Equitable Access to the SMPs through Purposeful Number Talk Progressions

NCTM Annual Conference
April 26, 2018

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METROCHICAGO MATHINITIATIVE

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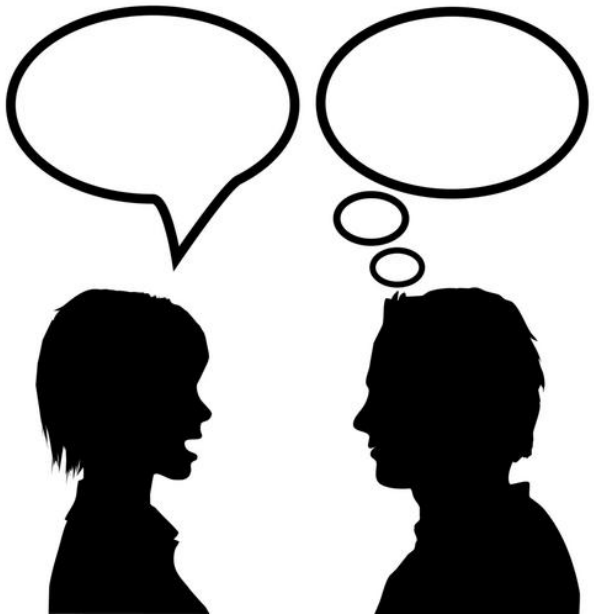
What is Quantitative Reasoning?

1. Think on your own
2. Pair & Share with a neighbor



What is Quantitative Reasoning?

"Quantitative reasoning entails habits of…considering the units involved; attending to the meaning of quantities, not just how to compute them…"

CCSS-M, SMP 2

"QR is the application of basic mathematics skills, such as algebra, to the analysis and interpretation of real-world quantitative information…it is not just mathematics."

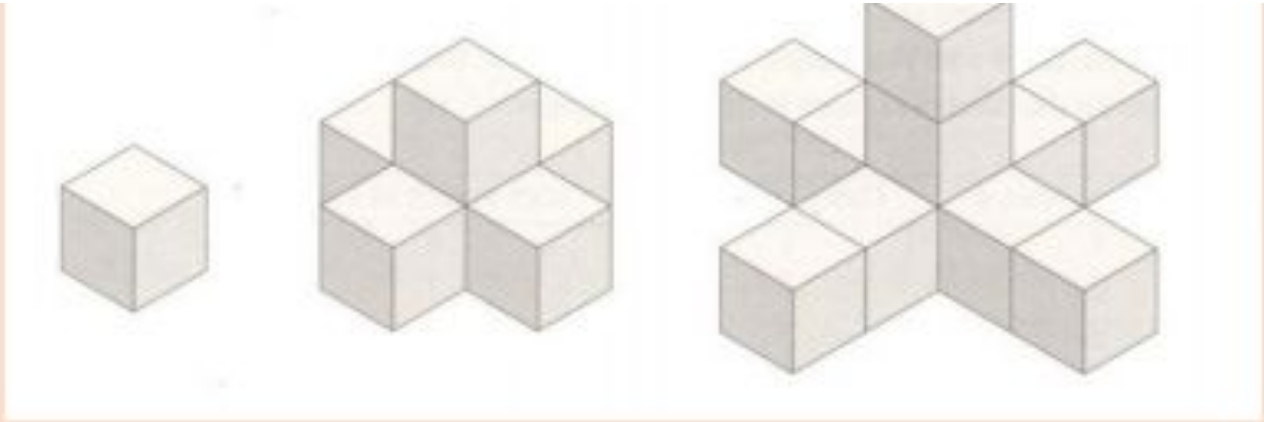
-Mathematics Association of America

"Quantitative reasoning is a way to describe the mental actions of a student who conceives of a mathematical situation, constructs quantities in that situation, and then relates, manipulates, and uses those quantities to make a problem situation coherent."

-Weber, et.al. (2014)

Counting Cubes Task

How does this task promote quantitative reasoning?



Counting Cubes Task

Be honest. How many of you generated an expression or equation for this task?

Did we ask you to?

QR in Action - Counting Cubes

What is Equity in Mathematics?

All students, regardless of their personal characteristics, backgrounds, or physical challenges, must have opportunities to study - and support to learn - mathematics. This does not mean that every student should be treated the same. But all students need access each year they are in school to a coherent, challenging mathematics curriculum that is taught by competent and well-supported mathematics teachers.

-*Principles and Standards for School Mathematics* (NCTM, 2000)

Anne's Number Talk Journey

This is cool!

SMP 1: Make sense of problems and persevere in solving them.
SMP 3: Construct viable arguments and critique the reasoning of others.

Anne's Number Talk Journey

This is cool,

and there are opportunities for stacking the deck!

SMP 1: Make sense of problems and persevere in solving them.
SMP 3: Construct viable arguments and critique the reasoning of others.

SMP 2: Reason abstractly and quantitatively.
SMP 6: Attend to precision.

Anne's Number Talk Journey

This is cool,

and there are opportunities for stacking the deck,

and I should really plan some longer chunks of these to make it stick!

SMP 1: Make sense of problems and persevere in solving them.
SMP 3: Construct viable arguments and critique the reasoning of others.

SMP 2: Reason abstractly and quantitatively.
SMP 6: Attend to precision.

SMP 7: Look for and make use of structure.
SMP 8: Look for and express regularity in repeated reasoning.

F. (Skip) Fennell
@SkipFennell

Follow

Students with number sense know WHEN! When to compute, When to use mental math, When to estimate, When to use data sources to inform, When they must work quickly, and When they should take their time. The intersection of experience, opportunity, AND, confidence gets them to WHEN.

10:42 AM - 20 Feb 2018

26 Retweets **54** Likes

26 54

Number Talk Progressions

- 3-5 related prompts
- Designed around a big idea or goal
- Structured to encourage reasoning & pattern sniffing
- “Ramped” to build toward the focus expectation

Look for these characteristics as we experience a few sample progressions. Can you identify these elements & our goals?

Sample Progression - Prompt 1

Would you rather have….

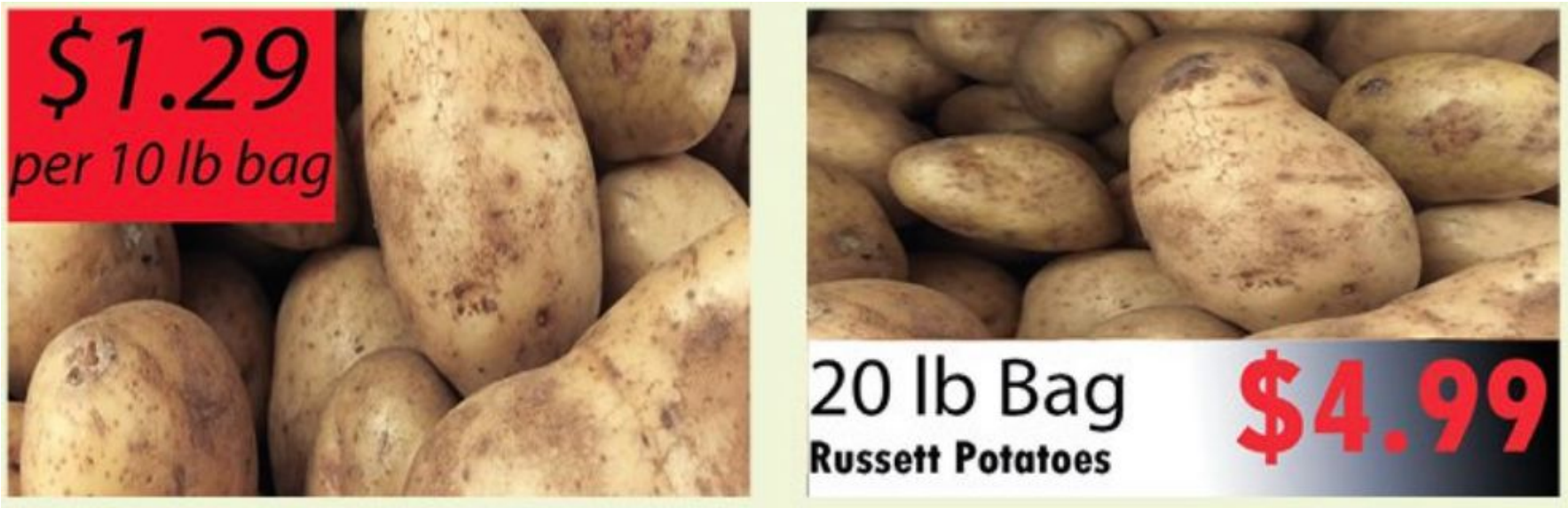
Pennies to match your weight

Quarters to match your height

Source: http://www.wouldyourathermath.com/height_weight/

Sample Progression - Prompt 2

Which is the better deal for potatoes?



Source: de la Cruz, Garney, *MTMS* 2016

Sample Progression - Prompt 3

Mrs. Leimberer wants to buy oranges to pack in her daughters' lunches. She sees the ads below in the newspaper.

Stanley's Produce Market	Franklin's Fresh Fruit
Fresh oranges on sale! 10 for $2.00 	Delicious oranges for you! 8 for $1.75 

Where should Mrs. Leimberer buy her oranges?

Sample Progression - Prompt 4

Convince me that...

cereal box B is the better buy.

A

$3.79 ea.

Rice Krispies Cereal, Toasted Rice (12 oz)

B

$4.29 ea.

Rice Krispies Cereal, Toasted Rice (18 oz)

Source: https://tinyurl.com/ConvinceMeThat

Sample Progression - Prompt 5

Source: http://www.wouldyourathermath.com/would-you-rather-44/

Sample Progression - Debrief

- Turn and talk to a neighbor:
  - What do you think the goal was of this progression?
  - What big idea(s) came up for you as you were thinking about the prompts?
  - Did you see evidence of “ramping” (building from one task to the next in a purposeful way)?

MTP Jigsaw

At your tables, you are receiving Jigsaw Progression #1, 2, or 3.

Your job is to become an expert on that progression:

- Read through the prompts one at a time
- Discuss as a group what the big idea might be and how it is building across prompts

MTP Jigsaw - Table Mixup

Share your learning! We will take 12 minutes to:

- ❏ Take turns talking through the progression for which you became an expert
- ❏ Think back to our MTP characteristics:
  What's the big idea?
  Is there evidence of ramping?
  How might students sniff out patterns/relationships?

It's Your Turn!

Think about a topic you would like to design a math talk progression for.

Work together - these are born from discussion!

Call to Action

Take a moment to think about a takeaway from today's session that you will implement when you go back to work next week.

Jot it on a post-it. (We will collect on your way out today!)

Make eye contact with someone from another table and go share your call to action with them!

Parting Words

“The purpose of computation is *insight*, not numbers.”
-Richard Hamming

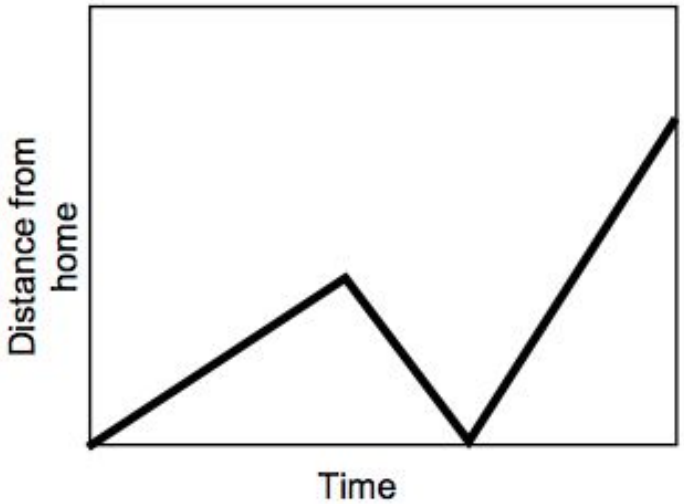
Thank you for your participation today! Keep in touch!
@anneagost @jleimberer1 #MathTalkProgs

You can find more of our MTPs at:
https://tinyurl.com/MathTalkProgs

Jigsaw Progressions

Jigsaw Progression #1 - Prompt 1

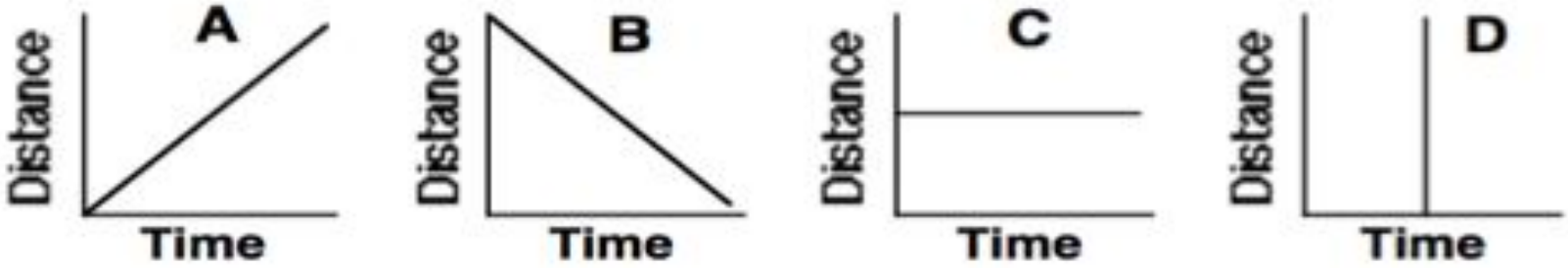
What do you notice/wonder about this graph?



Tell a story that would fit the graph.

Jigsaw Progression #1 - Prompt 2

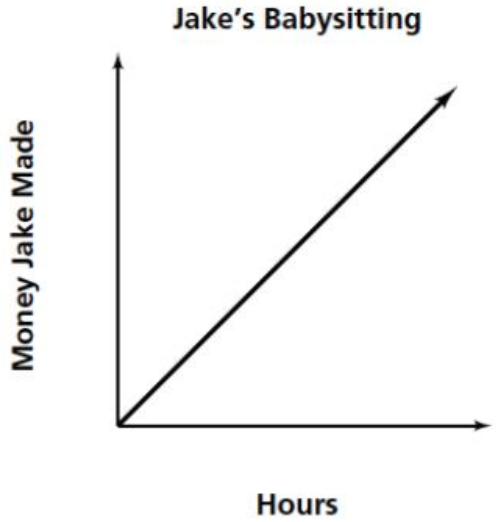
These graphs show the distances traveled from home.



1. Which graph shows the fastest travel time?
2. Which graph shows the car is not moving?
3. Which graph is impossible?

Jigsaw Progression #1 - Prompt 3

What's the story here? Put a scale on each axis and explain why they are reasonable.



Jigsaw Progression #1 - Prompt 4

Which line represents y = $5.25x and which line represents y = $8.50x?

How do you know?

What would a line look like for earnings at $12.75 per hour?

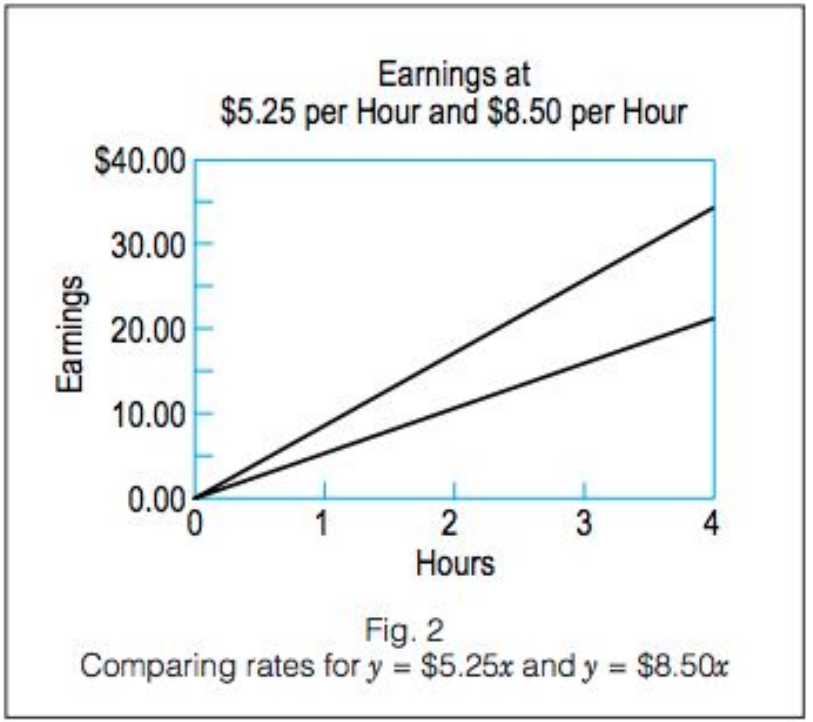
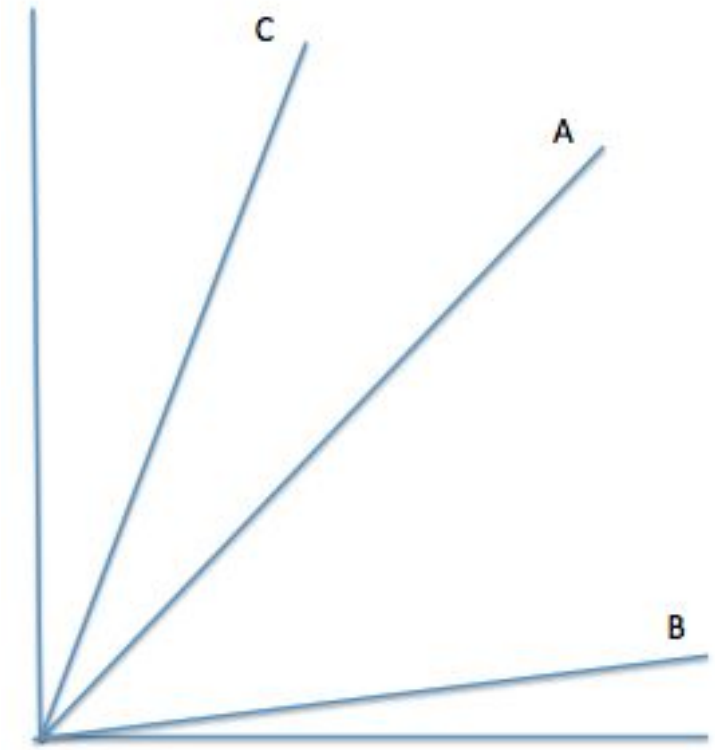


Fig. 2
Comparing rates for $y = \$5.25x$ and $y = \$8.50x$

Jigsaw Progression #1 - Prompt 5

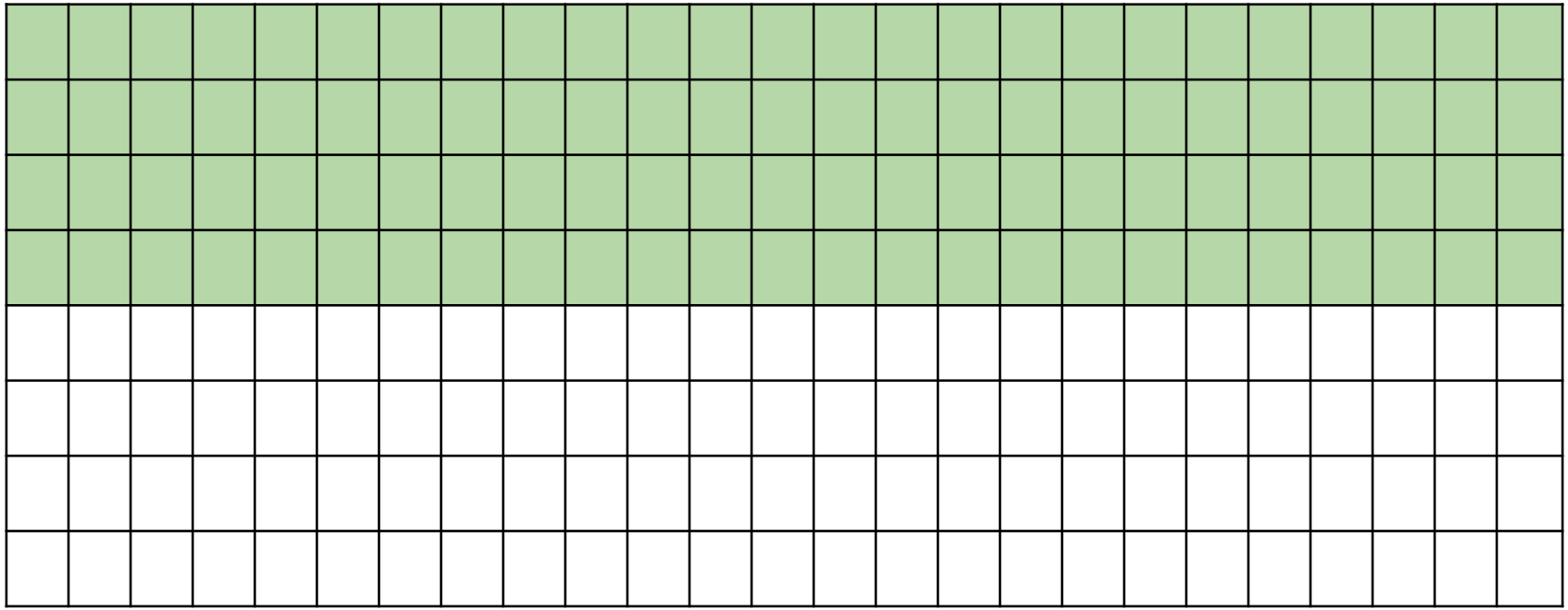


If the slope of line A is 1, what is the slope of B?

What is the slope of line C?

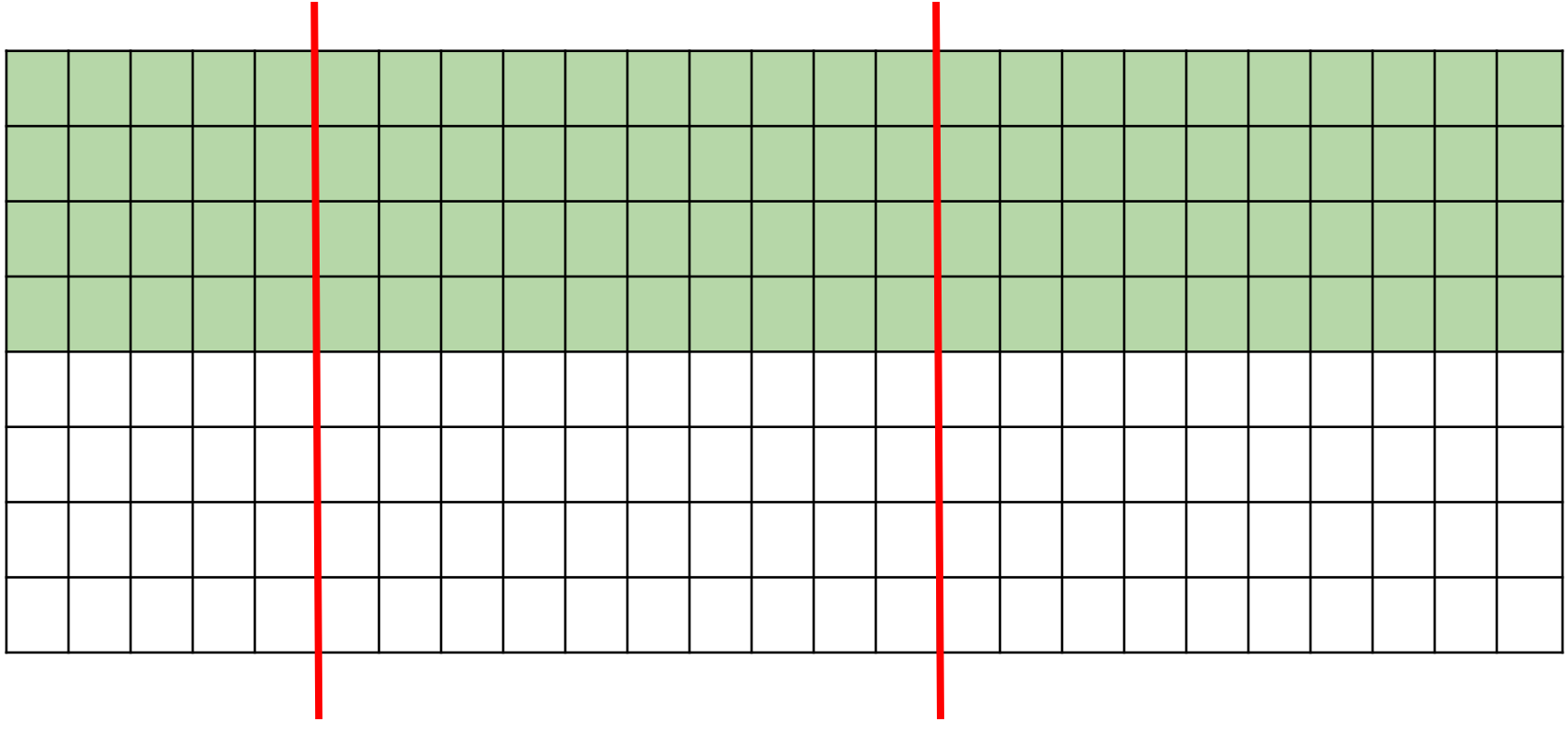
Jigsaw Progression #2 - Prompt 1a

How many squares are in the rectangle?



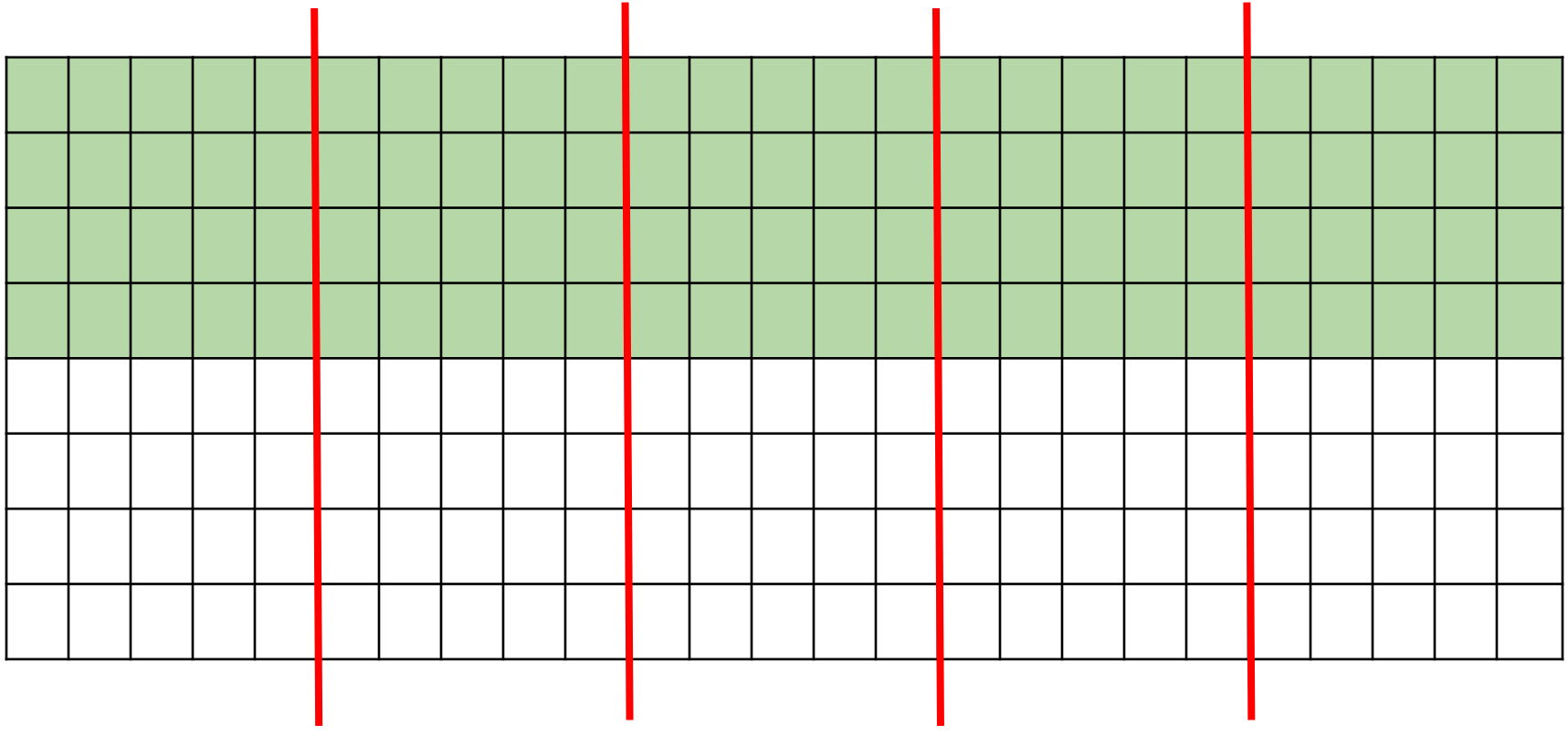
Jigsaw Progression #2 - Prompt 1b

How many squares are in the rectangle?



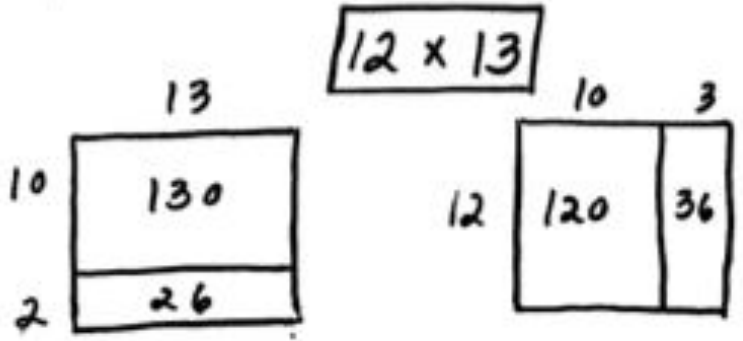
Jigsaw Progression #2 - Prompt 1c

How many squares are in the rectangle?



Jigsaw Progression #2 - Prompt 2

Which represent 12 x 13?



$(12 \times 10) + (12 \times 3)$ $(10 \times 13) + (2 \times 13)$

$(10 \times 10) + (2 \times 3)$

12
x 13
100
20
30
6
156

10 3
10 100 30
2 20 6
10 groups of 12 and 3 groups of 12

12
x13
100
+ 36
136

Jigsaw Progression #2 - Prompt 3

15 x 2 =

15 x 4 =

15 x 6 =

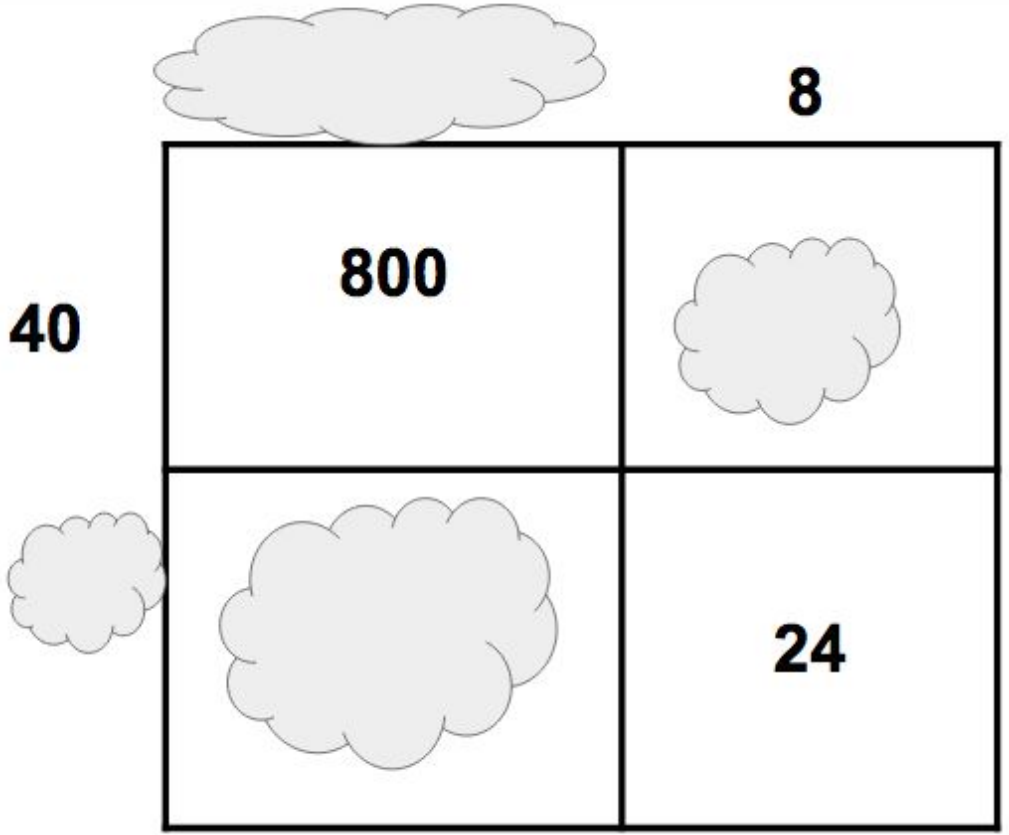
10 x 6 + 5 x 6 =

15 x 10 - 15 x 4 =

Jigsaw Progression #2 - Prompt 4

What relationships do you see?

What values belong in the clouds?



Jigsaw Progression #2 - Prompt 5

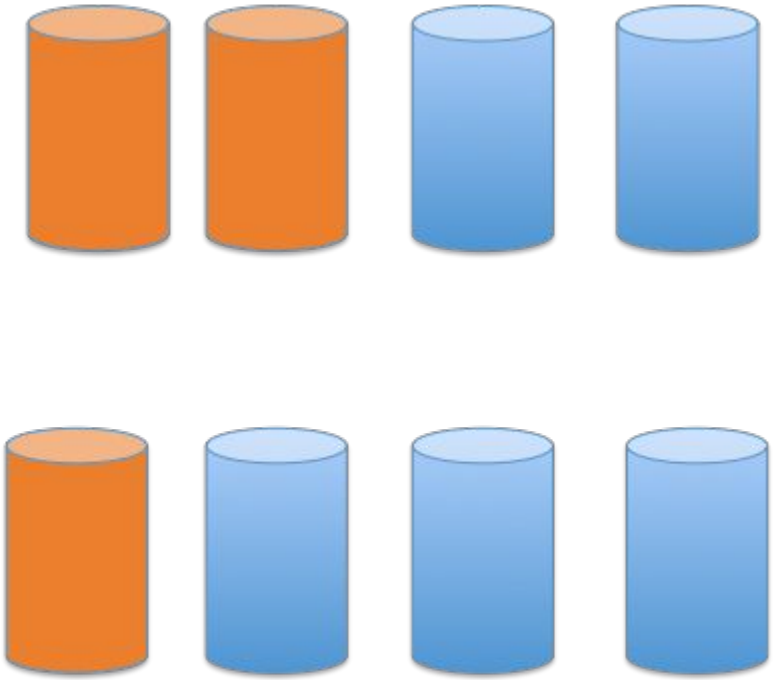
14 x 18

Jigsaw Progression #3 - Prompt 0

The orange represents one part juice. The blue represents one part water.

Jigsaw Progression #3 - Prompt 1

Which recipe is “orangier?”



Jigsaw Progression #3 - Prompt 2

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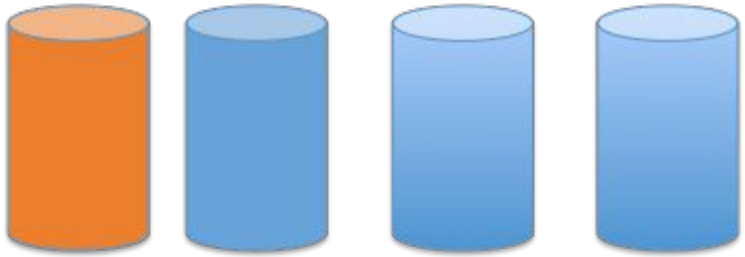

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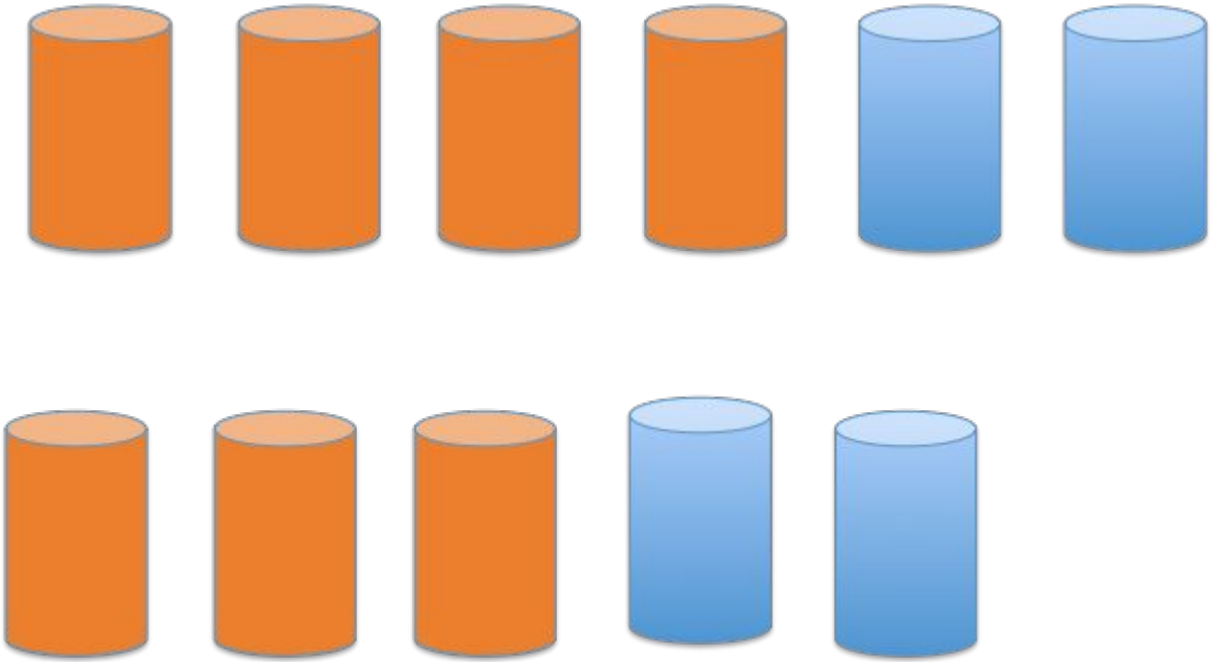
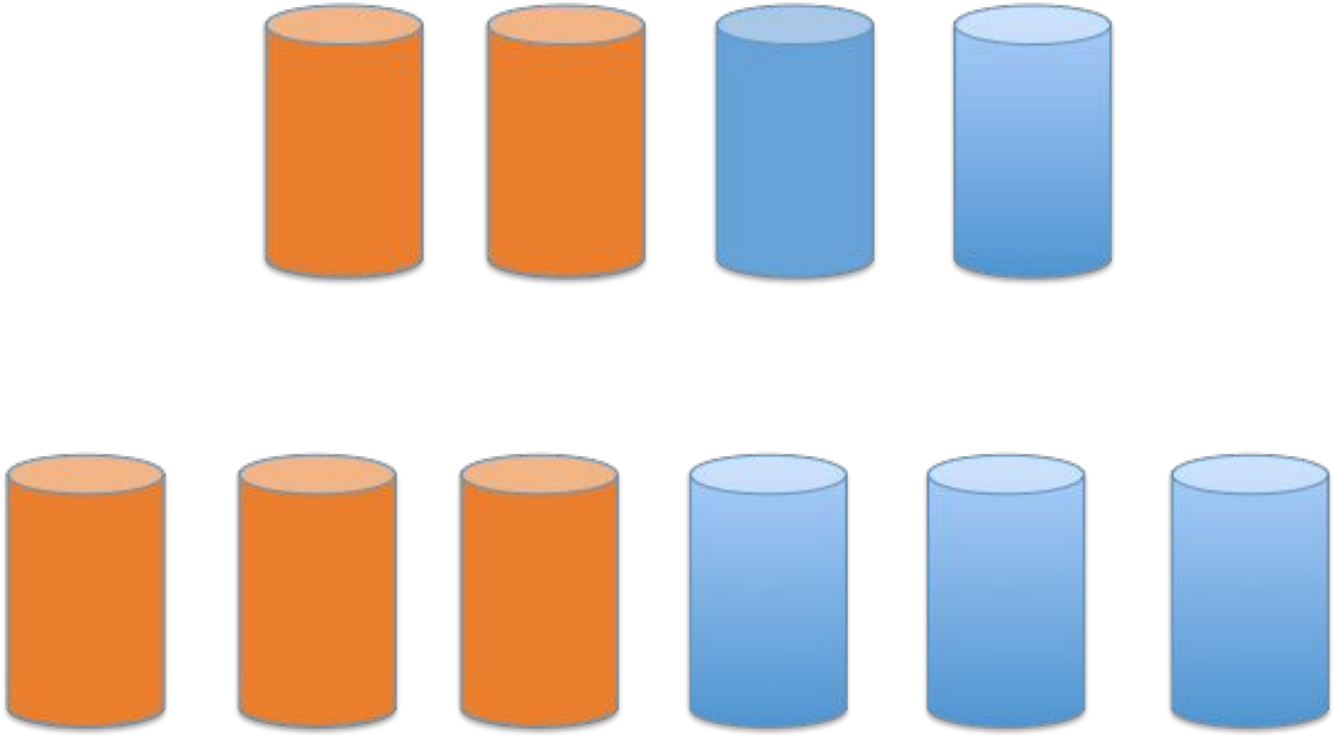


Jigsaw Progression #3 - Prompt 4

Which recipe is “orangier?”



Jigsaw Progression #3 - Prompt 5

Which recipe is “orangier?”