Math Teach & Talk

K-5 Teacher Guides & Daily Discussions

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DISCLAIMER!

Changing standards is about changing your mind first and then forming some new habits and routines as you abandon old ones.

-Arthur L. Costa and Bena Kallick

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Objectives

- Utilize the new **Math Teach and Talk** Resource
- To experience computational fluency strategies that connects to content and practice standards
- To gain deeper understanding of the PARCC, progression documents and other available resources

Key Shifts

Focus

Coherence

Rigor

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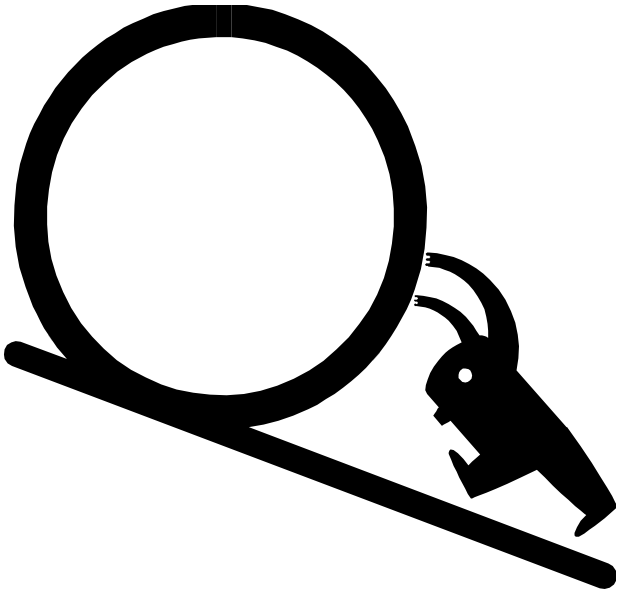
RIGOR
A DELICATE BALANCE

Which one are you?



Why?
Math Teach and Talk

- Implementing the New Illinois Learning Standards
  - What's important in my grade level?
  - How should I be teaching differently?
  - What strategies are important to use?
  - What's expected for my grade level?
  - How do I go deeper?

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Standard Algorithm

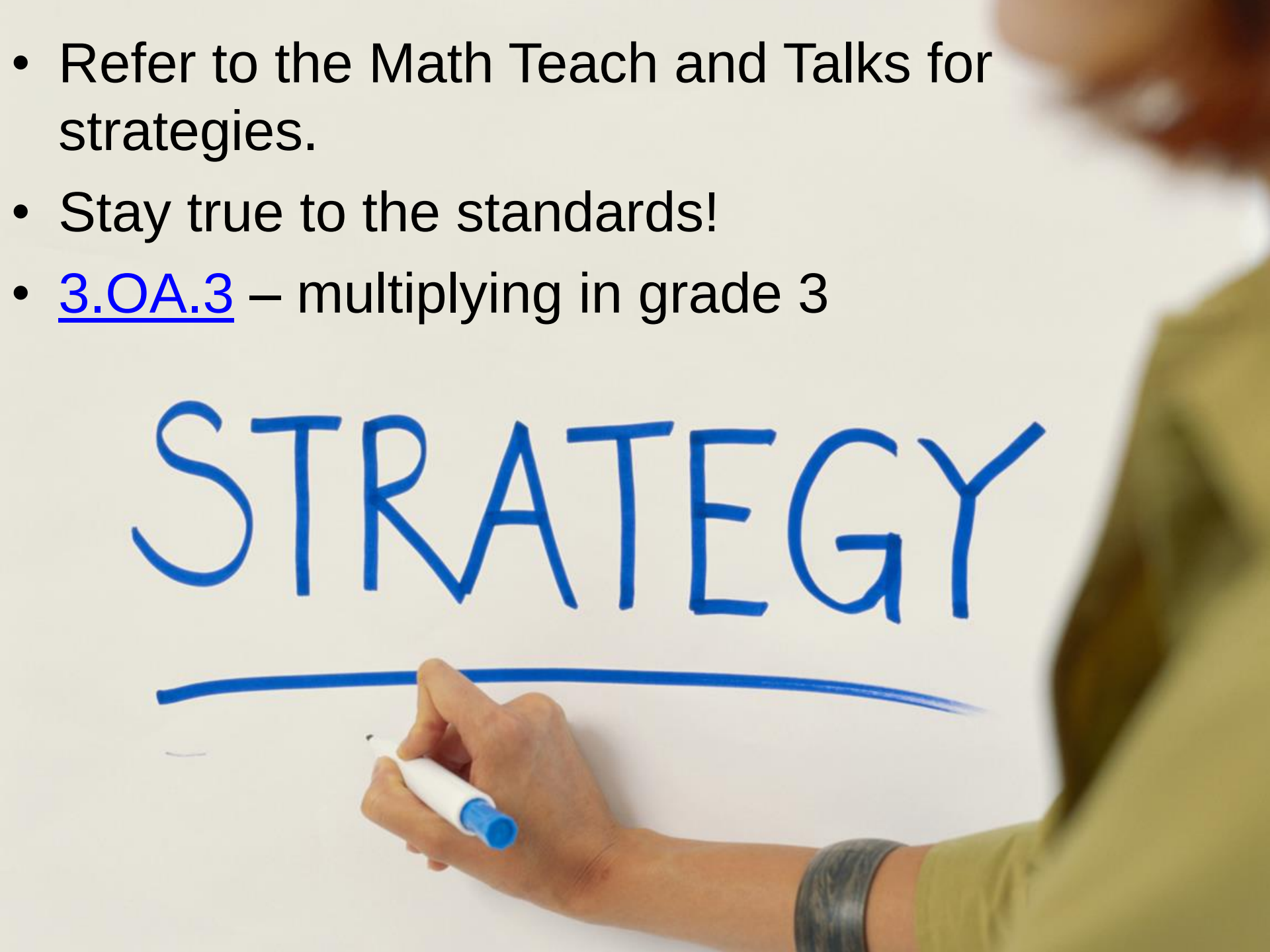
According to the standards… when will students

- Add/Subtract
  - 4.NBT.4 Fluently add and subtract multi-digit whole numbers using the standard algorithm.
- Multiplication
  - 5.NBT.5 Fluently multiply multi-digit whole numbers using the standard algorithm.
- Division
  - 6.NS.2 Fluently divide multi-digit numbers using the standard algorithm.

Teacher Guides

- Standard
- Defining Instructional Shifts/Vocabulary/Strategy
- Coherence and Connections: Need to Know
- Classroom Resources
- HOT Questions
- Additional Resources

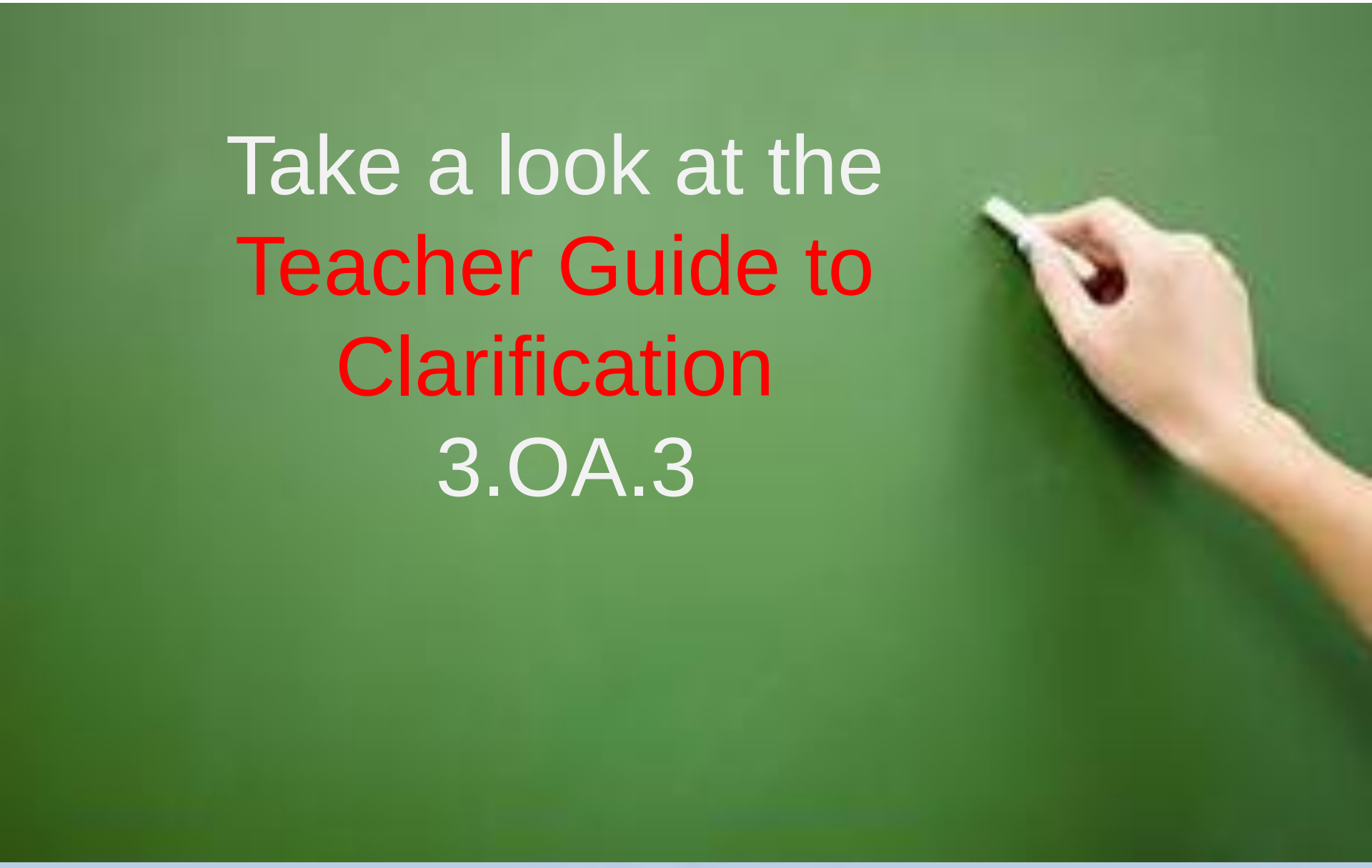
- Refer to the Math Teach and Talks for strategies.
- Stay true to the standards!
- 3.OA.3 – multiplying in grade 3



Take a look at the

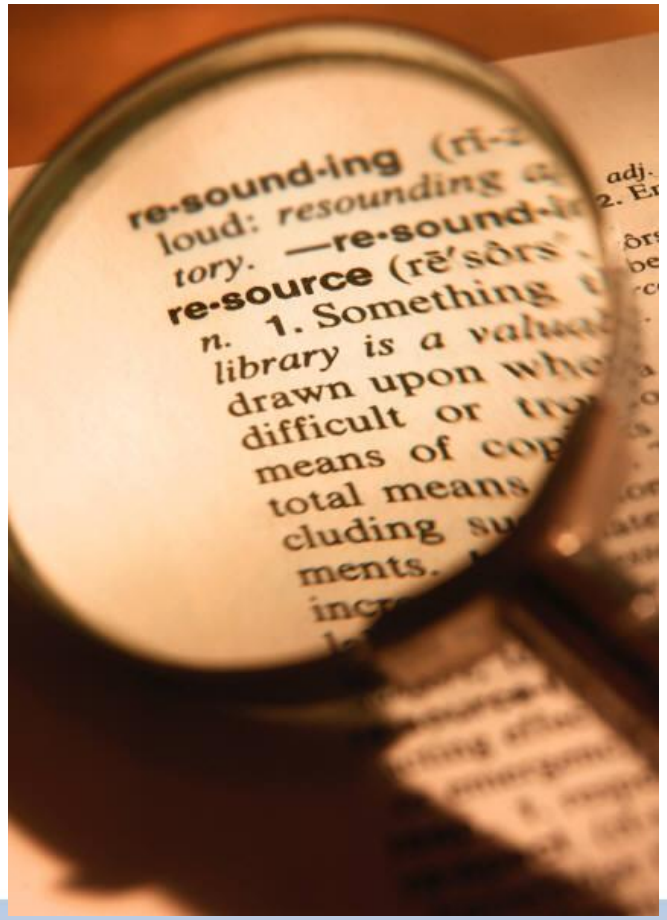
Teacher Guide to Clarification

3.OA.3

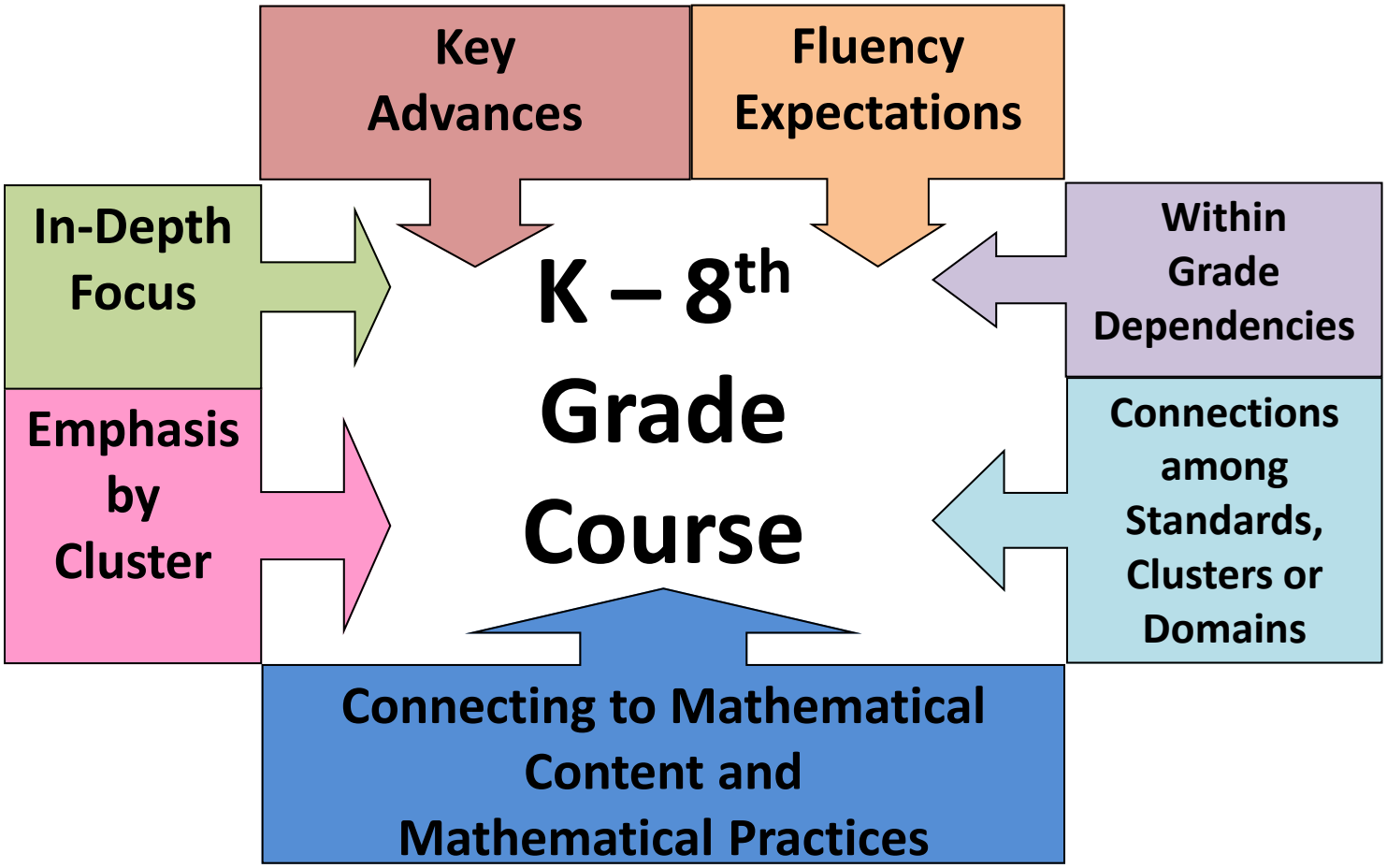


Reputable Resources Used

- The Standards Document
- PARCC Model Content Frameworks
- Progression Documents
- FLIPBOOKS from KATM.org
- NCTM Publications



What Makes a Framework?



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Standard Selection

PARCC Model Content Frameworks

- K-2 and 3 – 11

Fluency Expectations or Examples of Culminating Standards

1.OA.C.6 Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., 8 + 6 = 8 + 2 + 4 = 10 + 4 = 14); decomposing a number leading to a ten (e.g., 13 – 4 = 13 – 3 – 1 = 10 – 1 = 9); using the relationship between addition and subtraction (e.g., knowing that 8 + 4 = 12, one knows 12 – 8 = 4); and creating equivalent but easier or known sums (e.g., adding 6 + 7 by creating the known equivalent 6 + 6 + 1 = 12 + 1 = 13).

1.OA.D.7 Understand the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false. *For example, which of the following equations are true, and which are false? 6 = 6, 7 = 8 – 1, 5 + 2 = 2 + 5, 4 + 1 = 5 + 2.*

Standard Selection

PARCC Model Content Frameworks

Examples of Opportunities for In-Depth Focus

2.OA.A.1 Using situations (from word problems, from classroom events or experiences, and from discovered mathematical patterns) as a source of problems can help students make sense of and contextualize the operations they are learning. There is a tremendous variety of basic situation types in addition and subtraction.[19]

2.NBT.B.7 It takes substantial time throughout the year for students to extend addition and subtraction to 1,000, connecting steps in the computation to what they know about place value and properties of operations.

PARCC Evidence Tables and Clarification Statements

Grade 3 – PBA/MYA

Evidence Statement Key	Evidence Statement Text	Clarifications	MP
3.MD.1-1	Tell and write time to the nearest minute and measure time intervals in minutes.	i) Time intervals are limited to 60 minutes ii) No more than 20% of items require determining a time interval from clock readings having different hour values Acceptable intervals: ex. Start time 1:20, end time 2:10 – time interval is50 minutes. Unacceptable intervals: ex. Start time 1:20, end time 2:30 – time interval exceeds 60 minutes.	-
3.MD.1-2	Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.	i) Only the answer is required (methods, representations, etc. are not assessed here). ii) Tasks do not involve reading start/stop times from a clock nor calculating elapsed time.	1, 4, 2, 5

Standard Selection

Progression Documents 1.OA.2

There are a variety of methods to change to an easier problem. These draw on addition of three whole numbers.[1.OA.2] A known addition or subtraction can be used to solve a related addition or subtraction by decomposing one addend and composing it with the other addend. For example, a student can change 8+6 to the easier 10 + 4 by decomposing 6 = 2 + 4 and composing the 2 with the 8 to make 10:

8 + 6 = 8 + 2 + 4

10 + 4 = 14.

Standard Selection

FLIPBOOKS

4.OA.3

- Your class is collecting bottled water for a service project. The goal is to collect 300 bottles of water. On the first day, Creighton brings in 3 packs with 6 bottles in each container. Susan wheels in 6 packs with 6 bottles in each container. About how many bottles of water still need to be collected?

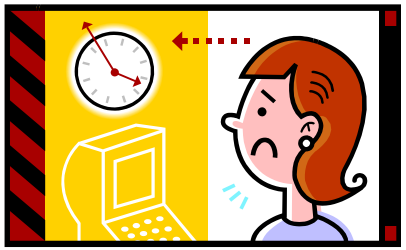
Student 1

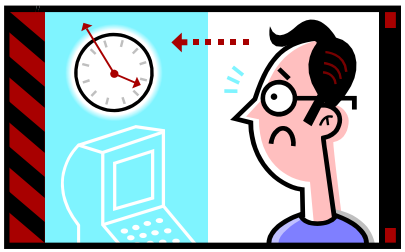
- First, I multiplied 3 and 6 which equals 18. Then I multiplied 6 and 6 which is 36. I know 18 plus 36 is about 50. I'm trying to get to 300. 50 plus another 50 is 100. Then I need 2 more hundreds. So we still need 250 bottles.

Student 2

- First, I multiplied 3 and 6 which equals 18. Then I multiplied 6 and 6 which is 36. I know 18 is about 20 and 36 is about 40. 40+20=60. 300 - 60 = 240, so we need about 240 more bottles.

Teacher Guide = Time Saver





Fluency Expectations

What is Computational Fluency?

"Computational fluency refers to having efficient and accurate methods for computing. Students exhibit computational fluency when they demonstrate flexibility in the computational methods they choose, understand and can explain these methods, and produce accurate answers efficiently. The computational methods that a student uses should be based on mathematical ideas that the student understands well, including the structure of the base-ten number system, properties of multiplication and division, and number relationships."

Principal and Standards for School Mathematics, NCTM, Reston, VA 2000, p.152

Fluency Foundation

1.OA.6 → 2.OA.2

1.OA.6 Add and subtract within 20, demonstrating fluency for addition and subtraction within 10.

Use strategies such as counting on; making ten (e.g., 8 + 6 = 8 + 2 + 4 = 10 + 4 = 14); decomposing a number leading to a ten (e.g., 13 – 4 = 13 – 3 – 1 = 10 – 1 = 9); using the relationship between addition and subtraction (e.g., knowing that 8 + 4 = 12, one knows 12 – 8 = 4); and creating equivalent but easier or known sums (e.g., adding 6 + 7 by creating the known equivalent 6 + 6 + 1 = 12 + 1 = 13).

2.OA.2 Fluently add and subtract within 20 using mental strategies.[2] By end of Grade 2, know from memory all sums of two one-digit numbers.

- [2] See Standard 1.OA.6 for a list of mental strategies

3.NBT.2 – Fluently add and subtract within 1,000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

Daily Discourse

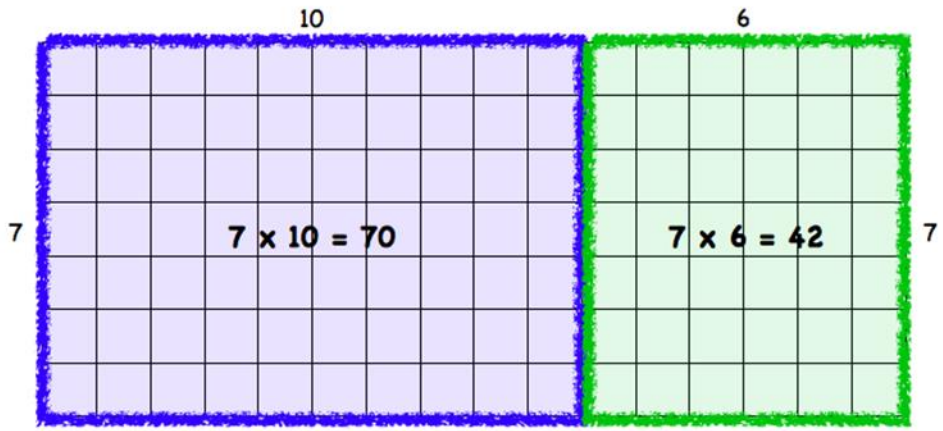
Multiplication Strategies Grades 3 & 4

- **3.OA.3** - Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.[1]
- **4.NBT.5** Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

Multiplication Arrays

7 x 16 =

7 x (10 + 6) =



70 + 42 = 112

You Try – pick one

- Multiply 14 X 5
- Multiply 24 x 18
- Multiply 364 x 32

Students will understand the relationship between multiplication, addition and subtraction

Division Strategy
Grades 4 & 5

- 4.NBT.6 – Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
- 5.NBT.6 – Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors. Illustrate and explain using rectangular arrays, and/or area models
- 6.NS.2 – Fluently divide multi-digit numbers using the standard algorithm

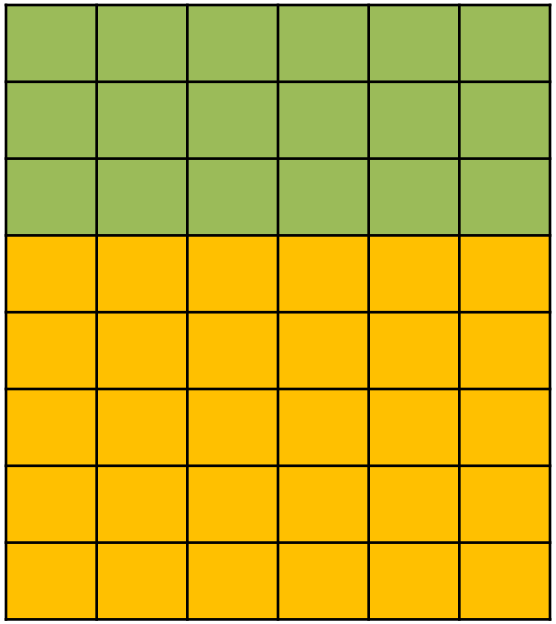
Division - *Area Model Array* Group Size unknown

If you have 48 inches of ribbon cut into 6 pieces, how long will each piece measure?

3 X 6 = 18

5 X 6 = 30

48 inches of Ribbon



You try – Pick one

- Divide 336 ÷ 6
- Divide 426 ÷ 12
- Divide 4992 ÷ 12

What would the answer be if I divided 4992 into 13? What can you predict about the answer using what you know about 4992 ÷ 12?

Recap on the 4 operations

- Kindergarten – Fluently add and subtract within 5
- Grade 1 –Be able to add and subtract within 100 using strategies and/or manipulatives and drawings
- Grade 2 – Fluently add and subtract within 100. Be able to add and subtract within 1000 using strategies and/or manipulatives and drawings
- Grade 3 - Fluently add and subtract within 1000 using strategies and algorithms. Multiply and divide within 100 using strategies and/or manipulatives and drawings
- Grade 4 – Fluently add and subtract multi-digit whole numbers using the standard algorithm. Multiply four digits by 1 digit and two two-digit numbers using strategies and/or manipulatives and drawings
- Grade 5 – Fluently multiply multi-digit whole numbers using the standard algorithm. Divide whole number quotients of whole numbers with up to four-digit dividends and two- two digit divisors using strategies and/or manipulatives and drawings
- Grade 6 – Fluently divide multi-digit numbers using the standard algorithm

Progression of Strategies

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
Compose and decompose numbers 1-20 into tens and ones.	Use strategies for addition and subtraction within 20.	Use strategies to fluently add and subtract within 100.	Fluently multiply and divide by applying properties of operations.	Add, subtract, multiply, and divide multi-digit whole numbers.	Add, subtract, multiply, and divide whole numbers, fractions, and decimals.
K.OA.3 K.OA.4 K.NBT.1	1.OA.3 1.OA.4 1.OA.6	2.NBT.B.5	3.OA.5 3.OA.7 3.OA.6 3.OA.8	4.NBT.4 4.NBT.6	5.NBT.6 5.NBT.7 5.NF.1 5.NF.2
Decompose numbers less than or equal to 10 into pairs in more than one way by using objects or drawings, and record by a drawing or equation. For any number from 1 to 9, find the number that makes 10 when added to the given number by using objects or drawings, and record with a drawing or equation. Compose and decompose numbers from 11 to 19 into ten ones and some further ones by using objects or drawings, and record by a drawing or equation understand that these numbers are composed of ten ones and one, two, three, four, five, six, seven, eight, or nine ones.	Apply properties of operations using strategies to add and subtract. Understand subtraction as an unknown-addend problem. Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten decomposing a number leading to a ten using the relationship between addition and subtraction and creating equivalent but easier or known sums.	Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.	Apply properties of operations as strategies to multiply and divide. Understand division as an unknown-factor problem. Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers. Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.	Fluently add and subtract multi-digit whole numbers using the standard algorithm. Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.	Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers.

HOT Questions

4.NF.3

Tape Diagram Strategy

- Appropriate for grades K – 8

4th Grade level

5/7 of the students seated in an auditorium are girls. There are 48 more girls than boys. How many students are in the auditorium?

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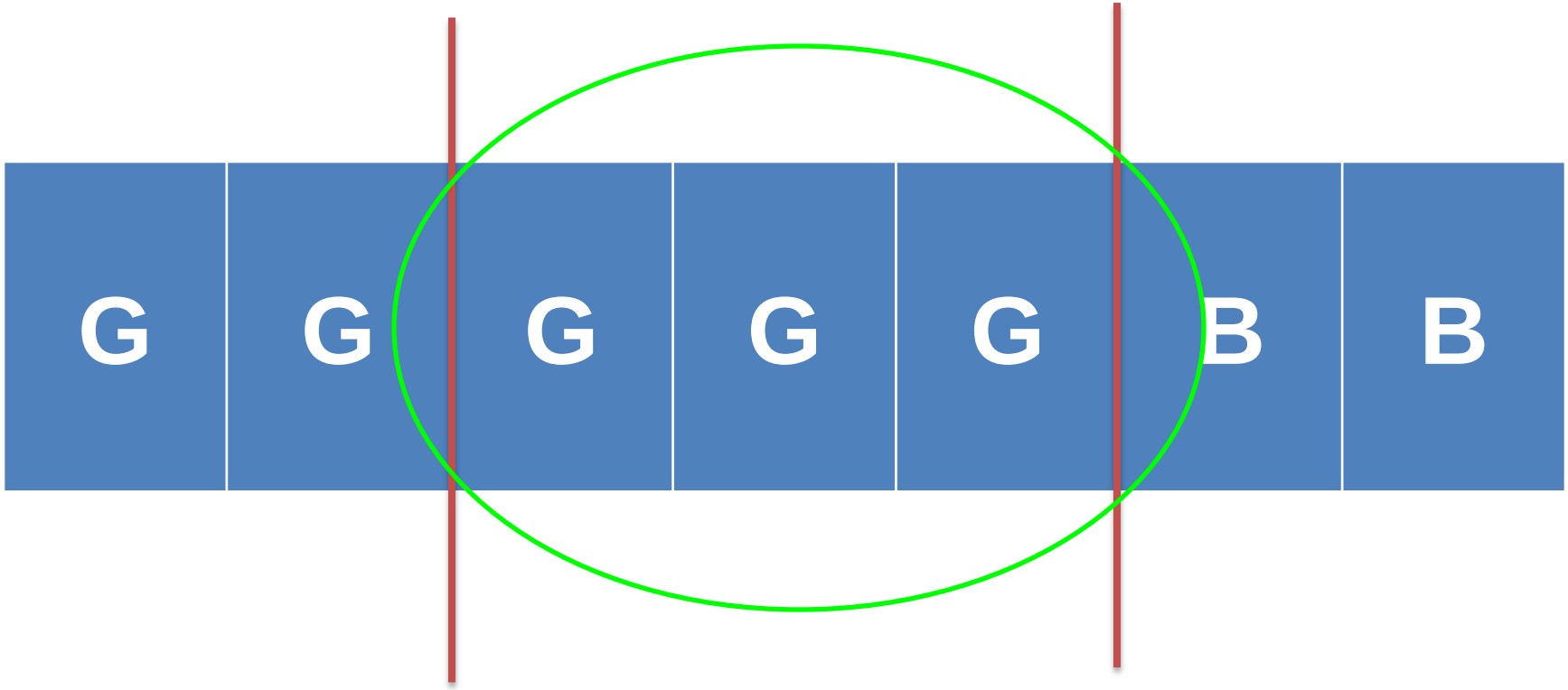

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One More 5.NF.3

- **2/3 of Alice's money is equal to ½ of Ben's money.**
- **If they have a total of $14, how much money does Ben have?**

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- A

Alice has $6

- B

Ben has $8

They have a total of $14.00

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PARCC Task Types

Overview of Task Types

- The PARCC assessments for mathematics will involve three primary types of tasks: Type I, II, and III.
- Each task type is described on the basis of several factors, principally the purpose of the task in generating evidence for certain sub claims.

Task Type	Description of Task Type
I. Tasks assessing *concepts, skills and procedures*	• Balance of conceptual understanding, fluency, and application • Can involve any or all mathematical practice standards • Machine scorable including innovative, computer-based formats • Will appear on the End of Year and Performance Based Assessment components • Sub-claims A and B
II. Tasks assessing *expressing mathematical reasoning*	• Each task calls for written arguments / justifications, critique of reasoning, or precision in mathematical statements (MP.3, 6). • Can involve other mathematical practice standards • May include a mix of machine scored and hand scored responses • Included on the Performance Based Assessment component • Sub-claim C
III. Tasks assessing *modeling / applications*	• Each task calls for modeling/application in a real-world context or scenario (MP.4) • Can involve other mathematical practice standards • May include a mix of machine scored and hand scored responses • Included on the Performance Based Assessment component • Sub-claim D

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For more information see PARCC Task Development ITN Appendix D.

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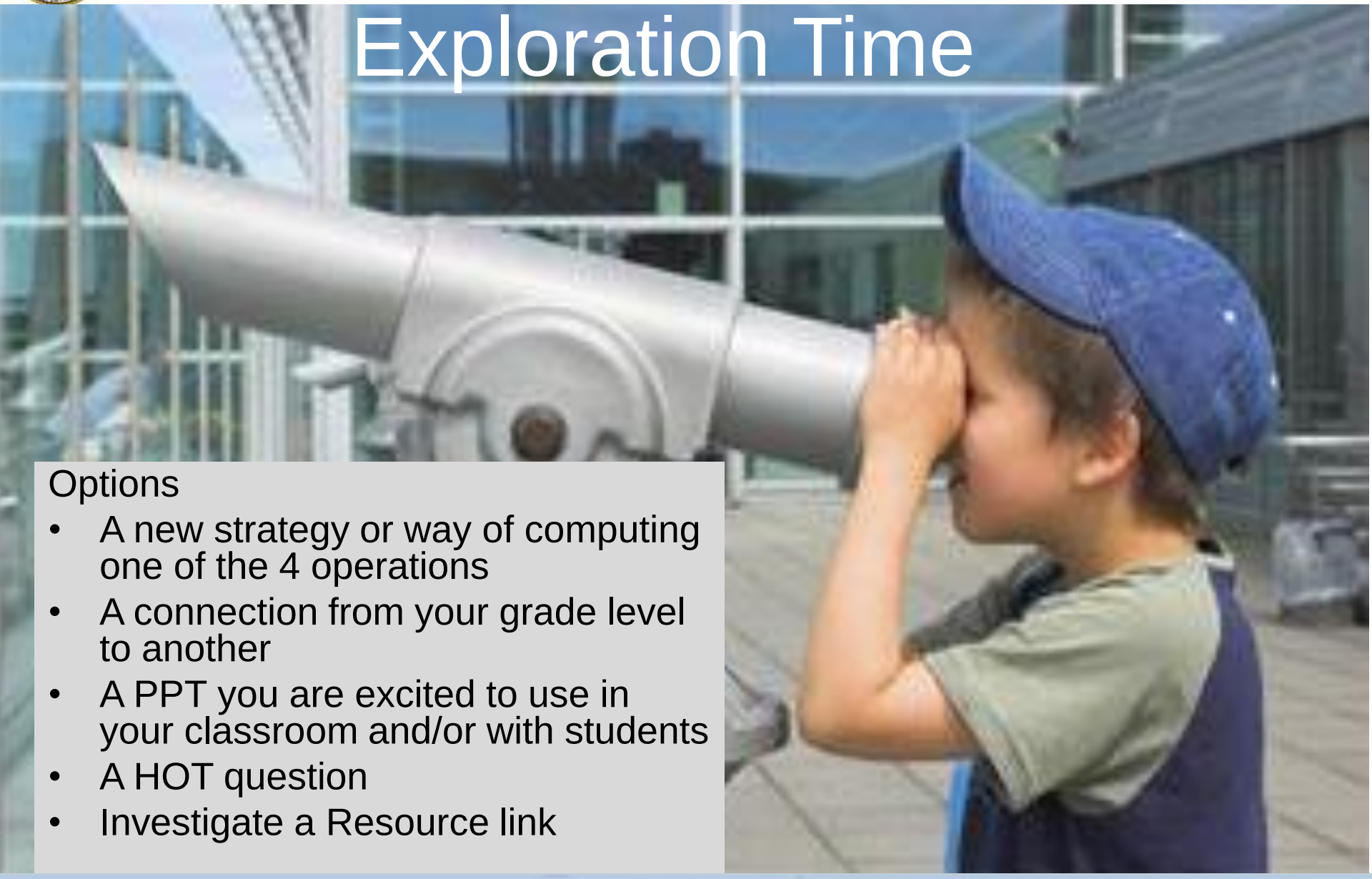
Exploration Time



Options

- A new strategy or way of computing one of the 4 operations
- A connection from your grade level to another
- A PPT you are excited to use in your classroom and/or with students
- A HOT question
- Investigate a Resource link

Be Prepared to Share one idea

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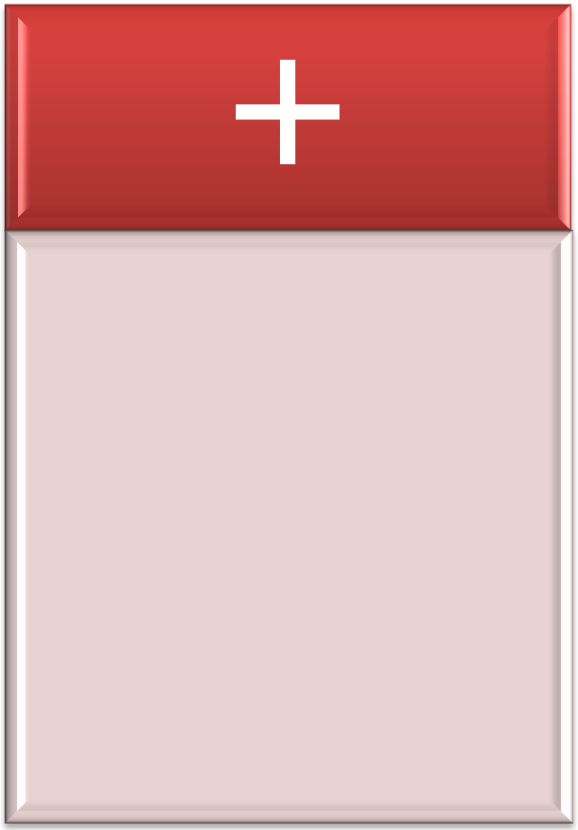

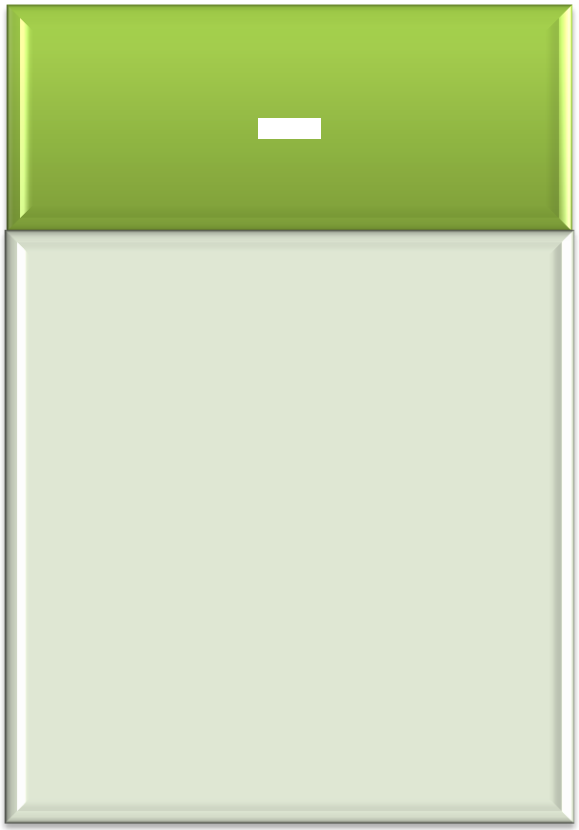

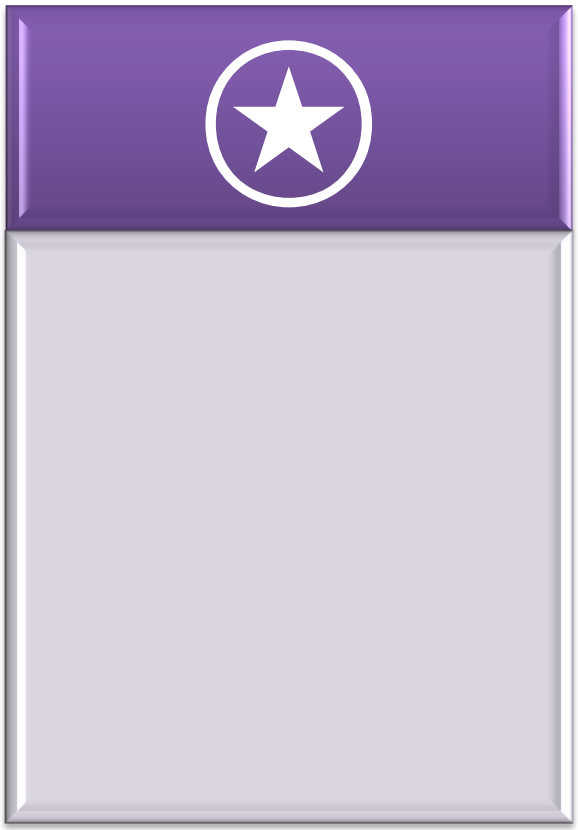

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