

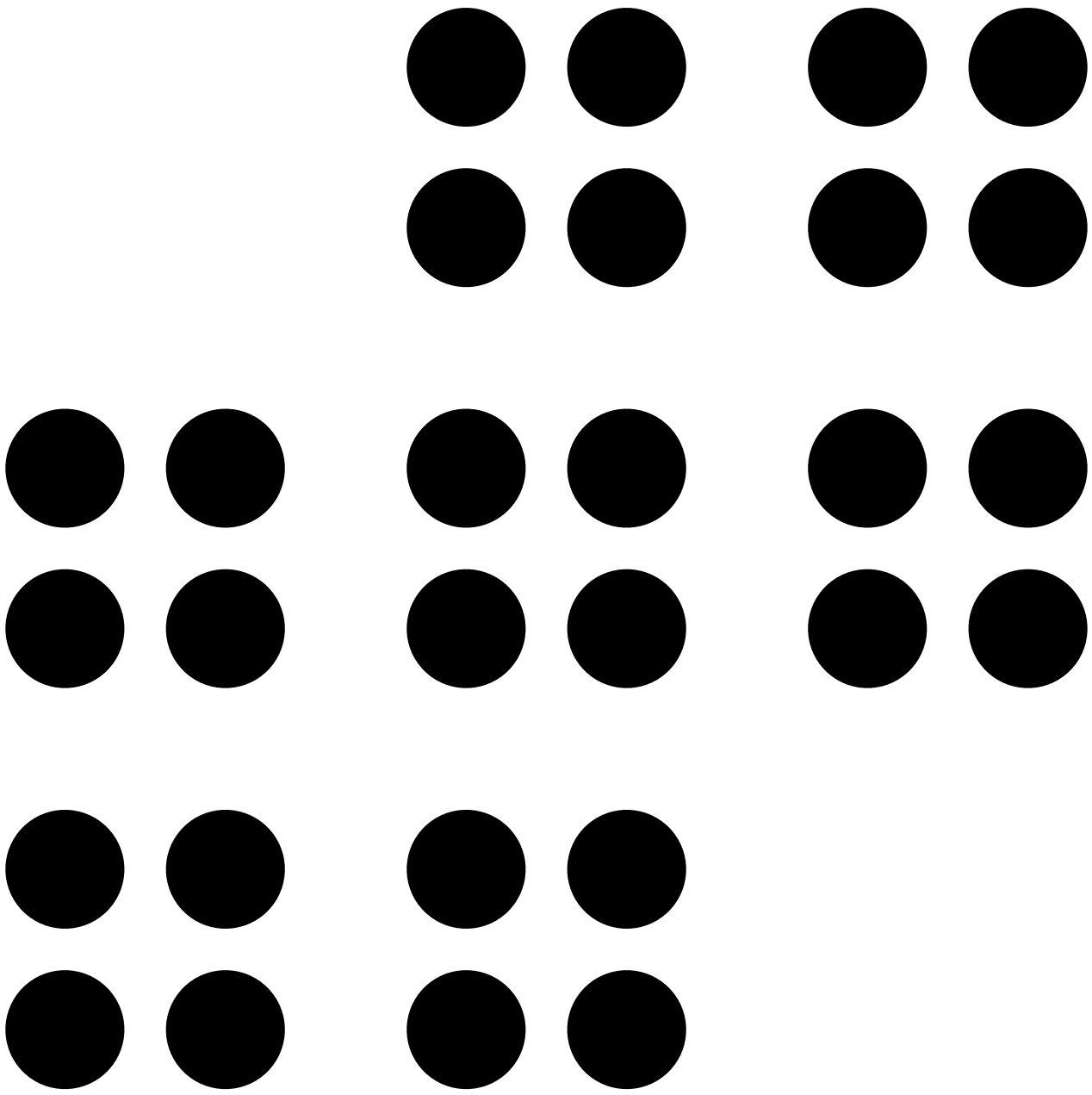
Operations Across the Grades

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K-12 Numeracy Helping Teacher • Surrey, BC, Canada

reflectionsinthewhy.wordpress.com/nwmc2017

2017 Northwest Mathematics Conference • Portland, OR





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"The operations of addition, subtraction, multiplication, and division hold the same fundamental meanings no matter the domain in which they are applied."

–Marian Small

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of Italy*

STARTING AT
\$1299

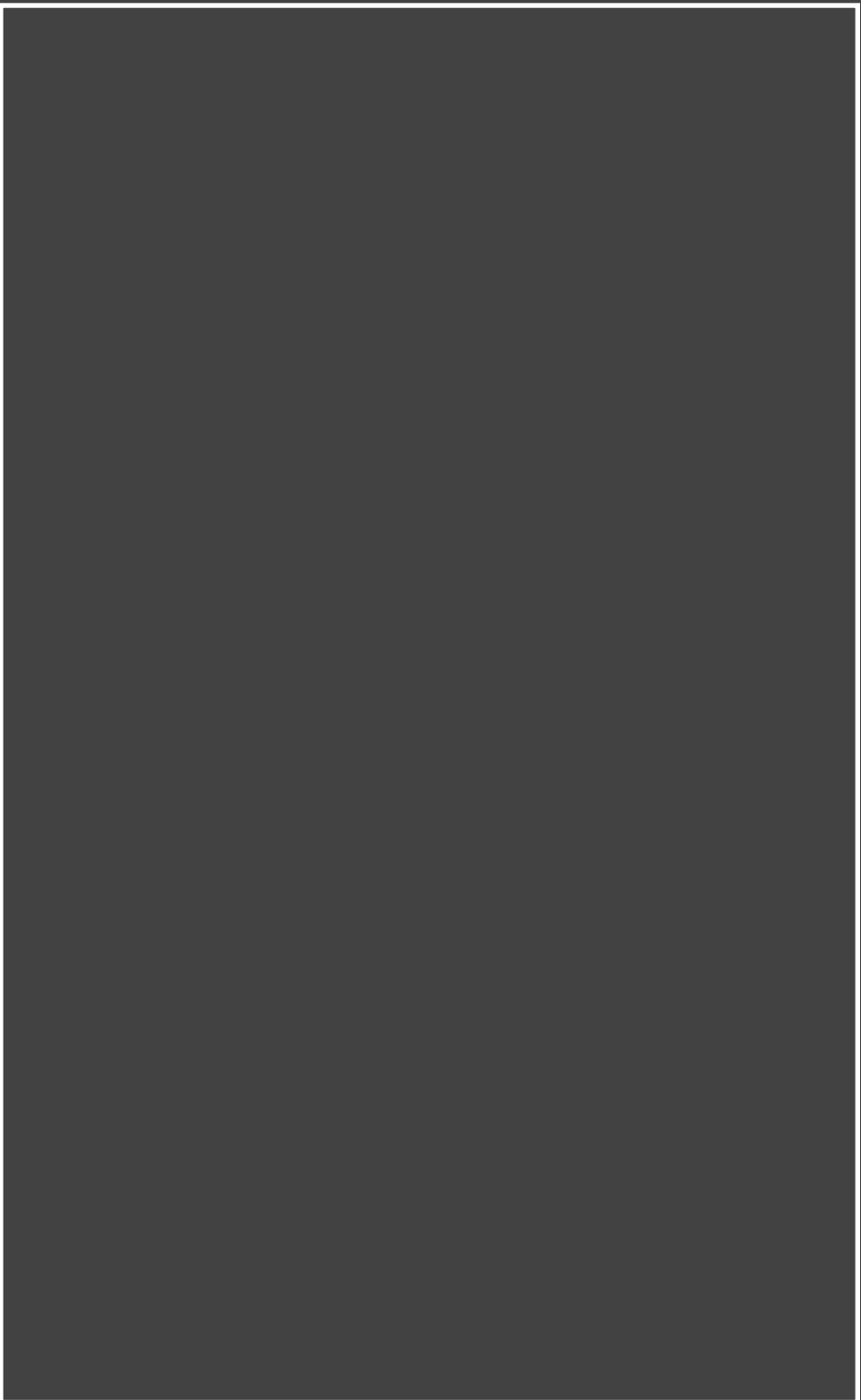


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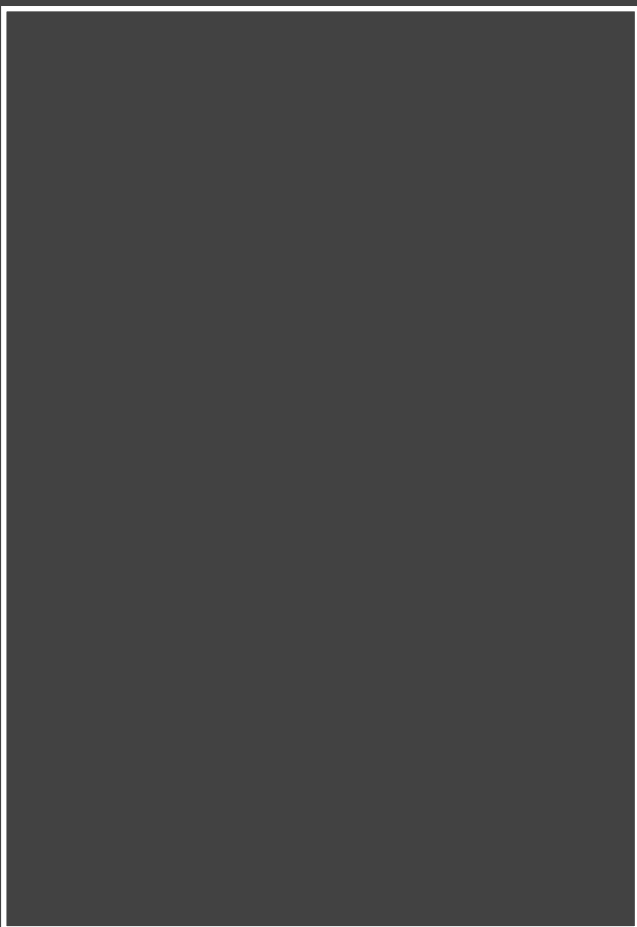
23

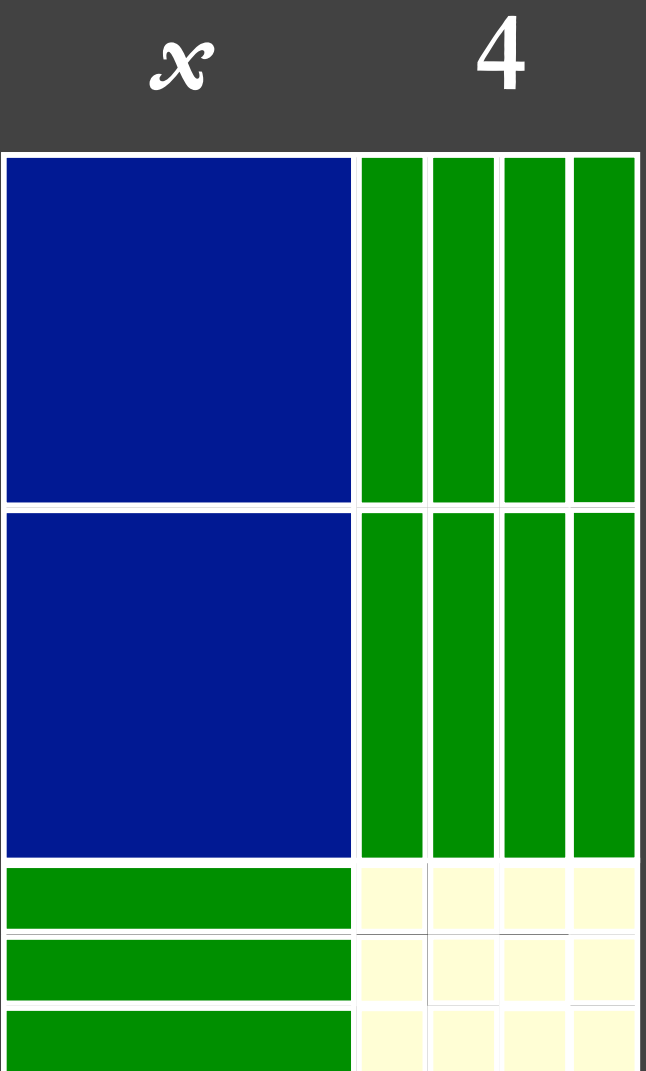
14



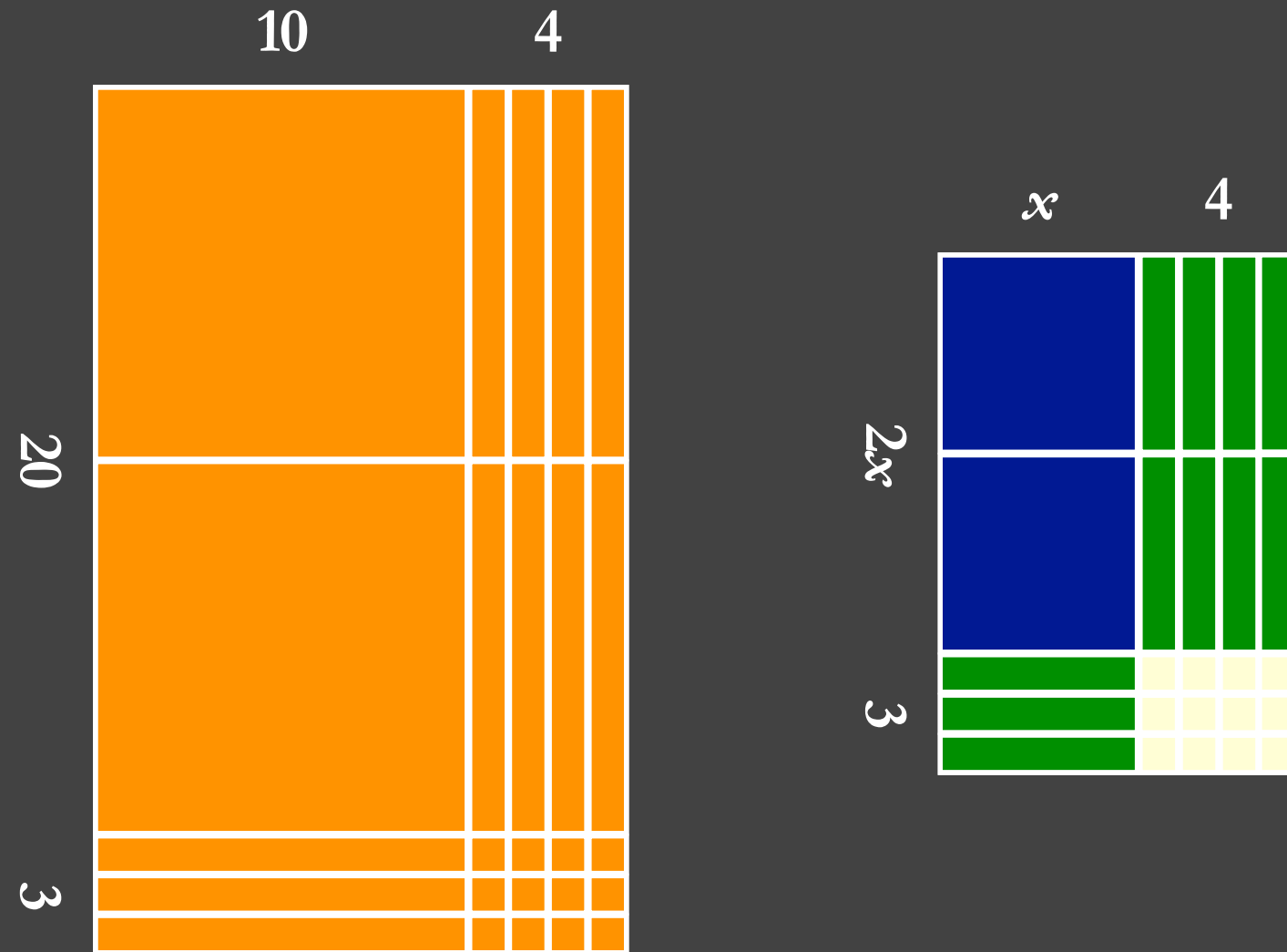
$2x + 3$

$x + 4$



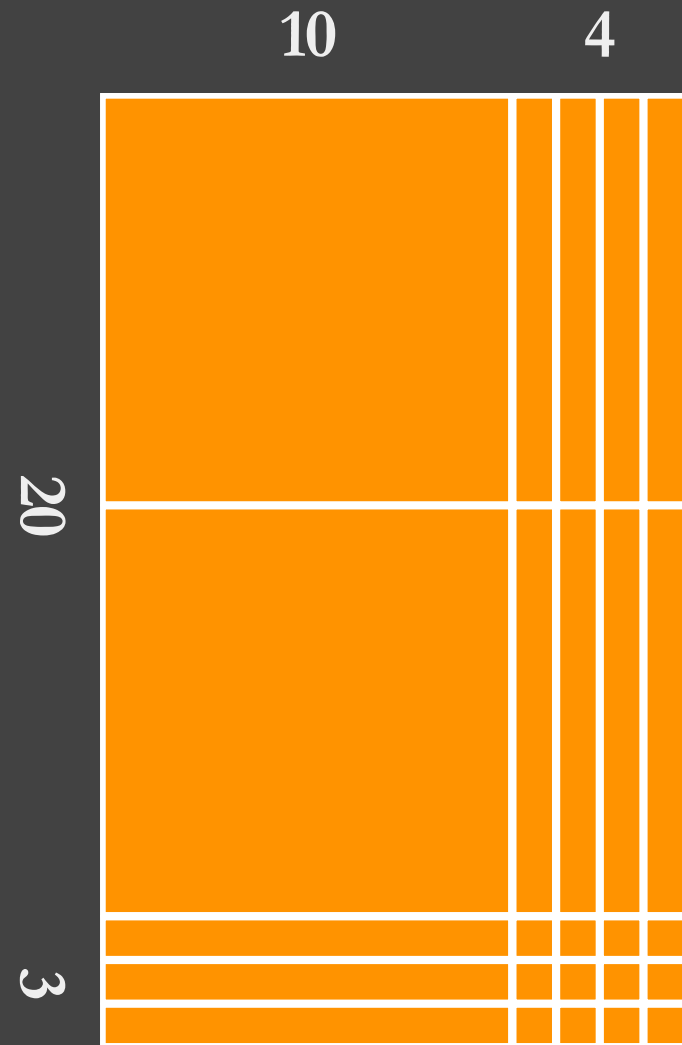


How are they the same? different?

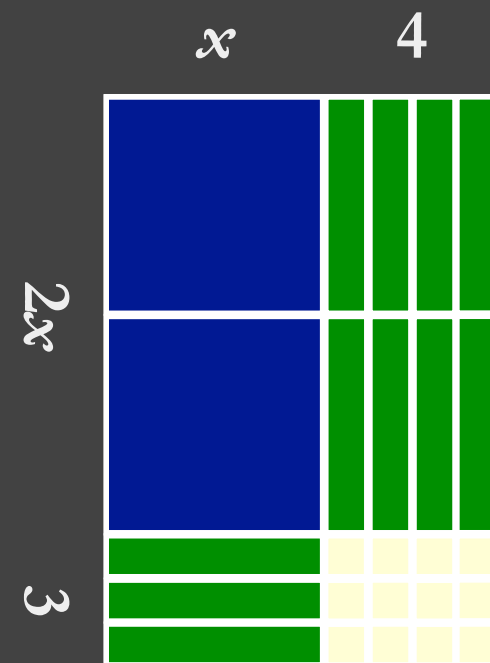


Make as many connections as you can, both conceptually and procedurally.

How are they the same? different?



$$20 \times 14 \\ = 2(10)^2 + 11(10) + 12$$



$$(2x + 3)(x + 4) \\ = 2x^2 + 11x + 12$$

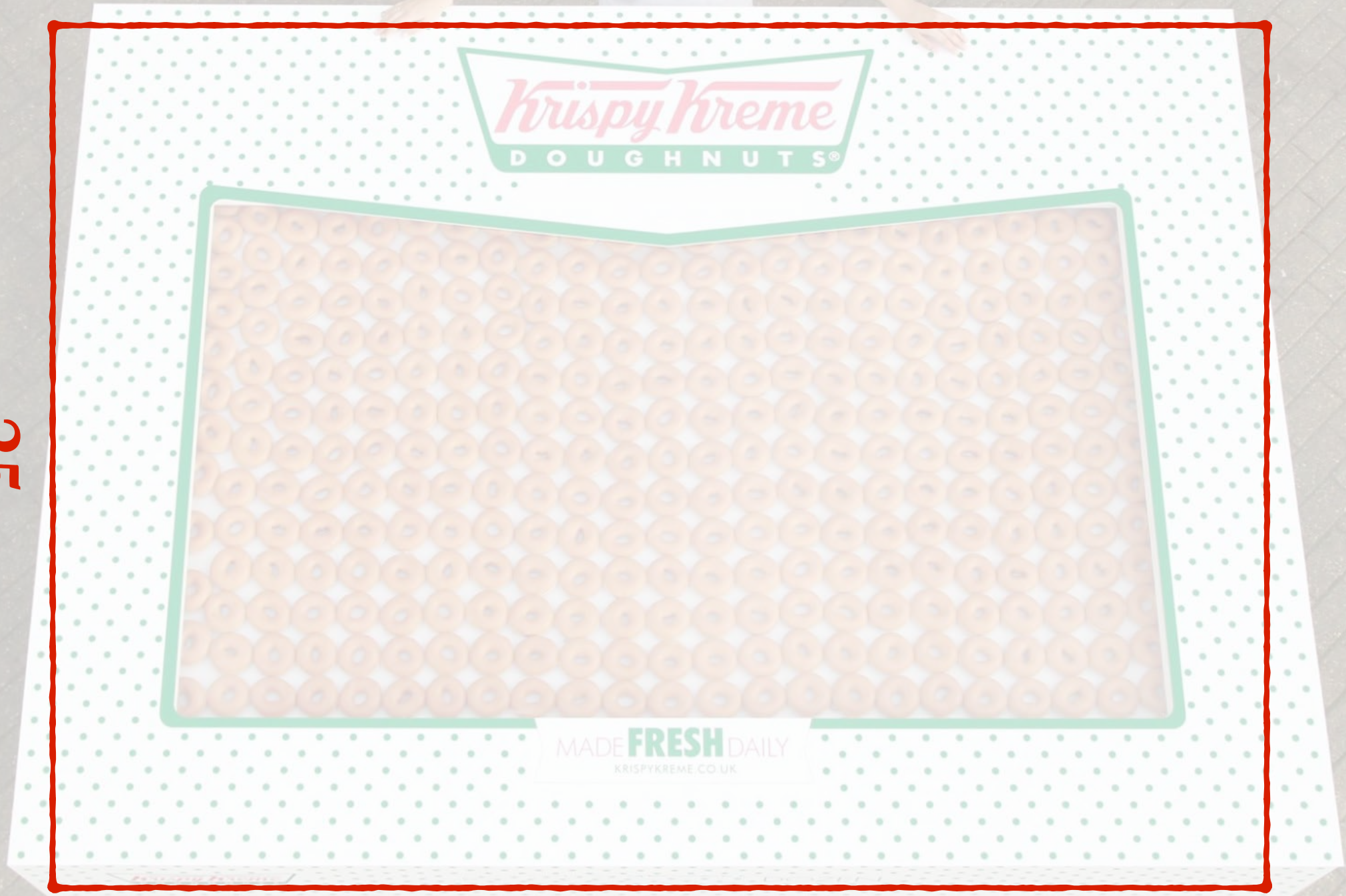
@gfletchy



@gfletchy

32

25



@gfletchy

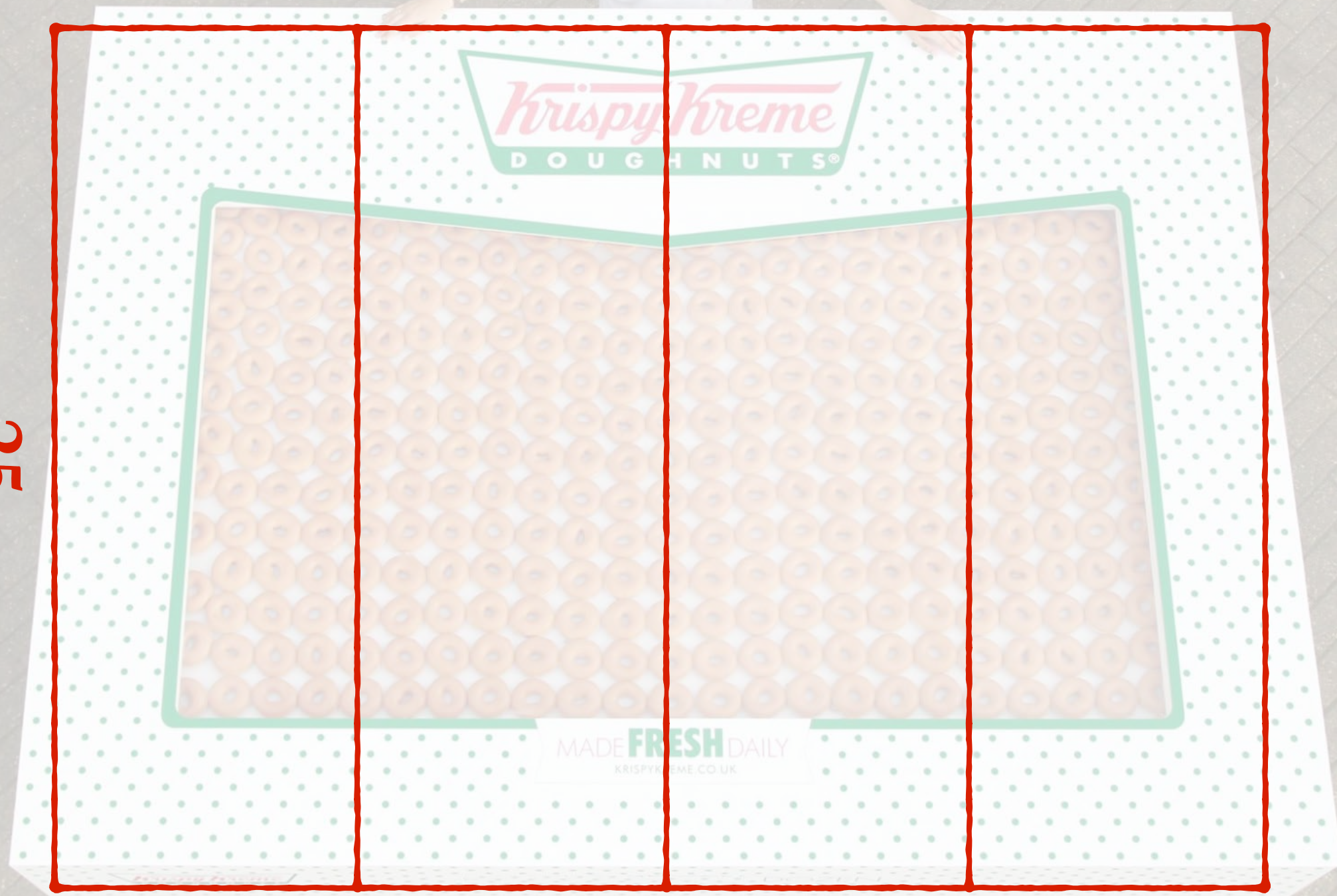
8

8

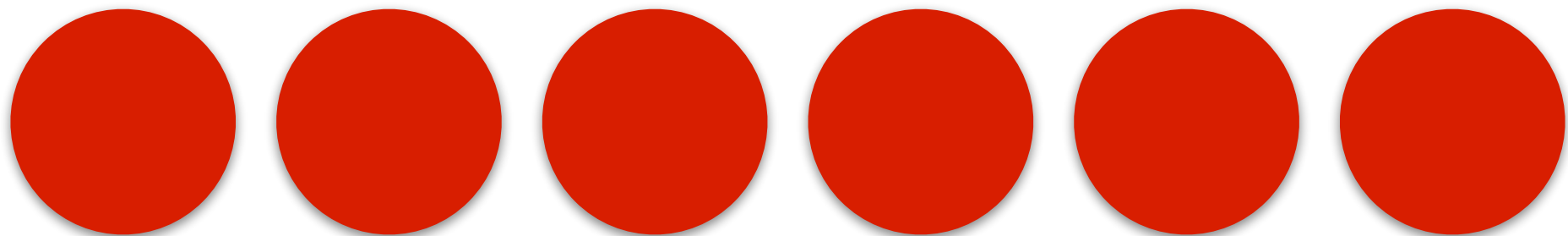
8

8

25

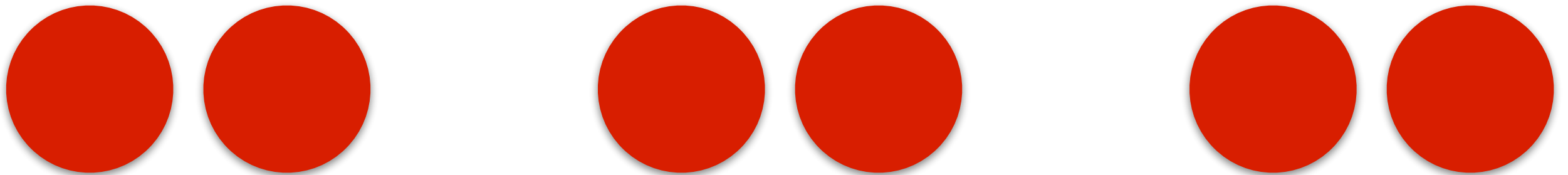


Division: $6 \div 3$



Division: $6 \div 3$

The number of groups is known.
How many in each group?



partitive (sharing)

Division: $6 \div 3$

The number in each group is known.
How many groups?



quotative (measurement)

"The operations of addition, subtraction, multiplication, and **division hold the same fundamental meanings no matter the domain in which they are applied."**

–Marian Small

Alike & Different

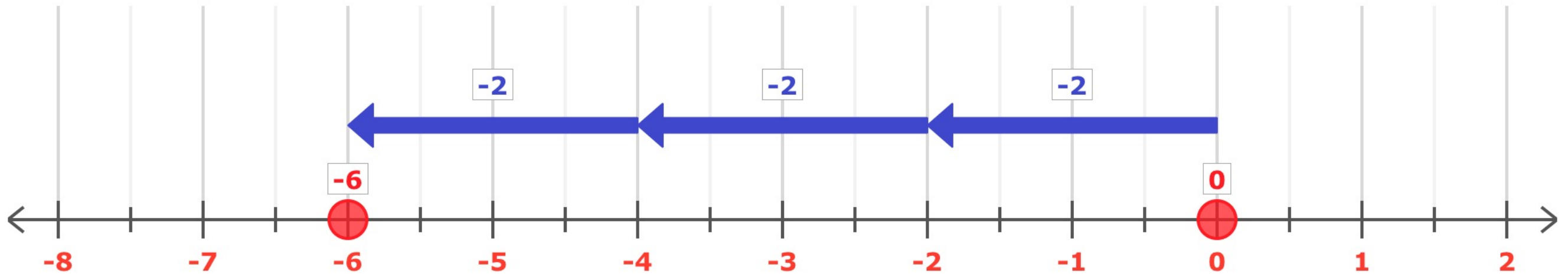
Which two expressions are most alike?

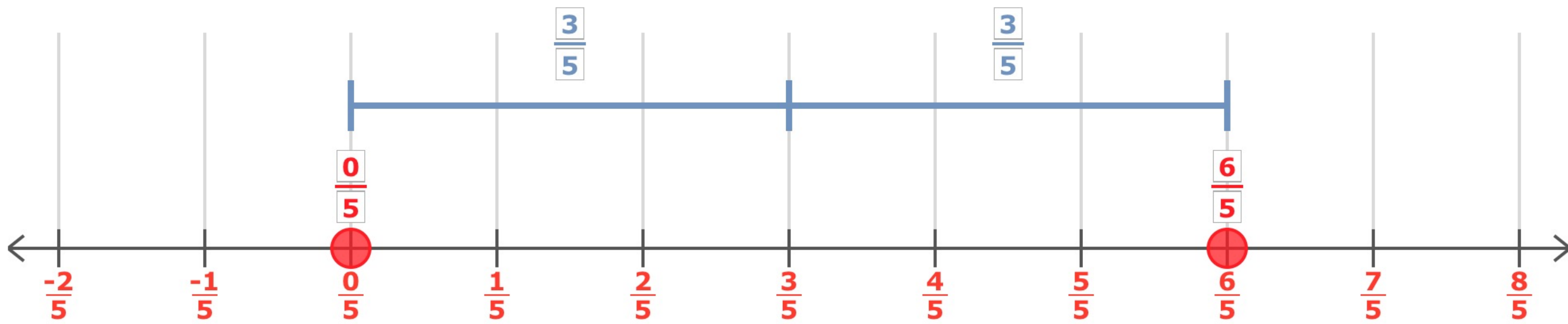
$$60 \div 3, 6 \div 0.3, 0.6 \div 3$$

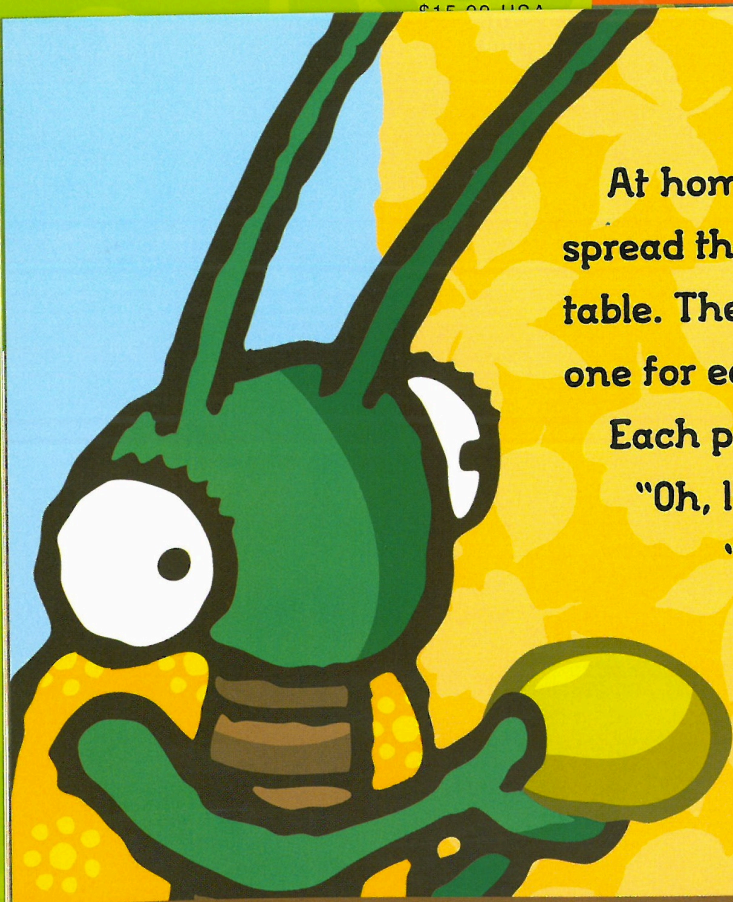
$$600 \div 300, 6/5 \div 3, 6/5 \div 3/5$$

$$(-6) \div (+3), (-6) \div (-3), 6x \div 3x$$

Why?







At home, Ralph and Flora spread the beans out on the table. They made two piles, one for each of them.

Each pile had six beans.

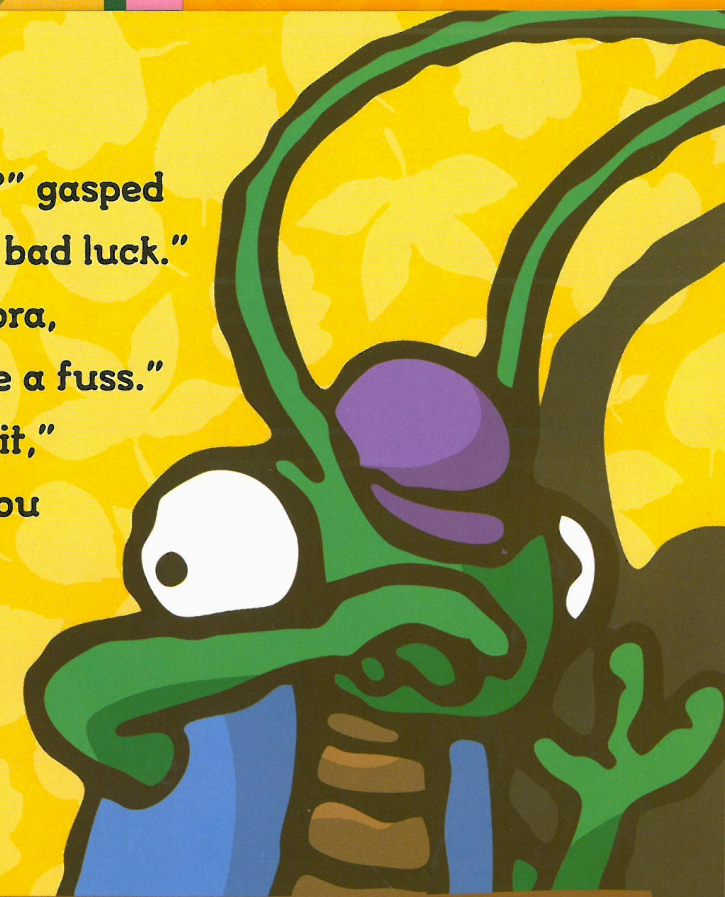
"Oh, look," said Flora,
"there's one left over.
You take it, Ralph."



"Bean thirteen?" gasped Ralph. "Never! It's bad luck."

"Ralph," said Flora,
"please don't make a fuss."

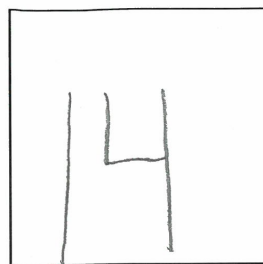
"I'm not eating it,"
said Ralph, "and you
can't make me."



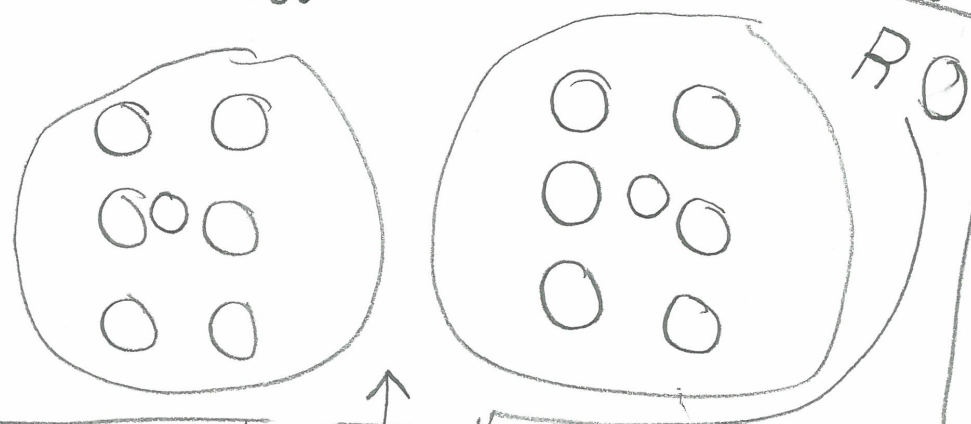
Frist we are starting with 2 groups and 7 beans.

/maan, Inesha
BEAN

Now we have 4 group and



Now we have 3 groups and 3 beans.



R0

3 beans.



R2

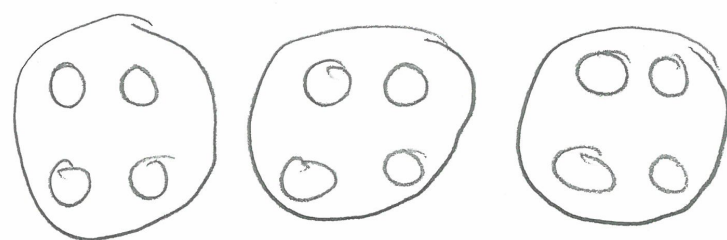


R2

$$14 \div 2 = 7$$

$$14 \div 4 = 3$$

$$14 \div 3 = 4$$

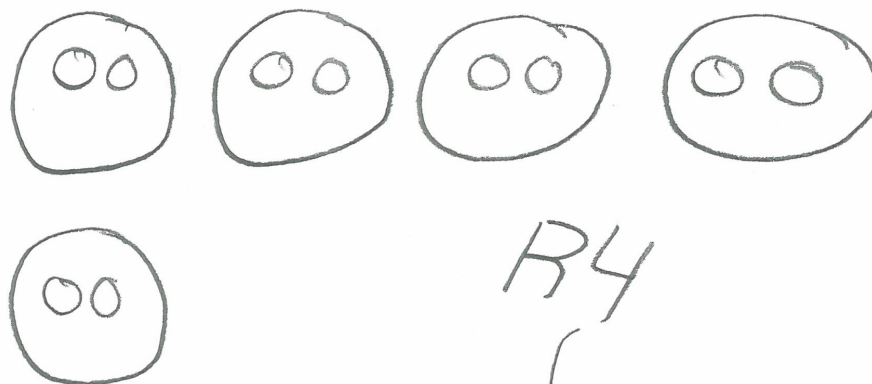


R2

Now we have 3 groups and 4 beans.

$$14 \div 3 = 4$$

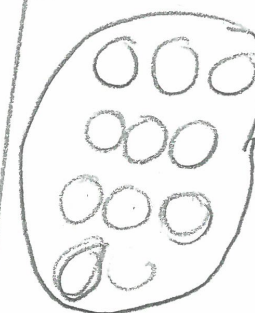
Now we have 5 group 2 beans.



R4

$$14 \div 5 = 2$$

Now we have 1 group of 10's.



R4



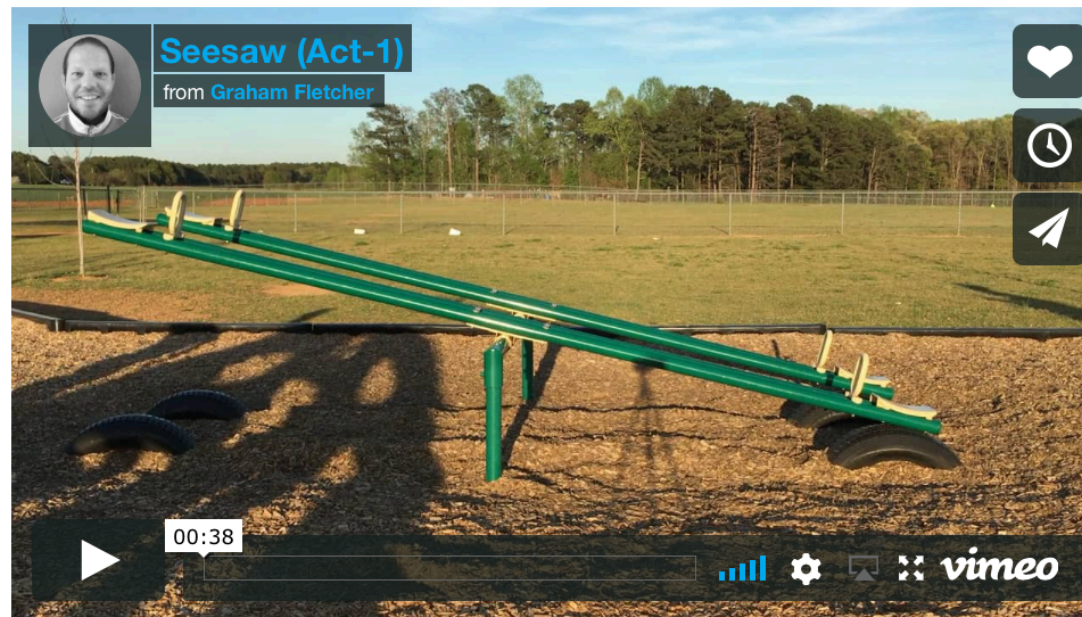
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Seesaw

standard:

Act 1

Watch the video:



What do you notice? What do you wonder?

- How many bricks will it take balance out the seesaw? Estimate.
- Write an estimate you know is too high. Write an estimate you know is too low.

Act 2

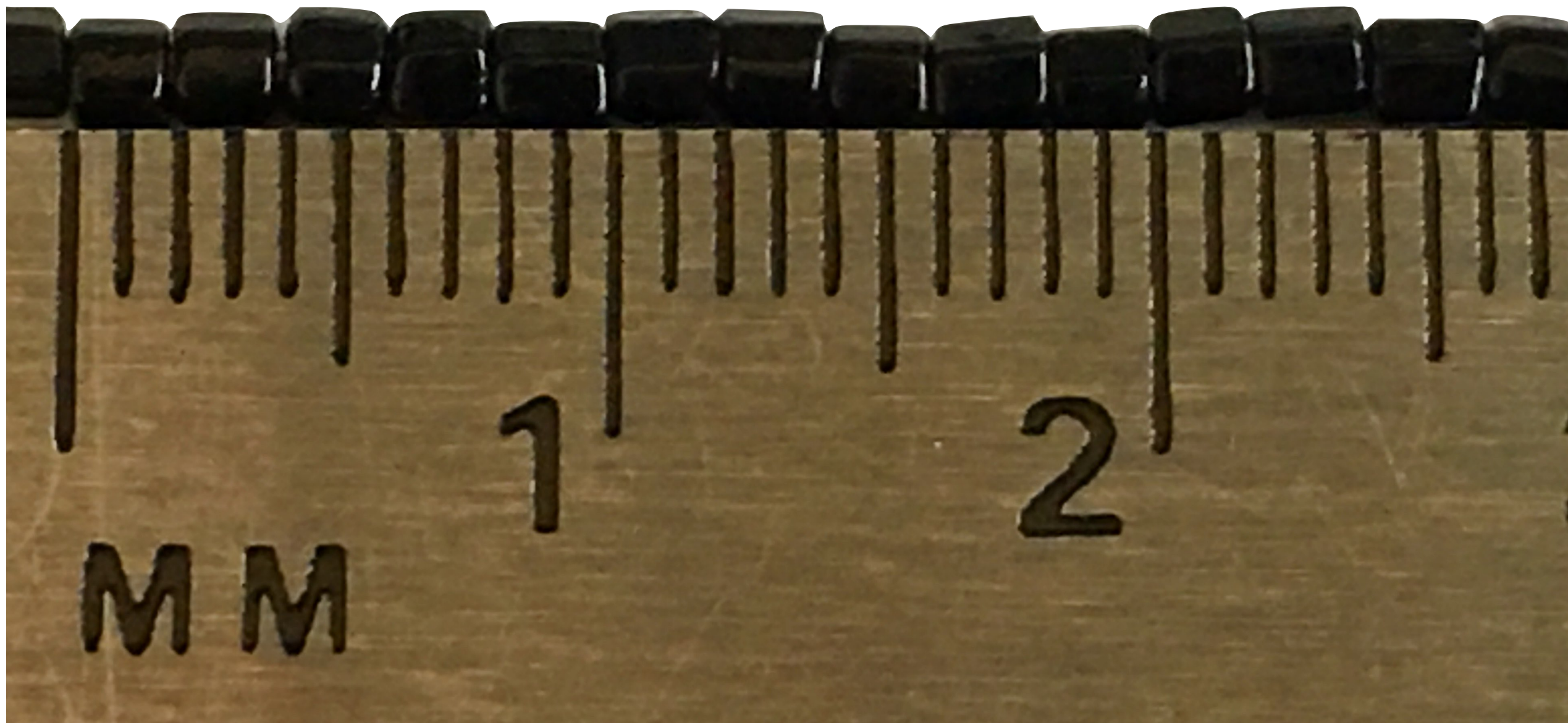
Weight of a Brick



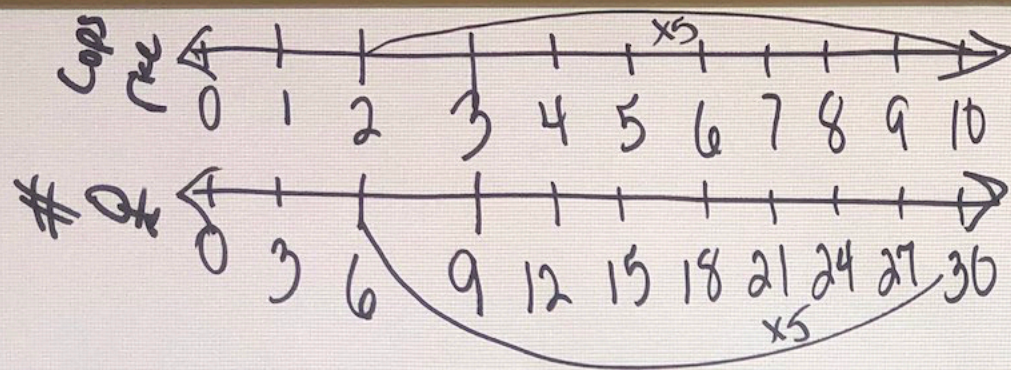


12.8 cm

4.4 cm

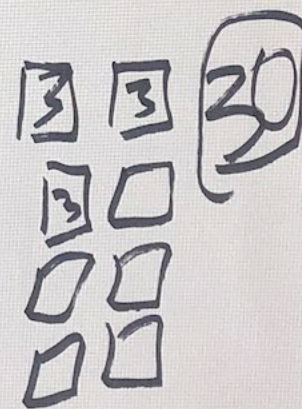
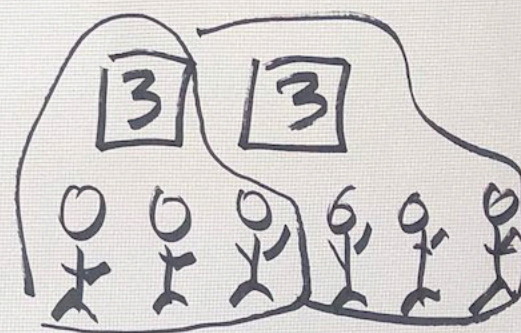


Marc Garneau (@314Piman)



$$\frac{3 \text{ people}}{1 \text{ cup}} \times \frac{10}{10} = \frac{30}{10}$$

$$\frac{6 \text{ people}}{2 \text{ cups}} \div \frac{2}{2} = \frac{3 \text{ people}}{1 \text{ cup}}$$



| C | # of people |
|----|-------------|
| 2 | 6 |
| 3 | 9 |
| 1 | 3 |
| 10 | 30 |
| 15 | 45 |

| cups of rice | number of people |
|--------------|------------------|
| 2 | 6 |
| 3 | 9 |
| 10 | 30 |
| | 45 |

Subtraction: 5 – 2

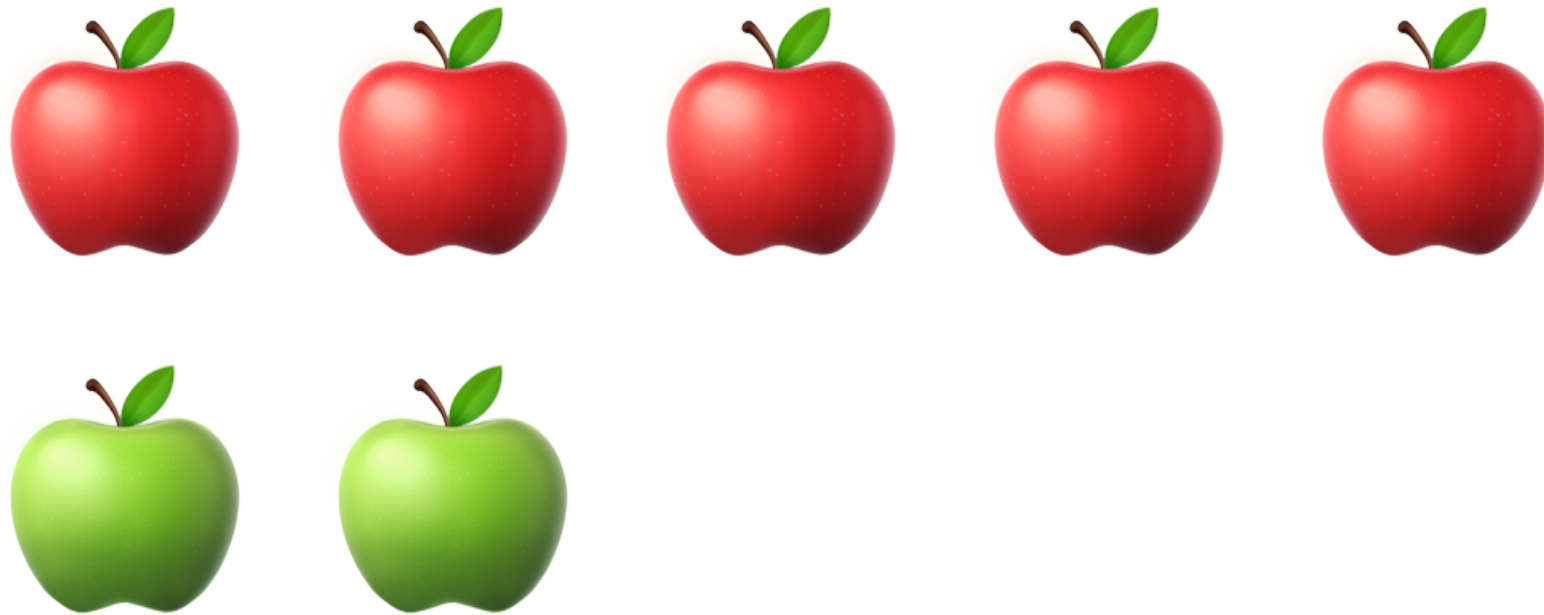
take away



removal

Subtraction: 5 – 2

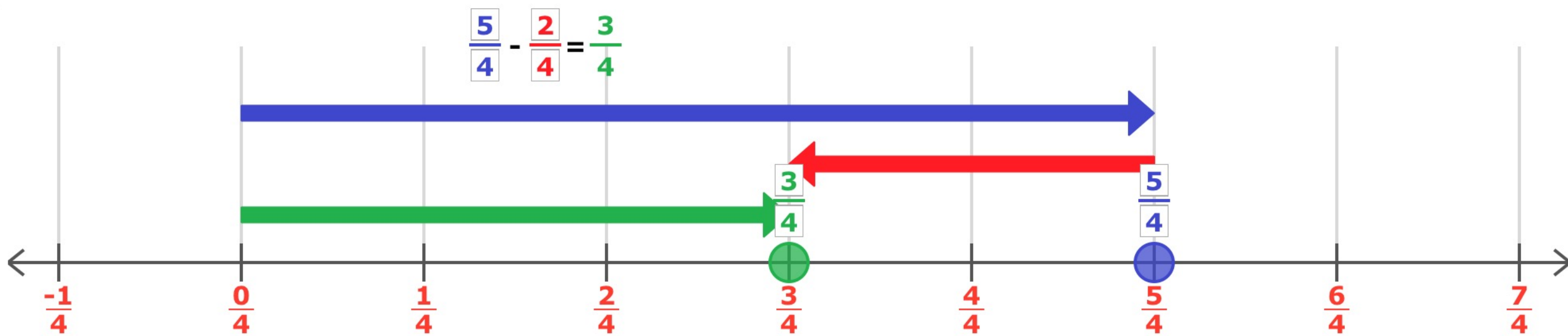
difference

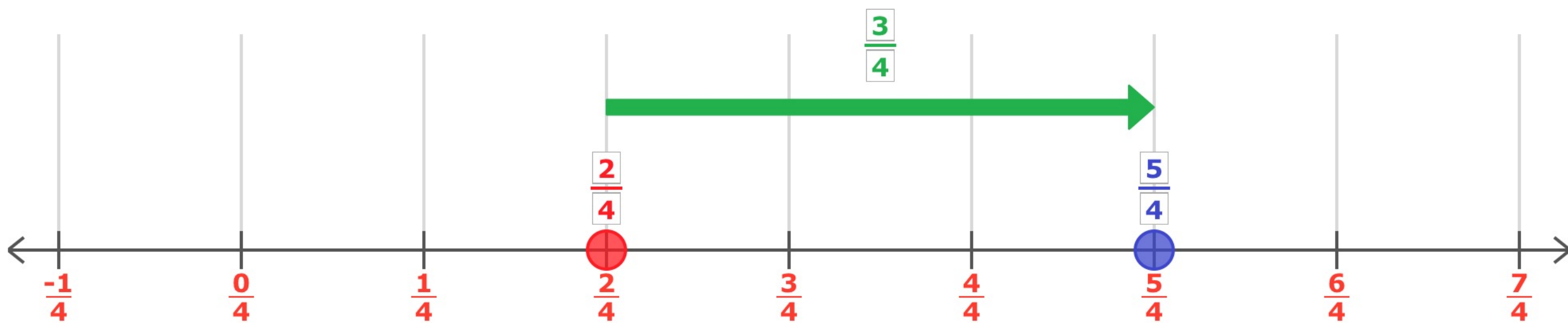


comparison

"The operations of addition, subtraction, multiplication, and division hold the same fundamental meanings no matter the domain in which they are applied."

–Marian Small





1001 – 2

1001 – 999

63 – 28

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KINGSMAN: THE GOLDEN CIRCLE (2017)

TOMATOMETER 50%
Average Rating: 5.3/10
Reviews Counted: 207
Fresh: 103
Rotten: 104

AUDIENCE SCORE 72%
Average Rating: 3.7/5
User Ratings: 32,868

CRITICS CONSENSUS: *Kingsman: The Golden Circle* offers more of everything that made its predecessor so much fun, but lacks the original's wild creative spark.

ADD YOUR RATING

+ WANT TO SEE NOT INTERESTED

Add a Review (Optional)

Post

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MOTHER! (2017)

TOMATOMETER 67%
Average Rating: 6.7/10
Reviews Counted: 257
Fresh: 173
Rotten: 84

AUDIENCE SCORE 46%
Average Rating: 2.7/5
User Ratings: 17,216

CRITICS CONSENSUS: There's no denying that *mother!* is the thought-provoking product of a singularly ambitious artistic vision, though it may be too unwieldy for mainstream tastes.

ADD YOUR RATING

+ WANT TO SEE NOT INTERESTED

Add a Review (Optional)

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72 - 50 = 22

KINGSMAN: THE GOLDEN CIRCLE (2017)

TOMATOMETER All Critics | Top Critics

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46 - 67 = -21

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Add a Review (Optional)

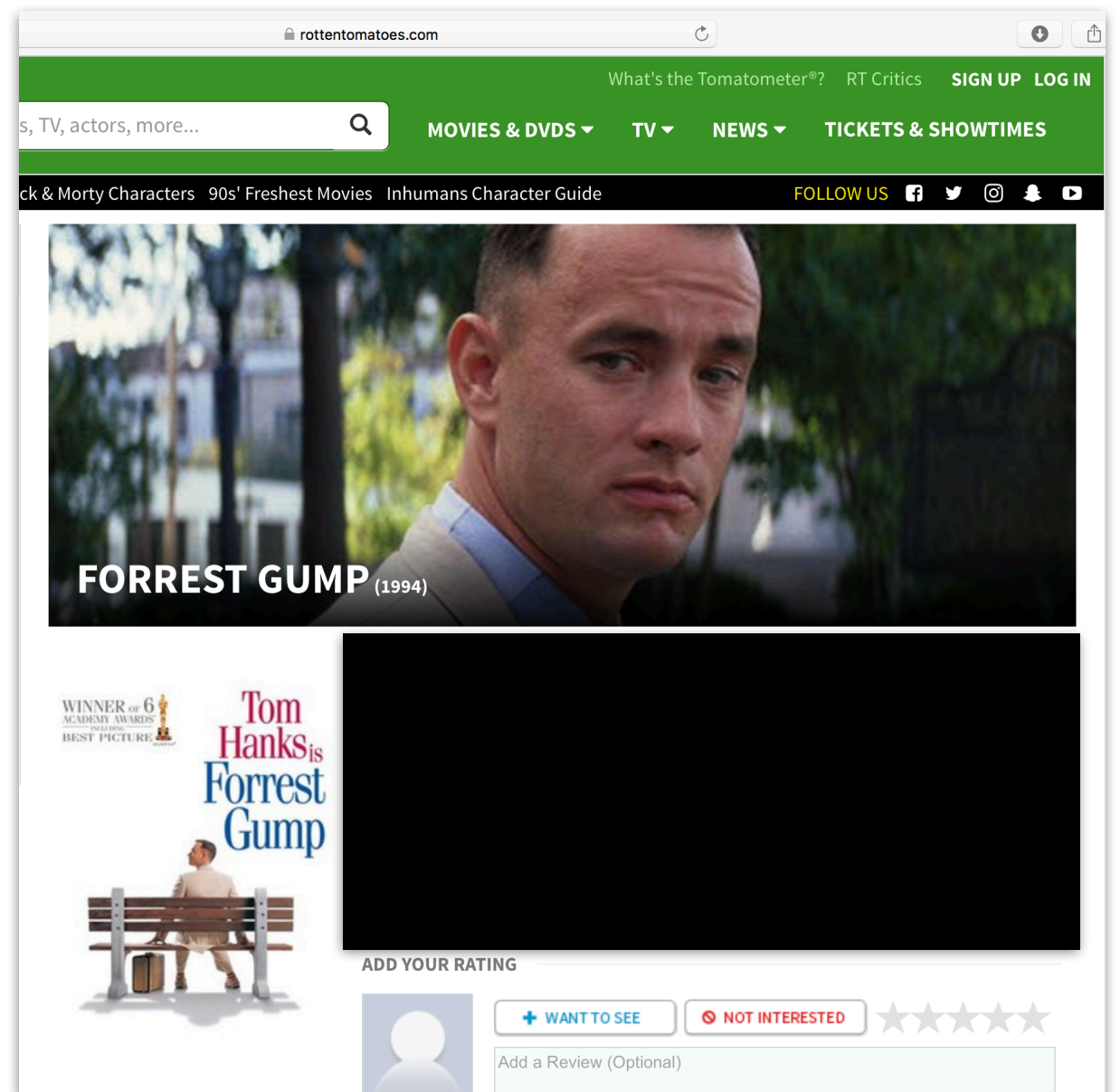
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Everyone's a critic.

Add your rating.

Call it ∞ .



Rotten Tomatoes

x - 71

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FORREST GUMP (1994)

WINNER of 6 ACADEMY AWARDS INCLUDING BEST PICTURE

Tom Hanks is Forrest Gump

TOMATOMETER All Critics | Top Critics

71%

Average Rating: 7.2/10
Reviews Counted: 86
Fresh: 61
Rotten: 25

Critics Consensus: *Forrest Gump* may be an overly sentimental film with a somewhat problematic message, but its sweetness and charm are usually enough to approximate true depth and grace.

AUDIENCE SCORE

95% liked it

Average Rating: 4.1/5
User Ratings: 1,242,820

ADD YOUR RATING

+ WANT TO SEE NOT INTERESTED

Add a Review (Optional)

Rotten Tomatoes

| $x - 71$ |

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Average Rating: 4.1/5
User Ratings: 1,242,820

ADD YOUR RATING

+ WANT TO SEE NOT INTERESTED

Add a Review (Optional)

Rotten Tomatoes

$$|x - 71| = 4$$

The screenshot shows the Rotten Tomatoes website interface. At the top, there's a navigation bar with links like 'What's the Tomatometer?', 'RT Critics', 'SIGN UP', and 'LOG IN'. Below this is a search bar and a menu with categories like 'MOVIES & DVDS', 'TV', 'NEWS', and 'TICKETS & SHOWTIMES'. The main content area features a large image of Tom Hanks as Forrest Gump, with the title 'FORREST GUMP (1994)' overlaid. Below the image, there's a section for the movie's ratings and reviews. The 'TOMATOMETER' section shows a 71% score with a tomato icon, an average rating of 7.2/10, and 86 reviews (61 Fresh, 25 Rotten). The 'AUDIENCE SCORE' section shows a 95% score with a popcorn icon, an average rating of 4.1/5, and 1,242,820 user ratings. A 'CRITICS CONSENSUS' section provides a summary of the film. At the bottom, there's a section for 'ADD YOUR RATING' with buttons for 'WANT TO SEE' and 'NOT INTERESTED', and a star rating system.

WINNER of 6 ACADEMY AWARDS
BEST PICTURE

Tom Hanks is
Forrest Gump

TOMATOMETER ? **71%**
Average Rating: 7.2/10
Reviews Counted: 86
Fresh: 61
Rotten: 25

AUDIENCE SCORE ? **95%**
liked it
Average Rating: 4.1/5
User Ratings: 1,242,820

CRITICS CONSENSUS: *Forrest Gump* may be an overly sentimental film with a somewhat problematic message, but its sweetness and charm are usually enough to approximate true depth and grace.

ADD YOUR RATING

★★★★★

Add a Review (Optional)

Rotten Tomatoes

$$|x - 71| < 10$$

The screenshot shows the Rotten Tomatoes website interface. At the top, there's a navigation bar with a search bar, links for 'MOVIES & DVDS', 'TV', 'NEWS', and 'TICKETS & SHOWTIMES'. Below this, a secondary navigation bar features links like 'Rick & Morty Characters', '90s' Freshest Movies', and 'Inhumans Character Guide'. The main content area is dedicated to the movie 'FORREST GUMP (1994)', featuring a large image of Tom Hanks. To the left of the movie details is a poster for 'Tom Hanks is Forrest Gump', which includes the text 'WINNER of 6 ACADEMY AWARDS INCLUDING BEST PICTURE'. The right side of the page contains the 'TOMATOMETER' section, showing a 71% score with a tomato icon, and the 'AUDIENCE SCORE' section, showing a 95% score with a popcorn icon. Both sections include average ratings and the number of reviews. A 'CRITICS CONSENSUS' is also provided. At the bottom, there's a section for 'ADD YOUR RATING' with buttons for '+ WANT TO SEE' and 'NOT INTERESTED', along with a star rating system and a text box for 'Add a Review (Optional)'.

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FORREST GUMP (1994)

WINNER of 6 ACADEMY AWARDS INCLUDING BEST PICTURE Tom Hanks is Forrest Gump

TOMATOMETER 71%
Average Rating: 7.2/10
Reviews Counted: 86
Fresh: 61
Rotten: 25

All Critics | Top Critics
Critics Consensus: *Forrest Gump* may be an overly sentimental film with a somewhat problematic message, but its sweetness and charm are usually enough to approximate true depth and grace.

AUDIENCE SCORE 95%
Average Rating: 4.1/5
User Ratings: 1,242,820
liked it

ADD YOUR RATING

+ WANT TO SEE NOT INTERESTED ★★★★★

Add a Review (Optional)

Rotten Tomatoes

$$|x - 71| \geq 20$$

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WINNER of 6 ACADEMY AWARDS INCLUDING BEST PICTURE

Tom Hanks is **Forrest Gump**

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User Ratings: 1,242,820

ADD YOUR RATING

+ WANT TO SEE NOT INTERESTED

Add a Review (Optional)

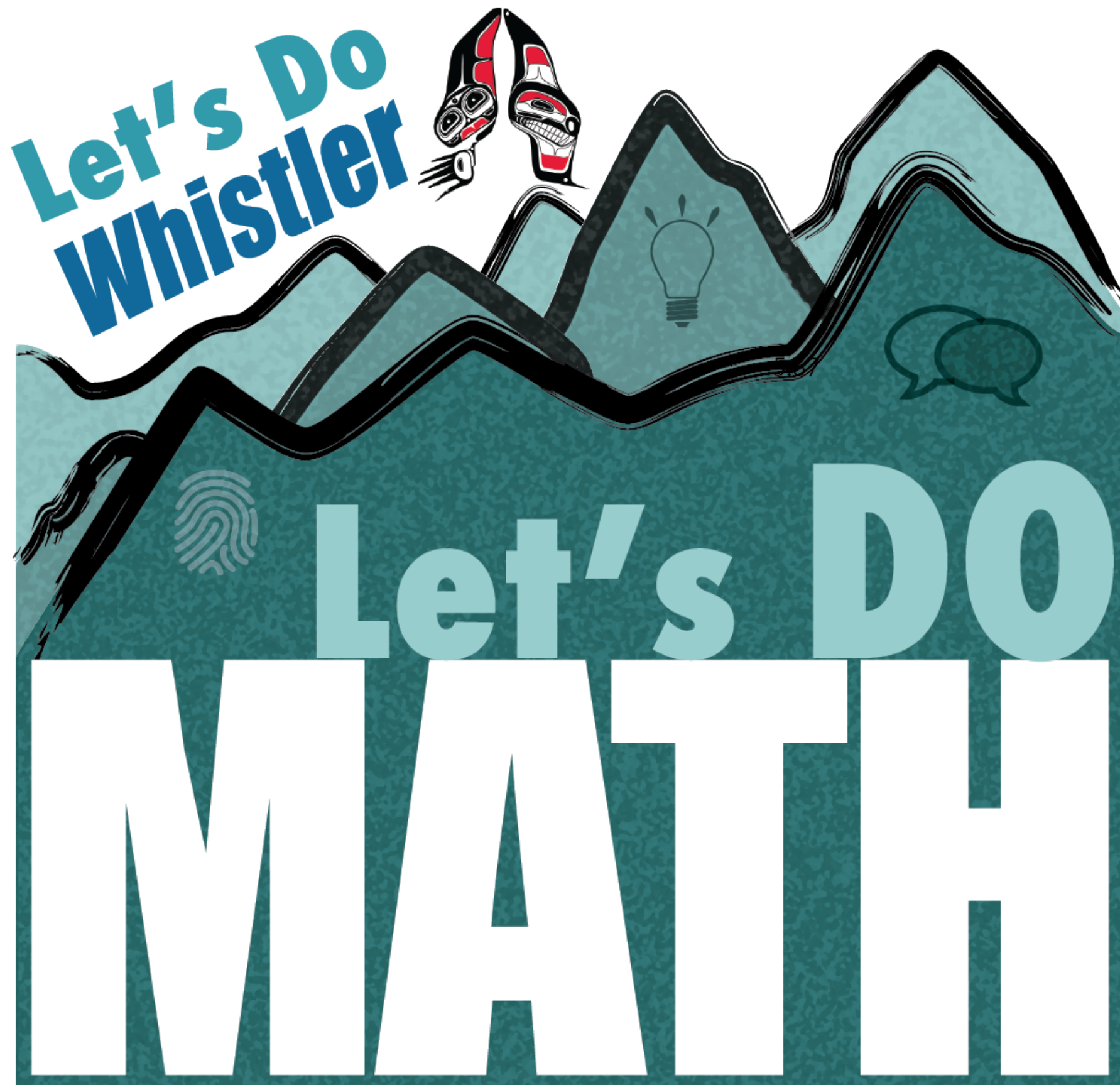
Subtraction: Across the Grades

Which meaning is more *meaningful*?

Solve for x : $|x - 5| = 2$

Simplify $(1.89t + 15) - (1.49t + 12)$, where t represents the number of pizza toppings.

Determine the slope of the line that passes through the points $(2, 1)$ and $(6, 4)$.



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