WHERE TO FOCUS

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AGENDA

- Teaching to Big Ideas
- Planning Lessons/Consolidation
- Focusing on understanding and thinking

WHAT DO YOU THINK?

Is it good enough if students can answer A and not B?

A: What is 12 – 9?

B: Draw a picture to show why 12 – 9 HAS TO BE the same as 13 – 10.

WHAT DO YOU THINK?

Is it good enough if students can answer A and not B?

A: What is 32 + 59?

B: How do you know that 32 + 59 is less than 100 without adding?

WHAT DO YOU THINK?

Is it good enough if students can answer A and not B?

A: How many centimetres is 1 m?

B: Why does the number of metres describing a length always a lot less than the number of centimetres?

WHAT DO YOU THINK?

Is it good enough if students can answer A and not B?

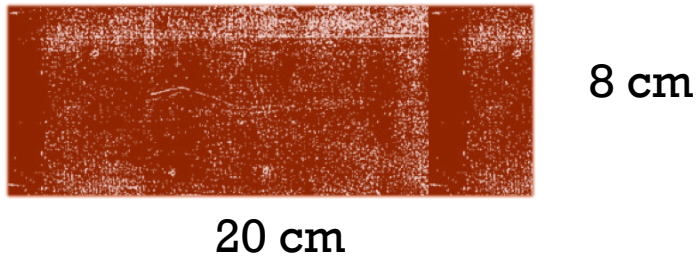
A: What is 32 x 22?

B: How do you know that 32 x 22 is between 600 and 1200 without multiplying?

WHAT DO YOU THINK?

Is it good enough if students can answer A and not B?

A: What is the perimeter of this rectangle?



B: Is the number of centimetres in the perimeter of a rectangle sometimes, always, usually, or never more than the number of square centimetres in its area?

TEACHING TO BIG IDEAS

- Choosing the two or three things you think matter most about a topic to help build lesson goals

THIS MATTERS BECAUSE

- It makes the curriculum more manageable and more meaningful.

DECIDING WHAT MATTERS MOST

- When you teach a topic, you need to decide in advance what matters most and emphasize that.
- So…

FOR EXAMPLE, PLACE VALUE

- What do we care about?

CHOICES

- Students need to know the place value columns and what values in each column represent.

CHOICES

- Students need to be aware that any number more than 10 can be represented using only tens and ones in different ways.

CHOICES

- Students need to be able to recognize why we trade before we write the symbolic form for a number.

CHOICES

- Students need to realize that the same digit farther to the left is worth more.

CHOICES

- Students need to realize that estimating numbers should focus on the leftmost digits.

SO I MIGHT ASK

- I represented 62 with 8 base ten blocks. What did it look like?
- What if I represented it with 35 base ten blocks?
- What other numbers of blocks could I represent it with?

SO I MIGHT ASK

- I had 5 tens and 14 ones in base ten blocks in front of me.
- Is the number 514? Why or why not?

SO I MIGHT ASK

- Write two different numbers with 5s in them but where one 5 is worth a lot more than the other 5.

SO I MIGHT ASK

- Which number is easier for you to estimate? Why?

  4[] OR []4?

WITH A DIFFERENT TOPIC

- Subtraction

WHILE WE STILL WANT

- Students who can estimate and calculate differences

WE ALSO NEED

SUBTRACTIONS

- An understanding that subtractions might represent take aways OR missing addends OR comparisons.
- An understanding that any subtraction situation involves an implicit addition situation.

SUBTRACTIONS

- An understanding that many subtractions result in the same difference and why.

SUBTRACTIONS

- An understanding that any subtraction represents an “infinite” number of different situations.

SUBTRACTIONS

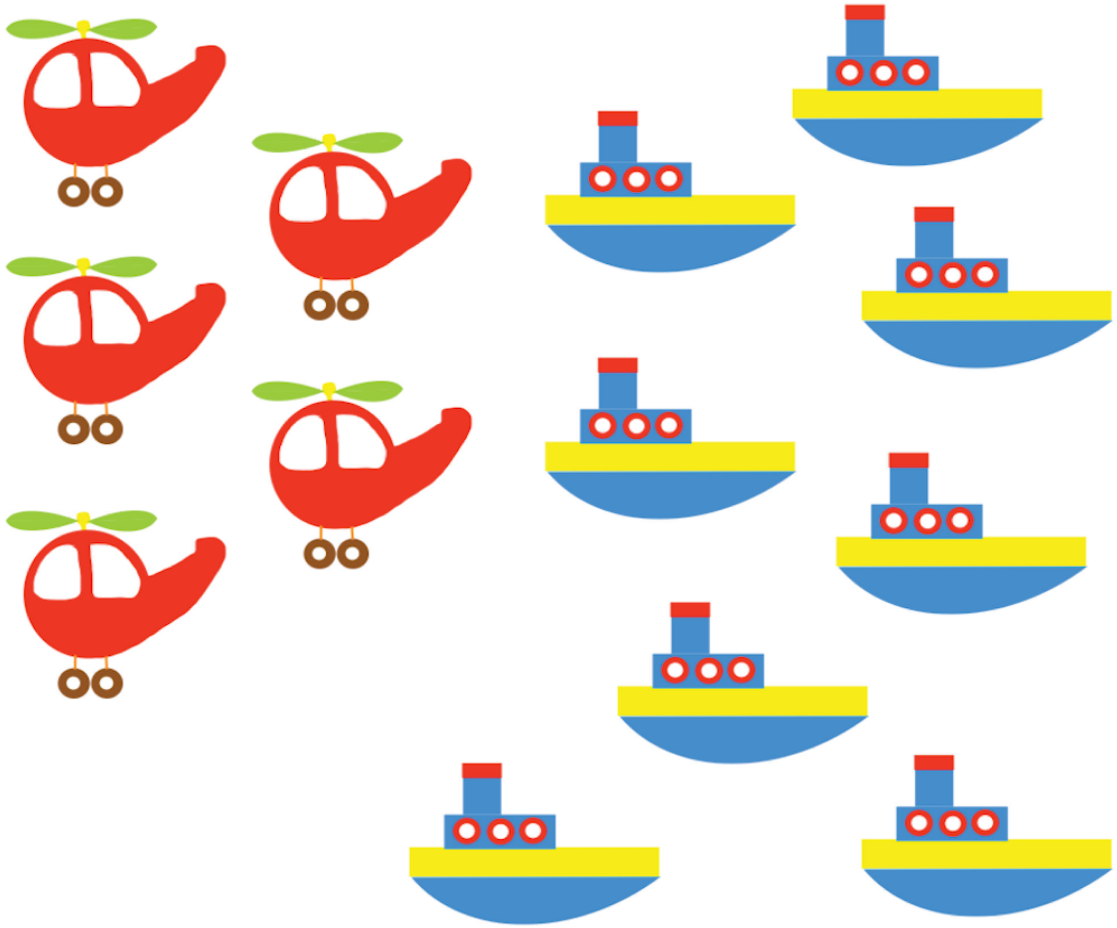
- An understanding that you can always add to subtract.

SO I MIGHT ASK

- Describe 4 completely different situations that 12 – 9 could represent.

SO I MIGHT ASK

Does this picture show addition or subtraction or both?



SO I MIGHT ASK

- I did a subtraction and the answer was 2.
- Could I have subtracted two small numbers? Which ones?
- Could I have subtracted two large numbers? Which ones?
- Could I have subtracted a small from a large? Which ones?

SO I MIGHT ASK

- How could I calculate 22 – 8 only using adding?

CONSIDER LENGTH

I NOT ONLY WANT STUDENTS TO REALIZE

- That you have to line things up straight, use uniform units and that there are unit choices….

I WANT STUDENTS TO REALIZE

- that sometimes you can only compare measures indirectly, but sometimes directly
- that if Object A is longer than Object B using one unit, Object A is longer using any unit

I WANT STUDENTS TO REALIZE

- that you need more smaller units than bigger ones
- that if you measure part of a length, you can use that to estimate the whole length

SO I MIGHT ASK

- How could you decide whether your bed, at home, is longer than the bulletin board or not?

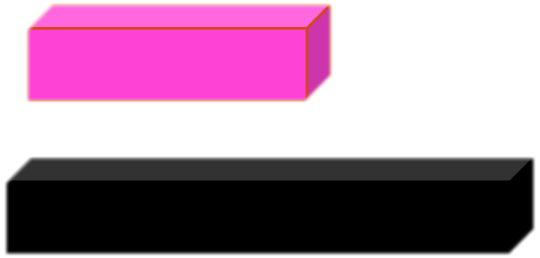
- Why is it easier to compare the lengths of these two ribbons than the height of the filing cabinet and the height of the stage in the gym?

SO I MIGHT ASK

- I measured Sara's height and my height using our "hand" ruler.
- Sara was 10 hands tall and I was 9 hands tall.
- Now we are going to measure in large blocks.
- Are you sure which of us will be taller or will you have to check?

SO I MIGHT ASK

- I measured the table in pink Cuisenaire rods and black rods.
- Which number was bigger? Why?



SO I MIGHT ASK

- How many pink rods long do you think this green ribbon is? Why?

DECIDING WHAT MATTERS MOST

- Consider these topics.What 1 or 2 (ONLY) ideas matter most when teaching:
- Grade 2: patterns
- Grade 5: data
- Grade 8: fraction operations

FOR ME, FOR EXAMPLE

- Patterns in Grade 2:
- Expectations are about: exploring,representing and creating growing and shrinking patterns on number lines and hundred charts, patterns in real-life, two-attribute repeating patterns, what patterns are

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THE IDEAS FOR ME ARE:

- Pattern in Grade 2:
- Knowing a pattern rule allows you to predict what happens later.
- Knowing a pattern rule allows for certainty.
- There needs to be consistency.

SO

- I might repeatedly ask questions (throughout the year) like:
- What numbers might be at the ends of the arrows?

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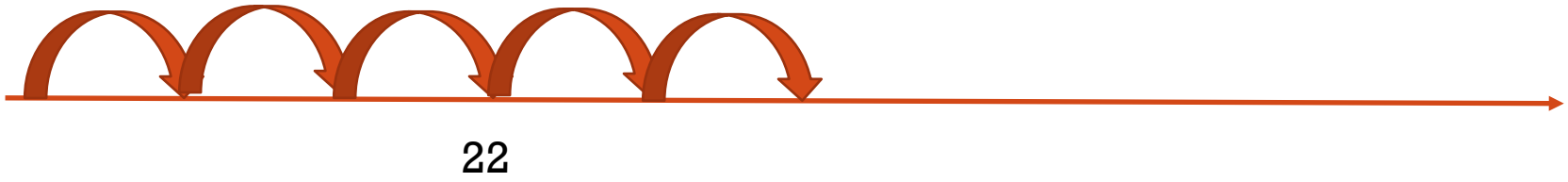

SO

- I might repeatedly ask questions (throughout the year) like:
- Could this be a pattern? Do you think it is?
- 8, 10, 11 , 12, 17, 19,…

GRADE 5 DATA

- Collect using survey or experiment, collect and organize in chart or table or graph including stem and leaf…, read and draw conclusions from primary data, median, describe shape of a set of data, compare two sets of data

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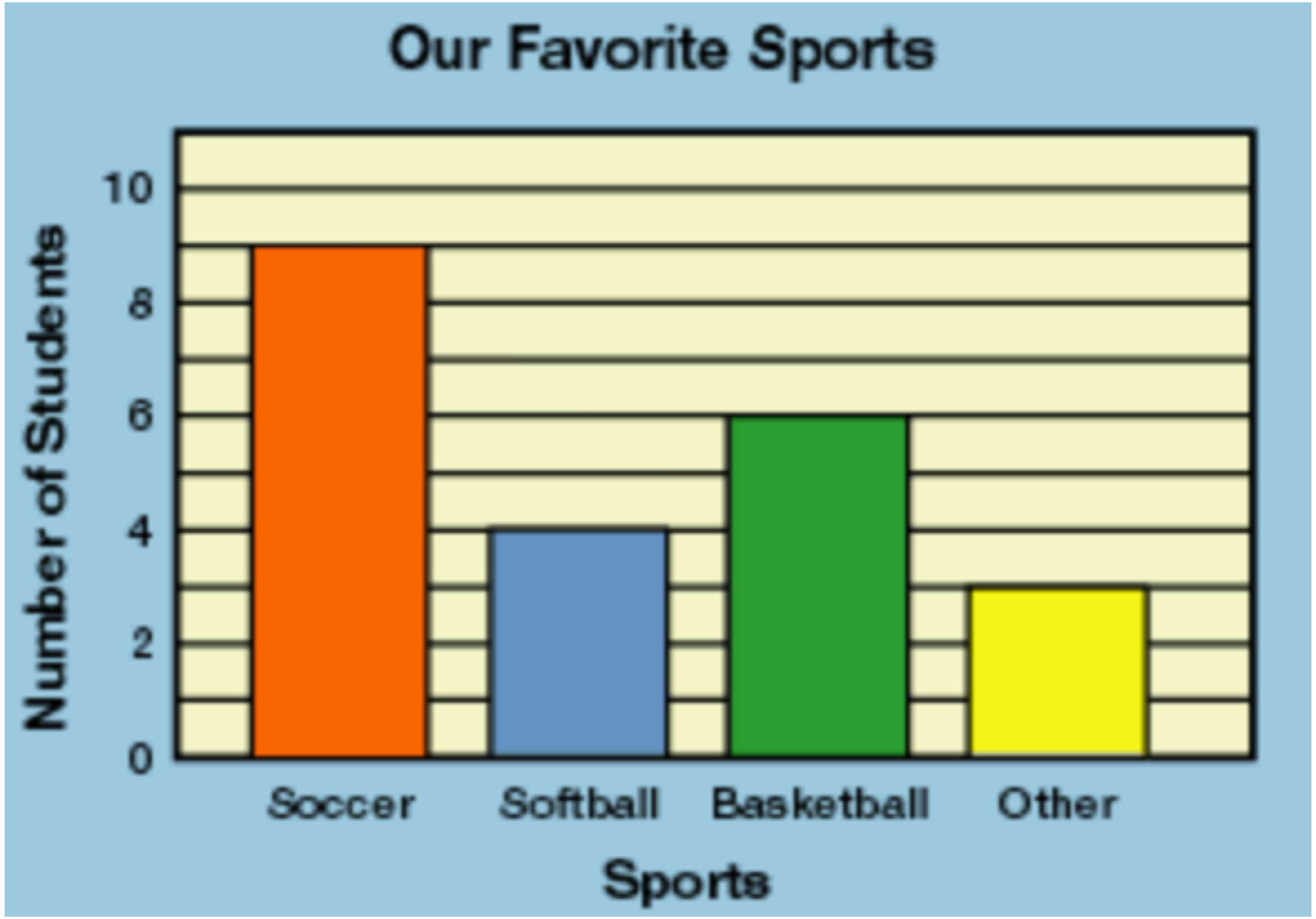
THE MOST IMPORTANT IDEAS FOR ME:

- When you have a set of data, you need to be able to describe what it tells you.
- You need to be able to justify your conclusions.

SO

- I might repeatedly ask: What do you think this tells us?


Our Favorite Sports
Number of Students
10
8
6
4
2
0
Soccer
Softball
Basketball
Other
Sports

Student	English	Math	Science	Spanish	Geography
Jacob	75	76	67	68	71
Ethan	74	58	76	66	87
Michael	56	80	62	79	83
Jayden	78	73	82	70	95
William	71	90	76	63	64
Alexander	87	85	90	78	94
Noah	83	98	75	76	62
Daniel	95	66	95	86	82
Aiden	64	97	78	88	76
Anthony	94	42	56	88	90

GRADE 8 FRACTION OPERATIONS

- Solve problems involving +, –, x and ÷ with simple fractions
- Use estimation when solving problems involving operations with whole numbers, decimals, percents, integers, and fractions…
- Represent the multiplication and division of fractions, using a variety of tools…

THE IDEAS FOR ME

- That operations with fractions mean the same thing as they did with whole numbers.
- Estimation of answer size .

SO

- I might ask…
- What does 2 ½ - ¾ mean?

- What does 5/8 ÷ 1/3 mean?

SO

- I might ask…
- WITHOUT CALCULATING:
- How do you know that ¾ x 5/3 is less than 5/3?

- How do you know that 2/3 ÷ 1/10 is a lot?

SO

- I might ask…
- Draw a picture that would help you figure out ¾ + 5/3.

- Or 3/5 x 4/3.

THEN YOU GO BACK AND

- Figure out what sorts of lessons you need.

PLANNING A LESSON

- Let's talk about 3-part lessons which include an activation, an action piece and a consolidation.
- (although it's not about 3-parts….)

BACKWARDS DESIGN

- Start with the learning goal/consolidation– What do I want students to be able to respond to at the end?

CHOOSE AN ACTION TASK

- Choose a task that would have potential to get you where you want to go.

PLAN CONSOLIDATION QUESTIONS

- Plan those final questions you really care about to bring out the math.
- Tie them to the work the kids did.
- Don’t dwell on solutions; dwell on the math ideas you want to bring out.

ACTIVATION

- Go back and think about what you'd do to get kids ready for the main task, without giving away the problem aspect of that task.

HERE IS A GRADE 1 EXAMPLE

- My learning goal:
- I can represent the same number differently and see something different about it.

I WANT THEM TO BE ABLE TO ANSWER QUESTIONS LIKE

- If you represent 12 using ten-frames, what is easy to see about 12?
- If you represent 12 using an egg-carton, what is easy to see about 12?
- If you represent 12 as 9 + 3, what is easy to see about 12?

I WANT THEM TO BE ABLE TO ANSWER QUESTIONS LIKE

- How could you represent 20 so it's easy to see that it's more than 18?
- How could you represent 20 so it's easy to see that it's even?
- How could you represent 20 so it's easy to see that it's bunches of 5s?

SO I CREATE A POSSIBLE TASK

- Choose a number between 10 and 25.
- Represent that number at least four different ways.
- For each way, tell what you can most easily see about your number.

I CONSOLIDATE BY ASKING QUESTIONS LIKE

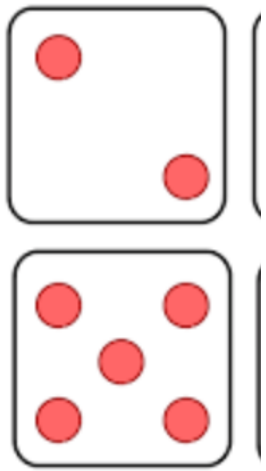
- Which of your ways helped show whether your number was more than 10?
- Which helped show that your number was less than 25?
- Which helped show whether it was even or odd?

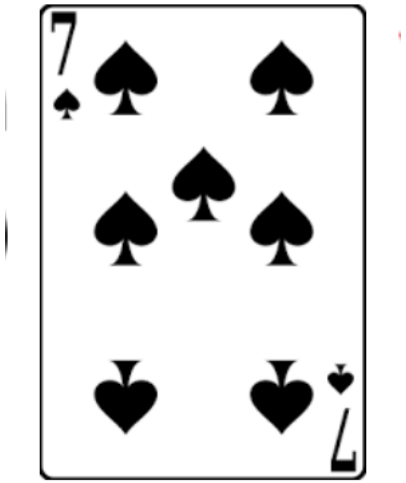
I CONSOLIDATE BY ASKING QUESTIONS LIKE

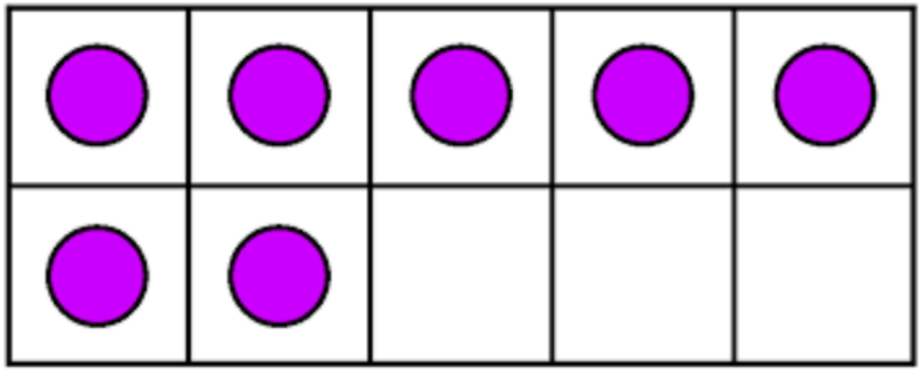
- How might you represent your number to show it's a bunch of equal groups? Or is it?
- How might you show your number another way to show something else about it?

I PLAN AN ACTIVATION

- What do you see about 7 in each picture?







HERE IS A GRADE 4 EXAMPLE

- I want students to be able to describe how a fraction changes when the numerator changes and when the denominator changes.
- But I want to engage them in thinking and make it interesting.

I WANT THEM TO BE ABLE TO ANSWER QUESTIONS LIKE:

- How are the pictures of 3/8 and 3/9 alike and different?
- How are the pictures of 3/8 and 5/8 alike and different?
- When I look at a representation of a fraction, where do I find the numerator? The denominator?

I CHOOSE A POSSIBLE TASK

- Choose a number between 3 and 8.
- Create a fraction where your number is the numerator.
- Use fraction pieces to represent that fraction.
- Create a fraction where your number is the denominator.
- Use fraction pieces to represent that fraction.

I CONSOLIDATE:

- This was Lara's representation:

- What number do you think she chose? Why? Was it for the numerator or denominator? Could it have been the other?

I CONSOLIDATE

- It it was for the denominator,

- what picture might she have drawn if that number was for the numerator? Etc. etc.

I CONSOLIDATE

- Lisa drew a number line representation and her number was 7.
- What do you think her pictures looked like? Etc. etc.

I CONSOLIDATE

- I go back to more general questions:
- How are the pictures of 3/8 and 3/9 alike and different?
- How are the pictures of 3/8 and 5/8 alike and different?
- When I look at a representation of a fraction, where do I find the numerator? The denominator?

ACTIVATION

- To get kids ready to do the task, I might ask:
- Think of 2 different ways to represent 8/10. OR

CONSIDER AREA FORMULAS

I NOT ONLY WANT STUDENTS TO REALIZE

- What the formulas for areas of rectangles, parallelograms, triangles, trapezoids and circles are, but…

I WANT STUDENTS TO REALIZE

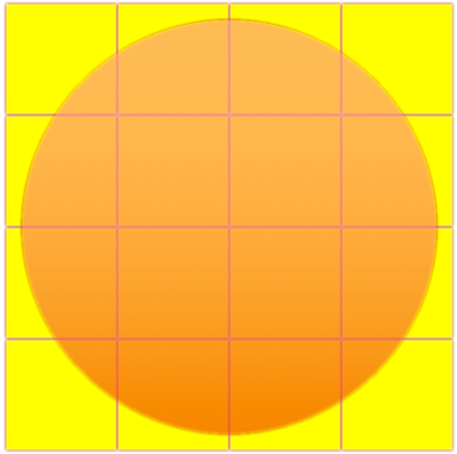
- That the number of variables on the "right side" of the formula tells how many measurements you need to take to figure out the desired measure
- That the purpose of a measurement formula is to make a hard measurement easier to determine
- That there are usually "alternate" formulas.

SO I MIGHT ASK

- What is the formula for the area of a trapezoid? How does it tell you which and how many measurements you need?

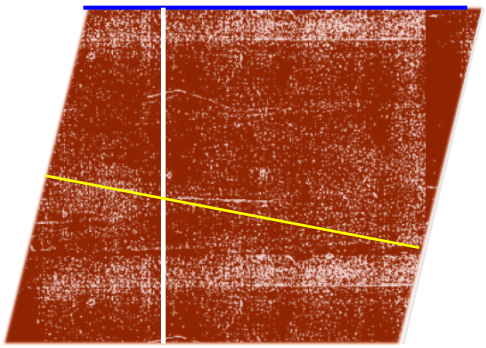
SO I MIGHT ASK

- Suppose you didn't know the formula for the area of a circle.
- Why might it be hard to determine this area?



SO I MIGHT ASK

- Jane said that the area of the parallelogram is found by multiplying the blue and green lengths.



- Kyle said it is found by multiplying the white and yellow lengths.

- With whom do you agree?

SO I MIGHT ASK

- Which do you think is true?
- You can get the area of a triangle by multiplying half its height by its base.
- You can get the area of a triangle by multiplying the base by half the height.
- You can get the area of a triangle by taking half of the product of the base and the height.

IT'S ABOUT UNDERSTANDING

- Instead of just asking what 25 + 12 is, I might ask:
- How do you know that 25 + 12 has to be more than 23 + 9 WITHOUT adding?

IT'S ABOUT UNDERSTANDING

- Instead of just asking to model 43 with base ten blocks, I might ask:
- How can you show 43 with 25 base ten blocks?

IT'S ABOUT UNDERSTANDING

- Instead of just asking for the calculation of a perimeter which is 10 cm x 5 cm, I might ask:
- How do you know that the perimeter of a rectangle must be more than twice its length?

IT'S ABOUT THINKING

- Questions like:
- You choose two numbers.
- When you add them, the result is double the amount as when you subtract them.
- Come up with lots of possibilities.

IT'S ABOUT THINKING

- Questions like:
- You choose a number.
- You add something to it and you also subtract the same amount from it.
- Your two answers are 12 apart.
- What could your numbers have been?

IT'S ABOUT THINKING

- Questions like:
- You complete activities A, B and C within a one hour time block.
- B takes twice as long as A.
- C takes twice as long as B.
- There are 5 minute breaks between A and B and B and C.
- How long could each of the activities have been?

IT'S ABOUT THINKING

- Questions like:
- You create a design with pattern blocks that is 1/5 blue and 1/2 green.
- What might it look like?

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