (See Figure 6–1.)

Janie and Cami, also frustrated by the calculator, asked for help. I offered no immediate answer but suggested, "Think about another way to solve the problem." I left the girls.

When I returned a few minutes later, Janie reported, "We think each king gets three elephants."

I responded, "OK, let's check it out. What should we do first to check to see if your answer makes sense?" The girls talked this over a moment.

Cami suggested, "Write down a three." I did as Cami suggested.


17 Kings and 42 Elephants

How can 17 kings share of taking care of 42 elephants? We used the calulator and pressed 42 ÷ 17 = 2.4705882 So I knew it wasn't possible. So we used tiles. We put 17 yellow tiles wich were kings and 42 red tiles wich we elephants. Then we started putting red tiles on top of yellow tiles until we ran out of the 42 tiles and had 8 left over, so we gave two kings one elephant and we had one king left. So we let the left over king share an elephant with the two kings.

Figure 6–1 *After they abandoned the calculator, Afton and Derryl used tiles to solve the problem.*

"What does the three mean?" I probed.

"That three means three elephants for one king," Janie explained. "Now write down another three."

"That takes care of elephants for how many kings?" I asked.

"Two," Janie said.

"How many threes do you need to write down to check your answer?" I asked.

"Seventeen," Cami answered.

"And what do seventeen groups of threes equal?" I asked.

Janie grabbed a calculator and punched in 17×3. "Fifty-one," she reported. "Too much."

Cami suggested, "How about two?" She wrote *2* on her paper seventeen times.

"There's another way," Janie insisted. She punched 2×17 into the calculator. When 34 appeared, Cami moaned, "Oh, that's not right, either." Cami, for whom numbers were only right or wrong, had no notion of how to look at a remainder. But she was conscientious and willing to keep working. Her method was to keep trying numbers until she got the one that she was looking for. If one number didn't work, then she'd try another—without taking any time to think about why the first number was incorrect. In this case, she did not look at whether thirty-four was too large or too small; all she noticed was that it wasn't forty-two.

Cami suggested, in more of a question than a hypothesis, "Maybe it's one?" She quickly started writing down a row of *1s*.

But Janie stopped her. "No, thirty-four is OK. That leaves eight elephants left over." She grinned. "We can have the kings cut up the remainder." The girls giggled at Janie's suggestion for the leftover elephants. In explaining her own thinking to Cami, Janie clarified what she herself knew.

Stopping to talk with Carol, I asked, "What are you going to do with the leftover elephants?"

Kareem overheard from a nearby table. "Make elephant stew," he quipped.

"Feed them to the tigers," said Ely, sitting next to Kareem.

I commented, "If you're going to use a mean solution, you need a nice one, too. Animal rights people will be upset if you are unkind to elephants."

Ely obliged and included two possible scenarios. He wrote:

$17 \div 42 = 2\ R8$ $\qquad 17\overline{)42}$ with quotient $2\ R8$

I would say that each king should get two elephant and let the rest eight elephants free.

Mean Sulution: We will feed the eight remaining elephants to tigers and crocodiles.

Although part of his symbolism was reversed, his answer was right. (See Figure 6–2.)

Cindy had a more humane touch in her solution. She wrote: *Each king would get two elephants. The eight elephants that are left [go] to the tigers as slaves and tell the tigers not to eat them.*

I commented to her, "You need to show how you figured that out." Cindy added: *I*

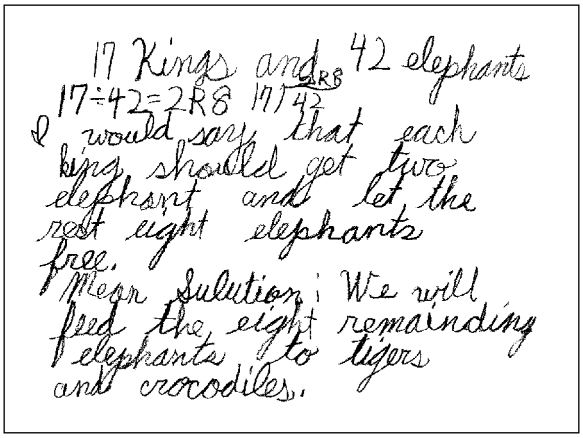


Figure 6–2 ***Ely provided two scenarios for what he might do with the extra elephants.***

got this answer by adding 17 + 17, and 8 were left over.

Gabby explained the problem of the leftover elephants: *We can not cut out the elephants. So I will gave the left over elephants to the zoo.* Her picture showed the seventeen kings walking away from the zoo, where they had left eight (sad) elephants. "They don't like being left behind," Gabby explained.

Taylor wrote: *If there [are] 8 Elephants I will get 8 [new] kings. then it is fair.*

Kareem corrected him, "If there were eight elephants I would get four more kings. Then it would be fair."

When I checked on Robby and Gib, Robby insisted, "Each king gets seven elephants."

"Let's see," I said. "Show me your thinking." Robby shrugged.

"Seven elephants equals how many kings?" I asked as I helped Robby and Gib construct the following chart:

7 elephants = 1 king

14 elephants = 2 kings

21 elephants = 3 kings

28 elephants = 4 kings

35 elephants = 5 kings

42 elephants = 6 kings

"Wow!" exclaimed Robby, admiring the chart. But his admiration was short-lived. "Uh oh, I'm in trouble. I didn't use up enough kings."

"If there were *six* kings, that would work," I said, emphasizing "six" and pointing to it on the chart.

"The solution is the others didn't want to be kings," Robby suggested.

Gib liked this solution. "They were probably scared of elephants," he added.

"OK, write it up," I agreed. I accepted Robby and Gib's solution.

At another table, I asked Harrison to explain his thinking. Harrison said, "Each king would get two elephants."

"Any leftovers?" I asked.

"No."

"How many elephants do you have?"

"I've got forty-two."

"But you only used thirty-four."

Harrison counted on his fingers. "Eight elephants left over."

"That's good that you did it all in your head," I said. "Now you need to write it down, so I can see your thinking."

A CLASS DISCUSSION

After all of the students had found solutions to the problem, I gathered them at the front of the room to share their thinking. I began by saying, "Even though there is only one answer, there are many ways to get it. I'm interested in having you hear all the different ways you used."

Jody went first. She showed her system of using tally marks and circles. (See Figure 6–3.)

Breanna demonstrated how she subtracted seventeen twice to get the answer. (See Figure 6–4.)

Troy commented to Breanna, "Ours are sort of the same, but backwards." He explained how he had added two seventeen times. (See Figure 6–5.)

Beth offered an unusual solution for the

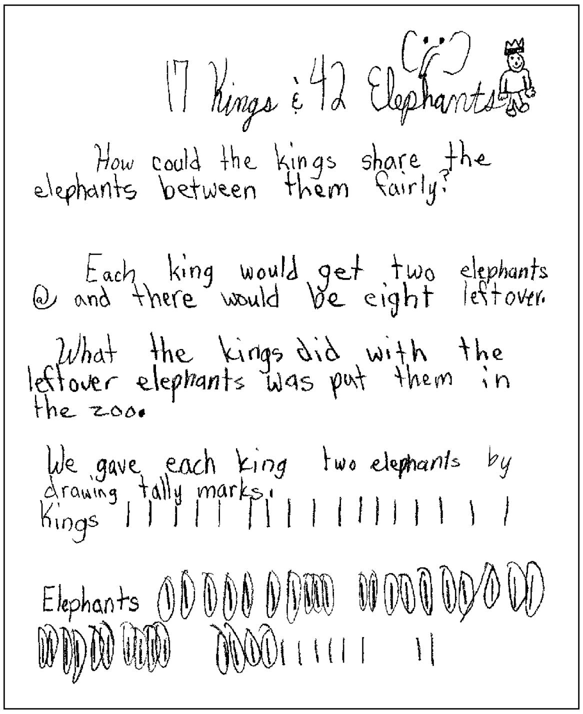


Figure 6–3 ***Jody explained her system of using tally marks.***

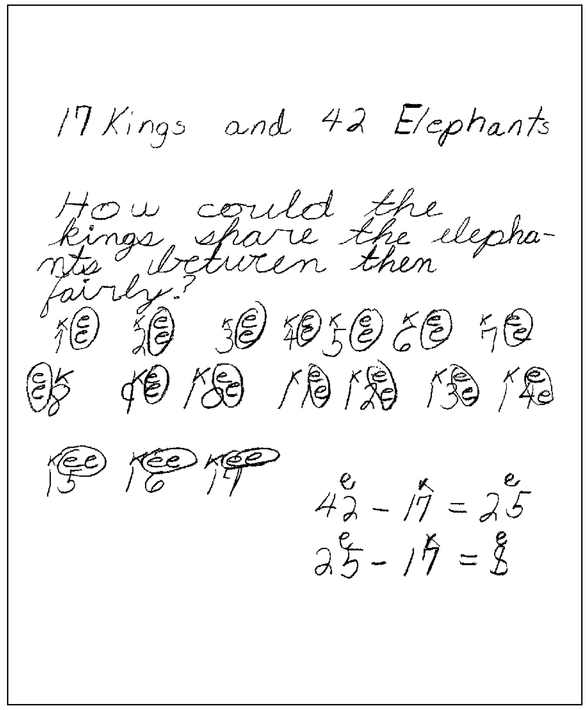


Figure 6–4 ***Breanna subtracted to figure out the answer.***

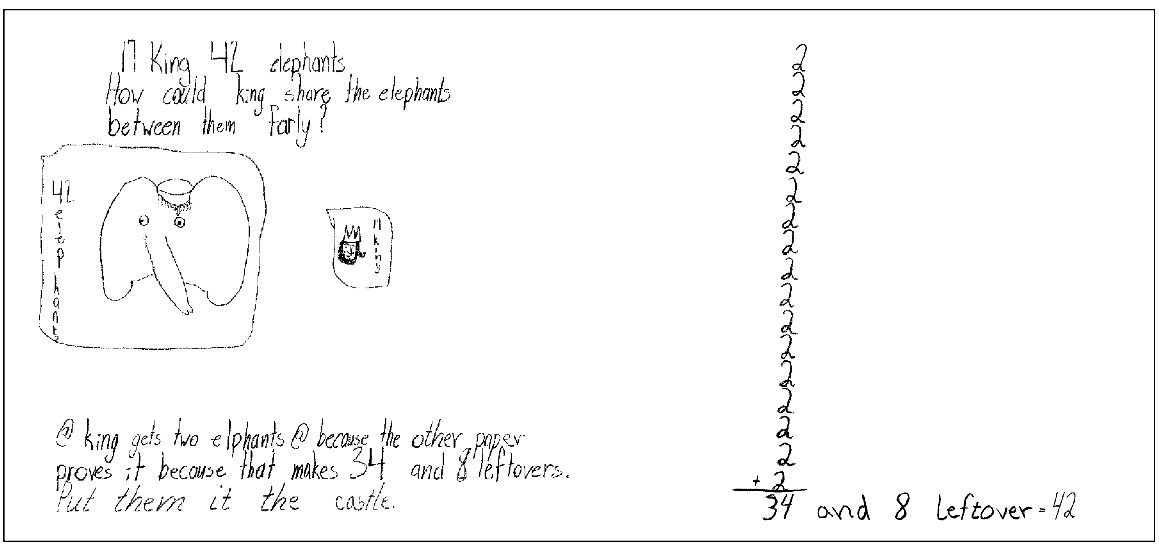
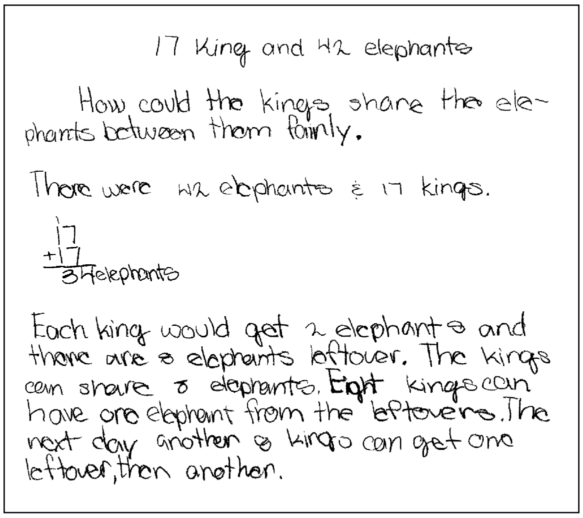


Figure 6–5 ***Troy used addition to solve the problem.***

leftover elephants. "I added seventeen plus seventeen and got thirty-four," she explained. "That means there are eight leftovers. I think it would be fair to rotate the leftover elephants." She wrote: *The kings can share 8 elephants. Eight kings can each have one elephant from the leftovers. The next day another 8 kings can get one leftover then another.* (See Figure 6–6.)

Afton, who had followed Beth's argument carefully, objected, "Then one king would get one elephant by himself. That's not fair sharing."

Beth was frustrated, unsure of how to



17 King and 42 elephants

How could the kings share the elephants between them fairly.

There were 42 elephants & 17 kings.

17
+17
34 elephants

Each king would get 2 elephants and there are 8 elephants leftover. The kings can share 8 elephants. Eight kings can have one elephant from the leftovers. The next day another 8 kings can get one leftover, then another.

Figure 6–6 ***Beth decided that the extra elephants should rotate among the kings***

answer Afton. I volunteered, "You're right, Afton. On the first day, eight kings each get an extra elephant; then on the second, eight different kings get the extras; but on the third day there is only one king left who hasn't had an extra elephant. But he can get his turn along with seven kings who already had an extra elephant on the first day and can have extras again."

"I get it," Afton said, smiling. "That's neat." Beth grinned.

"Robby and Gib have a different solution," I said, wanting to give status to the two boys for the thinking they did. Robby grinned as he announced, "Six kings got seven elephants each." He paused, "That's forty-two elephants because six times seven equals forty-two. We checked with a calculator."

"But that's only six kings!" protested several children.

"Because eleven kings were scared and didn't want any elephants," Gib announced, offering their punch line. He and Robby laughed, enjoying having surprised their classmates. Other children joined in the laughter, also enjoying this method of turning a mathematics problem into a shaggy-dog story.

The children were engrossed in this problem. They were intent on examining the thinking and problem-solving processes of their peers. They were anxious both to communicate what they knew and to learn from what their classmates knew.

It was nearly time to end math class and I asked, "Are there any more solutions?" Kareem volunteered.

"I had eight leftover elephants," he said, "and so I got four more kings. That means I have a new story. It's called *Twenty-One Kings and Forty-Two Elephants*."

I smiled. "That's great! Two new stories: Kareem's is *Twenty-One Kings and Forty-Two Elephants*. Robby and Gib's is *Six Kings and Forty-Two Elephants*."

Questions and Discussion

▲ ***What was your reason for allowing Robby and Gib to solve a problem different from the one you assigned?***

One of my goals is to recognize and nurture children's thinking. The boys were struggling to make sense of a difficult concept. Robby recognized his answer wasn't right, so when he came up with a clever solution for getting himself out of a numerical jam, I wanted to celebrate his humor and ingenuity, not stamp it as a 'wrong answer.'"

What's important is to listen to the children's thinking and help them verbalize their reasoning. The point is not merely for children to get answers but for them to communicate what they know and how they arrived at those answers.