

More Than Resources: The Internet and Deliberate Practice

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Two Goals

- Sell you on the #MTBoS (MathTwitterBlogoSphere)
- Think about getting better at teaching

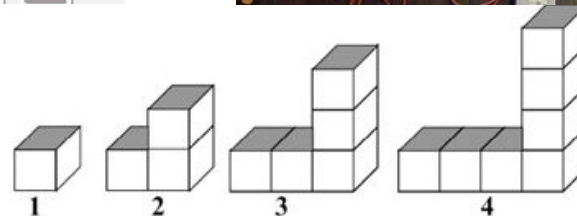
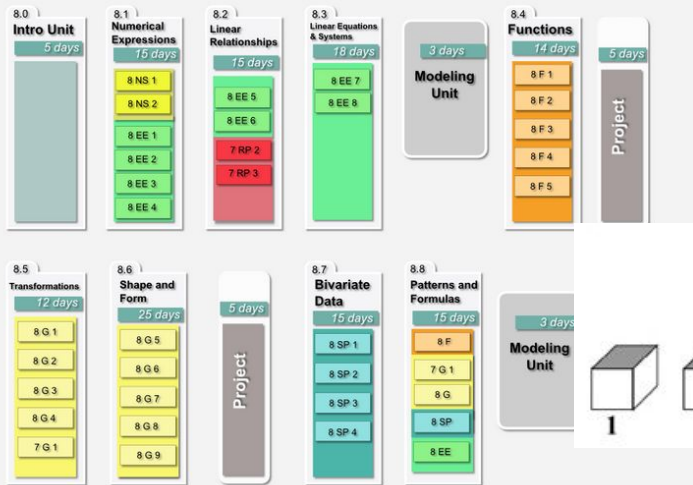
Story Time



5



Grade 8



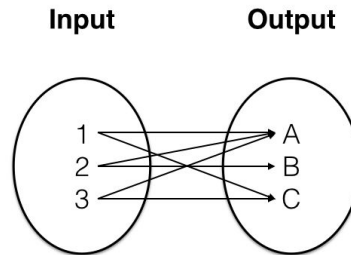
If Functions Are Aspirin, Then How Do You Create The Headache?

July 9th, 2015 by Dan Meyer

This Week's Skill

Determining if a relationship is a function or not.

A relationship that maps one set to another can be confusing. Questions like, "What single element does 2 map to in the output set below?" are impossible to answer because 2 maps to more than one element.



By contrast, a function is a relationship with *certainty*. Take any element of the input and ask yourself, "Where does this function say that element maps?" You aren't confused about any of them. Every input element maps to exactly one element in the output.

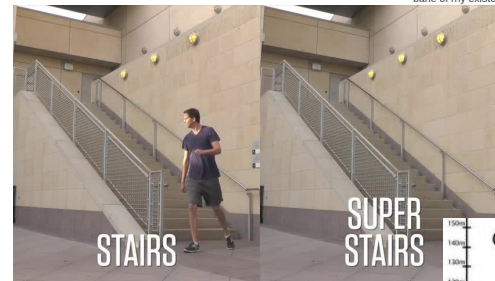
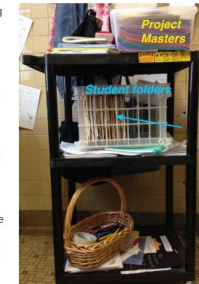
Hots N Lots Recap



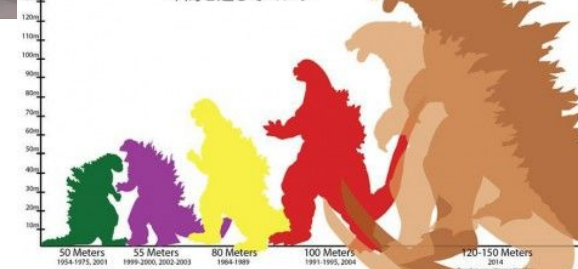
The dust has truly settled, and I have finished up my 8th school year. I escaped from NYC, and am ensconced in a cozy room at Exeter, where the [Anja S. Greer Conference for Math, Science and Technology](#). So far, the experience has been everything I hoped for – a great road trip with a wonderful buddy, in which our stories seamlessly and tangentially flowed from one to the other for 6 hours straight, and a delicious locally sourced dinner at [Blue Food Evolution](#), complete with a waiter who made math puns every time he visited our table. The weather is cool, dry and sunny. Perfect!

But this morning, before my head gets filled with the enrichment this conference will surely provide, I want to talk about the end of term project in my Geometry class – highlights and lessons learned. I am very proud of what happened in this class, the work many of the students did, and the opportunity it provided for them to demonstrate what they had learned in the three terms of Geometry they took. What needs to be improved stands out as well, glaringly so (to me).

Most days the class was truly abuzz with math. The hard planning was finished once the students began working, but each day in class was an aerobic activity for me. Whatever math these children had learned was not accompanied by independence. Many of the students needed (demanded) reassurance and guidance and checking every step of the way. I provided them with as many resources besides myself that I could – I had three different textbooks they could use, made the iPads available every few days, and sat them in strategically chosen groups which I hoped would give them the opportunity to support – but not distract – one another. This worked for some but not nearly all. Basketball was discussed frequently across the room, at a volume which made it impossible to ignore. And phones – PHONES! The very bane of my existence during 4th period each day. Class time for me was often spent answering questions, checking in with those who were struggling, and helping students choose new



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HAMBURGER

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SHAKES

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1⁷⁵

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IN-N-OUT BURGER



Clever Ideas $\neq$ Coherent Curriculum

- There's lots of great stuff on the internet
- That stuff doesn't instantly make me a better teacher

Getting better at teaching takes practice

Deliberate Practice

- Push beyond your comfort zone
- Work toward well-defined, specific goals
- Focus intently on practice activities
- Receive and respond to high-quality feedback
- Develop a mental model of expertise

Pause: Here's Some Cool Stuff

Open Middle

Using whole numbers from 1 through 9 without repeating, find the largest possible value for x

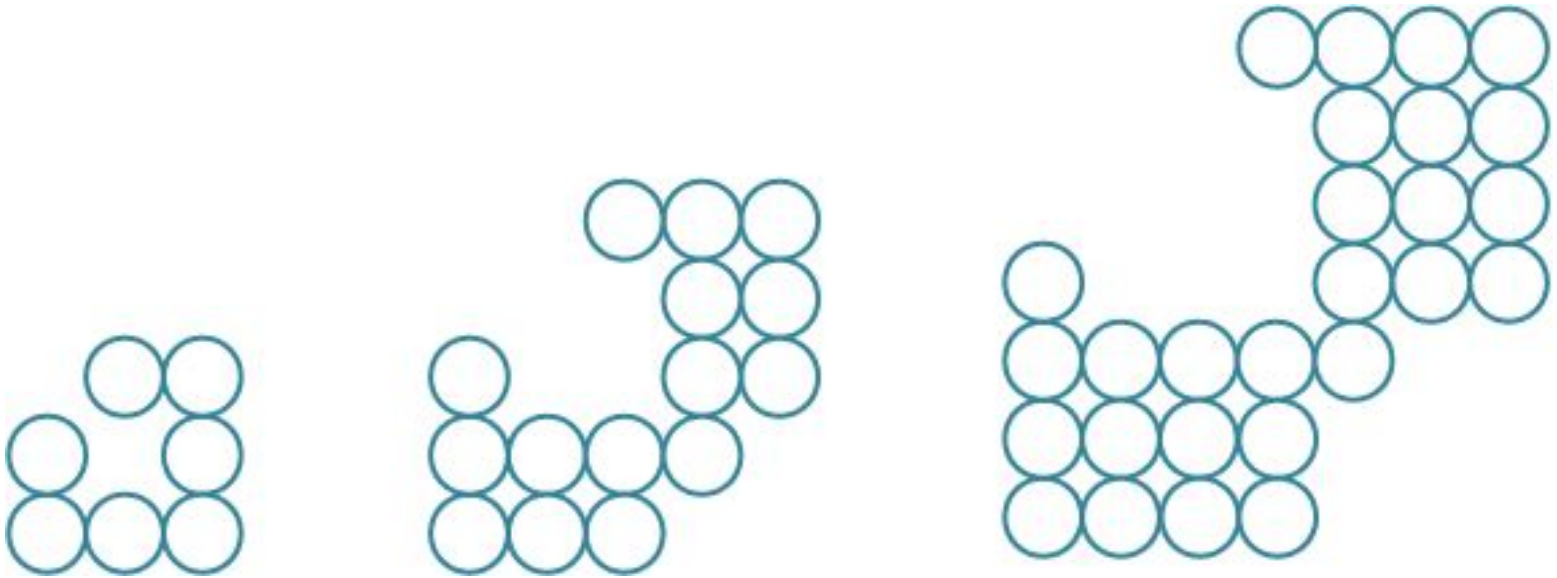
$$\square x + \square = \square$$

Three-Act Tasks

How long will it take the dog to pop 100 balloons?

Visual Patterns

Write an expression for the number of circles in the n th step

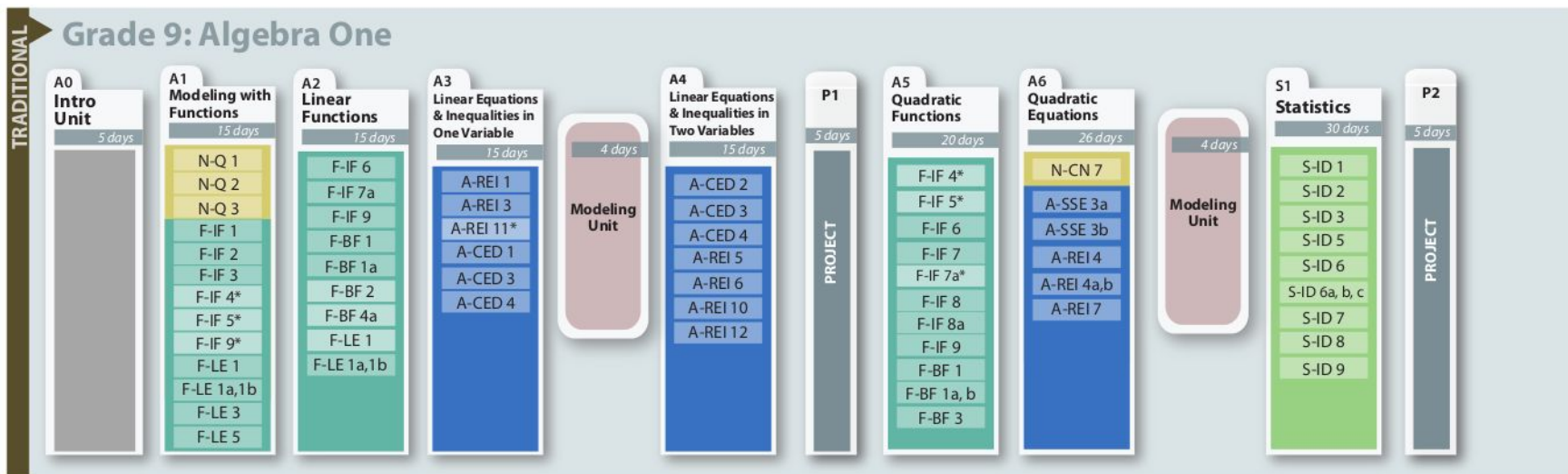


Estimation 180

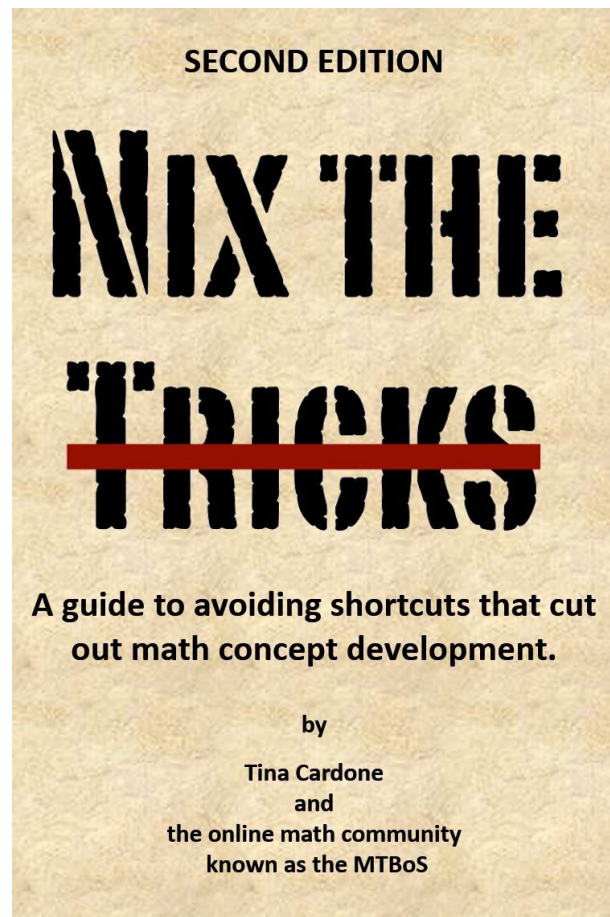
What percent of the pie has been eaten?



Emergent Math



Nix The Tricks



Which One Doesn't Belong?

$y = x^3 - x^2$	$y = x^2 + 1$
$y = x^2 - 2x + 1$	$y = x^2 + 3x + 2$

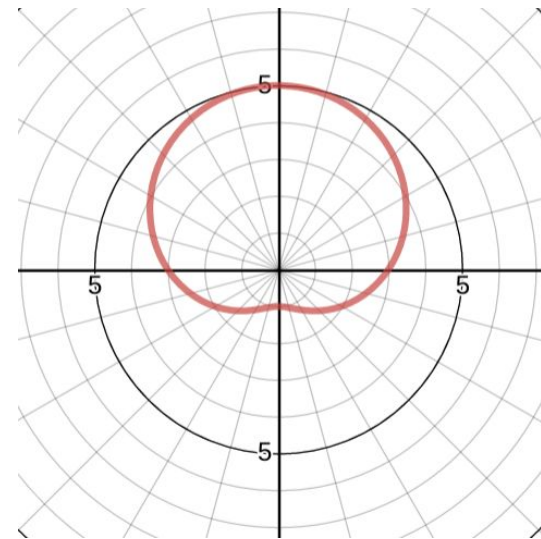
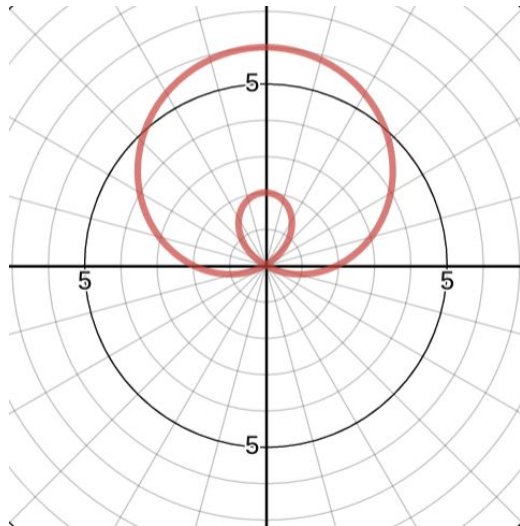
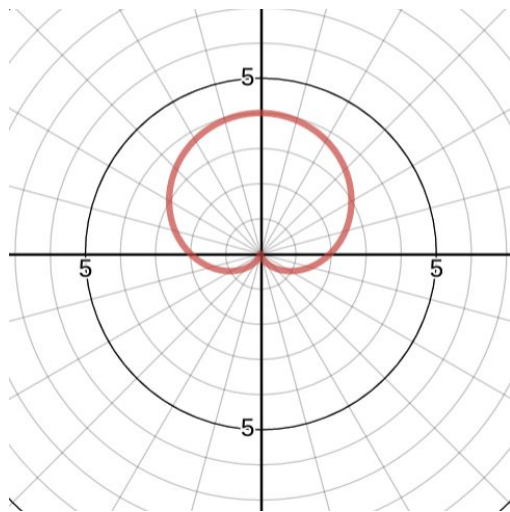
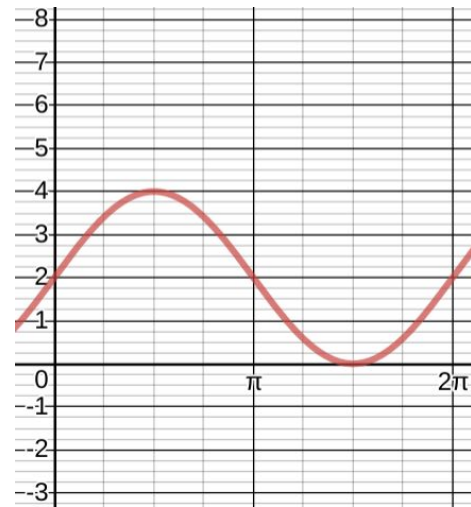
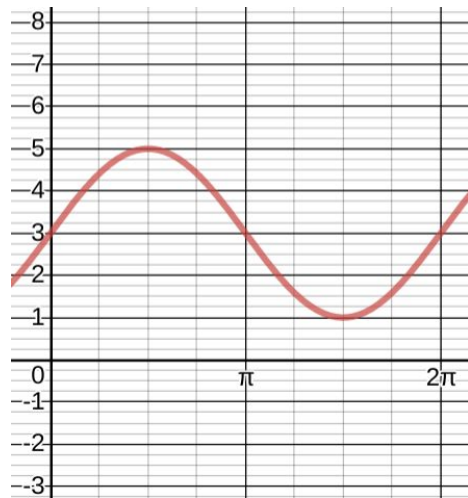
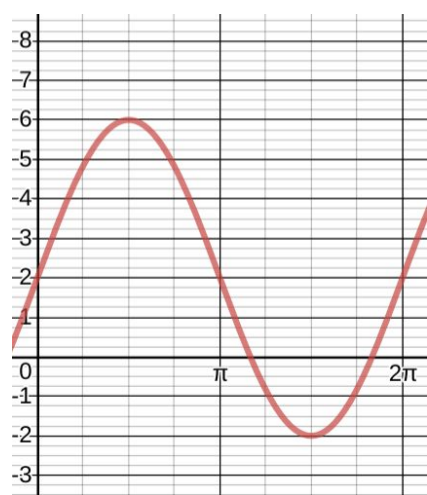
How does all this fit together?

Deliberate Practice

- Push beyond your comfort zone
- Work toward well-defined, specific goals
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Connecting Representations

#connectingreps

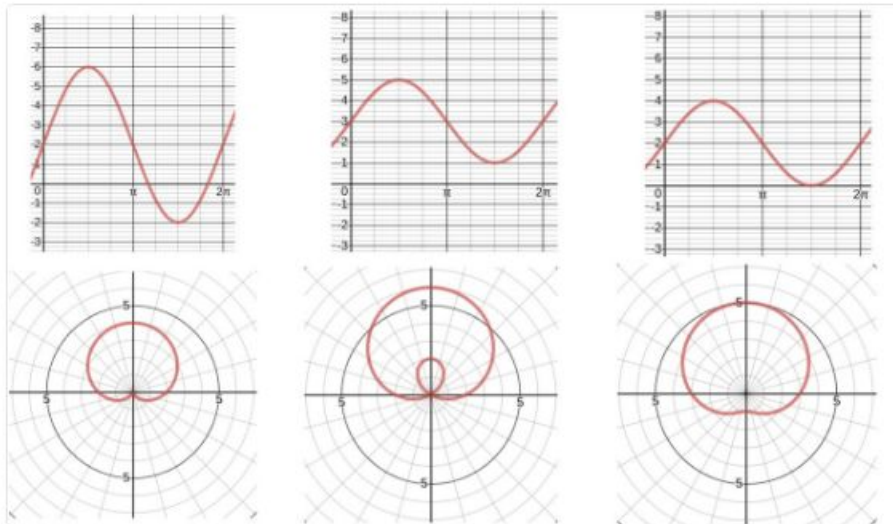




Dylan Kane

@math8_teacher

Possible #connectingreps task to introduce limacons tomorrow. Match the graphs. Ss have already graphed roses a bit. Thoughts?



RETWEETS

3

LIKES

11



4:07 PM - 22 Feb 2017



5



3



11



Dan Anderson · Feb 22

Replying to @math8_teacher
want a live version too?



1



Dylan Kane @math8_teacher · Feb 22

live in Desmos?



1



Dan Anderson @dandersod · Feb 22

yea



1



Dylan Kane @math8_teacher · Feb 22

I'm wondering if there are any ways to animate going from rectangular to polar coordinates. Think that would be really helpful.



1



1



Dan Anderson @dandersod · Feb 22

Is this a good start? [desmos.com/calculator/b5f...](https://www.desmos.com/calculator/b5f...)



1



Dylan Kane @math8_teacher · Feb 22

awesome! will use that tomorrow



2



Dan Anderson @dandersod · Feb 22

can futz with it and hide the red graph to see if they can guess what the polar would look like: [desmos.com/calculator/ygs...](https://www.desmos.com/calculator/ygs...)



1



Dylan Kane @math8_teacher · Feb 22

yea. this is useful as well: commons.wikimedia.org/wiki/File:Cart...



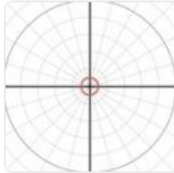
1



1

3 more replies

-  **Michael Pershan** @mpershan · Feb 22
Replying to @math8_teacher
I like! This is math I'm rusty on, it's fun to try it out. Random: if you label them it's easier to chat about the task.
1
-  **Michael Pershan** @mpershan · Feb 22
I'm connecting the max height of the top graphs with the max radius of the lower graphs?
1
-  **Michael Pershan** @mpershan · Feb 22
Sorry that was an errant "?". But that's what I was focusing my attention on.
1
-  **Dylan Kane** @math8_teacher · Feb 22
good to know, that's a useful noticing. And agreed on the labels, will add
1
-  **Michael Pershan** @mpershan · Feb 22
Which one of these were you thinking of knocking out and leaving for kids to make?
1
-  **Dylan Kane** @math8_teacher · Feb 22
not sure. I'm doing it on a slide, I'm worried it's already too crowded
1
-  **Michael Pershan** @mpershan · Feb 22
I was thinking you could knock out the bottom right limaçon, have kids try to make that from the leftover trig graph.
3
-  **Dylan Kane** @math8_teacher · Feb 22
yea. I'm nervous there's not enough info.

-  **Vanessa Garcia** @Vanes63 · Feb 24
Replying to @math8_teacher
mind sharing the updated result?
1
-  **Dylan Kane** @math8_teacher · Feb 24
I ended up using this same slide. Created lots of useful conversation about what features are important and why.
-  **Glen Russell** @RussellMath · Feb 22
Replying to @math8_teacher
@SMCPSMathDept hey I made this for polar graphs on Desmos teacher, feel free to use/abuse
- 

Polar Equations Investigations
Looking at some of the weird and wonderful things that polar equations can do for you
teacher.desmos.com
- 1
-  **Dylan Kane** @math8_teacher · Feb 22
neat! That's quite the tour of polar graphing.
1
-  **Glen Russell** @RussellMath · Feb 22
thanks. I had one day to teach polar equations so I crammed as much in as I could.
1
-  **amy lucenta** @AmyLucenta · Mar 9
Replying to @math8_teacher
@vivhoteaches Vivian developed some great #ConnectingReps for this. Viv?
1

math.newvisions.org/instructional-routines

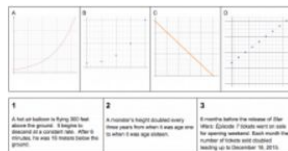
Course **- Any -** Unit **- Any -** Type of instructional activity **Connecting Representations** **Apply**

Choose a course Choose a unit Choose a type of instructional activity

Discrete versus Continuous

Description:

Students will make connections between examples of linear and exponential verbal situations and graphs using discrete and continuous properties.



Instructional Routine Type:
Connecting Representations

Course: Algebra I

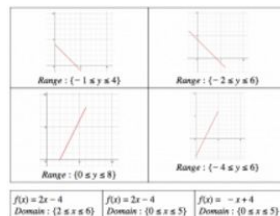
Unit: 1

Big Idea: [Big Idea 1](#)

Restricted Domains

Description:

Students will connect linear functions with restricted domains with their graph representations.



Instructional Routine Type:
Connecting Representations

Course: Algebra I

Unit: 1

Big Idea: [Big Idea 2](#)

Function or Not?

Description:

Use the verbal structure of a set of definitions of a function/non-function and match these definitions to a set of visuals of different types.



Instructional Routine Type:
Connecting Representations

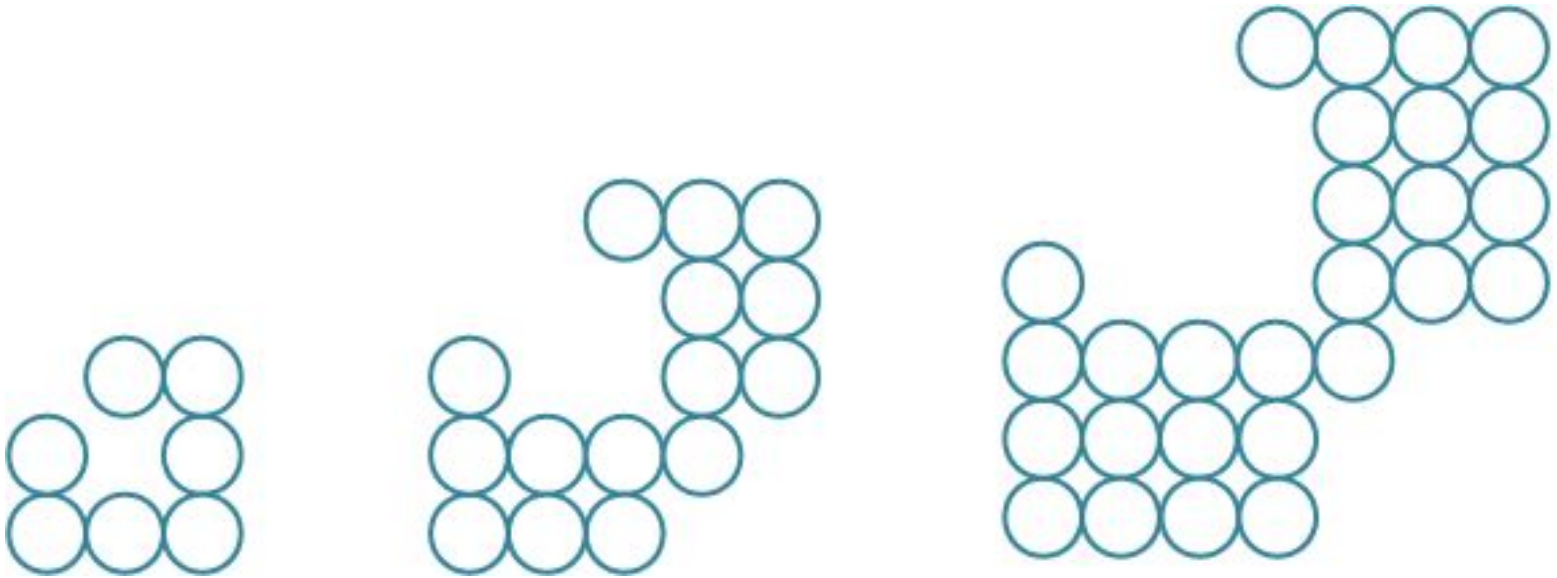
Course: Algebra I

Unit: 1

Big Idea: [Big Idea 2](#)

Visual Patterns

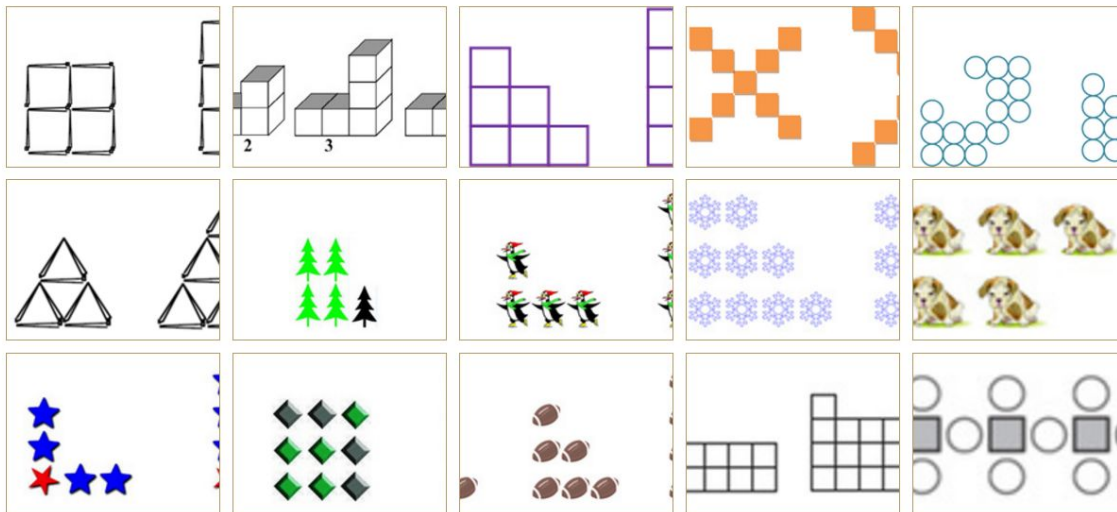
Write an expression for the number of circles in the n th step



visualpatterns.org

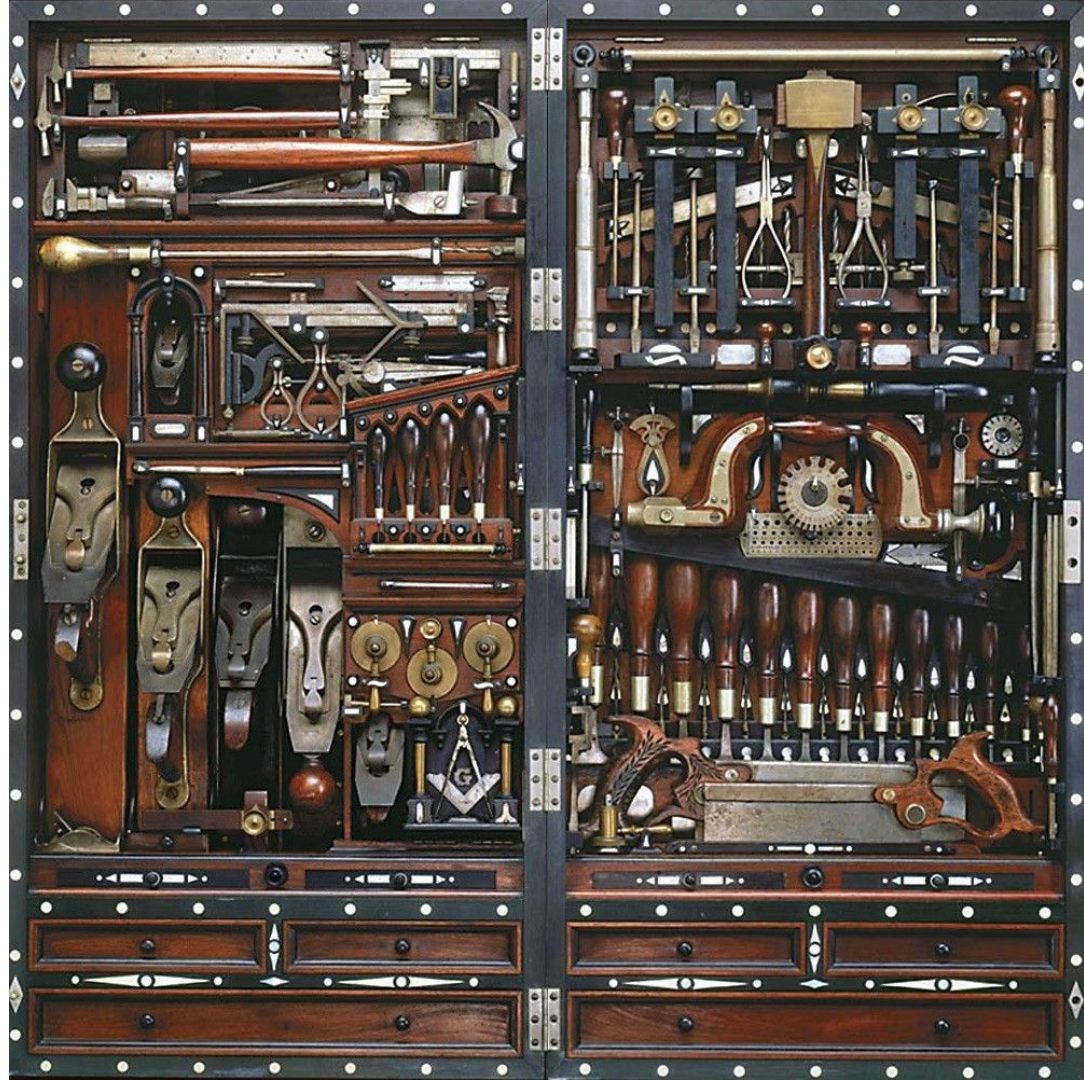
[1-20](#)[21-40](#)[41-60](#)[61-80](#)[81-100](#)[101-120](#)[121-140](#)[141-160](#)[161-180](#)[181-200](#)[201-220](#)[221-240](#)[TEACHERS](#)[GALLERY](#)[CONTACT](#)

Click on a pattern to see a larger image and the answer to step 43. What is the equation?



“Like so much else in education, ‘what works’ is the wrong question because everything works somewhere and nothing works everywhere”

Wiliam, 2015, p. 139



21st Century Teaching

10%

References

Ericsson, A & Pool, R. (2016). Peak: Secrets From the New Science of Expertise. Houghton Mifflin Harcourt.

Kelemanik, G., Lucenta, A., & Creighton, S. J. (2016). Routines for Reasoning. Heinemann.

William, D. (2015). Embedding Formative Assessment. Learning Sciences International.

References

[Meatballs](#)

[Barbie Bungee](#)

[Open Middle](#)

[Three-Acts](#)

[Visual Patterns](#)

[Estimation 180](#)

References

[Geoff Krall's Problem-Based Curriculum Maps](#)

[Nix the Tricks](#)

[Which One Doesn't Belong](#)

[Connecting Representations](#)

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