Enseigner avec intention; En se concentrant sur ce qui est important 4é-6é

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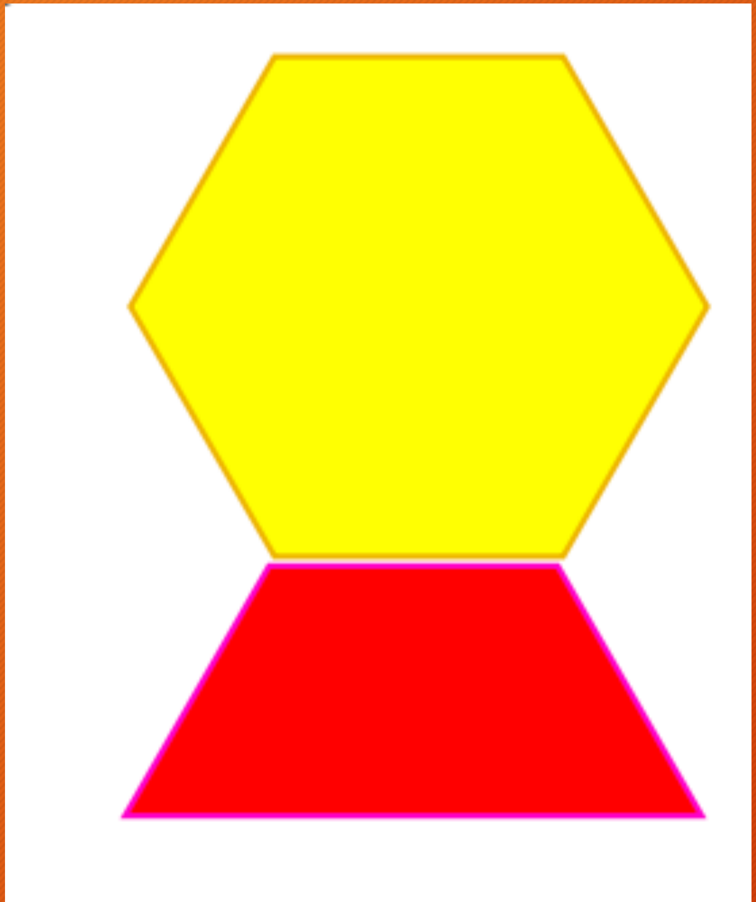
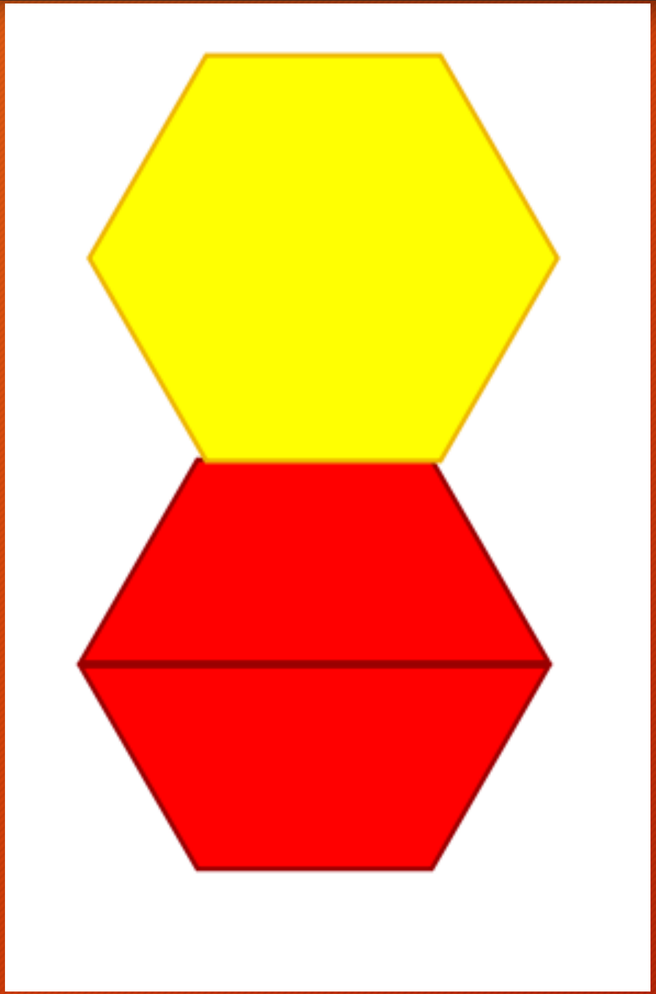
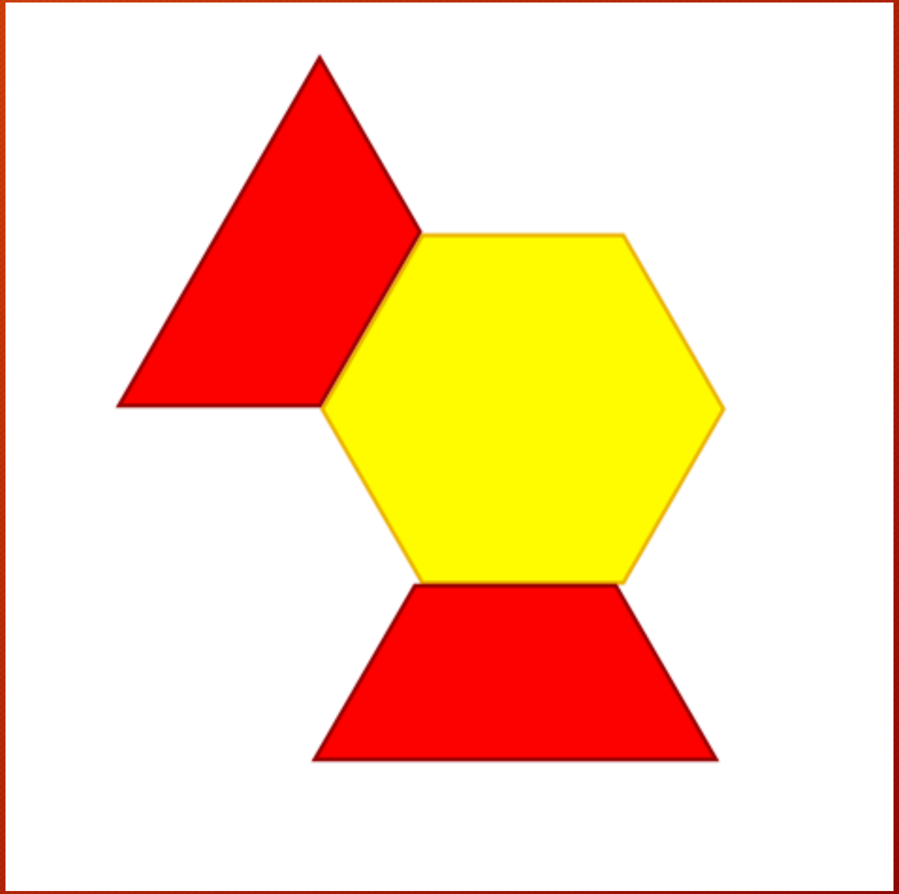
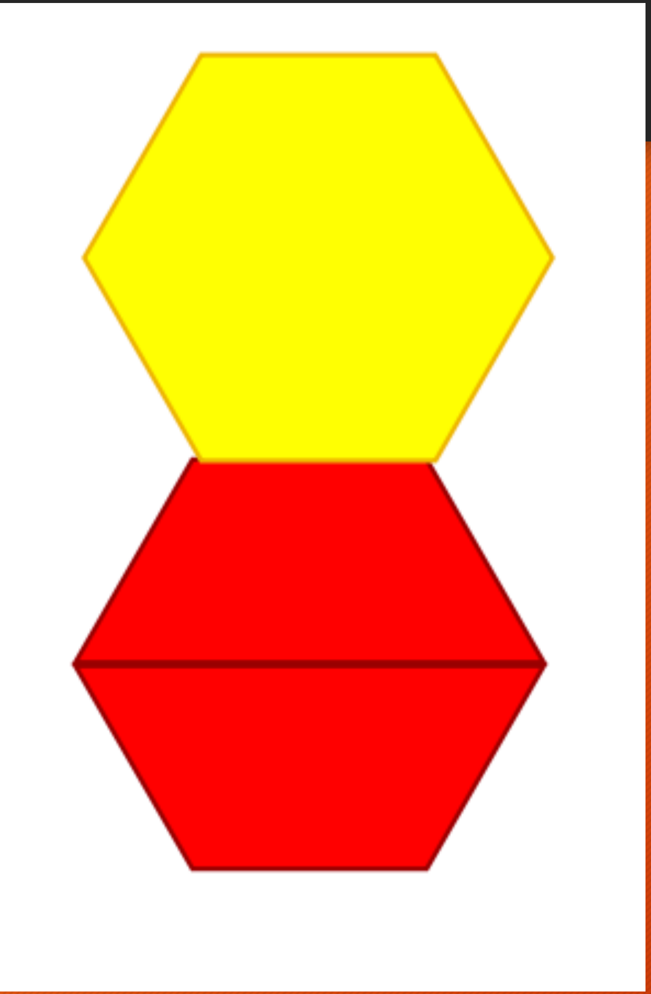
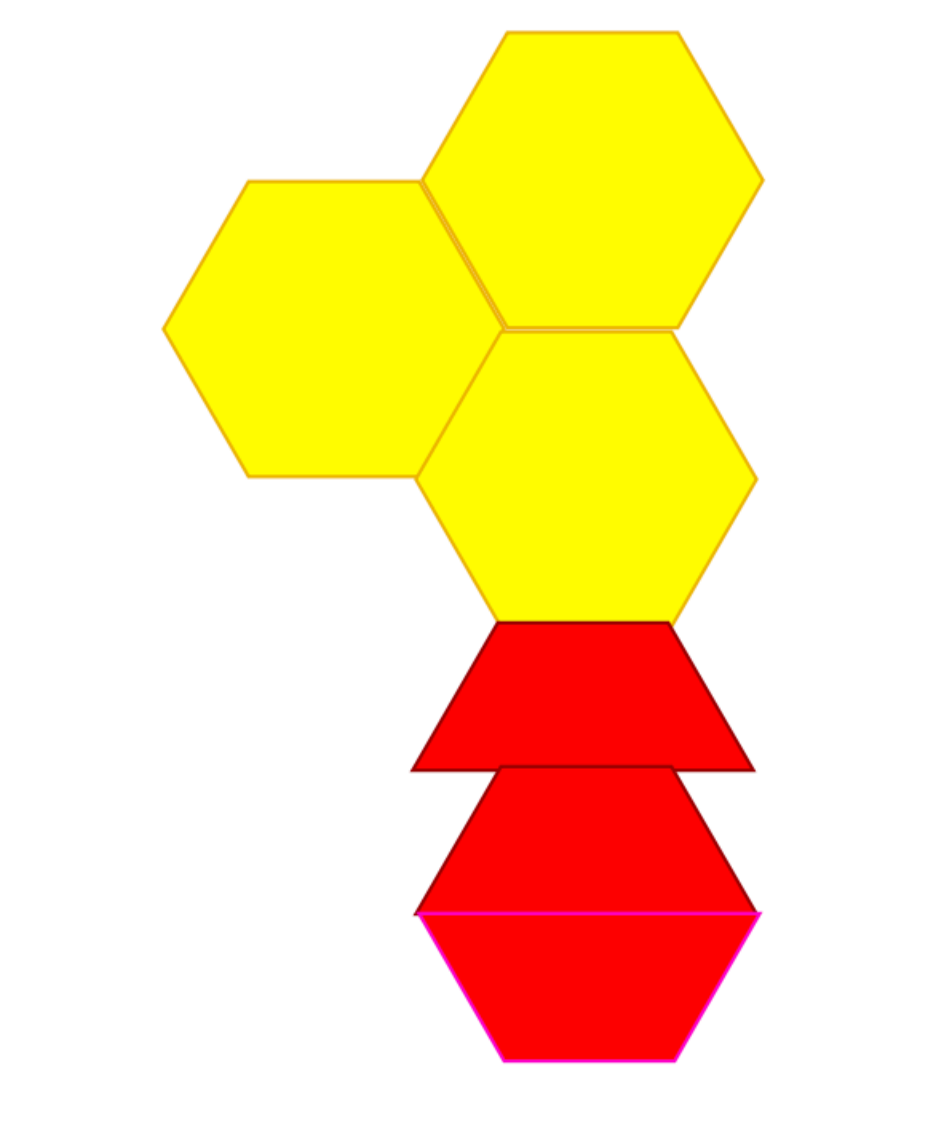
Let’s do a problem

- Use your pattern blocks to make a design that is half yellow.

What did I get out of this?

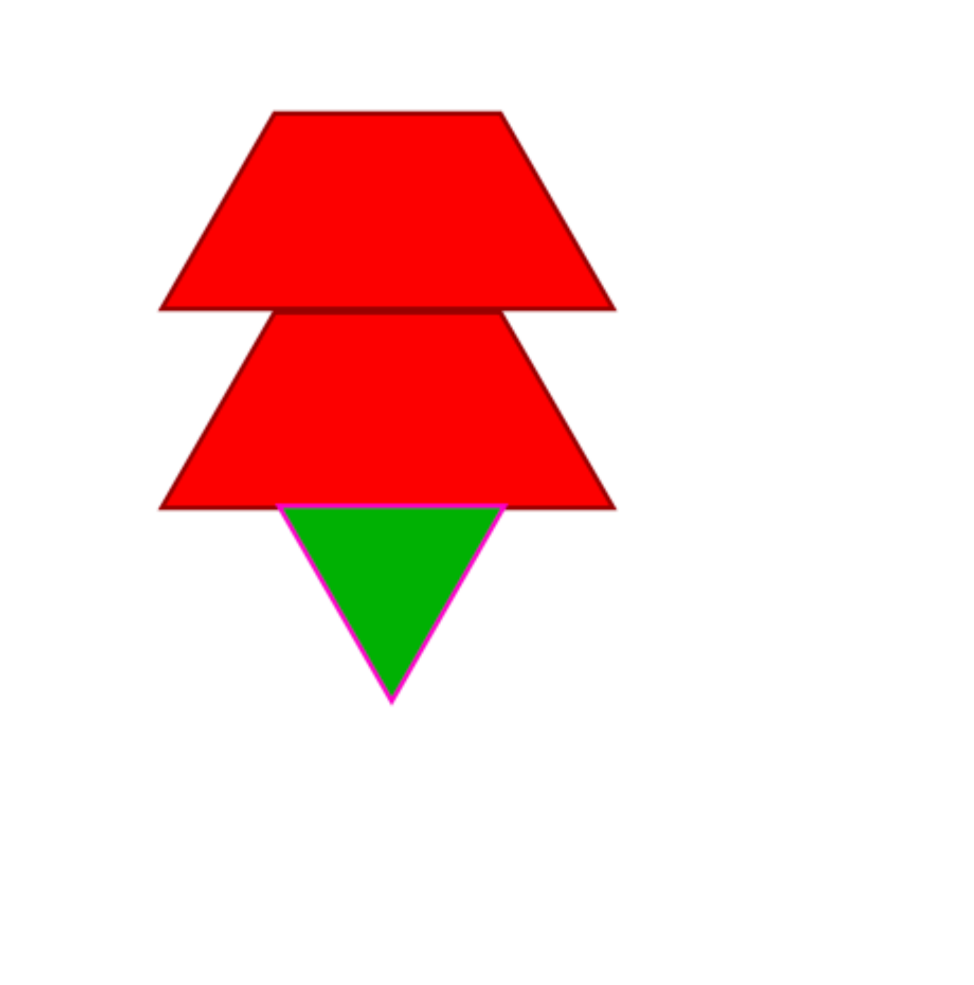
- The idea that half could be half a set or half an area.
- The idea that half does not mean symmetric.
- The idea that half yellow doesn’t tell you if the whole is big or small.

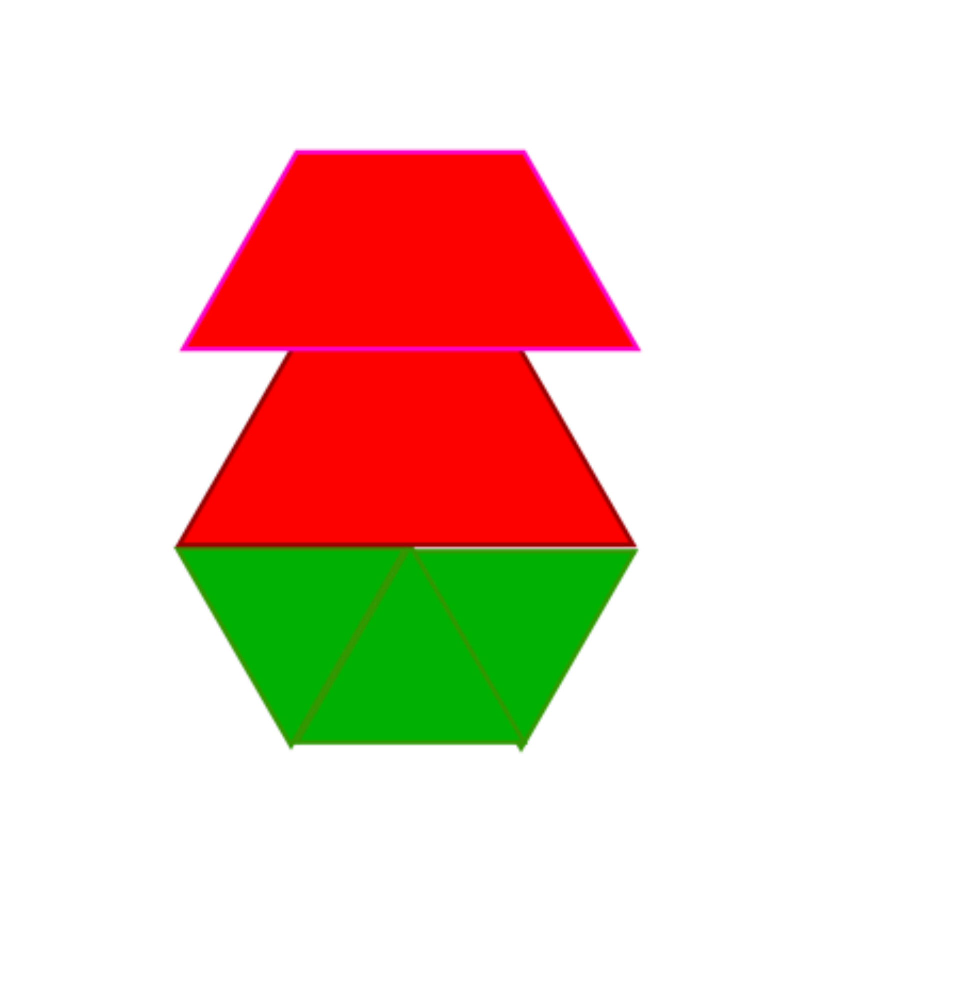




Let’s do another problem

- Use your pattern blocks to make a design that is 2/3 red and 1/3 green.



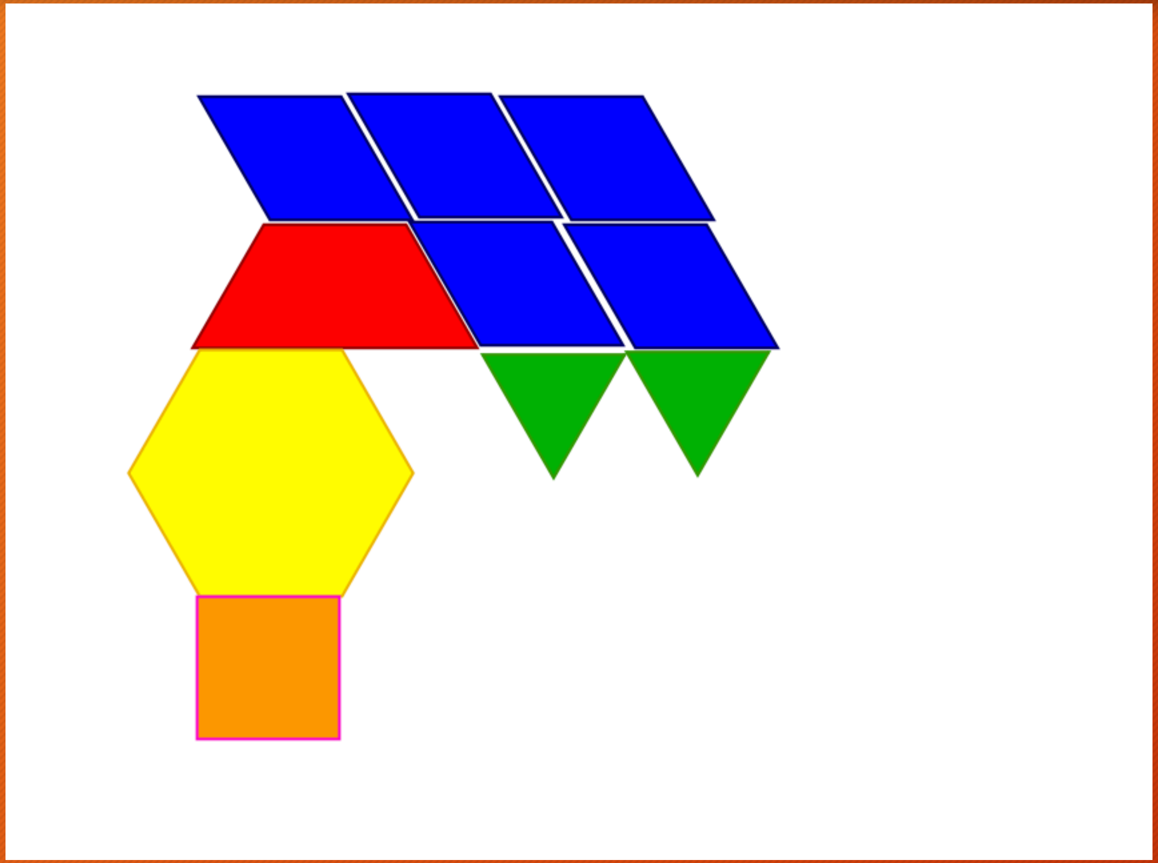
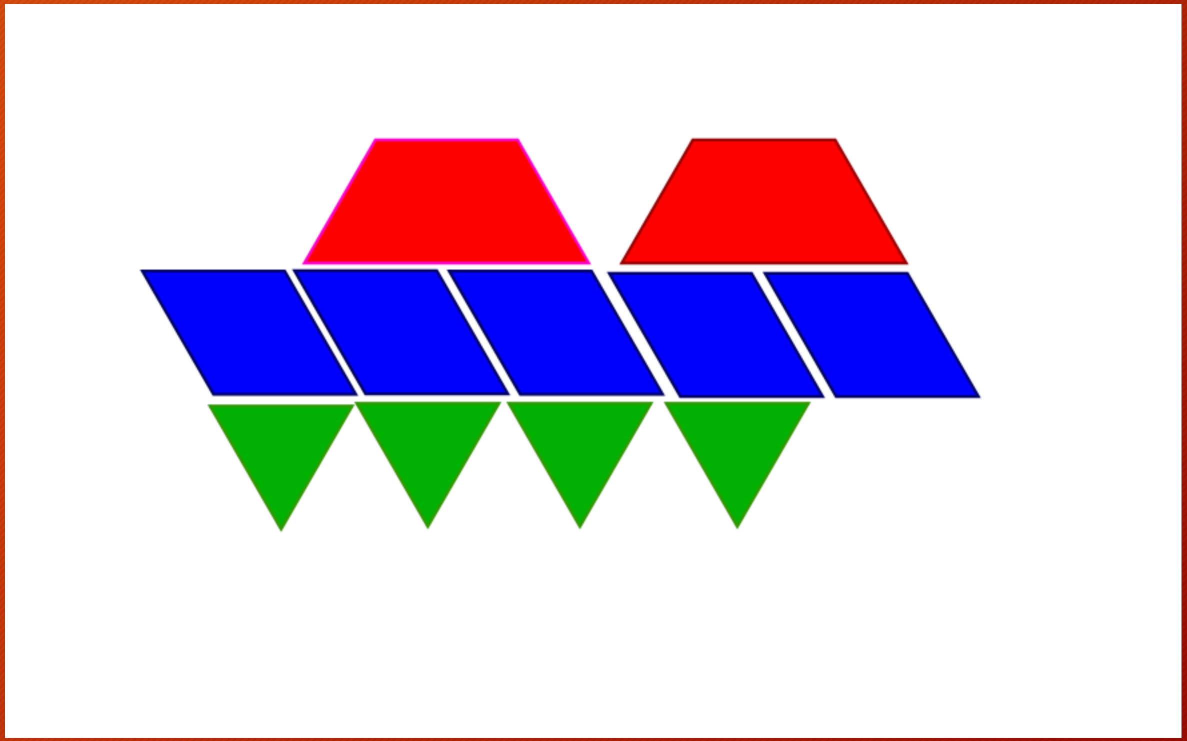


What did I get out of this?

- The idea that since 2/3 and 1/3 takes up everything, no other colours are possible.

Let's do a third problem

- Use your pattern blocks to make a design that is 1/2 blue and 1/5 green.

What did I get out of this?

- The need for a “common denominator” when trying to show halves and fifths at the same time.

What contenu was I addressing?

- 4^e année:

utiliser une variété d'objets et d'illustrations pour représenter des fractions simples en tant que parties d'un tout et parties d'un ensemble dans divers contextes (p. ex., six enfants s'amusent dans la cour de l'école. Deux tiers jouent au ballon. Combien d'enfants jouent au ballon?).

But I put “meat” on the contenus

I was addressing what I will call essential understandings.

Teachers need to borrow or learn about them so they don’t just “do stuff”.

I would argue

- That just “doing” contenus is not enough to lead to mathematical success.

- Students need to meet ideas and not just solve random problems.

Valuable work

- Would be to look at contenus and think about what ideas need to be addressed.

- Teachers should be expected to be able to articulate what those ideas are.

Let’s try one together

- What ideas are embedded in this contenu?

5e année

trouver les facteurs d'un nombre naturel inférieur à 144.

For me, it might be these ideas:

A factor is never more than the number.

For example, the greatest factor of 32 is 32.

A factor means you can divide the original amount into that many equal groups.

For example, since 7 is a factor of 21, you can divide 21 into 7 equal groups.

A factor means you can decompose the original amount into groups that are the size of the factor.

For example, if you know that 9 is a factor of 27, that tells you that you can make groups of 9 out of 27 with no remainder.

You can find factors of a number by building rectangles with the area of the original number and determining side lengths..

8 is a factor of 16 since 16 squares can be arranged into a 2 x 8 rectangle and 8 is a dimension.

Factors come in pairs. If you know one in the pair, you can calculate the other by dividing the original amount by the factor.

For example, since 4 is a factor of 64, then so is $64 \div 4$.

If you know one factor of a number, it automatically tells you other factors.

For example, if 9 is a factor of 99, so are:
3 (since 3 is a factor of 9) and so is $99 \div 9$ and $99 \div 3$.

6e année

- comparer et ordonner des nombres fractionnaires et des fractions en utilisant une variété de stratégies (p. ex., matériel concret, dessin, droite numérique, fraction repère).

Strategies for comparing fractions often change depending on what the fractions are.

For example, I decide whether 3/8 is more or less than 1/3 differently than whether 1/11 is more or less than 7/9.

•

An important way to compare fractions is to compare the numerator to denominator, but in terms of how many of the numerator makes the denominator (or vice versa) and not how far apart they are.

- For example, $2/10 < 3/8$ since it takes five 2s to make 10 but less than five 3s to make 8.

- Just because the numerator and denominator are closer doesn’t tell you which fraction is greater .

For example,

2/5 vs 2/6 (where 2/5 is greater)

2/5 vs 91/95 (where 91/95 is greater)

Grade 6

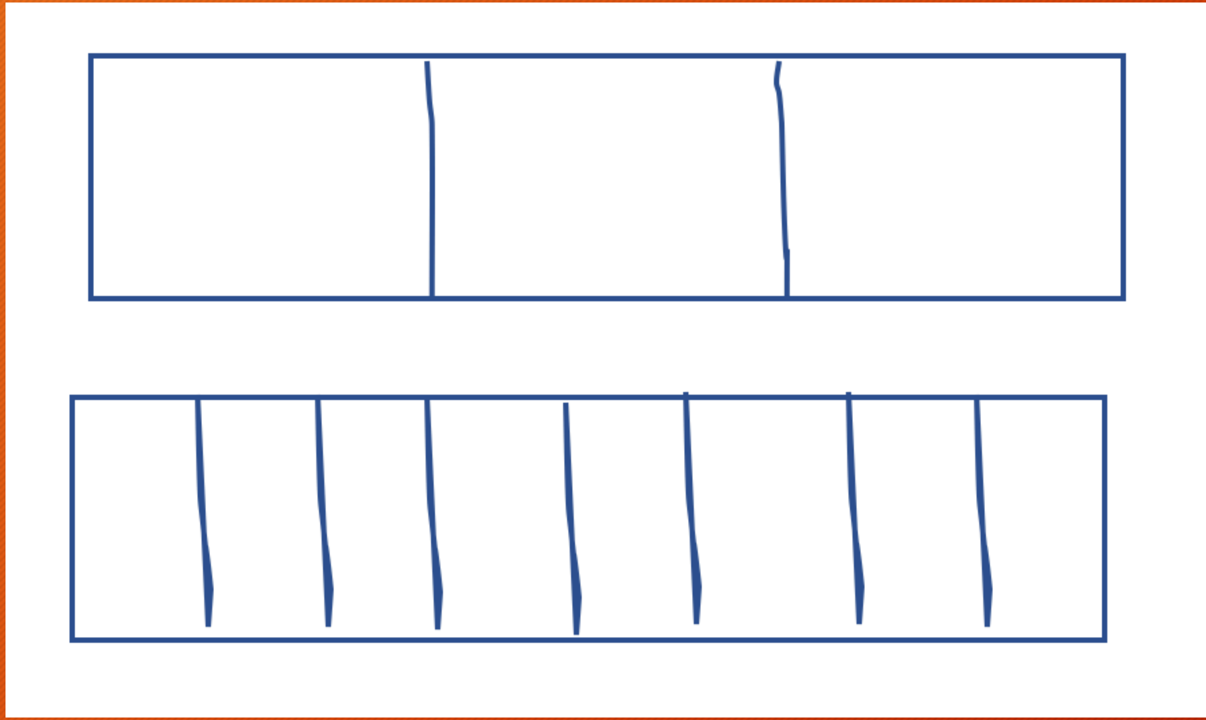
It’s usually easier to compare improper fractions as mixed numbers instead of as improper fractions, but not always.

For example, it’s easier to see that $3\frac{1}{2} < 4\ 1/3$ than to see that $7/2 < 13/3$

Grade 6

- Hand-made drawings help us compare fractions that are far apart, but not ones that are close together.

Grade 6



So now…

Choose a contenu in number in your grade.

Think about what ideas you would want to come out.

So is there a list of essential understandings?

Yes and no.

I have various lists in different books I have written or am writing, but they are not everybody's.

How does it play for me when teaching?

The first place is in setting learning goals for the lesson.

The second is in choosing activities to lead me to those goals.

How does it play for me when teaching?

The third is in consolidation.

The fourth is in assessment of learning.

Setting Learning Goals

Here are examples of learning goals I have set to fit 4e année contenus.

Setting Learning Goals

choisir l'unité de mesure conventionnelle appropriée pour estimer et mesurer des longueurs données (millimètre, centimètre, décimètre, mètre).

Setting Learning Goals

- My goal might be that students realize that the appropriate unit changes depending on purpose.

Setting Learning Goals

– identifier, effectuer et décrire des rotations d'un quart de tour, d'un demi-tour ou de trois quarts de tour, à l'aide de matériel concret ou de calquage sur papier quadrillé ou à points, en utilisant un des sommets de la figure comme centre de rotation.

My learning goal might be that sometimes it is easy to tell if or what rotation occurred and sometimes it is not; depends on the “symmetry” of the shape

5^e année

– comparer, à l'aide de matériel concret, l'aire de différentes figures ayant le même périmètre et vice versa.

5e année

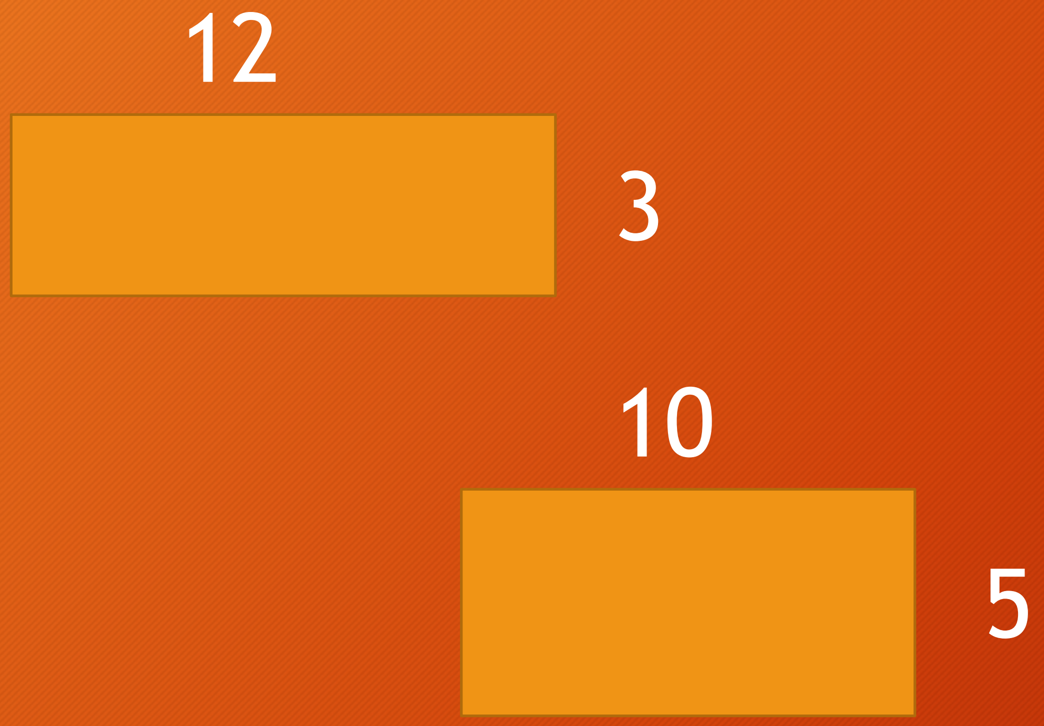
My learning goal might be that if two figures have the same perimeter, you can predict which has more area by knowing the ratio of the length to the width (not just the values).

5^e année

For example, imagine a rectangle where the length is four times the width and another where the length is double the width.

The perimeters are the same.
Which has more area?

5e année



5e année

- classifier les différents quadrilatères (carré, rectangle, losange, parallélogramme, trapèze, cerf-volant et deltoïde) selon leurs propriétés communes et distinctes (p. ex., axes de symétrie, côtés de même longueur, côtés parallèles, diagonales, angles).

5e année

My learning goal might be that students realize that there are different ways that you can define various quadrilaterals.

5e année

For example, the definition of a parallelogram could be a quadrilateral with pairs of opposite sides equal OR a quadrilateral with pairs of opposite sides parallel.

6e année

– tracer un rectangle, un triangle ou un parallélogramme ayant une aire donnée.

6e année

My learning goal might be that a triangle and parallelogram can have the same area, but only if the triangle is either taller or wider or both.

6e année

For example, if a parallelogram and a triangle have area 20 square units, the dimensions of the parallelogram might be b = 10 and h = 2, but the triangle needs a greater b or a greater h.

6e année

construire, à l'aide d'une règle et d'un rapporteur, divers polygones de mesures données (p. ex., construire un triangle isocèle obtusangle ayant un angle de 130°).

6^e année

My learning goal might be that there are usually fewer possibilities for a polygon if there are more rules and that sometimes contradictory rules make a construction impossible.

6^e année

For example, I might ask for a triangle with one side of 8 cm and look for options.

Then I'd ask for an isosceles triangle with one angle of 40° and a side length of 5 cm.

6e année

I might ask for a triangle with one angle of 40°, one of 100° and a side length of 5 cm.

I might ask for an equilateral triangle with an angle of 80°.

Your turn

Each team needs to choose one or two contenus that you might address by being much more clear about a learning goal which is about an IDEA (not skill) that you want students to learn.

Choosing activities to lead to a learning goal

Once I have a goal, it should make it easier to choose an appropriate activity.

For example…

My learning goal in Grade 4 might be that the student using a grid system with letters and numbers realizes that there are different grids possible, but that the distance between locations on the grid is predictable for all of them.

For example…

My activity might be to show students all four of these grids.

Grid 1

10										
9										
8										
7										
6										
5										
4										
3										
2										
1										
	A	B	C	D	E	F	G	H	I	J

Grid 2

										10
										9
										8
										7
										6
										5
										4
										3
										2
										1
J	I	H	G	F	E	D	C	B	A	

Grid 3

	A	B	C	D	E	F	G	H	I	J
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

Grid 4

j	I	H	G	F	E	D	C	B	A	
										1
										2
										3
										4
										5
										6
										7
										8
										9
										10

For example…

Then I ask them to choose locations for animals

A lion is at_____

A giraffe is at ______

A tiger is at ________.

A hippopotamus is at ________.

For example…

They plot them on each graph and figure out how far apart (how far over and up or down) each pair of animals is from the others.

Then I consolidate..

- I get 4 kids to each give us one of their locations and we write them down (e.g. F2, A4, B10, C7).

Then I consolidate..

- I ask kids to predict which two are the most total spaces apart on one of the grids if we count both over and up. Then they check.

Then I consolidate..

- I ask them to check to see if it mattered which grid we used and ask why.
- We do this a couple of times. Then I ask:

Then I consolidate..

- Suppose one animal is at C8. Where would a close animal be? Why?
- Where would a far animal be?
- Could animals at B[] and D[] be close? Far? How?

Then I consolidate..

- Where would an animal be if it were a total of 2 moves away from C8? How do you know?
- What about 7 moves away?
- How can you predict the number of moves from the coordinates?

Notice

My consolidation focused on my learning goal.

It could be 5e année

My learning goal might be that students realize that knowing the area of some shapes tells you nothing about their perimeters, but that sometimes knowing the area does tell you about the perimeter.

It could be 5e année

My activity might be to use grid paper to try to create the shapes listed and also calculate the perimeters.
- Two different rectangles with an area of 24 square units.

It could be 5^{e} année

- Two different triangles with an area of 12 square units.
- Two different L shapes with an area of 20 square units.
- Two different squares with an area of 25 square units.

Consolidation

- I might ask:

• Does knowing the area of a rectangle let you predict its perimeter?

• Does knowing the area of a triangle let you predict its perimeter?

Consolidation

- I might ask:
- Does knowing the area of a square let you predict its perimeter?
- Why was the square different?

It could be 6e année

My learning goal might be that students realize that the strategies you use to compare fractions should probably be different with different fractions.

It could be 6e année

I might set a task like this.

Choose numbers for the blanks to make each sentence true and explain what your strategies would be for each comparison.

It could be 6e année

I would use a different strategy to compare []/11 to []/75 than to compare 1/3 and 3/8.

I would use the same strategy to compare
8/[] to 30/[] as to compare 4/5 and
10/[illegible]

It could be 6^e année

I would use a different strategy to compare []/7 to []/9 than to compare 3/8 and 3/10.

I would use the same strategy to compare 6/[] to 9/[] as to compare 3/8 and 8/15.

Consolidation

My questions:

- What strategies did you think about for comparing fractions?

Consolidation

- Was it any easier to do the questions where the numerators were missing or where the denominators were missing or did it not matter?

Consolidation

- Why might you compare 3/8 and 3/10 differently from 3/8 and 8/15 or 3/18 and 1/3?

Your turn

- You come up with the questions for this activity.
- My learning goal was that the student would realize that how fast a pattern grows matters more than where the pattern starts when you are talking about terms that are far out in the pattern.

Your turn

- An example of a fast growing pattern could be 30, 50, 70, 90,… vs slower would be 100, 101, 102, 103,…

Your turn

- Which pattern will get past 1000 first? How do you know?
- 5, 15, 25, 35, 45,…
- 500, 501, 502,….

Your turn

- You come up with the consolidation questions for this activity.

Some ideas I had

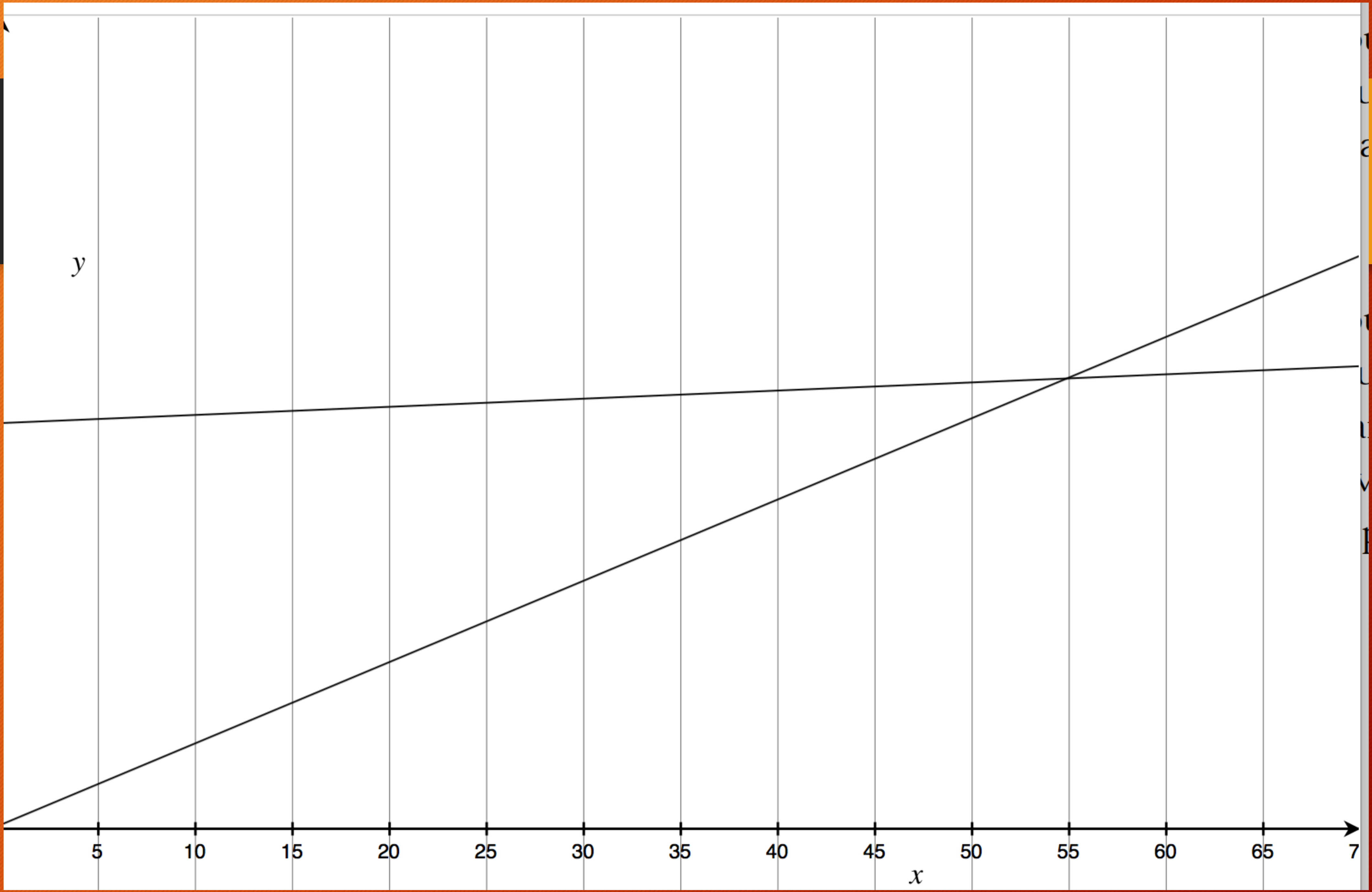
- Why might someone predict that the first pattern would win?
- Why might someone predict that the second pattern would win?
- For the first few terms,which pattern has higher numbers? Why?

Some ideas I had

- What about the 10th term?
- What about the 30 th term?
- So which term did win? Why did it?

I might add:

- Graph the patterns. What do you notice?


y
5
10
15
20
25
30
35
40
45
50
55
60
65
7
x

Assessment

Assessment needs to match instruction.

Teaching with intention means assessing with intention.

Assessment

If your goal for your students in math is just "doing it", you will have mostly knowledge items with some application thrown in.

Assessment

But if your goal is to build math thinkers, you will focus much more on understanding and thinking questions.

For example

Instead of: Which is greater? 4189 or 4976
You might ask: Which number is probably greater? Why?

4[]8[] OR []99[]

For example

Instead of: What are the factors of 44?
You would ask: How can tiles help you figure out the factors of 44?

For example

Instead of: Estimate 326 x 4.
You would ask: Why might someone estimate 1200?
Why might someone else estimate 1300?
Would 1400 also be a good estimate?

For example

Instead of: Write 1:23 pm using a 24 hour clock.
You would ask: Why might someone think a 12 hour clock system is better but other people think a 24 hour clock system is better?

For example

Instead of: How do you read: 6,316?
You would ask: What words are you sure you will hear when someone reads this decimal:
[], []4[]?

For example

Instead of: 3 kilometre = _____ cm?
You would ask: You converted a measurement given in one unit to one given in another. Your number got 1000 times as big. What could the units have been?

Today

Was a lot of hard thinking.

You can't change overnight, but maybe choose something you heard today that you are ready to work on.

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