TEACHING WITH INTENTION

FOCUSING ON WHAT MATTERS

Marian Small

November, 2018

My experience:

I plan lessons with teachers and ask:
What do you want students to get out of the lesson?

Too often

A restatement of a learning standard or the naming of a skill, but rarely, if ever, an idea that students will walk away with.

My experience:

After students work, too many teachers ask pretty much only “What was your answer?” and “How did you get it?”

I would wish…

A teacher to spend time thinking deeply about what s/he brings to students' attention and asks questions to ensure that happens.

I believe we need

teachers who teach with intention:

who use specific learning goals that often focus on ideas, not just skills

who pull lessons together by focusing on math ideas and not just answers

What might a clear and valuable learning goal be?

I do not just see it as a restatement of curriculum, even though it, of course, addresses curriculum standards.

I see it, frequently, as an idea that is to be brought to the surface that is important mathematically.

Here are some examples.

If I know some things about a number, I can figure out other things about it.

I tell you a number is 2 digits.
What else do you know about it?

Mystery Number Clues

Clue 1: The number is between 4000 and 6000.

Clue 2: It can be written as ____ tens but not as ____ hundreds.

Clue 3: It can be written in expanded form using only two parts.

1. List some numbers that the mystery number might be.
   For each number, explain how you know that it matches the set of clues.

2. List some numbers that the mystery number **cannot** be.
   For each number, explain how you know that it does not match the set of clues.

Mystery Number Clues

Clue 1: The number is between 4000 and 6000.

Clue 2: It can be written as ____ tens but not as ____ hundreds.

Clue 3: It can be written in expanded form using only two parts.

3. a) Create a set of clues about a mystery number that is between 1000 and 10 000.
Don’t make the clues too easy or too difficult.

b) Give your clues to your partner.
Ask your partner to list some numbers that match the clues and some numbers that do not match.

Here are some examples.

I get an idea of how big a fraction is by relating its numerator to its denominator.

1. Create two fractions that match this description:
   - the denominator is between 10 and 20
   - the value of the fraction is close to $\frac{1}{2}$ but not exactly $\frac{1}{2}$

   Explain your thinking.

2. Create two fractions that match this description:

- the denominator is between 20 and 30
- the value of the fraction is close to $\frac{3}{4}$ but not exactly $\frac{3}{4}$

Explain your thinking.

Consolidate Questions

1. How do you know that $\frac{11}{32}$ is close to $\frac{1}{3}$?

Consolidate Questions

2. How could comparing the numerators and denominators help you see why $\frac{7}{8}$ must be more than $\frac{1}{5}$?

Consolidate Questions

3. What fraction might you say that $\frac{17}{20}$ is close to? Explain your choice.

Consolidate Questions

4. How would you explain to someone how the relationship between the numerator and denominator of a fraction tells you about its size?

Here is another example.

A problem :
There are 44 kids, some Gr.2 and some Gr. 3.

There are LOTS more Gr 3 kids compared to Gr 2.

How many of each might there be?

- Then I pose this problem.
- Now there are 48 kids in the two grades.
- There are EXACTLY 4 more in Gr. 2 than Gr. 3.
- How many of each?

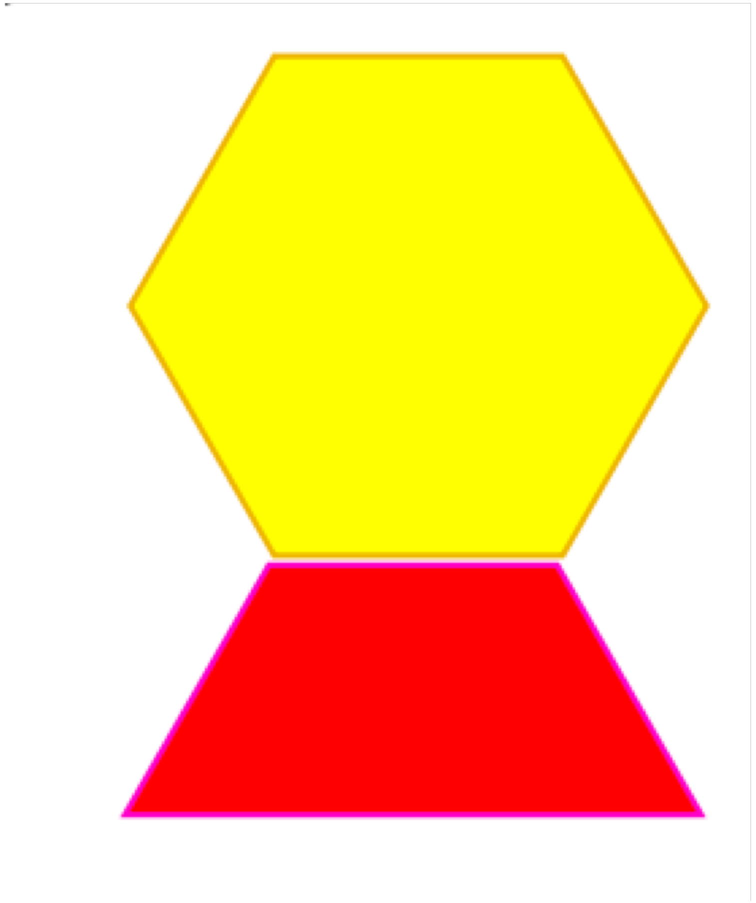
Now I ask:

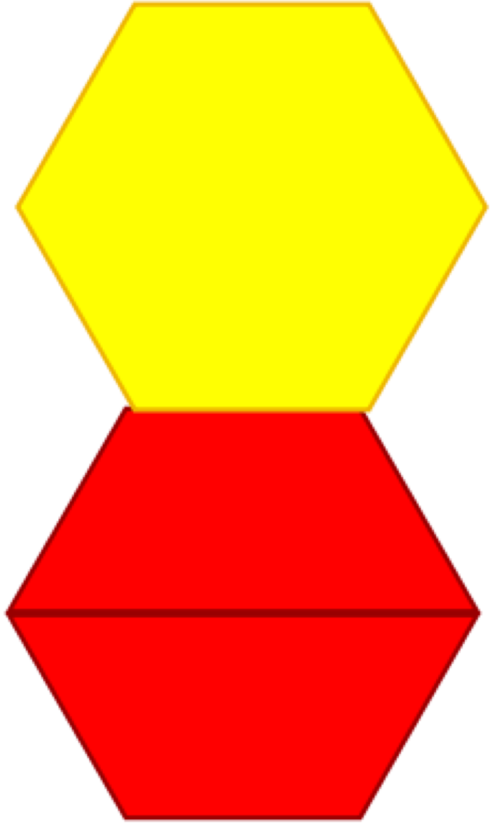
- Were the numbers of each close or far apart?
- Was either number in the 30s? Why or why not?
- How did you figure out how many of each?

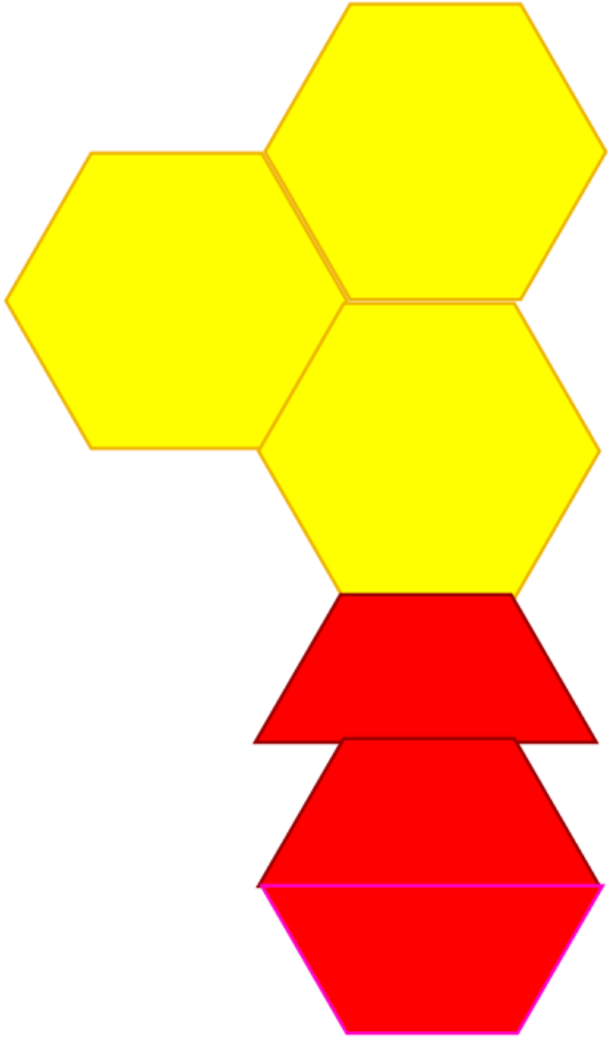
Why were there so many answers the first time?

Why were there not so many answers the second time?

- Or this one:
- Use your pattern blocks.
- Put some together so that half of what you see is yellow.







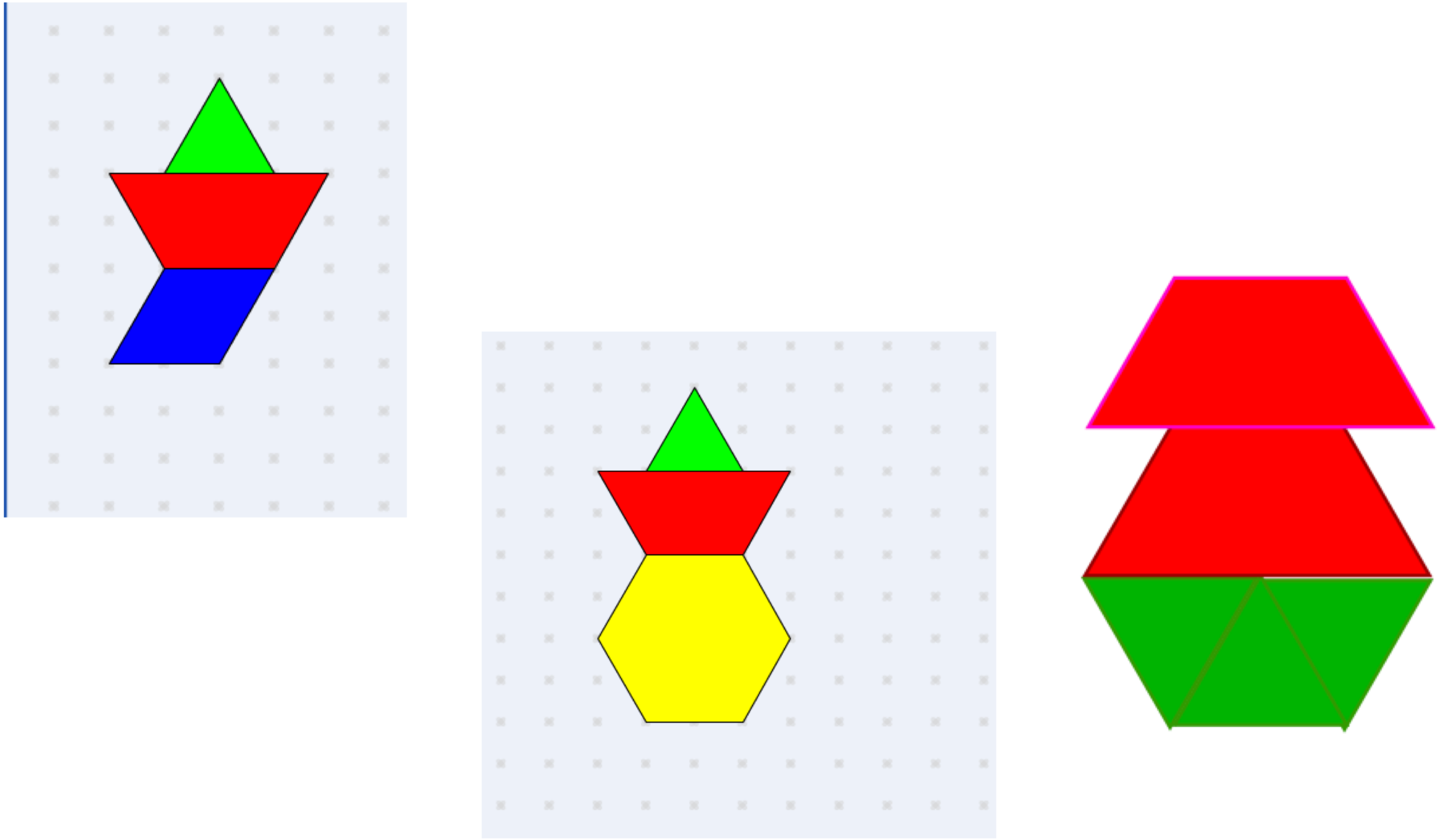
What would students see?

There could be a lot of blocks or not that many.

The half could be half of the blocks OR half could be half of that area (and those are different).

Now…

- **Put together blocks so that what you see is 1/3 red and 1/3 green.**
- **Put together blocks so that what you see is 2/3 red and 1/3 green.**

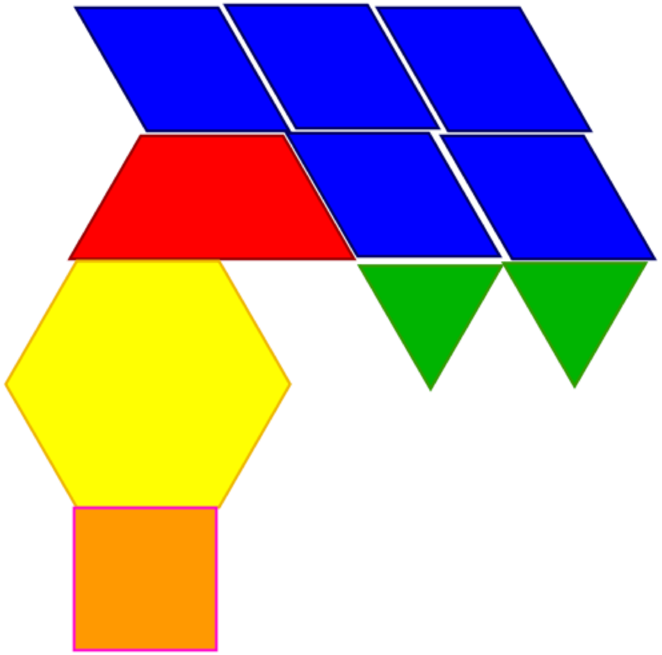


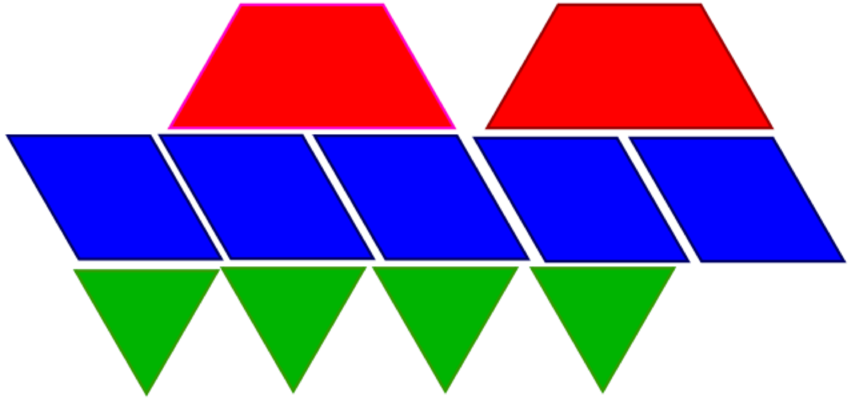
What will students learn?

When you use 1/3 and 2/3, there cannot be any other colours because 1/3 + 2/3 is the whole.

Or

Put together blocks so that what you see is 1/2 blue and 1/5 green.





What will students learn?

That when you work with both halves and fifths, you need to think about tenths.

Or this idea for a learning goal:

I want students to know that any number is a given percent of some other number, no matter what percent you choose.

I might ask:

40 is ____ % of _____.
What could be in the blanks?
Think of LOTS of possibilities.

Consolidation

Could 40 be 1% of something?
30% of something?
90% of something?

Consolidation

If 40 is ____ % of _____, are there numbers that could not go in the first blank? How do you know?

Are there numbers that could not go in the second blank? How do you know?

Or

I want students to know that if you know any percent of a given number, you know every other percent of that number.

I might ask:

Suppose I tell you that 30% of a number is 88. What other percents of that number are you sure of?

Consolidation

What percents of the number were easiest for you to figure out if I told you 30%? Why those?

Consolidation

Could you have figured out 1%? How?

Could you have figure out 50%? How?

Consolidation

Are there any percents of that number you could not have figured out? Explain.

Suppose the topic were right angle trigonometry

- **You might want students to realize that once you know any trig ratio for an angle in a right triangle, you know ALL of the ratios.**

You might ask:

Suppose you know the value of the sine of an acute angle.
What other ratios of that angle do you know?
What other ratios do you not know or are you not sure about?

Consolidate:

- **Which ratios were easiest to figure out right away? Why those?**

Did you need to figure out the angle value or not to figure out the other ratios?

Would your values have been different if you had figured out the angle first?

Suppose the topic were functions

- You might want students to realize that EVERY function can be written as a composite function, if you want to.

You might ask

What are some ways you could write each of these as composite functions:

$h(x) = 2x + 5$

$h(x) = 3x^2$

$h(x) = \sin x$

$h(x) = 5^{2x}$

Consolidate:

Is there more than one way to write $h(x) = 2x + 5$ as a composite function?

What about the other ones?

Consolidate:

What if $h(x) = x$ or $h(x) = x^2$? Would it be possible then?

Consolidate:

Are there any functions you could not write as composite functions?

- **The focus on intention is really a way to talk about the fact that teachers need to work on thinking about why they teach what they teach.**
- **Our curriculum documents don’t do a good enough job, in my opinion, in making these ideas clear.**

It is something worth working on no matter what grade level you teach.

Download:

www.onetwoinfinity.ca

Recent Presentations

KC