

Place Value (What is the Value of the Place?)

Second Grade

Formative Assessment Lesson

Designed and revised by Kentucky Department of Education Mathematics Specialists
Field-tested by Kentucky Mathematics Leadership Network Teachers

Created for the sole purpose of assisting teachers as they develop student understanding of Kentucky's Core Academic Standard through the use of highly effective teaching and learning.

Not intended for sale.

What is the Value of the Place?

This Formative Assessment Lesson is designed to be part of an instructional unit. This task should be implemented approximately two-thirds of the way through the instructional unit. The results of this task should then be used to inform the instruction that will take place for the remainder of your unit.

Mathematical goals

This lesson unit is intended to help you assess how well students are able to recognize the value of the place in a number. It will help you to identify students who have the following difficulties:

- **Recognizing place value of ones, tens, hundreds.**
- **Use correct mathematical vocabulary to explain place value to a partner.**
- **Make connections of place value to previously taught lessons.**
-

Common Core State Standards

This lesson involves *mathematical content* in the standards from across the grades, with emphasis on:

Number and Operations in Base Ten 2.NBT

- **Understand place value.**

This lesson involves a range of *Standards for Mathematical Practice*, with emphasis on:

2. Reason abstractly and quantitatively.
7. Look for and make use of structure.

Introduction

This lesson is structured in the following way:

- Before the lesson, students work individually on an assessment task that is designed to reveal their current understandings and difficulties. You then review their work and create questions for students to answer in order to improve their solutions.
- Students work in small groups on collaborative discussion tasks to represent 3-digit numbers in multiple ways. Throughout their work, students justify and explain their decisions to their peers.
- Students return to their original assessment tasks, and try to improve their own responses.

Materials required

Each individual student will need:

- Two copies of the assessment task *What's the Value?*

Each small group of students will need the following resources:

- Card Set A numeral cards with Card Set A Base Ten Cards
- A set of arrow cards.
- Card Set B numeral cards with Card Set B Base Ten Cards

Time needed

Approximately 15 minutes before the lesson (for the individual assessment task), one 40 minute lesson, and 15 minutes for a follow-up lesson (for students to revisit individual assessment task). Timings given are only approximate. All students need not complete all sets of activity cards. Exact timings will depend on the needs of the class.

Before the Lesson

Assessment task: What's the Value (15 minutes)

Have students do this task individually in class a day or more before the formative assessment lesson. This will give you an opportunity to assess the work, and to find out the kinds of difficulties students have with it. You will be able to target your help more effectively in the follow-up lesson. Depending on your class you can have them do it all at once or in small groups (they should still work individually.)

Give each student a copy of the assessment task *What's the Value*.

Today you are going to work on a task about place value. Look at the number at the top of your paper. Circle all the statements in the boxes that are true about the number. Explain why you think each statement is true or why you think it is not true. If you are not sure about all of your answers, it is okay. We are going to do an activity that will help you get better at place value.

It is important that the students are allowed to answer the questions without your assistance, as far as possible.

Students should not worry too much if they cannot understand or do everything, because in the next lesson they will engage in a similar task, which should help them. Explain to students that by the end of the next lesson, they should expect to answer questions such as these confidently. This is their goal.

Assessing students' responses

Collect students' responses to the task. Make some notes about what their work reveals about their current levels of understanding, and their different problem solving approaches. Partner/Group students with others who displayed similar errors/misconceptions on the pre-assessment task.

We suggest that you do not score student's work. The research shows that this will be counterproductive, as it will encourage students to compare their scores, and will distract their attention from what they can do to improve their mathematics.

Instead, help students to make further progress by summarizing their difficulties as a series of questions. Some questions on the following page may serve as examples. These have been drawn from commonly identified student misconceptions.

We suggest that you write a list of your own questions, based on your students' work, using but not limited to, the ideas that follow. You may choose to write questions on each student's work. If you do not have time to do this, select a few questions that will be of help to the majority of students. These can be written on the board at the end of the lesson before the students are given the post assessment task.

The solution to all these difficulties is not to teach one particular way of showing or determining the value of a multi-digit number, but to help students explore and discover a variety of ways that work in different situations and make sense to them.

Below is a list of common issues and questions/prompts that may be written on individual initial tasks or asked during the collaborative activity to help students clarify and extend their thinking.

Common Issues:	Suggested questions and prompts:
Students group cards based on hundred place only.	<ul style="list-style-type: none"> • <i>Why do you think those are a match?</i> • <i>I see that number is 362 and there are 3 hundred flats represented, but what about the rest of the blocks, did you count all those too?</i> • <i>How are you tracking that you have counted all the blocks?</i> • <i>Is there a way we can make sure we have counted everything?</i>
Students are selecting the wrong arrow cards. For example, if the number is 243, the students just may get out the 2...4...and 3 rather than 200...40...3	<ul style="list-style-type: none"> • <i>Did you line your arrows up?</i> • <i>What does it mean when we line our arrows up and the numbers cover each other up?</i> • <i>Look at you 2, what is the value of the two in you number and what is the value on your arrow card?</i>
Drawings are not represented correctly in set C.	<ul style="list-style-type: none"> • <i>How are you tracking that you have counted all the blocks?</i> • <i>Is there a way we can make sure we have counted everything?</i>
	<ul style="list-style-type: none"> •

Suggested lesson outline

Collaborative Activity: Match Base Ten Representations and Build Numbers with Arrow Cards

Strategically group students based on pre-assessment data in to groups of two or three. With larger groups, some students may not fully engage in the task. Group students with others who displayed similar errors/misconceptions on the pre-assessment task.

Give each group Set A of numeral cards, arrow cards, and base ten cards

Introduce the lesson carefully:

I want you to work as a team. Match each of the base ten cards to the correct numeral card. Take turns building the numeral using the arrow cards. Each time you do this, explain your thinking clearly to your partner. If your partner disagrees with your placement then challenge him or her to explain why. It is important that you both understand why each number is built the way it is. There is a lot of work to do today and you may not all finish. The important thing is to learn something new, so take your time.

Your tasks during the small group work are to make a note of student approaches to the task, and to support student problem solving. As you monitor the work, listen to the discussion and help students to look for patterns and generalizations.

Make a note of student approaches to the task

You can then use this information to focus a whole-class discussion towards the end of the lesson. In particular, notice any common mistakes. Partners should be engaged in checking their partner, asking for clarification, and taking turns. When calling on students make sure you allow the struggling groups to share first.

Support student problem solving

Try not to make suggestions that move students toward a particular approach to the task. Instead, ask questions to help students clarify their thinking. Encourage students to use each other as a resource for learning.

If one student has built a number in a particular way, challenge their partner to provide an explanation.

If you find students have difficulty articulating their decisions, then you may want to use the questions from the *Common Issues* table to support your questioning.

If the whole class is struggling on the same issue, then you may want to write a couple of questions on the board and organize a whole class discussion.

Place Card Set B

As students finish with matching Place card set A and can explain their work, hand out card set B. These are developed to be more difficult. There are three representations of each number using base ten cards which manipulate the tens and ones.

Do not collect Place card set A. An important part of this task is for students to make connections between different ways of building the numerals.

As you monitor the work, listen to the discussion and help students to look for patterns and generalizations.

Place Card Set C

As students finish with Card Set B and can explain their work, hand out Card Set C. Students will now be challenged to draw two different representations of each number. Do not take up the previous sets of cards. Students may use these for guidance in making their decisions.

Sharing Work (10 minutes)

When students get as far as they can with the card sets, allow groups to compare their work to other groups. Students are permitted to ask questions of one another and to make changes to their own group's work.

Extension activities

Extension 1: Challenge those students who complete card set C to go back and add a third representation of the number.

Extension 2: Provide the students with Card Set D and let them explore representations in the thousands.

Plenary whole-class discussion (10 minutes)

Give each student a mini-whiteboard, marker, and eraser.

Conclude the lesson by discussing and generalizing what has been learned. The generalization involves first extending what has been learned to new examples, and then examining some of the conclusions students come up with.

Allow groups to bring up some of their work samples and show the numbers they built. Discuss why they think that number is built. Have students explain their process for deciding which number goes in which place.

Improving individual solutions to the assessment task (10 minutes)

Give the students a new copy of the original task, *What's the Value?*

*Think about what you have learned during this lesson.
Using what you have learned, try to improve your work.*

To focus your students, refer to the common issues chart. Use the questions which reflect the greatest need(s) of your students. You may choose to write these questions on the board, state them out loud with the whole group, ask them of individuals as you move around the room, or work with small groups.

Resources:

Arrow Cards

<http://www.kentuckymathematics.org/intervention/doc/2008/Arrow%20Card%20Template%20-thous.pdf>

(Adapted From: Uncovering Student Thinking in Mathematics Grades K-5: 25 Formative Assessment Probes for the Elementary Classroom, Tobey and Minton, Corwin Press, 2011)

What's the Value?

243

Circle *all* the true statements about this number, and explain your thinking.

A) 2 tens and 43 ones

B) 243 ones

C) 2 hundreds 403 ones

D) 24 tens and 3 ones

E) 2 hundreds and 43 ones

F) 1 hundred and 143 ones

Card Set A

347

Card Set A

254

Card Set A

136

Card Set A

477

Card Set A

Card Set B

502

Card Set B

482

Card Set B

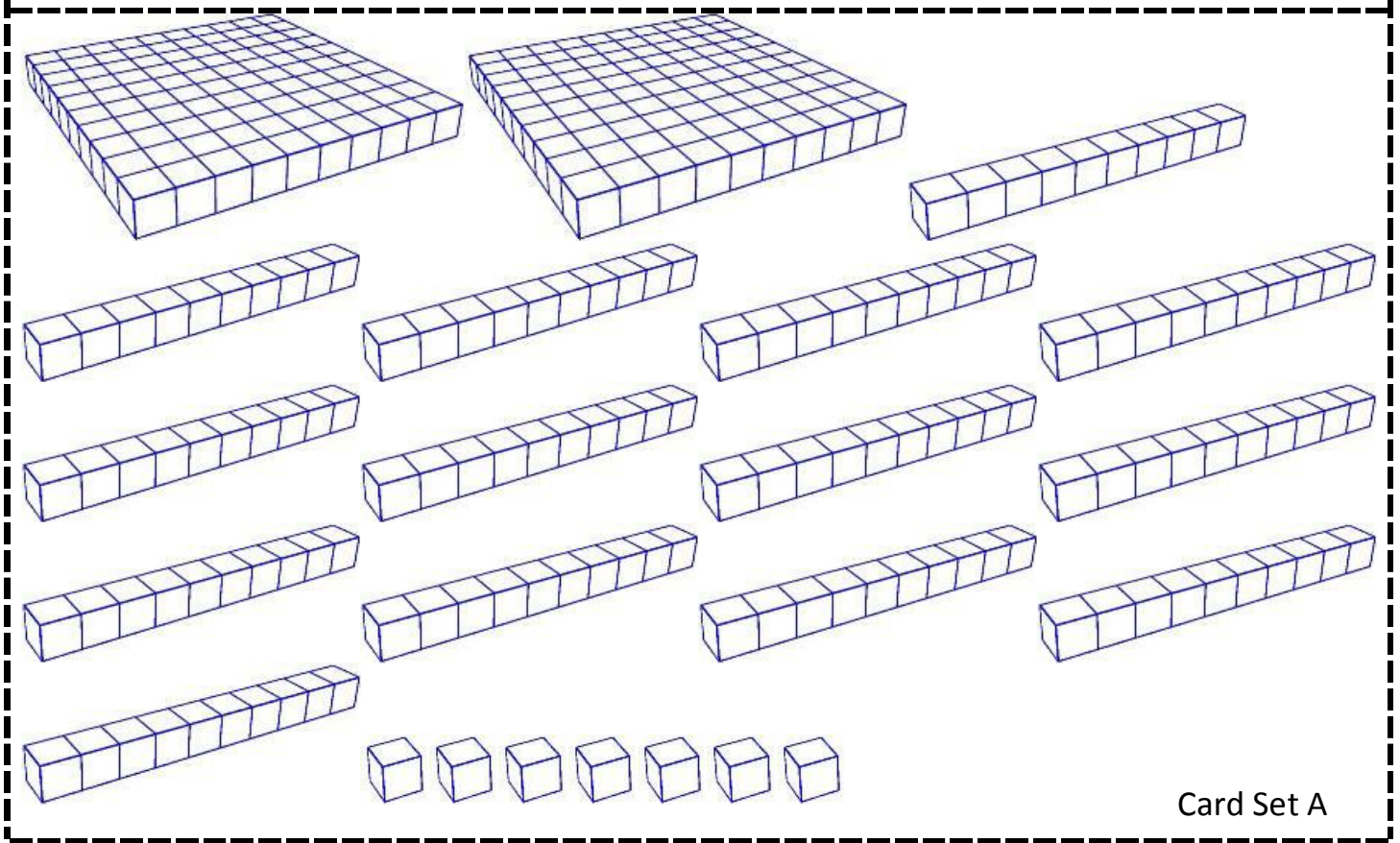
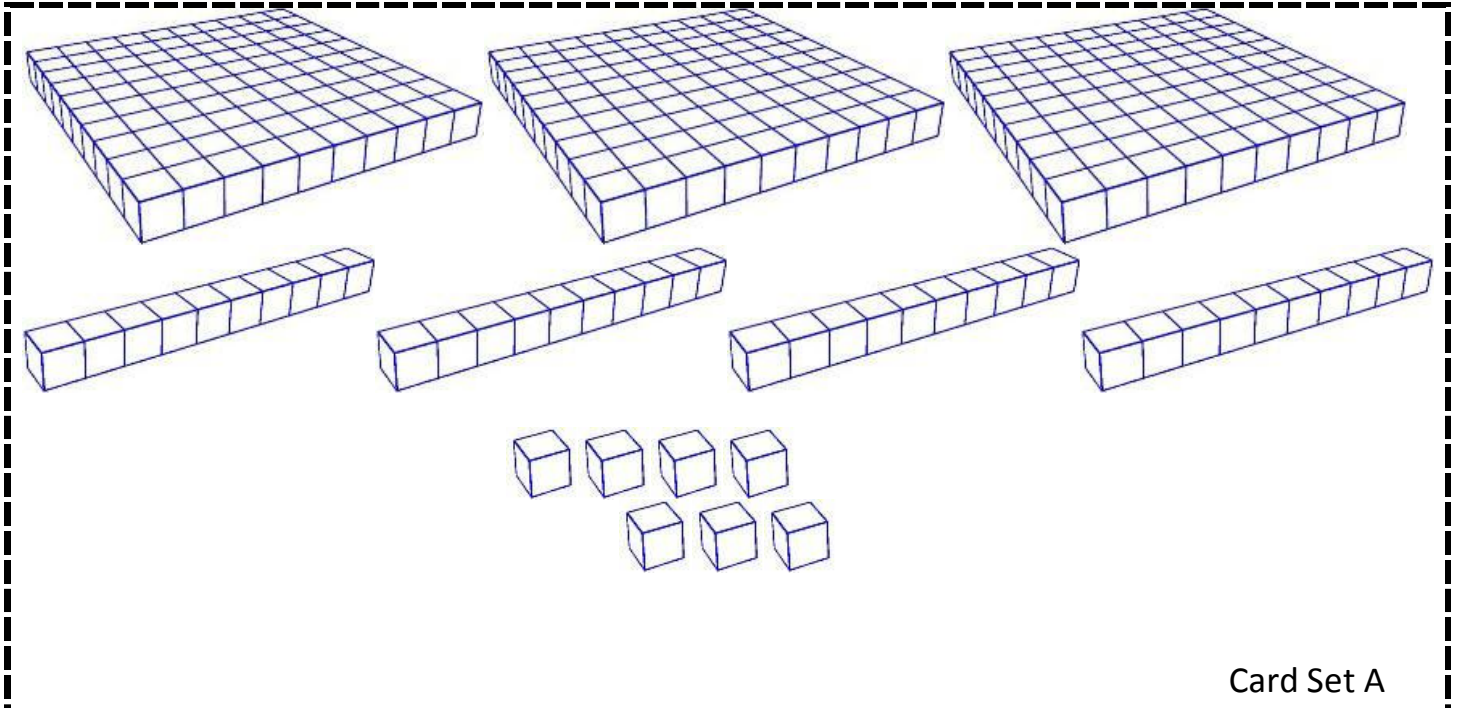
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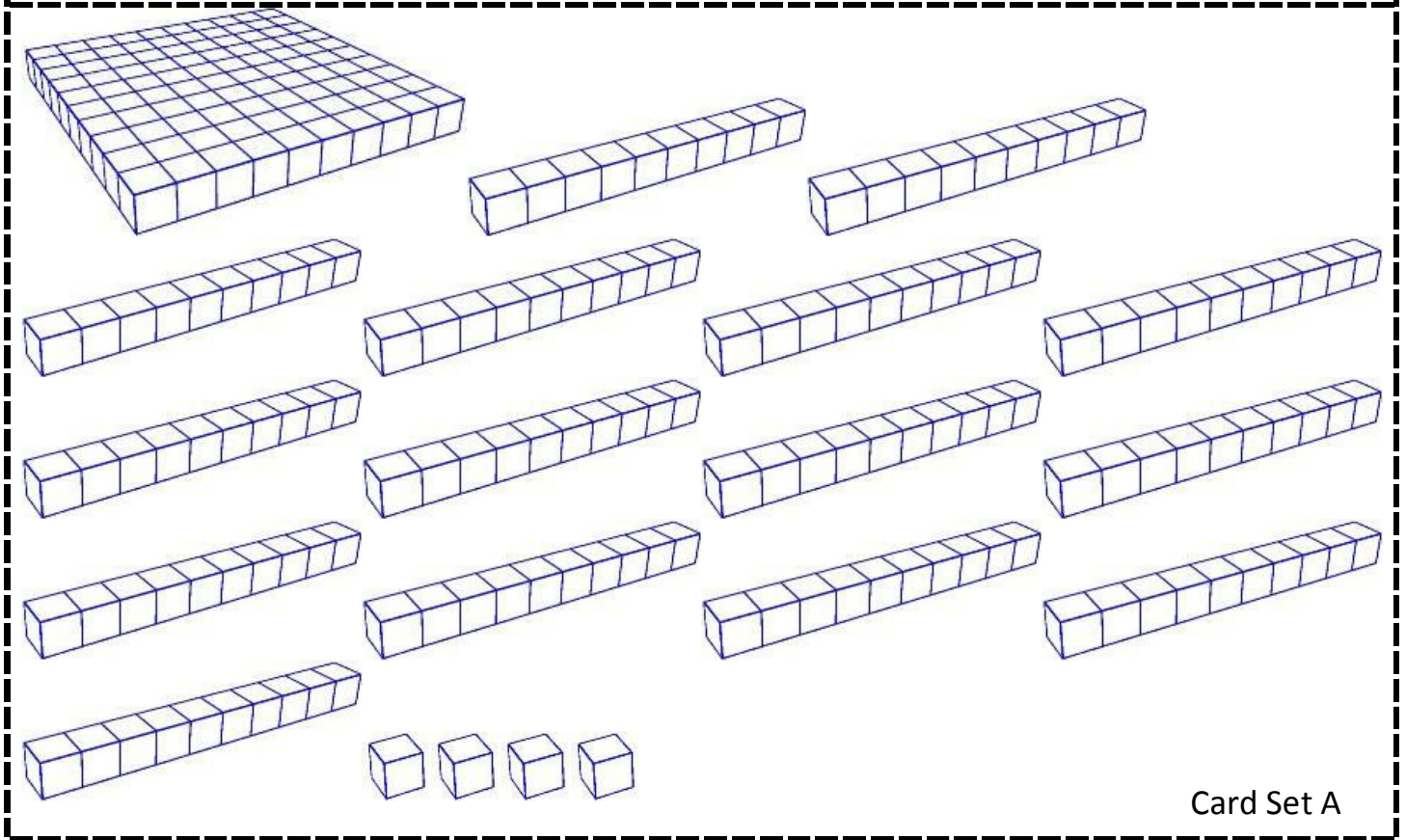
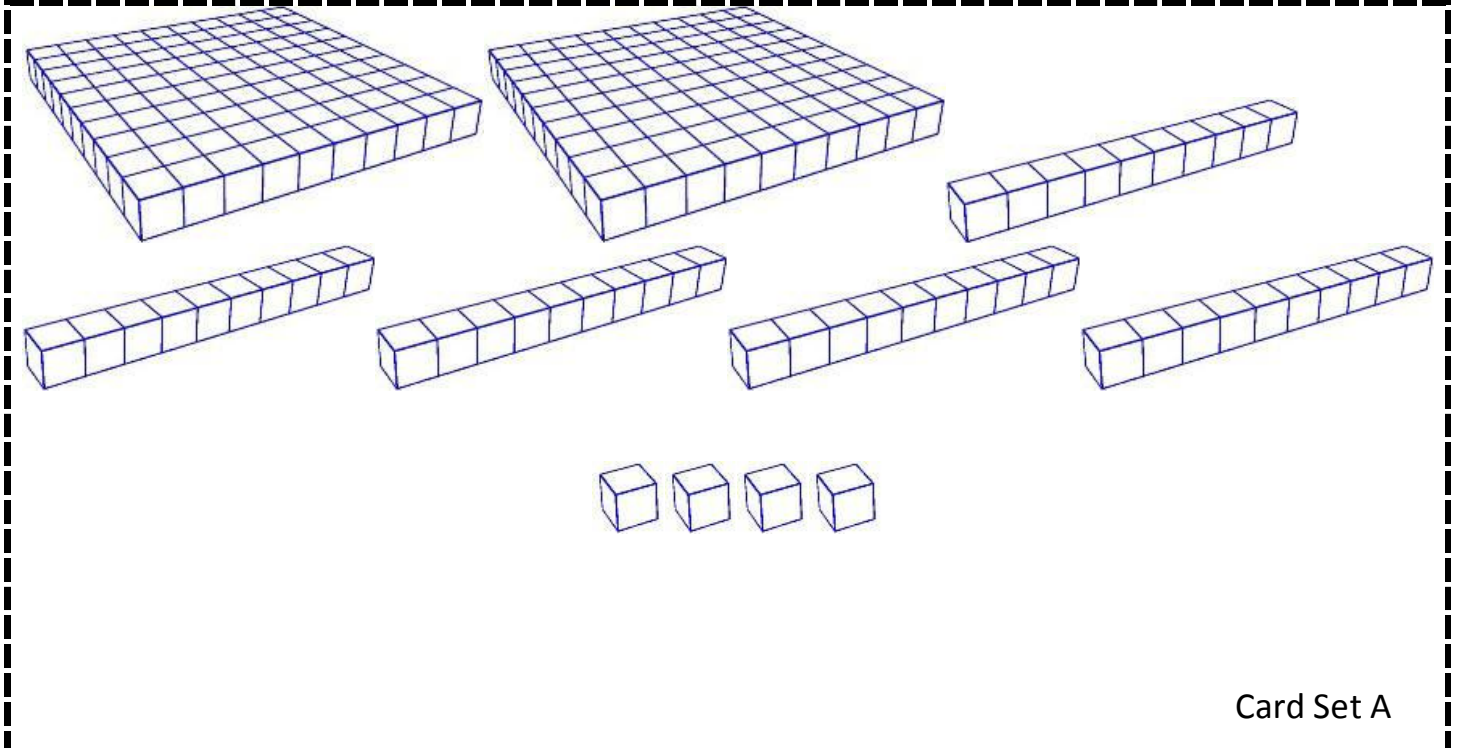
Card Set B

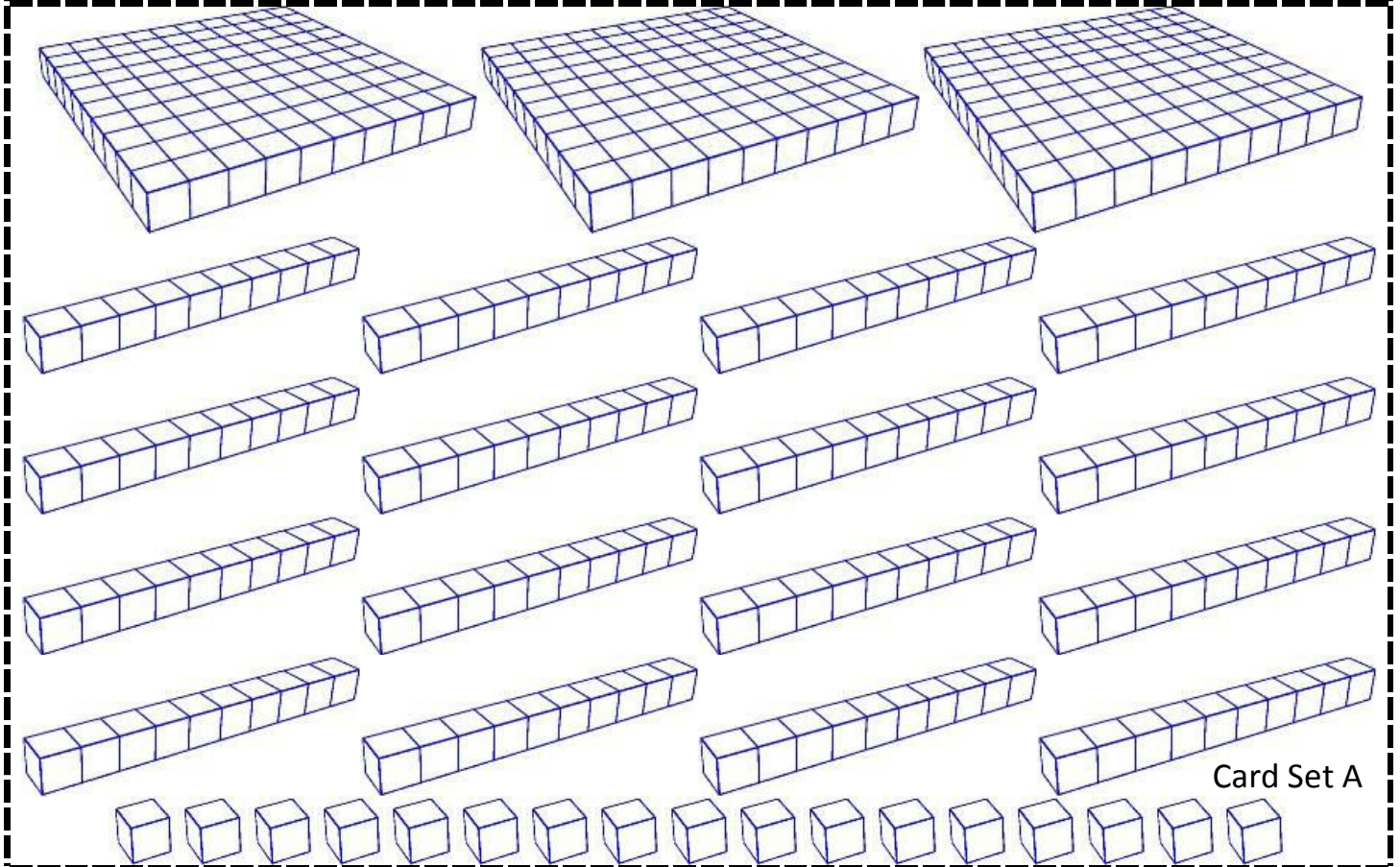
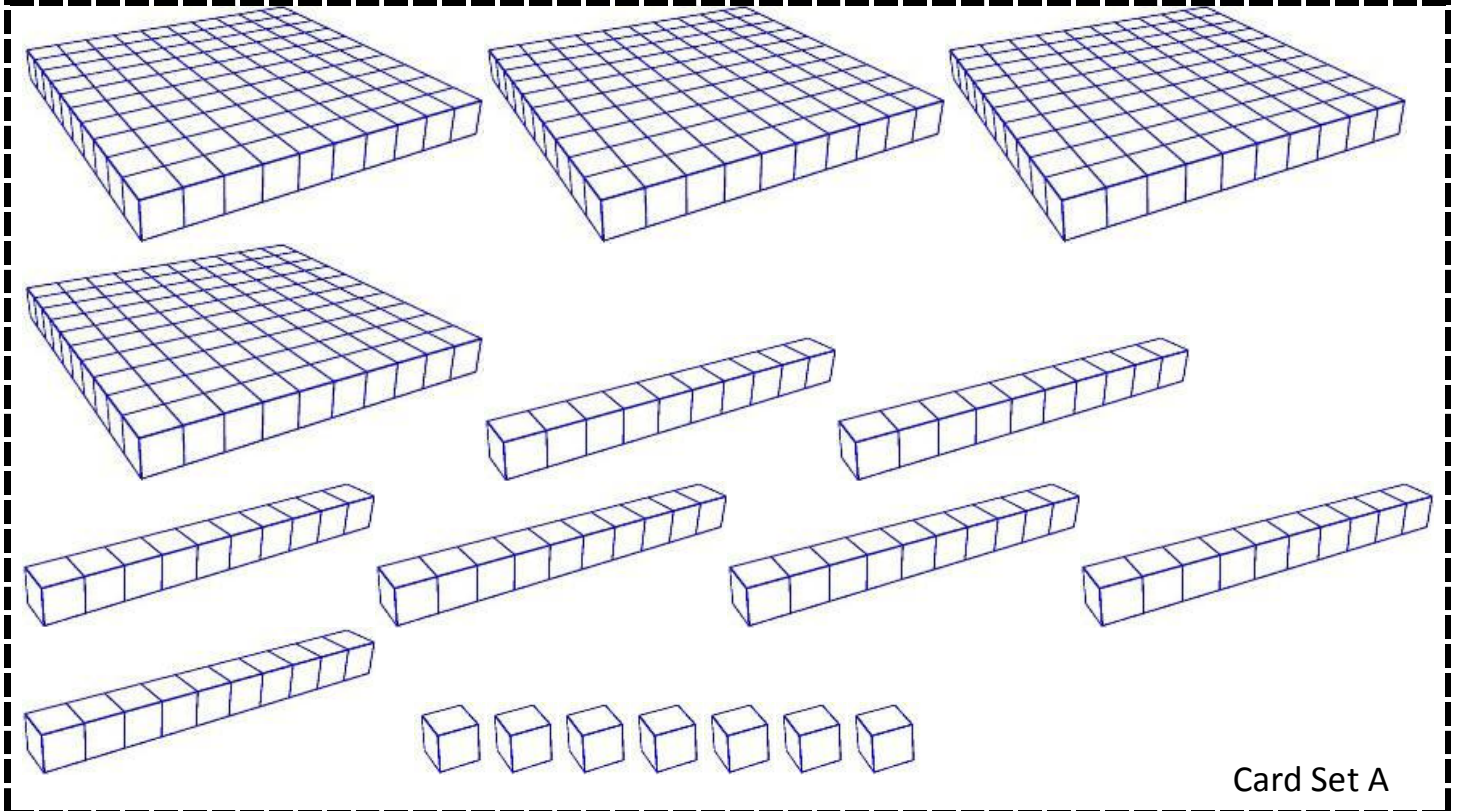
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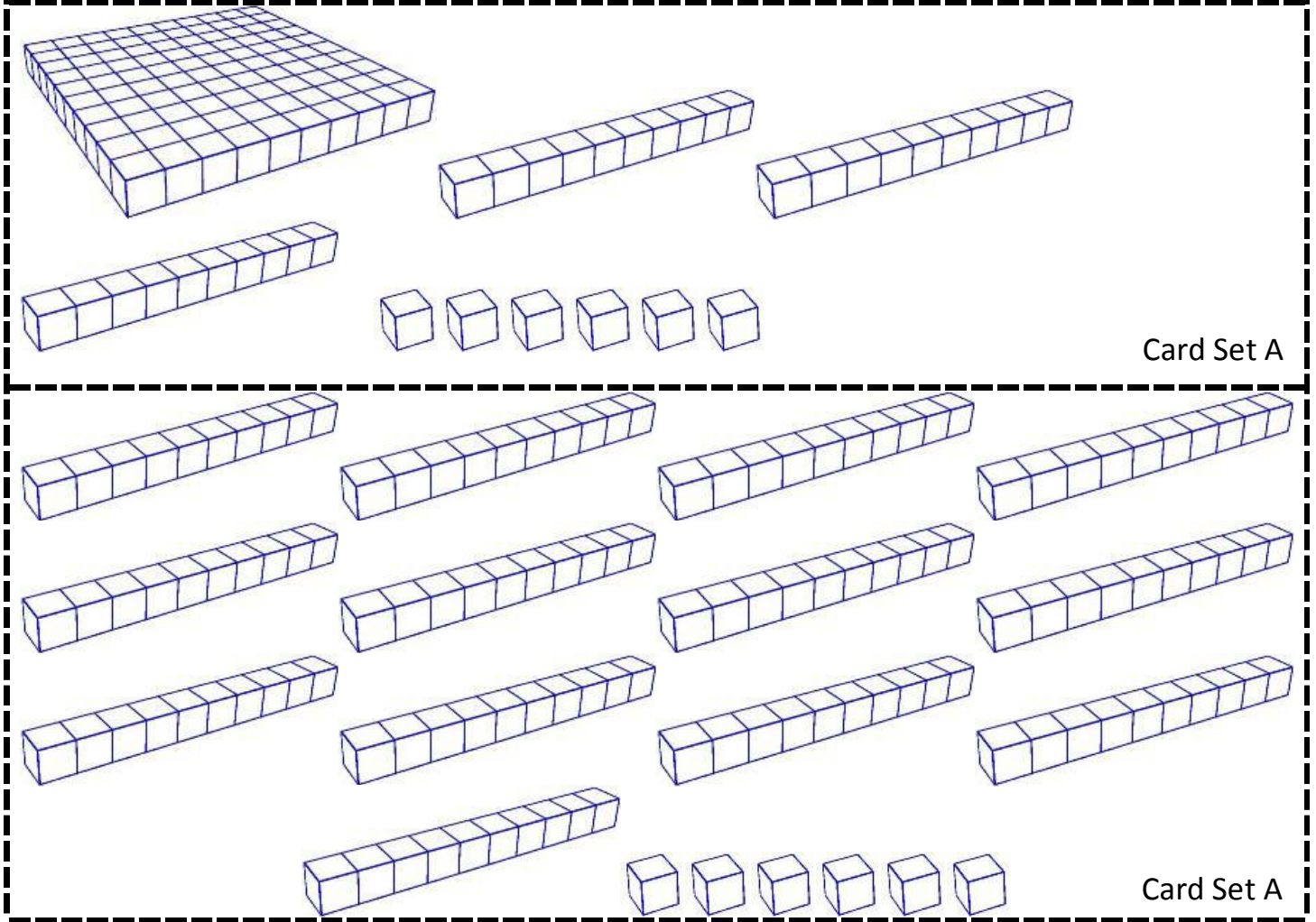
Card Set B

Card Set A



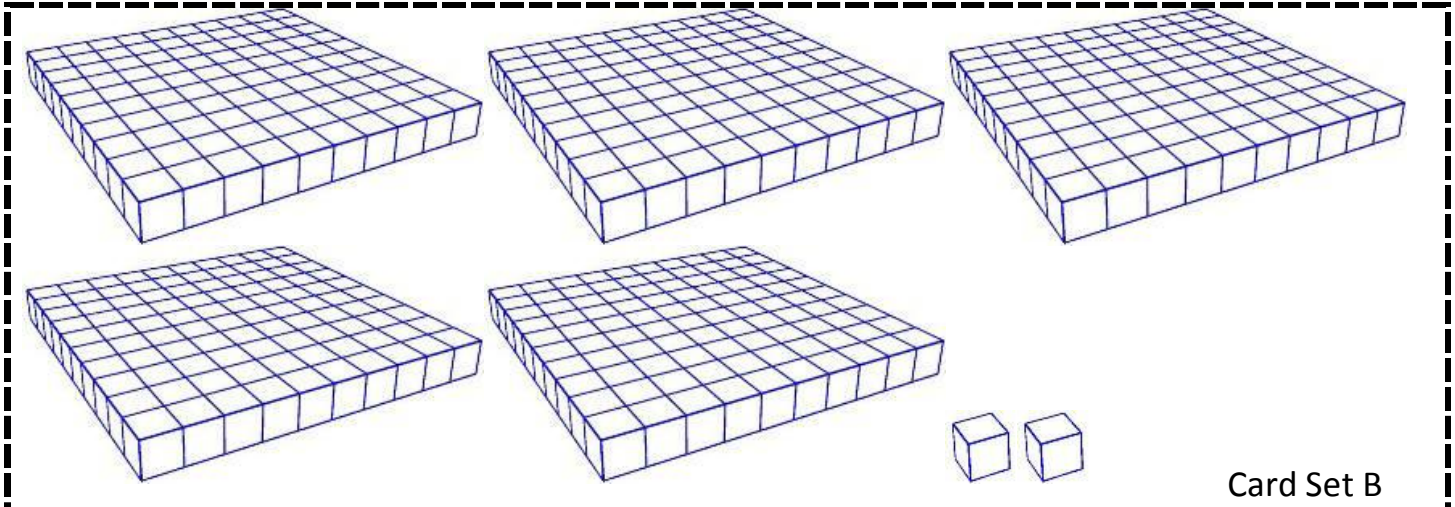




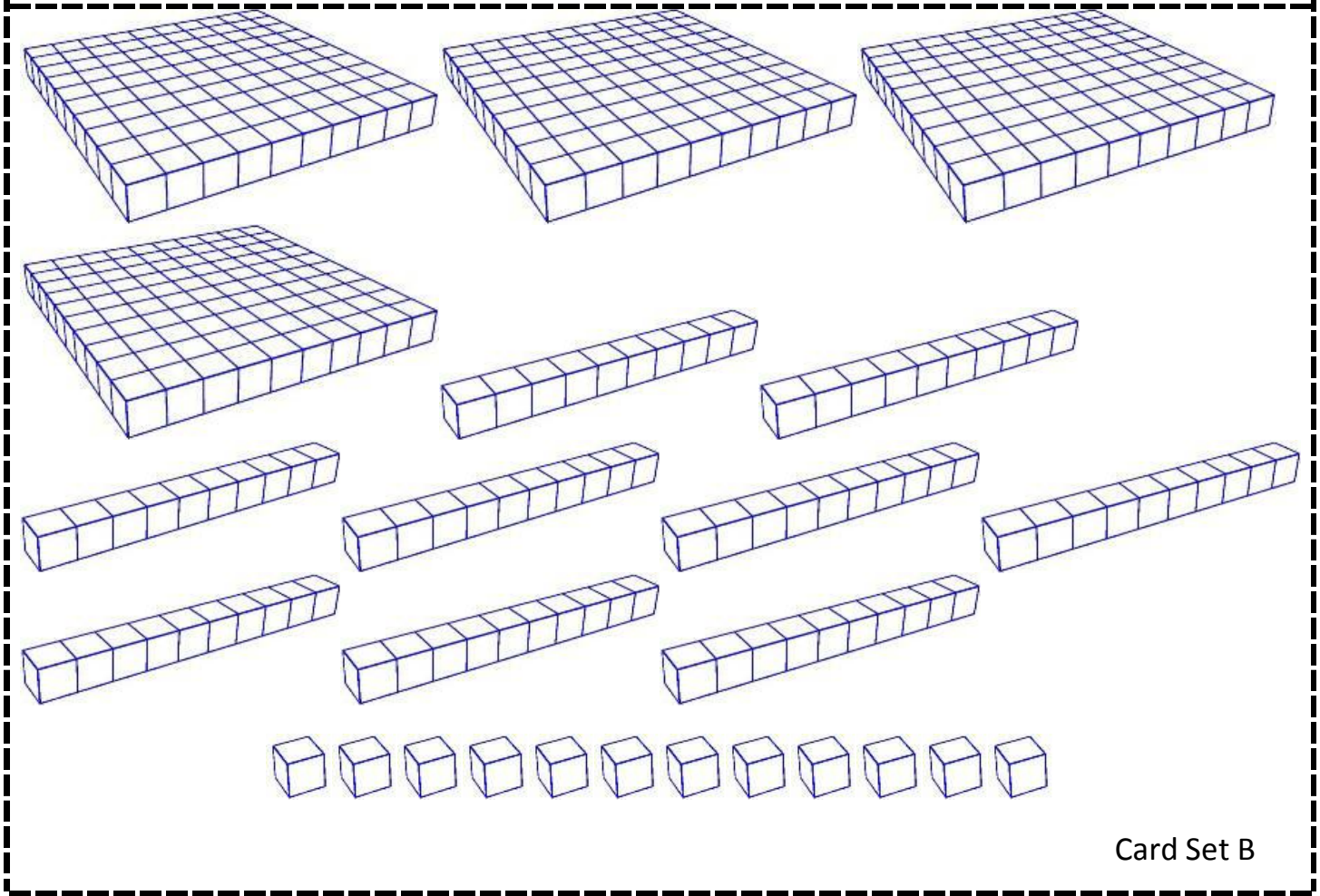


Card Set A

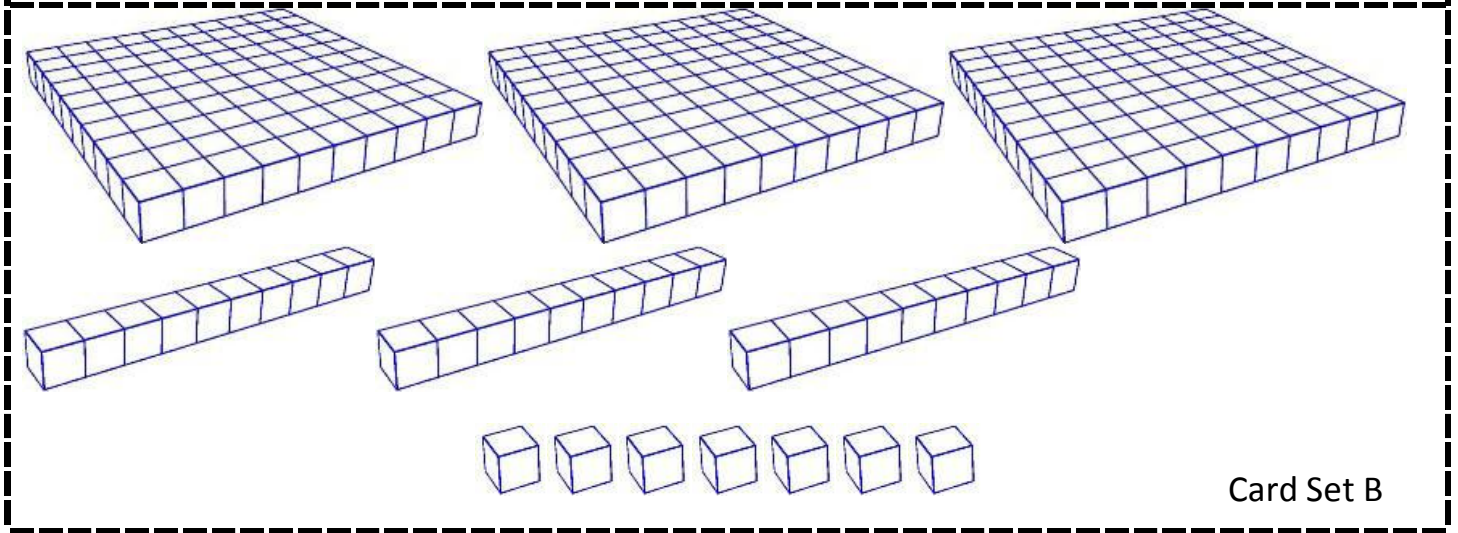
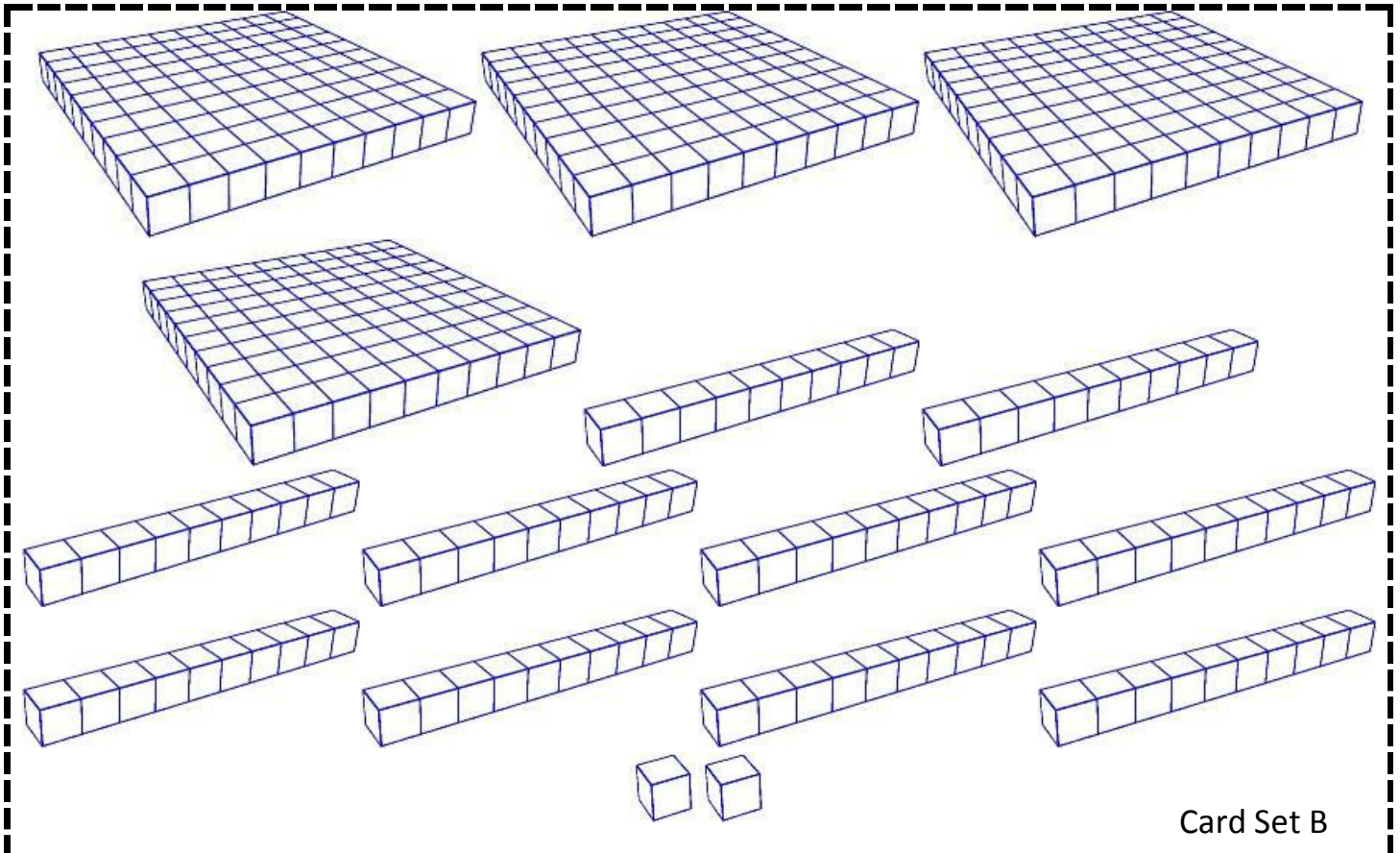
Card Set A

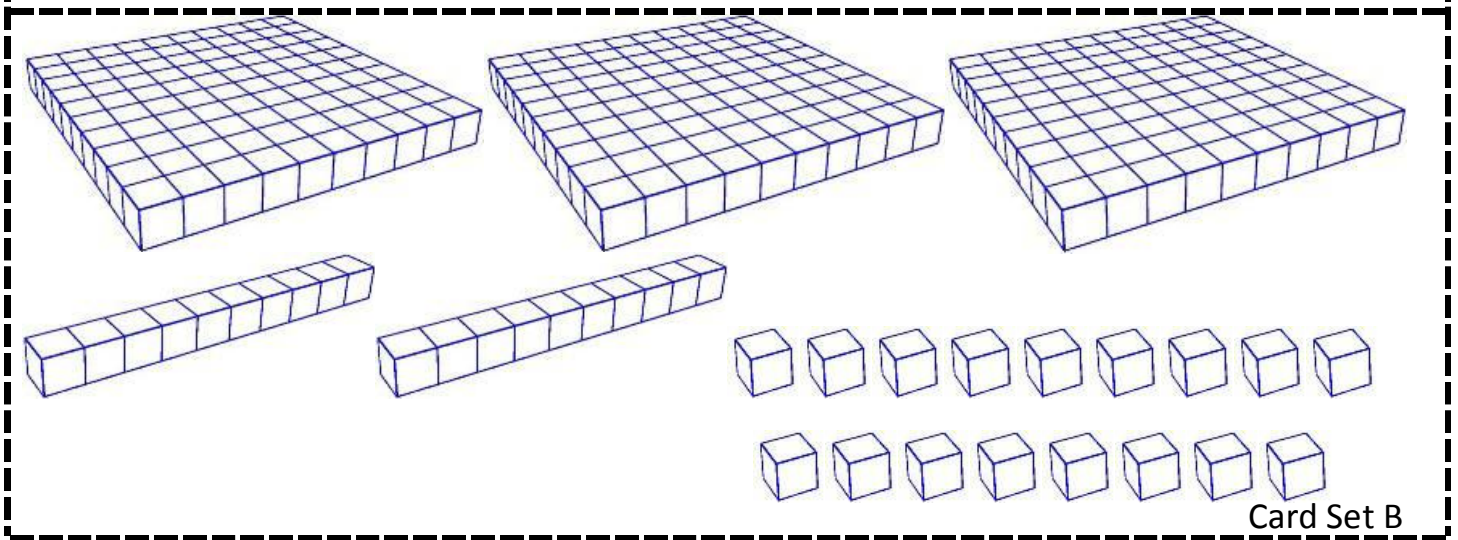
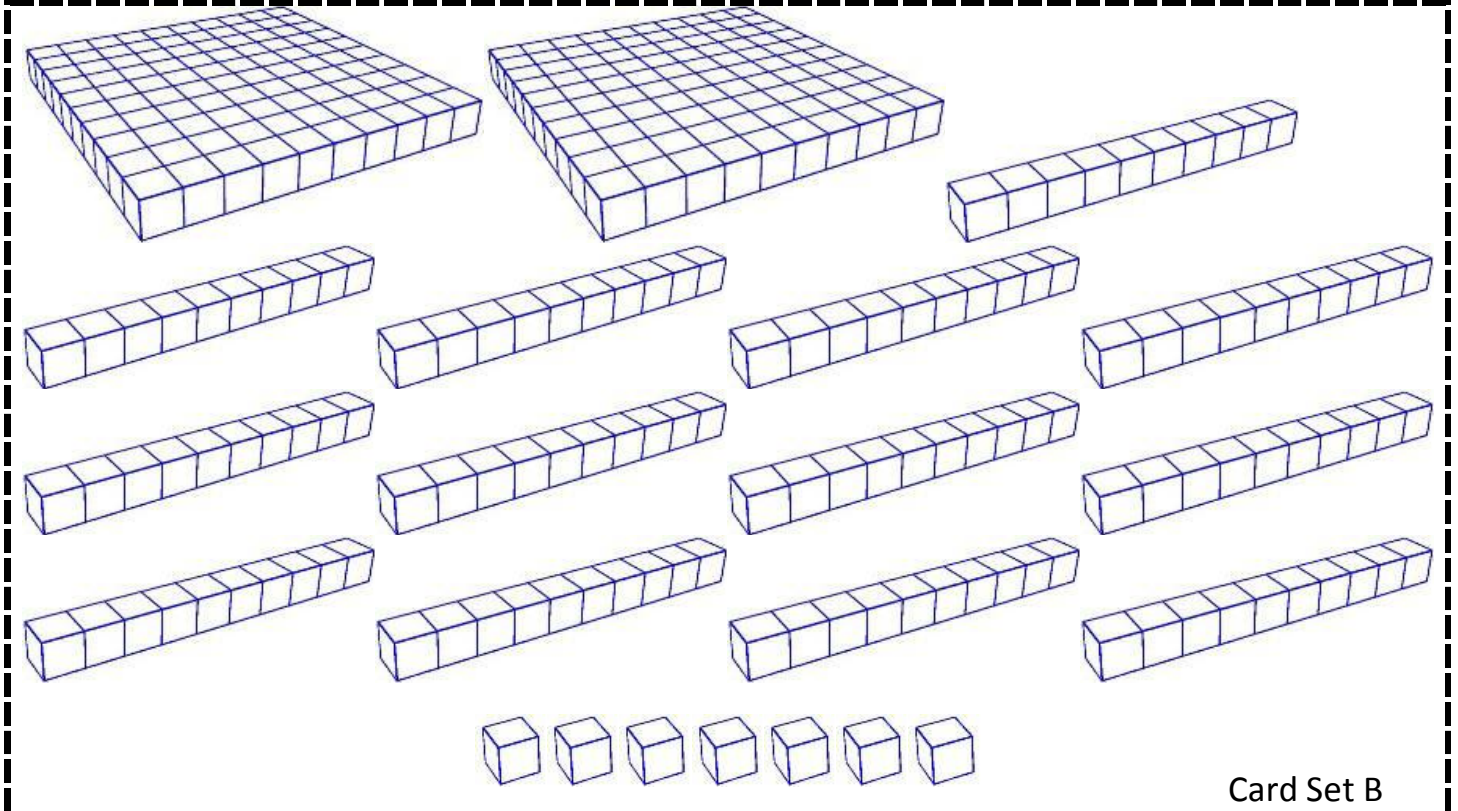


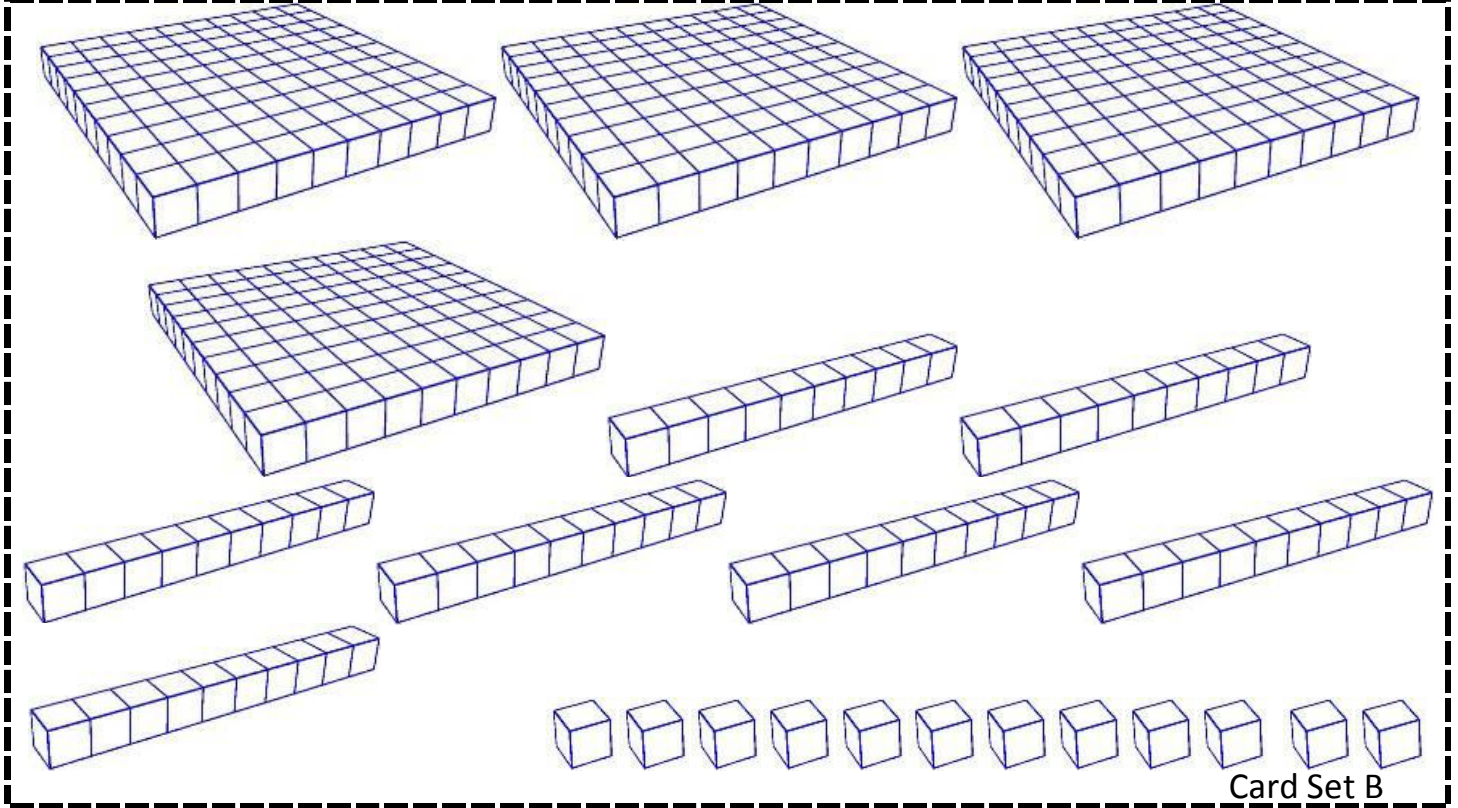
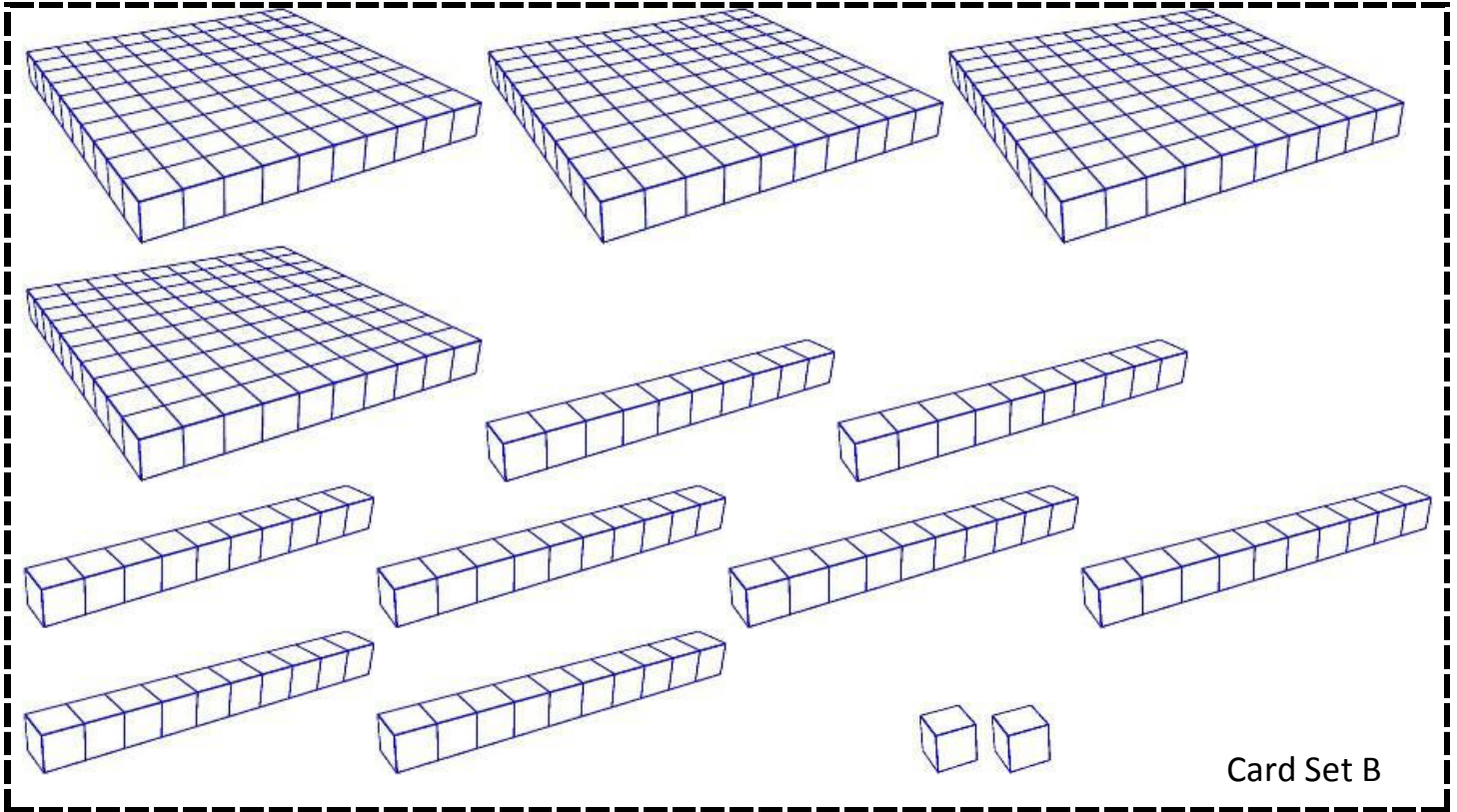
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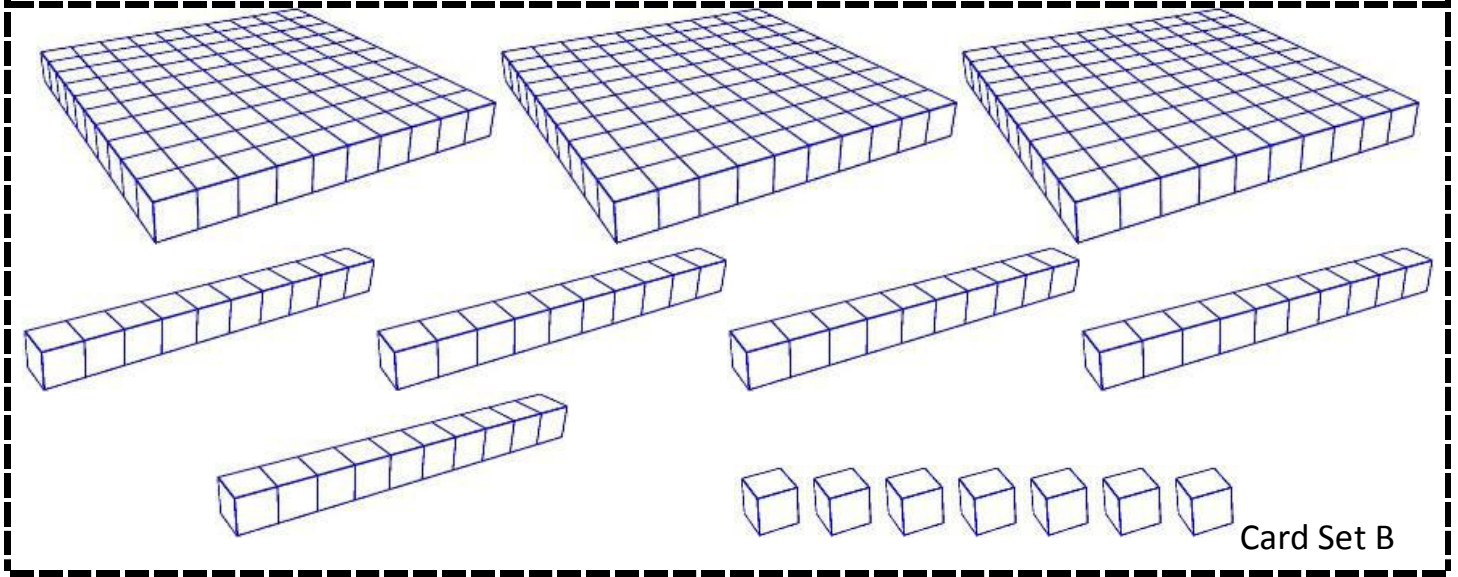
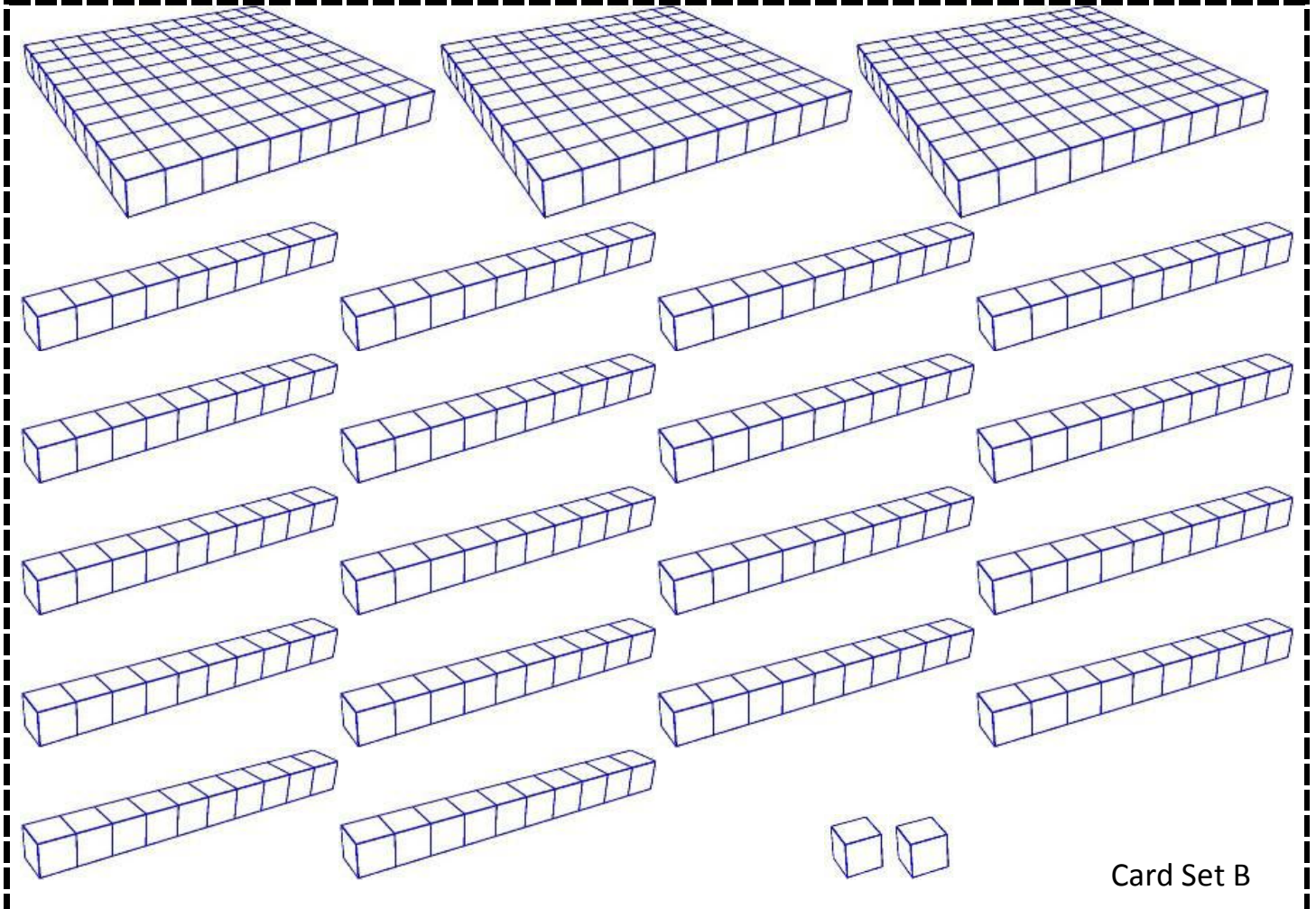


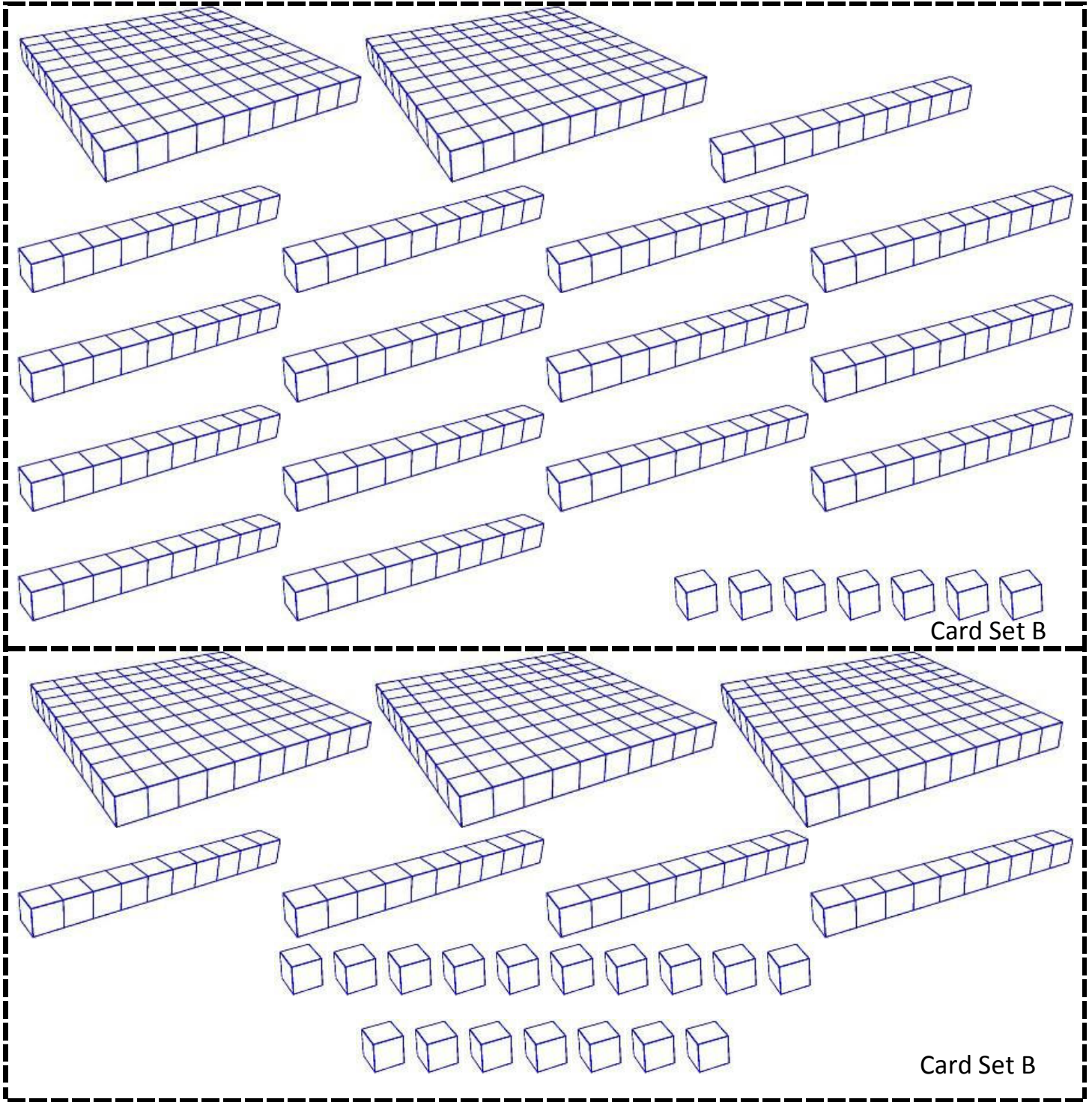
Card Set B











Card Set C

547

Card Set C

547

Card Set C

338

Card Set C

338

Card Set C

630

Card Set C

630

Card Set C

421

Card Set C

421

Card Set C

Extension #1

Students will return to card set C and will be asked to draw each number a third way.

Extension #2

Build the following numbers using base ten blocks.

4390	5912
7310	6934
2902	9022