ipdae INSTITUTE FOR THE PROFESSIONAL DEVELOPMENT OF ADULT EDUCATORS

Mathematics Through the Lens of CCRS

January 16, 2019

www.floridaipdae.org

This training event is supported with federal funds as appropriated to the Florida Department of Education, Division of Career and Adult Education for the provision of state leadership professional development activities.

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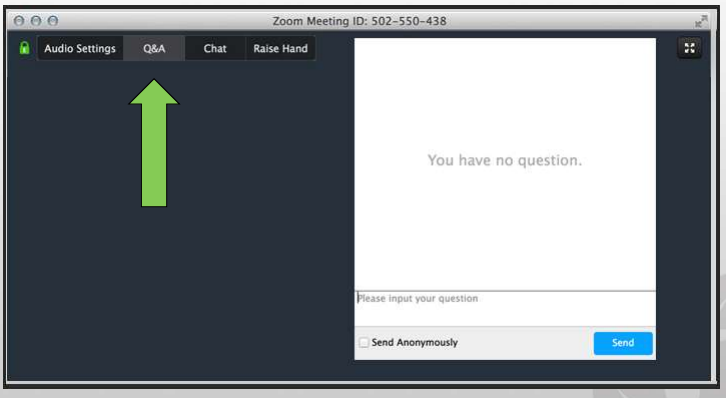
Webinar Things to Remember

- If you have a question, please type it into the **Q&A** option.



- Attendee microphones will be muted. You will be in **listen only** mode.
- Today's presentation is being **recorded**. It will be archived and available on the IPDAE website within 48 hours.

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Agenda

- Why CCRS?
- Shifts in the Standards
  - Focus
  - Coherence
  - Rigor

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Why CCRS

https://www.youtube.com/watch?v=Y9FOyoS3Fag

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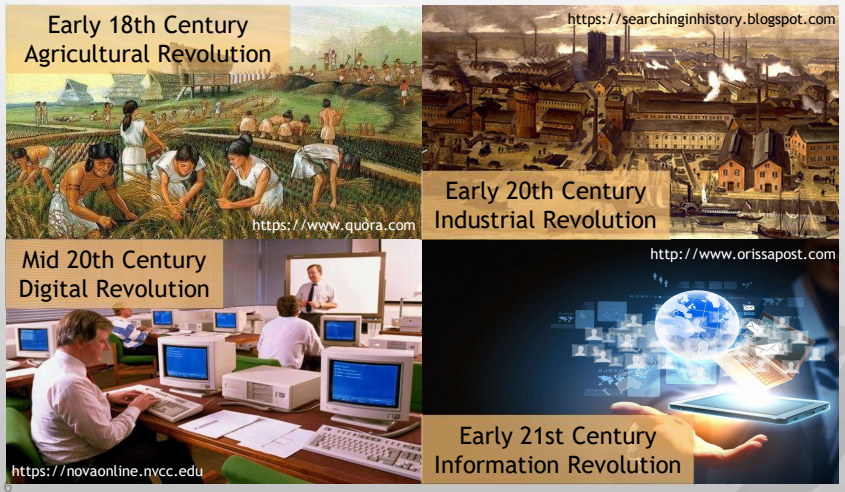
Why CCRS

Periods of Disruption in the Labor Market



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Why CCRS

According to the World Economic Forum:

- 7.1 million jobs could be lost by 2020
- White collar, office and administrative positions will be severely impacted

8 Jobs that will be in-demand by 2020:

- Data Analysts
- Computer and Mathematical Jobs
- Architects and Engineering Jobs
- Specialized Sales People
- Senior Managers (specializing in company transformations)
- Product Designers
- Human Resources and Organizational Development
- Regulatory and Government Relations

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Why CCRS

Skill Sets

- **Hard Skills** – programming, writing, mathematics, accounting
- **Soft Skills** - communication, critical thinking, empathy, leadership and conflict resolution
- **Transferrable Skills** - can apply to many different career fields. These include soft skills like critical thinking and problem solving, or hard skills such as writing and math ability.
- **Job-Specific Skills** - are those necessary for a particular position.

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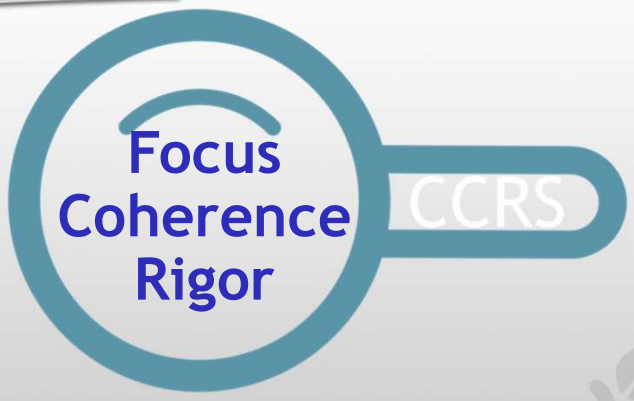

SHIFTS IN THE STANDARDS

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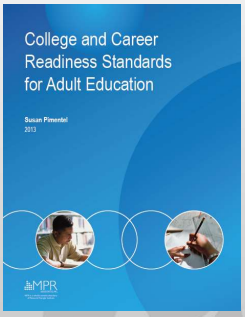
Focusing strongly where the standards focus

Instructors need to:

- narrow significantly and to deepen the manner in which they teach mathematics
- focus deeply on the major work of each level
- select priority content which addresses clear understanding



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Focus: Numeracy

Instructors need to use the concept of place value to explain why the strategies for the 4 basic operations work.

$$7 + 6 = 10 + 3 = 13$$

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Focus: Numeracy

Instructors need to use the concept of place value to explain why the strategies for the 4 basic operations work.

Concept of Base 10

$$7 + 6 = 10 + 3 = 13$$

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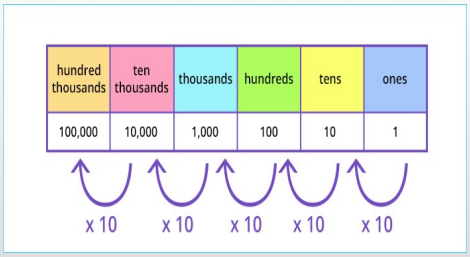
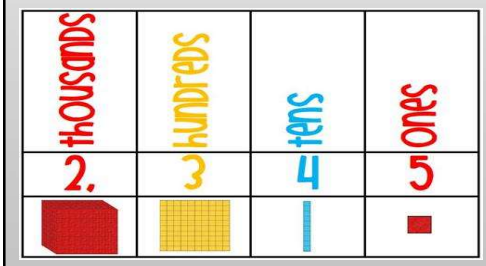
Focus: Place Value



https://www.splashmath.com

https://www.youtube.com/



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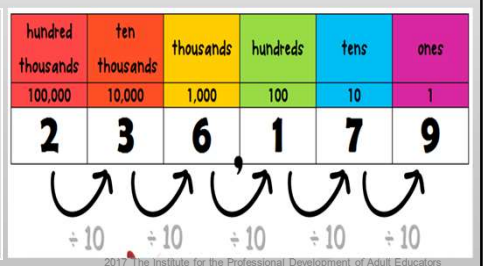

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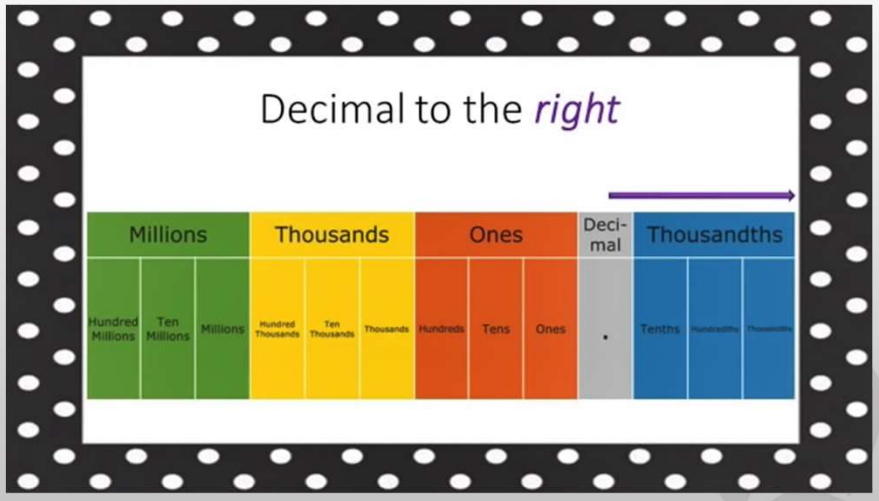
Focus: Place Value



https://www.youtube.com/watch?v=t_RCtcqha5U

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Focus: Numeracy

Instructors need to emphasize numeracy early leading to a deeper understanding of the properties of operations.

Commutative	Associative
$5 + 3 = 3 + 5$ $24 \cdot 3 = 3 \cdot 24$	$(5+3)+1 = 5+(3+1)$ $(5 \cdot 3) \cdot 1 = 5 \cdot (3 \cdot 1)$
Identity	**Inverse**
$7 + 0 = 7$ $2 \cdot 1 = 2$	$7 - 7 = 0$ $2 \cdot \frac{1}{2} = 1$
Distributive	
$3(5+2) = (3 \cdot 5)+(3 \cdot 2)$ $(8+6) \cdot 4 = (8 \cdot 4)+(6 \cdot 4)$	

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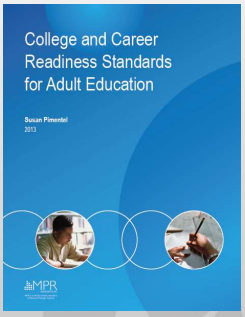
Coherence

Designing learning around coherent progressions from level to level

Instructors need to:

- create coherent progressions in the content within and across levels
- establish strong conceptual understanding of core content
- use standards at higher levels as extensions of previous learning rather than signaling a new concept or idea



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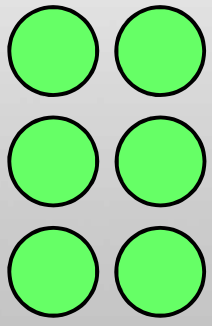
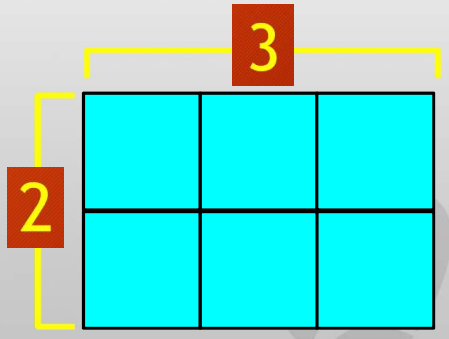
Coherence: Multiplication and Area

Teach Numeracy, Algebra and Geometry altogether when introducing the concept of multiplication.

$2 \cdot 3 = 6$

$A = L \cdot W$





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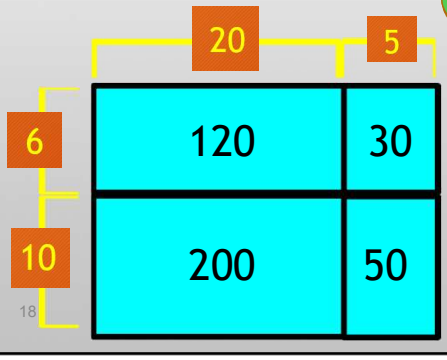
Coherence: Multiplication and Area

Reinforce the concept of place value, distributive property and areas to teach the skill of 2-digit by 2 digit multiplication using the concept of composite areas.

$16 \cdot 25 = (10+6) \cdot (20+5) = 400$



$$\begin{array}{r} 120 \\ 200 \\ 30 \\ +\ \ 50 \\ \hline 400 \end{array}$$

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Your Turn

Teachers Pay Teachers

1. 32 x 42 =	5. 19 x 41 =
2. 54 x 28 =	6. 43 x 42 =
3. 61 x 24 =	7. 55 x 28 =
4. 17 x 62 =	8. 65 x 33 =

Sydney Hebert
125 Followers
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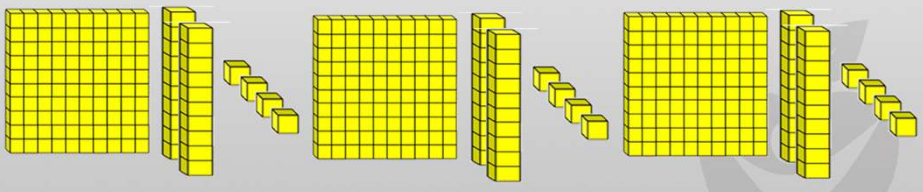
Coherence: Multiplication

Use visual strategies so students can see and analyze what is happening during multiplication.

Multiplication with Regrouping

$$124 \cdot 3$$



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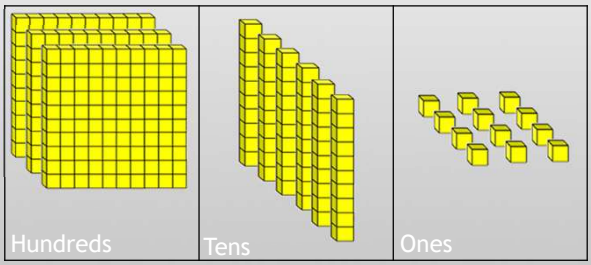
Coherence: Multiplication

Multiplication with Regrouping

$124 \cdot 3 = (100+20+4) \cdot 3 = 372$



100 x 3 = 300
20 x 3 = 60
\+ 4 x 3 = 12
372

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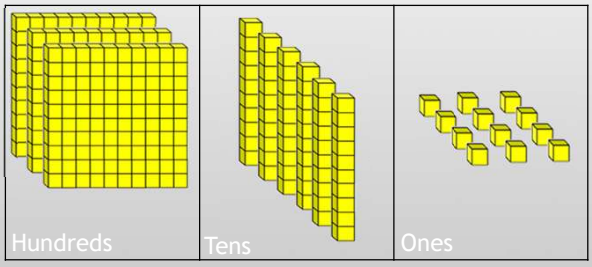
Coherence: Multiplication

Multiplication with Regrouping

124 x 3 = (100+20+4) x 3 = 372



Hundreds	Tens	Ones
	1	
1	2	4
x		3
3	7	2

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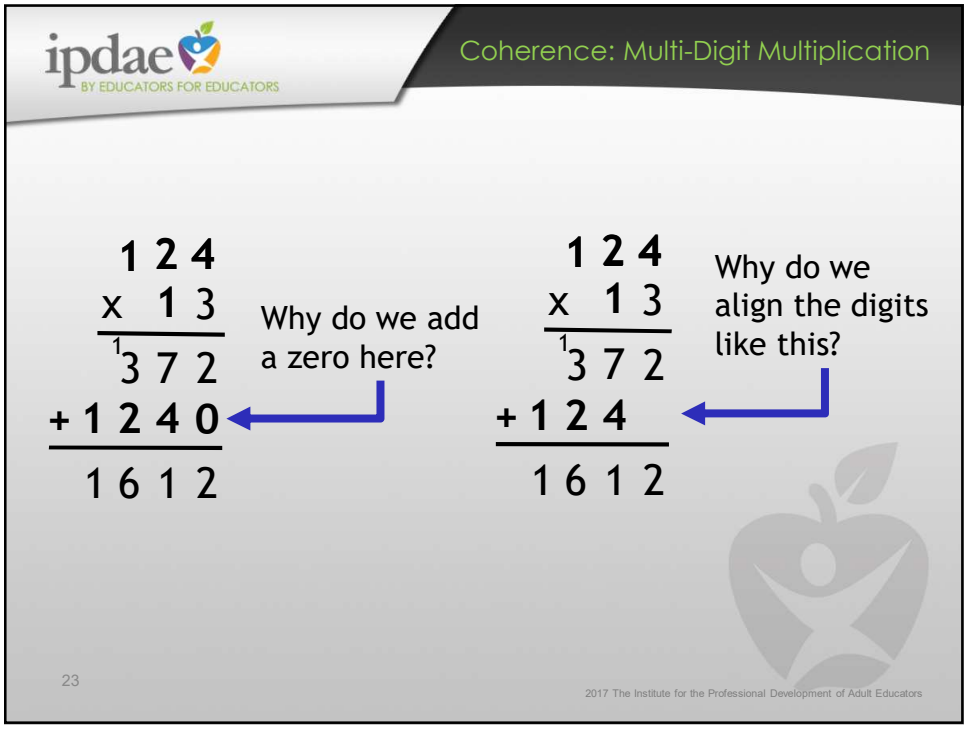
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Coherence: Multi-Digit Multiplication
124
x 13
372
+1240
1612
Why do we add a zero here?
124
x 13
372
+124
1612
Why do we align the digits like this?
23
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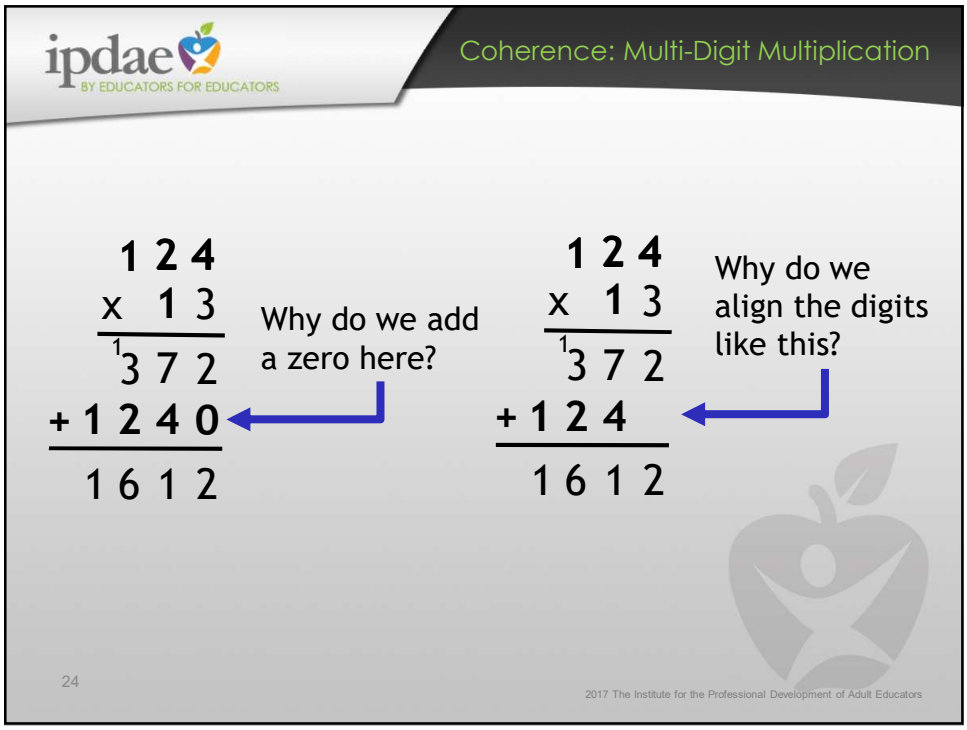
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1612
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24
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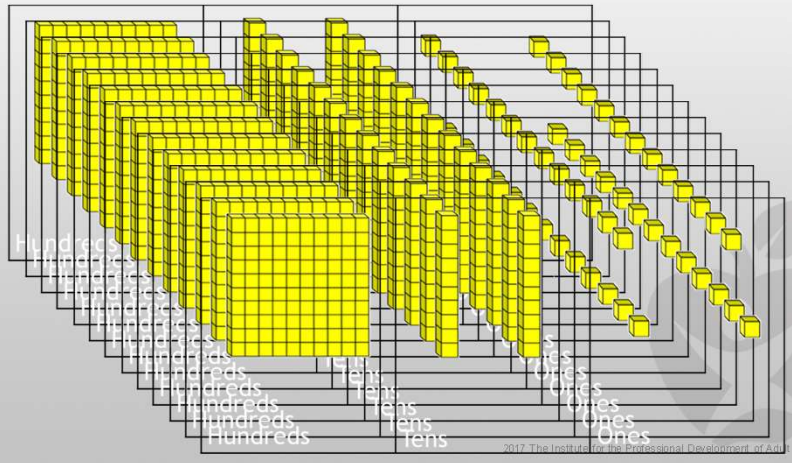
Coherence: Multi-Digit Multiplication

2-Digit by 3-Digit Multiplication

124 x 13 =



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Coherence: Multi-Digit Multiplication

Instructors need to use the concept of place value to explain why the strategies for the 4 basic operations work.

Thousands	Hundreds	Tens	Ones
	1	2	4
	x	1	3
	1		
	3	7	2
+ 1	2	4	0
1	6	1	2

$124 \times 13 = (100+20+4) \cdot (10+3)$

$(100+20+4) \cdot 10 + (100+20+4) \cdot 3$

This explains why this zero appears in the algorithm.

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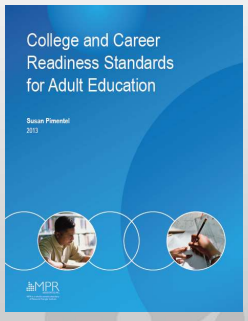
Rigor

Pursuing conceptual understanding, procedural skill and fluency, and application—all with equal intensity

Instructors need to:

- focus equally on conceptual understanding of **key concepts**, **procedural skill and fluency**, and rigorous **application of mathematics** in real-world contexts.
- show mathematics as more than just a set of procedures
- teach more than just "how to get the answer"



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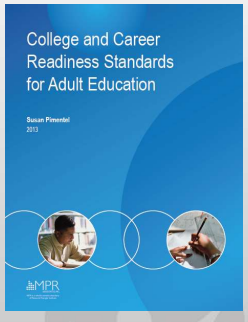

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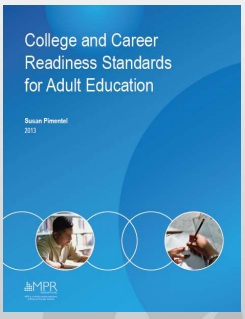
Rigor

Pursuing conceptual understanding, procedural skill and fluency, and application—all with equal intensity

Instructors need to:

- employ concepts from several perspectives
- demonstrate and develop the use of appropriate concepts and procedures, even when not prompted, and in content areas outside of mathematics



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Rigor: Multiplication of Fractions

Application Problem

A cupcake recipe asks for $\frac{3}{4}$ of a cup of butter. Tony wants to make $\frac{1}{2}$ of the original recipe. How many cups of butter will Tony need?

Workbook
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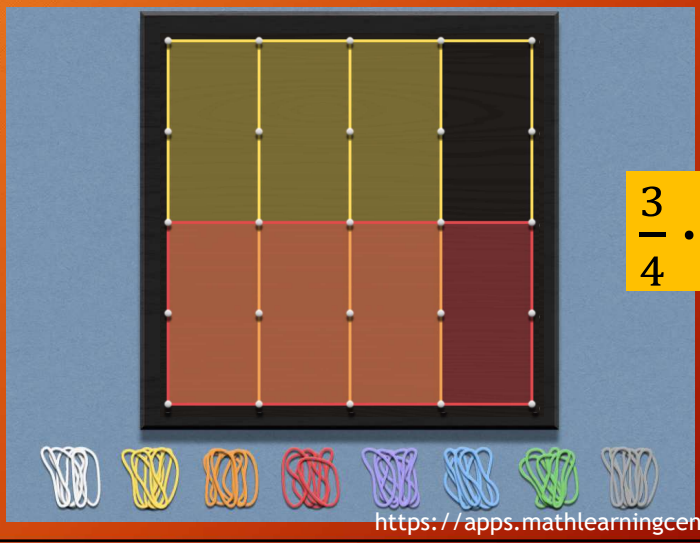
A cupcake recipe asks for $\frac{3}{4}$ of a cup of butter. Tony wants to make $\frac{1}{2}$ of the original recipe. How many cups of butter will Tony need?



$$\frac{3}{4} \cdot \frac{1}{2} = \frac{3}{8}$$

https://apps.mathlearningcenter.org/geoboard/

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Rigor: Multiplication of Fractions

Use the visual method of multiplying fractions to solve:

$$\frac{2}{3} \cdot \frac{1}{4} =$$

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Rigor: Multiplication of Fractions

Use the visual method of multiplying fractions to solve:

$$\frac{2}{3} \cdot \frac{1}{4} =$$

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Rigor: Division of Fractions

Million Dollar Question: When diving fraction, why do we change the operation to division and flip (or find the reciprocal of) the second fraction?

$$\frac{3}{4} \div \frac{1}{2} = \frac{3}{4} \cdot \frac{2}{1} = \frac{6}{4} = 1\frac{1}{2}$$

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Rigor: Division of Fractions

Application Problem

When building his deck, John needed several decking boards $\frac{1}{3}$ ft in length. How many $\frac{1}{3}$ ft decking boards can he make by cutting a 6ft decking board sold at a local hardware?

A couple of days later, John needed some decking boards $\frac{2}{3}$ ft in length. How many $\frac{2}{3}$ ft decking boards can he make if he bought the same 6ft decking board sold at the local hardware?

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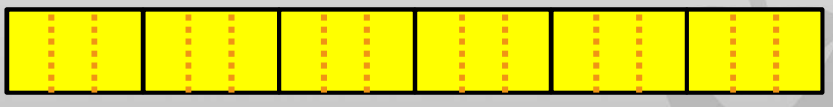
Rigor: Division of Fractions

Workbook P. 15

Application Problem

When building his deck, John needed several decking boards $\frac{1}{3}$ ft in length. How many $\frac{1}{3}$ ft decking boards can he make by cutting a 6ft decking board sold at a local hardware?

$$6 \div \frac{1}{3} = 6 \cdot \frac{3}{1} = \frac{6}{1} \cdot \frac{3}{1} = \frac{18}{1} = 18$$



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Rigor: Division of Fractions

Extend Your Learning

Using the same technique, solve the second part of the word problem:

A couple of days later, John needed some decking boards $\frac{2}{3}$ ft in length. How many $\frac{2}{3}$ ft decking boards can he make if he bought the same 6ft decking board sold at the local hardware?

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Additional Resources in Your Workbook

- Additional Worksheets
- Enlarged Images
- Visual Aids
- Activity Instructions
- Steps in Problem Solving
- Geoboard Template
- Colored Counters Template
- Lapboard Template
- Links to Videos
- Links to Resources
- Other Instructional Strategies

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IPDAE Resources

http://floridaipdae.org/

- ✓ Workshops
- ✓ New TABE E-Learning Modules
- ✓ Lesson Plans (aligned to the standards)
- ✓ Grab and Gos (videos)
- ✓ Webinar Wednesdays
- ✓ Toolkits
- ✓ Florida's Instructor Handbook for GED® Preparation
- ✓ **ABE Math Curriculum Matrix**
- ✓ **TABE Overlays to the ABE Math Matrix**

COMING SOON!

- **GED Performance Level Descriptors Matrix**
- **ABE Learning Objects**

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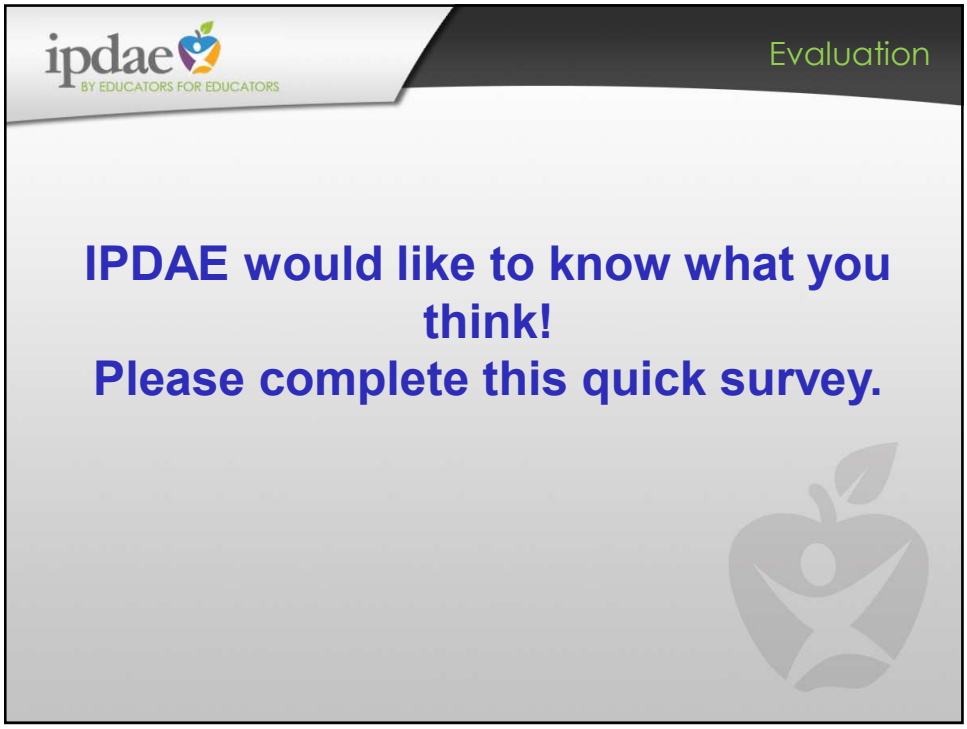
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Evaluation
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Thank you for your participation!