NCSM Leadership Seminar
Common Core State Standards

The Next Step

The Next Step

- People are the next step
- If people just swap out the old standards and put the new in the old boxes and powerpoints
- Put them into old systems and procedures
- Put them into the old relationships

- Then nothing will change

Standards are a peculiar genre

1. We write as though students have learned approximately 100% of what is in preceding standards. This is never even approximately true.
2. Standards are high points, finish lines, not complete specs for curriculum.
3. The grain size of coherence in mathematics is larger than "standards-based management systems" assume: Chapters or units are mathematically more coherent than lessons.

Standards are a platform for instructional systems

- This is a new platform for better instructional systems and better ways of managing instruction
- Builds on achievements of last 2 decades
- Builds on lessons learned in last 2 decades
  - Lessons about time and teachers

Old Boxes

- "Alignment", "covering standards" and "pacing" belong to a well intended, but weak concept for standards based teaching and learning.
  - Alignment is a bunt, lucky if you get to first base. We have to score. We need to swing at the ball. Cheap links.
  - Covering standards = mile wide-inch deep
  - Pacing means keep turning pages regardless of what students are learning: ignore student results.

It is time to move on to something stronger, more effective.

Common Core State Standards are designed as a tool to *raise* achievement, not just praise it.

- Cleared out the clutter from the basement and attic of the curriculum
- Depth, focus and coherence

Mathematical Practices Standards

1. Make sense of complex problems and persevere in solving them.
2. Reason abstractly and quantitatively
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision
7. Look for and make use of structure
8. Look for and express regularity in repeated reasoning.

College and Career Readiness Standards for Mathematics

Expertise and Character

- Development of expertise from novice to apprentice to expert
  - Schoolwide enterprise: school leadership
  - Department wide enterprise: department taking responsibility
- The Content of their mathematical Character
  - Develop character

Grain size is a major issue

- Mathematics is simplest at the right grain size.
- “Strands” are too big, vague e.g. “number”
- Lessons are too small: too many small pieces scattered over the floor, what if some are missing or broken?
- Units or chapters are about the right size (8-12 per year)
- STOP managing lessons,
- START managing units

What mathematics do we want students to walk away with from this chapter?

- Content Focus of professional learning communities should be at the chapter level
- When working with standards, focus on clusters. Standards are ingredients of clusters. Coherence exists at the cluster level across grades
- Each lesson within a chapter or unit has the same objectives….the chapter objectives

Each chapter

- Teach diagnostically early in the unit:
  - What mathematics are my students bringing to this chapter's mathematics
  - Take a problem from end of chapter
  - Tells you which lessons need dwelling on, which can be fast
- Converge students on the chapter mathematics later in the unit
  - Pair students to optimize tutoring and development of proficiency in explaining mathematics

Teachers should manage lessons

- Lessons take one or two days or more depending on how students respond
- Yes, pay attention to how they respond
- Each lesson in the unit has the same learning target which is a cluster of standards
- “what mathematics do I want my students to walk away with from this chapter?”

Social Justice

- Main motive for standards
- Get good curriculum to all students
- Start each unit with the variety of thinking and knowledge students bring to it
- Close each unit with on-grade learning in the cluster of standards

Bottom line

- These CCSS standards are deliberately designed as a platform
- Better chance of success for those who use them as a platform than they have had with old standards which were designed as agreements, not as a platform

U.S. standards organization

[Grade Level]

- Number and Operations
  - …
- Measurement and Geometry
  - …
- Algebra and Functions
  - …
- Statistics and Probability
  - …

U.S. standards organization

[12]

- Number and Operations
  - …
- Measurement and Geometry
  - …
- Algebra and Functions
  - …
- Statistics and Probability
  - …

Fractions Progression

- Understanding the arithmetic of fractions draws upon four prior progressions that informed the CCSS:
  - equal partitioning,
  - unitizing,
  - number line,
  - and operations.

Partitioning

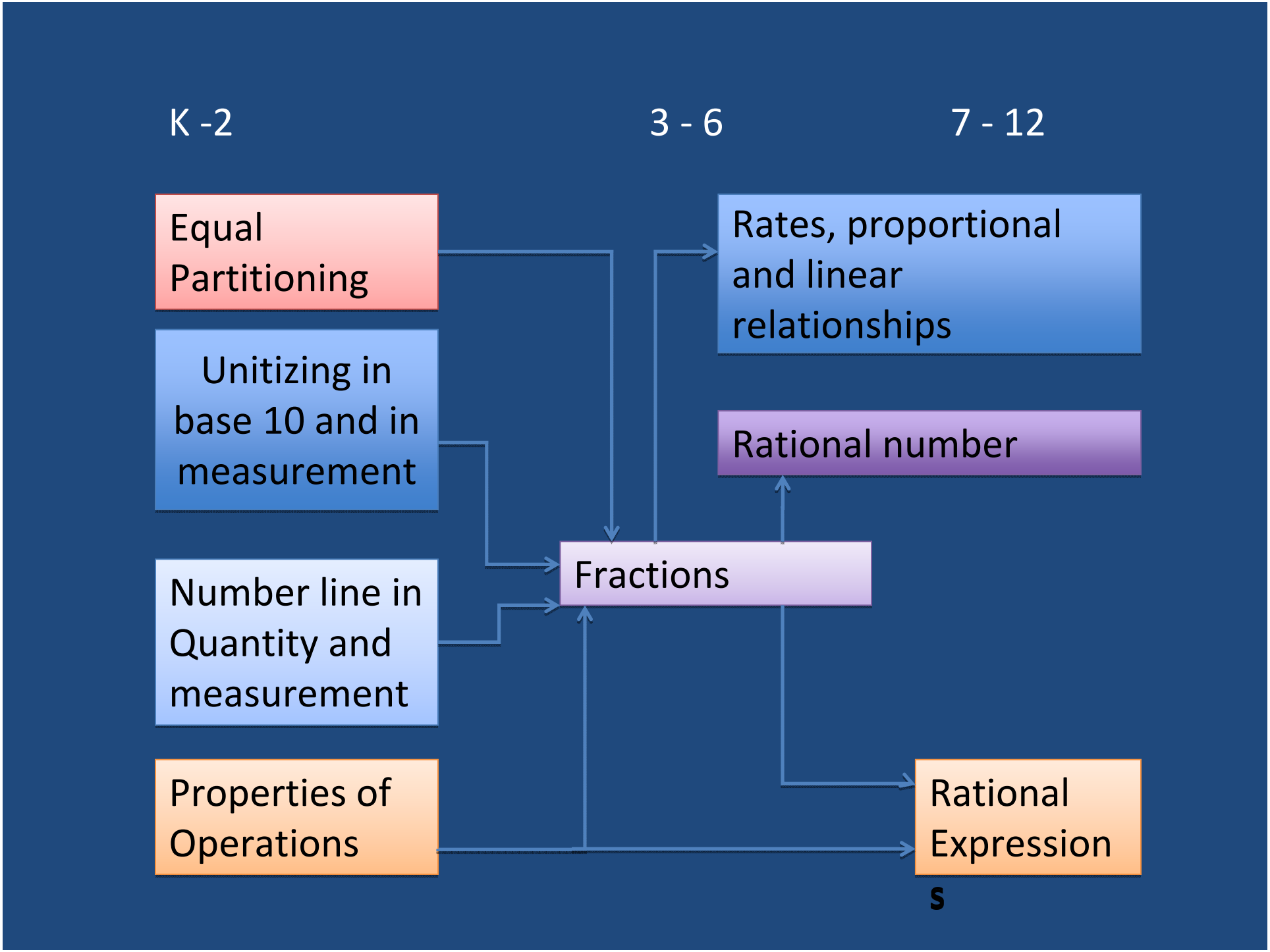
- The first two progressions, equal partitioning and unitizing, draw heavily from learning trajectory research. Confrey has established how children develop ideas of partitioning from early experiences with fair sharing and distributing. These developments have a life of their own apart from developing counting and adding

Unitizing

- . Clements and also Steffe have established the importance of children being able to see a group(s) of objects or an abstraction like ‘tens’ as a unit(s) that can be counted.
- Whatever can be counted can be added, and from there knowledge and expertise in whole number arithmetic can be applied to newly unitized objects, like counting tens in base 10, or adding standard lengths such as inches in measurement.

Unitizing links fractions to whole number arithmetic

- Students' expertise in whole number arithmetic is the most reliable expertise they have in mathematics
- It makes sense to students
- If we can connect difficult topics like fractions and algebraic expressions to whole number arithmetic, these difficult topics can have a solid foundation for students


K -2
3 - 6
7 - 12
Equal Partitioning
Unitizing in base 10 and in measurement
Number line in Quantity and measurement
Properties of Operations
Fractions
Rates, proportional and linear relationships
Rational number
Rational Expression
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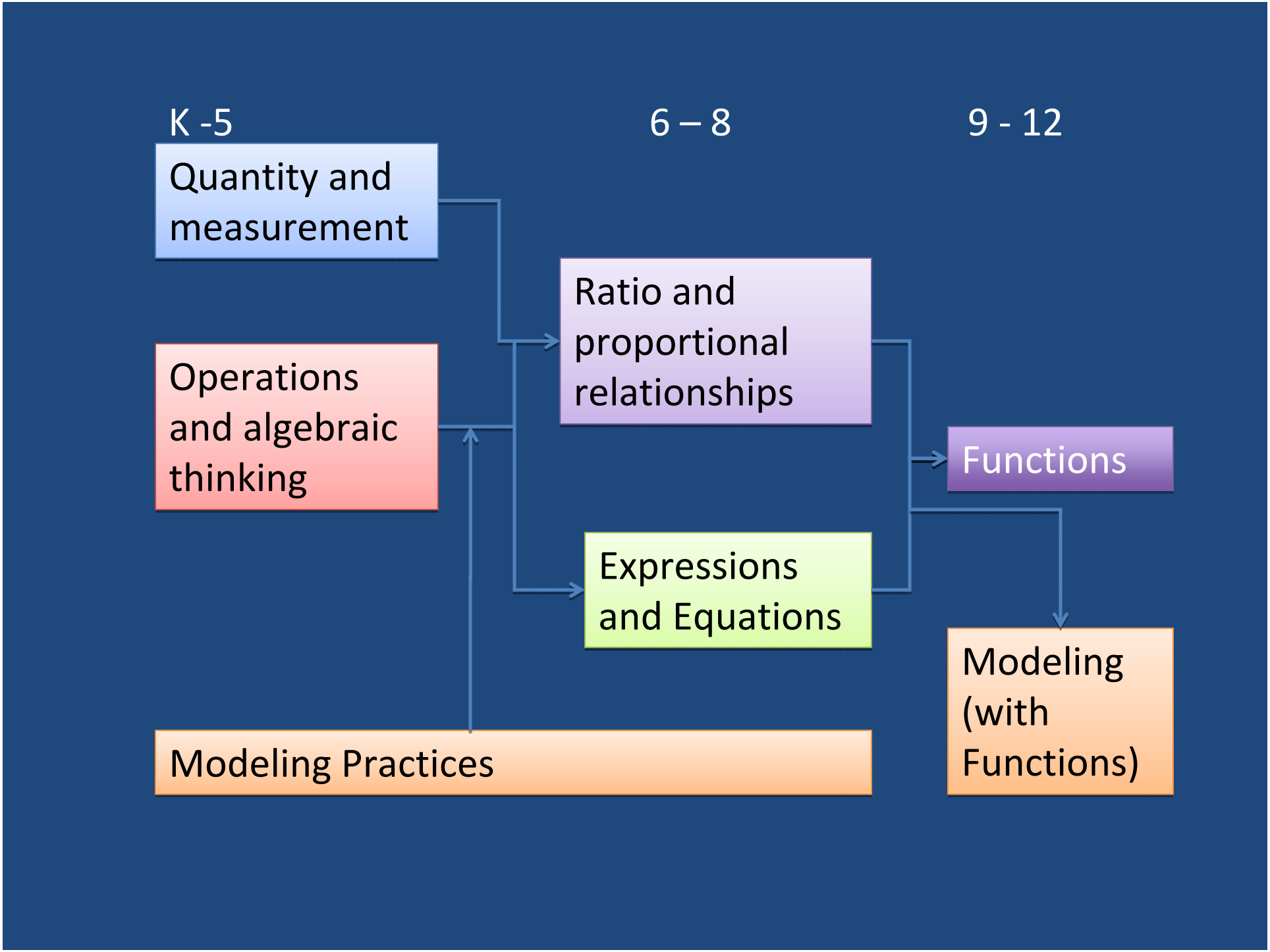
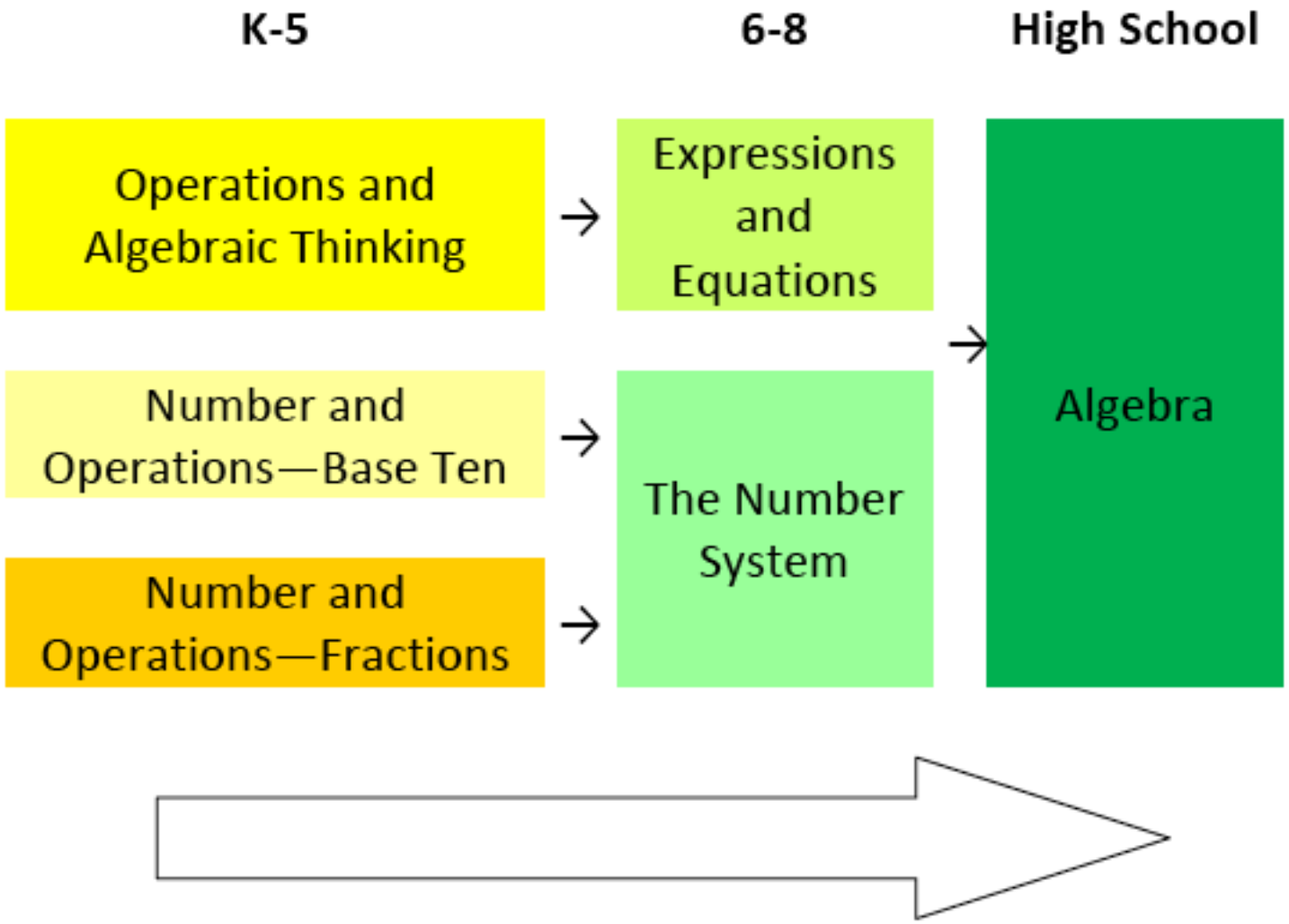

K -5
6 – 8
9 - 12
Quantity and measurement
Operations and algebraic thinking
Ratio and proportional relationships
Expressions and Equations
Functions
Modeling (with Functions)
Modeling Practices

Focusing attention within Number and Operations



Units are things you count

- Objects
- Groups of objects
- 1
- 10
- 100
- ¼ unit fractions
- Numbers represented as expressions

Units add up

- 3 pennies + 5 pennies = 8 pennies
- 3 ones + 5 ones = 8 ones
- 3 tens + 5 tens = 8 tens
- 3 inches + 5 inches = 8 inches
- 3 ¼ inches + 5 ¼ inches = 8 ¼ inches
- 3(1/4) + 5(1/4) = 8(1/4)
- 3(x + 1) + 5(x+1) = 8(x+1)

Principles for effective teaching

- Build on the knowledge learners already have.
- Expose and discuss common misconceptions.
- Use higher-order questions.
- Use cooperative small group work.
- Emphasise reasons rather than answers.
- Use rich collaborative tasks.
- Create connections between topics.
- Use technology in appropriate ways.