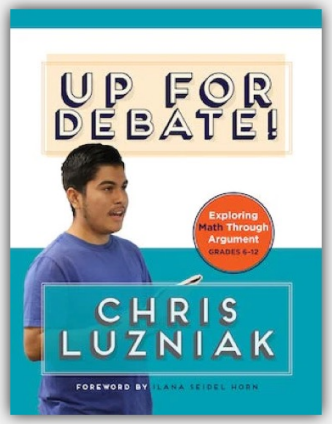
The Power of Math Debates

Marian Small April, 2023

Some of the language I will use

- is language encouraged by Chris Luzniak.
- He talks about claims and warrants (justifications).
- I will use the word claim, but not the term warrant.



Some of the styles

- you will see are suggested by Chris, but many are my own.

You might see these debates

- as whole class or partners or small group,
- where students are required to take both sides,
- where one student takes one side and another another side, trying to bring on supporters.

Primary

- CLAIM:
- The numbers 10 and 20 are a LOT alike.

Junior

CLAIM:

The fractions $\frac{2}{3}$ and $\frac{3}{4}$ are a lot alike.

Intermediate

CLAIM:

The numbers $\sqrt{2}$ and $\frac{3}{2}$ are A LOT alike.

Intermediate

CLAIM:
The formulas for the area of a trapezoid and the area of a rectangle are a LOT alike.

Intermediate

CLAIM:
The pattern rules for
3, 9, 15, 21, 27,,, and
200, 194, 188, 182,….
are a lot alike.

Your Turn

CLAIM:

Create a reasonable claim of the form:

___ and ____ are A LOT alike.

Primary

- CLAIM:
- When you subtract a 1-digit number from a 2-digit number, the answer is usually 1-digit.

Intermediate

CLAIM:
When you multiply a number by a fraction, the result is usually less than the number.

Primary

- CLAIM:
- When you subtract two big numbers, the answer is usually big.

Your Turn

- You create a claim of the form:
- When you….., the answer is usually….

Primary

- CLAIM:
- The number 15 is more like 10 than it is like 20.

Junior

- CLAIM:
- The number 64 is more like the number 36 than the number 46.

Intermediate

- CLAIM:
- The number π is more like the number $\sqrt{2}$ than the number 3.

Your Turn

- Create a claim of the form:
- The number …. is more like the number …. than the number ….

Primary

- CLAIM:
- When you add 72 and 63, you should add the ones first.

Primary

- CLAIM:
- The best first step if you want to subtract 8 from 22 is to draw a number line.

Junior

CLAIM:
The best first step if you want to divide 414 by 3 is to write 414 as 399 + 15.

Intermediate

CLAIM:
The best first step if you want to write the decimal for $\frac{3}{8}$ is to write an equivalent fraction to $\frac{3}{8}$ with a denominator of 1000.

Junior

CLAIM:
When you add 5193 + 285,
you should move 7 from 285 to 5193 first.

Your Turn

You create a claim where you suggest what you must do first.

What if the claim is wrong?

I think it's fine if the claim is wrong since students are likely to figure out that it is wrong in creating the argument (the warrant).

Primary

- CLAIM:
- The most likely mistake a student would make when they subtract 9 from 15 is to subtract 10 from 15 and then subtract 1.

Junior

CLAIM:
The most likely mistake students would make when they subtract 3.4 – 1.25 is to write 2.25.

Intermediate

CLAIM:
The most likely mistake students would make when they divide $\frac{4}{9}$ by $\frac{1}{2}$ is to suggest the answer is $\frac{2}{9}$.

Your Turn

Create a claim of the form:
The most likely mistake students might make when they… is ….

Primary

- CLAIM:
- The number 447 belongs with this set of numbers, but 42 does not.

78, 67, 96

Intermediate

CLAIM:
The set of three numbers 5-12-13 belongs with the group of numbers below, but the set 5-7-9 does not.

3-4-5 6-8-10 15-20-25

Junior

CLAIM:

The number $\frac{2}{3}$ belongs with the group of numbers below, but the number $\frac{1}{5}$ does not belong.

$\frac{2}{8}$ $\frac{3}{7}$ $\frac{1}{9}$

Your Turn

Create a claim of the form:
The number ... belongs with the group of numbers below, but the number …does not belong.

Primary

- CLAIM:
- When you add two numbers, the answer is always bigger than either number.

Junior

- CLAIM:
- When you divide two numbers, the answer is always less than what you divided, but more than what you divided by.

Intermediate

- CLAIM:
- When you subtract two negative integers, the answer is always negative.

Junior

CLAIM:
When you add two fractions, the answer is always a fraction.

Your turn

- Create a claim of the form:
- When you…, you always get….

Junior

CLAIM: The one that does not belong in this group of 4 multiplications is 12 x 10.

8 x 15	5 x 25
12 x 10	3 x 40

Primary

CLAIM: The one that does not belong in this group of 4 subtractions is 8 – 2.

11 – 5	**8 – 2**
12 – 6	**13 – 8**

Intermediate

CLAIM: The one that does not belong in this group of 4 additions is –4 + (–8).

-4 + (-8)	-12 + 0
15 + (-27)	-10 + 2

Your Turn

You create a which one doesn’t belong type claim where you suggest one answer is correct.

Lots of other examples

Primary

- CLAIM:
- The biggest number is 100.

Junior

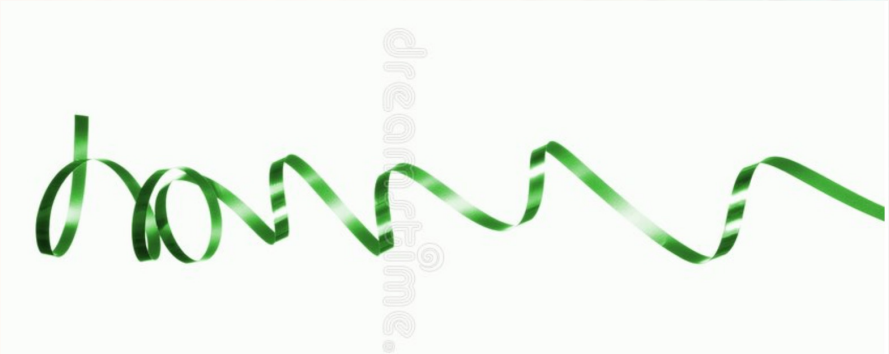
CLAIM:
A prism usually has more edges than a pyramid does.

Intermediate

CLAIM:
Usually the front view of a structure is more informative than the side view is.

Primary

- CLAIM:
- The green ribbon is shorter than the red one.



Primary

- CLAIM:
- The 50^{th} number in this pattern is 101.
- 3, 5, 7, 9, ….

Junior

CLAIM:
A number with more digits is always greater than a number with fewer digits.

Intermediate

CLAIM:
If a triangle is similar to a triangle with side lengths of 12, 15 and 18, then one of the side lengths of the similar triangle cannot be 7.

Junior

CLAIM:
The best estimate for 24 x 444 is 20 x 400.

Intermediate

CLAIM:
It is better to have a sale where you get 20% off than when you get $20 off.

Junior

CLAIM:
When the numerator and denominator of one fraction are closer together than the number and denominator of another fraction, the first fraction is greater.

Intermediate

CLAIM: the slope of this line must be really close to 0.

Intermediate

CLAIM:
If the numerator and denominator of two different fractions are 5 apart, then the fractions are equivalent.

Junior

CLAIM:
A number that takes 4 words to say can be greater than a number that takes 7 words to say.

Primary

CLAIM:
You can represent 1000 with 19 base ten blocks.

Intermediate

CLAIM:
When you multiply two decimals, the answer has more decimal places than either of the numbers you multiplied.

Intermediate

CLAIM:
By looking at a calculator display, you can usually tell whether a number is irrational or not.

Junior

CLAIM:
It is easier to figure out the 42^{nd} term of
1, 2, 3, 4, 5, 1, 2, 3, 4, 5,….
than of
10, 1, 1, 10, 1, 1, 10, 1, 1,….

Primary

CLAIM:
If you add 5 to a number you've modelled with 12 base ten blocks, you will need 17 blocks to model the bigger number.

Intermediate

CLAIM:

The only possible algebraic expression for this table of values is $y = 3x - 5$.

x	y
0	-5
1	-2
2	1

Any questions?