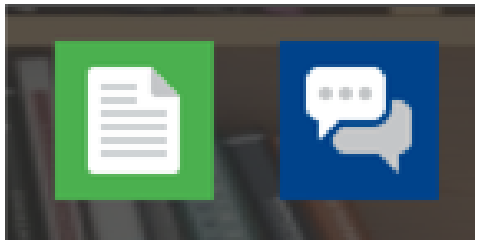
core advocates

Math Resource Fixer-Uppers

Core Advocates Monthly Webinar
May 6, 2020



The webinar will begin shortly. Check your Resource widget to preview the resources for today's session! Use the Group Chat to introduce yourself!

STUDENT ACHIEVEMENT PARTNERS

Introductions

Your hosts from Student Achievement Partners:

Pascale Joseph
Project Coordinator,
Tools and Classroom Resources, SAP

This month's presenters:

Jason Zimba
Founding Partner
Student Achievement Partners

Elizabeth Meier
Innovation Development Manager
Student Achievement Partners

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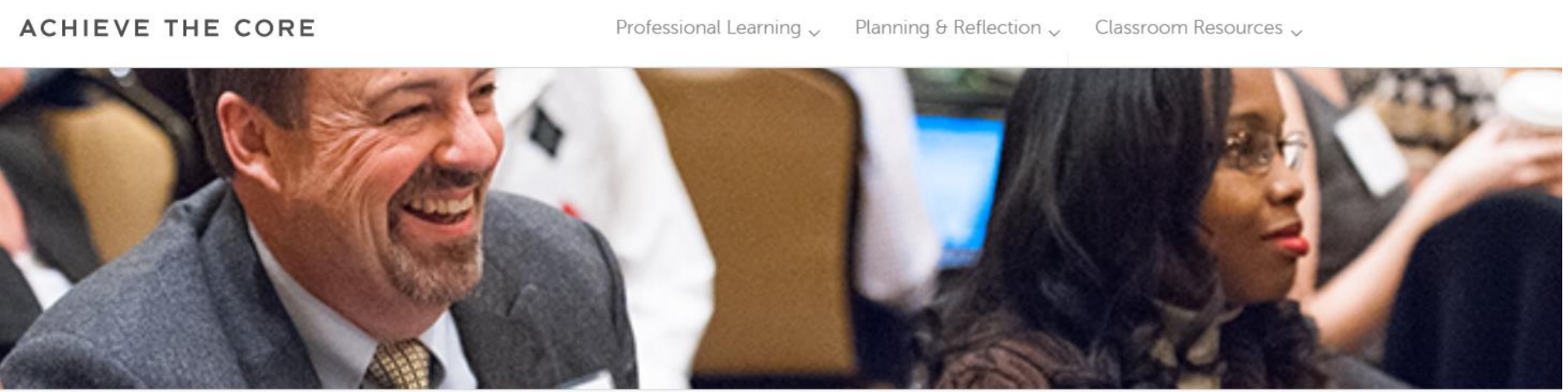
How many Core Advocate Webinars have you attended?

Please use the Questions tab on your control panel to respond.
If using a poll, please put up to 5 answer choices in the notes section below and indicate if attendees should choose only one response or multiple responses.

Join Our Network!

www.achievethecore.org/ca-signup



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National Core Advocate Network

College- and career-ready standards, including the CCSS, give educators an opportunity to work together and support each other— across districts, states, and content areas. The goal of the Core Advocates Network is to engage educators with the content knowledge and resources they need to support teachers and students in the transition towards a college- and career-ready education.

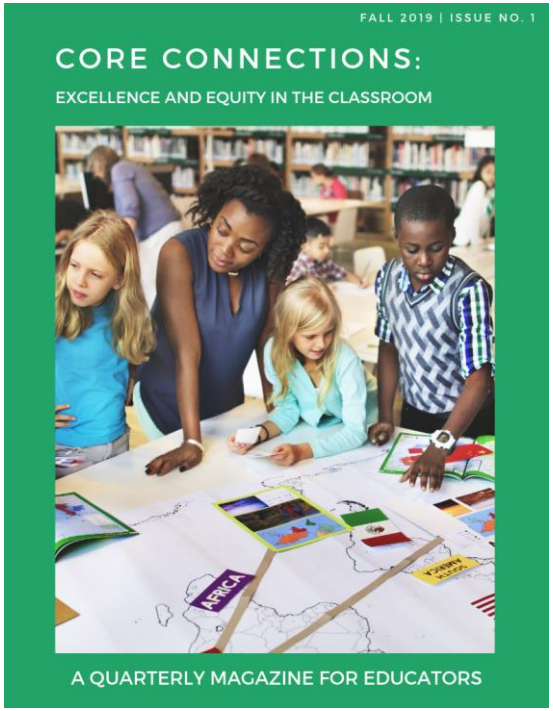
Join the Network

Interested in joining the Core Advocate network? Start by taking the

Core Advocates Survey .

Learn More About Us!

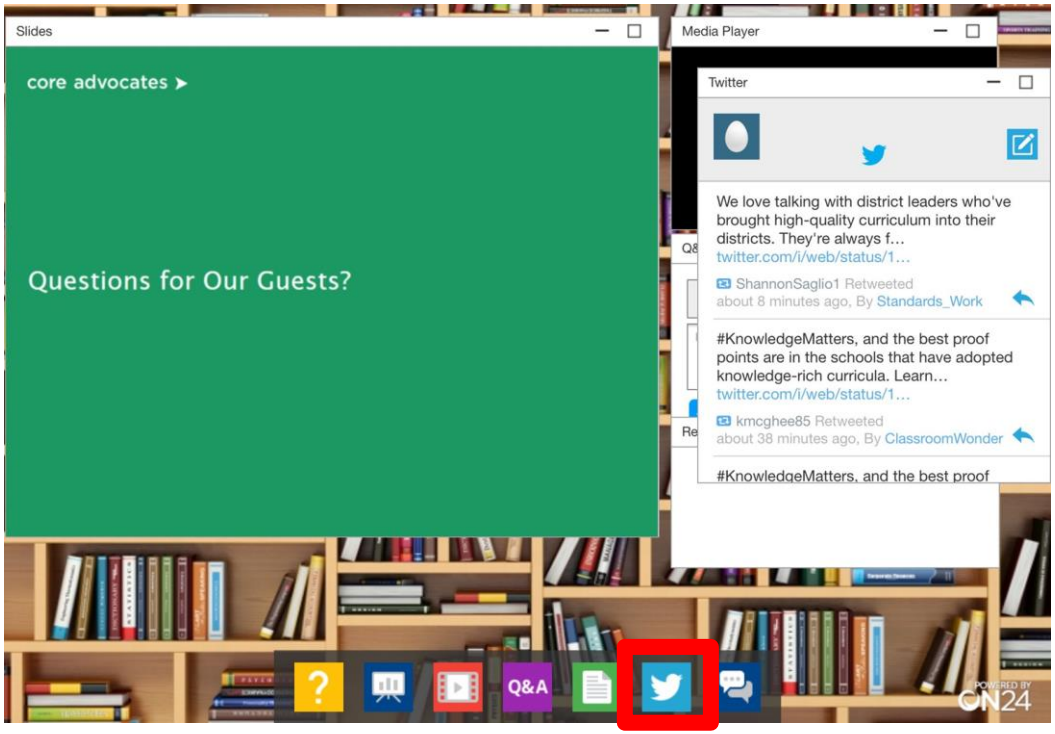
- Contact Jennie Beltramini (jbeltramini@studentsachieve.net) Joy Delizo-Osborne (jdelizo-osborne@studentsachieve.net)
- Complete this survey to join our database (and mailing list): www.achievethecore.org/ca-signup
- Visit our website: www.achievethecore.org



Tweet with Us!

Please feel free to tweet during and after the webinar using #coreadvocates

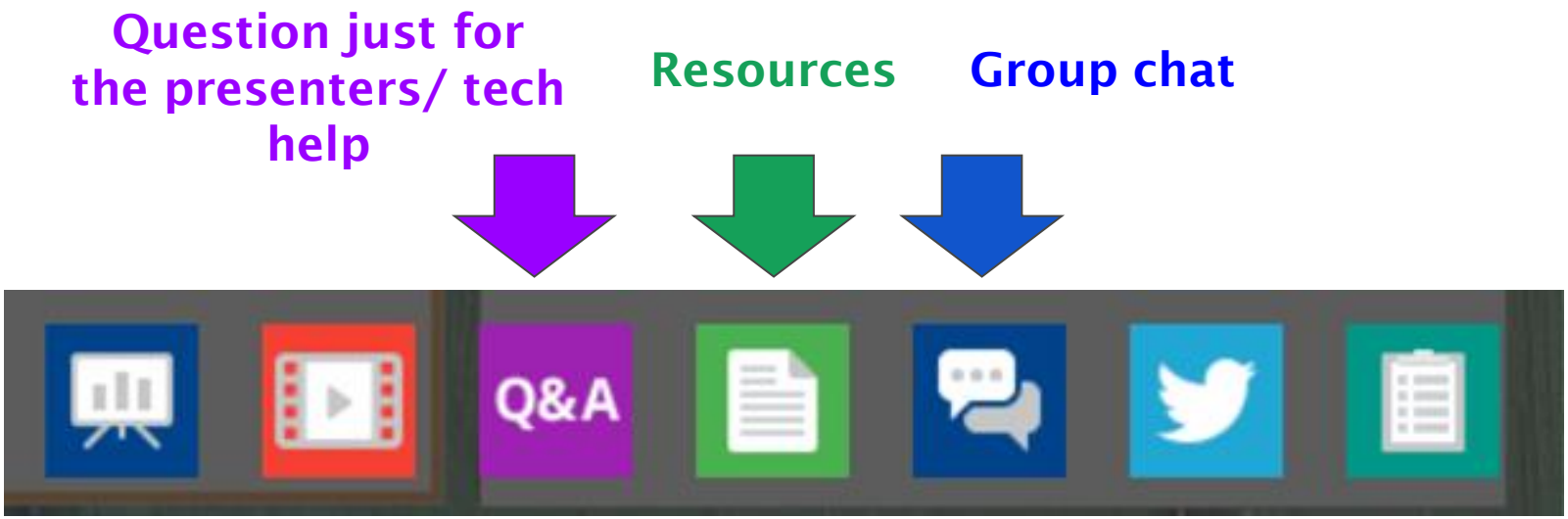
- @achievethecore
- @JennieBeltro



Click here!

Engage with Us!

During the webinar:



After the webinar:

- Access to recording will be emailed to you.

Take our survey in 2 weeks and receive a certificate verifying 1 hour of professional learning.

Agenda

Introduction

The game of “Good Thing, Bad Thing, Change One Thing”

Some ways to make improvements

Q&A

Next steps

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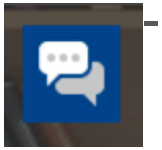
In what grades do you work with students and/or teachers on mathematics?

Please use the Questions tab on your control panel to respond.
If using a poll, please put up to 5 answer choices in the notes section below and indicate if attendees should choose only one response or multiple responses.

Norms for our time together



- **Use the group chat** to think out loud, comment on each other's thinking, ask follow-up questions for Liz & myself to elevate. By the end, our list of chat comments should look like a transcript of a productively noisy classroom.
- Your questions and voices are welcome. Your curiosity and learning are valued. You can feel safe taking risks.
- We (all of us participating today) will promote each other's positive views of student capabilities and high expectations for all students. We will value instruction that responds to and respects the value of all students' backgrounds, languages, cultures, points of view, knowledge, and skills.
- We will think critically about and respond to how representation of multiple perspectives and identities are evident in instructional materials, taking action when materials are lacking in representation.
- **Please use the group chat (say, with a thumbs-up or the like) to let us know you can embrace our norms for today!**

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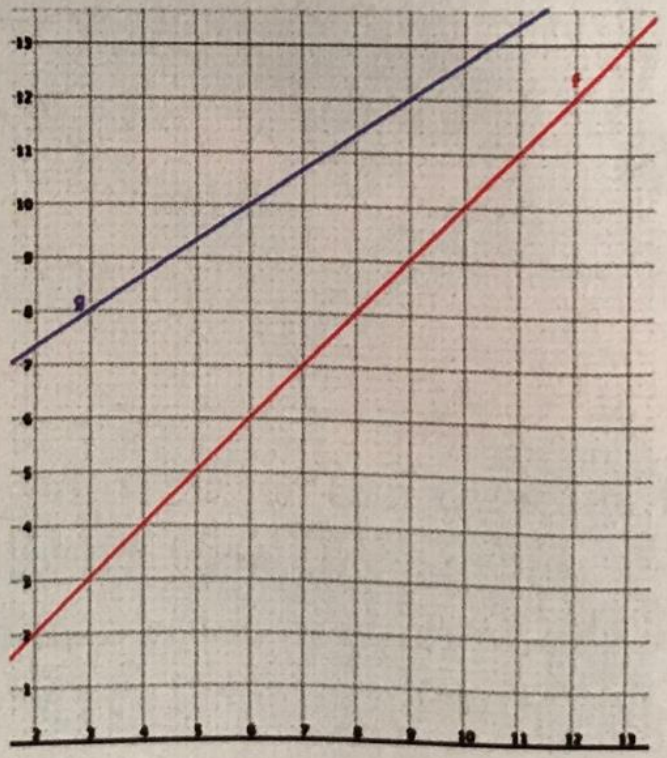
“Good Thing, Bad Thing, Change One Thing”

How It Works

Good Thing, Bad Thing, Change One Thing: How It Works

10. If the two lines in the graph below continue increasing at a constant rate, at what *x*-value will they intersect? (Notice, the *x*- and *y*-axes are not included in the graph.)



Good Thing, Bad Thing, Change One Thing: Your Turn!

Good Thing, Bad Thing, Change One Thing: Your Turn!

We'll show an image of an assignment

Take as much as 5 minutes to read it, do some of the problems

Then start chatting out your Good thing – Bad thing – Change One Things for this assignment as a whole

"Good - …"
"Bad - …"
"Change - …"

Jason will watch the chat and take notes to "comment on the comments"

Good, Bad, Change One Thing: Your Turn!

Take as much as 5 minutes to read, perhaps do some of the problems

Then use the group chat to start chatting out:

"Good thing - …"
"Bad thing - …"
"Change - …"

6.2: Exponent Product Rule

1. Complete the table to explore how to combine two bases that have the same exponent. Use the "expanded" column to work out how to combine the factors into a new base.

expression	expanded	exponent
$5^3 \cdot 2^3$	$(5 \cdot 5 \cdot 5) \cdot (2 \cdot 2 \cdot 2) = (2 \cdot 5)(2 \cdot 5)(2 \cdot 5) = 10 \cdot 10 \cdot 10$	10^3
$3^2 \cdot 7^2$		21^2
$2^4 \cdot 3^4$		
		15^3
		30^4
$2^4 \cdot x^4$		
$a^n \cdot b^n$		
$7^4 \cdot 2^4 \cdot 5^4$		

2. What happens if the exponents are not the same? Can you write $2^3 \cdot 3^4$ with a single exponent? Explain or show your reasoning.

Good thing , Bad thing,
Change One Thing:
Your Turn!

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Name: _____

Hundreds, Tens and Ones

a. 234 = _____ hundreds, _____ tens, _____ ones

b. 809 = _____ hundreds, _____ tens, _____ ones

c. 571 = _____ hundreds, _____ tens, _____ ones

d. 160 = _____ hundreds, _____ tens, _____ ones

e. 67 = _____ hundreds, _____ tens, _____ ones

f. _____ = 3 hundreds, 4 tens, 8 ones

g. _____ = 6 hundreds, 0 tens, 2 ones

h. _____ = 0 hundreds, 0 tens, 5 ones

i. _____ = 0 hundreds, 7 tens, 0 ones

j. _____ = 9 hundreds, 9 tens, 9 ones

Name:_____ **Date:**_____

Make true equations. Write one number in every space. Draw a picture if it helps.

1) 1 hundred + 4 tens = _____

2) 4 tens + 1 hundred = _____

3) 14 tens = 10 tens + _____ tens

= _____ hundred + 4 tens

= _____

4) 7 ones + 5 hundreds = _____

5) 8 hundreds = _____

6) 106 = 1 hundred + _____tens + _____ones

7) 106 = _____tens + _____ones

8) 106 = _____ones

9) 90 + 300 + 4 = _____

Are these comparisons true or false?

10) 2 hundreds + 3 ones > 5 tens + 9 ones _____

11) 9 tens + 2 hundreds + 4 ones < 924 _____

12) 456 < 5 hundred

From www.achievethecore.org

https://achievethecore.org/page/862/understanding-place-value-within-1000-mini-assessment

Some ways to make (small, gradual) improvements

- Challenge your students
- But don't complicate what is simple
- Refine over time
- What are your students interested in?
- Know the *good* sources of problems, worksheets, resources
- In HS, Blend middle-grades math applications into assignments
- Keep a math problem notebook, or scrapbook

Challenge your students

"Children prefer mathematical learning experiences that challenge their thinking and allow them to be creative in solving problems, responding positively to statements, such as, 'I like complex problems more than easy problems' and 'I like activities that challenge my thinking abilities.'"

Catalyzing Change in Early Childhood and Elementary Mathematics: Initiating Critical Conversations (NCTM, 2020)

3A *Time: 3 minutes*

Together Jake and Emily have 20 CDs. Emily has 2 more CDs than Jake. What is the number of CDs that Jake has?

1A *Time: 3 minutes*

What is the value of the following?

$$40 \times 30 \times 20 \times 10 \div 20 \div 40 \div 6$$

Which is greater? 0 + 0 + 0 + 0 + 0 + 0 + 0 + 50 + 0 + 0 20 + 10 + 10

(JZ)

Which is greater?

In each case, circle the greater quantity. Do not calculate anything. If the two quantities are equal, circle them both.

2,329,098 + 10	2,329,098 + 11
3,785 + 2,817	2,817 + 3,785
538 - 17	538 - 10 - 6
538 + 88 - 88	538 - 44 + 44
89 + 34	90 + 33

Which is greater?

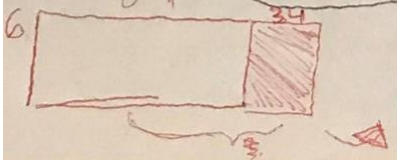
In each case, circle the greater quantity. Do not calculate anything. If the two quantities are equal, circle them both.

637 × 322	322 × 637
637 × 3 ÷ 3	3 × 637 ÷ 3
637 × 32 ÷ 31	32 × 637 ÷ 32
21 ÷ 4	20 ÷ 4
1,287 ÷ 17	1,287 ÷ (2 × 17)

Which is greater?

In each case, circle the greater quantity. Do not calculate anything. If the two quantities are equal, circle them both.

8,198	3 × 8,198
8,198	1 × 8,198
6 × (89 + 34) - 6 × 34	6 × 90
6 × (89 + 34)	6 × (90 + 33)

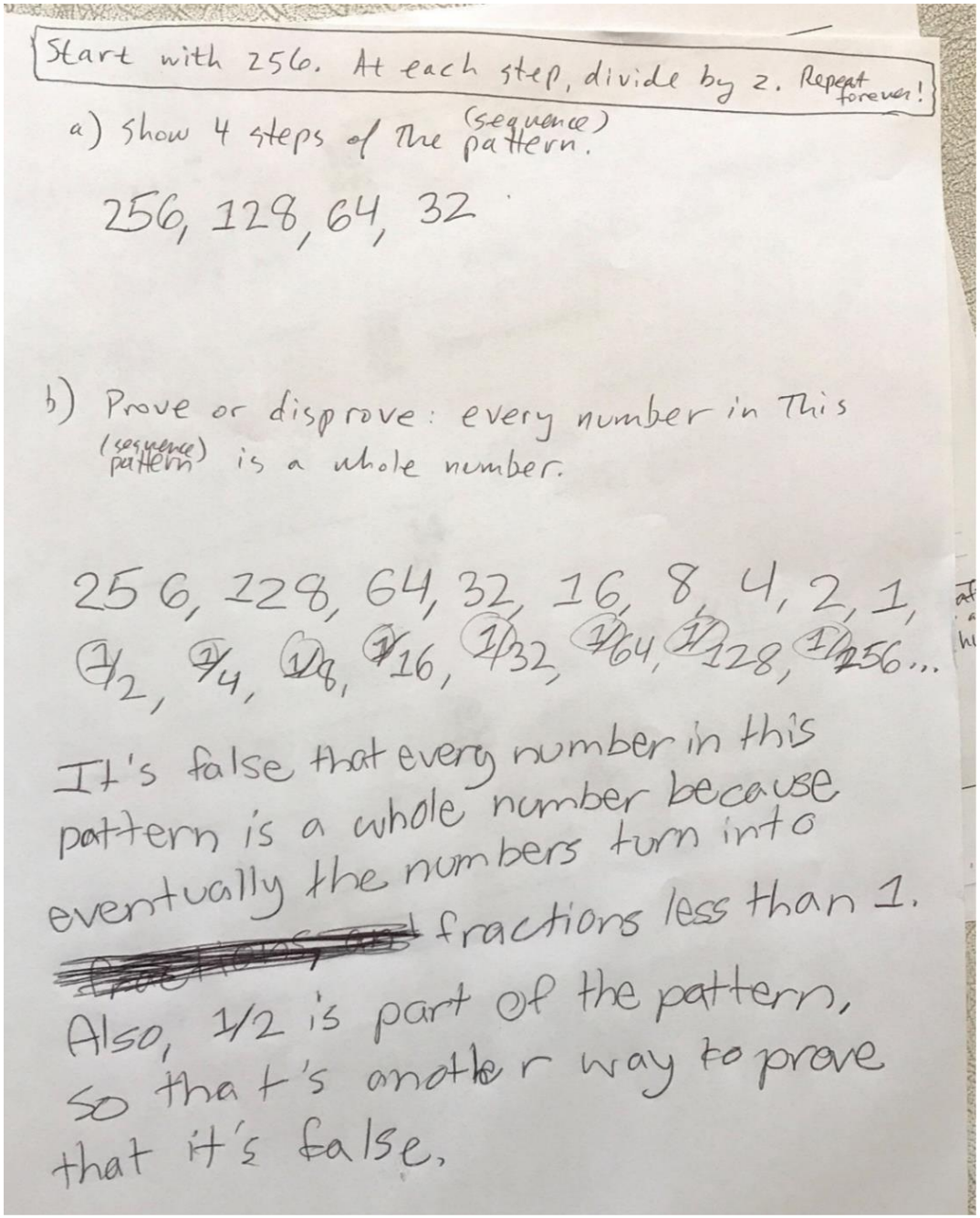


Which is greater?

In each case, circle the greater quantity. Do not calculate anything. If the two quantities are equal, circle them both.

$\frac{2}{3} \times \frac{1}{8}$	$\frac{1}{8} \times \frac{2}{3}$
$4 \times \frac{3}{5} \div \frac{3}{5}$	$\frac{3}{5} \times 4 \div \frac{3}{5}$
$637 \times \frac{1}{3}$	$637 \times \frac{1}{5}$
$6 \times (\frac{8}{9} + \frac{3}{4})$	$6 \times (\frac{3}{4} + \frac{8}{9})$
$\frac{3}{3} \times \frac{8}{8}$	$\frac{9}{9}$

(JZ)



Start with 256. At each step, divide by 2. Repeat forever!

a) Show 4 steps of the (sequence) pattern.

256, 128, 64, 32

b) Prove or disprove: every number in this (sequence) pattern is a whole number.

256, 128, 64, 32, 16, 8, 4, 2, 1, 1/2, 1/4, 1/8, 1/16, 1/32, 1/64, 1/128, 1/256...

It's false that every number in this pattern is a whole number because eventually the numbers turn into fractions less than 1.

Also, 1/2 is part of the pattern, so that's another way to prove that it's false.

(JZ)

Polygons

1. How many sides does an octagon have? 8
2. How many angles does a triangle have? 3
3. Does a rectangle have more sides or angles? same
4. How many sides does a pentagon have? 5
5. Which has more sides: a hexagon or a pentagon? hexagon
6. How many pairs of parallel lines does a trapezoid have? atleast 1
7. How many pairs of parallel lines does a square have? 2
8. How many pairs of parallel lines does a triangle have? 0
9. What polygon has 6 sides and 6 angles? hexagon

10. Name four types of quadrilaterals.

square, rectangle, rhombus, trapezoid

11. Does a polygon usually have more sides or more angles? Explain.

A polygon usually has the same amount of angles and sides. Every shape has the same

12. Is a cube a polygon? Why or why not?

No, a cube's not a polygon because a polygon is flat, 2D, and a cube is 3D.

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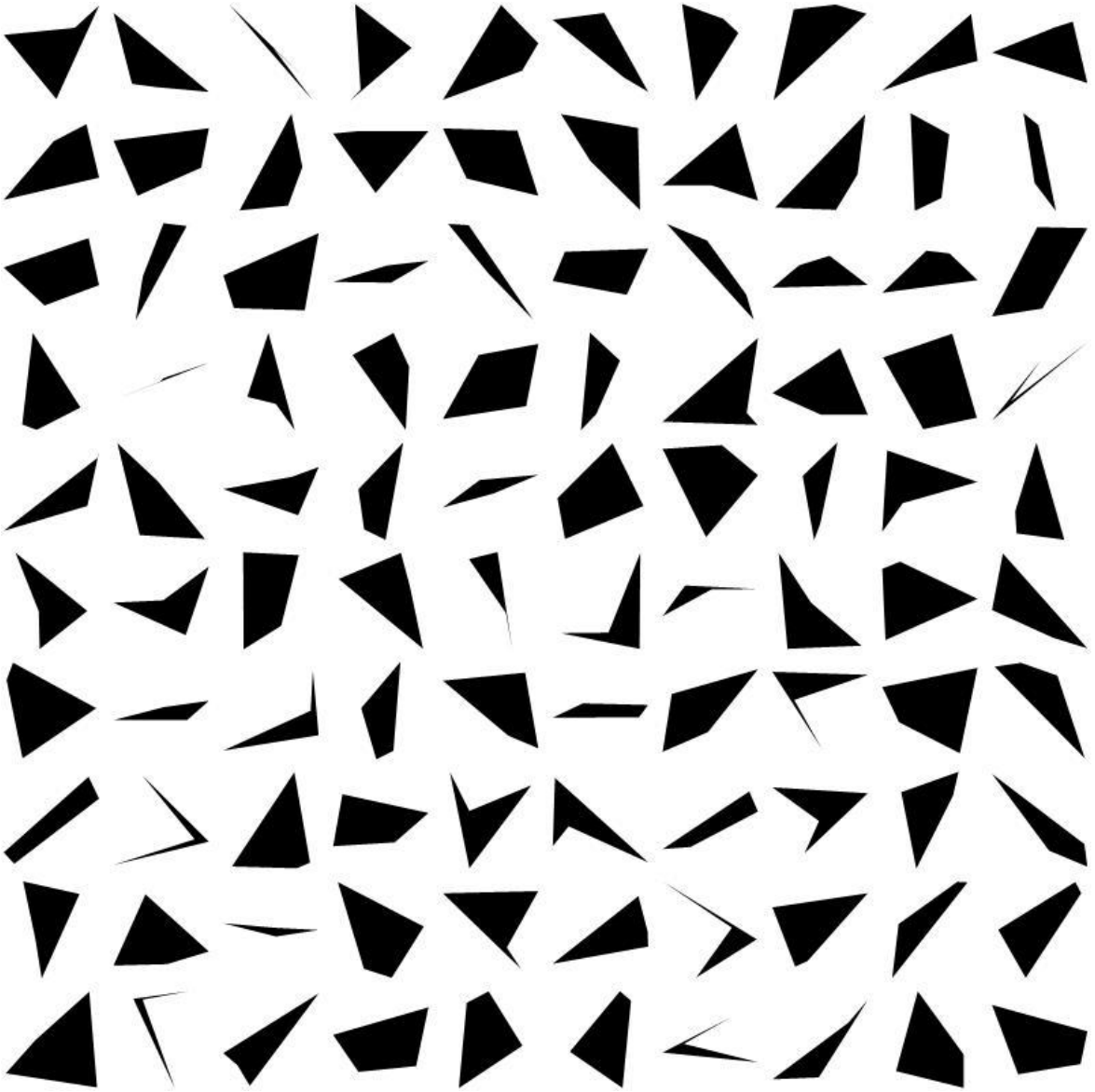
No, a cube's not a polygon because a polygon is flat, 2D, and a cube is 3D.

If possible, draw a quadrilateral that isn't one of the four types you named.



(JZ)

http://jzimba.blogspot.com/2019/02/random-quadrilaterals.html

Part 1: Math Magic

Here are two math tricks! But the really clever trick is explaining why these tricks are math, not magic! Like all good magicians, you should practice by trying them out. Then, try to explain why they work.

Math-e-magic #1:

- Think of a number
- Double it
- Add 10
- Halve it
- Take away your original number

Try this with a different starting number. Did you get a different result? Why does this happen?

For both numbers I got 5 as the result. It happens because half of 10 is 5, so after you've doubled it and added 10, when you divide it by two then you just always get 5 more than the original number, so when you subtract, it results in 5.

Mathe-e-magic #2:

- Think of a number
- Multiply the number by 3
- Add 8 more than the original number
- Divide by 4
- Subtract the original number

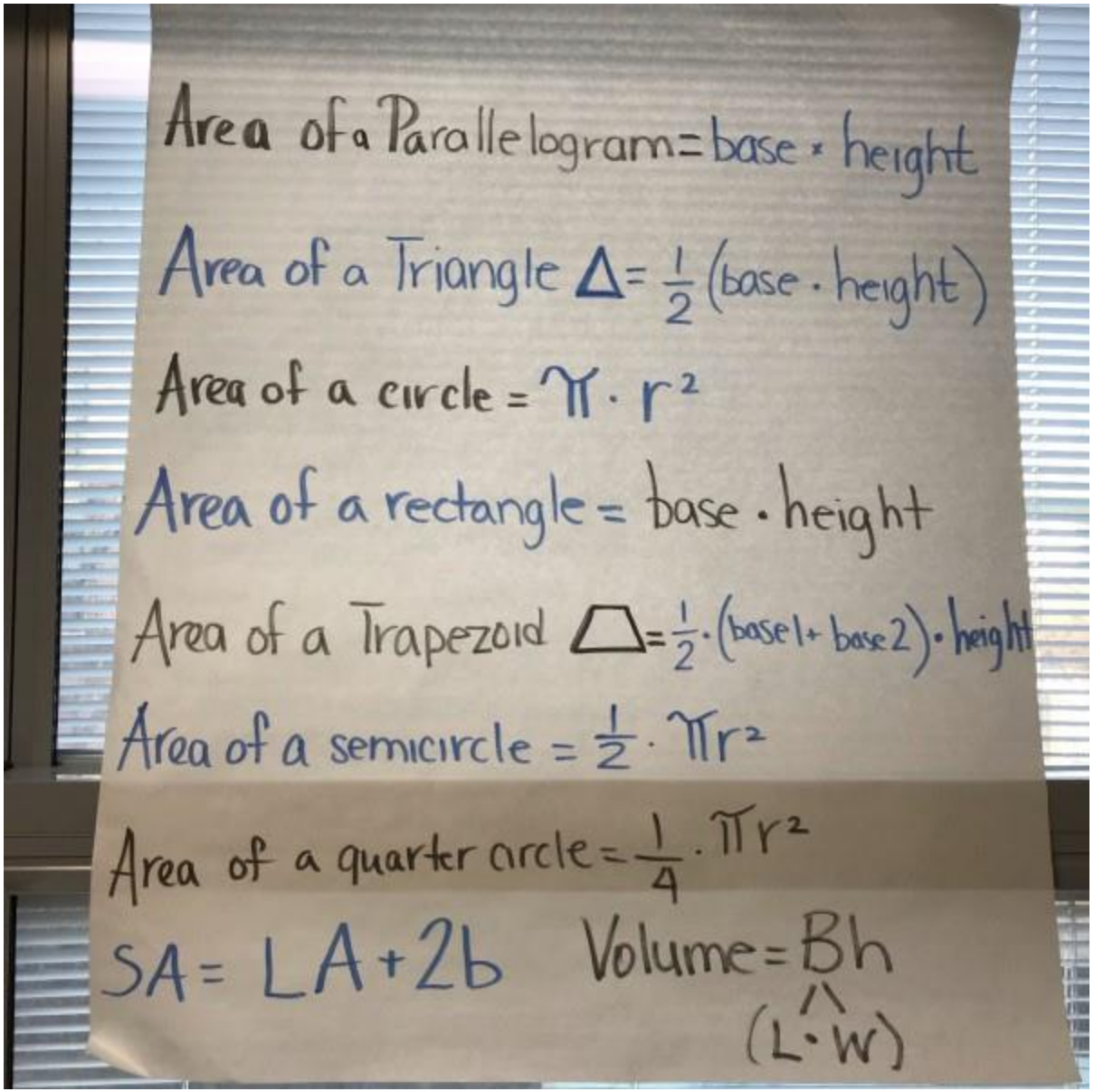
Try this with a different starting number. Did you get a different result? Why does this happen?

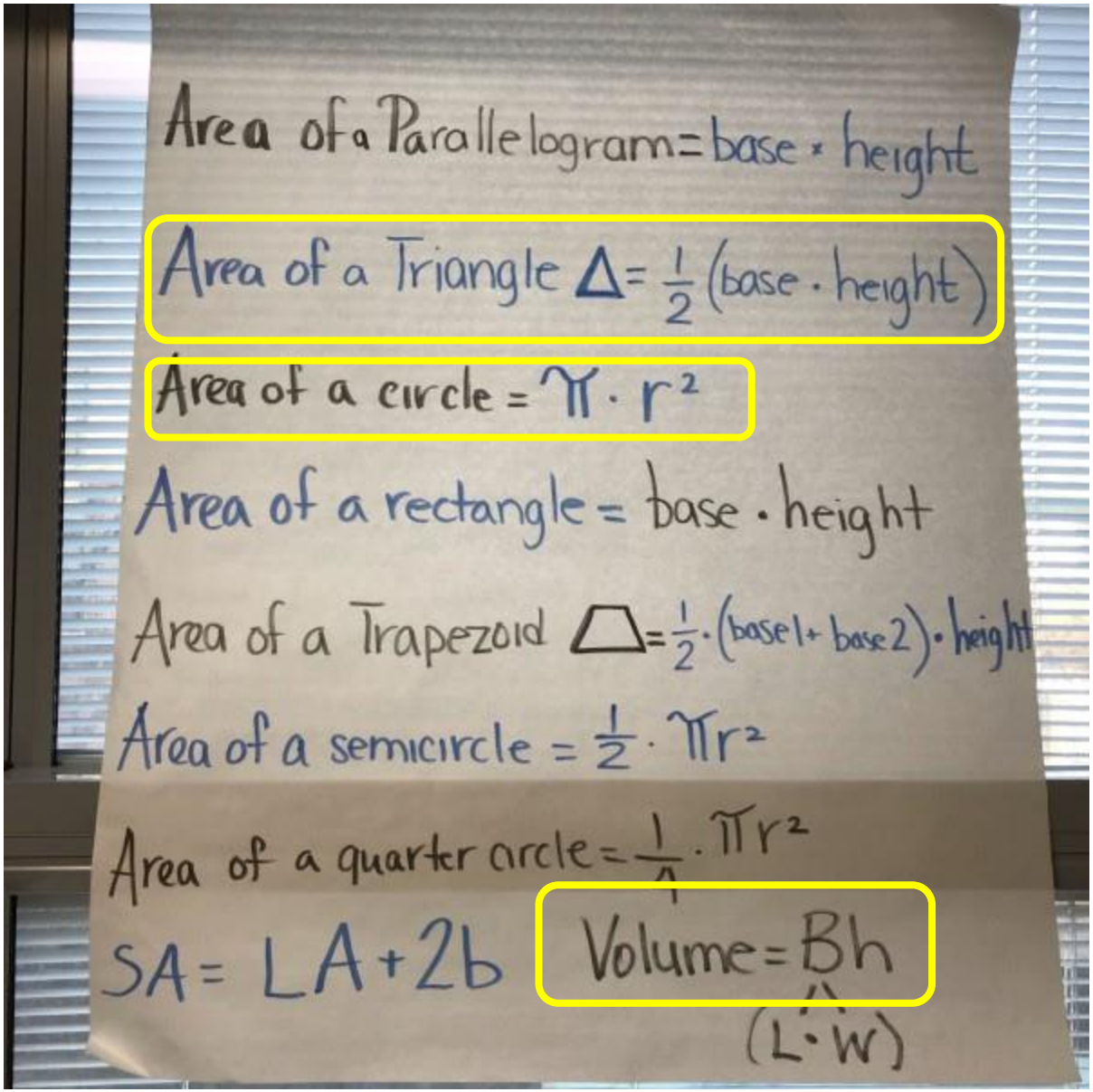
I first tried it with 2, then with 10. Each time I got 2 as the result. It happens because once you get to the fourth step, you added 8 more than the original, so when you divide $[(n \cdot 3) + (n+8)]$ by 4, you're doing $[(n \cdot 4)+8] \div 4$. The result will be $[n + (8 \div 4)]$, which is $(n+2)$, so it will always be 2 when you subtract.

Could you make your own mathemagical trick and explains why it works?

Think of a number
Duplicate it
Add 9
Add 3
Divide it in two
Subtract the original number
And you always get 6!

My trick works because you're doing $(n \cdot 2) + (9+3) \div 2$, which is the same as $(n \cdot 2 \div 2) + (12 \div 2)$, which is $n+6$. So when you subtract n from $(n+6)$, you always get 6.


Area of a Parallelogram = base · height
Area of a Triangle $\Delta = \frac{1}{2}(\text{base} \cdot \text{height})$
Area of a circle = $\pi \cdot r^2$
Area of a rectangle = base · height
Area of a Trapezoid $\text{⏢} = \frac{1}{2} \cdot (\text{base1} + \text{base2}) \cdot \text{height}$
Area of a semicircle = $\frac{1}{2} \cdot \pi r^2$
Area of a quarter circle = $\frac{1}{4} \cdot \pi r^2$
SA = LA + 2b
Volume = Bh
(L · W)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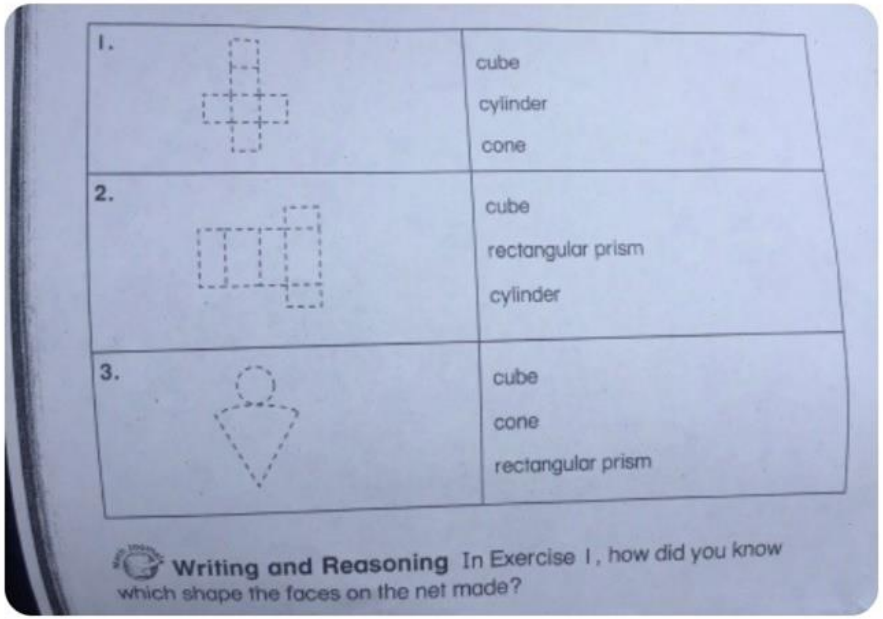
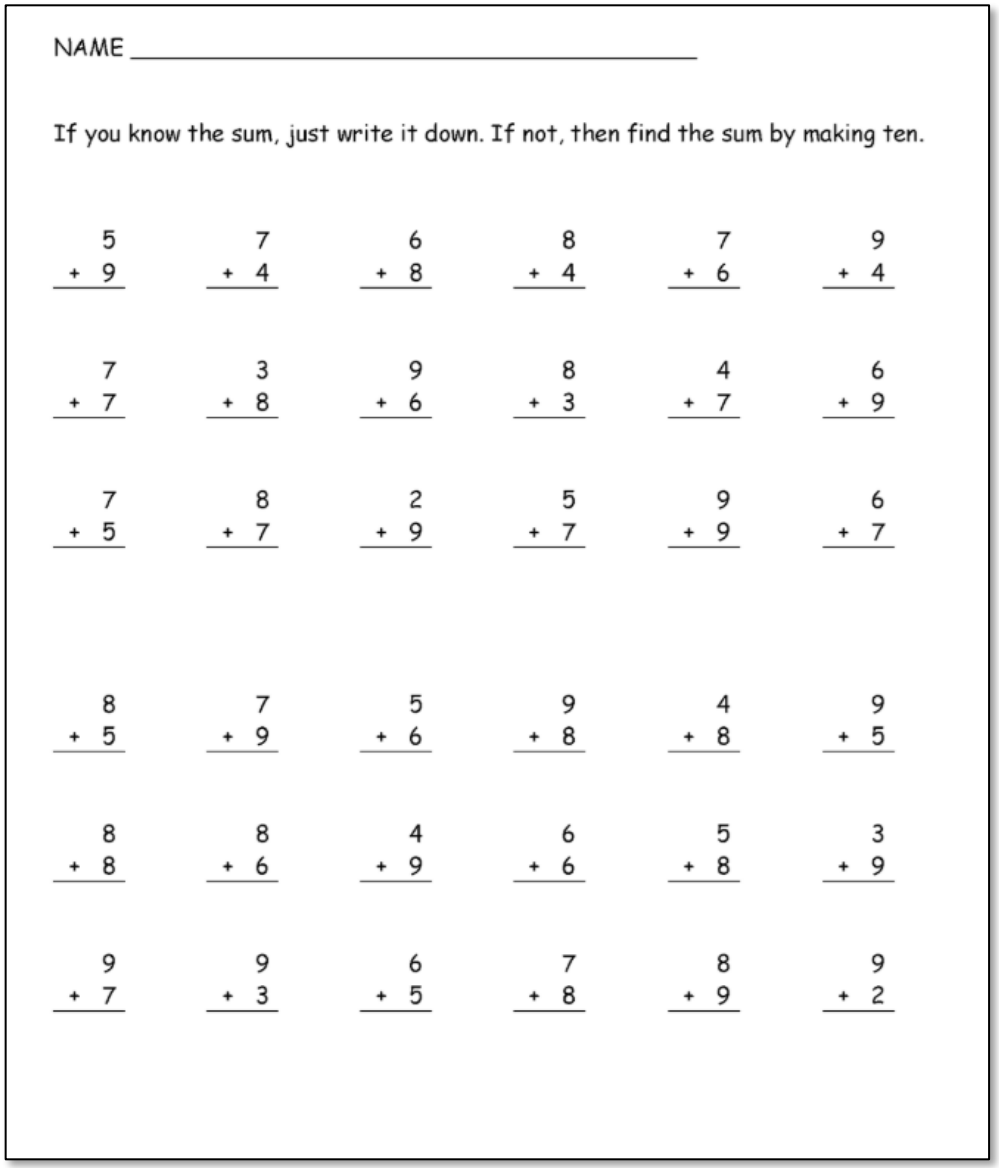
SA = LA + 2b
Volume = Bh
$(L \cdot W)$

Shelbi Cole
Mar 6, 2017

Grade 2 "enrichment" worksheet. Neighbor's kid says in my car as he is doing this for homework, "we didn't learn this." I guess that's good then. At least your not learning the 6th grade standards and *only* doing them for homework.



But don’t complicate what is simple

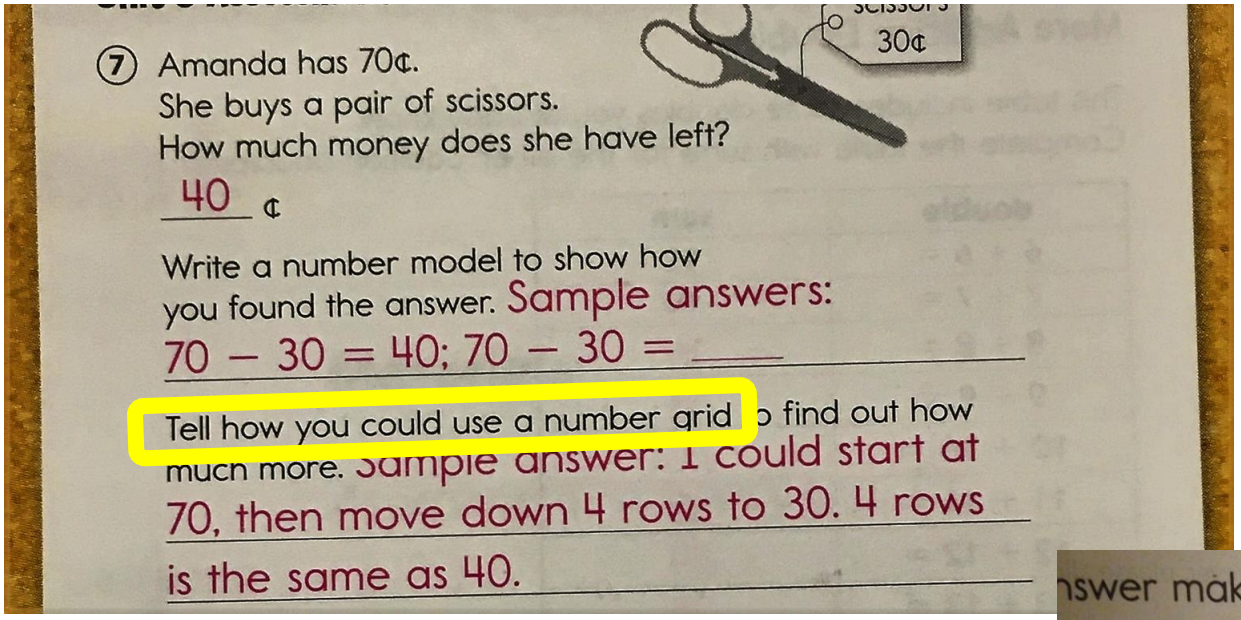


NAME _____

If you know the sum, just write it down. If not, then find the sum by making ten.

5 + 9	7 + 4	6 + 8	8 + 4	7 + 6	9 + 4
7 + 7	3 + 8	9 + 6	8 + 3	4 + 7	6 + 9
7 + 5	8 + 7	2 + 9	5 + 7	9 + 9	6 + 7
8 + 5	7 + 9	5 + 6	9 + 8	4 + 8	9 + 5
8 + 8	8 + 6	4 + 9	6 + 6	5 + 8	3 + 9
9 + 7	9 + 3	6 + 5	7 + 8	8 + 9	9 + 2

(JZ)



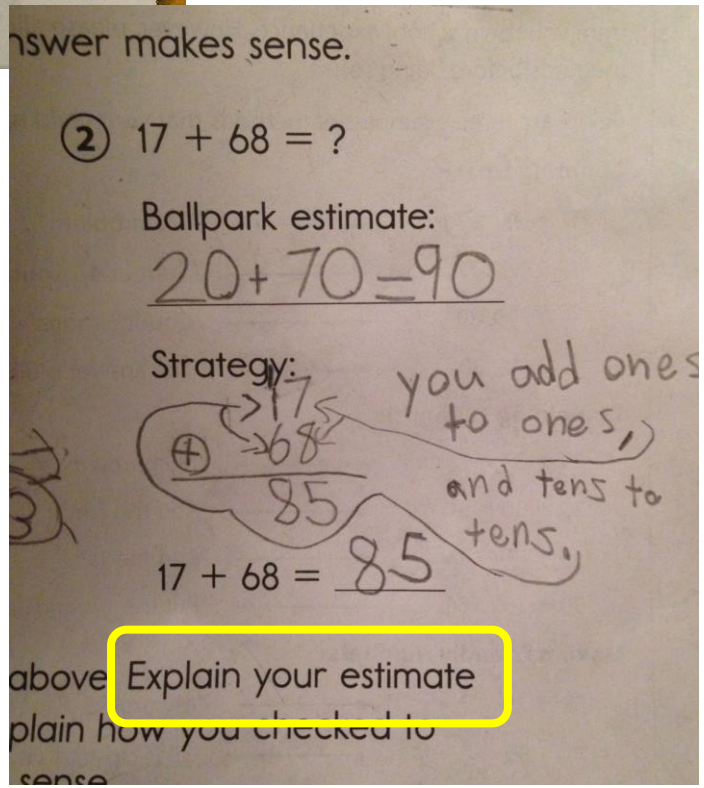
⑦ Amanda has 70¢.
She buys a pair of scissors.
How much money does she have left?

40 ¢

Write a number model to show how you found the answer. Sample answers:

70 − 30 = 40; 70 − 30 = ____

Tell how you could use a number grid to find out how much more. Sample answer: I could start at 70, then move down 4 rows to 30. 4 rows is the same as 40.



nswer makes sense.

② 17 + 68 = ?

Ballpark estimate:

20+70=90

Strategy:

you add ones to ones, and tens to tens,

17
+68
85

17 + 68 = 85

Explain your estimate

above

plain how you checked to

sense

Calibrating on Fluency

Alongside many other goals, K-5 teaching must endow students with these important procedural fluencies that build steadily across years of schooling:

- Remembering single-digit sums and fluency with related differences
- Remembering single-digit products and fluency with related quotients
- Calculating with paper and pencil using the standard base-ten algorithms
- Calculating mentally using algebraic thinking about numbers

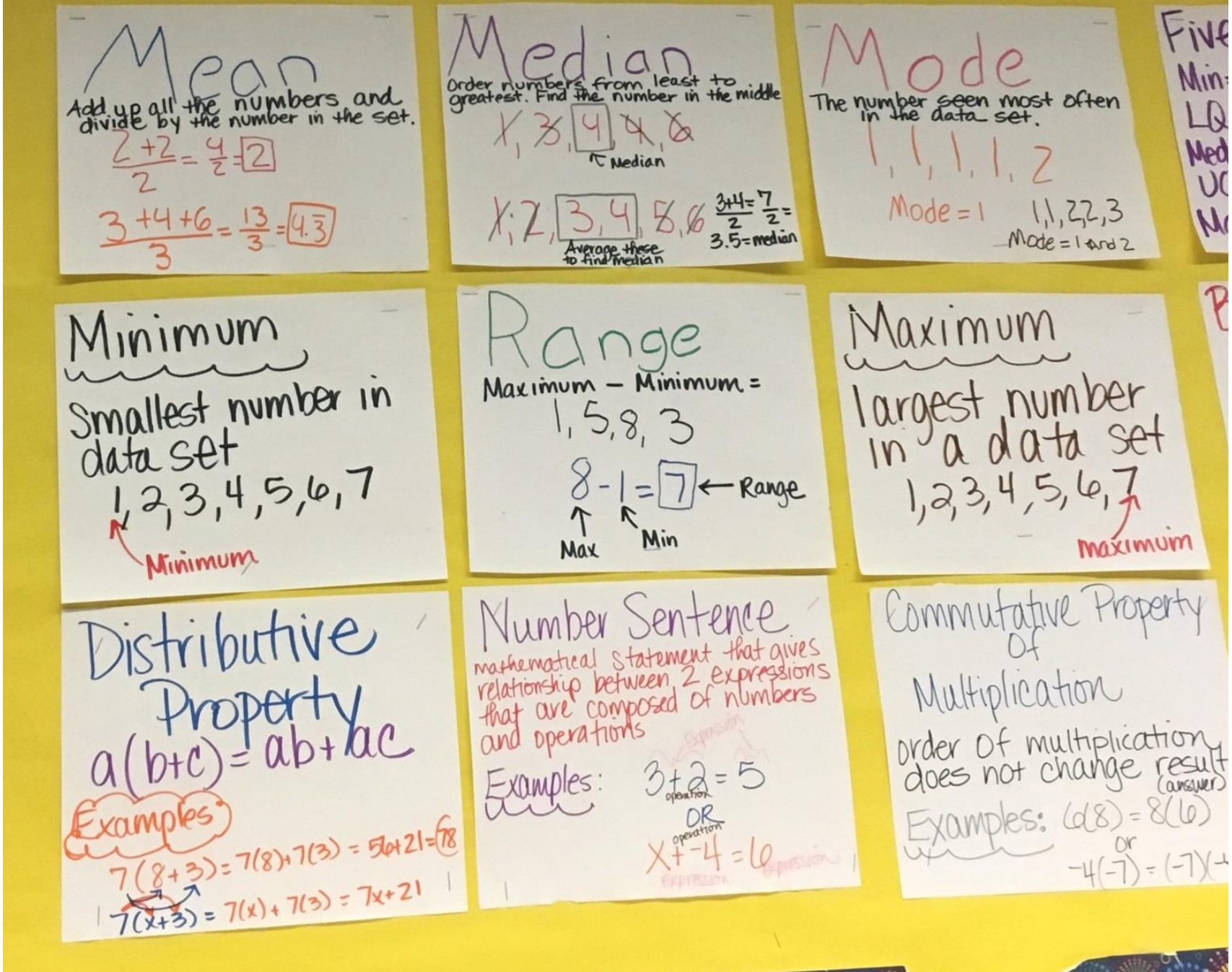
Calibrating on Fluency

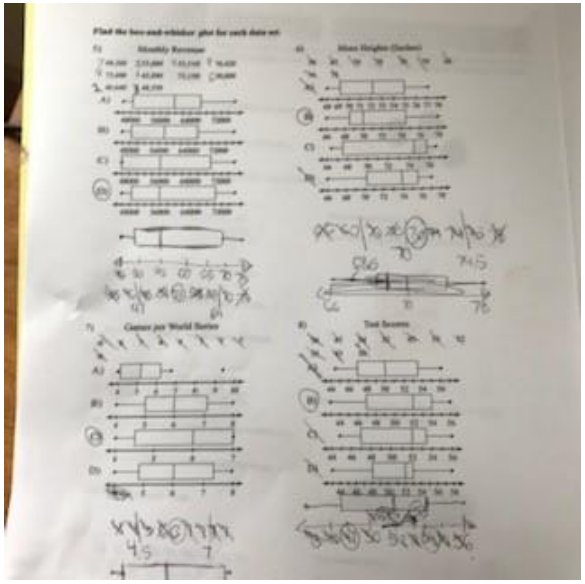
What about grades 6-HS?

Time is used inefficiently if **every** topic is construed as a procedure, and **every** procedure is reinforced to fluency.

Examples:

- Determining the median value of an artificial data set
- Applying volume formulas
- Factoring trinomials over the integers
- Simplifying complex rational expressions


Mean
Add up all the numbers and divide by the number in the set.
2+2/2 = 4/2 = 2
3+4+6/3 = 13/3 = 4.3
Median
Order numbers from least to greatest. Find the number in the middle
1, 3, 4, 4, 8
Median
1, 2, 3, 4, 5, 6
Average these to find median
3+4=7/2 = 3.5 = median
Mode
The number seen most often in the data set.
1, 1, 1, 1, 2
Mode = 1
1, 1, 2, 2, 3
Mode = 1 and 2
Minimum
Smallest number in data set
1, 2, 3, 4, 5, 6, 7
Minimum
Range
Maximum − Minimum =
1, 5, 8, 3
8 − 1 = 7 ← Range
Max
Min
Maximum
largest number in a data set
1, 2, 3, 4, 5, 6, 7
maximum
Distributive Property
a(b+c) = ab+ac
Examples
7(8+3) = 7(8)+7(3) = 56+21 = 78
7(x+3) = 7(x)+7(3) = 7x+21
Number Sentence
mathematical statement that gives relationship between 2 expressions that are composed of numbers and operations
Examples:
3+2 = 5
operation
OR
x+−4 = 6
operation
expression
expression
Commutative Property of Multiplication
order of multiplication does not change result (answer)
Examples: 6(8) = 8(6)
or
−4(−7) = (−7)(−4)



Find the box-and-whisker plot for each data set.

5) Monthly Revenue

A)
B)
C)
D)

6) Mean Heights (Inches)

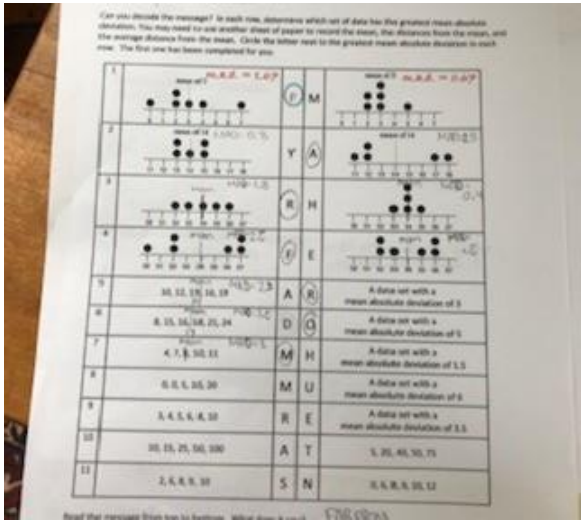
A)
B)
C)
D)

7) Games per World Series

A)
B)
C)
D)

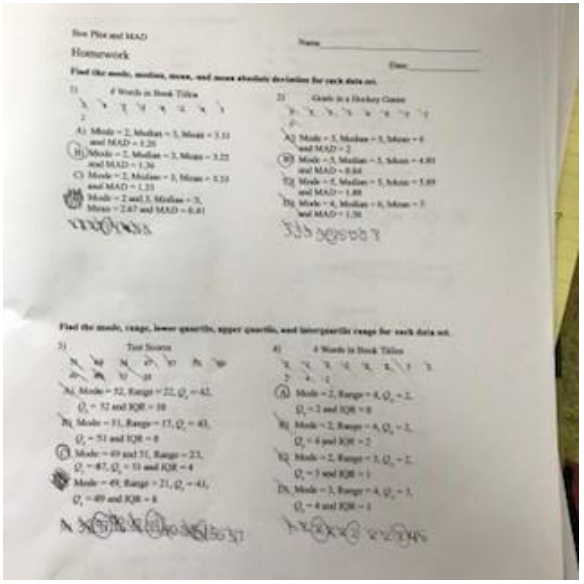
8) Test Scores

A)
B)
C)
D)



Can you decode the message? In each row, determine which set of data has the greatest mean absolute deviation. You may need to use another sheet of paper to record the mean, the distances from the mean, and the average distance from the mean. Circle the letter next to the greatest mean absolute deviation in each row. The first one has been completed for you.

1		F	M		
2		Y	A		
3		R	H		
4		I	E		
5	10, 12, 15, 16, 19	A	R	A data set with a mean absolute deviation of 3	
6	8, 15, 16, 18, 21, 24	D	O	A data set with a mean absolute deviation of 5	
7	4, 7, 8, 10, 11	M	H	A data set with a mean absolute deviation of 1.5	
8	0, 0, 5, 10, 20	M	U	A data set with a mean absolute deviation of 6	
9	3, 4, 5, 6, 8, 10	R	E	A data set with a mean absolute deviation of 2.5	
10	10, 15, 25, 50, 100	A	T	5, 20, 40, 50, 75	
11	2, 6, 8, 9, 10	S	N	0, 0, 0, 0, 10, 12	



Box Plot and MAD

Homework

Name

Date

Find the mode, median, mean, and mean absolute deviation for each data set.

1) # Words in Book Titles

A) Mode = 2, Median = 3, Mean = 3.33 and MAD = 1.26
B) Mode = 2, Median = 3, Mean = 3.22 and MAD = 1.36
C) Mode = 2, Median = 3, Mean = 3.33 and MAD = 1.33
D) Mode = 2 and 3, Median = 3, Mean = 2.67 and MAD = 0.81

2) Goals in a Hockey Game

A) Mode = 5, Median = 5, Mean = 4 and MAD = 2
B) Mode = 5, Median = 5, Mean = 4.83 and MAD = 0.64
C) Mode = 5, Median = 5, Mean = 3.83 and MAD = 1.88
D) Mode = 6, Median = 6, Mean = 5 and MAD = 1.50

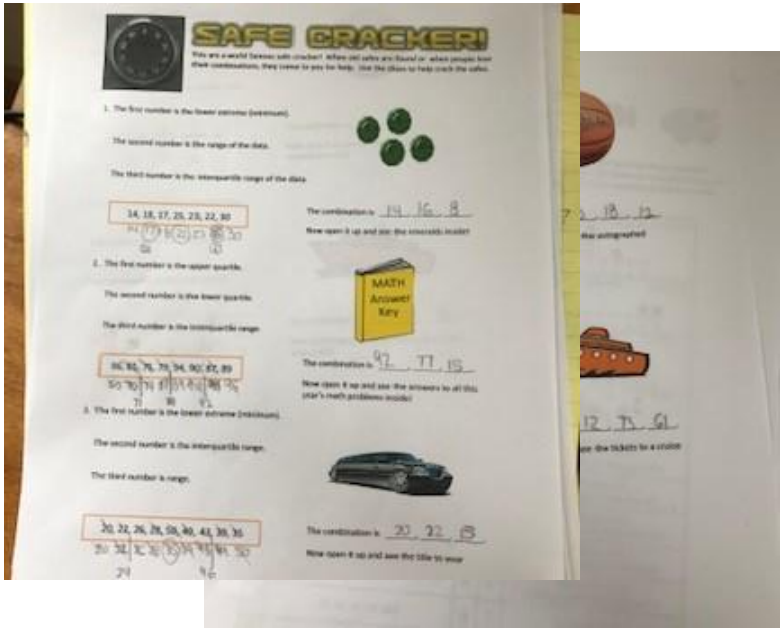
Find the mode, range, lower quartile, upper quartile, and interquartile range for each data set.

3) Test Scores

A) Mode = 92, Range = 22, Q_1 = 62, Q_3 = 92 and IQR = 30
B) Mode = 81, Range = 17, Q_1 = 43, Q_3 = 51 and IQR = 8
C) Mode = 49 and 51, Range = 23, Q_1 = 47, Q_3 = 51 and IQR = 4
D) Mode = 49, Range = 21, Q_1 = 41, Q_3 = 49 and IQR = 8

4) # Words in Book Titles

A) Mode = 2, Range = 4, Q_1 = 2, Q_3 = 3 and IQR = 0
B) Mode = 2, Range = 4, Q_1 = 2, Q_3 = 4 and IQR = 2
C) Mode = 2, Range = 3, Q_1 = 2, Q_3 = 5 and IQR = 3
D) Mode = 3, Range = 4, Q_1 = 3, Q_3 = 4 and IQR = 1



SAFE CRACKER!

You are a world famous safe cracker! When old safes are found or when people lose their combinations, they come to you for help. Use the clues to help crack the safes.

1. The first number is the lower extreme (minimum).

The second number is the range of the data.

The third number is the interquartile range of the data.

14, 18, 17, 25, 23, 22, 30

The combination is 14 16 8

Now open it up and see the crowns inside!

2. The first number is the upper quartile.

The second number is the lower quartile.

The third number is the interquartile range.

MATH Answer Key

The combination is 92 77 15

Now open it up and see the answers to all this year's math problems inside!

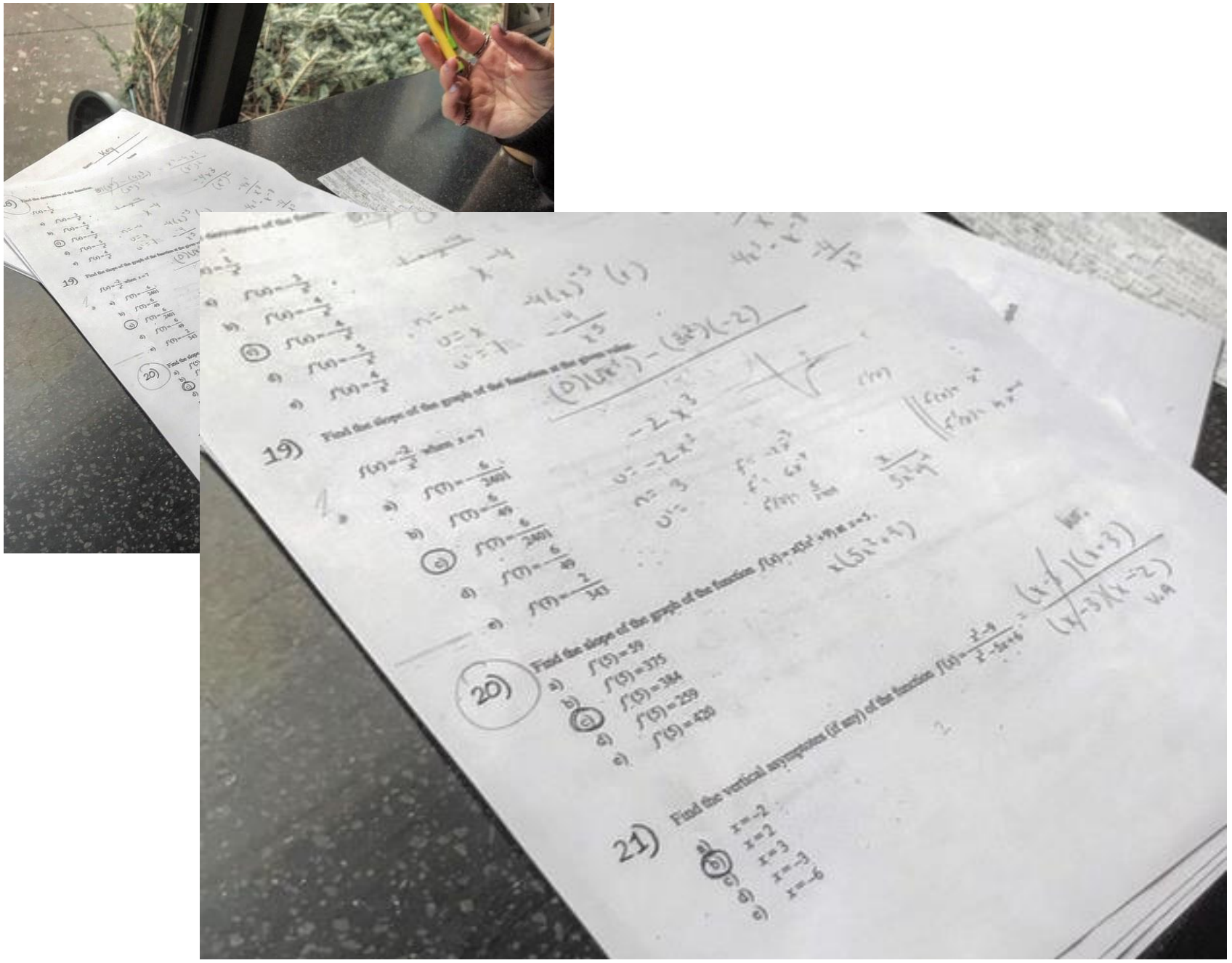
3. The first number is the lower extreme (minimum).

The second number is the interquartile range.

The third number is range.

The combination is 20 22 18

Now open it up and see the title to your


19) Find the slope of the graph of the function at the given value.
20) Find the slope of the graph of the function $f(x)=x(5x^2+9)$ at $x=5$.
21) Find the vertical asymptotes (if any) of the function $f(x)=\frac{x-9}{x^2-5x+6}$

Part One

Monica and Jose have different methods for finding square roots.

Monica's Method

To find the square root of x, find a number where the product of the number and itself is x. For example, $2 \cdot 2 = 4$, so the square root of 4 is 2.

Jose's Method

To find the square root of x, divide x by 2. For example, $4 \div 2 = 2$, so the square root of 4 is 2.

Which student's method is **not** correct?

- ☐ Monica's method
- ☒ Jose's method

Explain why the method you selected is not correct **in complete sentences**.

Jose methods is wrong because you aren't suppose to divide x to 2 ang get 4 your suppose to multiply 2 times itself get 4 and the savare root is 2.

Calibrating on Fluency

What about grades 6-HS?

Time is used inefficiently if **every** topic is construed as a procedure, and **every** procedure is reinforced to fluency.

Examples:

- Determining the median value of an artificial data set
- Applying volume formulas
- Factoring trinomials over the integers
- Simplifying complex rational expressions

In cases like the above in grades 6-HS, reams of repetitive "bite-size" problems consume too much time that might instead be spent in

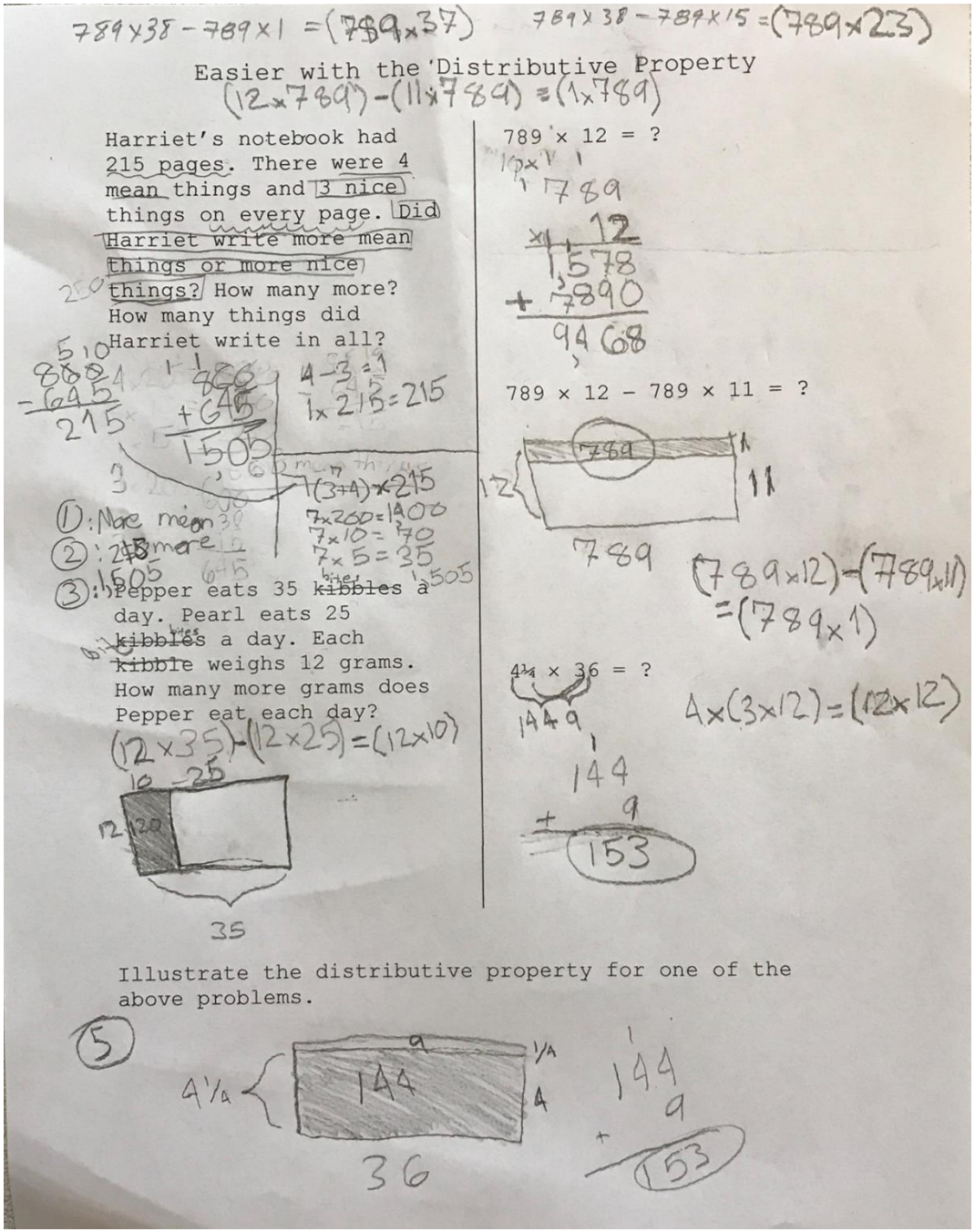
- Fostering student understanding of the topic (which is more durable)
- Providing students with "life-size" problems (meaningful and rewarding)
- Reinforcing procedural fluency where it actually matters (such as distributive property, equation solving)

Refine over time

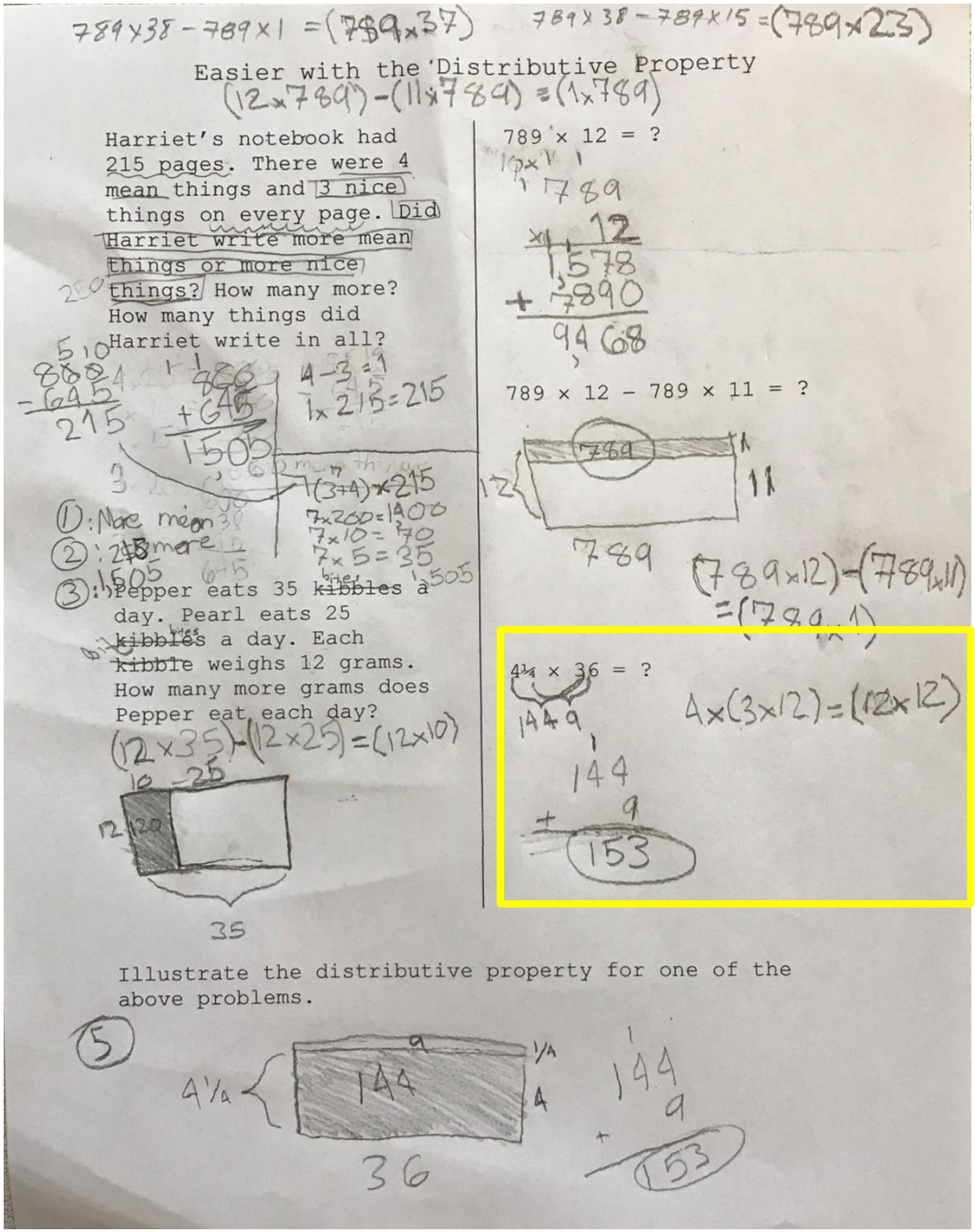
10. Ninety-seven lunch trays were placed equally in 4 stacks. How mar
How many lunch trays will be left over?

$1350

14. Ryan transfers 15% of his monthly pay into a savings account. If Max makes $1850 per month, how much will he save in a year?


789×38−789×1 =(789×37)
789×38−789×15 =(789×23)
Easier with the Distributive Property
(12×789)−(11×789) =(1×789)
Harriet's notebook had 215 pages. There were 4 mean things and 3 nice things on every page. Did Harriet write more mean things or more nice things? How many more? How many things did Harriet write in all?
4−3=1
1×215=215
①: More mean
②: 215 more
③: 1505
Pepper eats 35 kibbles a day. Pearl eats 25 kibbles a day. Each kibble weighs 12 grams. How many more grams does Pepper eat each day?
(12×35)−(12×25)=(12×10)
35
789 × 12 = ?
789 × 12 − 789 × 11 = ?
(789×12)−(789×11)
=(789×1)
4¼ × 36 = ?
4×(3×12)=(12×12)
144
9
153
Illustrate the distributive property for one of the above problems.
5
4¼
36

(JZ)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4 − 3 = 1
1 × 215 = 215
(3+4) × 215
7×200 = 1400
7×10 = 70
7×5 = 35
1505
① : More mean
② : 215 more
③ : 1505
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(12×35) − (12×25) = (12×10)
12
10
25
12
120
35
789 × 12 = ?
1578
+ 7890
9468
789 × 12 − 789 × 11 = ?
789
12
11
789
(789×12) − (789×11)
= (789×1)
4¼ × 36 = ?
144
9
144
+ 9
153
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4¼
144
9
¼
4
36
144
9
153

(JZ)

Refining Word Problem Assignments

Sometimes, mix it up. Reorder sentences so that the question comes first … delete the question sentence leaving just the “givens” and ask the student to create a question and answer it … ask a qualitative question (‘I spent 40% of a 12-hour trip playing video games. Was that more or less than 6 hours of video games?’)

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Delete "explain" or "justify" for word problems. Instead...

For one-step word problems:

- Mostly, just pose the problem, giving space to show work. Can say something like, "Draw a diagram if it helps."
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⑥ Nathan has 5 bags of marbles.
Each bag has 4 yellow marbles and 6 red marbles.

How many marbles does Nathan have in all?

The letter *M* represents the number of marbles that Nathan has.

a. Underline the number model that fits the story.

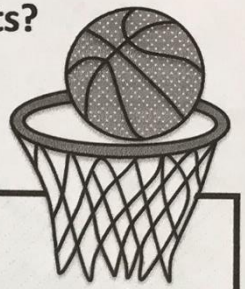
$5 \times 4 + 6 = M$ $\quad$ $5 \times (4 + 6) = M$ ✓ $\quad$ $(5 + 4) \times 6 = M$

What are your students interested in?

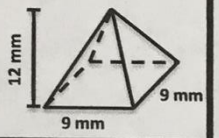
Why do basketball players love doughnuts?

Name _____

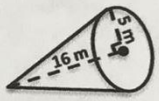
Solve and show your work. Place the letter of the problem in the blank above the numerical answer at the bottom of the page. Use 3.14 for pi and round answers to the nearest whole number as necessary.



N)



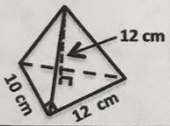
M)



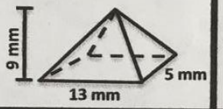
$$V_{\text{pyramid or cone}} = \frac{1}{3}Bh$$

B: Base Area
h: height

Y)

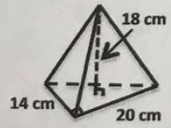


D)



C)

T)



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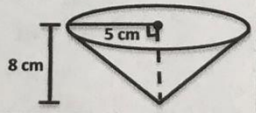
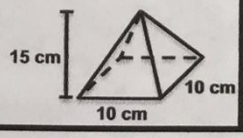


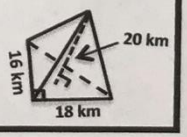
U)

A)

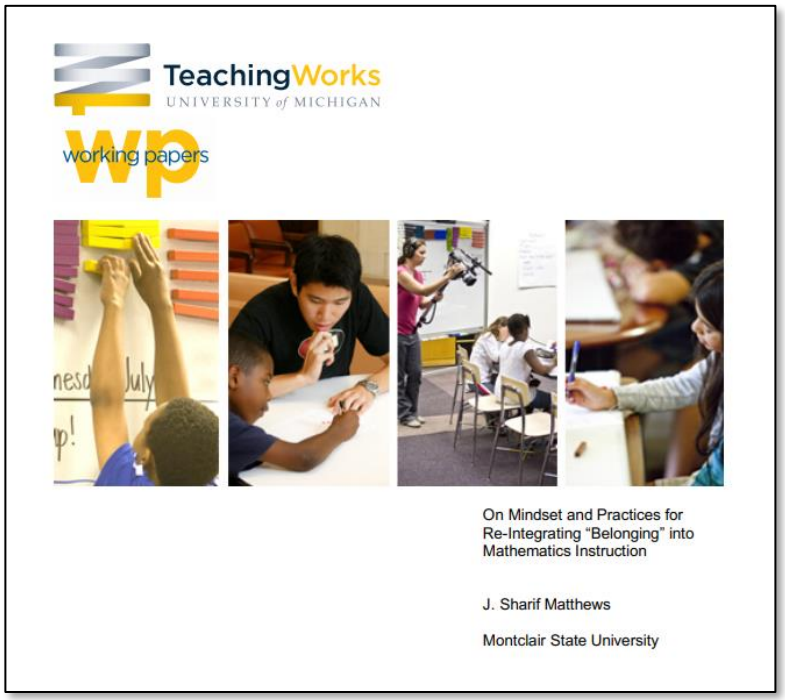
H)



K)



840	500	209	240	314	301	324	195	510	324	960	840	500	209	419



http://www.teachingworks.org/images/files/TeachingWorks_Matthews.pdf

Prof. J. Sharif Matthews: 4Hs of belonging-centered math instruction: Home, Hobbies, Hopes, and Heritage.

"For teachers who have begun to develop critical awareness, but don't know where to begin **integrating students' culture into mathematics instruction**, I offer this heuristic the 4Hs of belonging-centered math instruction: Home, Hobbies, Hopes, and Heritage. This heuristic offers four locales of meaningful connection for students. Home refers to consistent activities engaged at home or the properties of the home space (e.g., cooking, interactions with family, the heating bill, dimensions of the living room). Hobbies are personal activities engaged in at least once per week (e.g., sports teams, social media, work, smart phone apps/games). Hopes are personal aspirations, interests, or goals (e.g., desired career or major, making the varsity team, making my paycheck last all week). Heritage is a connection to a tradition or a people that is a source of pride (e.g., local celebrities in the community, Black female mathematicians).

High school teachers: Blend middle-grades math applications into assignments

Suppose that life exists everywhere on Earth to within a depth of 10 miles, but not deeper than that. What percentage of Earth's volume contains life? Try to draw an accurate scale diagram of a cross section of Earth showing the 'living region.'

(JZ)

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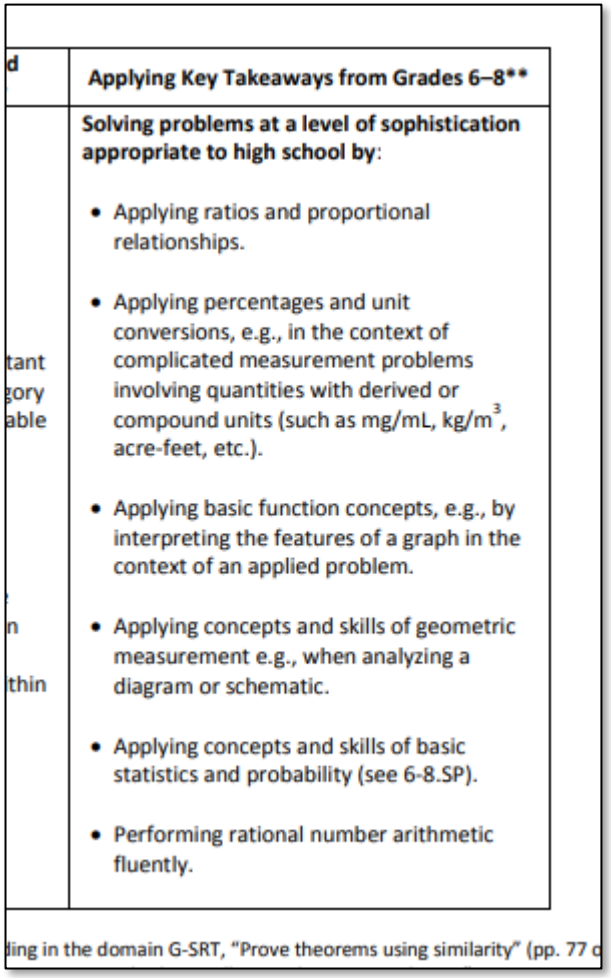


d	Applying Key Takeaways from Grades 6–8**
tant gory able	**Solving problems at a level of sophistication appropriate to high school by**: • Applying ratios and proportional relationships. • Applying percentages and unit conversions, e.g., in the context of complicated measurement problems involving quantities with derived or compound units (such as mg/mL, kg/m^3, acre-feet, etc.). • Applying basic function concepts, e.g., by interpreting the features of a graph in the context of an applied problem. • Applying concepts and skills of geometric measurement e.g., when analyzing a diagram or schematic. • Applying concepts and skills of basic statistics and probability (see 6-8.SP). • Performing rational number arithmetic fluently.
n thin	

ding in the domain G-SRT, "Prove theorems using similarity" (pp. 77 c

https://achievethecore.org/page/701/widely-applicable-prerequisites-for-college-and-careers

https://achievethecore.org/coherence-map/HS/M/tasks
(some A1/M1 tasks)

A programmer is writing a piece of software. One part of the software will ask the CPU to repeatedly calculate the value of

```
x * x + 4 * x * y + 3 * y * y.
```

Suppose the CPU can perform 2.6×10^9 additions per second, but only 1.1×10^9 multiplications per second.

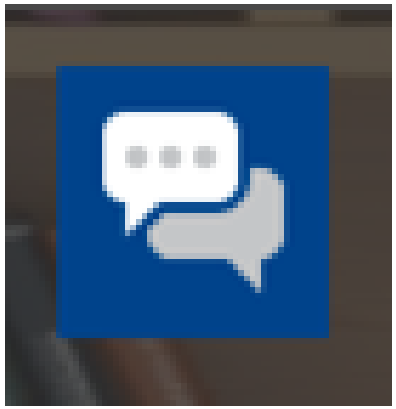
a) How can the programmer rewrite the expression so that evaluating the expression takes less time? Explain intuitively why your form of the expression evaluates faster.
b) By rewriting the expression the way you did, what percentage decrease did you achieve in the time required to evaluate the expression?

(JZ)

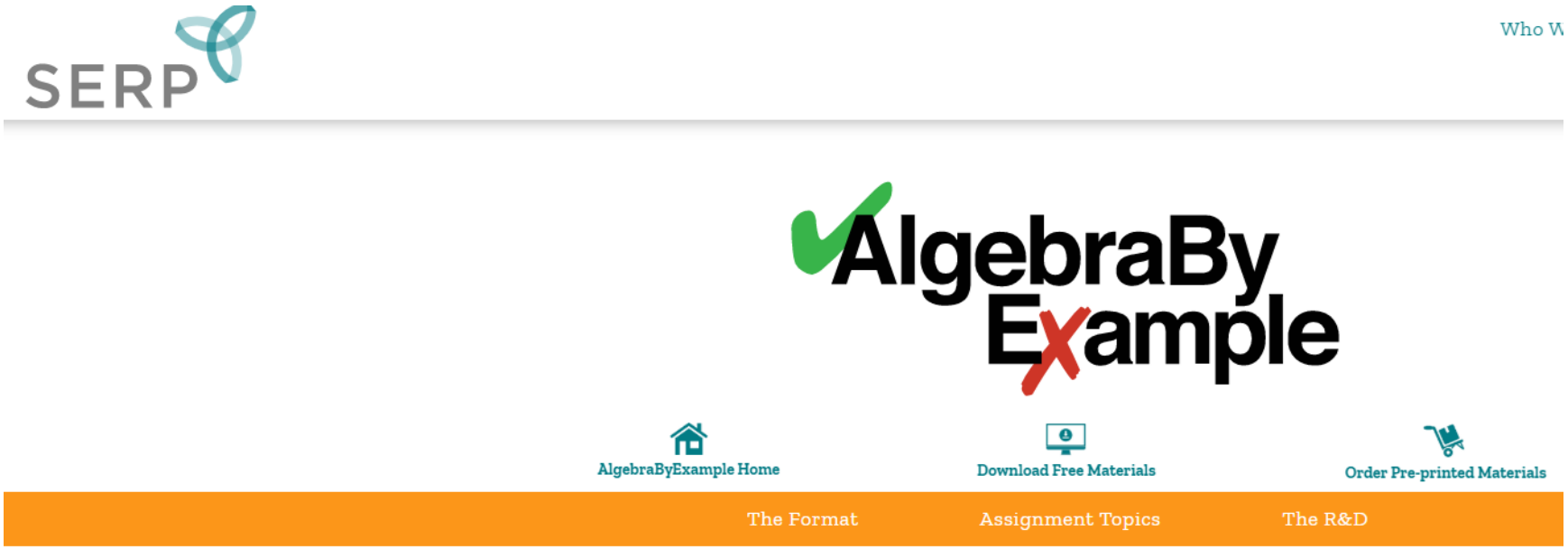
Know the good sources for problems, worksheets, resources

Know the good sources for problems, worksheets, resources

What are your faves?
Share your answers in the group chat!
(Free is best!)



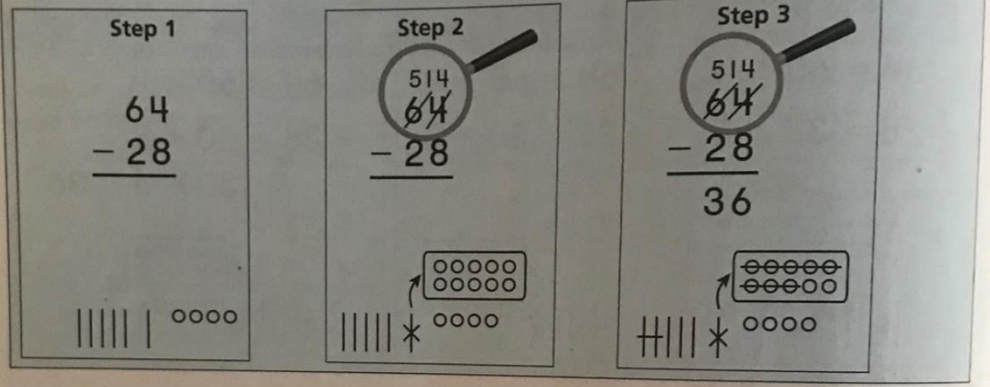
Algebra by Example, https://www.serpinstitute.org/algebra-by-example



Keep a math problem notebook, or scrapbook

▶ Explain the Ungroup First Method

Mrs. Green likes this method. Explain what she does.



▶ Try the Ungroup First Method

Show your work numerically and with a proof drawing.

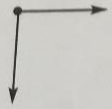
4. 42
   −19

5. 75
   −46

6. 81
   −37

Name each angle. Write acute, obtuse, or right.

_____



_____

_____

_____

_____

_____

Estimate the size of each angle in degrees.

_____

_____

_____

_____

Draw an angle for each of the following measures.

about 10 degrees

about 90 degrees

about 175 degrees

Dividing Larger Numbers with Remainders

divisor: 6

dividend: 3,772

quotient: _____

remainder: _____

$6{,}031 = (q \times 9) + r$

q = _____

r = _____

$7\overline{)1{,}504}$

$1{,}129 = (q \times 3) + r$

q = _____

r = _____

example

How do you rename $\frac{2}{5}$ to a decimal?

Step 1: Rename $\frac{2}{5}$ to a fraction with a denominator of 10, 100, or 1,000. $\frac{2}{5} = \frac{4}{10}$

Step 2: Rename $\frac{4}{10}$ to a decimal. $\frac{4}{10} = .4$

Rename to a decimal.

$\frac{4}{5} =$ _____ $\frac{7}{20} =$ _____ $\frac{1}{4} =$ _____

$\frac{5}{8} =$ _____ $\frac{3}{4} =$ _____ $\frac{4}{25} =$ _____

There is a secret in finding which fractions can be renamed directly to decimals. Circle the fractions which can be renamed directly to decimals.

$\frac{2}{3}$ $\frac{1}{5}$ $\frac{9}{20}$ $\frac{1}{6}$ $\frac{5}{7}$ $\frac{9}{25}$

My secret is _____

_____

Example

Commutative Property

$a \times b = b \times a$

Changing the order of the factors does not change the product.

Associative Property

$a \times (b \times c) = (a \times b) \times c$

Changing the grouping of the factors does not change the product.

Distributive Property

$6 \times 17 = (6 \times 10) + (6 \times 7)$

You can find a product by renaming one factor as the sum of two addends, multiplying each addend by the other factor, and adding the partial products.

Identity Property (Property of 1)

$n \times 1 = n$

When 1 is one of two factors, the product is the other factor.

Property of Zero

$n \times 0 = 0$

When 0 is a factor, the product is 0.

Tell which property goes with each problem, write an equation, and explain your answer.

In which box will George be able to fit more CD's, a box with 6 rows and 4 CD's in each row, or a box with 4 rows and 6 CD's in each row?

Juan has one CD box with 9 rows and 10 CD's in each row. He has another CD box with 9 rows and 6 CD's in each row. How many CD's does Juan have?

Lisa bought a CD rack that has one column which holds 24 CD's. How many CD's are in the rack when it is full?

Molly selected 14 CD's but decided to not buy any of them. How many CD's did she buy?

Jim built two solid figures from 1-inch cubes. One figure has a height of 3 inches and a base that is 5 inches by 2 inches. The other figure has a height of 5 inches and a base that is 2 inches by 3 inches. Which figure is made up of more cubes?

14. Show that the sum of any $2n + 1$ consecutive integers is divisible by $2n + 1$.

fix a value

6. $10^{n+1} + 10^n + 1$ is divisible by 3.

1. Find $f(x) - f(x-1)$ if $f(x) = 2x + 3$.
2. Find $f(a) - f(a-1)$ if $f(x) = mx + b$.

5. $x^2(a+b) + y^2(a+b)$

33. $\dfrac{1}{1 - \dfrac{1}{2 - \dfrac{1}{3 - x}}}$

3. $\dfrac{\dfrac{a+1}{a-1} - \dfrac{a-1}{a+1}}{\dfrac{a+1}{a-1} + \dfrac{a-1}{a+1}}$

value

21. In what range of values must the sum of a real number and its reciprocal lie?

22. For the equation $ax^2 + bx + c = 0$ show that
(a) if one root is the negative of the other, then $b = 0$;

16. Find the maximum value of the product of two numbers, if their sum is 4.

17. Find the minimum value of the product of two numbers, if their difference is 4.

29. $\left[\dfrac{1}{1-x} - \dfrac{1}{1+x}\right] \div \left[\dfrac{1}{1-x} + \dfrac{1}{1+x}\right]$

19. $\dfrac{(x-y)^2}{y^2 - xy}$

10. $\dfrac{a^4 - b^4}{(a-b)^3} \cdot \dfrac{a-b}{a^2+ab} \cdot \dfrac{a^2}{a^2+b^2}$

If $f(x) = 3x^2 - 4x + 1$ and $F(x) = x^3 + 6x - 7$, prove that:
3. $f(4) = F(4)$

37. $cx + dy - dx - cy$

27. A takes 2 hr longer than B to walk d miles, but if A should double his speed, he would walk it in 1 hr less. Find the time B needs to walk the d miles.

21. What expression must be subtracted from $x^2 + 2xy + 3y^2$ to give $x^2 - 3xy - 5y^2$?

20. What expression must be added to $3a - 4b + 6c$ to give $3a - 10b + 3c$?

EXAMPLE 4. $\dfrac{1}{\sqrt{2}+\sqrt{3}} = \dfrac{1}{\sqrt{2}+\sqrt{3}} \cdot \dfrac{\sqrt{4}-\sqrt{6}+\sqrt{9}}{\sqrt{4}-\sqrt{6}+\sqrt{9}} = \dfrac{\sqrt{4}-\sqrt{6}+\sqrt{9}}{5}$.

Solve $\sqrt{3x-5} + \sqrt{2x+3} + 1 = 0$.

FIGURE 3

This example shows possible modification of items to explicitly show gaps.

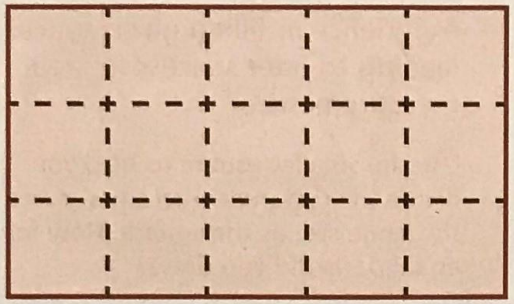
The picture shows John's attempt to ~~cover a rectangle with equal parts to measure the area.~~ John says that he used 7 unit squares to cover the shape, so the area is 7 unit squares.

- Is John correct? Explain.
- It looks like John has some gaps, or uncovered spaces, in his picture. What would the area of the rectangle be if he did not have any gaps?
- Was John's area too big or too small? Why do you think that is?

Previous studies have shown that even with pictured squares, rows, and columns, the connection between counting unit squares and area is unclear to elementary school students (Battista 2004). With limited opportunities to understand array structure, students may struggle to see how the two are related (Sarama

FIGURE 4

This possible modification explicitly shows row and column structure.



1. How many rows and columns are in this rectangle? ___
2. How many unit squares can be placed in each row and column?
3. There are ___ rows, with ___ squares in each row.
4. There are ___ columns, with ___ squares in each row
5. Use skip counting in two different ways to find out how many total squares fit in the shape. ___
6. How many unit squares are needed to cover this rectangle without any gaps or overlaps? ___ Explain how you know.

6.2 Unit Rate

In the previous section, we defined what an average or average rate is. Let's look at how the concept of a unit rate can help us make better decisions.

CLASS ACTIVITY 2

Objective: To compare various quantities using different units.

Two pens of different areas, each containing different numbers of puppies, are shown below. Which pen is more crowded?

Pen *A*

Pen *B*

	Area (m^2)	Number of Puppies
Pen *A*	5	8
Pen *B*	8	10

Questions

1. Which puppy pen do you think is more crowded and why?

2. Next, compare them by finding the number of square meters per puppy.

Pen *A* 8 puppies → ☐ m^2

1 puppy → $\frac{\square}{8}$ = ☐ m^2

There is ☐ m^2 for each puppy.

Pen *B* 10 puppies → ☐ m^2

1 puppy → $\frac{\square}{10}$ = ☐ m^2

There is ☐ m^2 for each puppy.

Based on this method, which pen is more crowded and why?

Pen *A*

Pen *B*

	Area (m^2)	Number of Puppies
Pen *A*	5	8
Pen *B*	8	10

uestions

Which puppy pen do you think is more crowded and why?

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Pen *A* 8 puppies → ☐ m^2

1 puppy → $\frac{\square}{8}$ = ☐ m^2

There is ☐ m^2 for each puppy.

4. Complete the table by using the reciprocal of the divisors to write equivalent multiplication expressions.

Division Expression	Quotient	Equivalent Multiplication Expression	Product
$6 \div 3$	2	$6 \times \frac{1}{3}$	2
$6 \div 2$			
$6 \div \frac{3}{2}$			
$6 \div 1$			
$6 \div \frac{1}{2}$			
$6 \div \frac{1}{3}$			

(a) Look at the patterns in the divisors and the quotients. What happens to the quotient, as the divisor gets smaller?

(b) What do you notice about the quotients of the division expressions and the products of the equivalent multiplication expressions?

4/7/2020

A unit square has one vertex at the center of another unit square. What is the area of overlap?

THE NUMBERS | By Jo Craven McGinty

How Moisture in the Air Brings on the Heat

When the sun radiates blistering heat, how hot the air feels depends on how much moisture is in it.

Ninety degrees Fahrenheit could pass for an unpleasant 100 degrees or a dangerous 132.

Meteorologists call this the heat index, a value that combines the effects of air temperature and relative humidity to represent the perceived temperature. The index is derived from a mathematical equation that accounts for everything from

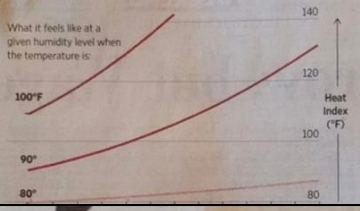
This year, more than a dozen deaths are believed to be heat-related in the Phoenix area, which was so hot last month that airlines grounded more than 40 flights.

Each of the National Weather Service's 122 offices issues alerts at its own discretion, but in general, an advisory is issued if within 12 hours the heat-index temperature is expected to hit 100 degrees Fahrenheit and last for at least two days. A warning is issued if in the same period the index is expected to hit at least 105 degrees.

When the body gets

Turning Up the Heat

The Heat Index is derived from a mathematical equation that uses temperature and humidity, and incorporates factors including body size, to come up with what the temperature feels like.



familiar measurement is dew point, the temperature below which water vapor begins to condense, forming dew, fog or raindrops.

"If the dew point is in the 60s in the summer, it's a little humid," Mr. Jacks said. "If it gets into the upper 60s, it's pretty bad. In the 70s, it's really oppressive."

The heat index, which the National Weather Service has used since 1979, is based on the work of R.G. Steadman, a professor in the textiles and clothing department of Colorado State University in Fort Collins who created a chart of values using the dew point.

Mr. Steadman's calculations, which incorporated about 20 different variable

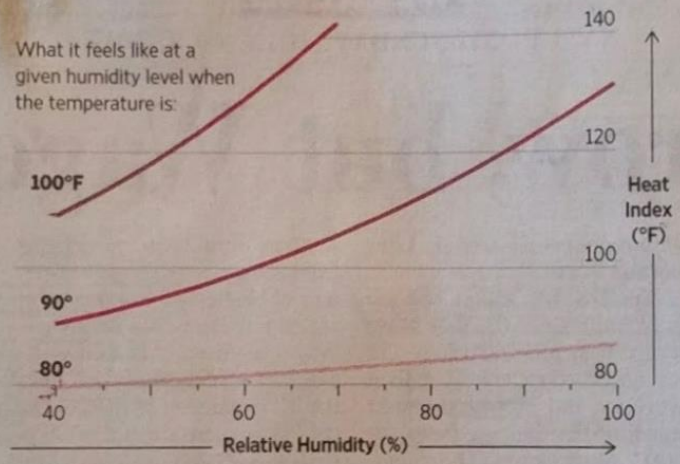
$$
\begin{aligned}
&.22475541*T*RH - \\
&.00683783*T*T - \\
&.05481717*RH*RH + \\
&.00122874*T*T*RH + \\
&.00085282*T*RH*RH - \\
&.00000199*T*T*RH*RH
\end{aligned}
$$

The equation is valid for temperatures ranging from 80 to 110 degrees Fahrenheit and humidity ranging from 40% to 100%.

But the index, once calculated, is not one-size fits-all. It applies to someone who is 5 feet, 7 inches tall, weighs 147 pounds, is wearing long trousers and a short-sleeved

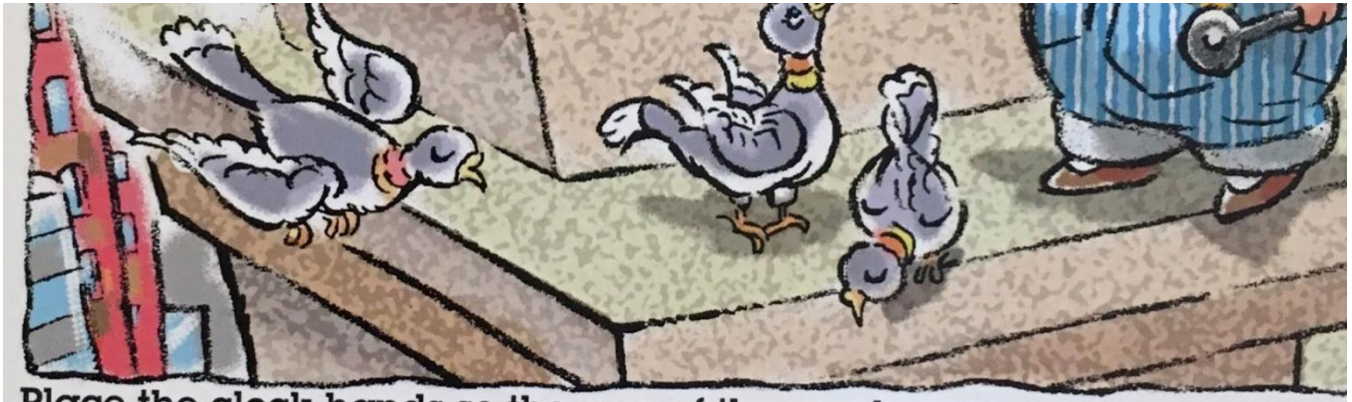
Turning Up the Heat

The Heat Index is derived from a mathematical equation that uses temperature and humidity, and incorporates factors including body size, to come up with what the temperature feels like.



Source: National Weather Service

THE WALL STREET JOURNAL.



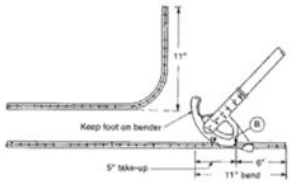
Place the clock hands so the sum of the numbers on one side of them equals the sum on the other side.


All Natural
LAND O LAKES LARGE BROWN EGGS
2/$5
12 ct. pkgs.
Salted or Unsalted
BREAKSTONE'S BUTTER QUARTERS
Breakstone's
ALL NATURAL SALTED BUTTER
$4.99
16 oz. pkg.
JACK FROST SUGAR
Jack Frost Sugar
$1.99
1 lb. bag
Assorted Varieties
GENOVA TUNA
ALBACORE TUNA
YELLOWFIN TUNA
2/$4
5 oz. cans
Assorted Varieties
GALBANI MOZZARELLA CHEESE
Galbani
MOZZARELLA
$3.99
16 oz. pkg.
Assorted Varieties
GALBANI RICOTTA CHEESE
Galbani
RICOTTA
$4.99
32 oz. cont.
ICY POINT PINK SALMON
Icy Point
PINK SALMON
2/$5
14.75 oz. cans
BOTTICELLI OLIVE OIL
Botticelli
OLIVE OIL
$9.99
50.7 oz. btl.
BREAKSTONE'S TEMP-TEE WHIPPED CREAM CHEESE
TEMPTEE
$3.99
11.5 oz. cont.
Assorted Varieties
DAISY SOUR CREAM
Daisy
SOUR CREAM
Pure & Natural
Daisy
Light
SOUR CREAM
2/$4
16 oz. conts.
HUNT'S TOMATO KETCHUP
Hunt's
99¢
24 oz. btl.
Assorted Varieties
JIF PEANUT BUTTER
Jif
CREAMY
$2.99
16 oz. cont.

Conduit Bending Instructions (EMT Bender)

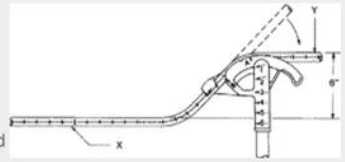
Accurate Stubs

Subract take-up from desired stub height. This gives distance at which to place B on bender from the end of the tube. To make 11", 90° bend with 1/2" tube, allow for 5" for take-up as shown on diagram.
With 3/4" tube, allow 6"
With 1" tube, allow 8"



True Offsets

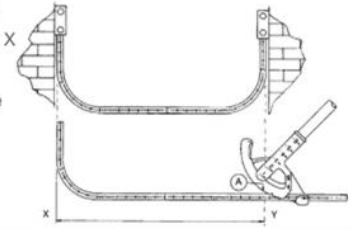
Line up arrow on either side of hook with guideline and make 45° bend in tube. Reverse tube in bender and adjust so that X is lined up with inch-mark on bender corresponding to depth of offset desired. Line up guide-line with opposite arrow and make second 45° bend. A true offset, in the sname plane, will result between X and Y.



Back-to-Back Bends

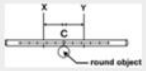
Make stub bend at X with guide-line centered on either arrow located on side of hook. Measure distances from X to Y on tube.

Reverse bender and put A on bender at Y on tube. Line up guide-line with opposite arrow than used when making first stub and make second bend.



Saddle Bends

C -- Center of finished Saddle Bend
X -- Double of the diameter of round object from C
Y -- Double of the diameter of round object from C



Saddle Bend, Step 1

Place tube in bender so that "C" on tube is at notch on bender and make a 45 bend. (A 45 bend is reached when bender handle is at a right angle to the tube.)

Agenda

Introduction

The game of “Good Thing, Bad Thing, Change One Thing”

Some ways to make improvements

Q&A Session

Next steps

Questions for Our Guests?

Agenda

Introduction

The game of “Good Thing, Bad Thing, Change One Thing”

Some ways to make improvements

Q&A Session

Next steps

How you can carry the work forward

- Read the 4H article
- Evaluate Algebra by Example
- Start a math problem notebook/scrapbook
- When evaluating an assignment, try doing “Good Thing, Bad Thing, Change One Thing”
- Find a colleague to trade assignments – offer each other a good thing/bad thing/change one thing

- Tweet or email us before-and-after photos of an assignment – tell us if your changes helped!
- Tweet or email us an assignment, and we’ll suggest a “Good Thing, Bad Thing, Change One Thing”

#MathFixerUpper

Email us at info@studentsachieve.net.

Resource Name	Link
Join Our Network!	www.achievethecore.org/ca-signup
Matthews, On Mindset and Practices for Re-Integrating "Belonging" into Mathematics Instruction	http://www.teachingworks.org/images/files/TeachingWorks_Matthews.pdf
Algebra By Example	https://www.serpinstitute.org/algebra-by-example
Coherence Map	https://achievethecore.org/coherence-map/HS/M/tasks
Widely Applicable Prerequisites for College and Careers	https://achievethecore.org/page/701/widely-applicable-prerequisites-for-college-and-careers
"How I See Addition Facts"	http://static1.squarespace.com/static/54f60ba7e4b0625e8c527330/t/57c79dad03596e87a7a0705a/1472699830328/CMT-Fall+2016k.pdf

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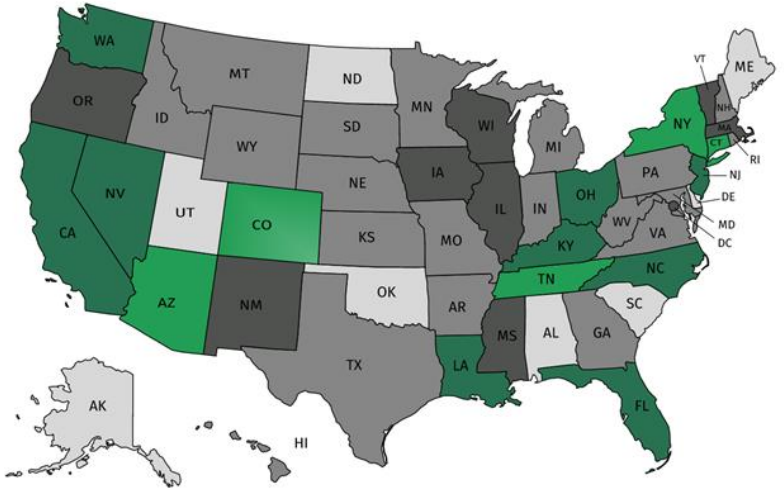

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Thank You!