

# THREE ENGAGING METHODS TO UNCOVER AND FIX HIDDEN STUDENT MISCONCEPTIONS

**ROBERT KAPLINSKY**

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# GOALS

☐ KING SOLOMON AND VAN HALEN

☐ OPEN MIDDLE

☐ ALWAYS, SOMETIMES, NEVER

☐ TRUTH TRUTH LIE

☐ NEXT STEPS











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B-2	K-1	T-6
C-2	L-4	U-4
D-4	M-2	V-2
		W-2

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S<sub>1</sub>  
C<sub>3</sub>  
R<sub>1</sub>  
A<sub>1</sub>  
B<sub>3</sub>  
B<sub>3</sub>  
L<sub>1</sub>  
E<sub>1</sub>

L<sub>1</sub> U<sub>1</sub> R<sub>1</sub> E<sub>1</sub> D<sub>2</sub> (DOUBLE LETTER SCORE) (TRIPLE WORD SCORE)  
 D<sub>2</sub> A<sub>1</sub> T<sub>1</sub> A<sub>1</sub> I<sub>1</sub> I<sub>1</sub> C<sub>3</sub> Y<sub>4</sub> (DOUBLE WORD SCORE)  
 Z<sub>10</sub> O<sub>1</sub> O<sub>1</sub> A<sub>1</sub> S<sub>1</sub> P<sub>3</sub> I<sub>1</sub> E<sub>1</sub> (DOUBLE WORD SCORE)  
 G<sub>2</sub> L<sub>1</sub> S<sub>1</sub> E<sub>1</sub> T<sub>1</sub> (DOUBLE LETTER SCORE) (DOUBLE WORD SCORE)  
 M<sub>3</sub> O<sub>1</sub> P<sub>3</sub> E<sub>1</sub> K<sub>5</sub> (DOUBLE WORD SCORE)  
 X<sub>8</sub> S<sub>1</sub> I<sub>1</sub> S<sub>1</sub> (TRIPLE LETTER SCORE)  
 E<sub>1</sub> X<sub>8</sub> T<sub>1</sub> R<sub>1</sub> A<sub>1</sub> (DOUBLE LETTER SCORE)  
 G<sub>2</sub> A<sub>1</sub> G<sub>2</sub> G<sub>2</sub> E<sub>1</sub> D<sub>2</sub> A<sub>1</sub> (DOUBLE LETTER SCORE) (DOUBLE LETTER SCORE)  
 A<sub>1</sub> V<sub>4</sub> E<sub>1</sub> A<sub>1</sub> L<sub>1</sub> (DOUBLE LETTER SCORE)  
 M<sub>3</sub> E<sub>1</sub> D<sub>2</sub> I<sub>1</sub> C<sub>3</sub> I<sub>1</sub> N<sub>1</sub> E<sub>1</sub> (TRIPLE LETTER SCORE)  
 O<sub>1</sub> G<sub>2</sub> L<sub>1</sub> E<sub>1</sub> D<sub>2</sub> (DOUBLE LETTER SCORE)  
 H<sub>4</sub> (DOUBLE LETTER SCORE)  
 Z<sub>10</sub> A<sub>1</sub> P<sub>3</sub> F<sub>4</sub> U<sub>1</sub> S<sub>1</sub> E<sub>1</sub> R<sub>1</sub> (DOUBLE WORD SCORE)  
 I<sub>1</sub> (DOUBLE LETTER SCORE) (DOUBLE WORD SCORE)  
 C<sub>3</sub> O<sub>1</sub> A<sub>1</sub> N<sub>1</sub> U<sub>1</sub> (DOUBLE WORD SCORE) (DOUBLE WORD SCORE)  
 K<sub>5</sub> N<sub>1</sub> O<sub>1</sub> W<sub>4</sub> N<sub>1</sub> (DOUBLE WORD SCORE) (DOUBLE WORD SCORE)



INTERNATIONAL



# Winner Of French Scrabble Title Does Not Speak French

July 21, 2015 · 1:00 PM ET

[BILL CHAPPELL](#)



# GOALS

KING SOLOMON AND VAN HALEN

OPEN MIDDLE

ALWAYS, SOMETIMES, NEVER

TRUTH TRUTH LIE

NEXT STEPS

Using the digits 1-9 at most one time each,  
place a digit in each box to create a fraction  
that is as close to one as possible.

<hr/>	

**Extension:**  
How many  
ways can you  
prove that you  
are correct?

Source: Peter Morris on [openmiddle.com](http://openmiddle.com)

$$\frac{79}{81} \times \frac{79}{79} = \frac{6241}{6399}$$

$$6399 - 6241 = 158$$

$$\frac{81}{79} \times \frac{81}{81} = \frac{6561}{6399}$$

$$6399 - 6561 = -162$$

0.975308

+/-

$\sqrt{\quad}$

%

MC

MR

M-

M+

$\div$

1.02531690

+/-

$\sqrt{\quad}$

%

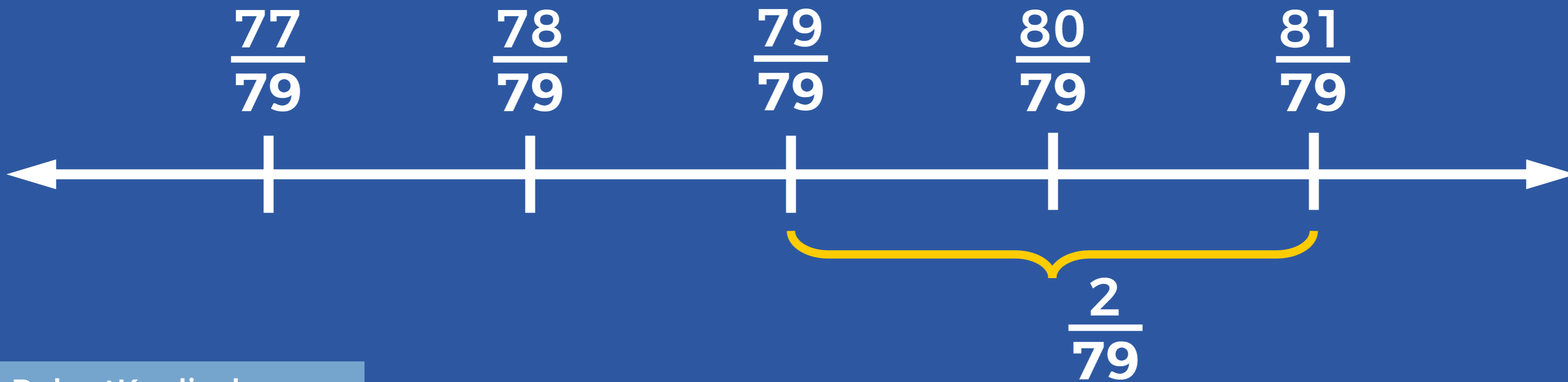
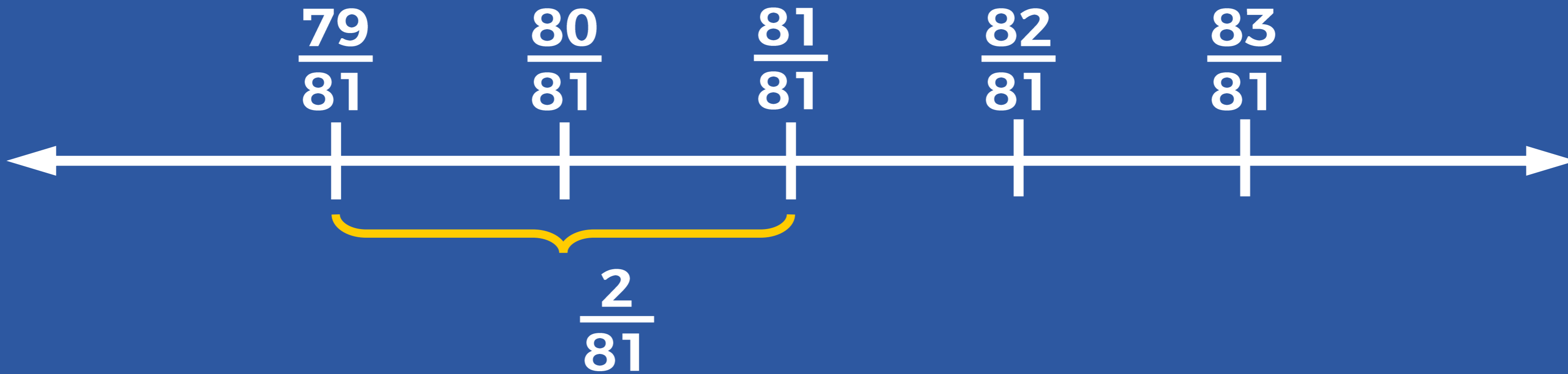
MC

MR

M-

M+

$\div$



Using the digits 1 to 9 at most one time each, place a digit in each box to make the greatest possible sum.

$$\boxed{9} \boxed{8} + \boxed{8} \boxed{6} =$$



What is the perimeter  
of a rectangle that  
measures 8 units by 4  
units?



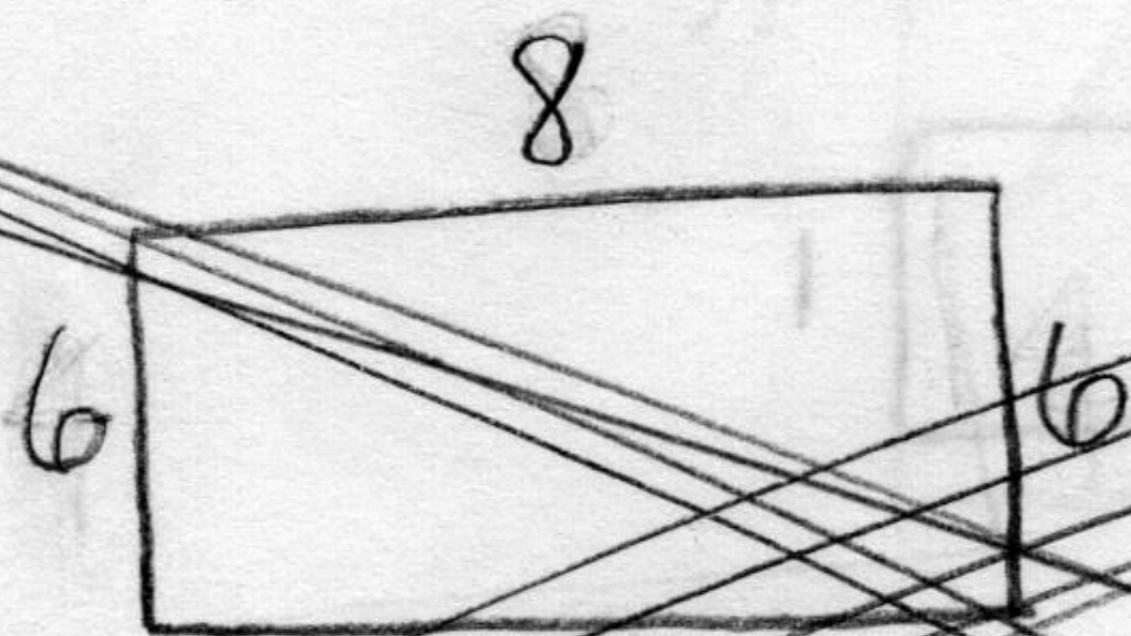
List the dimensions of a rectangle with a perimeter of 24 units.



What is the greatest area you can make from a rectangle with a perimeter of 24 units?

First attempt:

Points: \_\_\_/2 attempt \_\_\_/2 explanation



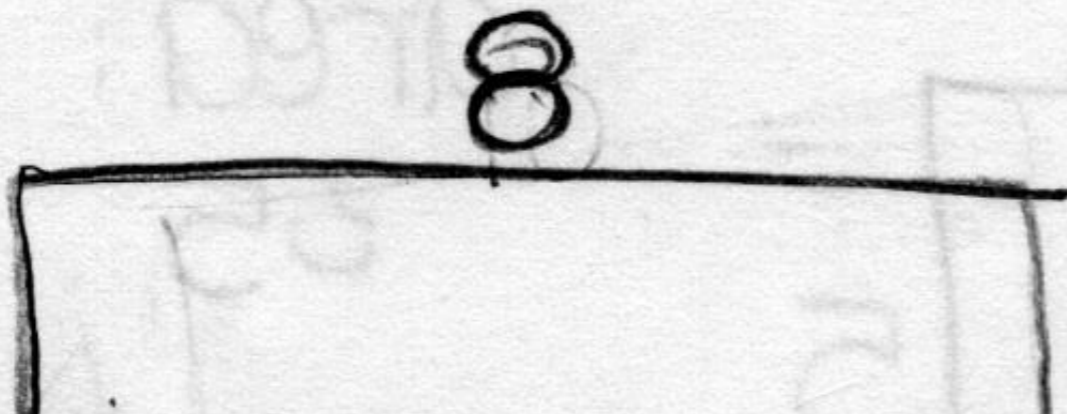
area:  
48

What did you learn from this attempt? How will your strategy change on your next attempt?

~~This attempt doesn't equal 24.~~

Second attempt:

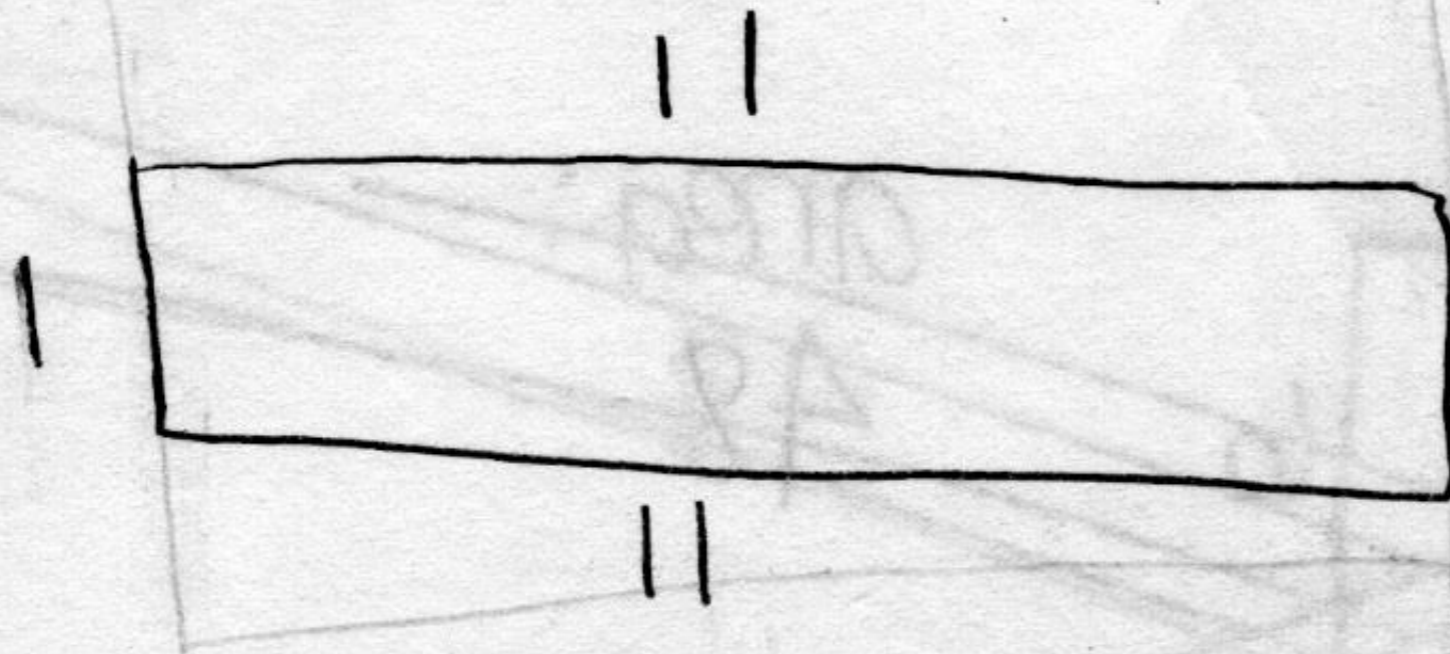
Points: \_\_\_/2 attempt \_\_\_/2 explanation



area:  
32

Fourth attempt:

Points: \_\_\_/2 attempt \_\_\_/2 explanation

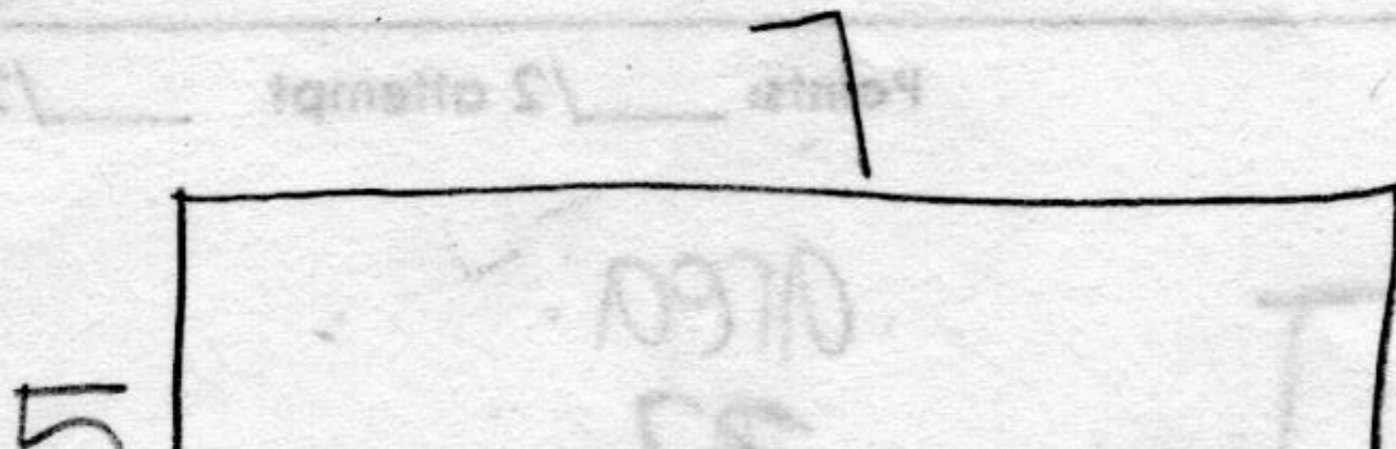


What did you learn from this attempt? How will your strategy change on your next attempt?

The perimeter is 24, but the area is 11 and attempt #2 the area is 32  
Strategy: Use #'s with more than one row.

Fifth attempt:

Points: \_\_\_/2 attempt \_\_\_/2 explanation



area:  
35

**11 units**



**1 unit**

**10 units**

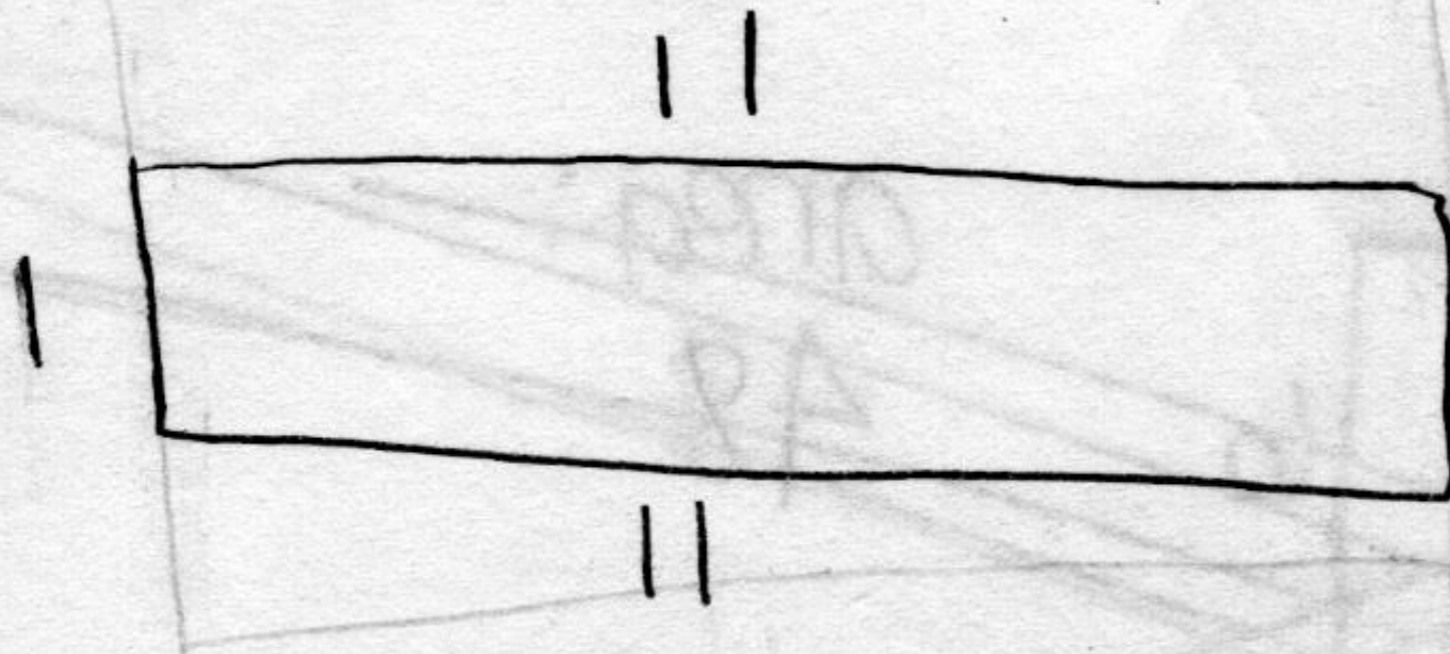


**2 units**



Fourth attempt:

Points: \_\_\_/2 attempt \_\_\_/2 explanation

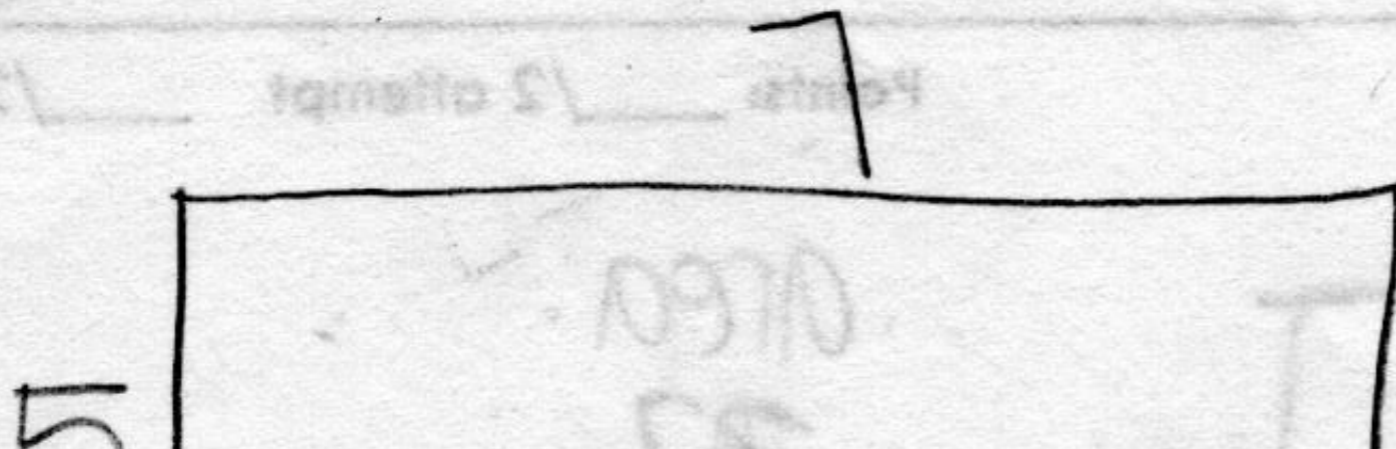


What did you learn from this attempt? How will your strategy change on your next attempt?

The perimeter is 24, but the area is 11 and attempt #2 the area is 32  
Strategy: Use #'s with more than one row.

Fifth attempt:

Points: \_\_\_/2 attempt \_\_\_/2 explanation



area:  
35

# GOALS

KING SOLOMON AND VAN HALEN

OPEN MIDDLE

ALWAYS, SOMETIMES, NEVER

TRUTH TRUTH LIE

NEXT STEPS

A number with 3  
digits is larger than a  
number with 2 digits.

Source: Joe Schwartz

# ALWAYS, SOMETIMES, NEVER

- How do you prove something is:
  - always true?
  - sometimes true?
  - never true?

# ALWAYS, SOMETIMES, NEVER

- Can be used:
  - as a collection of statements

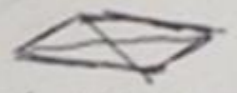
A square has opposite angles congruent.

- Yes bc all angles are 90°

13. A parallelogram is a quadrilateral.

- Yes b/c it has 2 pairs of sides parallel to each other

14. A parallelogram has diagonals that bisect each other.



always when both pairs of sides are parallel

1. A square is a rectangle.

- because it's a rectangle with all equal sides & angles

# Sometimes

12. A rhombus is a rectangle.

- only when there are 90° angles

6. A square is a rhombus.

- when the angles are all 90°

15. A rectangle is a rhombus.

- only when it is a square and when the sides are equal

4. A rhombus is a square.

- only when the angles are 90°

16. A rhombus has congruent diagonals.

- when all of the sides are equal

# NEVER

3. A rectangle is a square.

- a square can be a rectangle but a rectangle can never be a square

8. A trapezoid has legs congruent.

~~Yes bc one pair is parallel (base)~~  
None but they are not pair congruent

5. A trapezoid has opposite sides parallel.

- One pair of opposite sides are parallel but the other pair is not.

11. A rectangle has perpendicular diagonals.

- never because only diagonals are perpendicular with squares and rhombuses

# Always

# Sometimes

# NEVER

11. A rectangle has perpendicular diagonals.

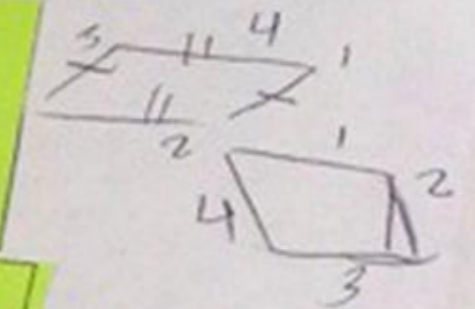
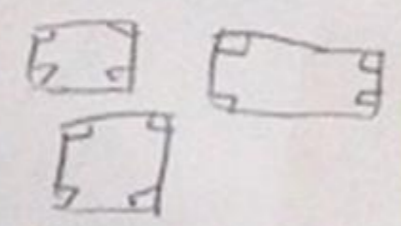
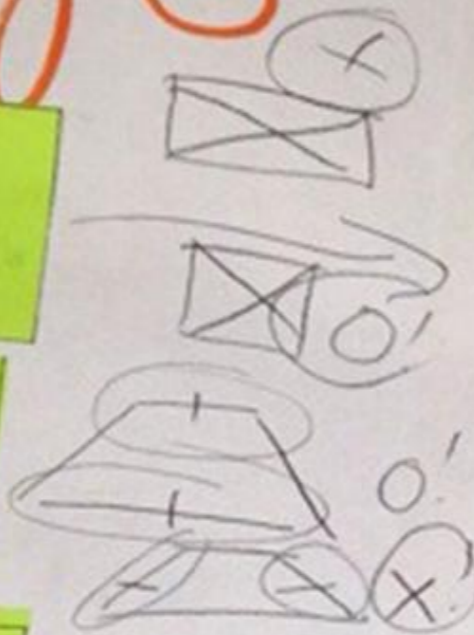
5. A trapezoid has opposite sides parallel.

1. A square is a rectangle.

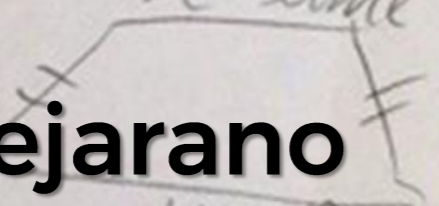
3. A parallelogram is a quadrilateral.

A square has opposite angles congruent.

A trapezoid has legs congruent.



has to be the same



10. A parallelogram has congruent diagonals.

7. A parallelogram is a rectangle.

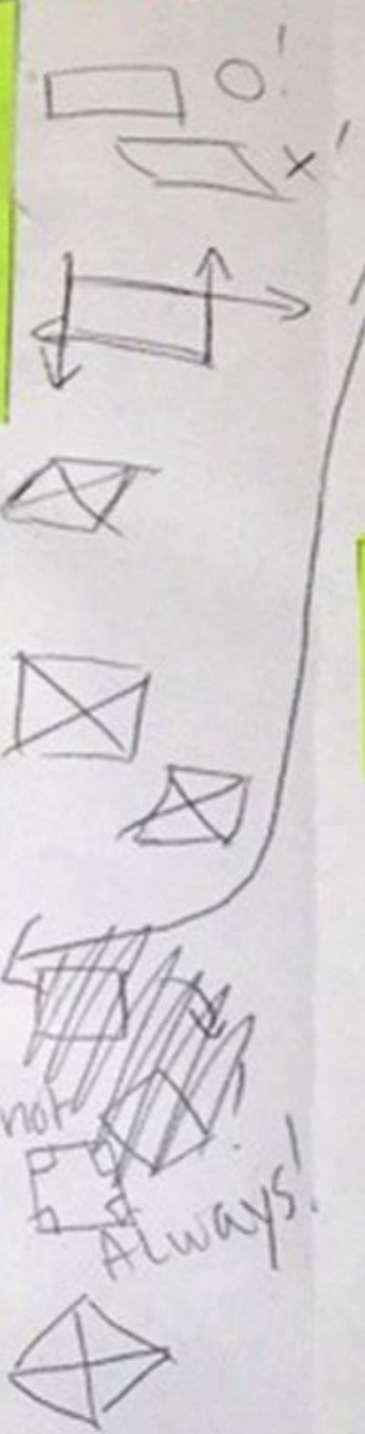
18. The diagonals of a rhombus are congruent.

2. The diagonals of a rhombus are perpendicular.

4. A rhombus is a square.

16. A rhombus has congruent diagonals.

17. A parallelogram has diagonals that bisect



not Always!

not evenly

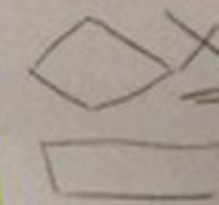
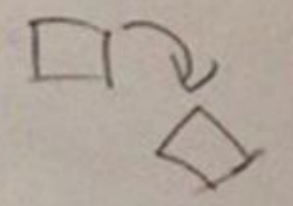
6. A square is a rhombus.

12. A rhombus is a rectangle.

3. A rectangle is a square.

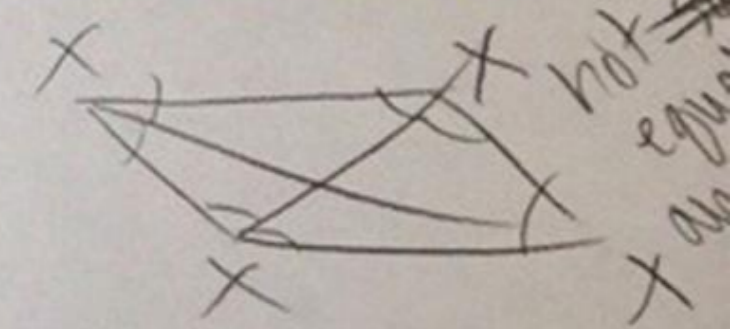
15. A rectangle is a rhombus.

14. A parallelogram has diagonals that bisect each other.



square has to have all congruent sides

NO



not equal

# ALWAYS, SOMETIMES, NEVER

- Can be used:
  - as a collection of statements
  - a single statement



A Hexagon is...  
SIX sided figure  
with equal side lengths  
with each side coming  
together at a  $60^\circ$  angle  
on the inside

# ALWAYS, SOMETIMES, NEVER

- Grades K-5: Arithmetic
- Grade 3-8: Fractions
- Grades 9-12: Systems of Equations



Sort the cards into three groups. Put all the statements that are always true with the ALWAYS card. Put all the statements that are sometimes true with the SOMETIMES card. Put all the statements that are never true with the NEVER card.

Fractions are numbers less than one.

Fifths are bigger than sixths

If two fractions have the same denominator, the one with one with the larger numerator is greater.

You can represent the area of the fraction like 1/2 in different ways as long as they have each have the same total area.

Tenths are smaller than hundredths

One-third is one of three pieces.

The fractions 1/2, 3/6, and 4/8 all appear in the same place on a number line.

SOMETIMES

The numerator is less than the denominator.

The bigger the denominator, the bigger the pieces.

Fractions have a value between 0 and 1.

ALWAYS

$$\frac{3}{6} > \frac{1}{2}$$

You can't simplify a fraction with an odd denominator.

NEVER

$$\frac{3}{5} > \frac{3}{4}$$

Equal-sized pieces have the same shape.

The bigger the numerator, the more pieces there are.

# LESSONS LEARNED ABOUT ASN

- Be careful using statements that expire:
  - When you subtract a number, you can never take away a larger number from a smaller number.
  - When you divide, the quotient is always smaller.
  - Only positive numbers have square roots.

# LESSONS LEARNED ABOUT ASN

- Better in small groups than individually.
- You can jigsaw groups.
- More issues come out during discussions.
- Talk about sufficient reasoning.

# ALWAYS, SOMETIMES, NEVER

Lisa Bejarano

Grace Chen

Sarah Carter

Beth Ferguson

Kristin Gray

Chris Luzniak

Fawn Nguyen

Joe Schwartz

Christy Sutton

Tracy Zager

# GOALS

KING SOLOMON AND VAN HALEN

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TRUTH TRUTH LIE

NEXT STEPS

# TRUTH TRUTH LIE

- I've been in two commercials but have only seen one of them.
- I always skip a page of the *Cat in the Hat* because it scares me.
- I have a rap video on YouTube with over 19,000 views



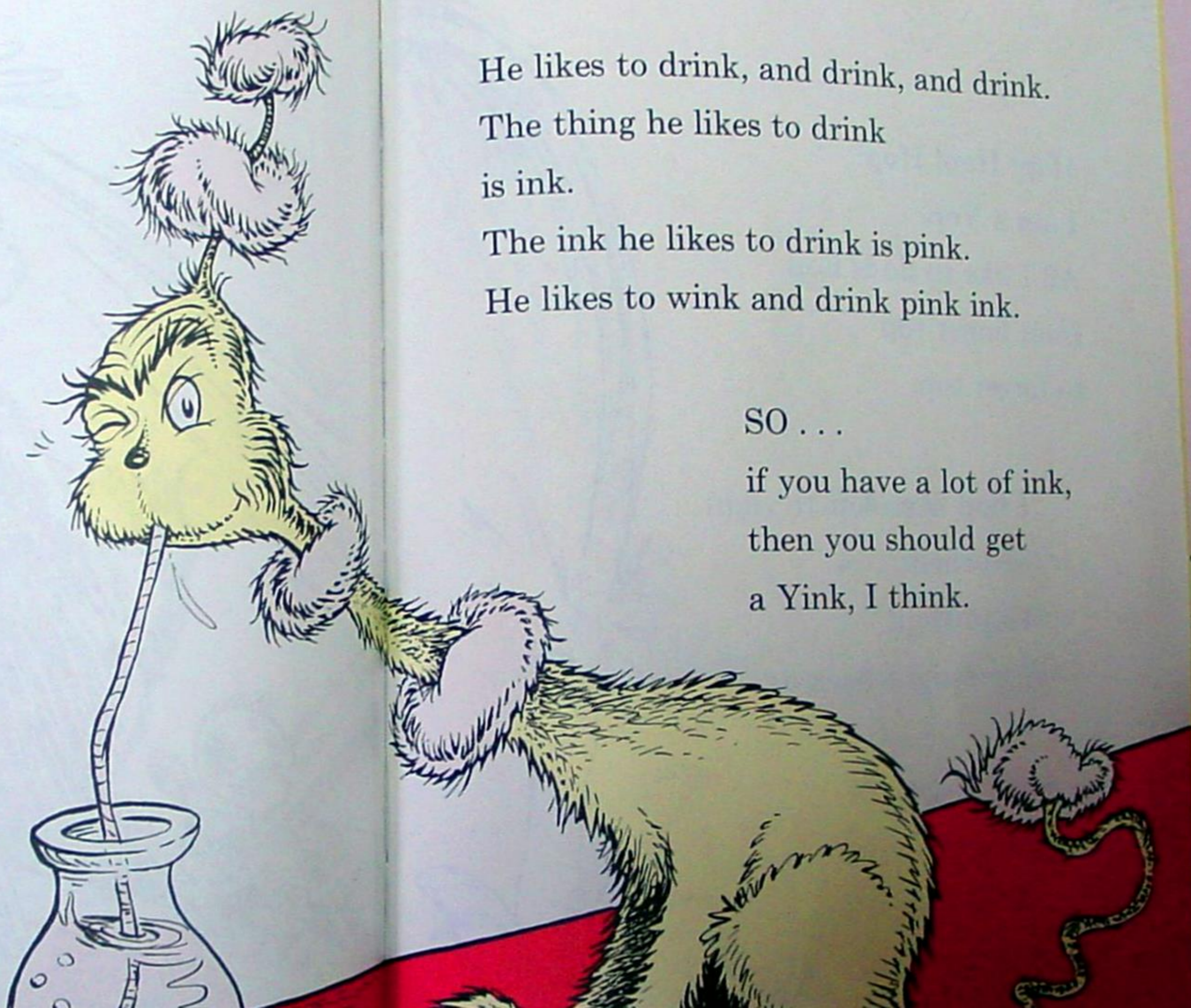




This one,  
I think,  
is called  
a Yink.

He likes to wink,

he likes to drink.



He likes to drink, and drink, and drink.  
The thing he likes to drink  
is ink.

The ink he likes to drink is pink.

He likes to wink and drink pink ink.

SO . . .

if you have a lot of ink,  
then you should get  
a Yink, I think.

# TRUTH TRUTH LIE

- My name is Robert.
- I eat food.
- I am 14 feet tall.

- Adding two negative numbers always gives you a negative sum.
- Subtracting two negative numbers always gives you a positive difference
- Multiplying two negative numbers always gives you a positive product.

**False**

•  $1 - -1 = 0$

•  $-3 - 2 = -5$  **True**

•  $2 \cdot 15 = 40$

**False?!**

**Thinking: Mistake is probably the first statement. Need to review subtracting integers.**

True

Multiplying negatives makes a positive

True

If you square a negative number its positive

Integers are all rational numbers.

True!?

Thinking: Unclear.

I think integers are cool

I think integers are boring

I think integers are easy

**Thinking: I needed to show more examples and more clearly set expectations.**



# LESSONS LEARNED ABOUT TTL

- Huge reality check
- Easier to answer than create.
- Smoother later in unit

# GOALS

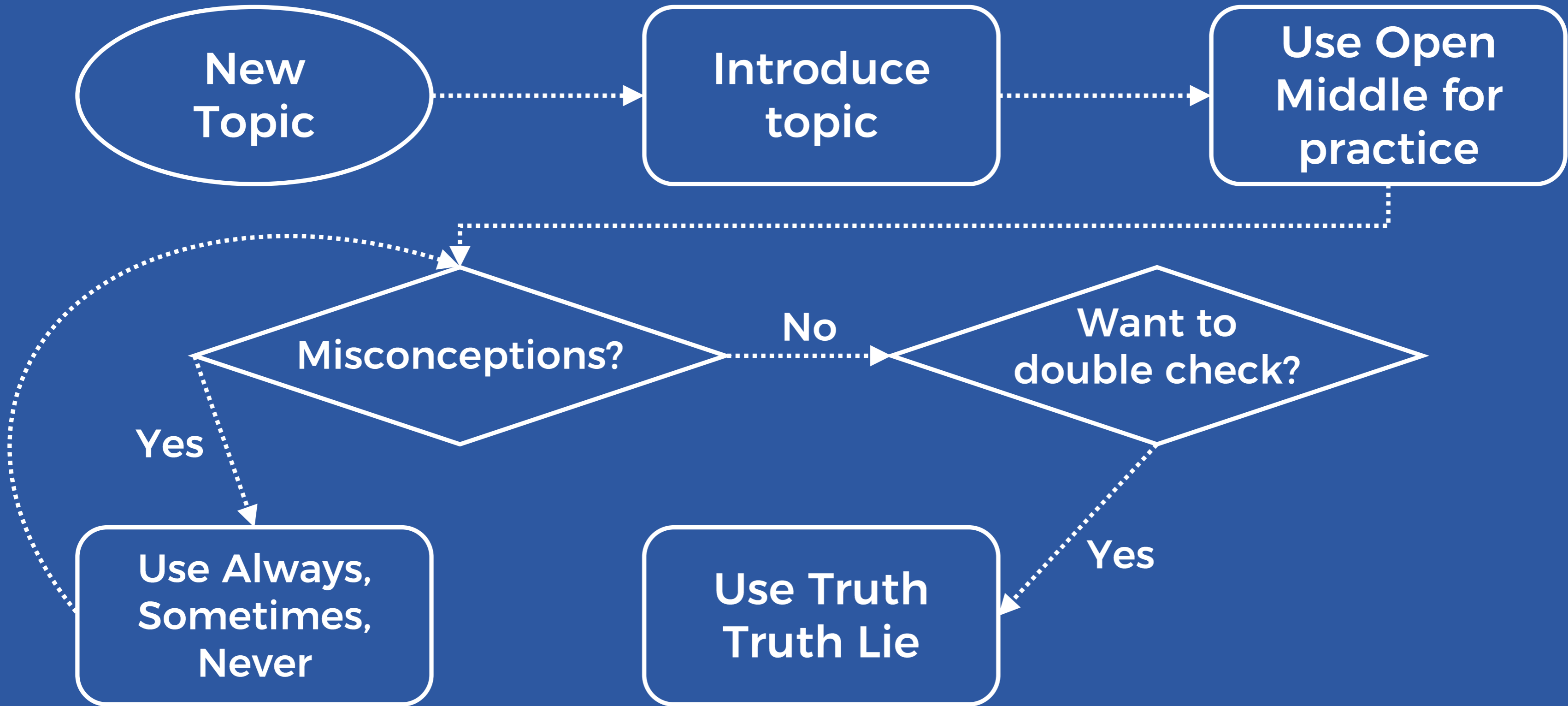
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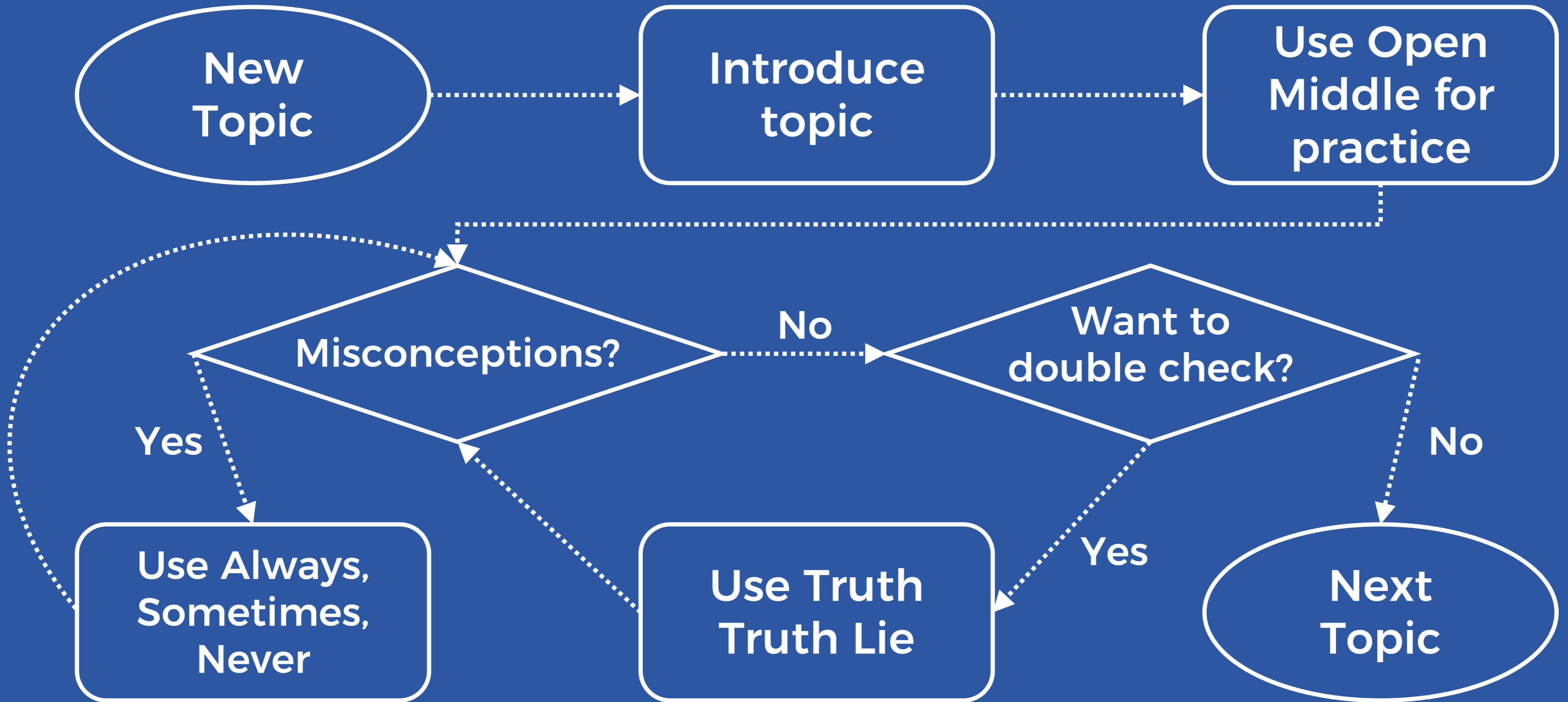
NEXT STEPS

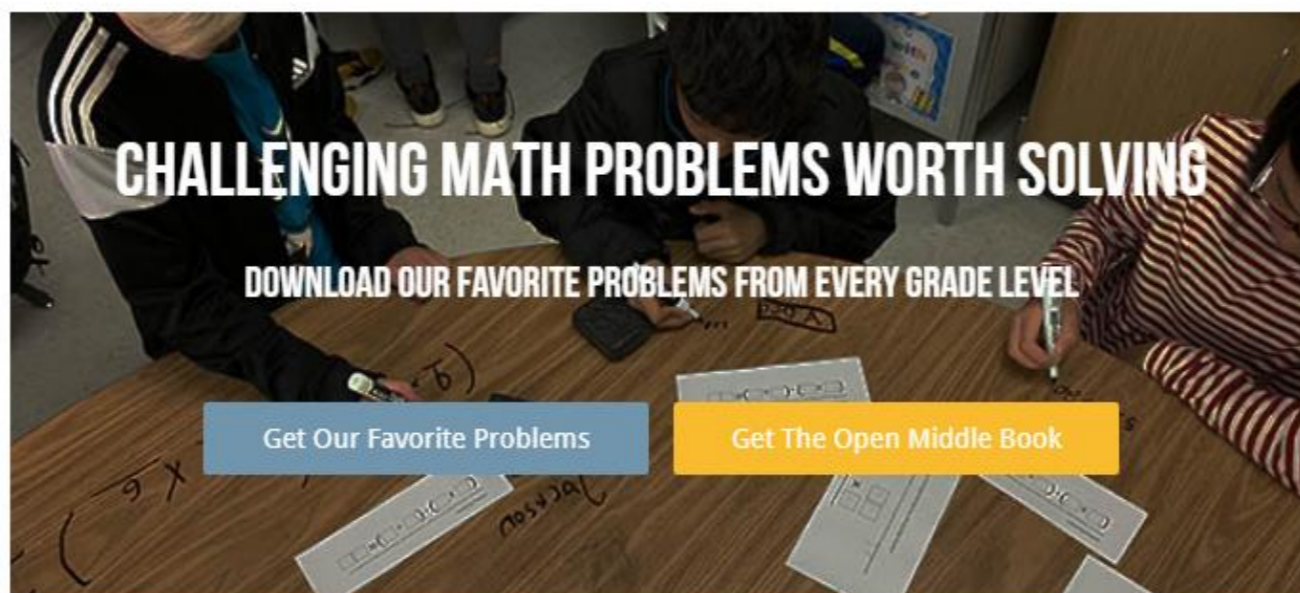


1.) a negative plus a negative is a positive

2.) adding 2 numbers together gives you a bigger number

3.)  $a -$  plus  $a +$  can be  $a -$  or  $a +$  depending on which is bigger





## WANT TO SHARE OPEN MIDDLE WITH OTHERS?

CHECK OUT THESE FREE WEBINARS TO HELP TEACHERS RETHINK CLASSWORK

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[Kindergarten \(13\)](#)[Counting & Cardinality \(3\)](#)[Geometry \(3\)](#)[Number & Operations in Base Ten \(1\)](#)[Operations & Algebraic Thinking \(6\)](#)[Grade 1 \(21\)](#)[Geometry \(3\)](#)

Home > Grade 7 > Expressions & Equations > Two-Step Equations

## TWO-STEP EQUATIONS

Directions: Using the digits 1 to 9 at most one time each, place a digit in each box to find the greatest (or least) possible values for  $x$ .

$$\boxed{\phantom{00}}x + \boxed{\phantom{00}} = \boxed{\phantom{00}}$$

Hint

How does each constant's value affect the solution's value?  
How does the coefficient's value affect the solution's value?

Answer

Assuming  $x$  can be a negative value,  $1x + 9 = 2$  gives the least possible value of  $-7$ . The greatest possible value would be,  $1x + 2 = 9$

Source: [Audrey Mendivil](#), [Daniel Luevanos](#), and [Robert Kaplinsky](#).



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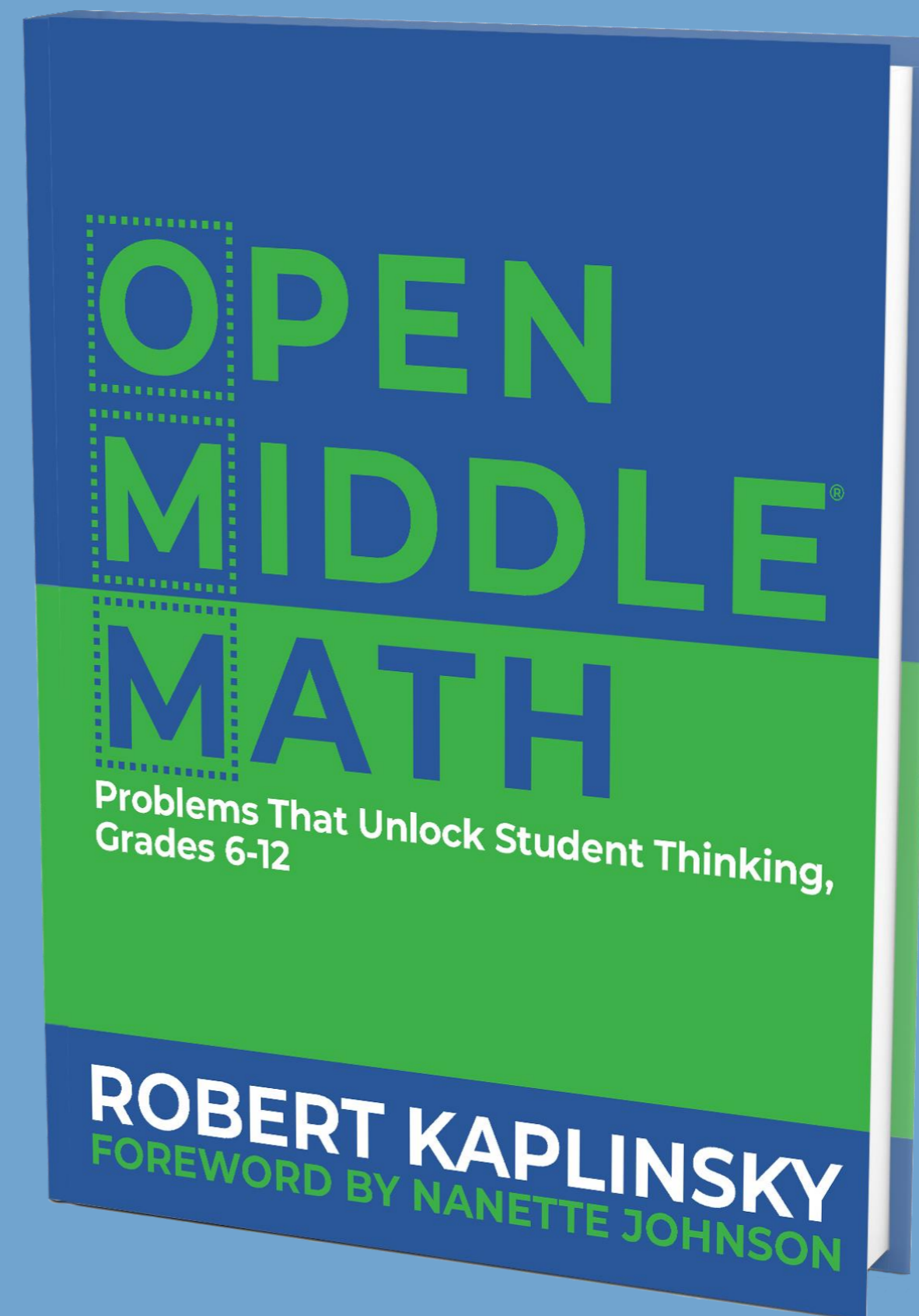
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  - Geometry (3)
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- Grade 1 (21)
  - Geometry (3)

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# GOALS

KING SOLOMON AND VAN HALEN

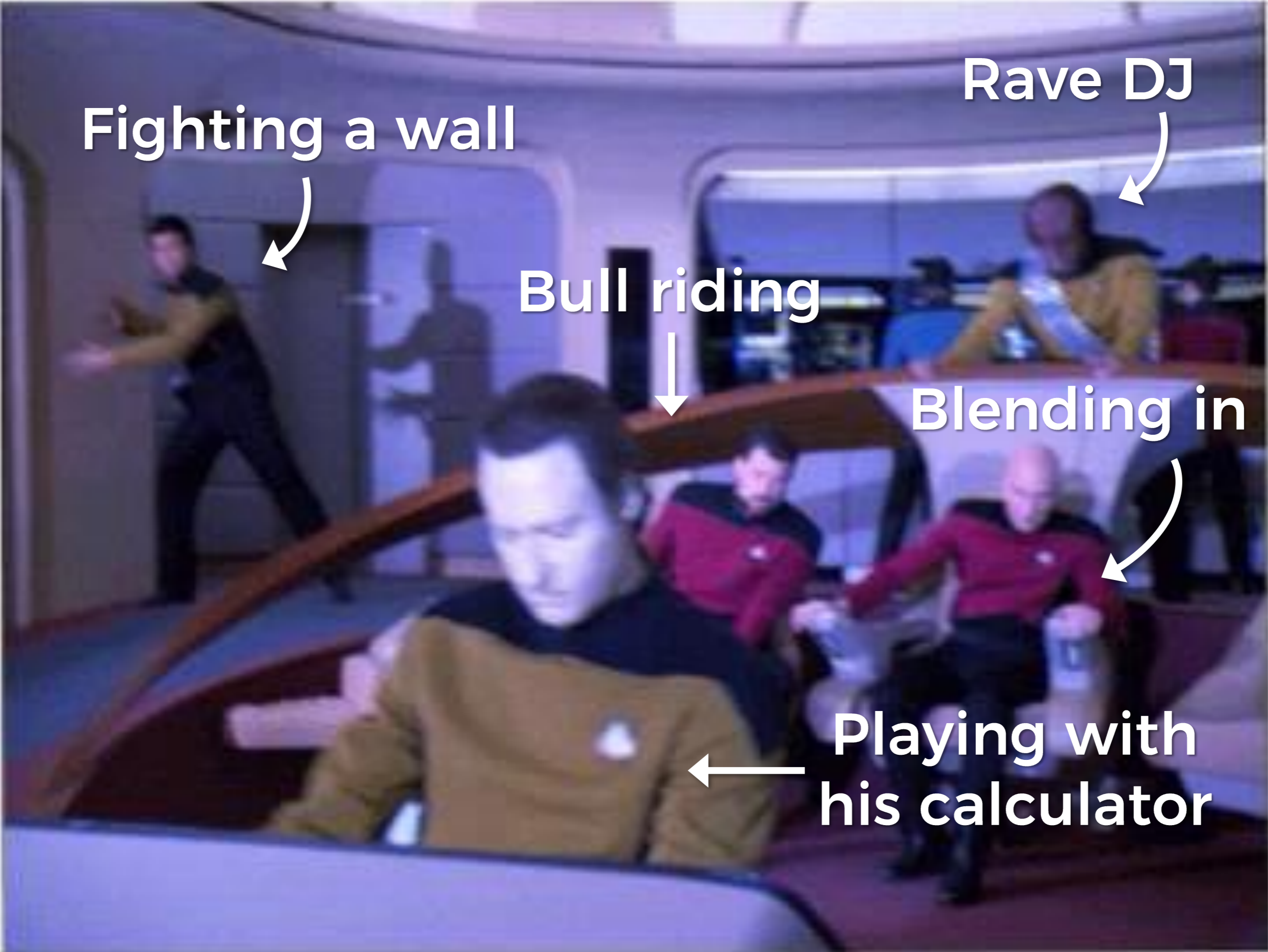
OPEN MIDDLE

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TRUTH TRUTH LIE

NEXT STEPS





Fighting a wall



Rave DJ



Bull riding



Blending in



Playing with his calculator



# THREE ENGAGING METHODS TO UNCOVER AND FIX HIDDEN STUDENT MISCONCEPTIONS

**ROBERT KAPLINSKY**

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To 44222