Math in Focus: Singapore Math National Institute
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An In-Depth Look by Grade Level: Grades 4 & 5

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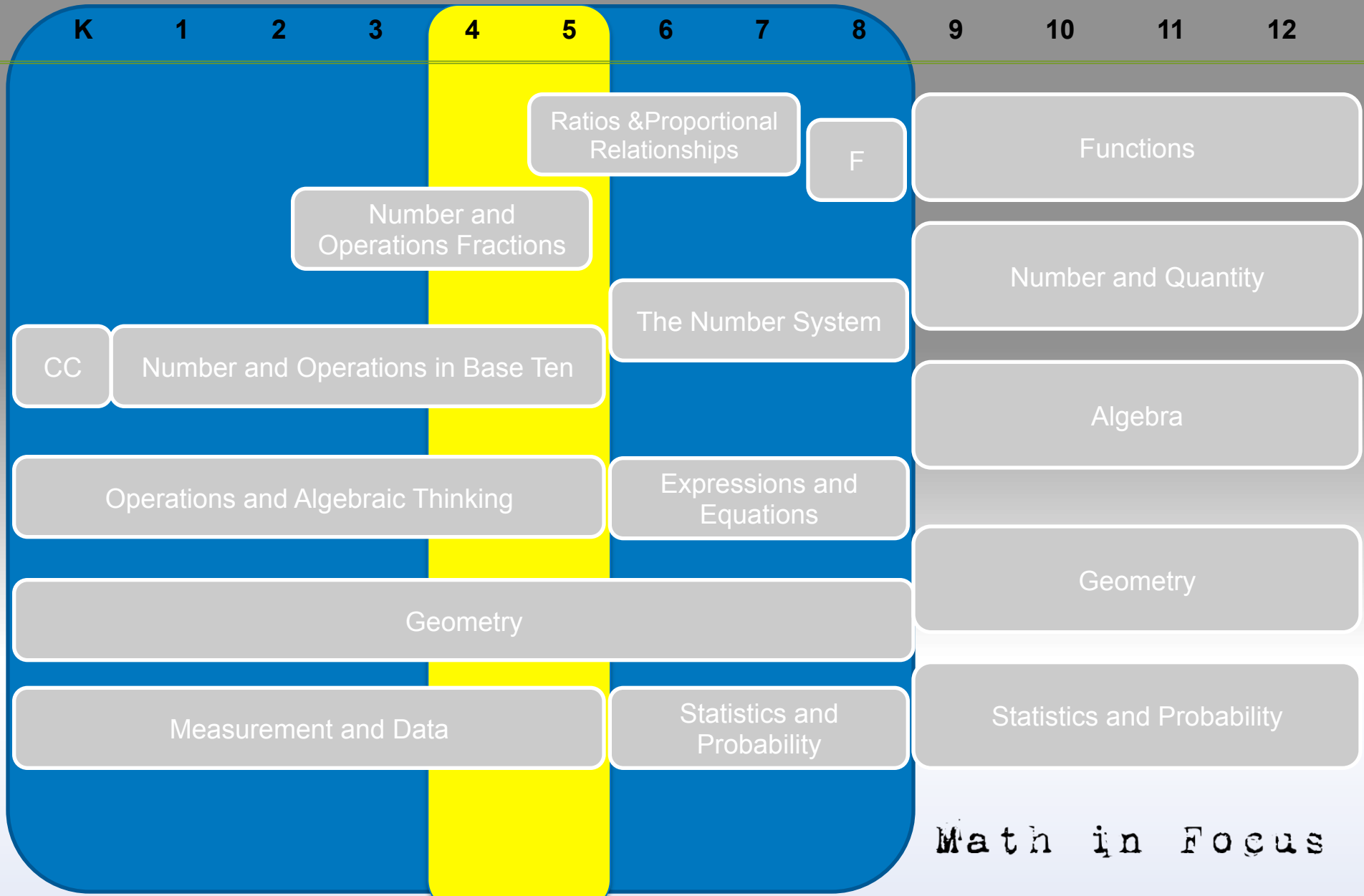
Big Ideas: K - 8



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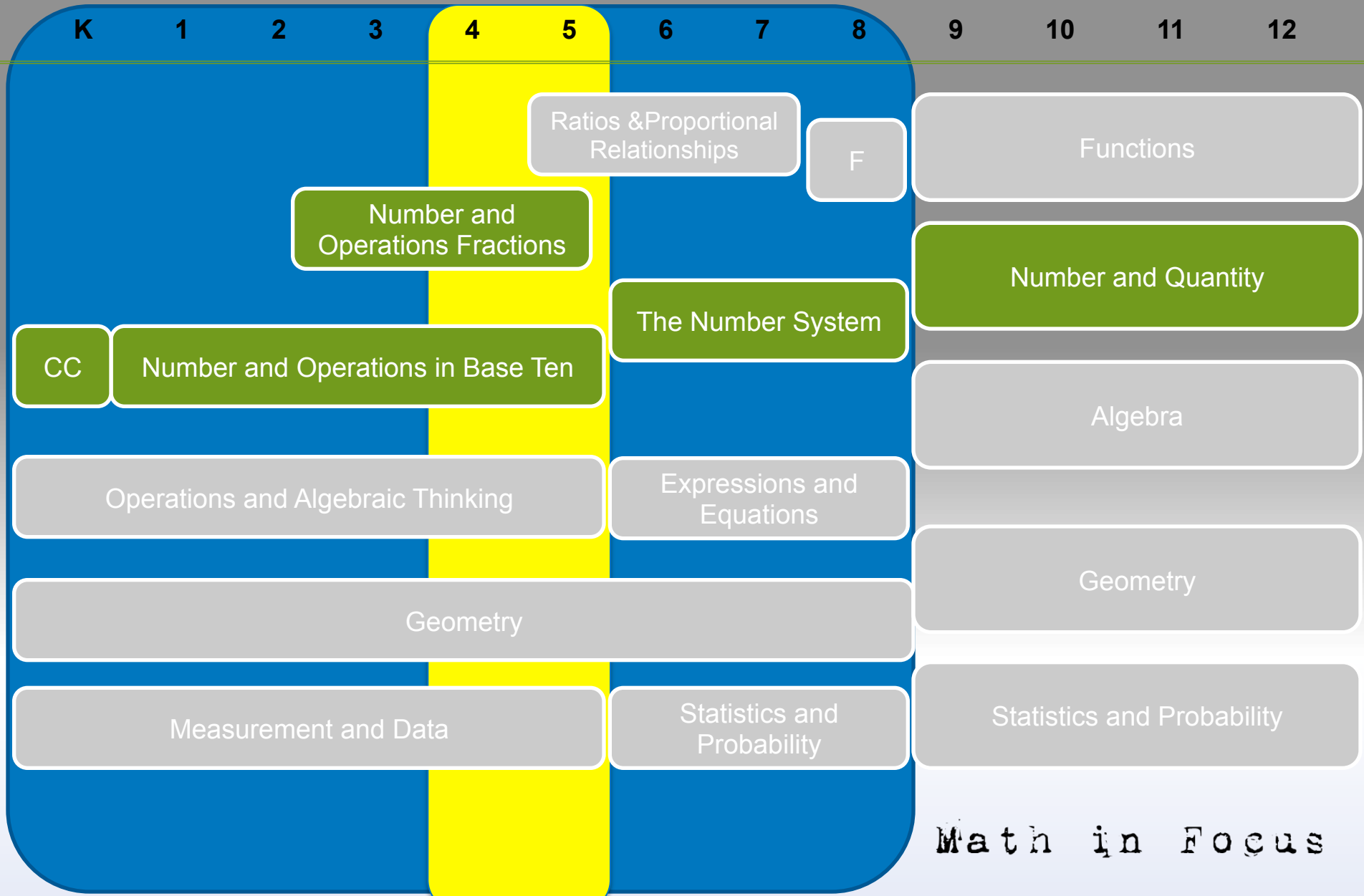
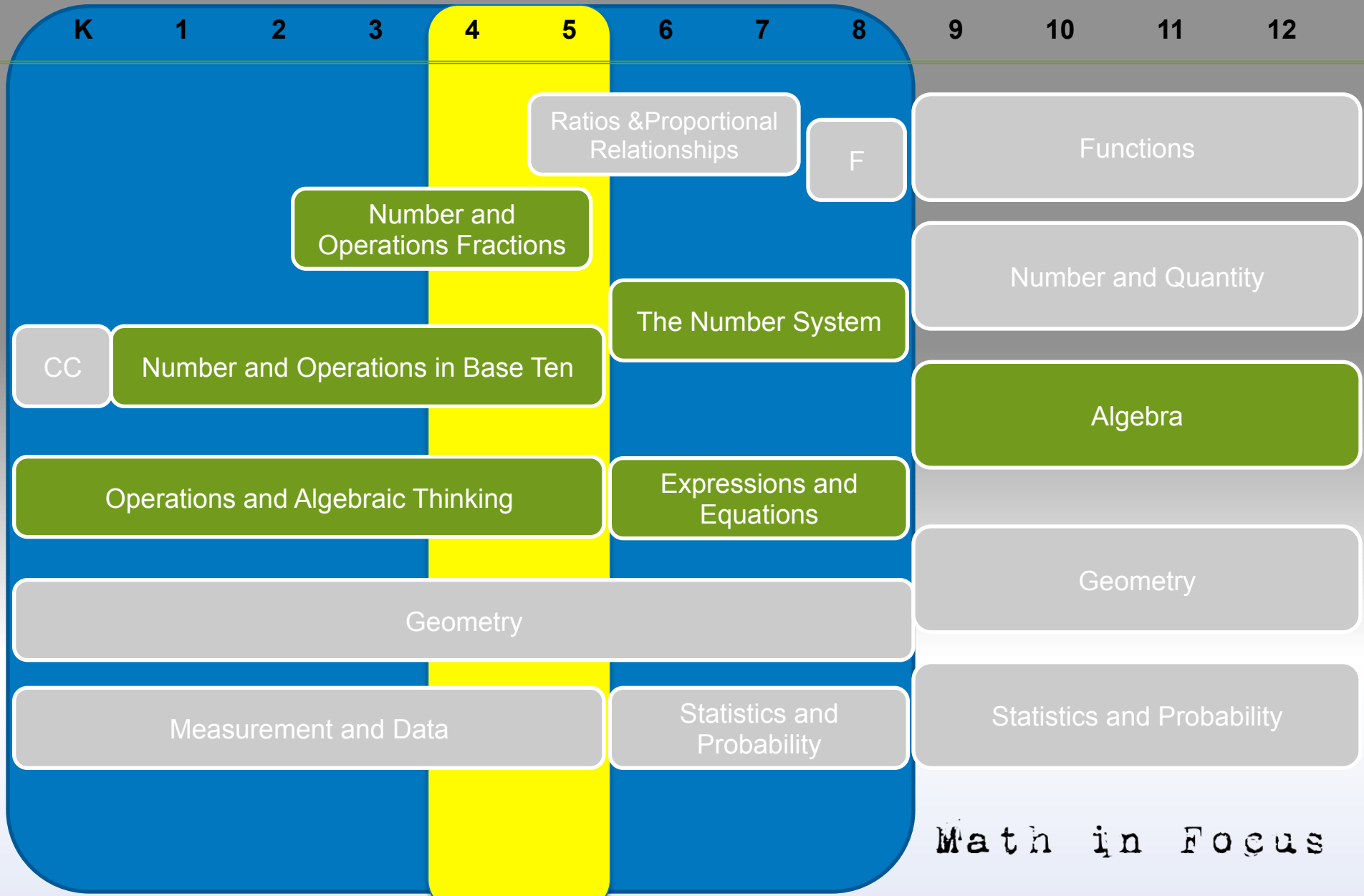
Big Ideas: K - 8



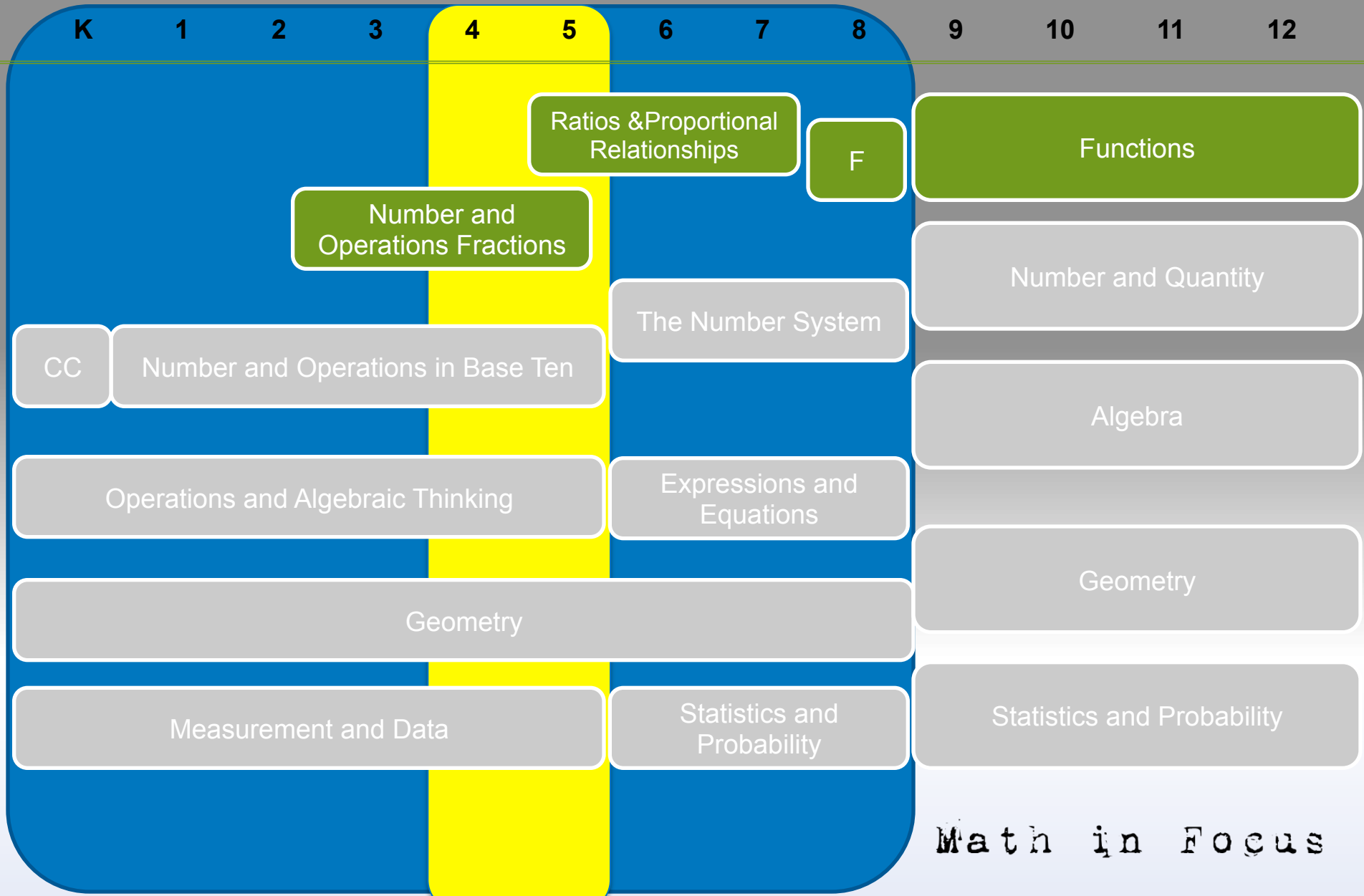
Math in Focus

Big Ideas: K - 8



Math in Focus

Big Ideas: K - 8



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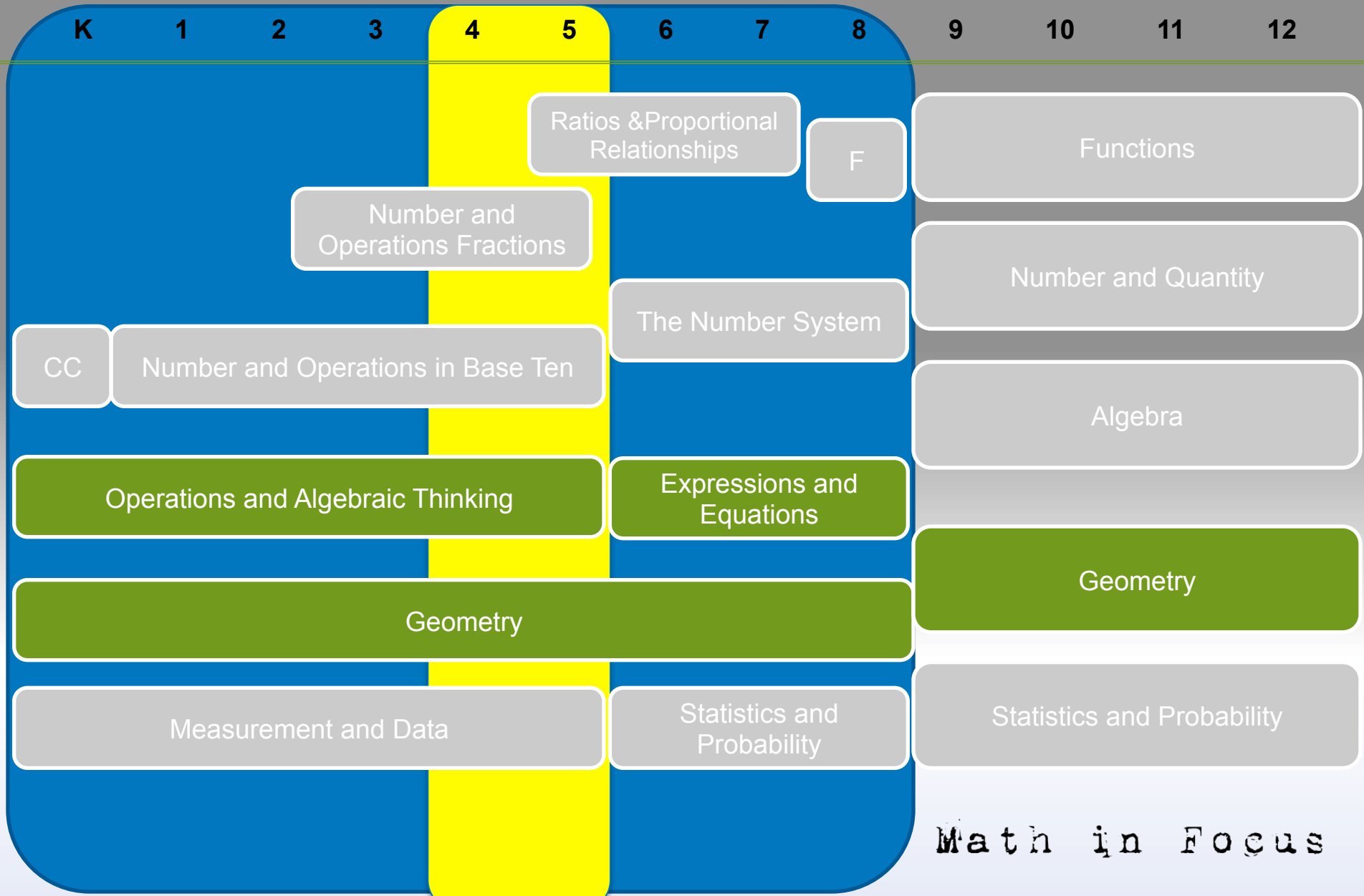
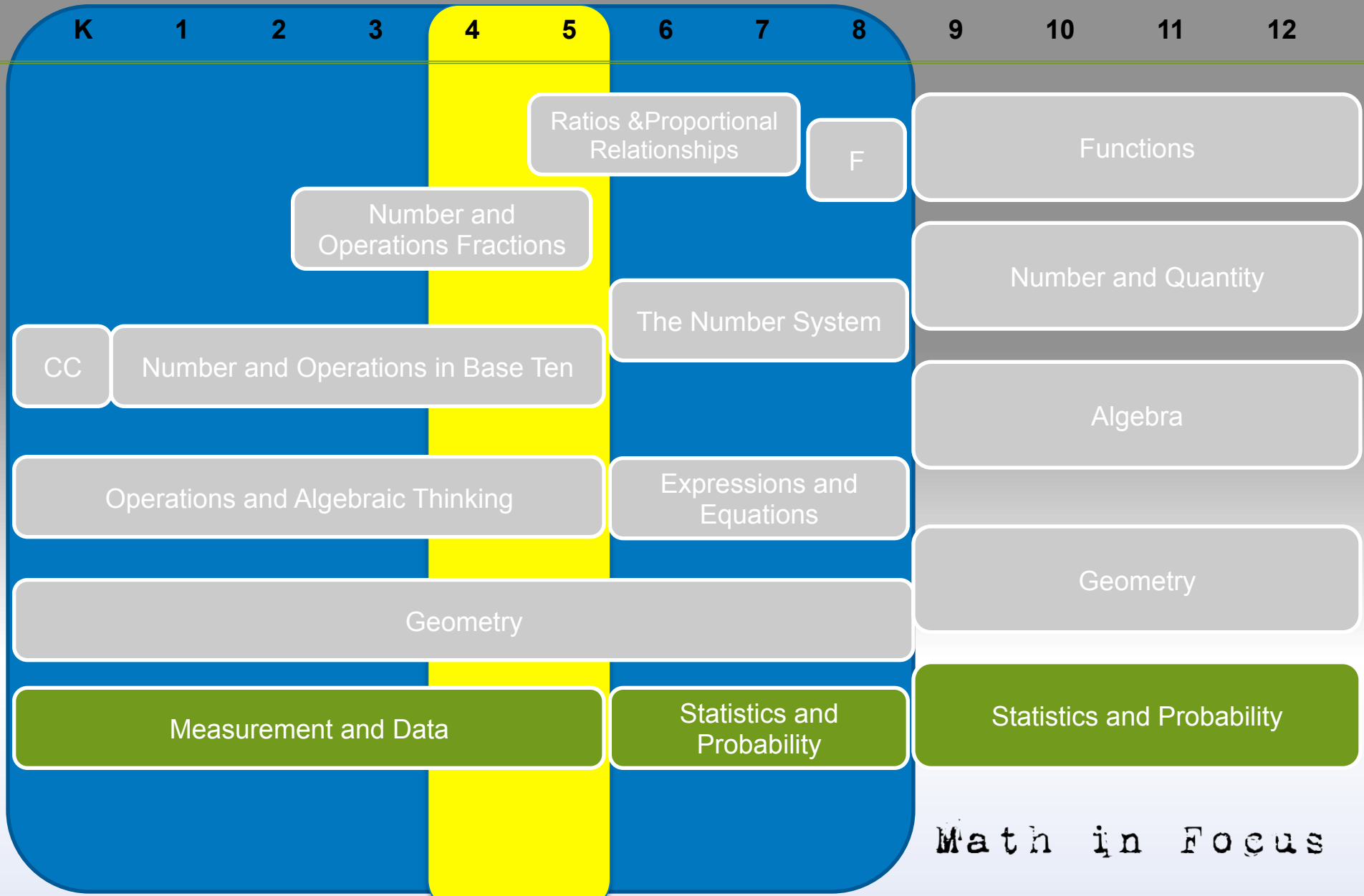


Math in Focus

Big Ideas: K - 8



Math in Focus

Number and Operations

Progression across grade levels

K: Chapter 14

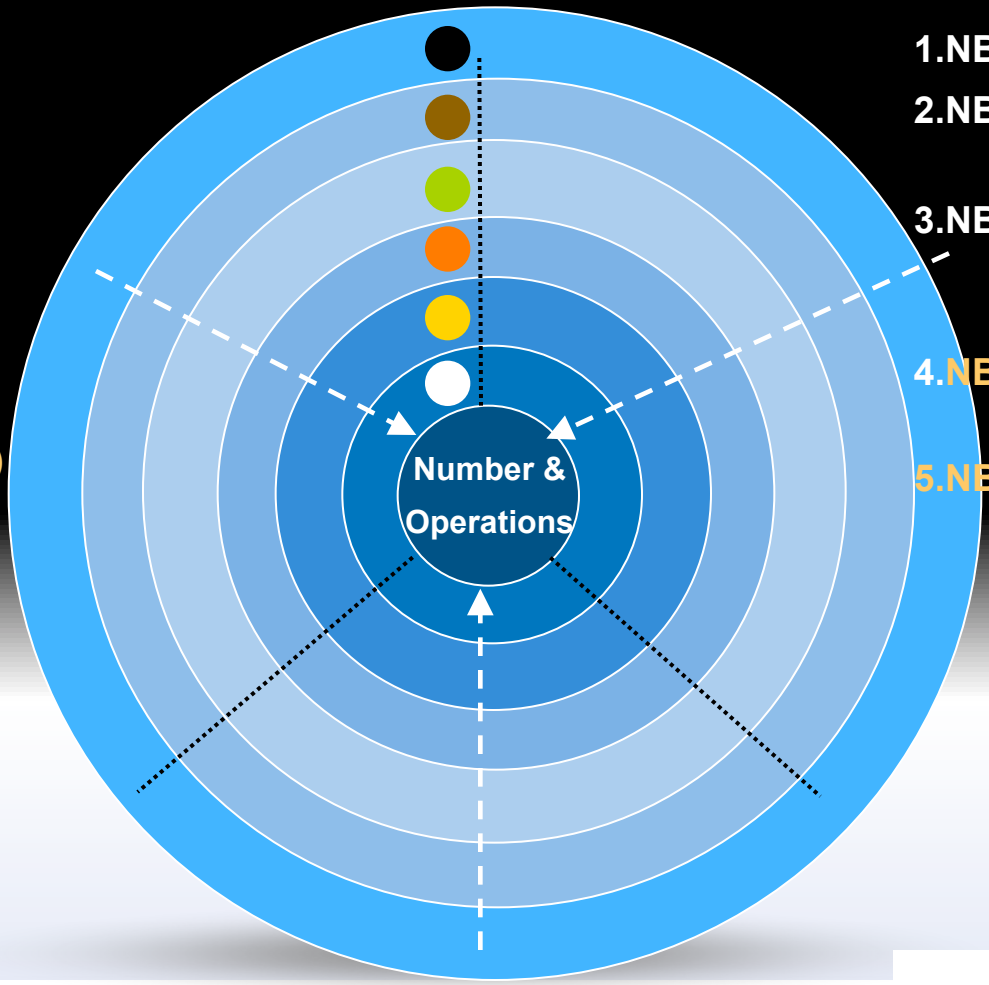
1st: Chapter 17

2nd: Chapters 2 & 3

3rd: Chapter 7

4th: Chapter 3

5th: Chapter 9 (add/sub in 4th grade Chap 8)



5th Grade

4th Grade

3rd Grade

2nd Grade

1st Grade

Kindergarten

Common Core

K.NBT.1 Numbers 11-19

1.NBT.4 Add/Subtract to 100

2.NBT.7 Add/Subtract to 1,000

3.NBT.3 Multiply 1-digit by multiples of 10 up to 90.

4.NBT.5-6 Multiply & Divide multi-digits.

5.NBT.7 Mult/Div/Add/Sub decimals.

Number and Operations

Math in Focus Singapore Math by Marshall Cavendish

COMMON CORE
STATE STANDARDS INITIATIVE
PREPARING AMERICA'S STUDENTS FOR COLLEGE & CAREER

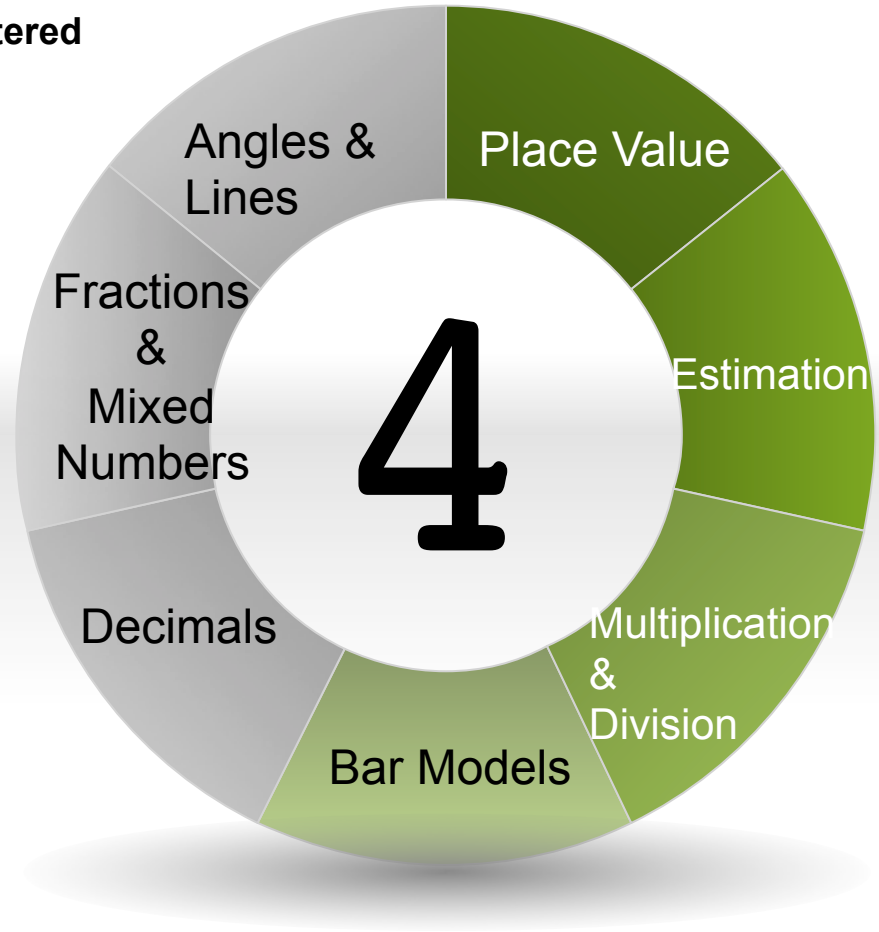
Grade 4

In Grade 4, instructional time should focus on three critical areas: (1) developing understanding and fluency with multi-digit multiplication, and developing understanding of dividing to find quotients involving multi-digit dividends; (2) developing an understanding of fraction equivalence, addition and subtraction of fractions with like denominators, and multiplication of fractions by whole numbers; (3) understanding that geometric figures can be analyzed and classified based on their properties, such as having parallel sides, perpendicular sides, particular angle measures, and symmetry.

Grade:Fourth

Grade 3 Material Mastered

- Multiplication facts.
- Estimation strategies need not be taught towards mastery but practiced year long.



Topics Emphasized

- Number and Operation concepts
- Chapters 1-3 are the most difficult.

Manipulatives

- Concrete materials and visuals cannot be short-changed.
- Use virtual manipulatives.
- Place Value Disks.

Bar Models

- First Year: Go back to 2nd grade Chapter 4 and 3rd grade Chapter 5.
- Bar Modeling technique must be taught.

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Grade 5

In Grade 5, instructional time should focus on three critical areas: (1) developing fluency with addition and subtraction of fractions, and developing understanding of the multiplication of fractions and of division of fractions in limited cases (unit fractions divided by whole numbers and whole numbers divided by unit fractions); (2) extending division to 2-digit divisors, integrating decimal fractions into the place value system and developing understanding of operations with decimals to hundredths, and developing fluency with whole number and decimal operations; and (3) developing understanding of volume.

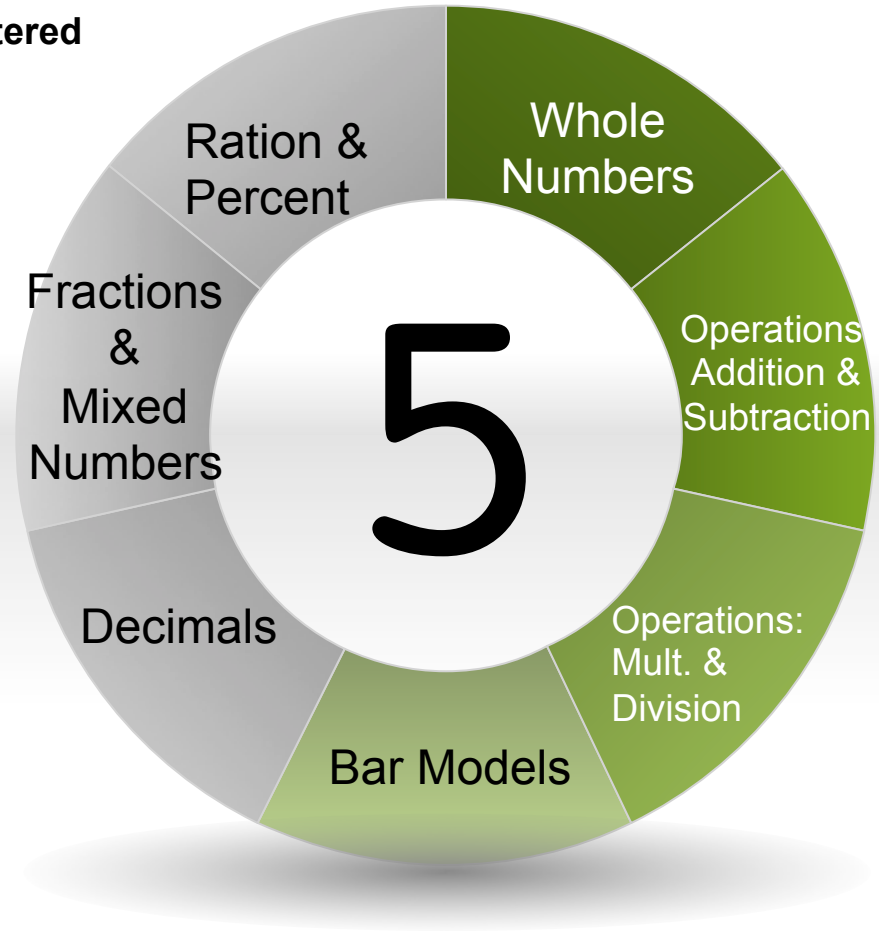
Grade: Fifth

Grade 4 Material Mastered

- Multiplication facts.
- Multiplication & Division
- Decimal & Fraction concepts
- Bar Model technique

Manipulatives

- Concrete materials and visuals cannot be short-changed.
- Use virtual manipulatives.
- Place Value Disks.



Topics Emphasized

- Multiplication & Division of: Whole Numbers, Fractions and Decimals.

Bar Models

- First Year: Go back 3rd grade Chapter 5 and 4th grade Chapter 3.

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Chapters to address CCSS	Chapter Concepts After State Assessment	Additional Topics Since not in CCSS, these should be taught after the other content
Grade 4:		
Chapters 1-3, 6,7, 9-13 Notes: Chapters 1-3 are major topic of 4th grade and will take more time. Chapter 6 is also a major topic, though addition and subtraction with unlike denominators is not required in CCSS, so emphasize mixed numbers and meaning of operations.	Chapter 4 with line plots added, including fractional measurements	Chapters 5 Chapter 8 Chapter 14

Chapters to address CCSS	Chapter Concepts After State Assessment	Additional Topics Since not in CCSS, these should be taught after the other content
Grade 5:		
Chapters 1- 4, 5.1 – 5.2, 8, 9, 12 - 15 Notes: Chapters 1-4 are the most critical and will require more time than is allotted to them. This is especially true for chapters 2 and 3 which may require returning to the previous grade level to ensure that prerequisite knowledge is sufficient. Chapter 8 will require students to have a good mastery of the 4th grade decimal content (chapter 7 of 4th grade) to understand decimals in chapter 8. Chapter 15 is part of the major content, particularly volume	Chapter 11 especially 11.2, Also include 5MD2 line plots 11. 3 is not necessary	Chapters 6, 7, 10, Chapter 7 is good to include if possible in preparation for 6th grade

Progressions & Trajectories

Content across grade levels

- **Learning Progressions:** Narrative documents describing the progression of a topic across a number of grade levels, informed both by research on children's cognitive development and by the logical structure of mathematics.

Content within grade level

Learning Trajectories: An empirically supported developmental progression of how students move through successive refinements from informal to complex ideas, taking into consideration needed instructional practices, tasks, and tools (Confrey et al., 2009).

Progression of Topics

Grade 4

1 Place Value of Whole Numbers
2 Estimation and Number Theory
3 Whole Number Mult. And Div.
4 Tables and Line Graphs
5 Data and Probability
6 Fractions and Mixed Numbers
7 Decimals
8 Adding and Subtracting Decimals
9 Angles
10 Perpen & Parallel Line Segments
11 Squares and Rectangles
12 Area and Perimeter
13 Symmetry
14 Tessellations

Grade 5

1 Whole Numbers
2 Whole Number Mult. And Division
3 Fractions and Mixed Numbers
4 Mult. & Div Fract. and Mixed Numb
5 Algebra
6 Area of a Triangle
7 Ratio
8 Decimals
9 Multiplying and Dividing Decimals
10 Percent
11 Graphs and Probability
12 Angles
13 Prop of Triangles & 4-sided Figures
14 Three-Dimensional Shapes
15 Surface Area and Volume

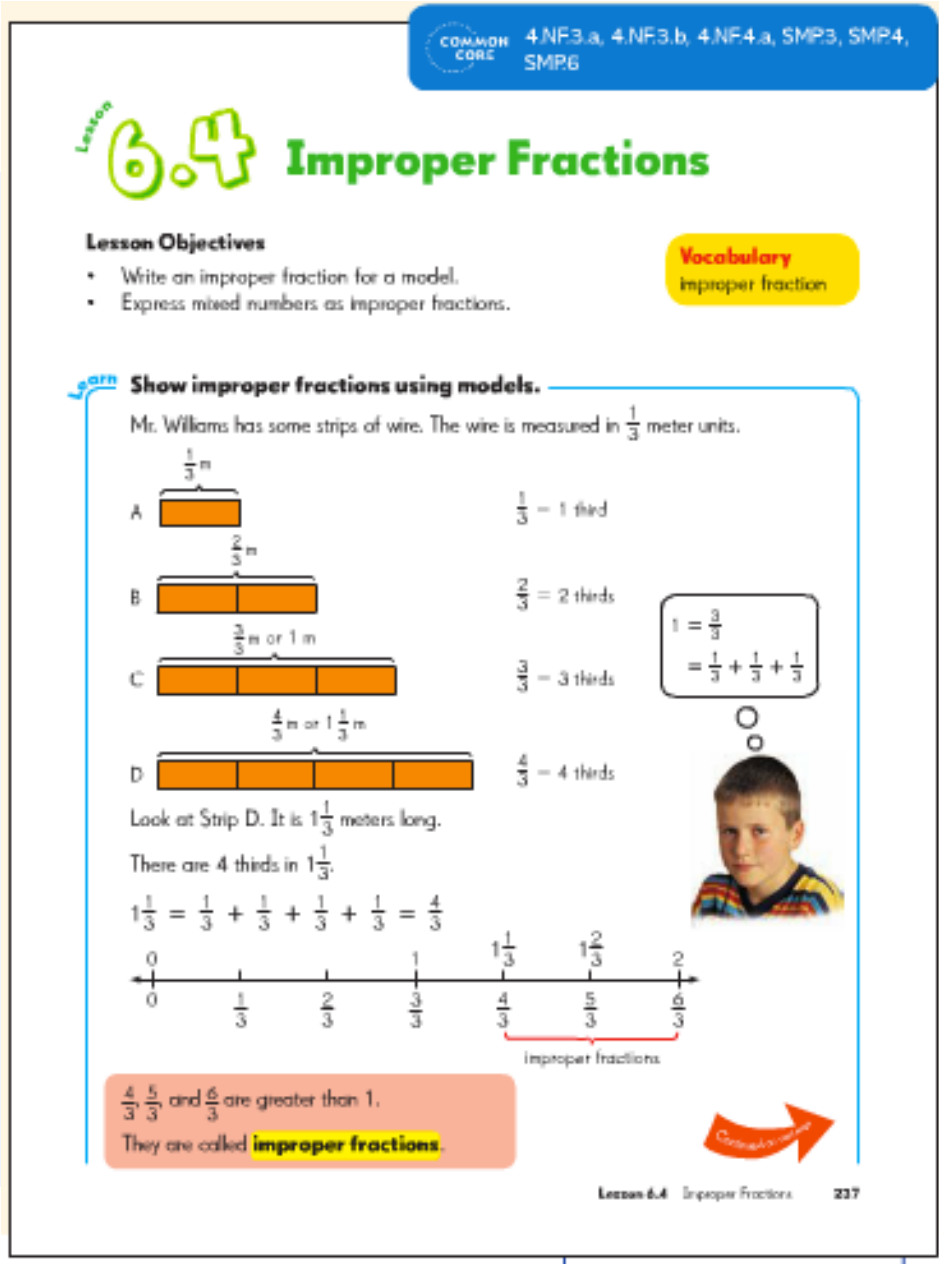
Learning Trajectories

Grade 4

Pedagogical Approach C → P → A

6 Fractions and Mixed Numbers

Lesson 6.0	Comparing Unlike Fractions
Lesson 6.1	Adding Fractions
Lesson 6.2	Subtracting Fractions
Lesson 6.3	Mixed Numbers
Lesson 6.4	Improper Fractions
Lesson 6.5	Renaming Improper Fractions and Mixed Numbers
Lesson 6.6	Renaming Whole Numbers when Adding and Subtracting Fractions
Lesson 6.7	Fraction of a Set
Lesson 6.7.a	Multiplying Fractions and Whole Numbers
Lesson 6.8	Real-World Problems: Fractions
Lesson 6.8.a	Line Plots with Fractions of a Unit



COMMON CORE 4.NF.3.a, 4.NF.3.b, 4.NF.4.a, SMP.3, SMP.4, SMP.6

Lesson 6.4 Improper Fractions

Lesson Objectives

- Write an improper fraction for a model.
- Express mixed numbers as improper fractions.

Vocabulary
improper fraction

Learn **Show improper fractions using models.**

Mr. Williams has some strips of wire. The wire is measured in $\frac{1}{3}$ meter units.

A $\frac{1}{3}$ m — $\frac{1}{3}$ = 1 third

B $\frac{2}{3}$ m — $\frac{2}{3}$ = 2 thirds

C $\frac{3}{3}$ m or 1 m — $\frac{3}{3}$ = 3 thirds

D $\frac{4}{3}$ m or $1\frac{1}{3}$ m — $\frac{4}{3}$ = 4 thirds

$1 = \frac{3}{3}$
$= \frac{1}{3} + \frac{1}{3} + \frac{1}{3}$

Look at Strip D. It is $1\frac{1}{3}$ meters long.

There are 4 thirds in $1\frac{1}{3}$.

$1\frac{1}{3} = \frac{1}{3} + \frac{1}{3} + \frac{1}{3} + \frac{1}{3} = \frac{4}{3}$

0, $\frac{1}{3}$, $\frac{2}{3}$, 1, $\frac{3}{3}$, $1\frac{1}{3}$, $\frac{4}{3}$, $1\frac{2}{3}$, $\frac{5}{3}$, 2, $\frac{6}{3}$

improper fractions

$\frac{4}{3}$, $\frac{5}{3}$, and $\frac{6}{3}$ are greater than 1.
They are called **improper fractions**.

Lesson 6.4 Improper Fractions 237

Components of Math In Focus Learning Trajectories

Main Anchor Task	New information. Big Ideas. "Learn"
Supporting Anchor Tasks	Prior information. RPK. Within grade level and from previous grades.
Instructional Strategies	CPA. "Guided Practice". Visualization. Math is Thinking. Differentiation. Questioning techniques.
Formative Assessments	Individual Lesson objectives. "Let's Practice"/ Indep. Practice.
Summative Assessments	Put On Your Thinking Cap. TestPrep. Benchmark, Midyear and Final.

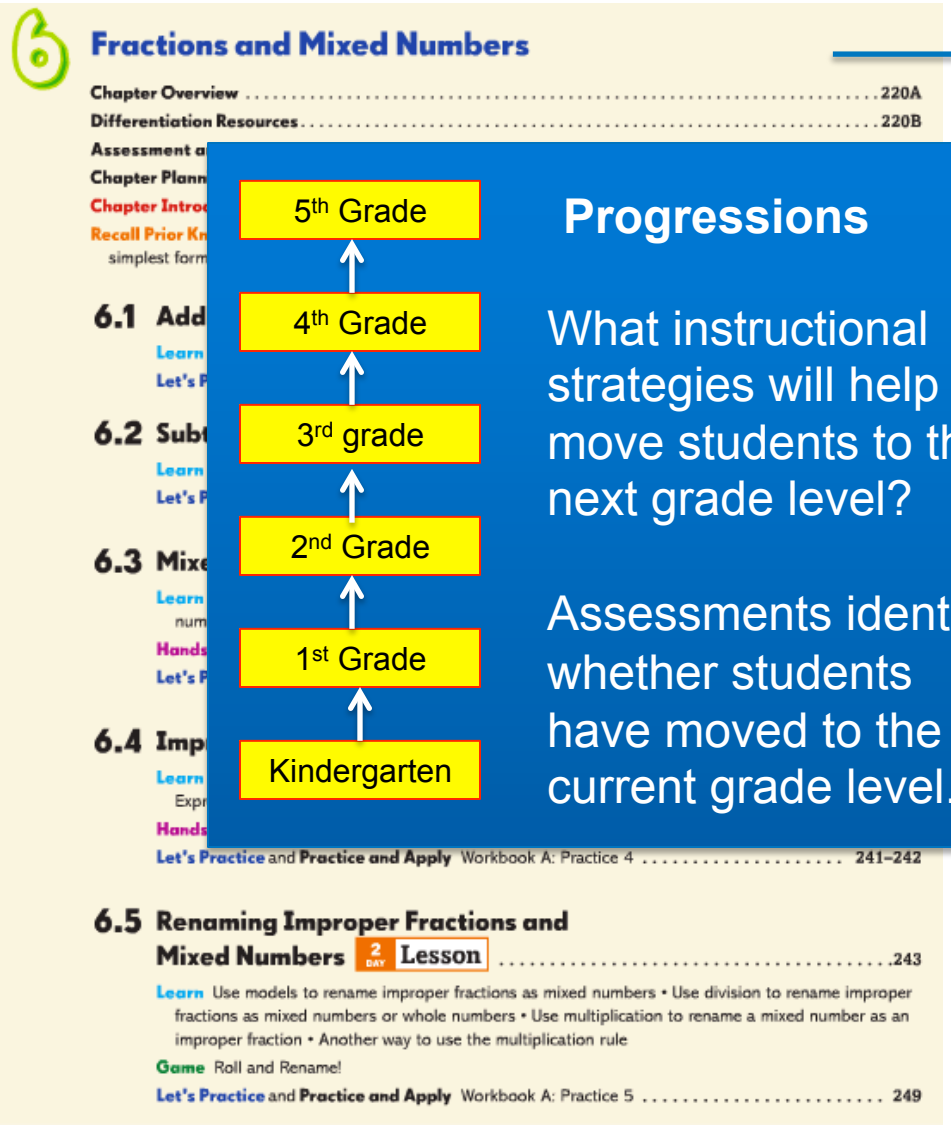
Math in Focus The Singapore Approach

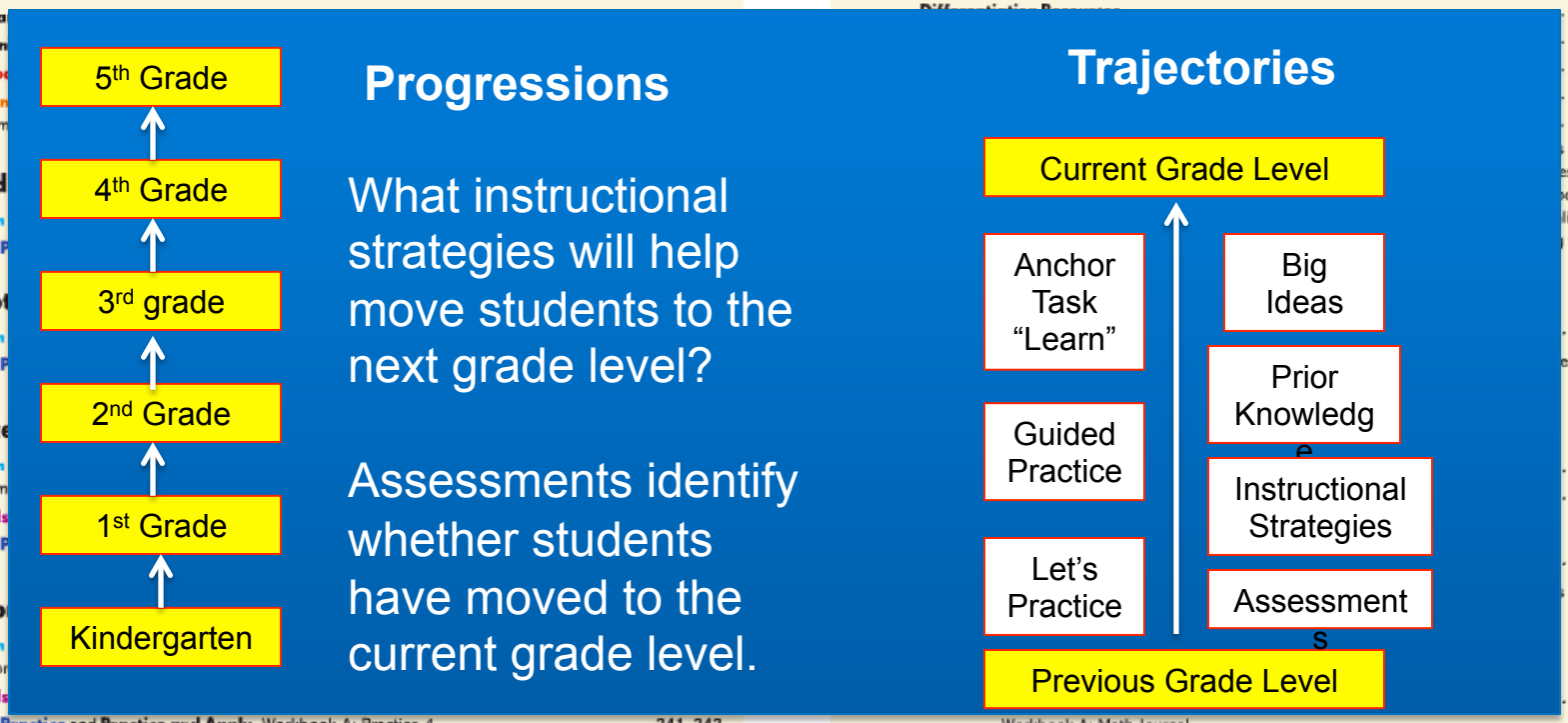
Houghton Mifflin Harcourt

Math In Focus Progressions & Trajectories

4th

5th





Houghton Mifflin Harcourt

MIFASSESSMENT

Types of assessment

basic calculation – procedural

direct calculation - middle level application

unusual calculation– novel problems
(out of the box)

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MIFLEVELS OF MASTERY

The ability to apply concepts to novel situations.

The ability to apply concepts in problem solving situations.

The ability to perform computations without the support of concrete materials.

The ability to perform computations with the support of concrete materials.

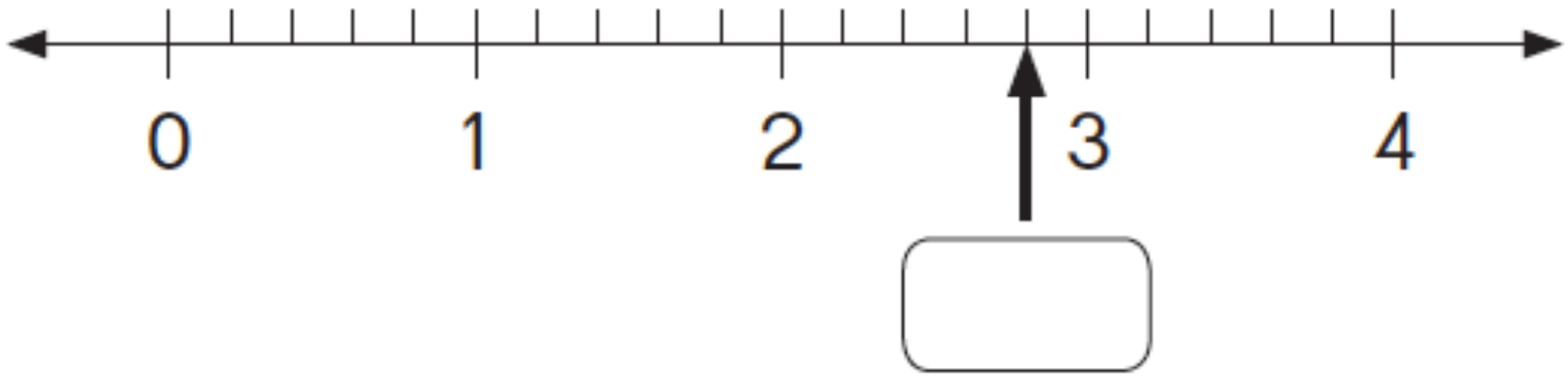
basic calculation – procedural

3. Find the difference between $\frac{1}{2}$ and $\frac{3}{8}$.

(A) $\frac{1}{8}$ (B) $\frac{4}{8}$ (C) $\frac{2}{6}$ (D) $\frac{7}{8}$

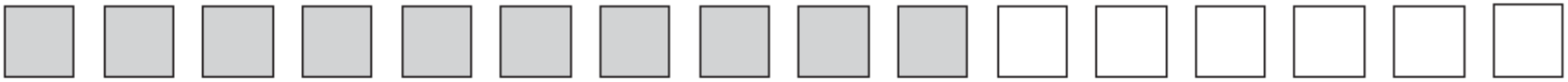
direct calculation - middle level application

4. What fraction belongs in the box?



unusual calculation– novel problems
(out of the box)

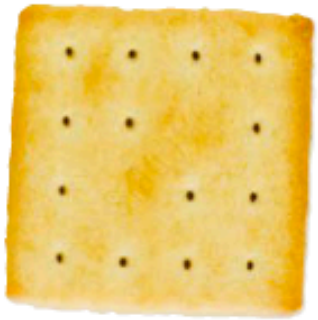
9. What fraction of the set is unshaded? Give your answer in simplest form.



CRITICAL THINKING SKILLS

Put On Your Thinking Cap!

PROBLEM SOLVING



2 Jessie had a whole graham cracker.

Minah had only part of another graham cracker.

Jessie gave $\frac{1}{4}$ of her graham cracker to Minah.

In the end, both girls had the same fractional part of a graham cracker.

What fraction of a graham cracker did Minah have at first?

Fractions and Mixed Numbers

basic calculation – procedural

Add or subtract. Express each sum or difference in simplest form.

6. **a.** $2\frac{3}{4} + 3\frac{2}{5}$ **b.** $3\frac{1}{2} - 1\frac{7}{8}$

Fractions and Mixed Numbers

direct calculation - middle level application

Solve. Show your work.

8. Gail baked some cookies. She sold $\frac{2}{7}$ of the cookies on Monday. She sold $\frac{1}{3}$ more of the cookies on Tuesday than on Monday. What fraction of the cookies did Gail sell on the two days?

unusual calculation– novel problems
(out of the box)

12.

Julian and Stacey needed 10 liters of water to fill a tank. Stacey filled the tank with $3\frac{11}{12}$ liters of water. Julian poured $1\frac{2}{5}$ liters less than Stacey into the tank. How much more water is still needed to fill the tank?

Put On Your Thinking Cap!

Problem Solving

Solve. Use a model to help you.

Paul mixes cement with sand. He uses $3\frac{3}{4}$ kilograms of cement and $\frac{1}{2}$ kilogram more sand than cement. He needs 10 kilograms of the mixture. Does he have enough mixture? If yes, how much more does he have and if no, how much more does he need?