

Helping Students Succeed in Algebra through the use of Manipulatives

Kevin Dykema

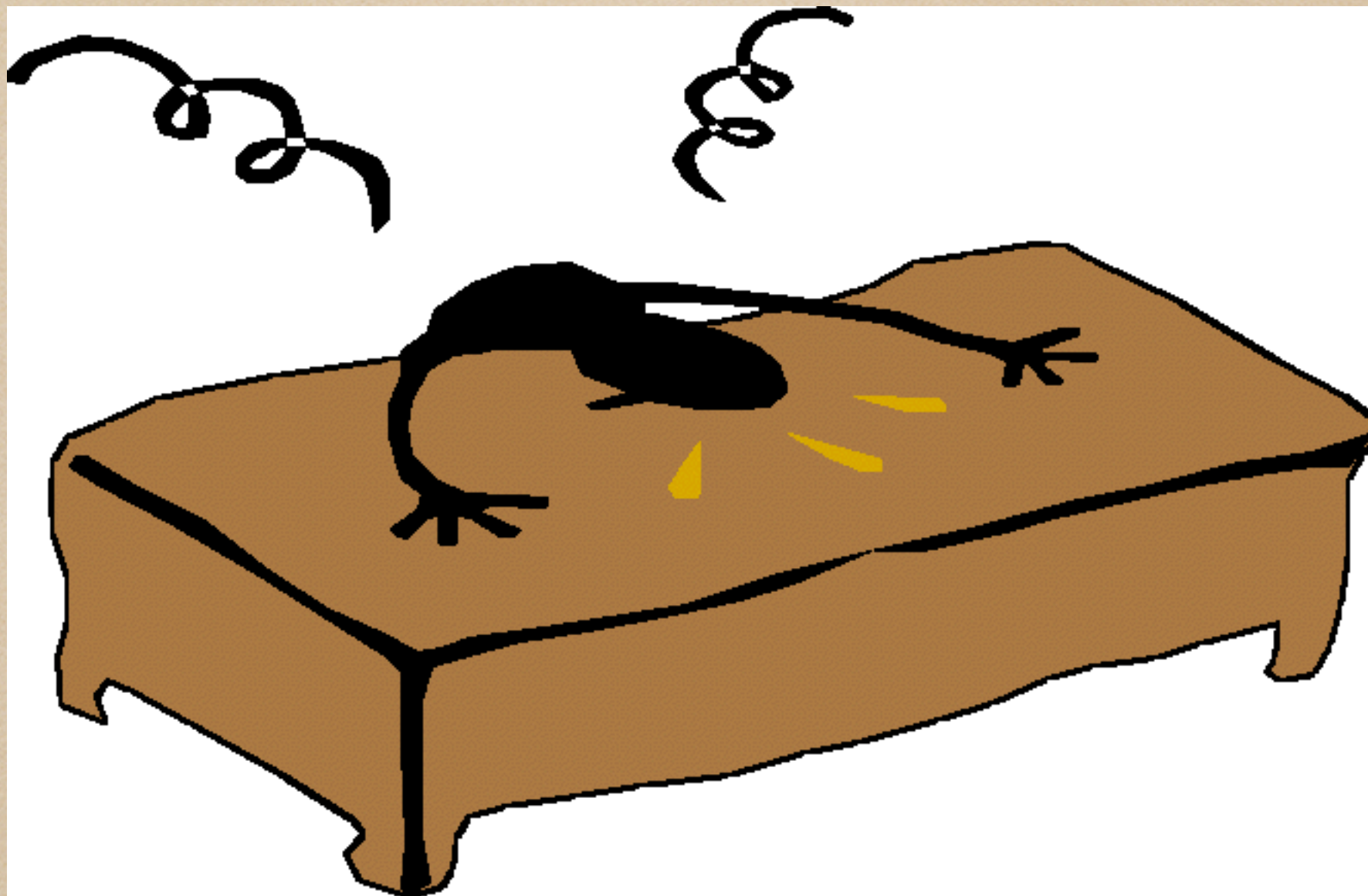
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An Ancient Saying

- ◆ I hear and I forgot
- ◆ I see and I remember
- ◆ I do and I understand



I Can't remember the formula!

The Definition of Insanity

- ◆ Doing the same thing over and over again and expecting different results

A Great Quote

- ◆ “If students cannot learn the way we teach them, then we must teach them the way they learn”
- ◆ Dr. Kenneth Dunn from Queens College, author of several books on learning styles

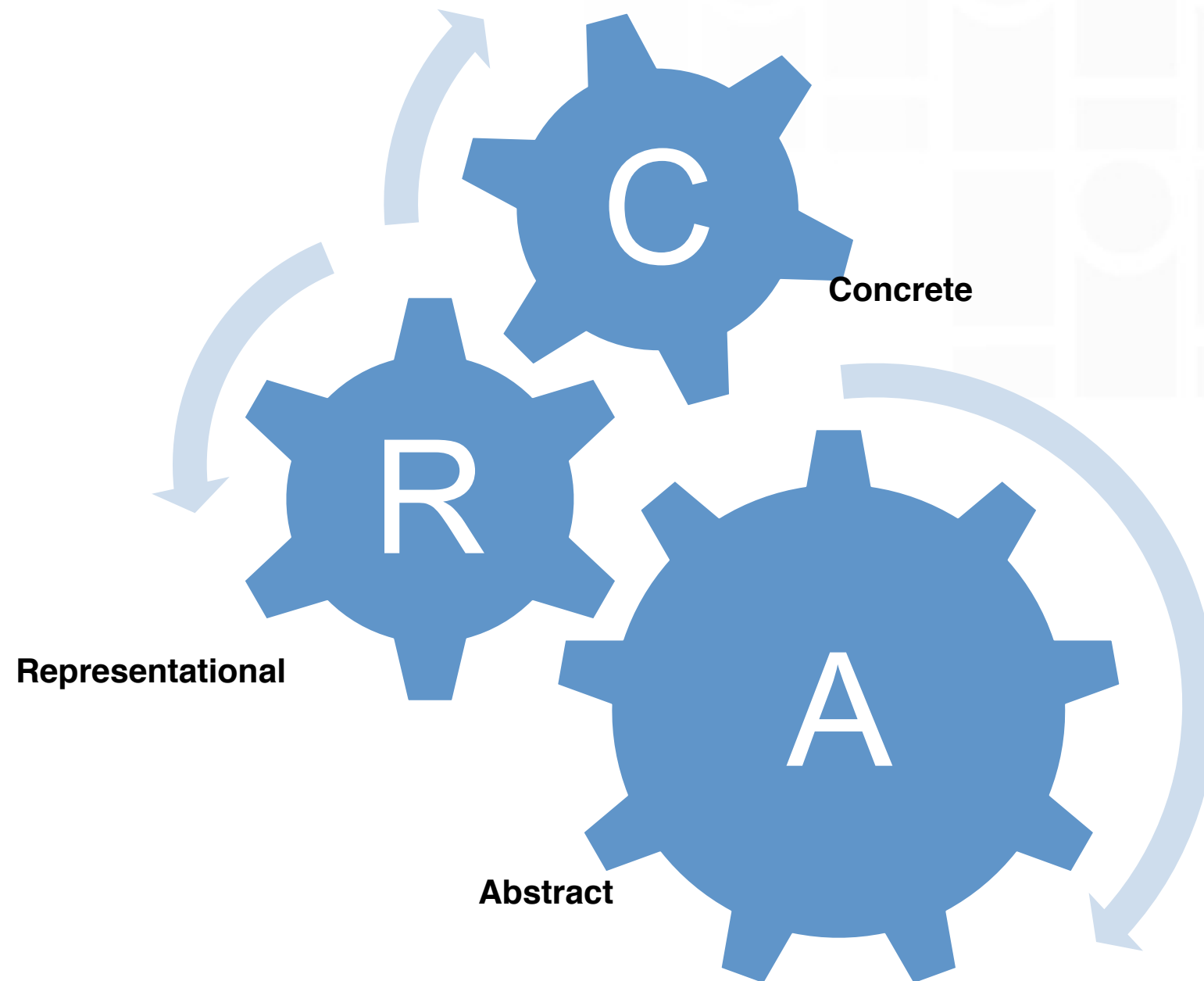
Principles to Actions

- ◆ Mathematics Teaching Practices



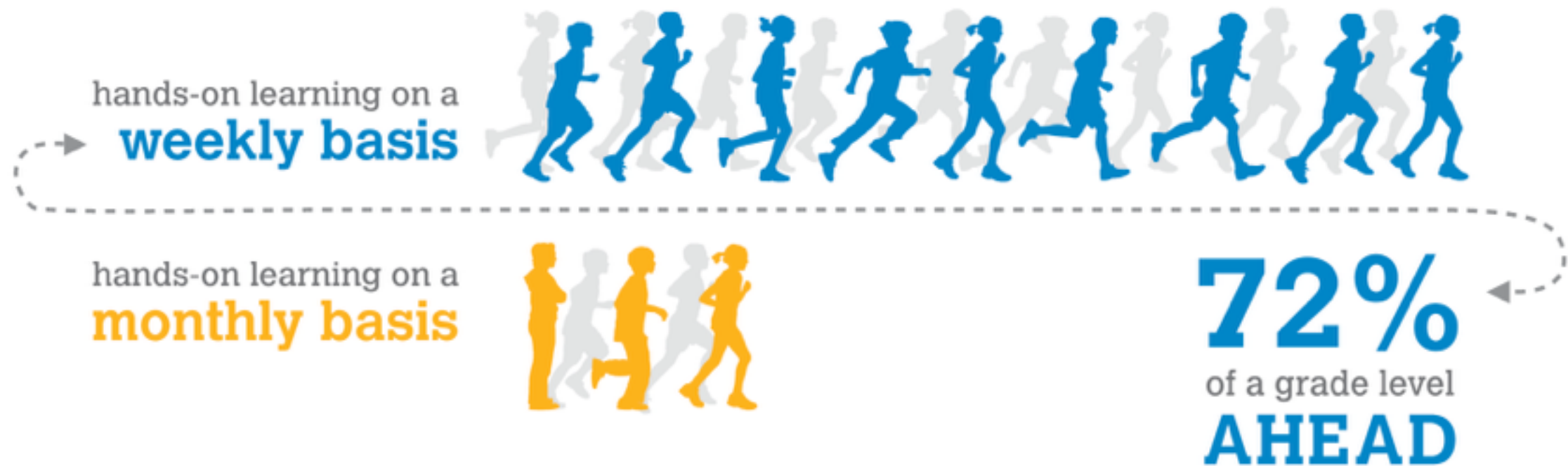
- ◆ Establish mathematics goals to focus learning.
- ◆ Implement tasks that promote reasoning and problem solving
- ◆ Use and connect mathematical representations
- ◆ Facilitate meaningful mathematical discourse
- ◆ Pose purposeful questions
- ◆ Build procedural fluency from conceptual understanding
- ◆ Support productive struggle in learning mathematics
- ◆ Elicit and use evidence of student thinking

Hands-On Learning Instructional Cycle



What's the 'Big Idea?'

When students are exposed to **hands-on learning** on a **weekly** basis rather than **monthly** basis, they prove to be **72% of a grade level ahead in mathematics.***



* How Teaching Matters: Bringing the classroom back into discussions of teacher quality. Princeton, NJ: Educational Testing Service.

Manipulatives provided by:



www.hand2mind.com

Math • Science • Literacy

Color Tiles

- ◆ Multiplication as a rectangular array
- ◆ Commutative Property of Multiplication
- ◆ Factors and Prime Numbers

Distributive Property

- ◆ Color Tiles
- ◆ Algebra Tiles

Finding Patterns with Color Tiles

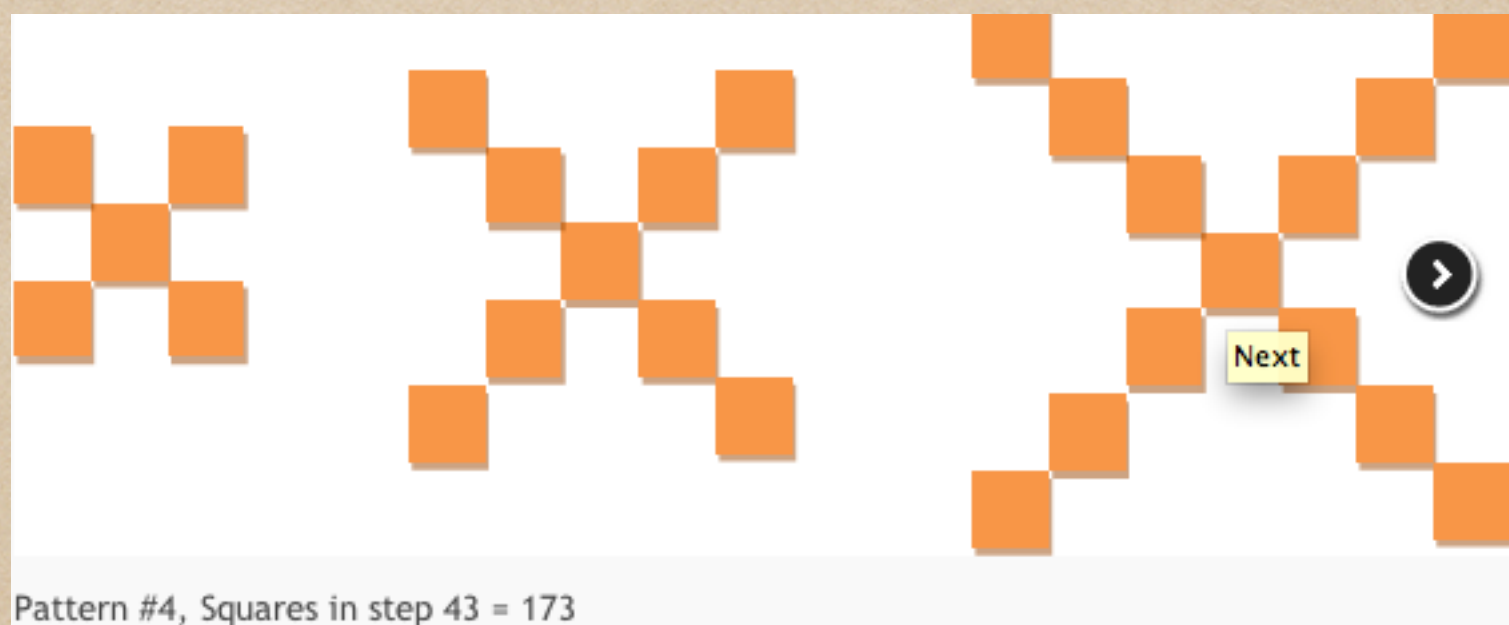
- Expanding Squares
- Enclosing Squares (Napkins)
- Windows and Walls
- Perimeter of Snake

Tantalizing Tuesday

- visualpatterns.org
- Fawn Nguyen



Pattern #7, Trees in step 43 = 87



Pattern #4, Squares in step 43 = 173

Special of the Day

- ◆ Make it Close Monday
- ◆ Tantalizing Tuesday
- ◆ Which One Wednesday
- ◆ Thoughtful Thursday
- ◆ Find it Friday

XY- coordinate pegboard

- ◆ Peg and stretch the following polygon on your pegboard and classify it according to type.
- ◆ $A(-1, -4)$, $B(3, -1)$, $C(3, 3)$, $D(-1, 6)$, $E(-5, 3)$, $F(-5, -1)$
- ◆ You could also have your students measure each angle and determine the total number of degrees in a polygon of that type.

More pegboard

- ◆ Slope
- ◆ Graphing Lines
- ◆ Graphing Inequalities
- ◆ Solving systems of equations by graphing
- ◆ Reflections

Integers & Expressions

- ◆ Two-Color Counters
- ◆ Algebra Tiles
- ◆ Algeblocks

More Algebra Tiles and Algeblocks

- ◆ Multiplying Binomials
- ◆ Solving equations

“Teacher demonstrations alone are as shallow as eating a papaya in front of the class and expecting them to know how it tastes.”



Marilyn Burns

Resources

- ◆ Hands-on Standards series of books by ETAhand2mind
- ◆ Facebook- ETAhand2mind



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