07314

Juegos y Conversaciones: ELLs and Reasoning, Precision, and Arguments

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Introduction

Introduction

* Who are you?
* Who am I ? (briefly)
* What will we do?
* Warning you will be (I hope) challenged linguistically
  * (Is mathematics a "universal" language?)

Nos/otr@s (Anzaldúa 2005; Keating 2000, 2005)

(Meet and Greet)

* Walk across the room, and introduce yourself to those you don't know.
* From 'strangers' to conocid@s (acquaintances).

Desconocid@s → Conocid@s → Amig@s
Parientes → Familia

Nos/otr@s (Anzaldúa 2005; Keating 2000, 2005)

(Meet and Greet)

* Who are we?
  * How many of you teach...
  * Elementary School: Hold up 1 finger
  * Middle School: Hold up 2 fingers
  * High School: Hold up 3 fingers
* What area of mathematics do you teach? (Raise Hand)
  * Algebra
  * Geometry
  * Number and operations
  * Data and Probability
  * Other
* Where do you teach (city)? (Can we have a few volunteers?)

Introduction

* Work in groups (please avoid working individually)
  * and I will only speak Spanish.

* We will debrief afterwards about the experience.

Activities

* Knots / Pen / Pentominoes / Tangrams / Soma Cubes

* Nudos
  * Spatial Reasoning / Geometry
  * Soma Cubes (?)

Actividades

Actividades

#1: Nudos!
(En Español)

Actividades

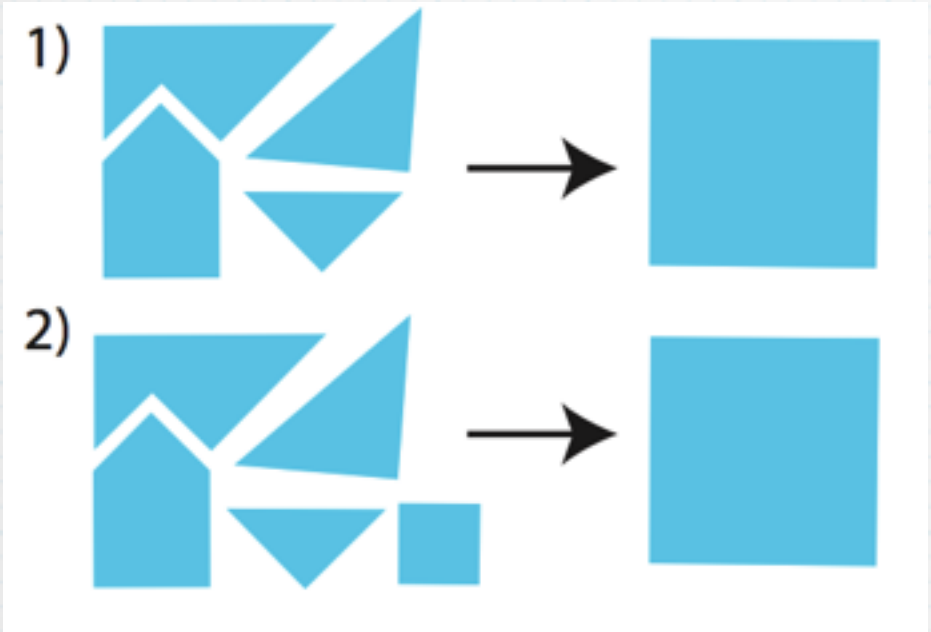
#1: Nudos!

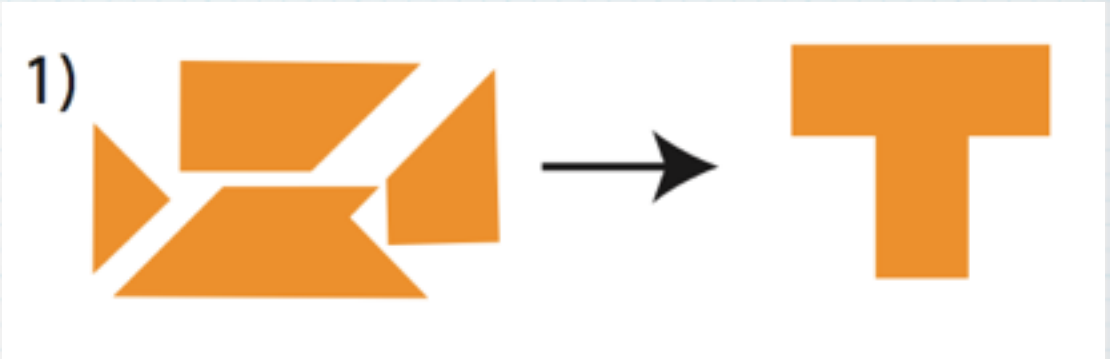
(En Español)

- Take a long cloth
- Grab the ends of the cloth and make a knot. But, once you've gotten a hold of the cloth you cannot let go.

Actividades

#2: Rompe Cabezas! (English is Allowed)





Let's talk about the language

* What made this difficult?
* What helped (or could have helped?
* What have you experienced in the past that could help?
* What suggestions / ideas do you have?

* (teachers get told enough what to do; let's co-constructs these ideas)

Discussion

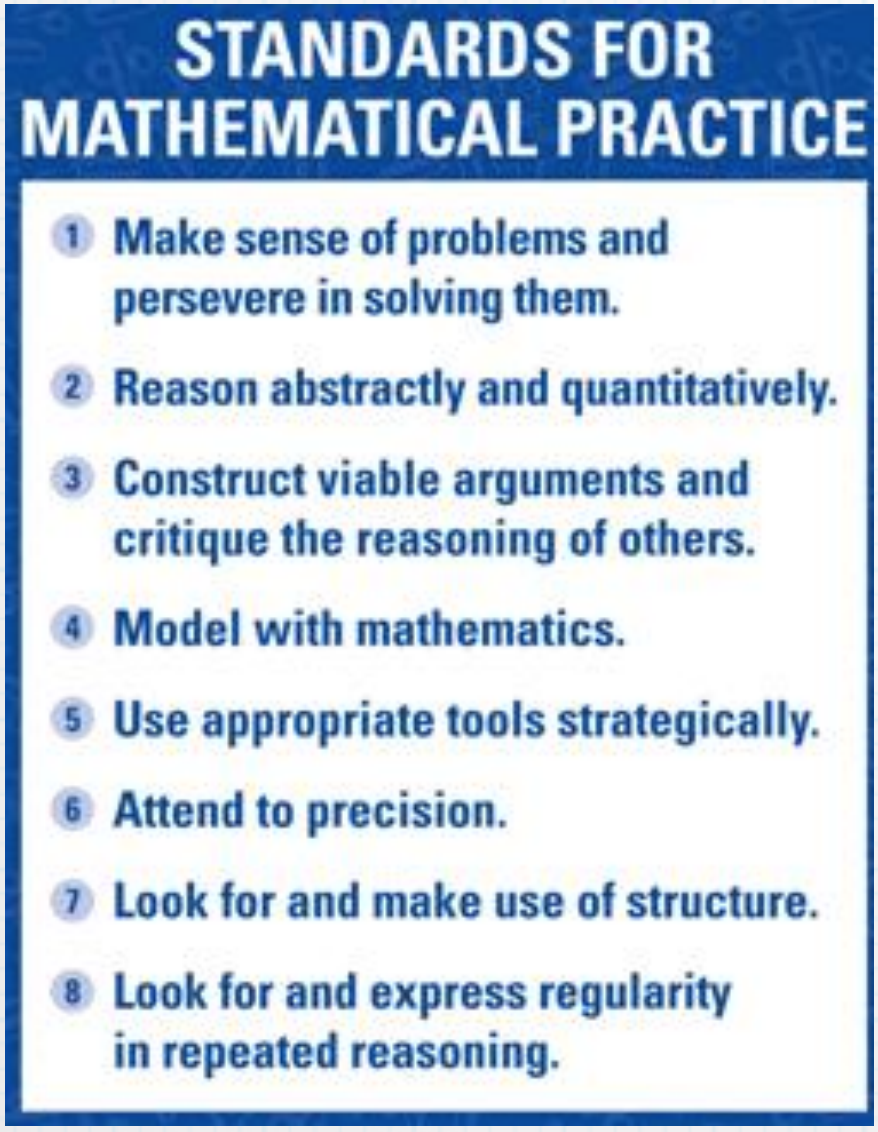
- Provide activities that may be challenging but engaging enough to persevere
- Even if students may have linguistic difficulties, they will seek ways to participate (group ground rules are important to know how to support each other)
- Identifying cognates may help students understand mathematics vocabulary
- TRUST YOUR GUT: You know when students are discussing mathematics and when they are not (if you do not understand their primary language) [Read body language]

(Thanks for sharing your ideas!!)

Let's talk about the math

* What were the concepts?
* How did the activity deepen the understanding of these concepts?
* When could this lesson be taught?
* How could it be changed/improved?

CCSS



* What do you do?
* What can you do?
* What will you do?

  * Note: I will keep in mind curriculum, standards, district/administrative/ department expectations & decisions...

Let's talk about the language

* Is it a matter of simply "good teaching"?
  * Is the hidden curriculum considered?
  * The hidden pedagogy?
  * Is culture, language, community knowledge taken into account?
  * How is the classroom community (climate/ culture)?

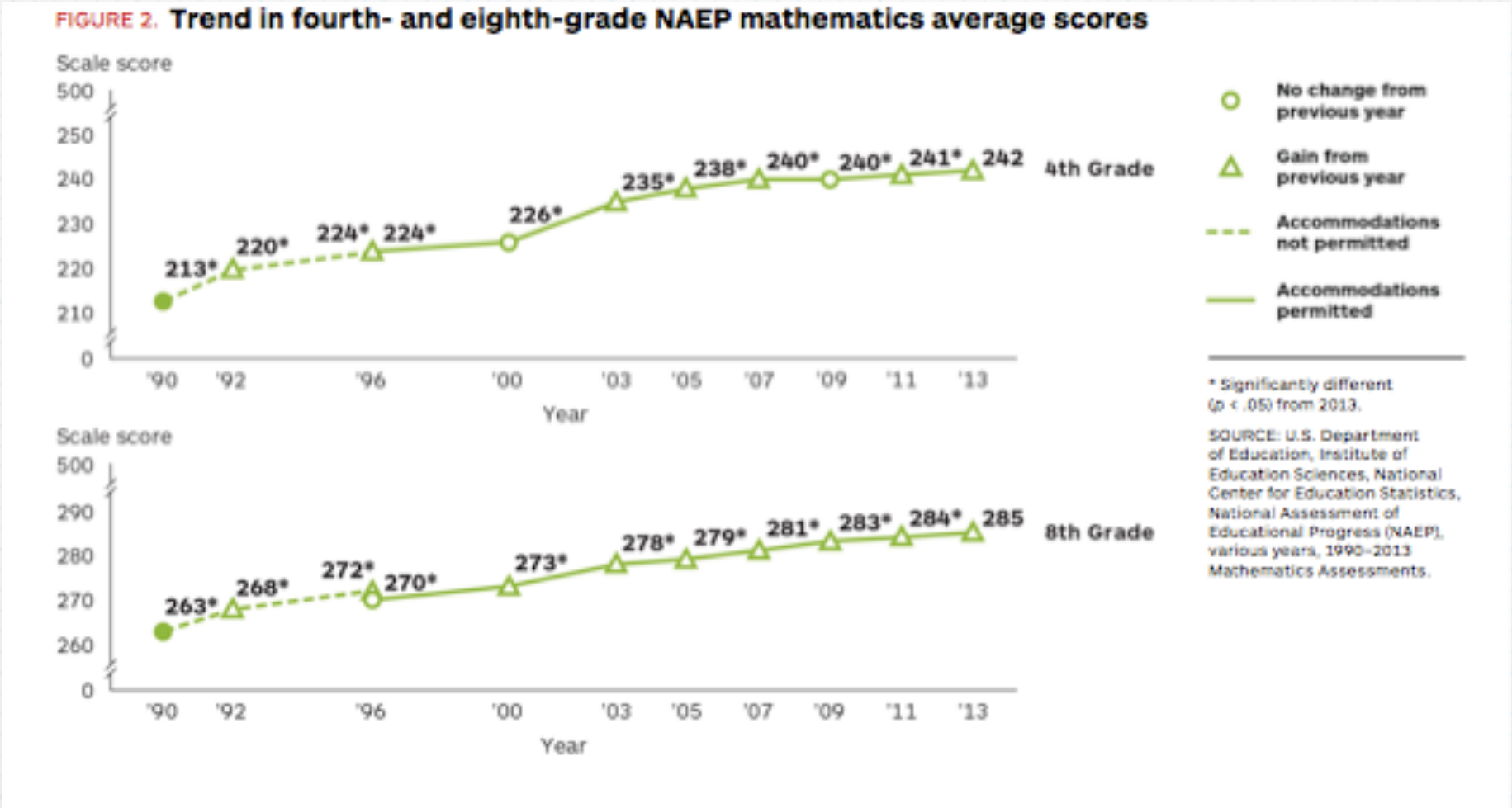
Research

Why?

* Changing demographics
  * diversity in student population (even linguistically) (Goldenberg, 2006; Pew Hispanic Center, 2008)
* 2013 Nation's Report Card
* ELLs demonstrate comparable mathematics scores (NAEP, 2011)
* Still many do not go on to college (nor choose STEM fields)

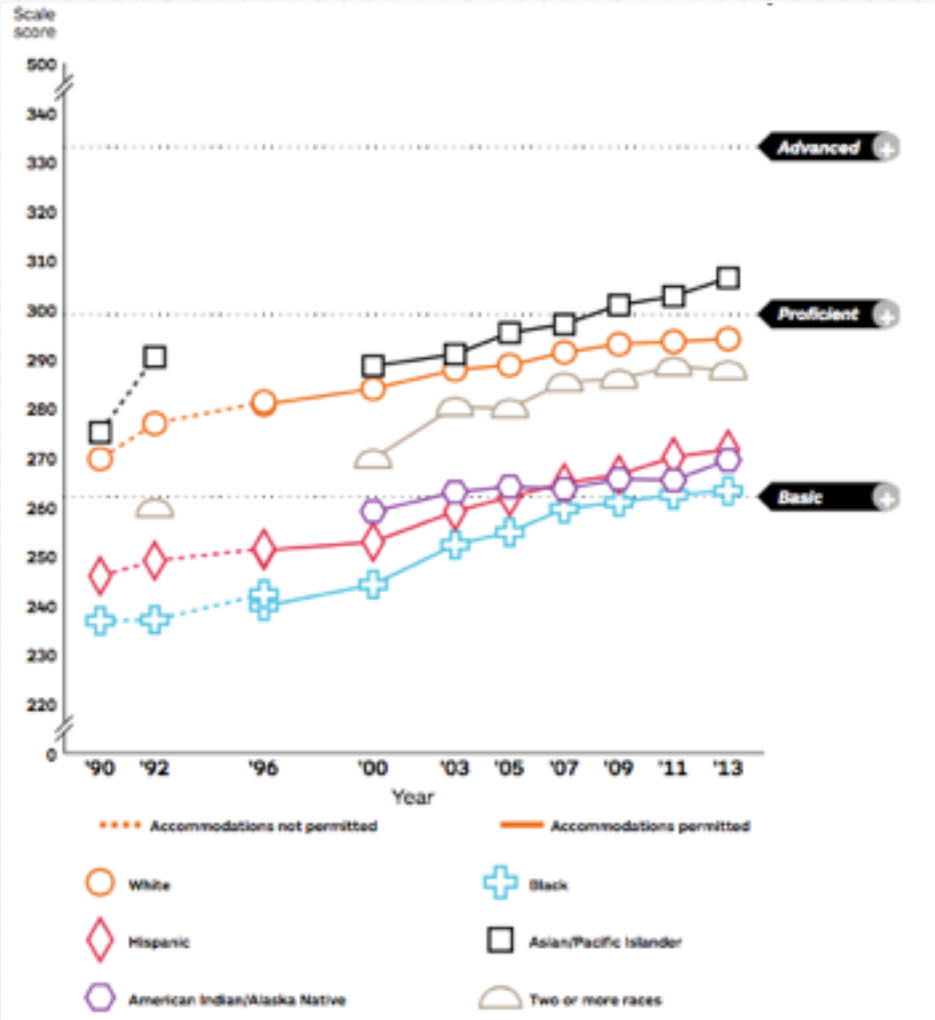
Why?

* 2013 Nation's Report Card



Why?

* 2013 Nation's Report Card



Why?

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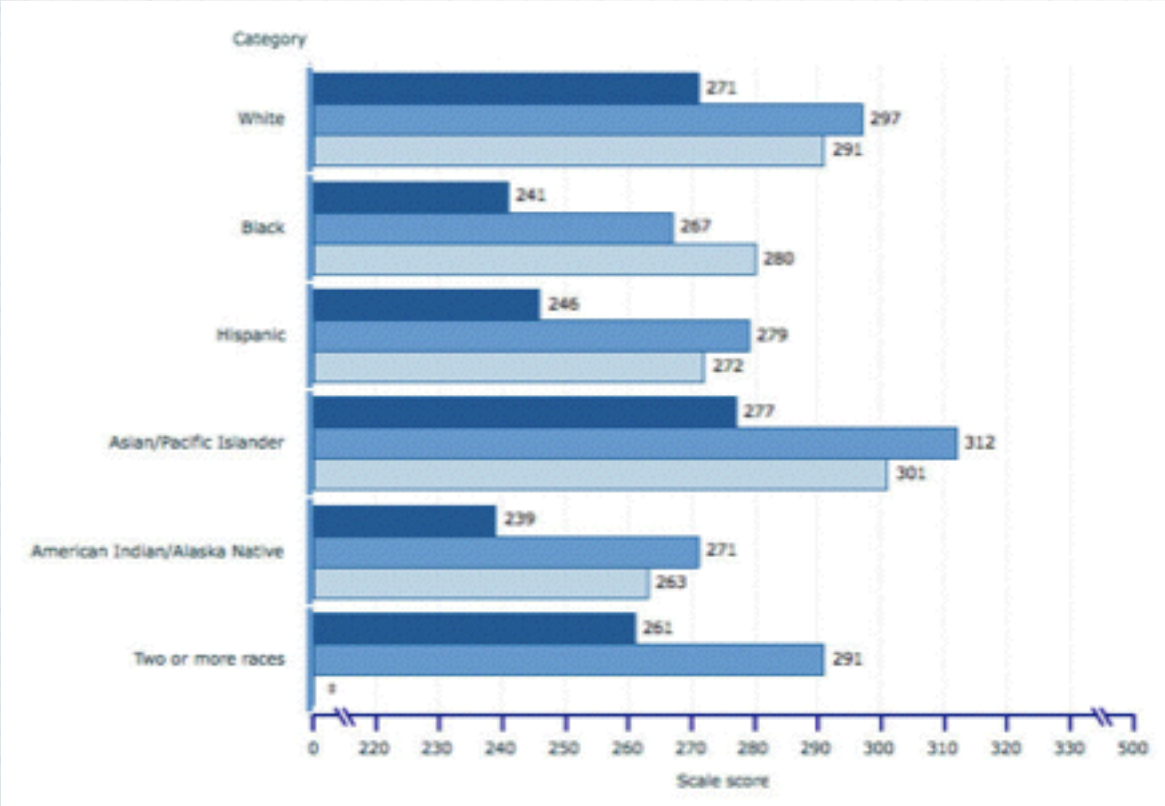

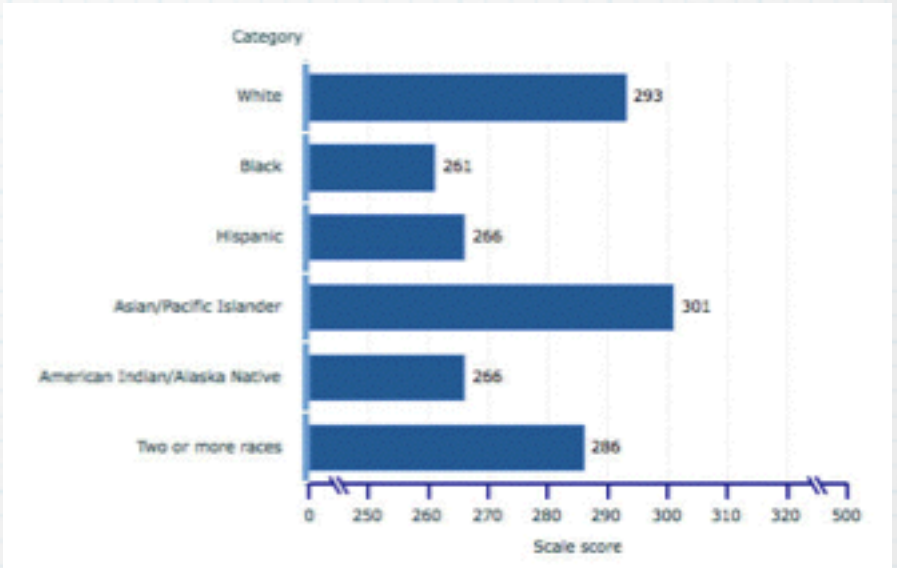

Introduction (detailed)

* My experience
  * Former Middle School teacher in LAUSD
  * Bilerate
  * Formerly undocumented

  * My research interest
    * Critical Mathematics in Teacher Education
    * After-school program that recruits Black and Latin@ students to have pre-service secondary mathematics teachers work with them to do mathematical activities

Some research...

* WARNING (Moschkovic, 2002)
  * "In reform-oriented mathematics classrooms, students are no longer grappling primarily with acquiring technical vocabulary, developing comprehension skills to read and understand mathematics textbooks, or solving traditional word problems. Students are now expected to communicate mathematically, both orally and in writing, and participate in mathematical practices, such as explaining solution processes, describing conjectures, proving conclusions, and presenting arguments"

  * "Some concerns that stem from these reforms are how bilingual Latino students will be affected by this emphasis on mathematical communication and how classroom instruction can support these students in learning to communicate mathematically" (p. 190)

Some research...

* Equity (Gutiérrez, 2009, pp. 5-6)
* 4 Dimensions of Equity
  * Access / Achievement
  * Identity
    * cultural and linguistics resources, context of schooling, an "additive" experience
  * Power
    * voice in the classroom, math as a tool to critique society, alternative notions of knowledge, and rethinking mathematics as a human endeavor
  * These are often overlooked (yes, complex)

CCSS

Application of Common Core State Standards for English Language Learners

* all students should be held to the same high expectations outlined in the Common Core State Standards
* English language learners (ELLs). However, these students may require additional time, appropriate instructional support, and aligned assessments as they acquire both English language proficiency and content area knowledge
* ELLs are a heterogeneous group with differences in ethnic background, first language, socioeconomic status, quality of prior schooling, and levels of English language proficiency
* Effectively educating ELLs requires diagnosing each student instructionally
    * adjusting instruction accordingly
    * and closely monitoring student progress
* Teachers should recognize that it is possible to achieve the standards for reading and literature, writing & research, language development and speaking & listening without manifesting native-like control of conventions and vocabulary

CCSS

Application of Common Core State Standards for English Language Learners

- ELLs are capable of participating in mathematical discussions as they learn English
- ELL students should draw on multiple resources and modes available in classrooms— such as objects, drawings, inscriptions, and gestures—as well as home languages and mathematical experiences outside of school
- Mathematics instruction for ELLs should address mathematical discourse and academic language
  - All languages and language varieties (e.g., different dialects, home or everyday ways of talking, vernacular, slang) provide resources for mathematical thinking, reasoning, and communicating
- Regular and active participation in the classroom is critical to the success of ELLs in mathematics
  - not only reading and listening but also discussing, explaining, writing, representing, and presenting

Recommendations (pp. 21-22)

(Celedón-Pattichis, S., & Ramirez, N. (2012)

* **Treat students' language as a resource, not a deficit**
  * Teachers can maintain a focus on mathematical reasonong as well as lanauge development
  * Draw on many classroom resources: objects, drawings, graphs, and gestures as well as home languages, everyday meanings for or phrases, and experiences outside of school (including algorithms from other countries)
* **Address much more than vocabulary and support ELLs' participation in mathematical discussions as they learn English**
  * Instruction should not focus on low-level language skills buet opportunities to actively communicate about mathematical ideas: mathematical concepts and reasoning and not pronunciation, vocabulary, low-level linguistic skills

Guiding Principles (pp. 22)

(Celedón-Pattichis, S., & Ramirez, N. (2012)

* Challenging mathematical tasks (P1)
  * Made accessible though supports that clarify their understanding of the task
* Linguistically sensitive social environment (P2)
  * Teacher-supported, ongoing, high-quality interactions that includes all forms of communication between teacher-student and student-student
* Support for learning English while learning mathematics (P3)
  * support structures that scaffold students' language development, participate in mathematical discourse communities, make mathematical content linguistically comprehensible, and assess progress reaching linguistic and mathematical goals
* Mathematical tools and modeling as resources (P4)
  * Tools and modeling provide a resource for ELLs to engage in mathematics and communicate their mathematical understanding
* Cultural linguistic differences as intellectual resources (P5)
  * Can be used to connect prior knowledge and to create a community whose members value one another's ways of engaging in mathematics

My Take Aways

- Classroom community
  - Expectations
  - Beware of the hidden pedagogy (Denscombe, 1982) / hidden curriculum (Anyon, 1980)
- Listening
  - parents, students, community members
- Doing what is BEST for your students!
  - rigorous mathematics & opportunities for higher level thinking

Resources

CCSS (continued...)

Application of Common Core State Standards for English Language Learners

- Mathematics instruction for ELLs should address mathematical discourse and academic language
  - This instruction involves much more than vocabulary lessons
  - Language is a resource for learning mathematics
  - it is not only a tool for communicating
  - but also a tool for thinking and reasoning mathematically
  - All languages and language varieties (e.g., different dialects, home or everyday ways of talking, vernacular, slang) provide resources for mathematical thinking, reasoning, and communicating
- ELLs can produce explanations, presentations, etc. and participate in classroom discussions as they are learning English
- ELLs, like English-speaking students, require regular access to teaching practices that are most effective for improving student achievement
  - Mathematical tasks should be kept at high cognitive demand
  - teachers and students should attend explicitly to concepts
  - and students should wrestle with important mathematics

CCSS (continued...)

Application of Common Core State Standards for English Language Learners

* Instruction should ensure that students understand the text of word problems before they attempt to solve them;
* It is critical that students who are learning English have opportunities to communicate mathematically
* this is not primarily a matter of learning vocabulary
* Students learn to participate in mathematical reasoning, not by learning vocabulary, but by making conjectures, presenting explanations, and/or constructing arguments

CCSS (continued...)

Application of Common Core State Standards for English Language Learners

* While vocabulary instruction is important, it is not sufficient for supporting mathematical communication.
  * vocabulary drill and practice are not the most effective instructional practices for learning vocabulary.
  * Research has demonstrated that vocabulary learning occurs most successfully through instructional environments that are language-rich, actively involve students in using language, require that students both understand spoken or written words and also express that understanding orally and in writing, and require students to use words in multiple ways over extended periods of time
  * To develop written and oral communication skills, students need to participate in negotiating meaning for mathematical situations and in mathematical practices that require output from students.

Beyond Good Teaching (pp. 5)

(Celedón-Pattichis, S., & Ramirez, N. (2012)

* What do ELLs experience:

What ELLs Observe	How ELLs Respond
Teachers think they are saving us an embarrassment by not calling on us.	But not calling on us makes us feel invisible.
Teachers think they are doing us a favor by always grouping us together.	We like to work together, BUT WE NEED to work with all of our classmates.
Teachers avoid conflicts by ignoring students who tease us.	I can't ignore teasing. Address it.
Teachers give us identical assignments instead of accommodations for our needs.	We need accommodations to help us meet YOUR targets.
Teachers assume that when we don't raise our hands this means we don't need help. They also presume that help means translation.	We need your help—which can mean giving an example, explaining the question, defining the word, etc.

Fig. 1.1. Comments of senior ELLs in a Prezi presentation

An Effective Teacher of ELLs (pp. 22-23)

(Celedón-Pattichis, S., & Ramirez, N. (2012)

* 1. Uses challenging problems and provides access by-
  * a. assessing students' prior knowledge to determine ELLs' familiarity with the context of a task rather than ssumign that ELLs are familiar with contexts and langauge that may be commonplace o others;
  * b. Integrating culturally relevant tasks
  * c. planning for the use of a variety of tools and mathematical models; and
  * d. focusing on students' understanding of both the mathematical and everyday language involved in the task by-
    * i. using strategies such as ácting it out' and displaying Web-based pictures or videos;
    * ii. explicitly addressing unfamiliar contexts and linguistic structures within the task
    * iii. using manipulatives, diagrams, models, and symbolic notations P1-5)

An Effective Teacher of ELLs (pp. 22-23)

(Celedón-Pattichis, S., & Ramirez, N. (2012)

* 2. Makes grouping decisions based on cognitive demand of the task with awareness that the higher the level of complexity, the more one uses his or her first language to think and reason (P1,2)

* 3. Carefully sequences on a trajectory that continually develops facility with language while at the same time developing competence with mathematics (P3)

* 4. Facilitates and guides the mathematical discourse in the classroom so that ELLs have the opportunity to engage in Mathematical Discourse Communities to develop conceptual understanding, becoming mathematically proficient while simultaneously increasing their language proficiency (P2,3)
* 5. Structures opportunities that scaffold the complexity of the language demands in tasks (P2,3)

An Effective Teacher of ELLs (pp. 22-23)

(Celedón-Pattichis, S., & Ramirez, N. (2012)

* 6. Allows processing time, recognizing the difference in the mental requirements for speaking, reading, and writing a new language (P2,3)

* 7. Provide opportunities for students to read and writer about their mathematics learning, gives students written feedback that purposefully focuses on mathematical language development, and allows students to revise their writing (P2, 3)

* 8. Uses both rich mathematical context and sophisticated language to help ELLs advance in their linguistic development and their mathematical learning (P2,3,5)

* 9. Writes mathematical terms so that they are visible in the classroom; explicitly refers to the terms and their meanings often; and engages students in interacting with the chart by asking them to read, describe, model, and use the terms orally and in writing (P3)

An Effective Teacher of ELLs (pp. 22-23)

(Celedón-Pattichis, S., & Ramirez, N. (2012)

* 10. Considers the level of the cognitive and linguistic demands of participating in a new learning community and engaging in mathematical tasks, and plans for an appropriate amount of processing time (P2)

* 11. Facilitates the use of tools (e.g., tables, graphs, cubes, calculators, electronic whiteboards) to enhance mathematical discourse and understanding (P3,4)

* 12. Consistently makes visual references to mathematical models in the environment while facilitating classroom discourse and interactions (P3,4)

* 13. Highlights distinctions between the meaning of terms used in mathematics and the meanings of terms used in everyday life. Emphasizes homonyms as needed to develop mathematical understanding (P2)

An Effective Teacher of ELLs (pp. 22-23)

(Celedón-Pattichis, S., & Ramirez, N. (2012)

* 14. Listens to, cares about, guides, and mentors students while advocating for their human and educational rights (P2, 5)

* 15. Enhances teacher-students interactions by linguistically sensitive and by learning about the students' and their communities' culture, languages, differences in dialects, and ways of knowing and communicating (P2,5)
* 16. Understands the effects that acceptance of the students' language and culture can have on the students' learning. Explicitly models acceptance and interest in culture and language to ensure that students have a positive academic identity. (P2, 5)

* 17. Models making sense of written instructions during lessons rather than letting students encounter these instructions or the first time on exams (P3)

* 18. Recognizes that writing in cursive may add to the cognitive demands for some ELLs but not for others (P3)

Three Guiding Principles (p. 167)

(Celedón-Pattichis, S., & Ramirez, N. (2012)

* 1. Challenging Mathematical Task Principle
  * Possible and important to engage ELLs at all levels of language proficiency in mathematical work that challenges them on a regular basis to reason mathematically and solve problems
  * Example: Teachers may question students to extend their thinking and to promote sense making and reasoning. They may promot students who are working in pairs to engage with each other in making convincing mathematical explanations.
  * 'highly cognitive demand tasks' QUASAR (Silver and Stein, 1996) - tasks that take students beyond only memorizing and using procedures without recognizing connections to doing mathematics or using procedures with an awareness of connections to their underlying mathematical meaning (p. 167-168)

Three Guiding Principles (p. 168)

(Celedón-Pattichis, S., & Ramirez, N. (2012)

* 2. Multimodal Representation Principle
  * Classroom environments that make ample use of mullitple modes - pictures, diagrams, presentations, written explanations, and gestures
  * Afford ELLs the means to understand that mathematics and to express the thinking behind their reasoning and problem solving
* 3. Academic Language Principle
  * ELLs can learn to express their mathematical thinking and reasoning in precise academic English
  * Example: teachers can model the use of academic lanauge, clear mathematical explanations, and sentence structures used to express mathematical reasoning (such as 'if... then...')
  * 'Academic language' - language that falls into two categories: 1) Technical, discipline-specific words and phrases used in content-area texts, including, in the area of mathematics; and 2) all-purpose academic words used across content areas.
  * Students build on their own everyday language, with the

Putting the Principles Into Action (p. 175)

(Celedón-Pattichis, S., & Ramirez, N. (2012)

LESSON OPENING	*How will I assess and activate students' prior knowledge and prepare them to engage in the task(s) of the lesson without lowering the demand?* *How will I introduce the mathematical ideas and challenges in the lesson without lowering the demand?* *What will I hear (language) or see (gestures, drawings, etc.) that will indicate students understand the task(s)?* *Will students work on the task(s) individually or in pairs/small groups? Will students be partnered in a specific way? If so, in what way?* *What resources and tools will be available for students to use?* *How will students record and report their work?*
LESSON CORE	*What will I do if a student does not know how to begin to solve the task(s)? How will I support students without lowering the demand?* *What questions will I ask to uncover, assess, focus, and advance students' understanding of key mathematical ideas and academic language?* *What opportunities are here for students to use mathematical diagrams, physical models, or technology? What kind of diagrams?* *What will I hear or see that tells me students are thinking about key math ideas?* *What academic language will I listen for students to use?* *What academic language will I model? How/when will I model it?*
LESSON SUMMARY	*What mathematical and language understandings do I want students to take away from this lesson?* *What mathematical ideas do I want shared and discussed? How will they be shared and discussed? What order of sharing will promote connections and develop students' understanding?* *How will I know if they "got it"? What will I see or hear in student discussions of the mathematics or in their work that indicates they understand the mathematical ideas?*

Fig. 9.8. Lesson planning guide: planning questions with the three principles running through them as guiding threads

Guiding Principles-Teacher Actions (p. 176)

(Celedón-Pattichis, S., & Ramirez, N. (2012)

Guiding Principles	Teacher Actions
Challenging Mathematical Tasks	• Scaffolding tasks to maintain a high level of cognitive demand while building on students' prior knowledge • Questioning students to extend their thinking and promote sense making • Modeling convincing mathematical arguments, clear explanations, a variety of solution strategies, and the process of making conjectures and generalizations • Prompting students to ask questions, consider different solutions, conjecture, and generalize • Encouraging students to share their solutions by using justifications, convincing mathematical arguments, and clear explanations • Other
Multimodal Representation	• Highlighting the variety of ways (e.g., diagrams, drawings, gestures, technology, concrete objects, mathematical symbols) that mathematical ideas are communicated during lessons • Helping students learn to diagram mathematically and encouraging them to use diagrams • Providing specific tools that allow students opportunities to communicate mathematical ideas in multiple ways • Prompting students to represent a concept or solution by using one or more modes in addition to language—gestures, writing or drawing, technology, concrete objects, mathematical symbols • Making explicit connections between different ways that mathematical ideas are represented or communicated (e.g., verbal descriptions, gestures, writing or drawings, technology, concrete objects, mathematical symbols) • Other
Academic Language	• Modeling mathematical language and clear explanations • Highlighting and clarifying relevant terms that come up in the lesson • Prompting students to use mathematically accurate language • Providing students ample opportunity to communicate (e.g., read, write, speak) about mathematics • Grouping students to promote mathematical discussions (e.g., pairing ELLs with non-ELLs, including peers who can communicate in ELLs' primary language) • Connecting mathematical symbols to mathematical language • Rephrasing a student's everyday language with proper mathematical language • Requesting student clarification of statements • Other

Fig. 9.9. Lesson implementation guide: teacher actions that support the three principles

Guiding Principles- Goals of Lesson (p. 177)

(Celedón-Pattichis, S., & Ramirez, N. (2012)

Goal(s) of the lesson:
How do I know if the students "got it"? What did I see or hear in student discussions of the mathematics or in their work that indicated that they understood the mathematical ideas?

Challenging Mathematical Tasks: Student Actions	Multimodal Representation: Student Actions	Academic Language: Student Actions
• Thinking about or reflecting on the meaning of the mathematics content • Making conjectures, generating generalizations, and comparing alternative solutions • Providing a variety of mathematical solutions and explanations (e.g., counter-examples, non-examples) • Providing explanations of other students' thinking, including reasons why solutions are correct or incorrect • Other	• Using multiple representations (e.g., diagramming, drawings, gestures, technology, concrete objects, mathematical symbols) to support their mathematical thinking • Translating visual representations into verbal descriptions • Discussing the relationships among different representations • Other	• Communicating (e.g., reading, writing, speaking) about mathematics • Stating mathematical language in their own words, using everyday or primary language • Using mathematically accurate language • Engaging in student-to-student or student-to-teacher mathematical discussions • Other

Upon reflection, what aspects of the lesson seemed to support students' learning of the mathematics and academic language? In what ways?

Upon reflection, what aspects of the lesson did not support students' learning of the mathematics and academic language? Why? What design decisions or implementation moves can I make differently next time?

Fig. 9.10. Lesson reflection template: looking for *evidence* of students' mathematical thinking, in relation to the three principles

Language Demands (p. 185)

(Celedón-Pattichis, S., & Ramirez, N. (2012)

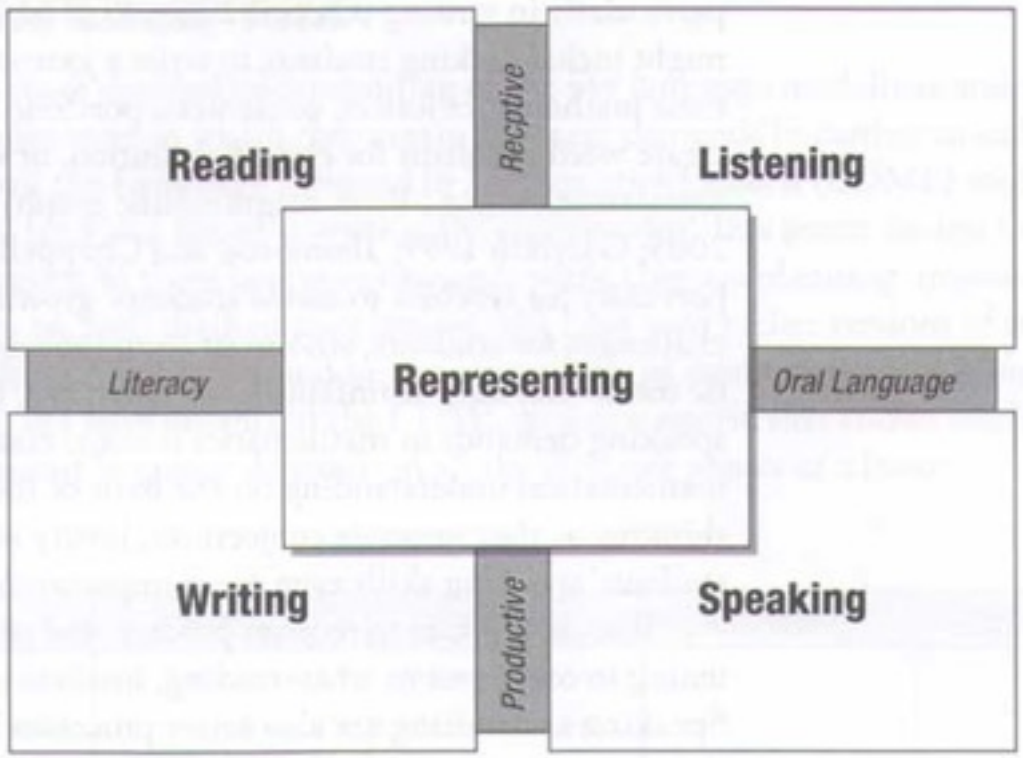

Fig. 10.1. Language demands in mathematics lessons

Language Demands (p. 187)

(Celedón-Pattichis, S., & Ramirez, N. (2012)

Lesson Phase	Reading	Writing	Speaking	Listening	Representing
Phase 1: Before/Launch					
Phase 2: During/Explore					
Phase 3: After/Summarize					

Fig. 10.2. Language Demand in Mathematics Lessons (LDML) tool

Framework for Analyzing Word Problems (p. 197)

(Celedón-Pattichis, S., & Ramirez, N. (2012)

Framework for Analyzing Word Problems: Guiding Questions, Language Demands, and Tasks for Teachers

Guiding Questions to Ask	Language Demands to Identify	Tasks for Teachers to Perform
1. What task is the student asked to perform?	Type of questions and their structure—for example, *how many, how much*	To analyze the question by identifying what it is asking
2. What relevant information is presented in the word problem?	Overall clause construction—the verbs and *who, what, to whom*	To break down the clause by finding what information is presented
3. Which mathematical concepts are presented in the information?	Specific clause construction—numerical information presented in different parts of the clause	To connect the mathematical concepts needed by looking for specific numerical information presented in the clause
4. What mathematical representations and procedures can students use to solve the problem, based on the information presented and the mathematical concepts identified?	Question + overall clause structure + specific clause structure	To connect all previously analyzed pieces to determine a variety of mathematical representations and procedures that can be used to solve the problem
5. What additional language demands exist in this problem?	Language "chunks": nouns, verbs, prepositional phrases within clauses—not as isolated elements Connections among clauses to determine how different parts of the word problem are connected	To identify any aspect of language that seems problematic for ELLs not recognized through the previous guiding questions

Fig. 11.1. A framework for analyzing word problems

Some research...

* Linguistically responsive teaching (Villegas & Freedson-Gonzalez, 2008pp. 367-369)
  * Using extra-linguistic supports
  * Supplementing and modifying written text
  * Supplementing and modifying oral language;
  * Giving clear and explicit instructions
  * Facilitating and encouraging the use of students; native languages
  * Engaging ELLs in purposeful activities in which they have many opportunities to interact with others and negotiate meaning.
    * modify their questions to how and why, as well as questions to which they do not know the answers to
    * respond to students in nonevaluative ways
    * use instructional conversations in which teacher acts as a facilitator rather than a questioner
    * allow students to use primary language with others to problem solve
  * Minimizing the potential for anxiety associated with being an ELL in a mainstream classroom
* HENCE, "Identifying the language demands inherent in classroom tasks" (p. 367)

Resources - Books

* NCTM Position Paper on ELLs
  * http://www.nctm.org/about/content.aspx?id=16135
* Celedón-Pattichis, S., & Ramirez, N. (2012). Beyond good teaching. NCTM, Reston, VA
* Moschkovich, J (2010). Language and mathematics education. IAP, Charlotte, NC
* Téllez, K., Moschkovic, J., & Civil, M. (eds.) (2010). Latino/as and mathematics education: Research on learnign and teachign in classrooms and communities
* Echevarría, J, Vogt, M., & Short, D.J. (2010). The SIOP Model for teaching mathematics to english learners. Pearson, Boston, MA.
* Secada, W. (2005). Changing the faces of mathematics: Perspectives on Latinos. NCTM, Reston, VA
* Khisty, L. L. (1997). Making mathematics accessible to Latino students: Rethinking instructional practice. In J. Trentacosta & M. J. Kenney (Eds.), Multicultural and gender equity in the mathematics classroom: The gift of diversity (pp. 92-101). Reston, VA: National Council of Teachers of Mathematics.

Resources - Articles

* JRME Special Equity Issue: http://www.nctm.org/jrmeequity/
* Zahner, W., & Moschkovich, J. (2011). Bilingual students using two languages during peer mathematics discussions: ¿Qué significa? estudiantes bilingües usando dos idiomas en sus discusiones matemáticas: What does it mean? In K. Tellez & J. Moschkovich (Eds.), Latinos and mathematics education: Research on learning and teaching in clasroom communities. Charlotte, NC: Information Age Publishing.
* Celedón-Pattichis, S. (2010). Implementing reform curriculum: Voicing the experiences of an ESL/Mathematics teacher. Middle Grades Research Journal, 5, 185-198.
* Gutiérrez, R. (2009). Framing equity: Helping students "Play the Game" and "Change the Game". Teaching for Excellence and Equity in Mathematics, 1, 4-8. Retrieved from http://data.memberclicks.com/site/toma/TEEMv1n1excerpt.pdf
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Organizations / Links

Organizations / Links

* TODOS
  * http://www.todos-math.org
* CEMELA
  * http://math.arizona.edu/~cemela/english/index.php
* ELL Advocates
  * http://www.elladvocates.org
* NABE
  * http://www.nabe.org
* Center for Equity for English Learners
* http://soe.lmu.edu/centers/ceel/
* Jamal Abedi (assessment & ELLs)
* http://education.ucdavis.edu/faculty-profile/jamal-abedi

Organizations / Links

* Radical Math
  * http://www.radicalmath.org

* Creating Balance in an unjust world
  * http://creatingbalanceconference.org

* JUME
* http://ed-osprey.gsu.edu/ojs/index.php/JUME

* Philosophy of Math Education (Critical Mathematics Education)
* http://people.exeter.ac.uk/PErnest/pome25/index.html

Technology

* I mirror my iPad (and iOS devices) using this software
  * http://www.airserver.com
  * (if on the same "wifi" network this works seamlessly; I recommend use the "trial version")

* I did this:
  * http://www.airserver.com/Support
    * look at "Can I connect with an ad-hoc network?"

* There are cables though:
  * http://store.apple.com/us/product/MC552ZM/B/apple-vga-adapter
  * http://store.apple.com/us/product/MC748ZM/A/apple-composite-av-cable?fnode=3a
  * http://store.apple.com/us/product/MD826ZM/A/lightning-digital-av-adapter?fnode=3a
    * (there are probably less expensive 3rd party alternatives)

Contact Information

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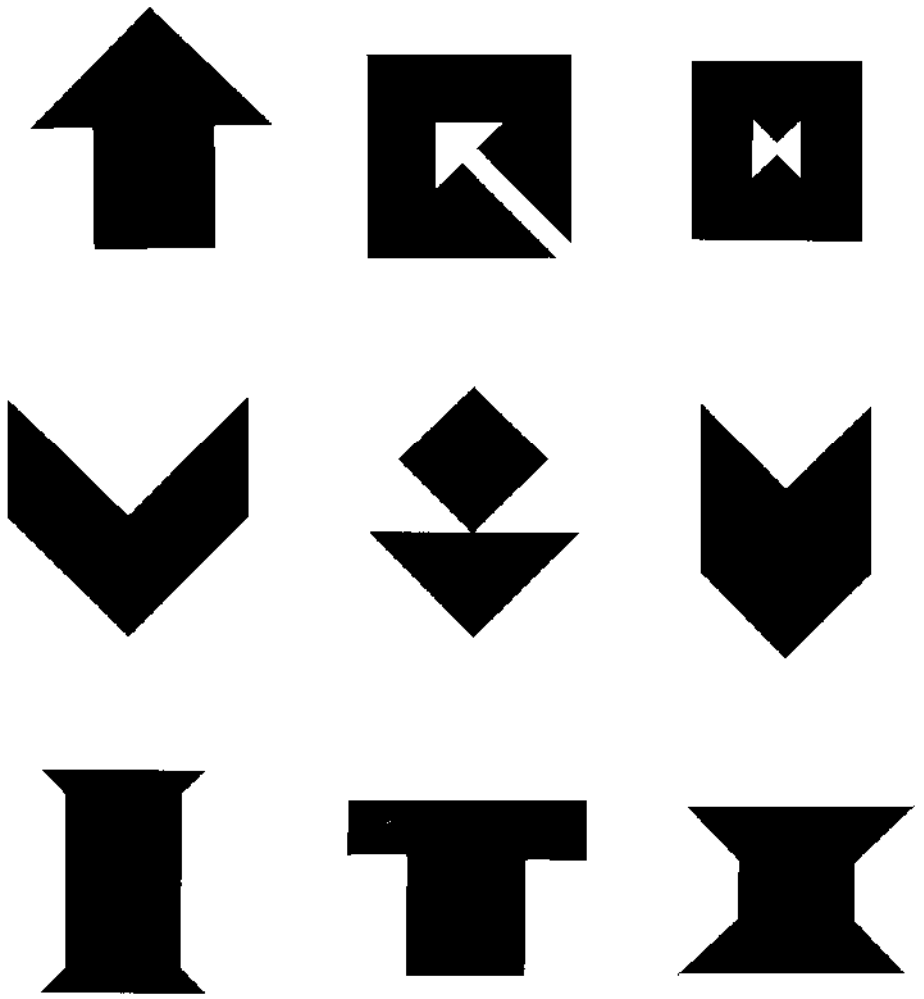
  * NOYCE ILLINOIS
    * http://changethegame.education.illinois.edu
  * email: gerardo1@illinois.edu

TANGRAM PUZZLES

INSTRUCTIONS: You can make each of the following puzzles using your geometric shapes... GOODLUCK!!
Rules: All 7 shapes must be used, they must touch and no shapes can overlap.



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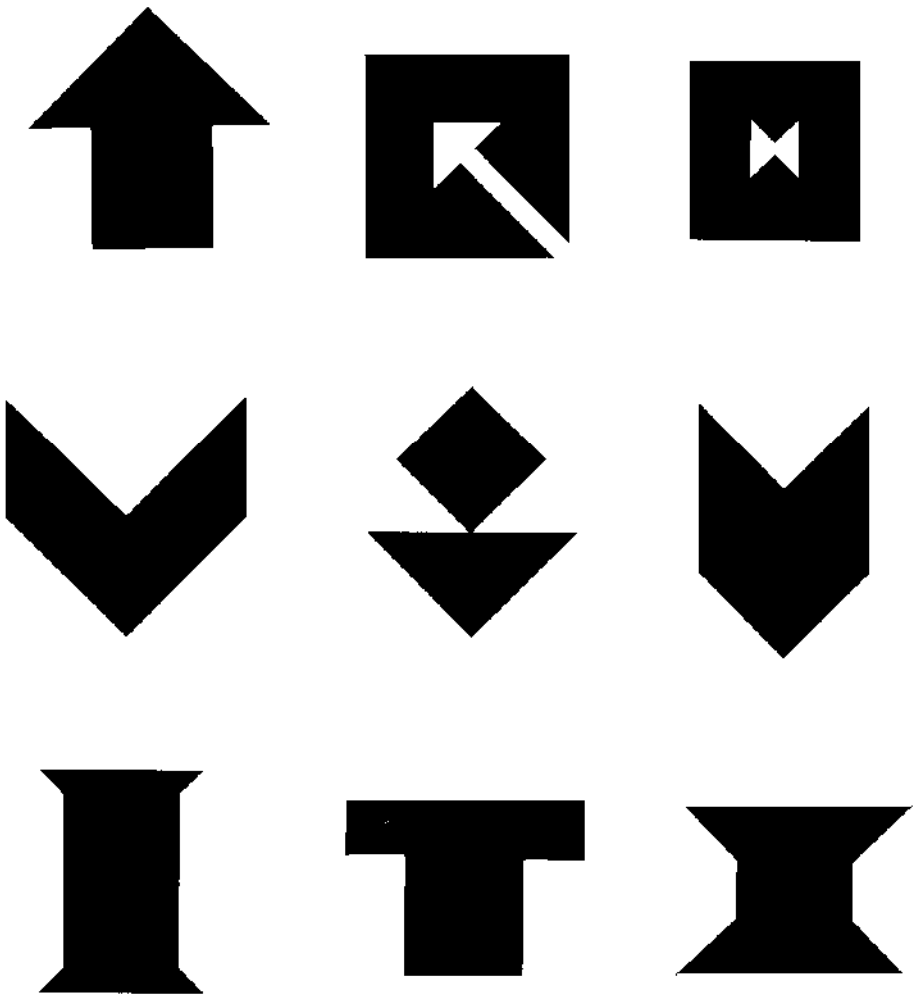

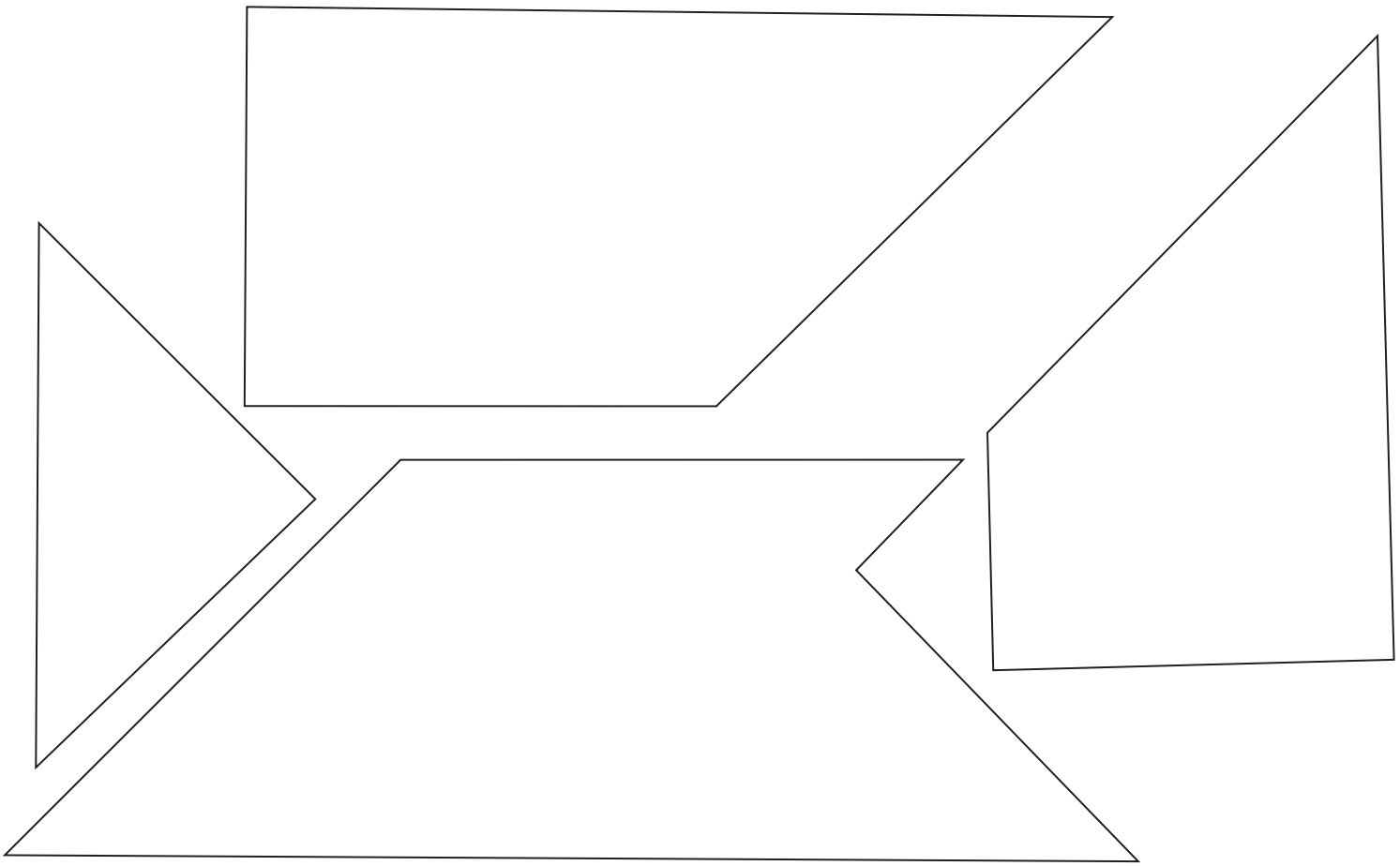

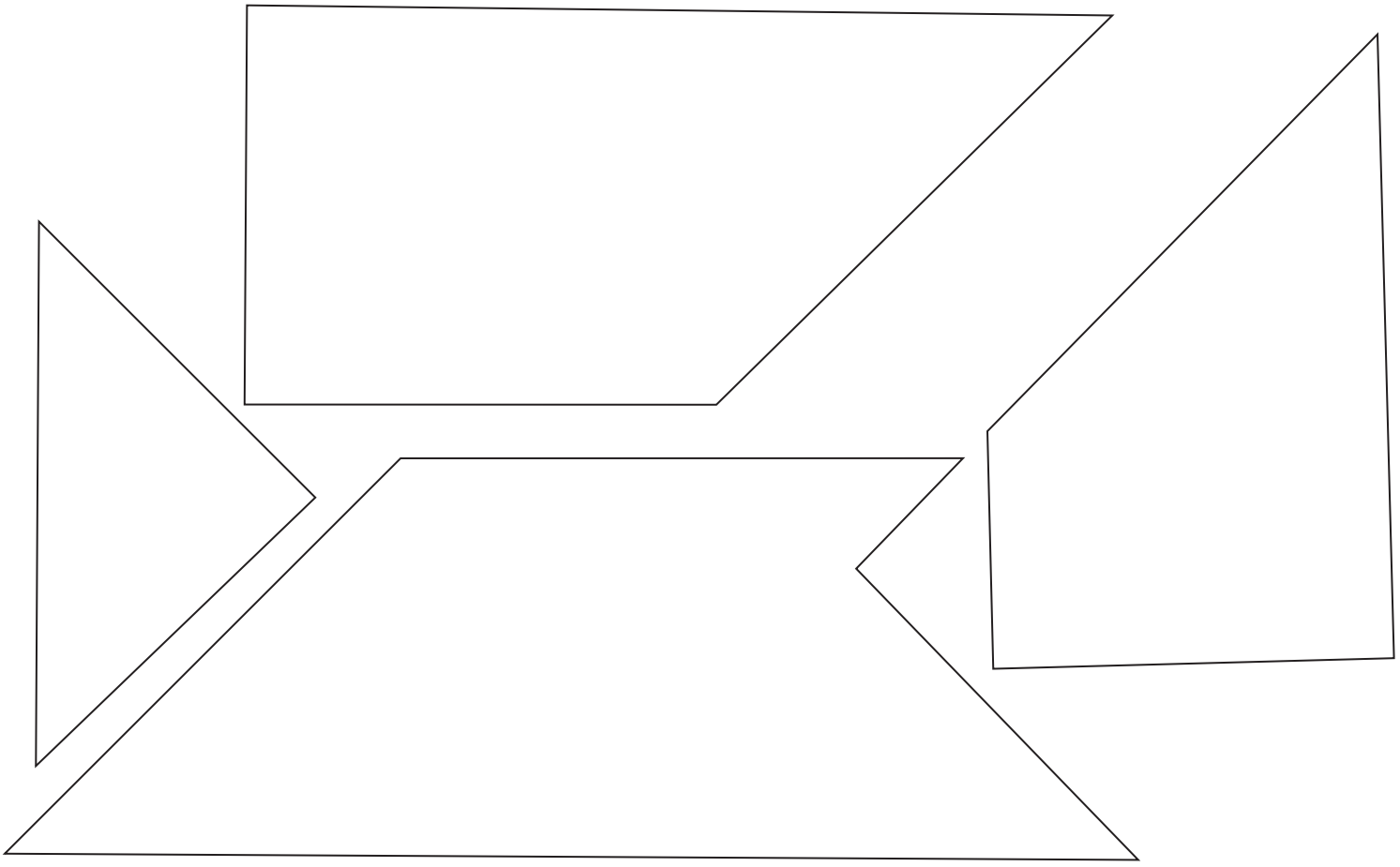

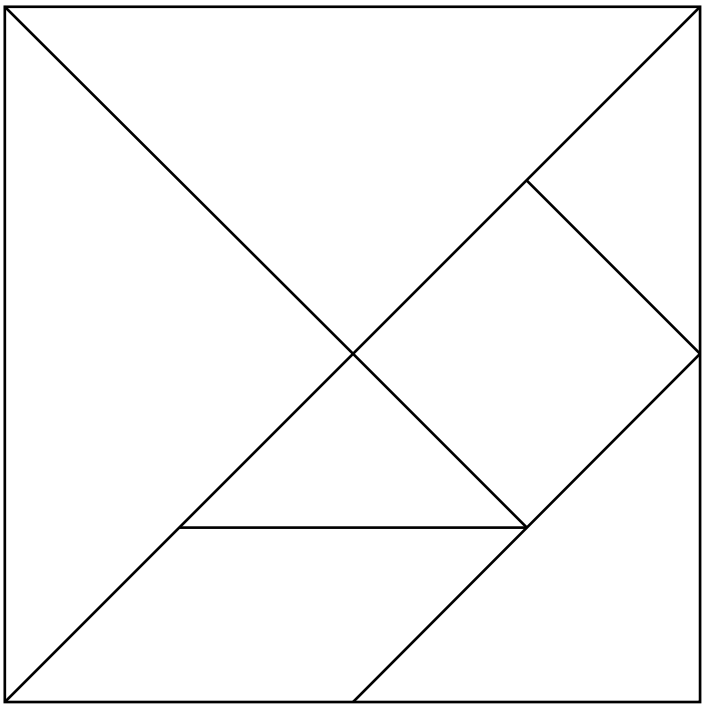

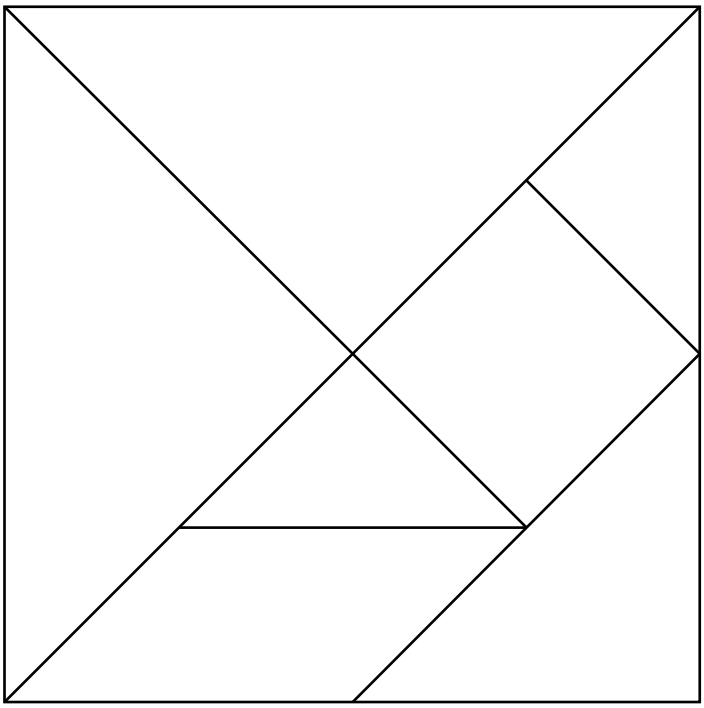

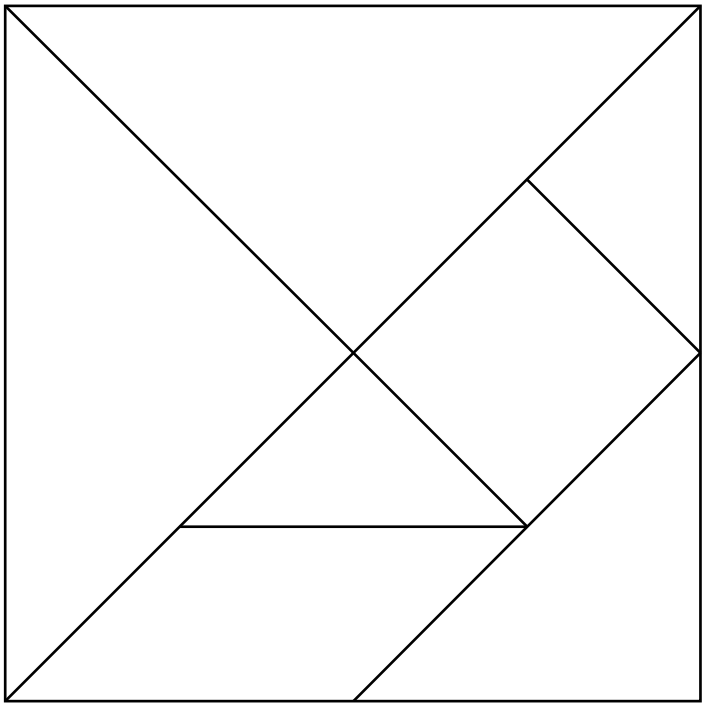

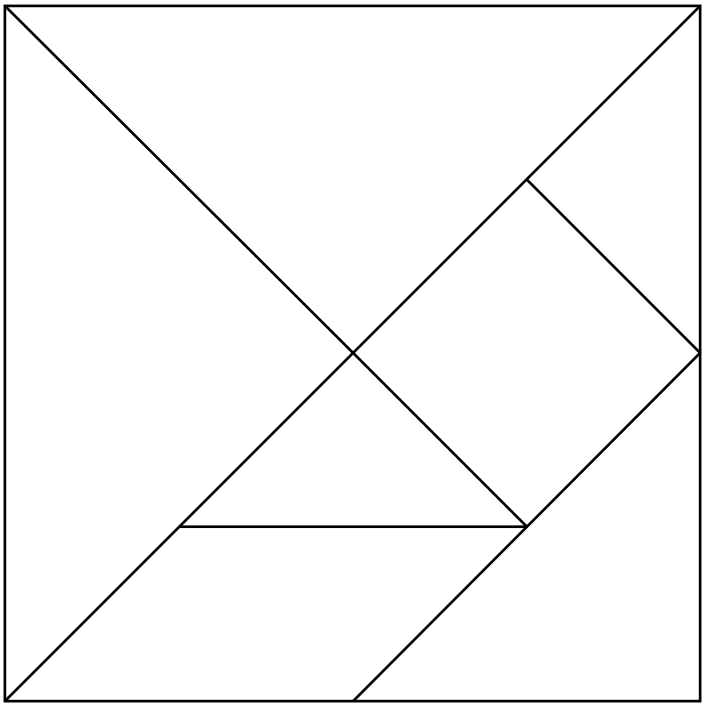

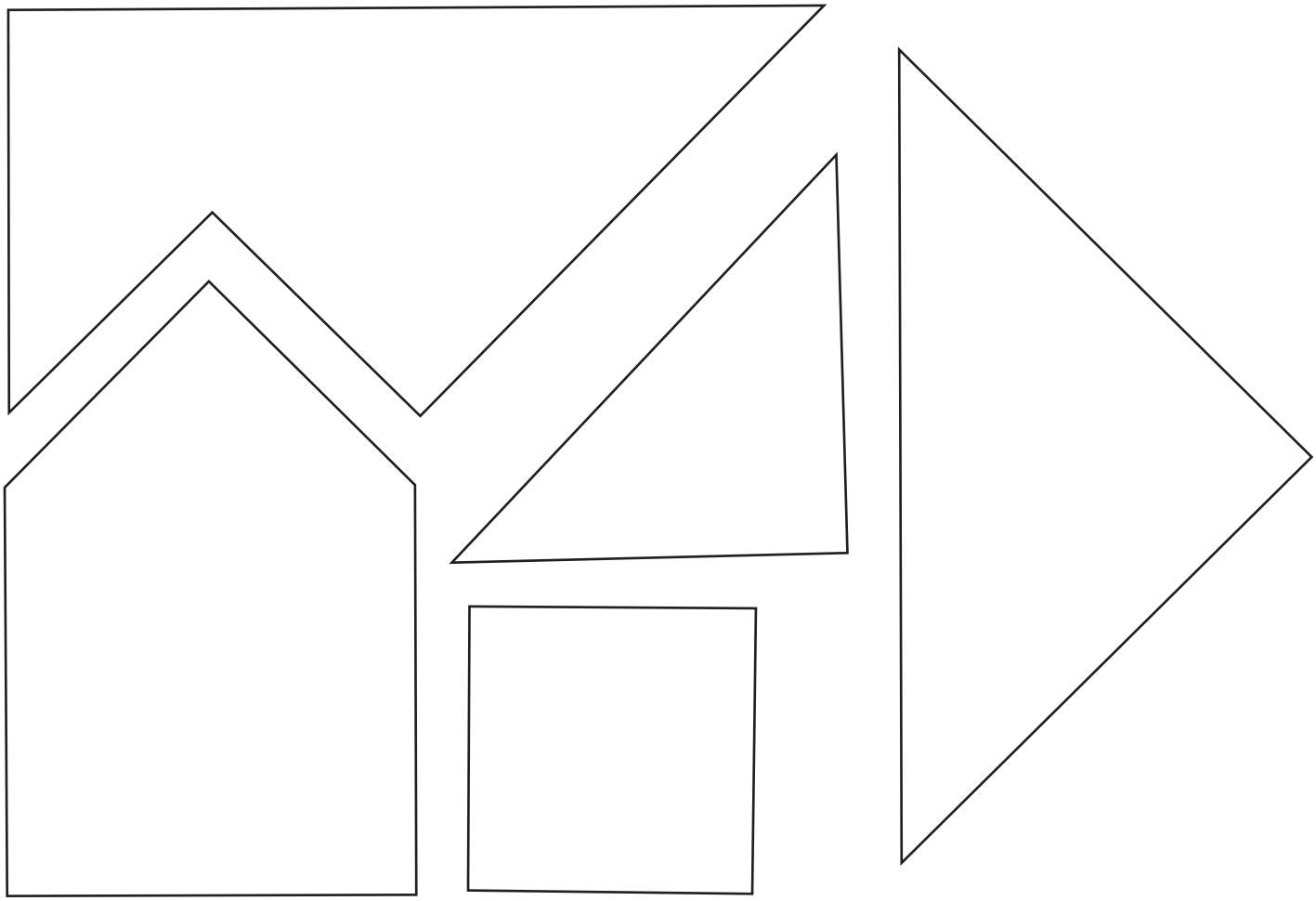

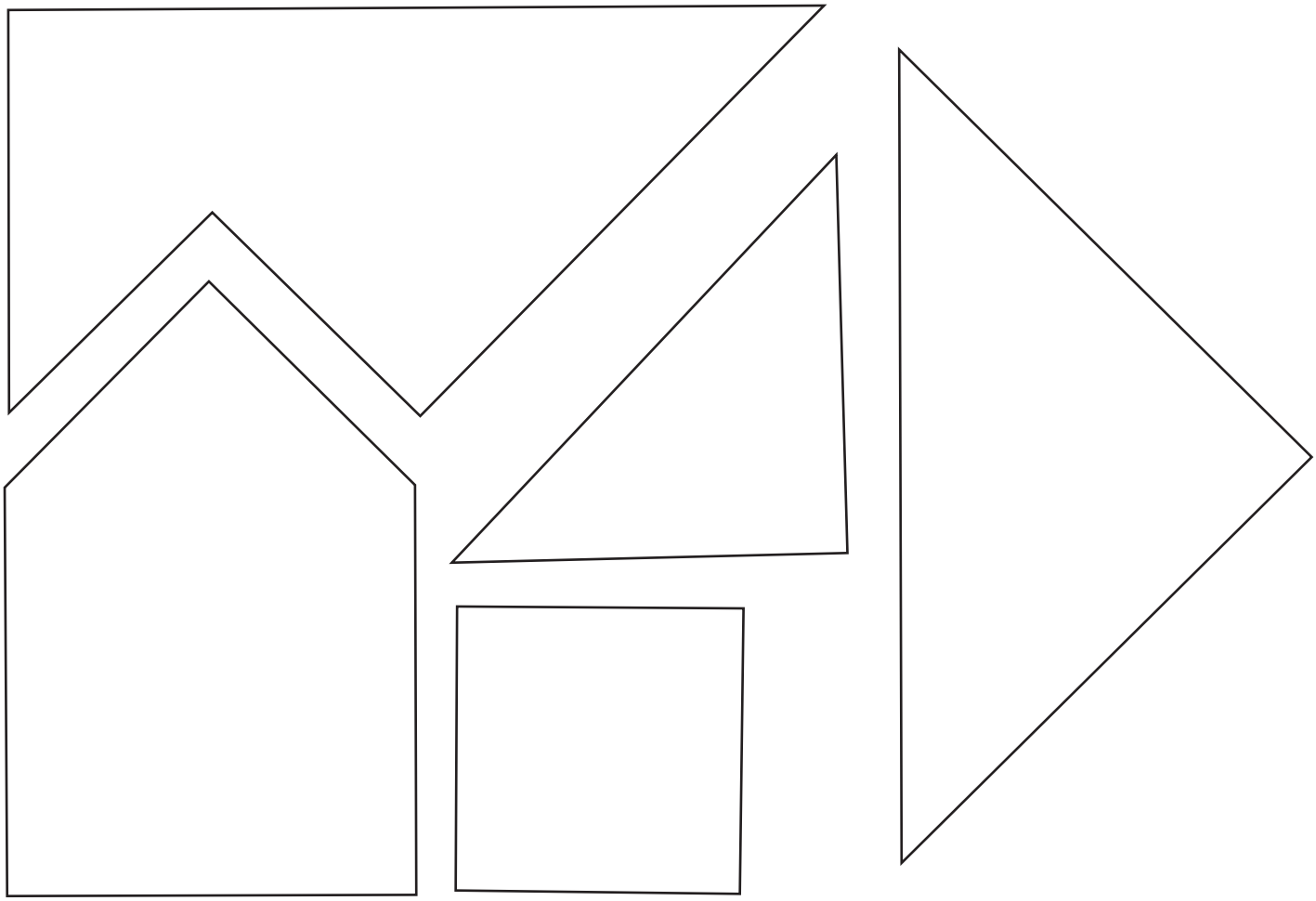

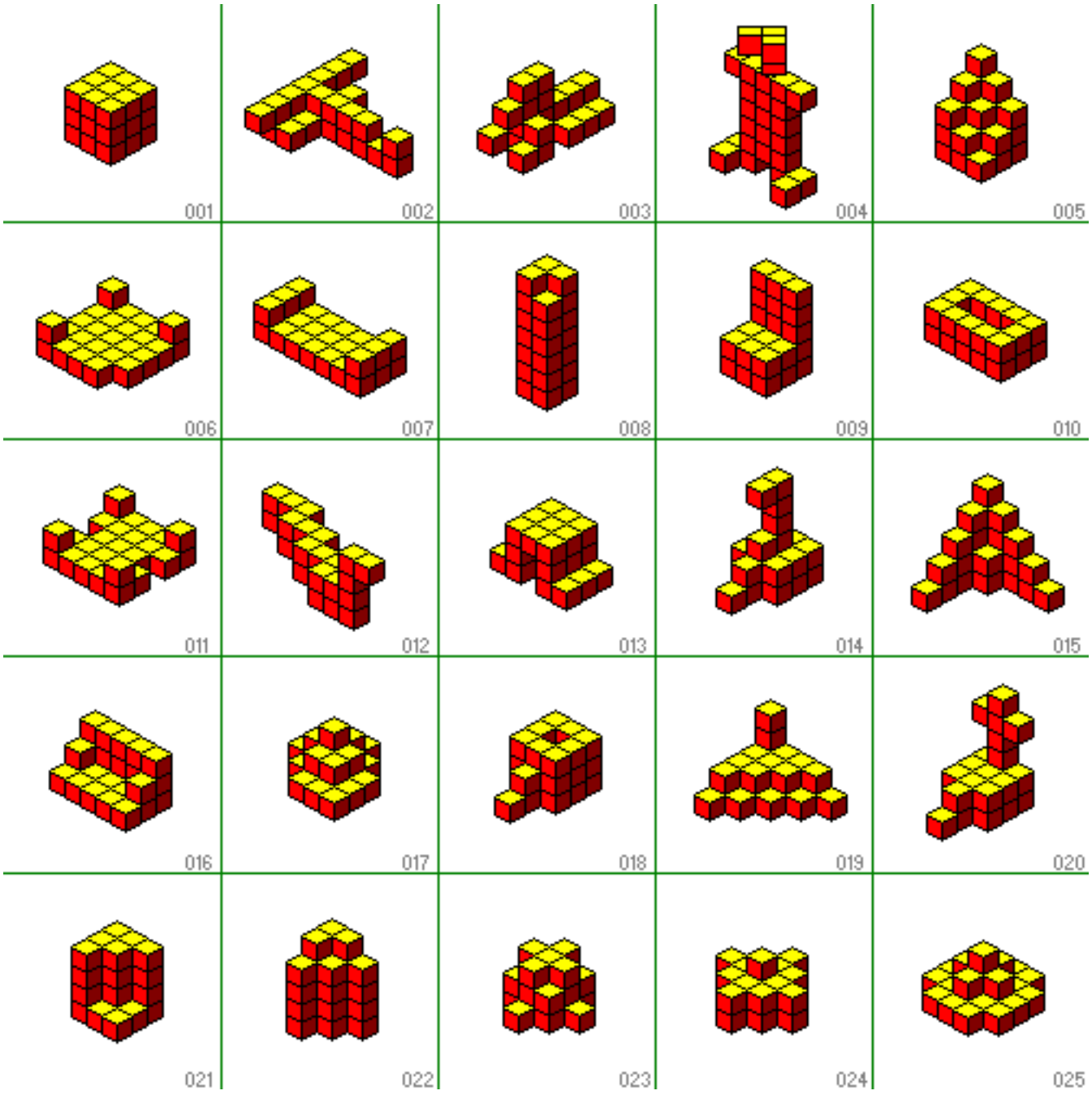
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