WHAT DO WE KNOW ABOUT EDUCATION?

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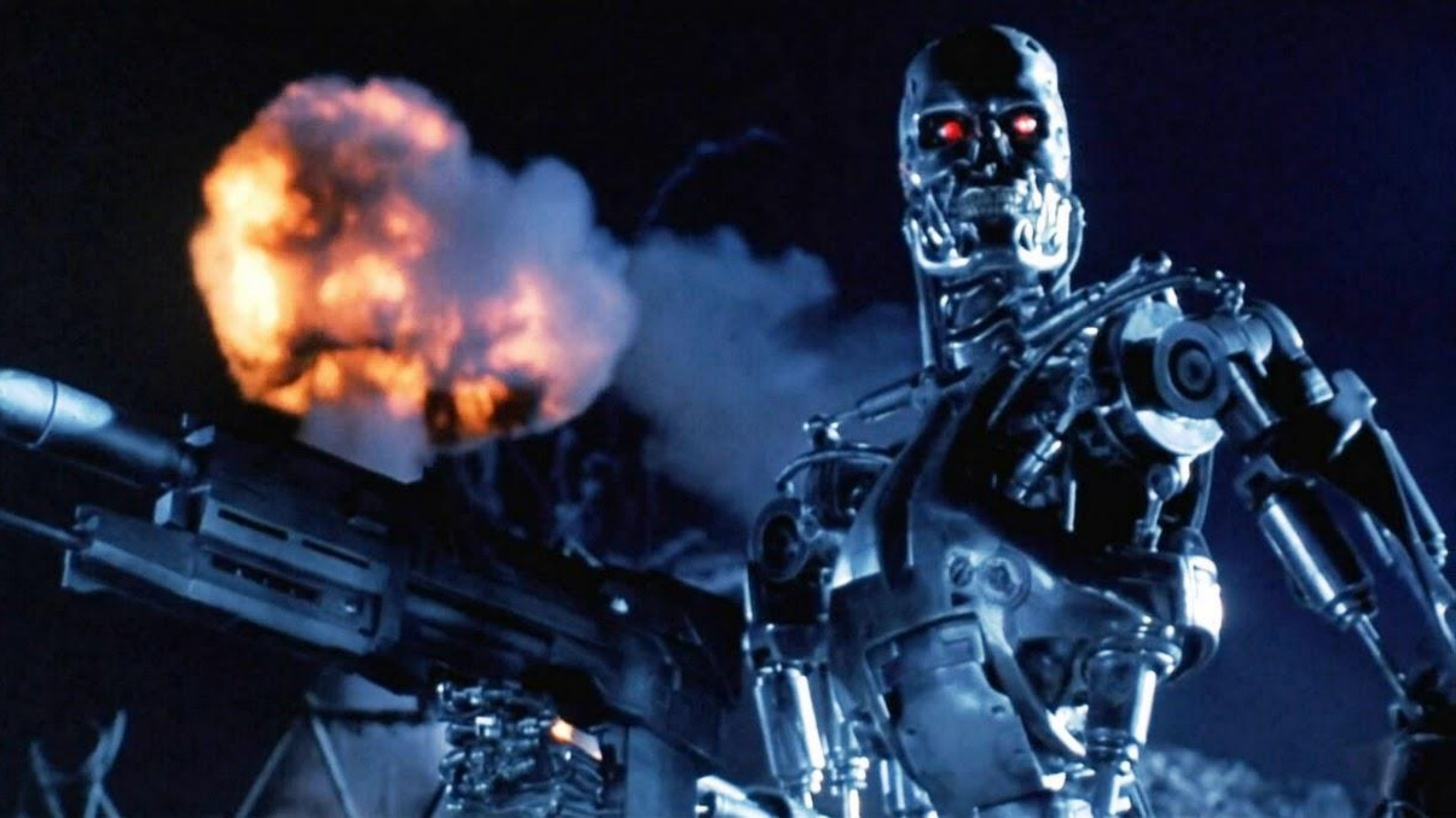
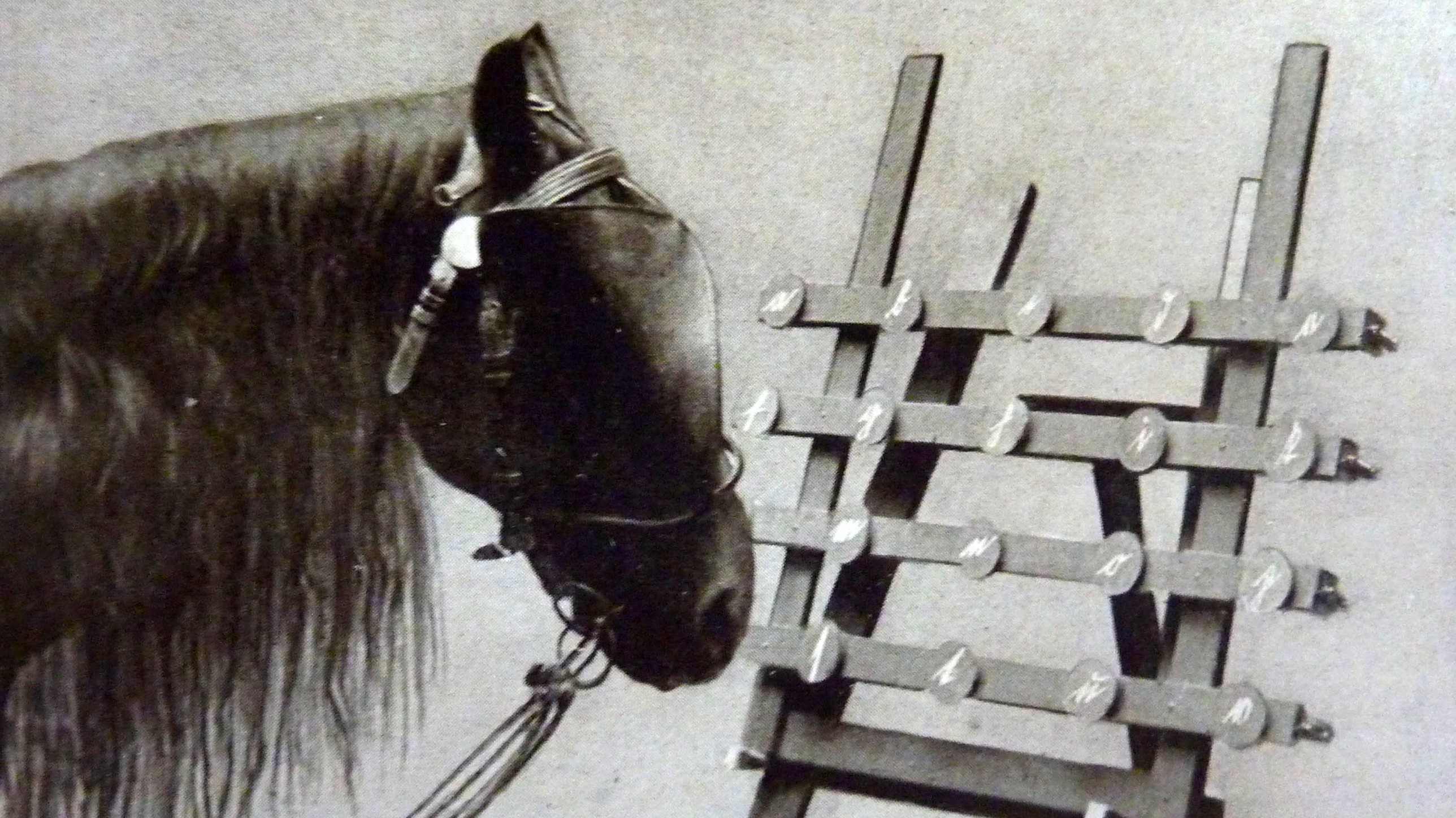
paradigm shift

GOALS

- ❑ WHAT IS INTELLIGENCE?
- ❑ WHY DON'T STUDENTS REMEMBER?
- ❑ WHAT MATHEMATICS IS IMPORTANT?




2/3 + 3/4 =
26743 : 8 =
12986 x 3 =

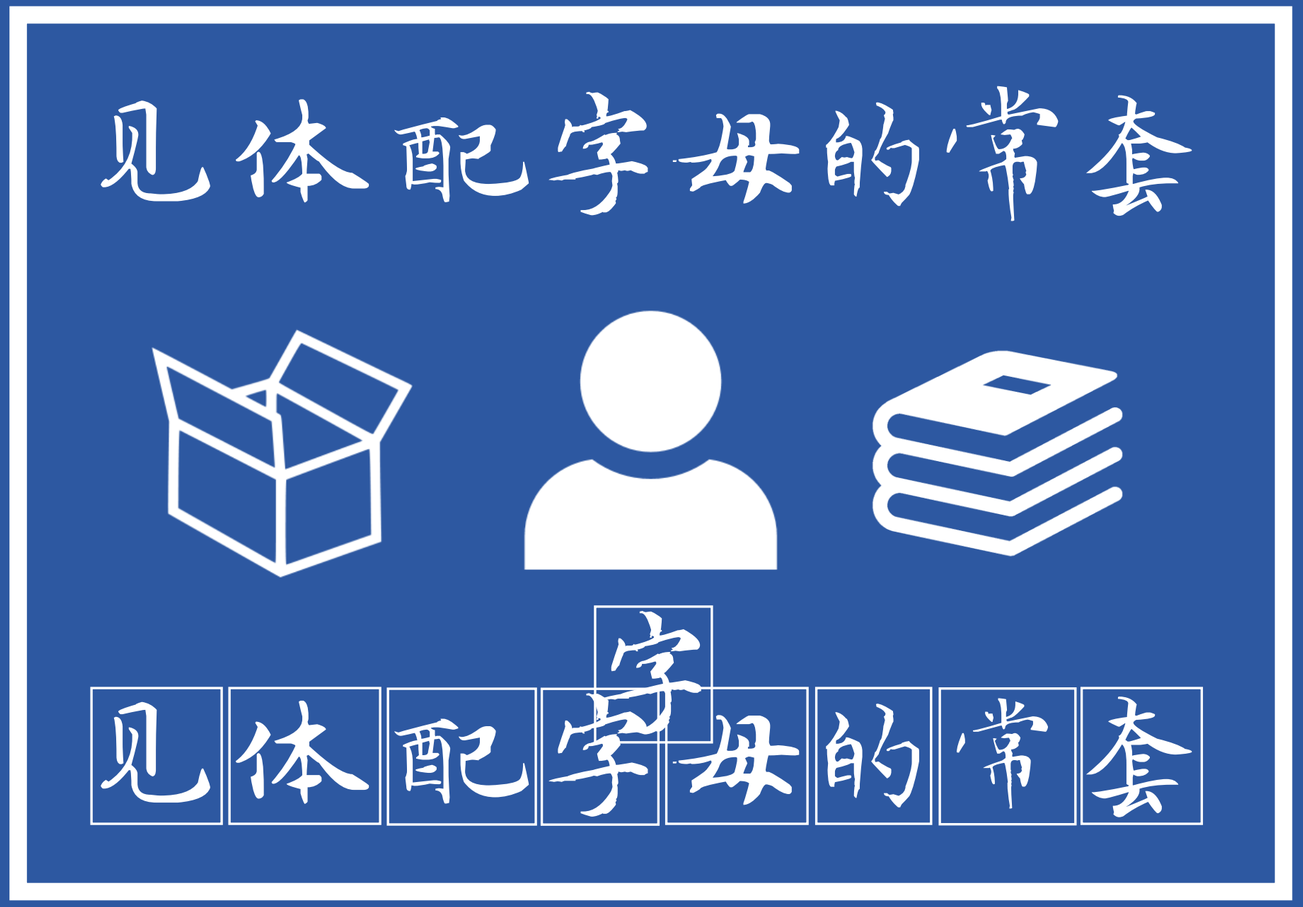


Yes… no… uh… yes… maybe?

MANY STUDENTS

TURING TEST

CHINESE ROOM



DISCUSSION TIME

- What does intelligence even mean?
- How do we ask questions that measure intelligence?
- Will the tasks that work now always be Chinese room and horse proof?

GOALS

- ☑ WHAT IS INTELLIGENCE?
- ☐ WHY DON'T STUDENTS REMEMBER?
- ☐ WHAT MATHEMATICS IS IMPORTANT?

February 28 ·

If a theif forces you to take money out of an ATM, do not argue or resist. What you do is punch in your pin # backwards. EX: if its 1234, you'll type 4321. When you do that, the money will come out but will be stuck in the slot. The machine will immediately alert the local police without the robbers knowledge & begin taking photos of the suspect.
Every ATM has the feature. Stay safe.

Like Share

19

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Will Entering Your PIN in Reverse at an ATM Summon the Police?

Entering your PIN in reverse at any ATM will not automatically send an alarm to local police -- the idea is nothing more than an old and unimplemented suggestion.

CLAIM

Entering your PIN in reverse at any ATM will automatically summon the police.
See Example(s)

RATING

FALSE

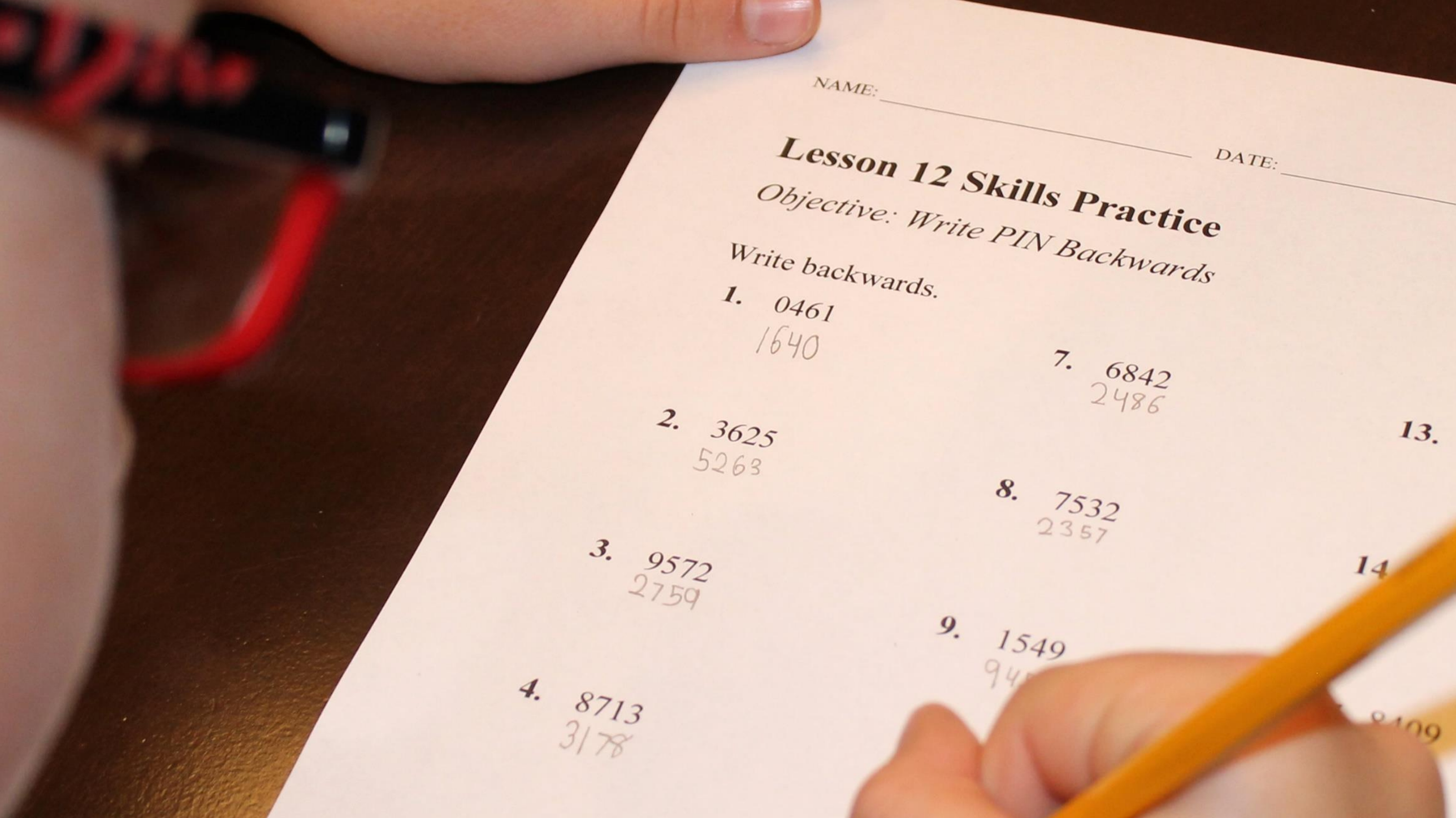
ORIGIN

Messages offering a seemingly helpful heads-up about how to deal with a situation in which one is forced to hand over money withdrawn from an ATM under duress began circulating on the Internet in September 2006:

Tell them what you're going to tell them. Tell it to them.

Then tell them what you told them.

UNKNOWN



NAME: _____ DATE: _____

Lesson 12 Skills Practice

Objective: Write PIN Backwards

Write backwards.

1. 0461
   1640
2. 3625
   5263
3. 9572
   2759
4. 8713
   3178
7. 6842
   2486
8. 7532
   2357
9. 1549
   94
13.
14

Presentation

- Tell them what you're going to tell them.
- Tell it to them.
- Then tell them what you told them.

Lesson

- State the lesson objectives.
- Teach the lesson.
- Review the lesson objectives.

The definition of insanity is doing the same thing over and over again but expecting different results.

UNKNOWN

Why Some Ideas Survive and Others Die...

MADE to STICK

Chip Heath & Dan Heath

- Understood
- Remembered
- Lasting impact

STICKY ATTRIBUTES

- ❑ SIMPLE
- ❑ UNEXPECTED
- ❑ CONCRETE
- ❑ CREDIBLE
- ❑ EMOTIONAL
- ❑ STORIES

Simplify.

$$(x^2 + 3)(2x^3 - 7x + 4)$$

Fig. 1.

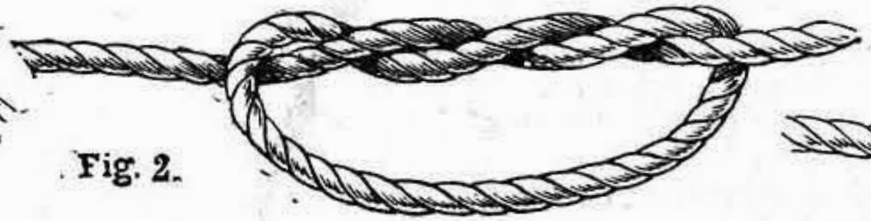


Fig. 2.

Fig. 2a.

Fig. 3.

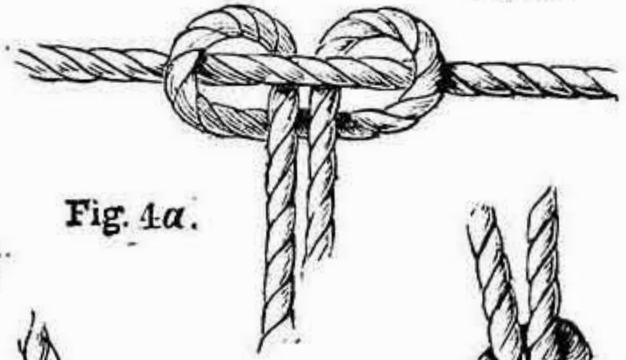


Fig. 4a.

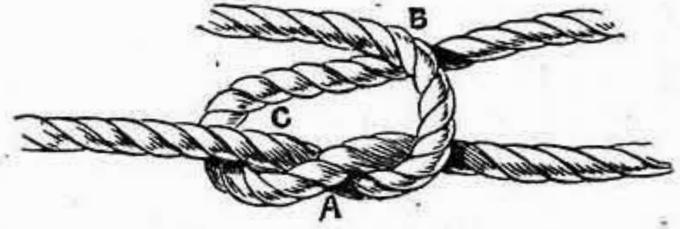


Fig. 5.

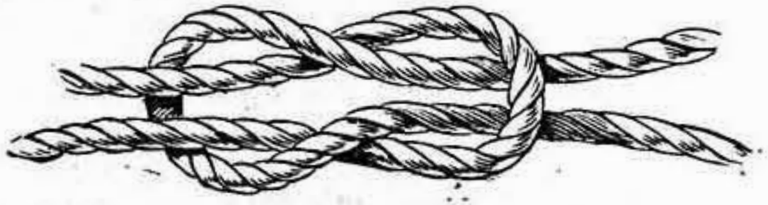


Fig. 4.

Fig. 14.

Fig. 6.

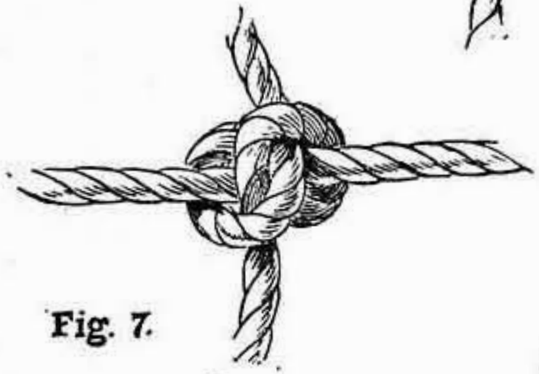


Fig. 7.

Fig. 8.

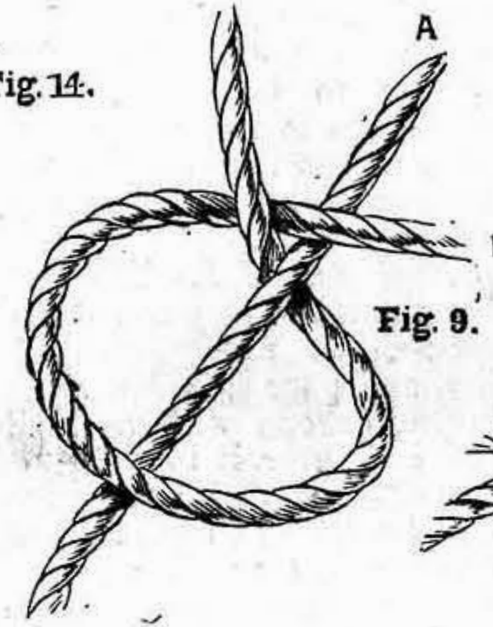


Fig. 9.

Fig. 10.

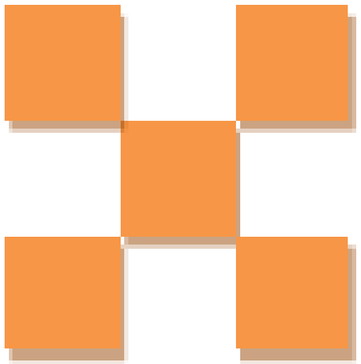
Fig. 11.

Fig. 13.

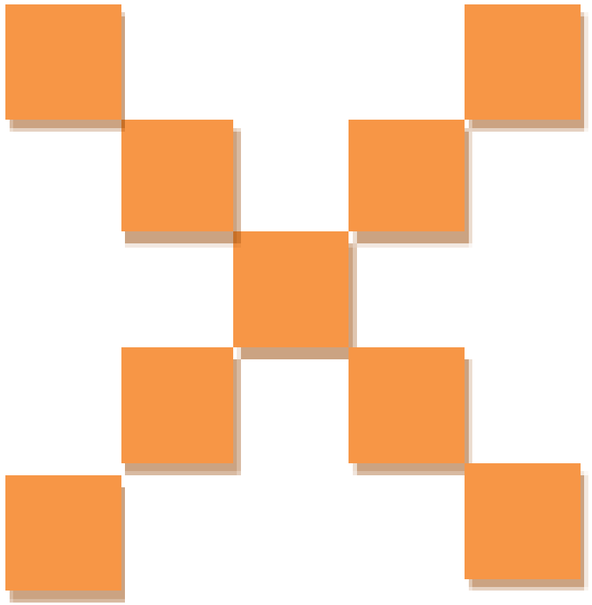
Fig. 12.

If math is the aspirin, then how do you create the headache?

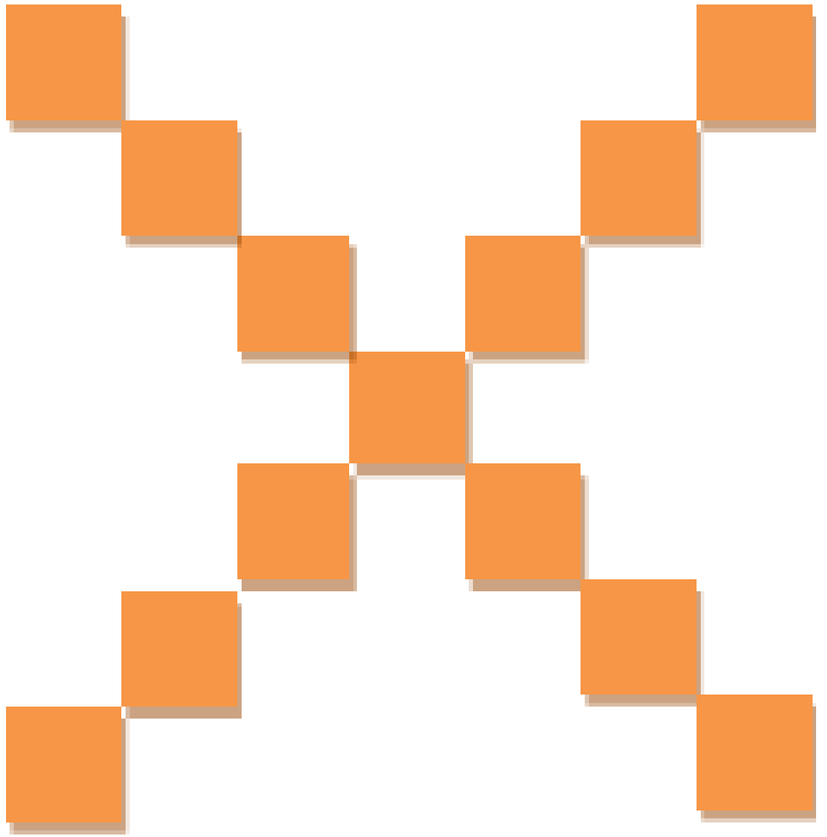
DAN MEYER



Step 1

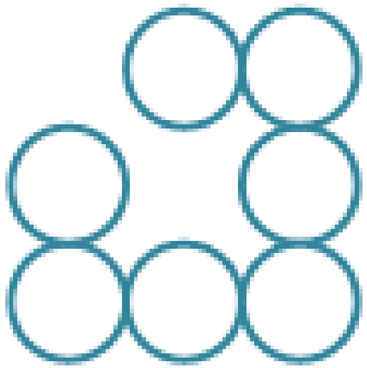


Step 2

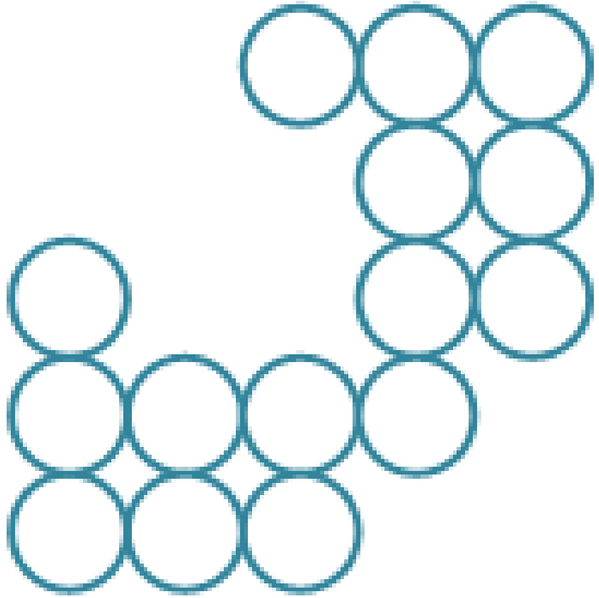


Step 3

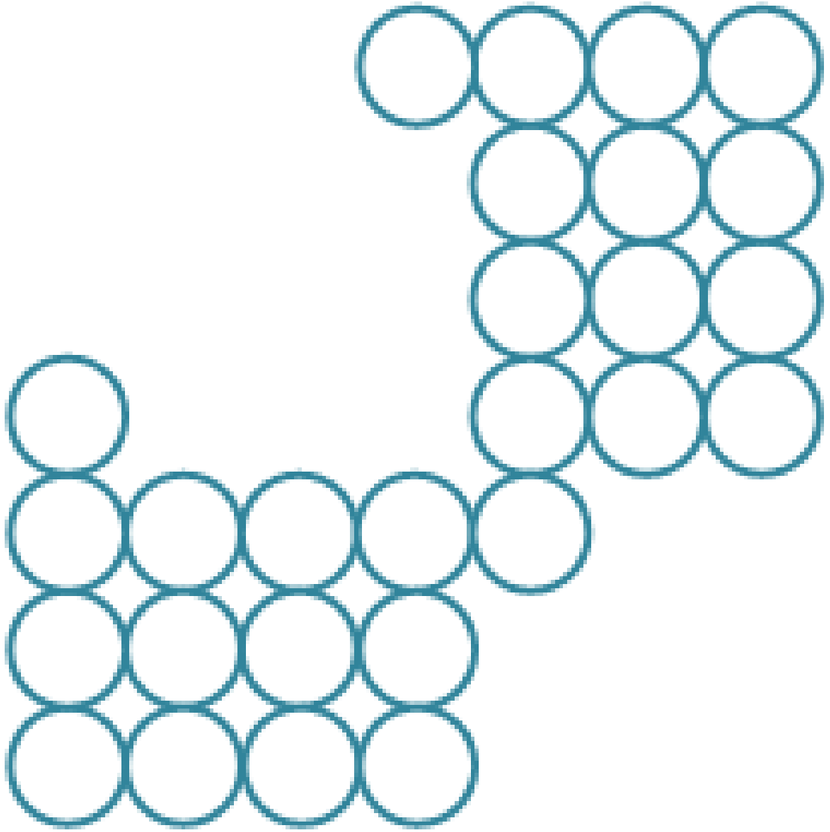
Source: visualpatterns.org



Step 1



Step 2



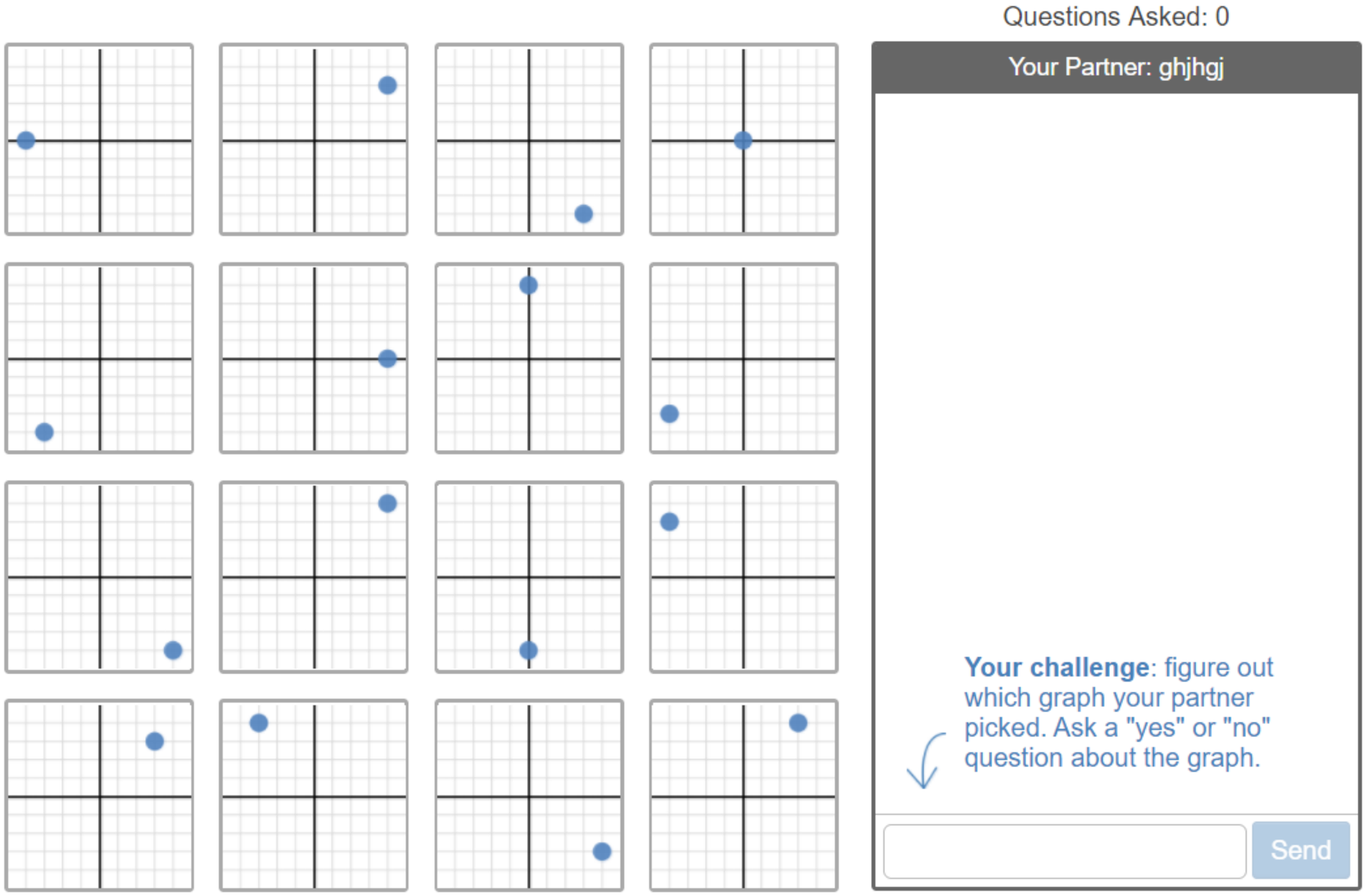
Step 3

Source: visualpatterns.org

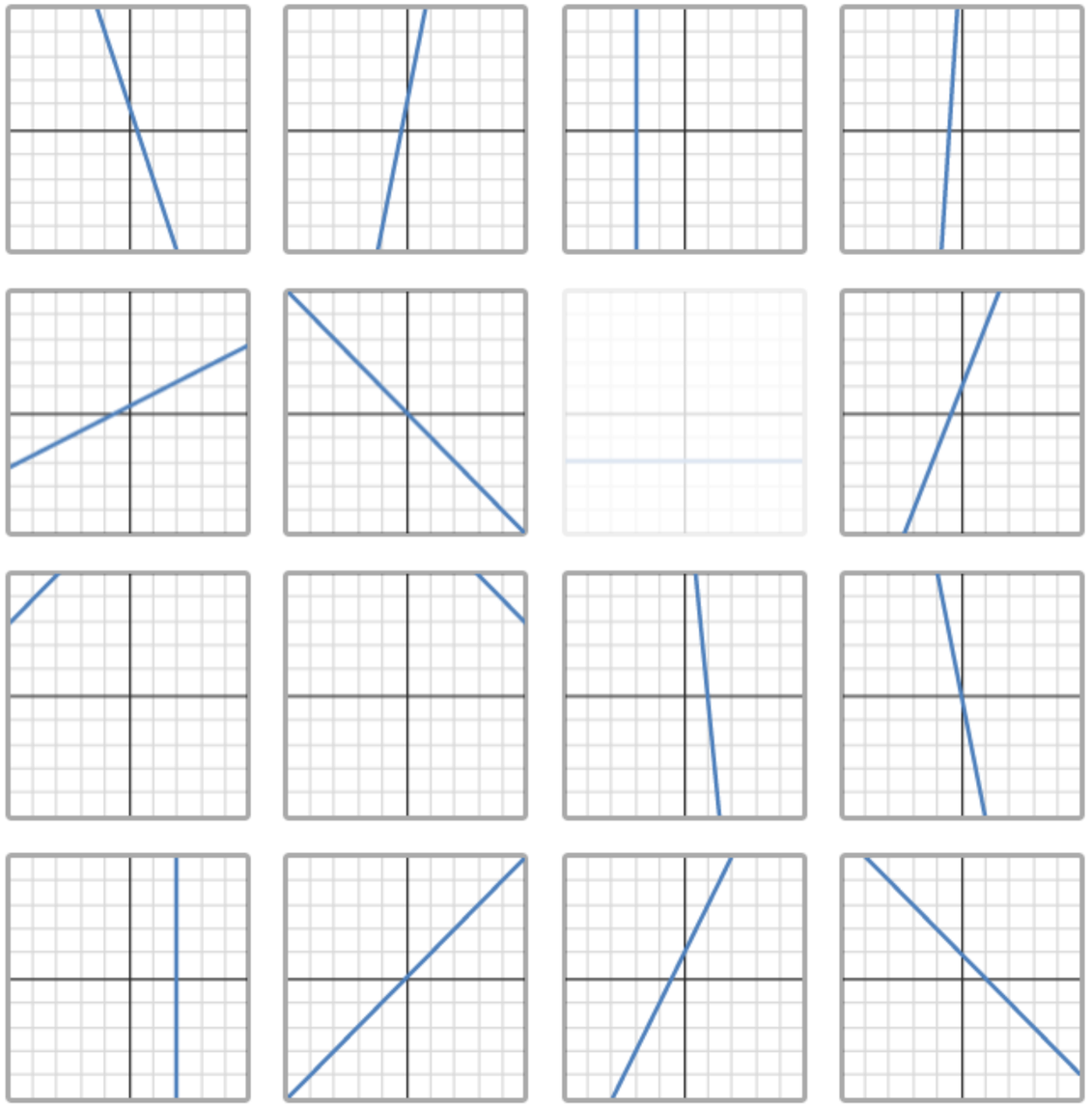
Select a person that's special to you for any reason. Next

Skip the practice round.

Source: teacher.desmos.com/polygraph



Source: teacher.desmos.com/polygraph



Questions Asked: 2

Your Partner: Lupita

YOU ASKED
Does your line go up and down?

YOUR PARTNER CHOSE
Yes

YOUR PARTNER ELIMINATED
×

YOU ASKED
Is your line slanted?

YOUR PARTNER CHOSE
I Don't Know

Select lines to eliminate based on your partner's answer. Then press the button below.

Go on without Eliminating

Source: teacher.desmos.com/polygraph

STICKY ATTRIBUTES

- [x] SIMPLE
- [ ] UNEXPECTED
- [ ] CONCRETE
- [ ] CREDIBLE
- [ ] EMOTIONAL
- [ ] STORIES

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Source: reasonandwonder.com

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THINKING TIME

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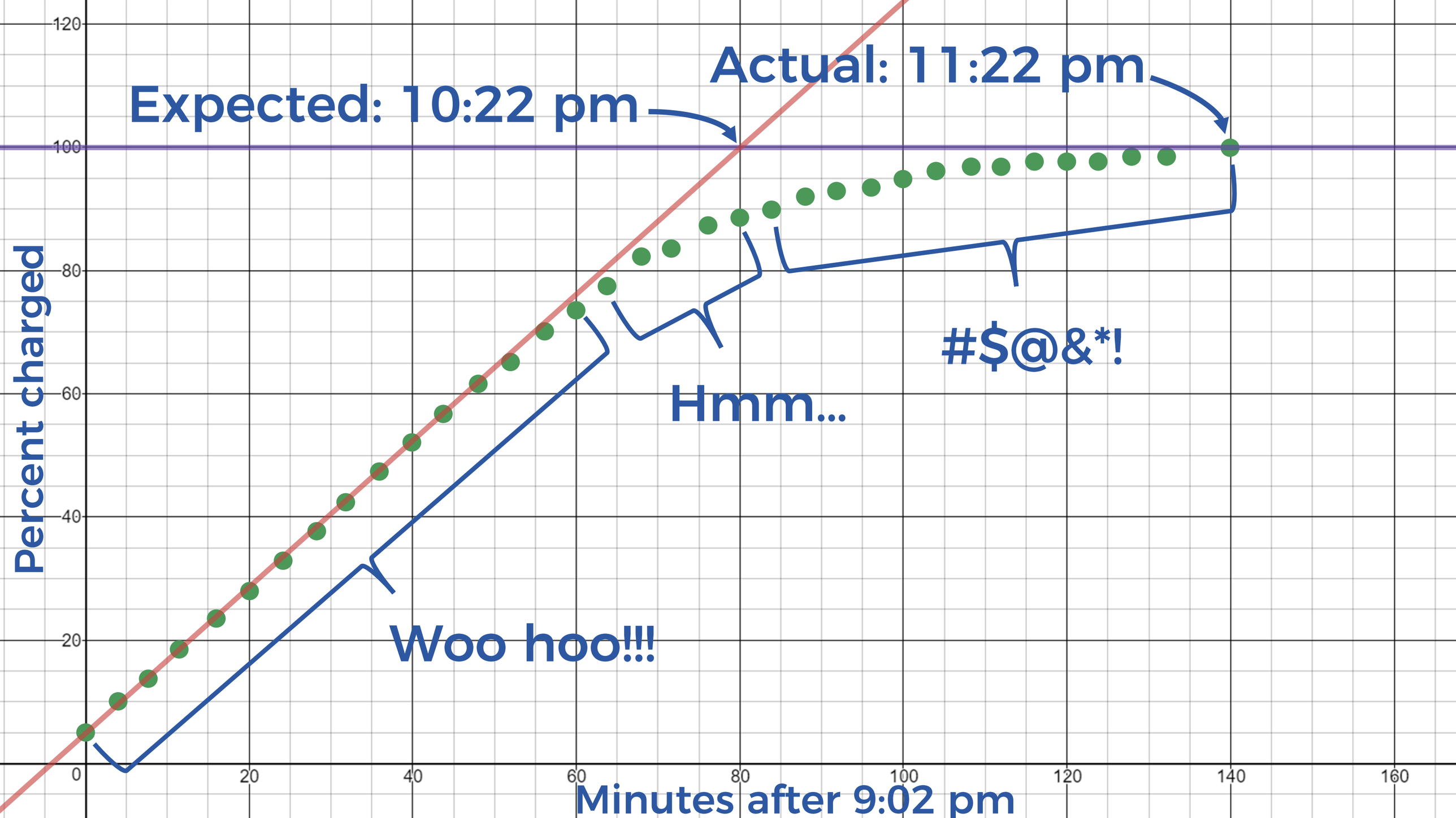
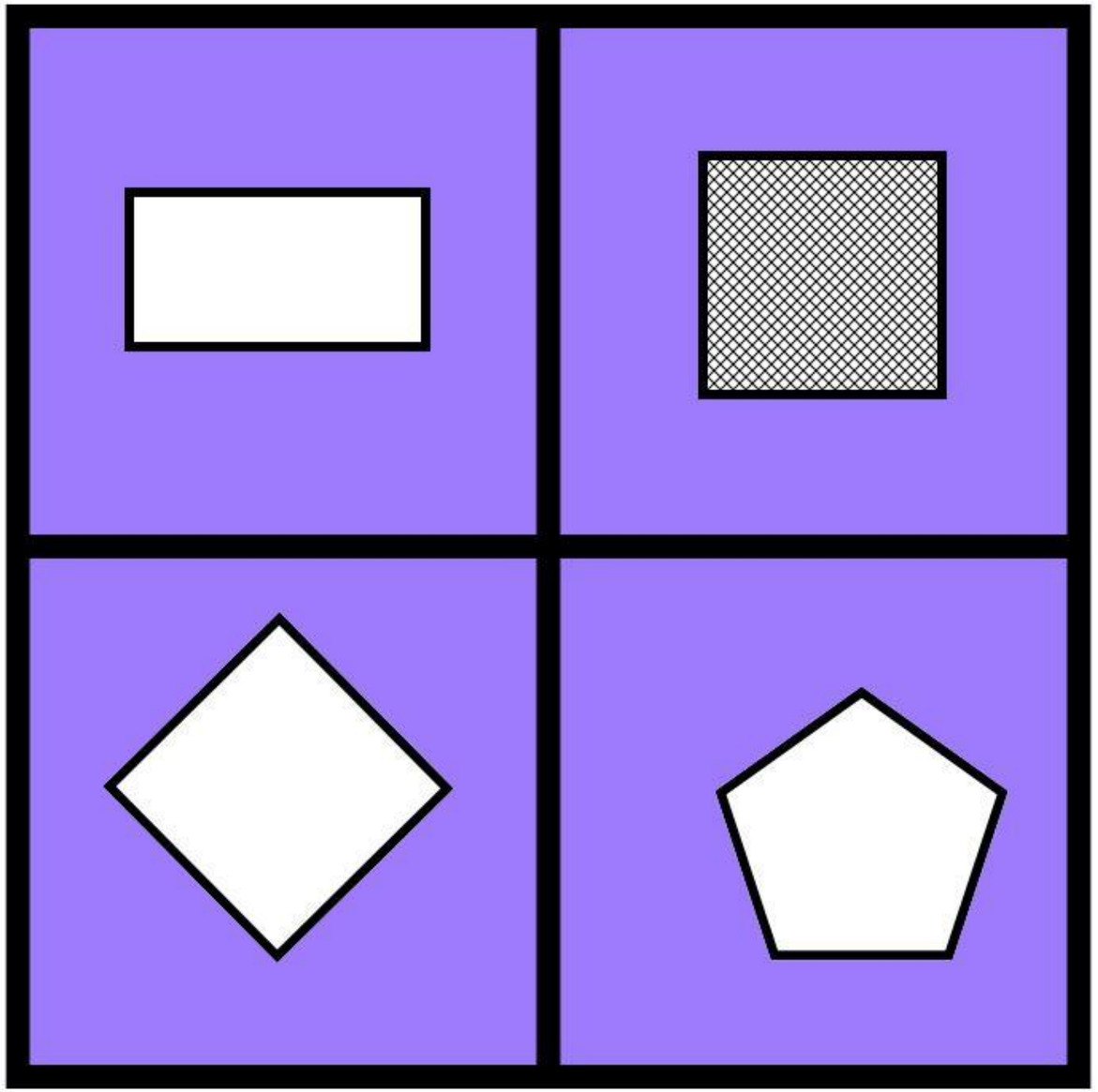
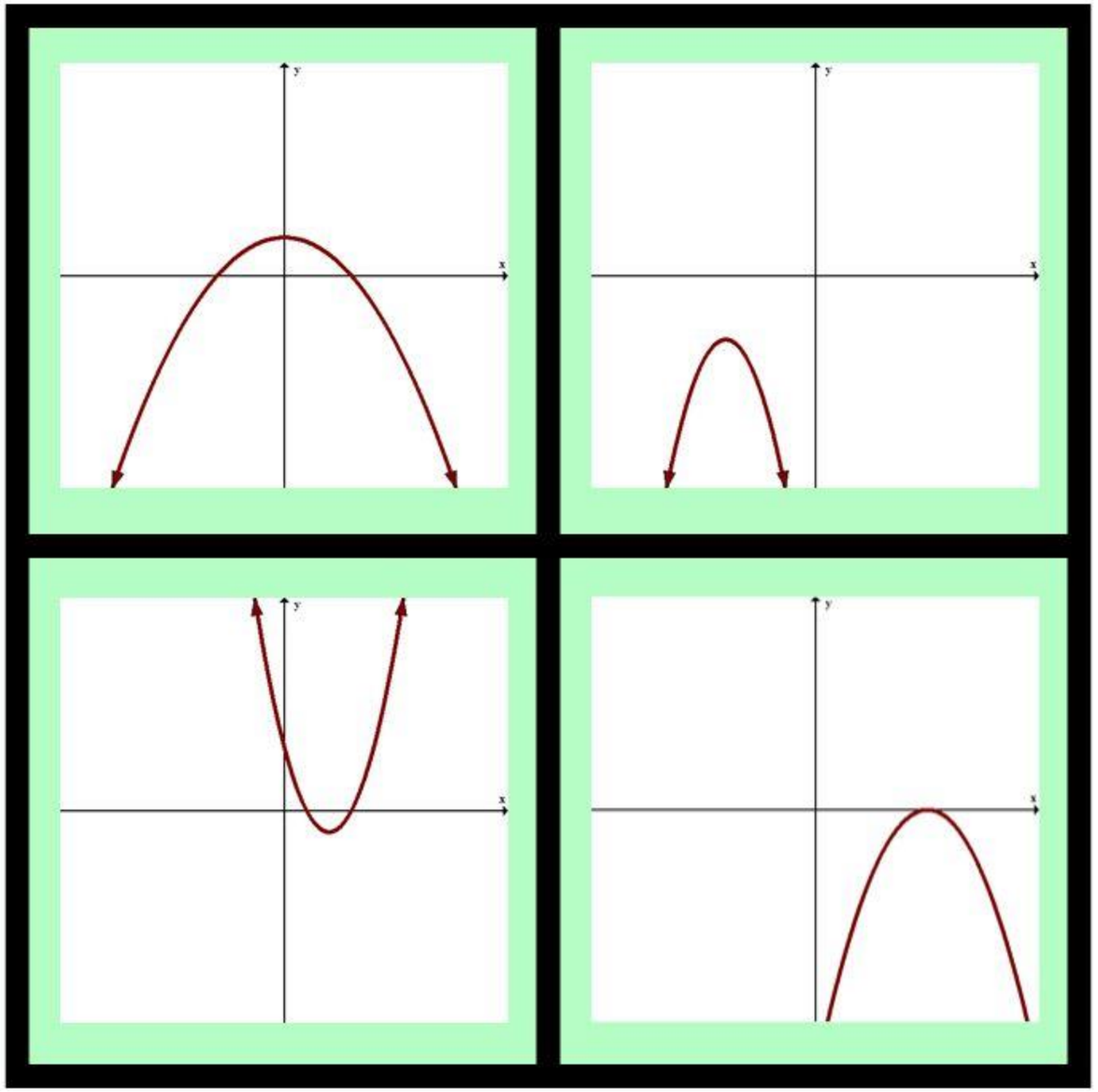

Actual: 11:22 pm
Expected: 10:22 pm
#$@&*!
Hmm...
Woo hoo!!!
Percent charged
Minutes after 9:02 pm
120
100
80
60
40
20
0
20
40
60
80
100
120
140
160

UNEXPECTED

- ❑ PATTERN BREAKING
- ❑ COUNTERINTUITIVE
- ❑ KNOWLEDGE GAPS
- ❑ OPEN MIDDLE



Source: wodb.ca



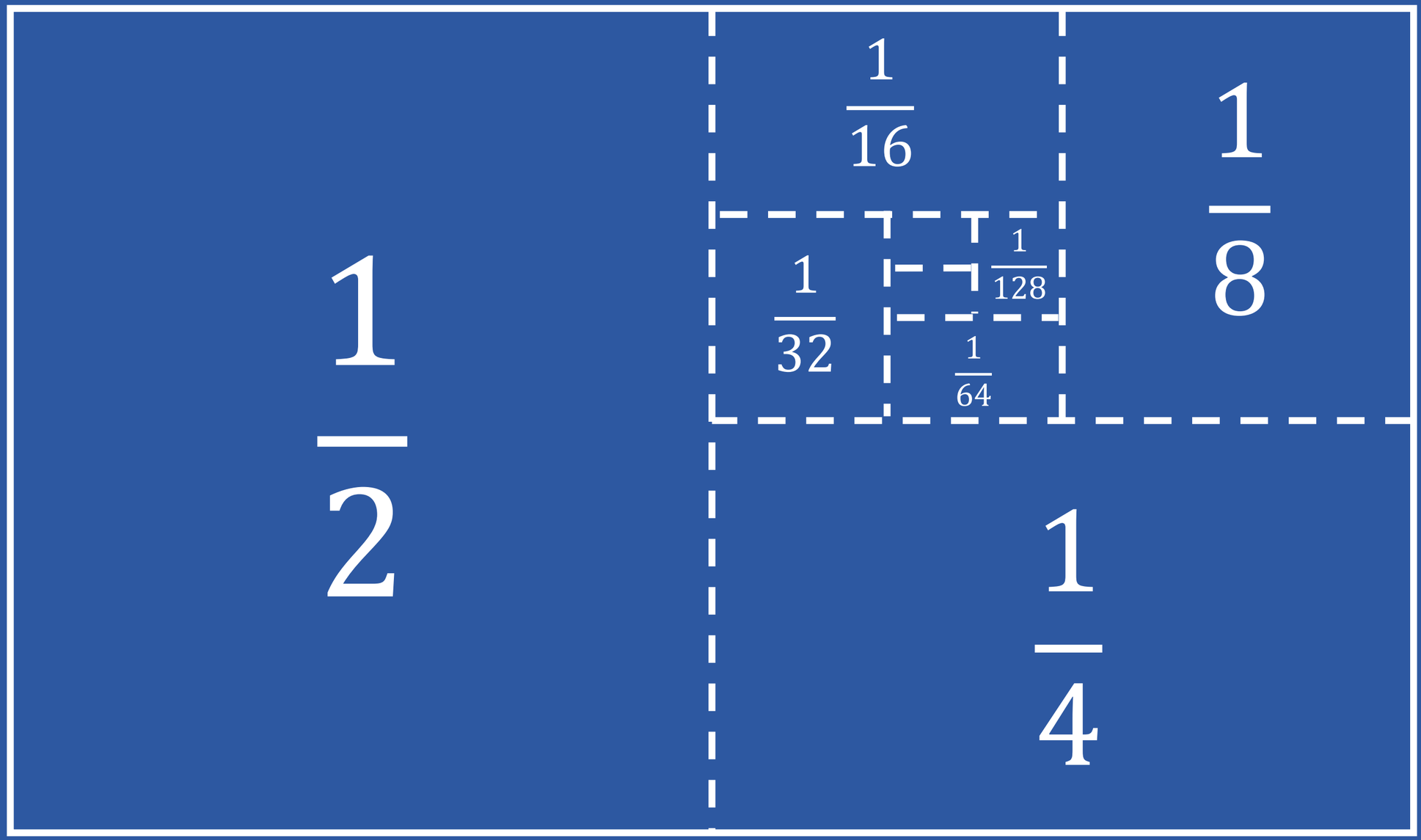
Source: wodb.ca

UNEXPECTED

- [x] PATTERN BREAKING
- [ ] COUNTERINTUITIVE
- [ ] KNOWLEDGE GAPS
- [ ] OPEN MIDDLE

$$\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+\frac{1}{16}+\frac{1}{32}+\cdots$$

$$=1$$


$\frac{1}{2}$
$\frac{1}{16}$
$\frac{1}{8}$
$\frac{1}{32}$
$\frac{1}{128}$
$\frac{1}{64}$
$\frac{1}{4}$

Source: Kyle Pearce - youtube.com/watch?v=Yr53Ji4SZDg

UNEXPECTED

- [x] PATTERN BREAKING
- [x] COUNTERINTUITIVE
- [ ] KNOWLEDGE GAPS
- [ ] OPEN MIDDLE

Curiosity... arises from the perception of a gap in knowledge or understanding.

GEORGE LOEWENSTEIN

Source: robertkaplinsky.com/lessons

Source: robertkaplinsky.com/lessons

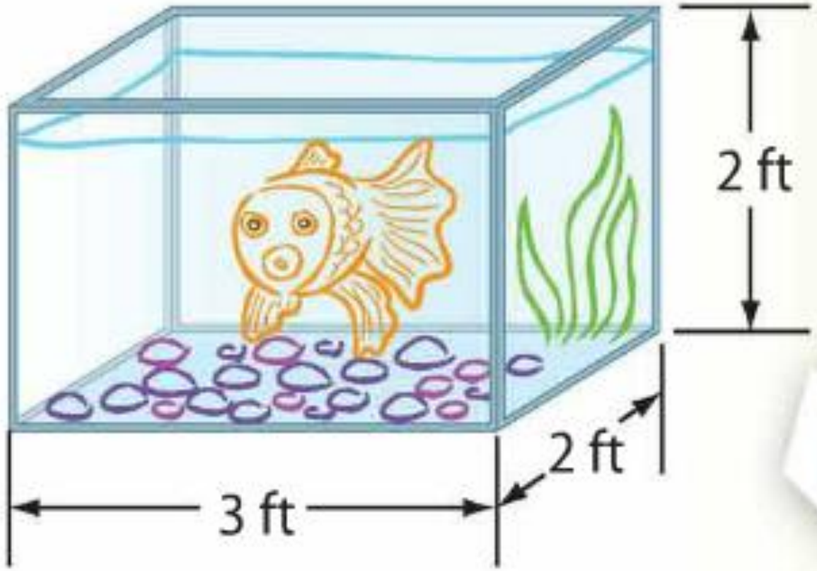
Source: robertkaplinsky.com/lessons

Source: robertkaplinsky.com/lessons

Real-World Link

Watch

Aquarium The dimensions of an aquarium are shown.



1. What is the area of the base of the aquarium? _____

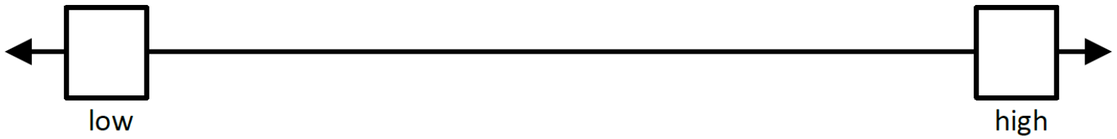
2. What is the height of the aquarium? _____

3. Fill in the blanks to find the volume.

_____ × _____ × _____ = 12 ft^3

What problem are you trying to figure out?

What estimates do you have?



Place your estimate on the number line.

What info do you already know about the problem?

What info do you need about the problem?

What is your conclusion? How did you reach that conclusion?

UNEXPECTED

- [x] PATTERN BREAKING
- [x] COUNTERINTUITIVE
- [x] KNOWLEDGE GAPS
- [ ] OPEN MIDDLE


N

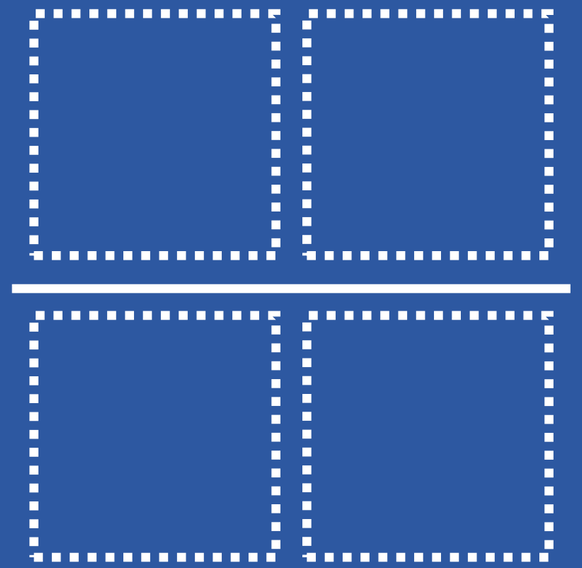
Google Maps My Village to Treasure Chest Travel 3621 miles, 21 days, 4 hours

Map data ©2017 Google 500 mi

My Village

	Treasure Map	Google Maps
Beginning	Closed	Closed
Middle	Open	Closed
End	Closed	Closed

Using the digits 1-9, at most one time each, fill in the boxes to create a fraction that is as close to one as possible.



Extension: How many ways can you prove that you are correct?

Source: Peter Morris on openmiddle.com

	Open Middle	Closed Middle
Beginning	Closed	Closed
Middle	Open	Closed
End	Closed	Closed

Name _____ My Homework _____

Independent Practice

Solve each syst

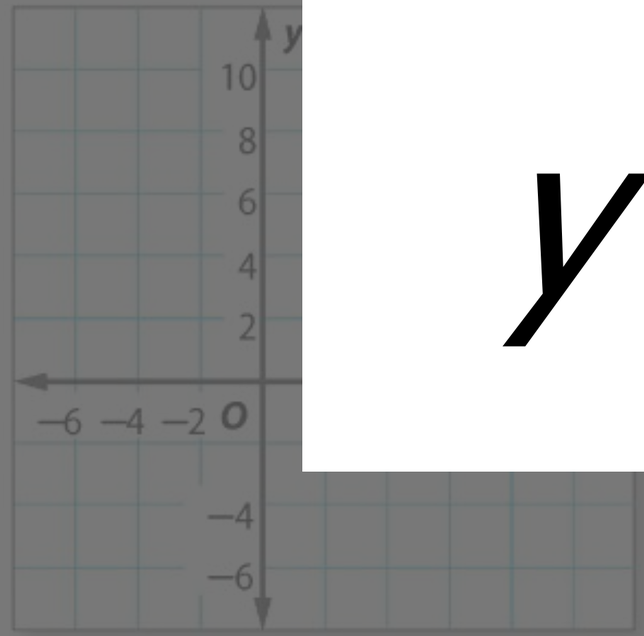
1. $y = x$
   $y = 2x - 4$

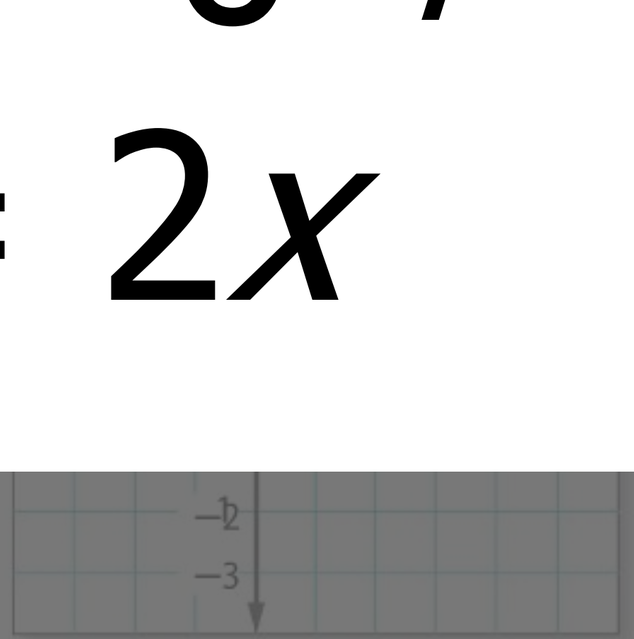
Show your work.

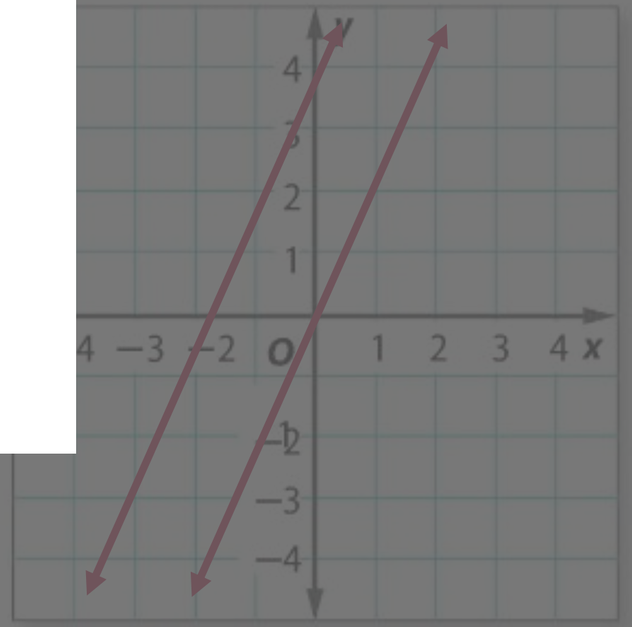
$0 \neq 4$

$y = 2x$

$y - 2x = 4$
$y = 2x$







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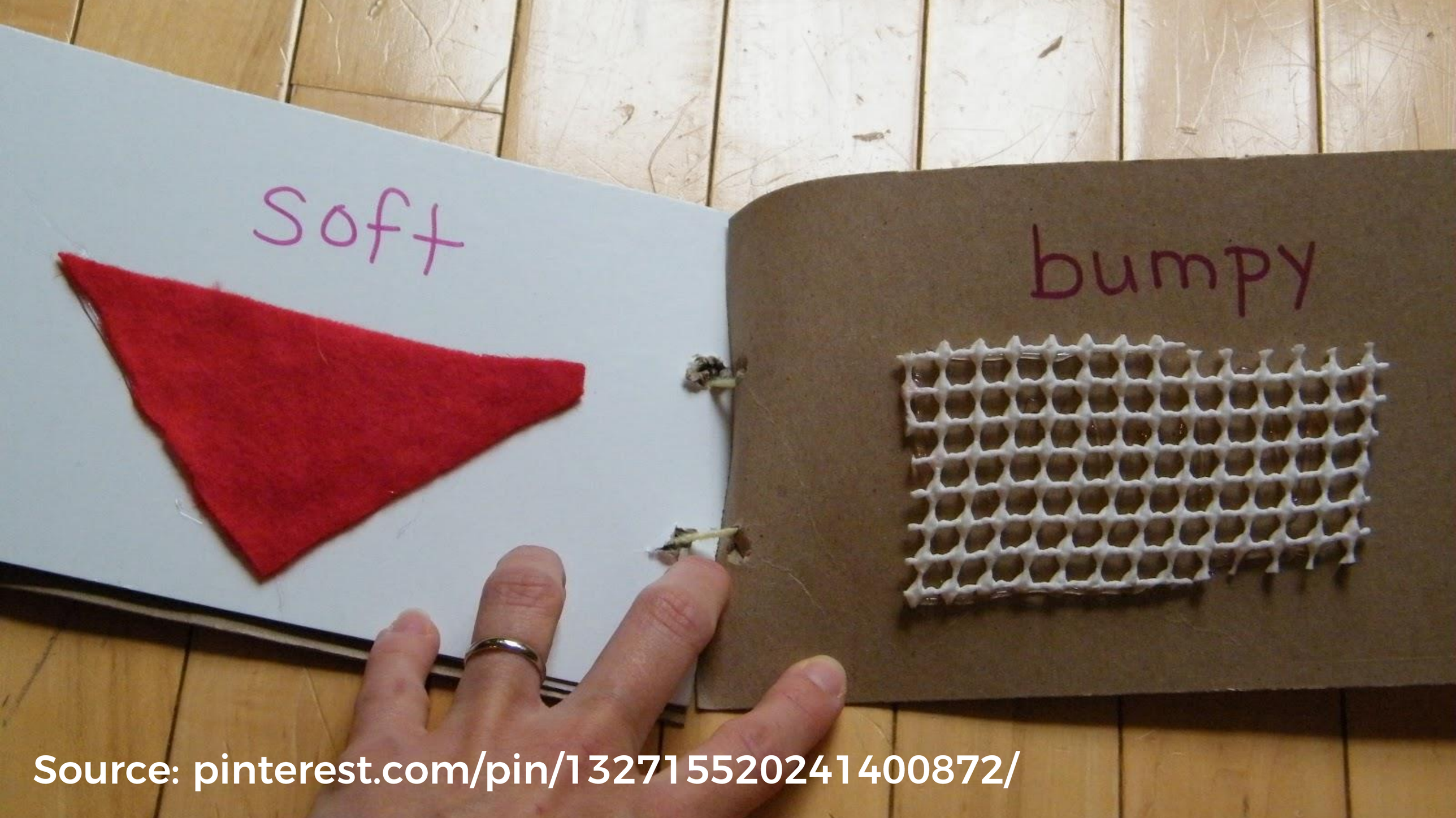


Source: pinterest.com/pin/132715520241400872/

Source: Color Dog


HunterDouglas
HunterDouglas
WINDOW FASHIONS
VICTORIA
15553
PRESIDENT'S
MINI BRIE
19.6 OUNCES
5.99
4988
VALLEY SUN
SUN-DRIED TOMATOES
JULIENNE CUT 32 OUNCE
UNIT PRICE PER OUNCE
.234
SELL PRICE
7.49

NAME: _____ DATE: _____ PERIOD: _____

Lesson 7 Skills Practice

Objective: Divide Decimals by Decimals

Divide.

1. $4.86 \div 0.2$

2. $628.2 \div 34.9$

7. $2.25 \div 0.15$

8. $421.6 \div 0.4$

13. $7.52 \div 0.74$

14. $0.105 \div 0.6$

Fans stream Nelly to help him pay off $2.4 million debt

by Lisa Respers France @CNNMoney

September 13, 2016: 2:47 PM ET

- How many $0.006 are there in $2,400,000?
- How many 6 are there in 24?

LESSON 19-1

Stretching, Compressing, and Reflecting Sine and Cosine Graphs

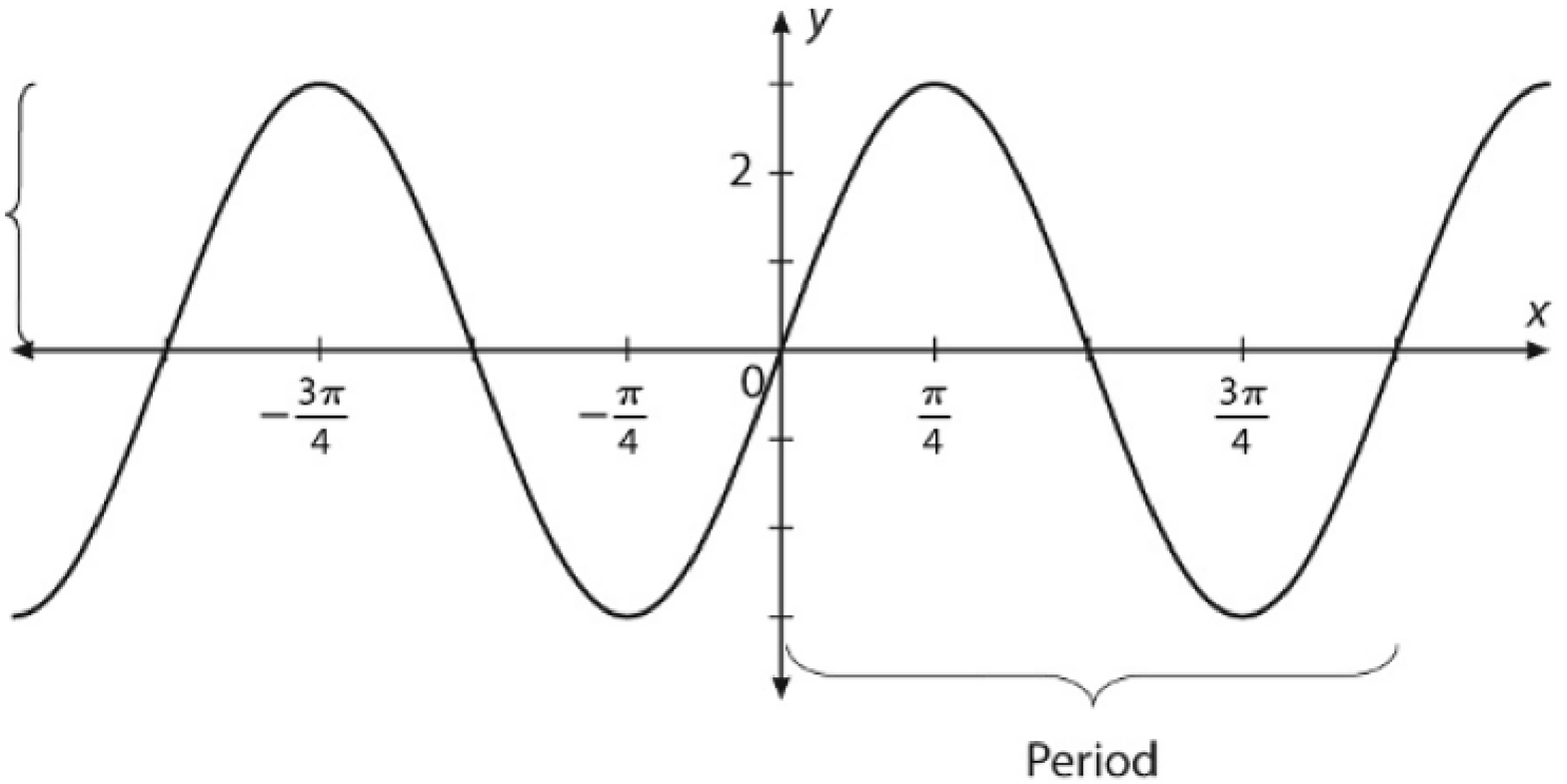
Reteach

For a sine function, $y = a\sin\left(\frac{1}{b}x\right)$.

Amplitude $= |a|$

Period $= 2\pi \cdot b$

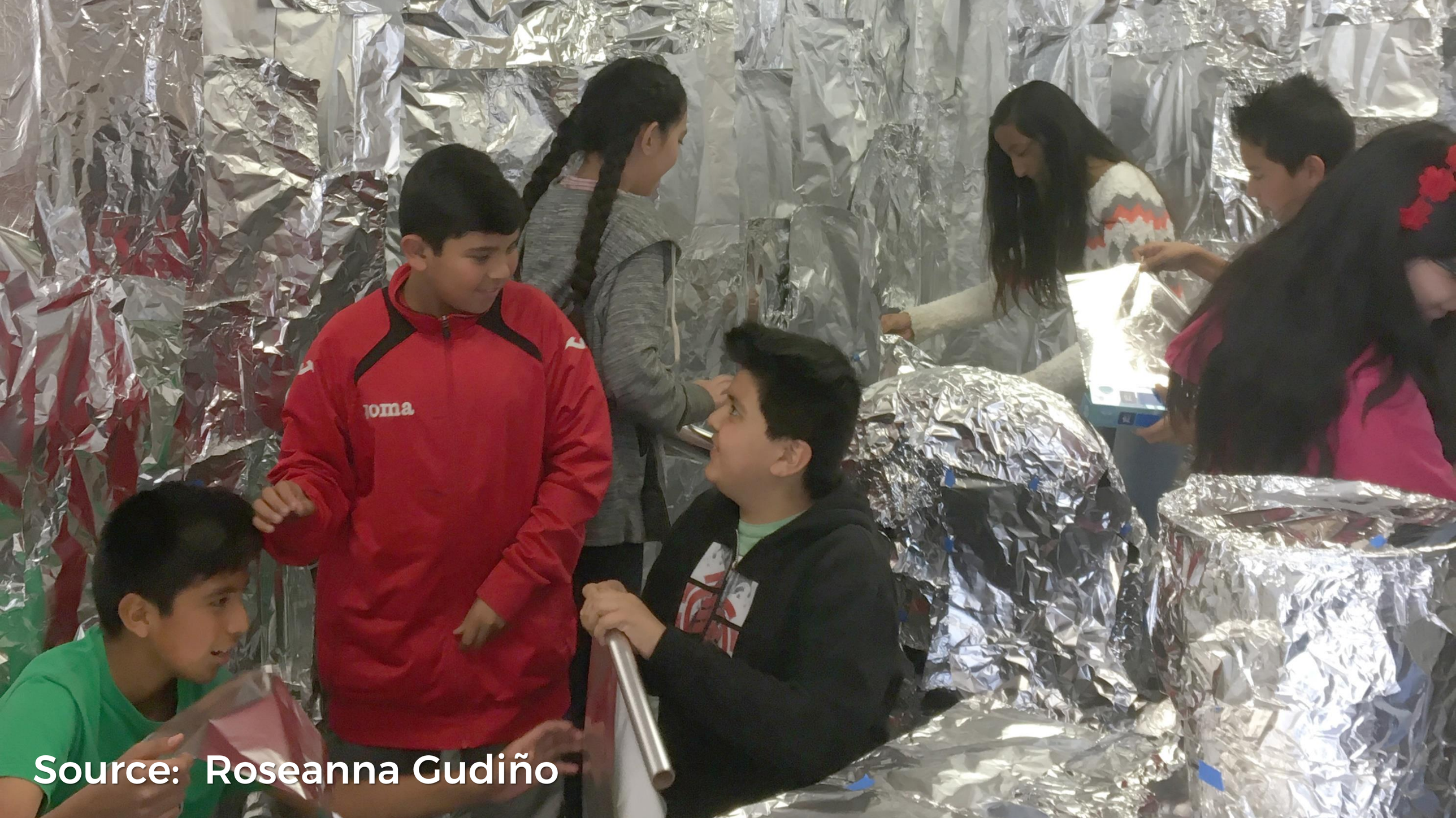
If $a < 0$, the graph is reflected across the x-axis.



Example Write the function shown in the graph above.

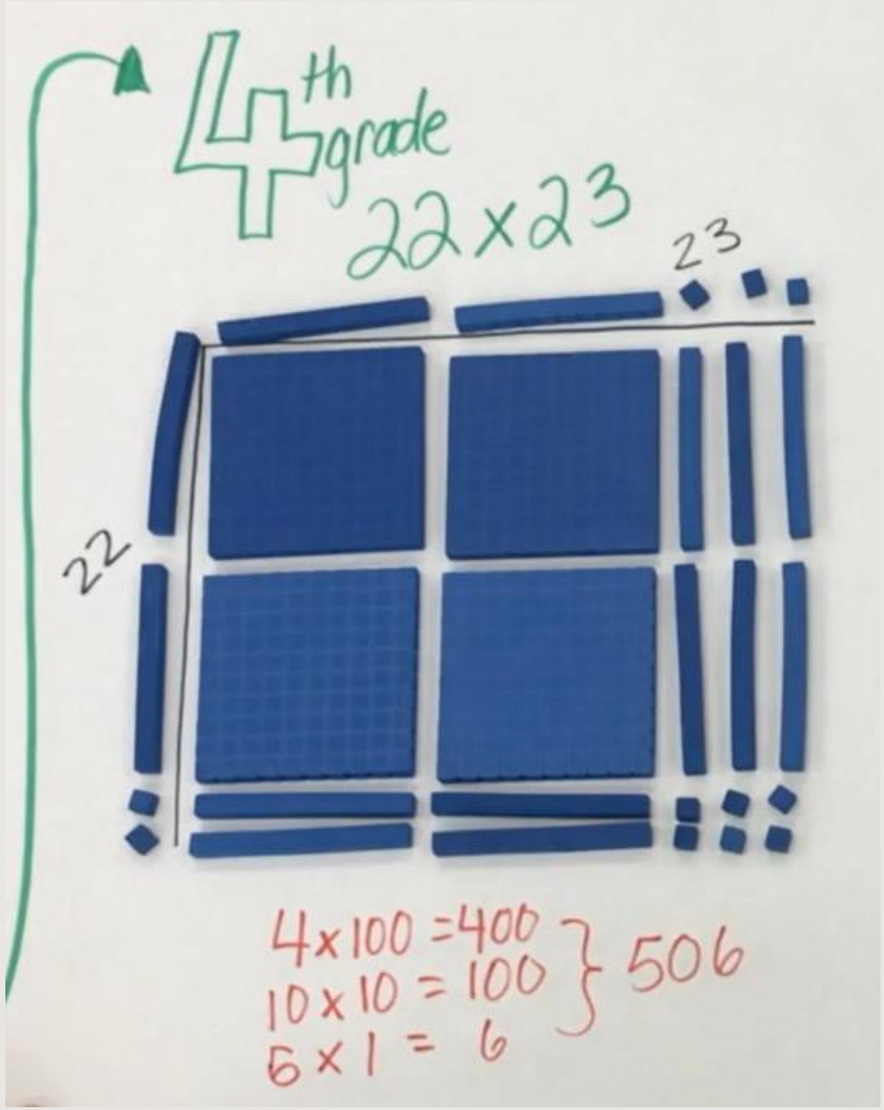
Source: graphingstories.com

Source: robertkaplinsky.com/lessons

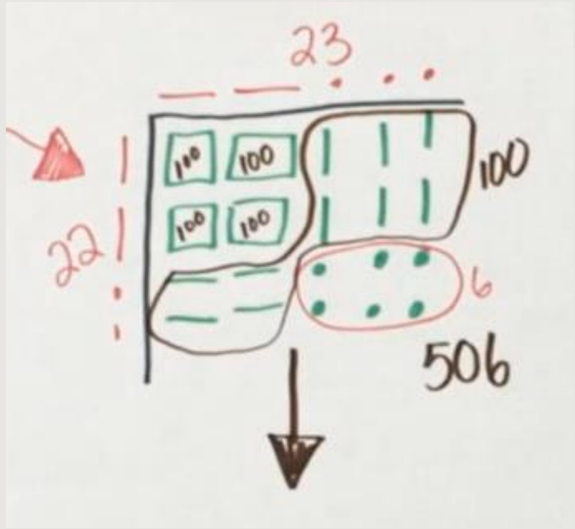


Source: Roseanna Gudiño

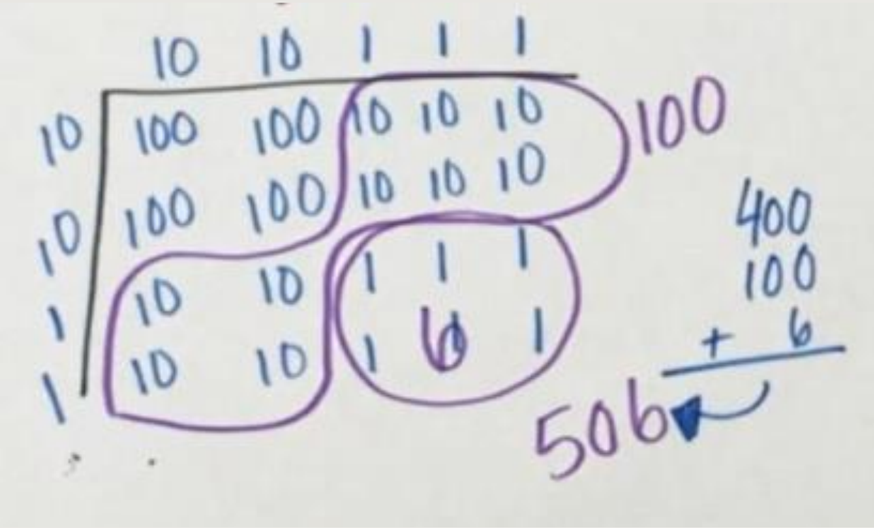
Source: gfletchy.com/progression-videos



Concrete



Representational



Abstract

Source: gfletchy.com

MY OLD METHODS

$$4(x+3)$$

$$4(x)+4(3)$$

$$(x+3)(x-1)$$

F $x(x)$

O $x(-1)$

I $3(x)$

L $3(-1)$

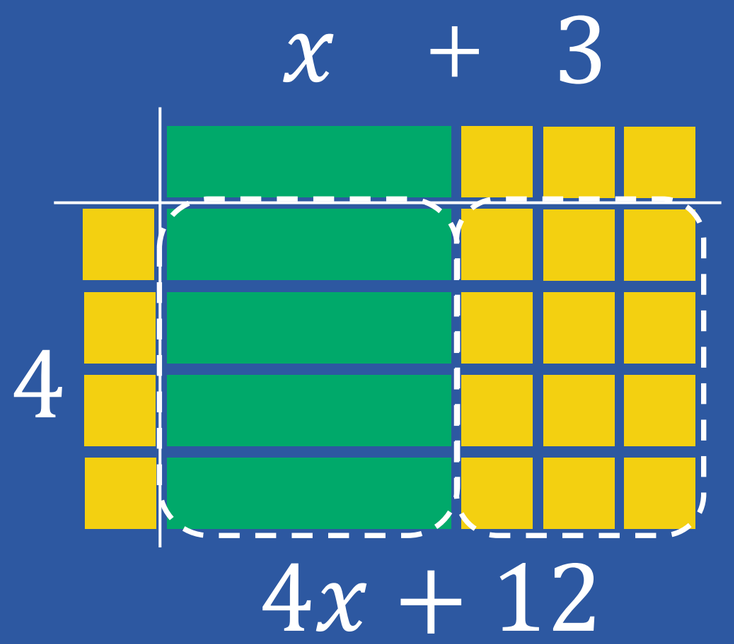
$$= x^2 - x + 3x - 3$$

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

DISTRIBUTIVE PROPERTY

$$4(x+3)$$

Concrete



Representational

	x	$+\ 3$
4	$4x$	12

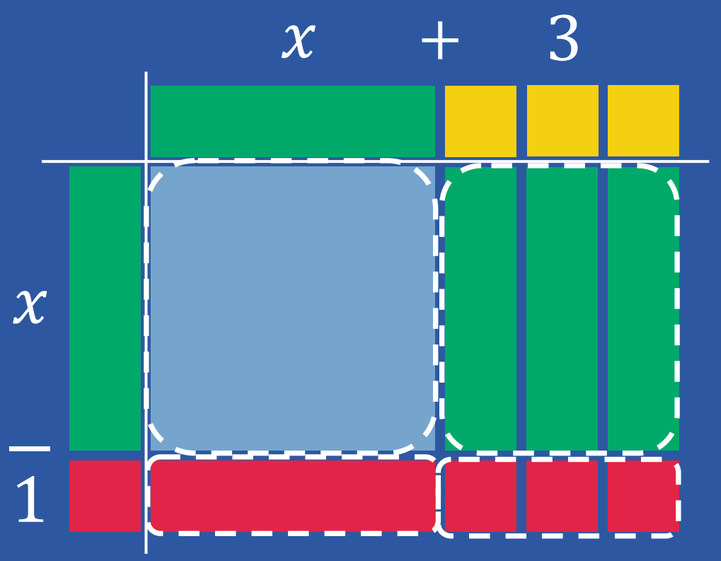
Abstract

$$4(x+3)$$
$$= 4(x) + 4(3)$$
$$= 4x + 12$$

BINOMIAL MULTIPLICATION

$(x + 3)(x - 1)$

Concrete



$x^2 - x + 3x - 3$

$x^2 + 2x - 3$

Representational

	x	+ 3
x	x^2	3x
− 1	$-x$	-3

$x^2 - x + 3x - 3$

$x^2 + 2x - 3$

Abstract

$(x + 3)(x - 1)$

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

$= x^2 + 2x - 3$

STICKY ATTRIBUTES

- [x] SIMPLE
- [x] UNEXPECTED
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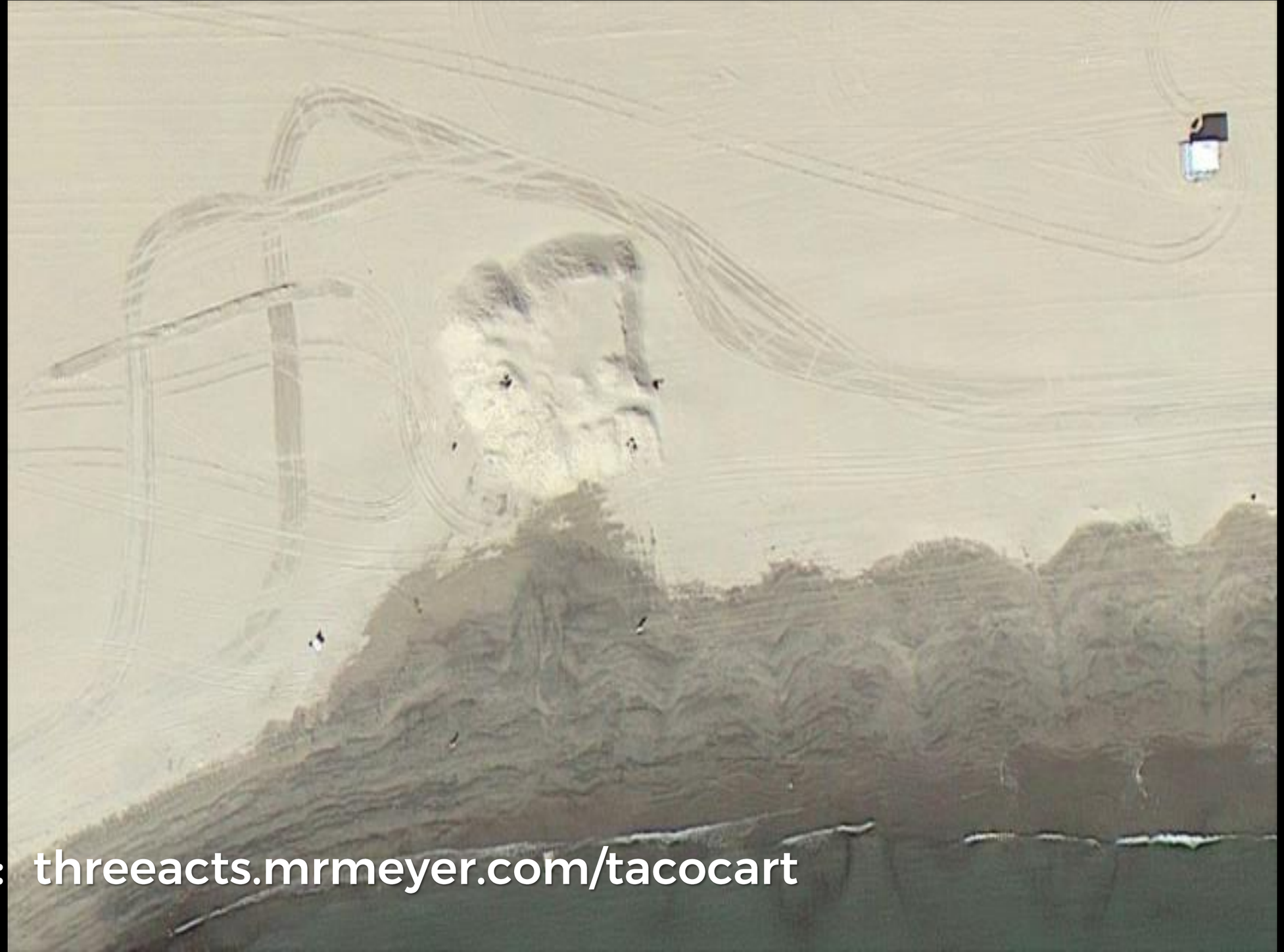
- [ ] STORIES

RobertKaplinsky.com



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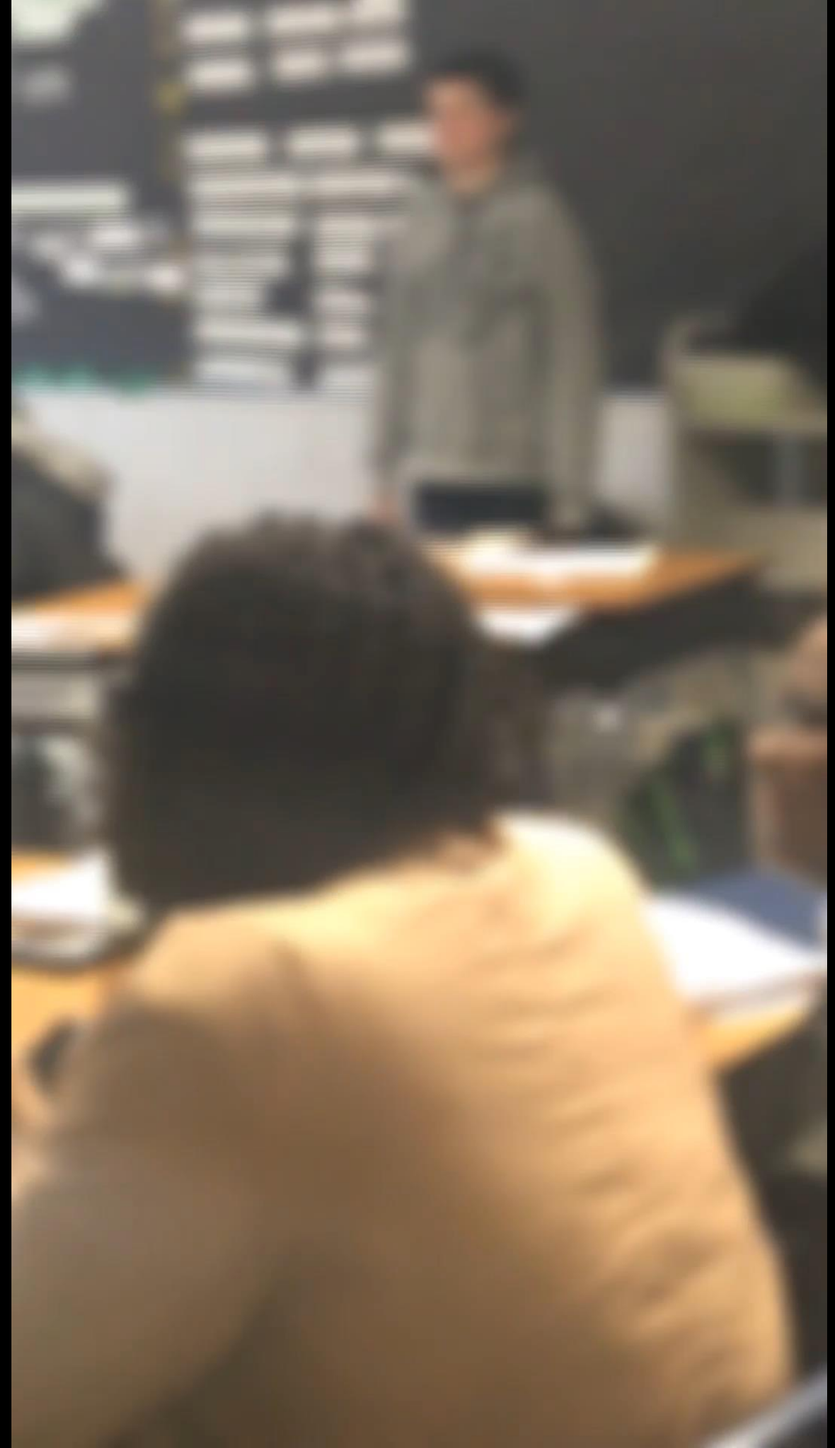
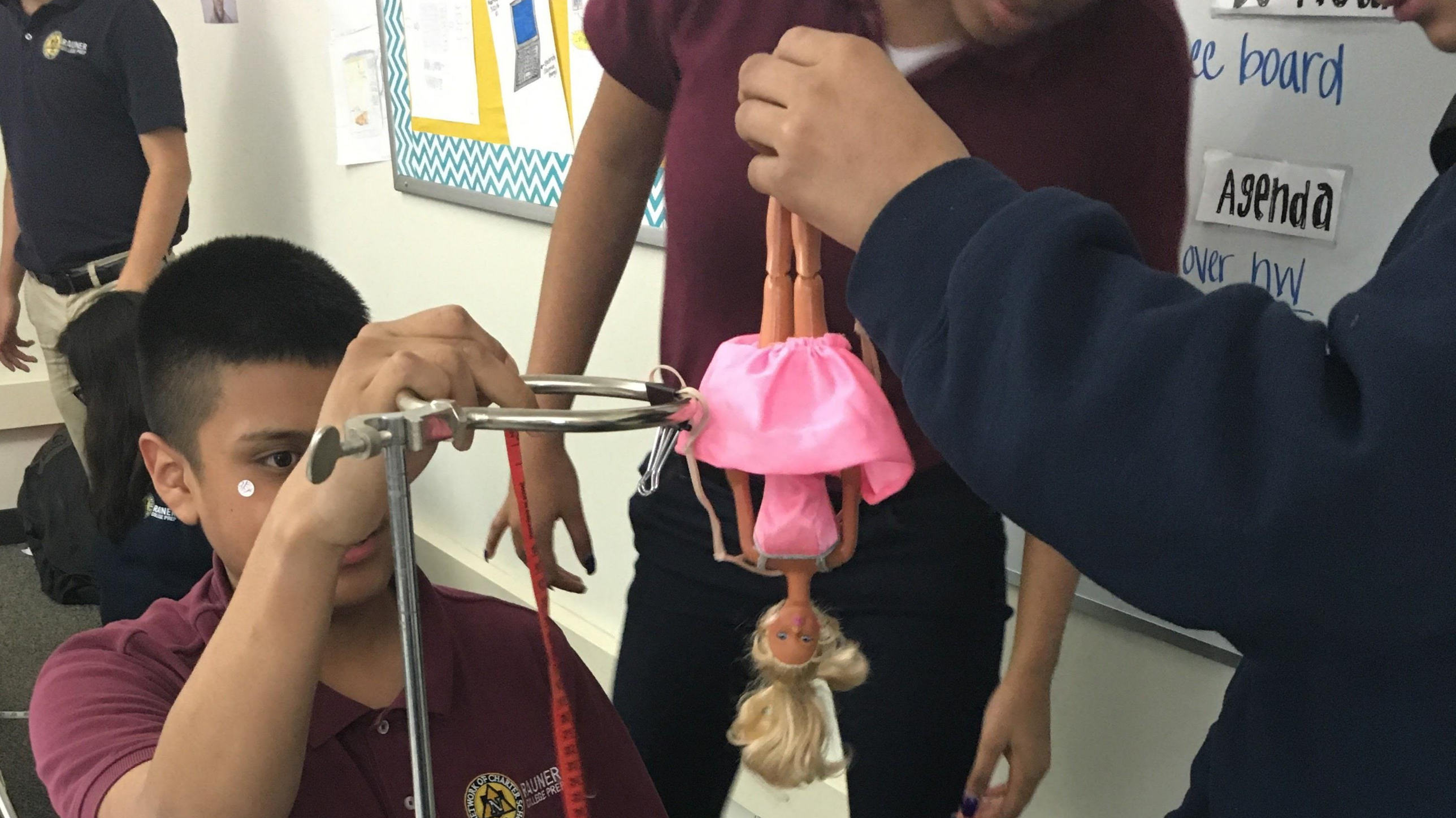


Source:
Jenise Sexton

Source: Tom Ward

Source: Tom Ward


ee board
Agenda
over hw

Source:
Fawn Nguyen


Medication
No Refill
Division
Pain Relief Fever Reduction
NSAID
200 Tablets 200 mg
Functions
Pain Reliever/ Fever Reducer
Caffeine-Free
200 tablets
325 mg each
Extra Strength
Perimeter
Pain Reliever/ Fever Reducer
200 Capsules 500 mg. each
90 tablets

STICKY ATTRIBUTES

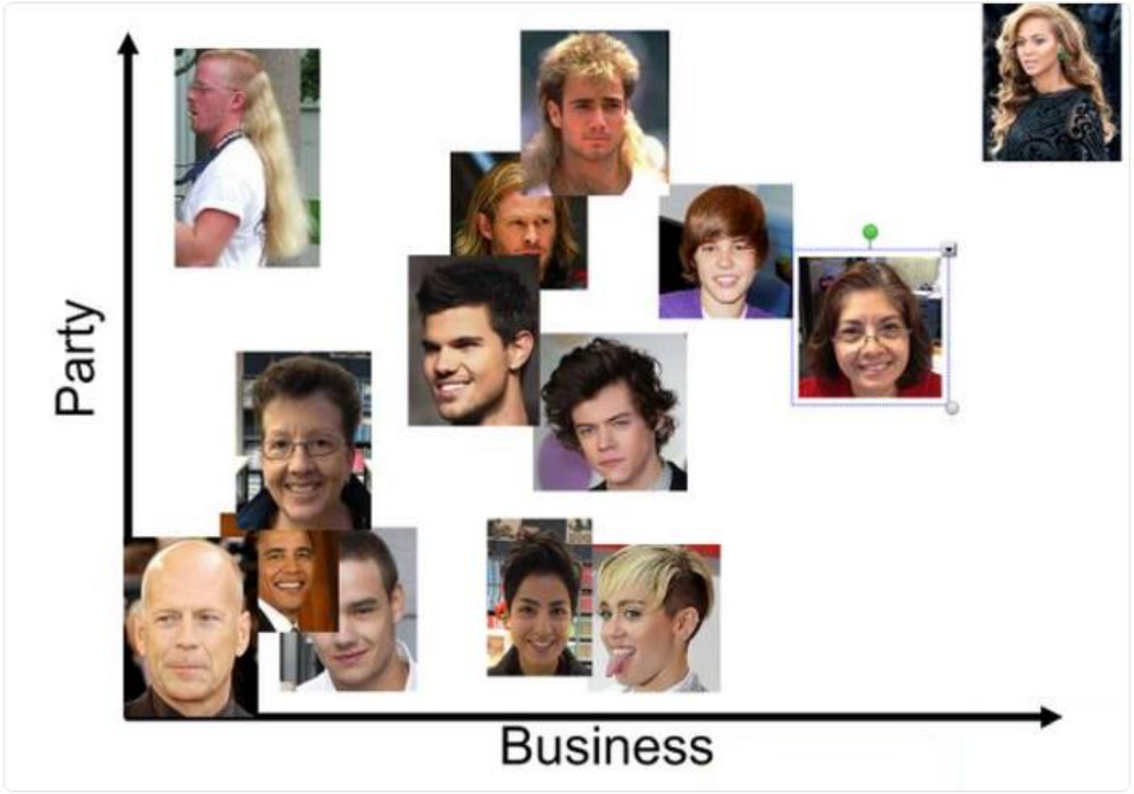
- [x] SIMPLE
- [x] UNEXPECTED
- [x] CONCRETE
- [x] CREDIBLE
- [ ] EMOTIONAL
- [ ] STORIES

Source: mrvaudrey.com

Matt Vaudrey
@MrVaudrey

Following

Things I never thought I'd say: "So you're saying that Thor has less party than Justin Bieber, but more than Obama?"



RETWEETS 4 LIKES 7

STICKY ATTRIBUTES

- [x] SIMPLE
- [x] UNEXPECTED
- [x] CONCRETE
- [x] CREDIBLE
- [x] EMOTIONAL
- [ ] STORIES

Source: robertkaplinsky.com/lessons

Patrick Peterson Hasn't 'Gotten Around' to Cashing $15 Million Bonus Check

KYLE NEWPORT

AUGUST 25, 2014

Source: robertkaplinsky.com/lessons

20. Sports Cornerback Patrick Peterson did not deposit a $15,361,000 signing bonus check for 27 days. Assuming a 2% interest rate, how much money did he lose by not cashing the check immediately?

Source: robertkaplinsky.com/lessons

IMPORTANCE OF CONTEXT

- Play four songs
- Tapped out
- Write down song names
- Share answers with neighbors
- Listen again with song names

SONG #1

SONG #2

SONG #3

SONG #4

SONG #1

Itsy Bitsy Spider

SONG #2

Wheels On The Bus

SONG #3

Row Row Row Your Boat

SONG #4

Take Me Out To The Ballgame

Robert Kaplinsky
@robertkaplinsky

Random favor: please listen to me tapping out 4 songs and try to guess the name. Should take < 2 min. It's not easy!

Recognizing Tapped Songs

Please listen to each of the four songs, type in the name of the song, and the click submit. You may have no clue about what the song is called. If that happens, just write something like, "I don't...

docs.google.com

RETWEET
1

2:47 PM - 13 Jun 2017

TAKEAWAYS (PART ONE)

- Of 192 people surveyed:
  - Itsy Bitsy Spider: ~41%
  - Wheels on the Bus: ~29%
  - Row Your Boat: ~25%
  - Take Me Out to the Ballgame: ~3%

TAKEAWAYS (PART TWO)

- Many said, “I’m sorry. I don’t know.”
- Many said, “I’m not good at this.”
- Many said, “I don’t like this.”

CURSE OF KNOWLEDGE

STICKY ATTRIBUTES

- [x] SIMPLE
- [x] UNEXPECTED
- [x] CONCRETE
- [x] CREDIBLE
- [x] EMOTIONAL
- [x] STORIES

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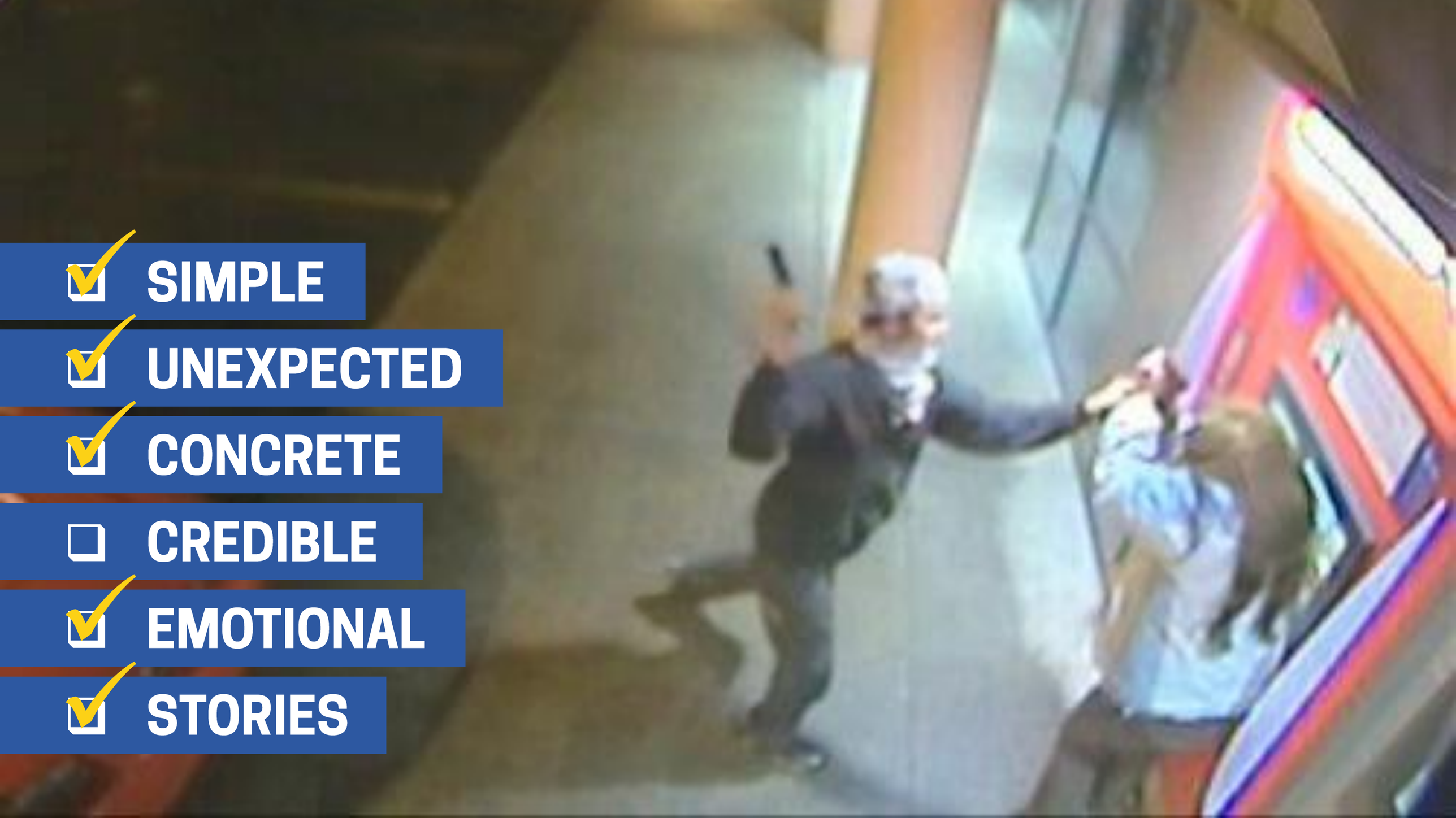
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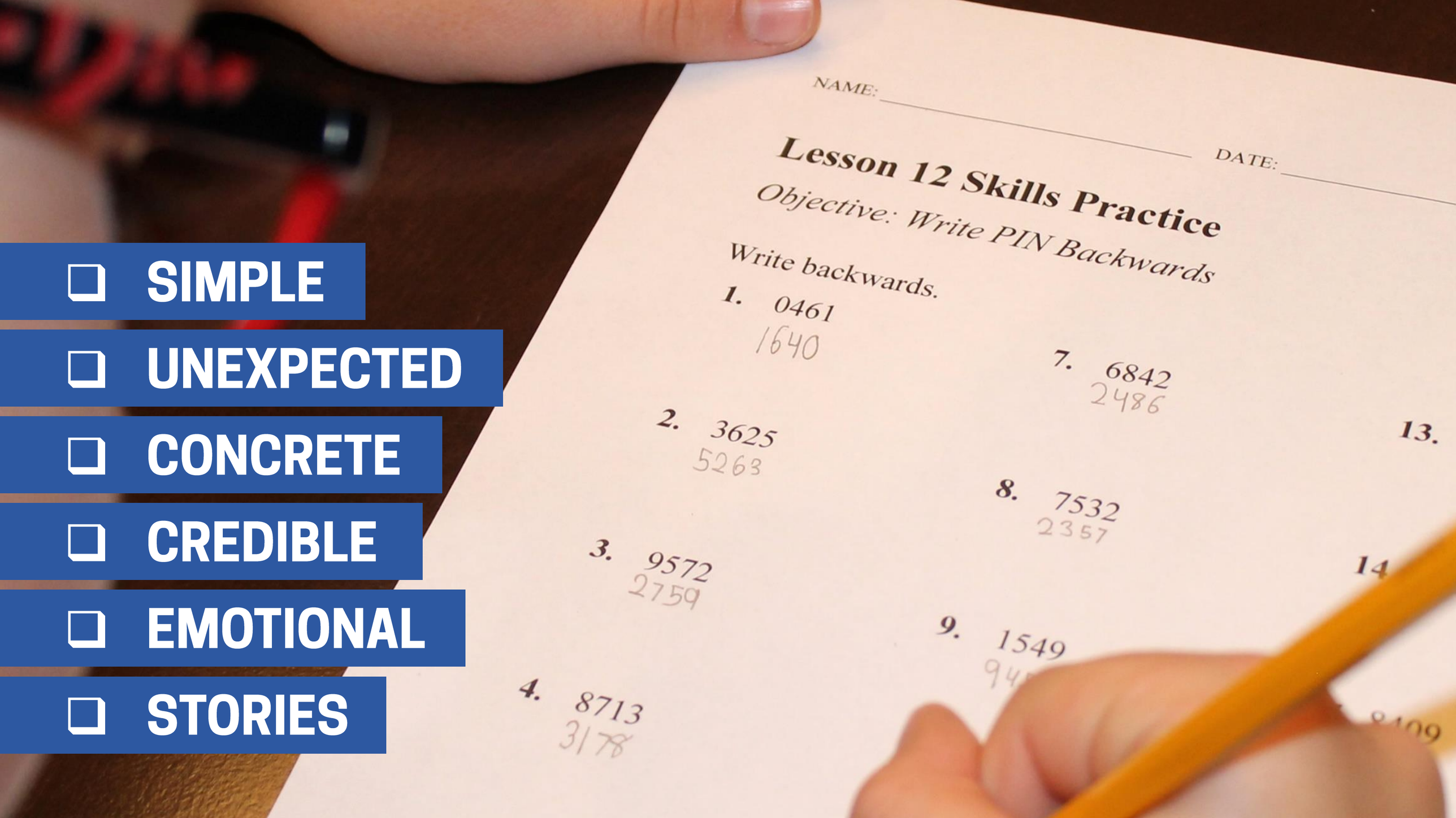
CREDIBLE
EMOTIONAL
STORIES



- ❑ SIMPLE
- ❑ UNEXPECTED
- ❑ CONCRETE
- ❑ CREDIBLE
- ❑ EMOTIONAL
- ❑ STORIES

DISCUSSION TIME

- Which of the attributes (simple, unexpected, concrete, credible, emotional, and stories) resonates most with you and why?
- How can we apply these attributes to how we teach mathematics?

GOALS

- ☑ WHAT IS INTELLIGENCE?
- ☑ WHY DON'T STUDENTS REMEMBER?
- ☐ WHAT MATHEMATICS IS IMPORTANT?

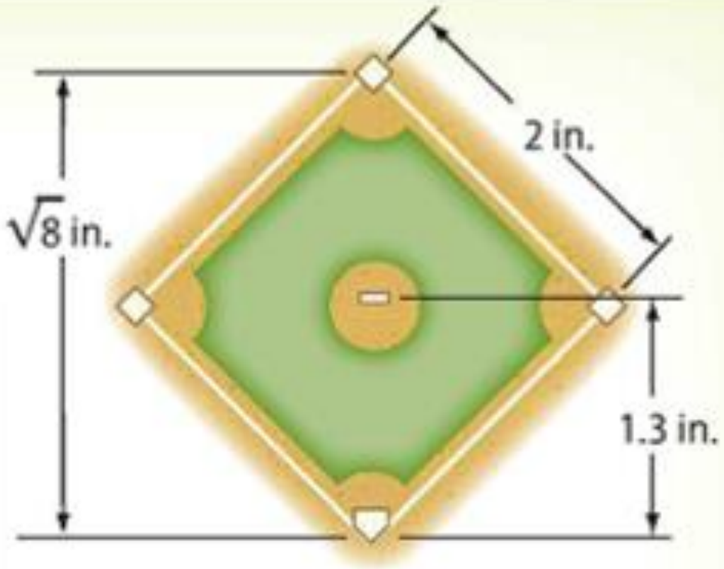
Real-World Link

Common Core State Standards

Content Standards
8.NS.1, 8.NS.2, 8.EE.2

Mathematical Practices
1, 3, 4, 6

Sports Major League baseball has rules for the dimensions of the baseball diamond. A model of the diamond is shown.



1. On the model, the distance from the pitching mound to home plate is 1.3 inches. Is 1.3 a rational number? Explain.

2. On the model, the distance from first base to second base is 2 inches. Is 2 a rational number? Explain.

3. The distance from home plate to second base is $\sqrt{8}$ inches. Using a calculator, find $\sqrt{8}$. Does it appear to terminate or repeat?

Real-World Link

Common Core State Standards

Content Standards
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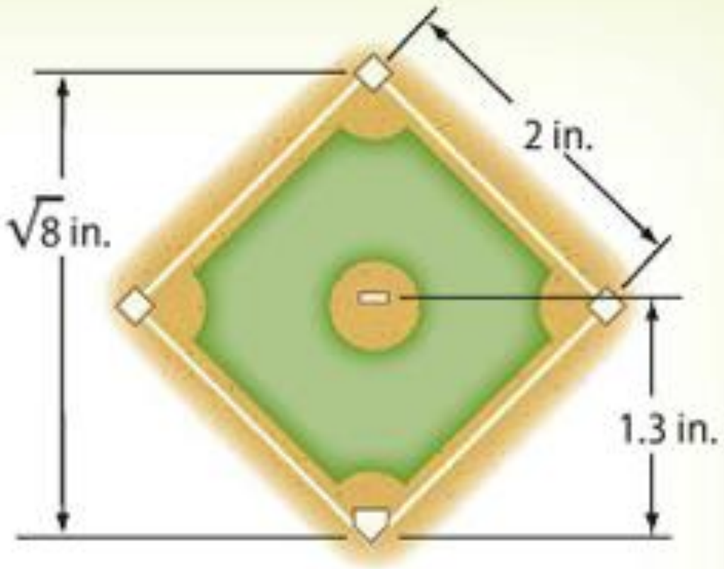

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Doritos® & Cheetos® Mix

20 Singles

DORITOS® Nacho Cheese Flavored Tortilla Chips 1 OZ. EA. DORITOS® COOL RANCH® Flavored Tortilla Chips 1 OZ. EA. CHEETOS® Puffs Cheese Flavored Snacks ⅞ OZ. EA. CHEETOS® Crunchy Cheese Flavored Snacks 1 OZ. EA.

20 INDIVIDUAL BAGS: ⅞ OZ. EACH, 1 OZ. EACH, TOTAL NET WT. 19⅝ OZ. (1 LB. 3⅝ OZ.) 556.3 g

⚠ WARNING: PREVENT ENTANGLEMENT AND STRANGULATION. KEEP THIS BAG AWAY FROM YOUNG CHILDREN. IT IS NOT A TOY.

THINKING TIME

- Why did many of you expect there to be five of each?
- Why was it not five of each?
- How might they decide on this combination?

Classic Mix

20 Singles

LAY'S® Classic Potato Chips, DORITOS® Nacho Cheese Flavored Tortilla Chips, DORITOS® COOL RANCH® Flavored Tortilla Chips, CHEETOS® Crunchy Cheese Flavored Snacks, SUNCHIPS® Original Multigrain Snacks, FRITOS® Original Corn Chips (All 1 OZ. Each)

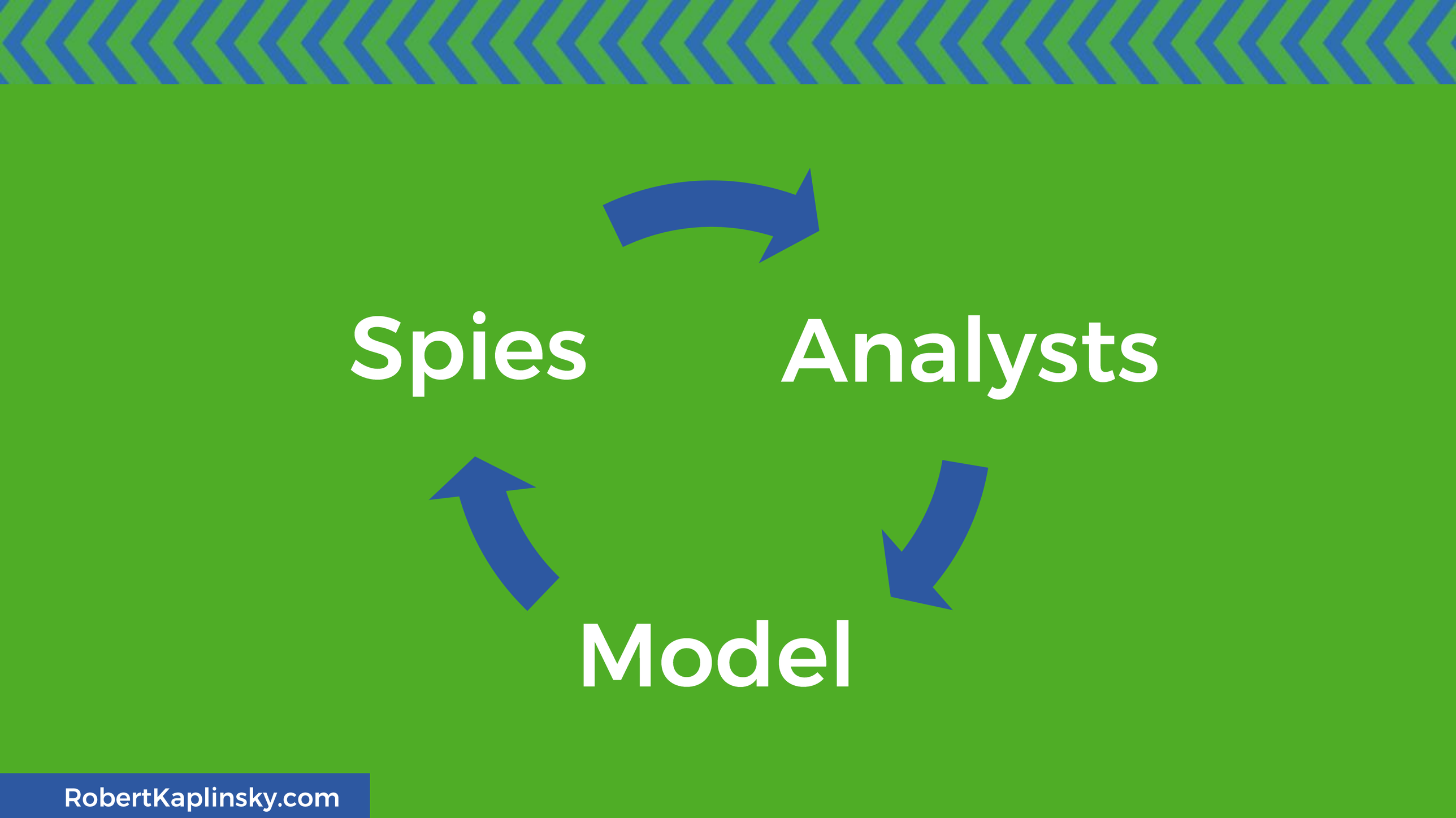
20 INDIVIDUAL BAGS: 1 OZ. EACH, TOTAL NET WT. 20 OZ. (1 LB. 4 OZ.) 567 g

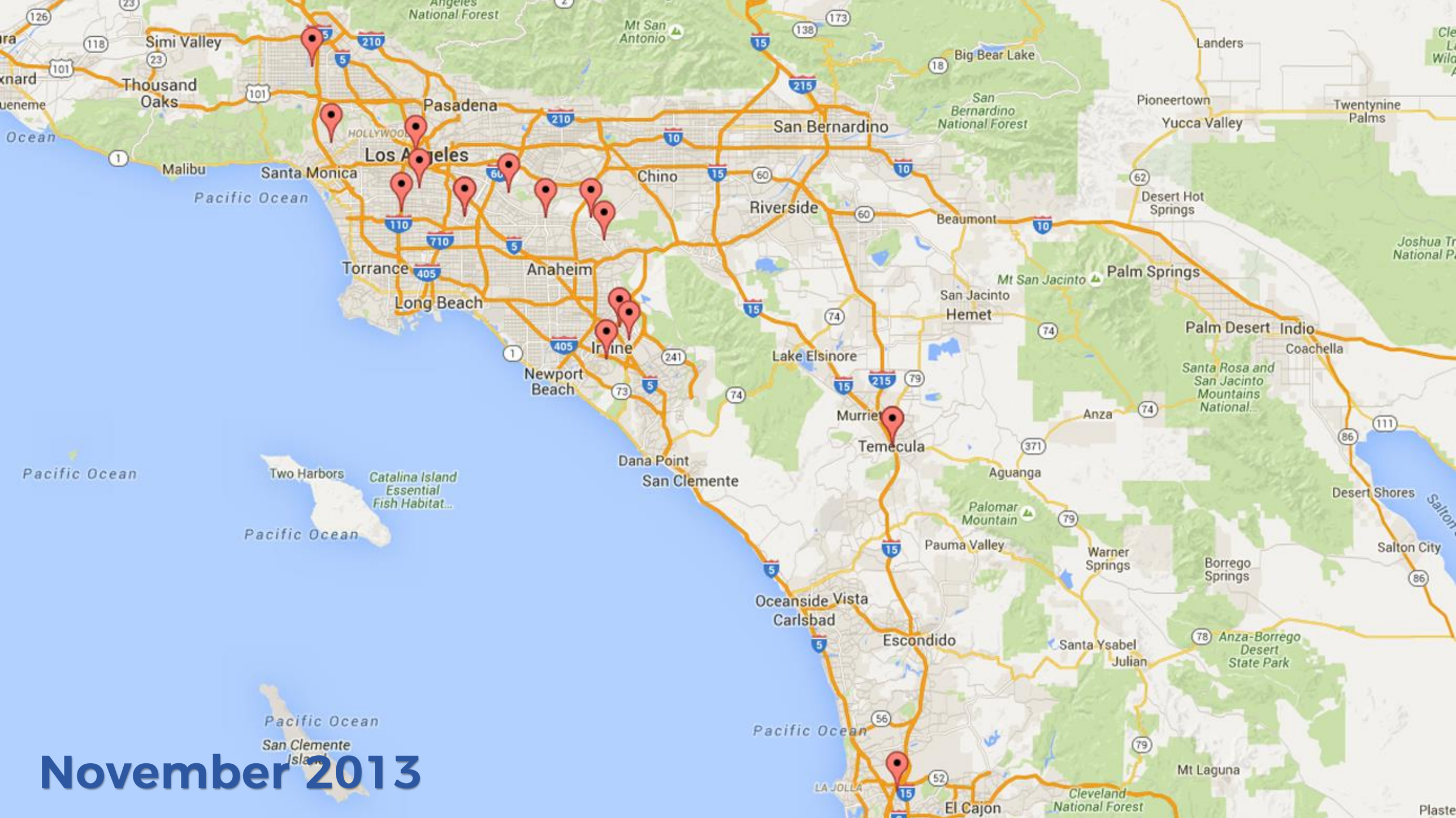
⚠ WARNING: PREVENT ENTANGLEMENT AND STRANGULATION. KEEP THIS BAG AWAY FROM YOUNG CHILDREN. IT IS NOT A TOY.

MATH MODELING

- ❑ HOW DO WE MAKE SENSE OF MATH MODELING?
- ❑ IS IT JUST ANSWERING QUESTIONS?
- ❑ HOW DO YOU PROFIT FROM MATH MODELING?
- ❑ HOW DO WE HELP OUR STUDENTS IMPROVE?


CENTRAL INTELLIGENCE AGENCY
UNITED STATES OF AMERICA


Spies
Analysts
Model



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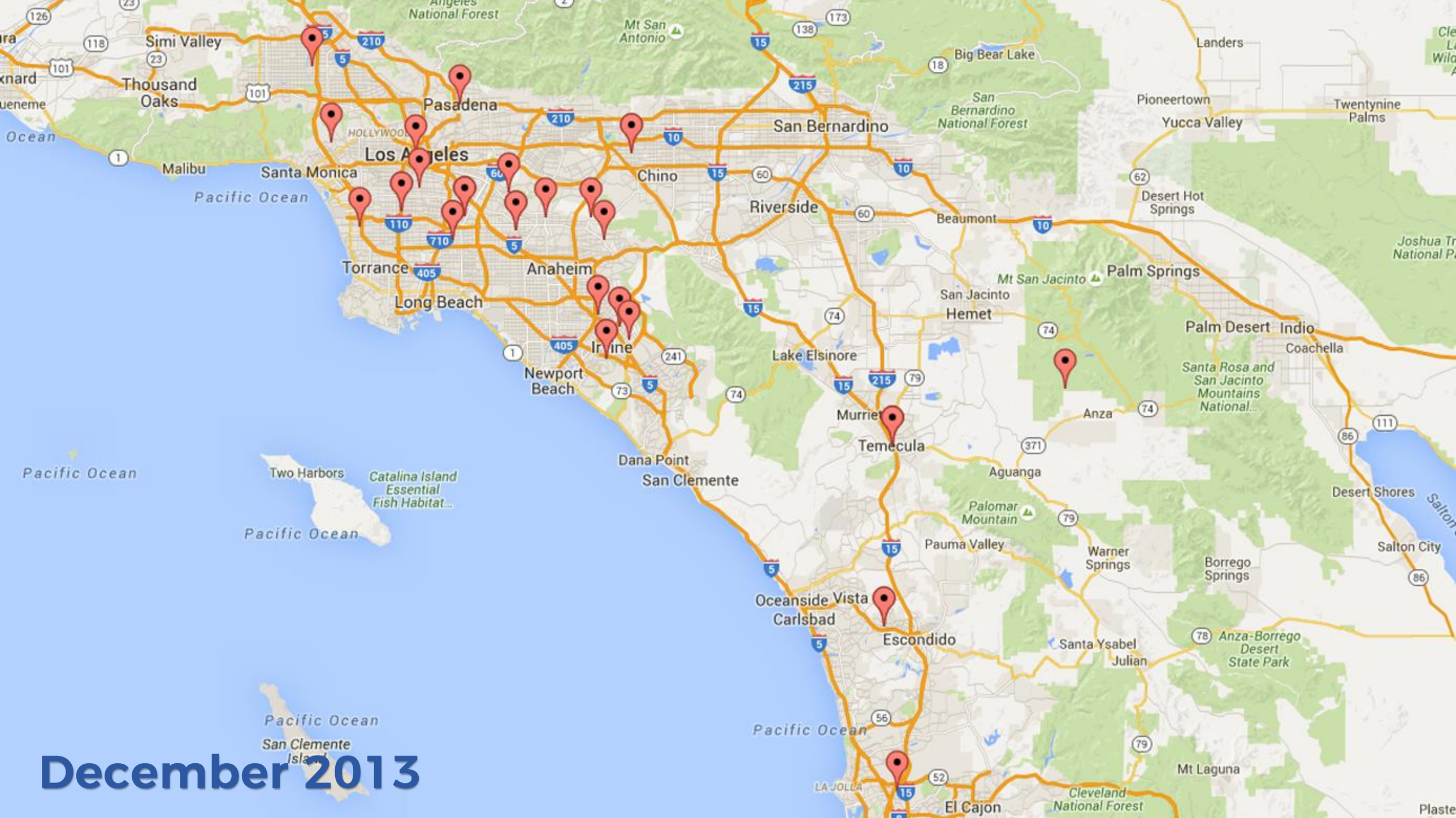

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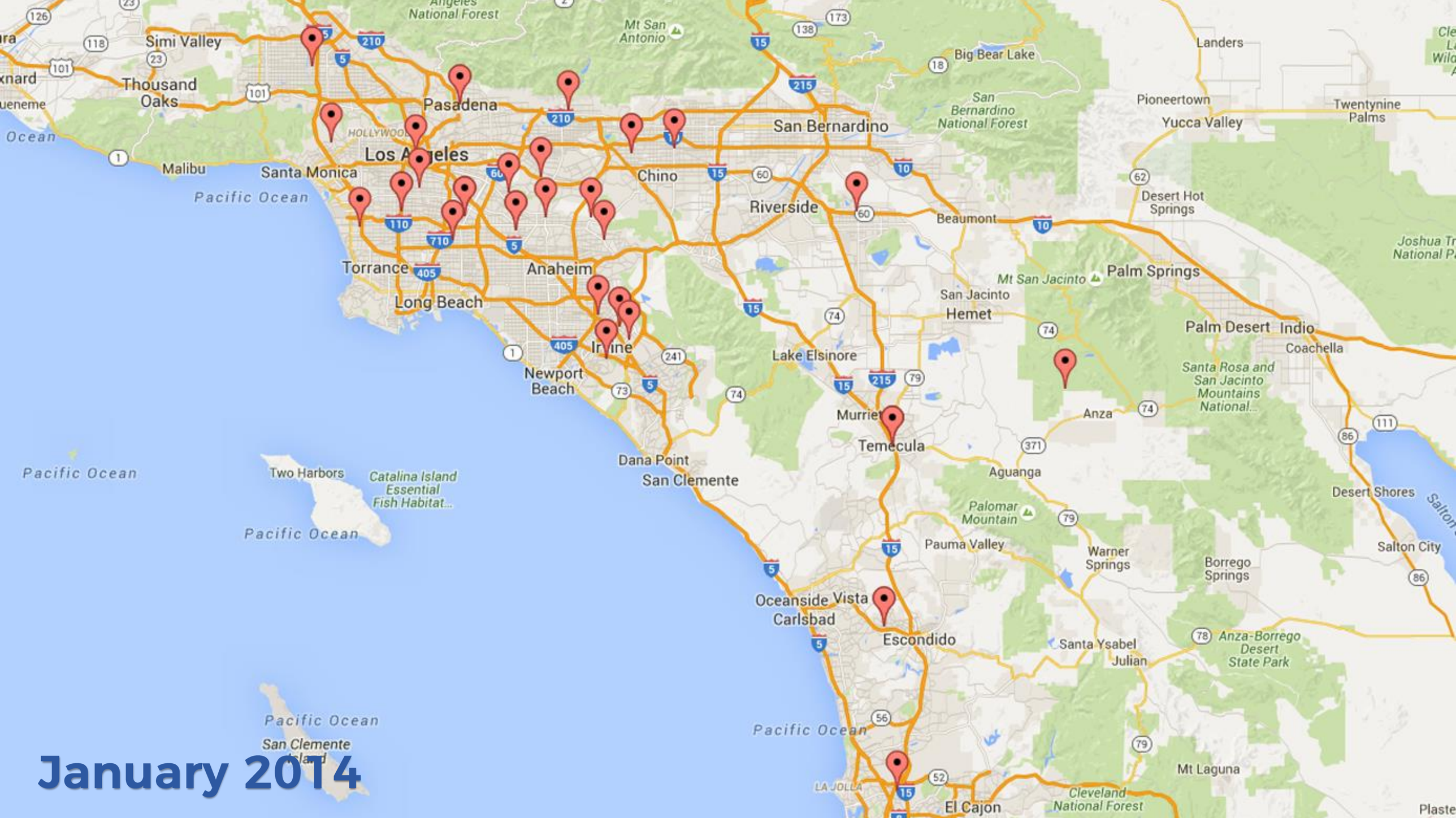

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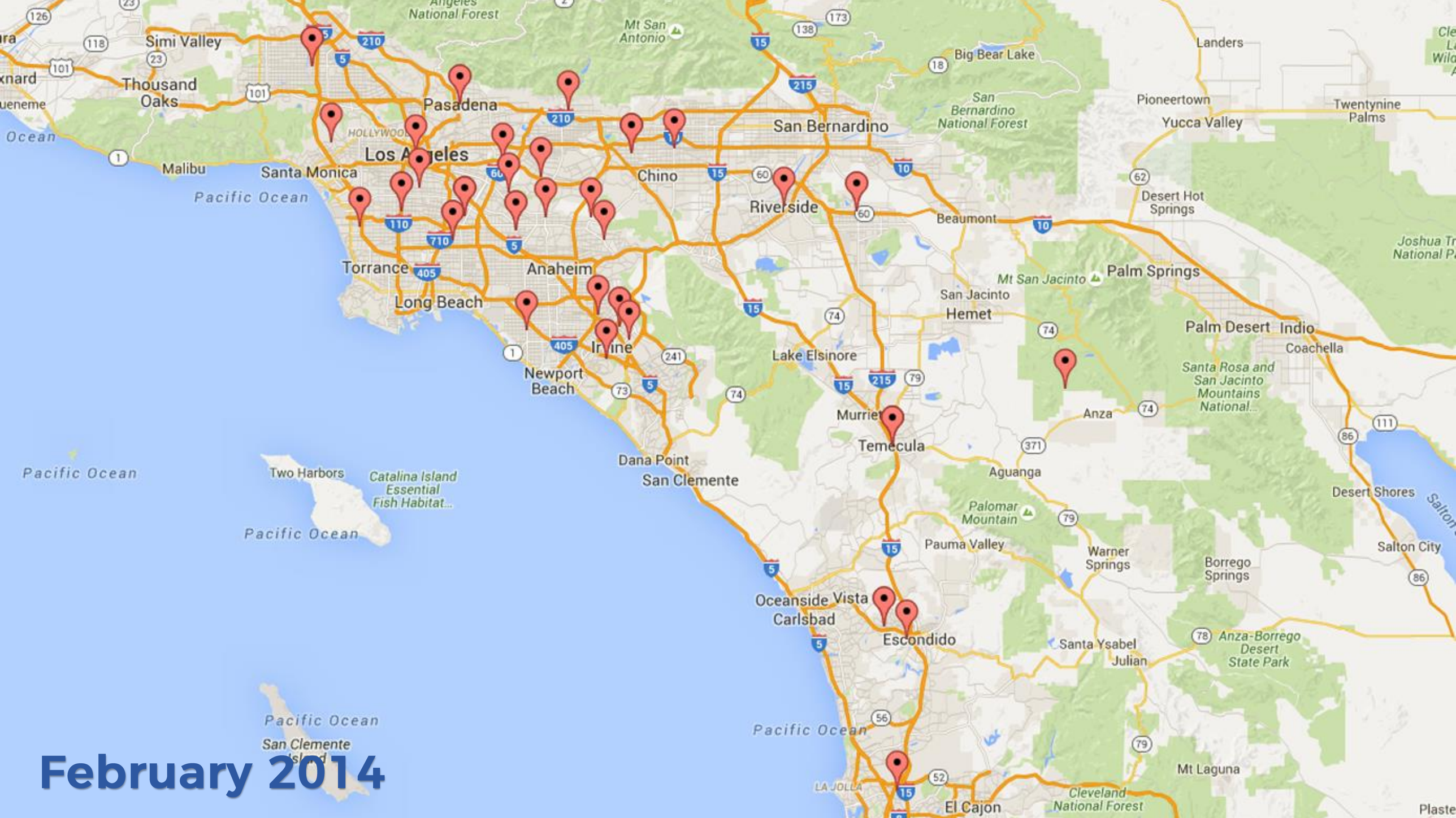

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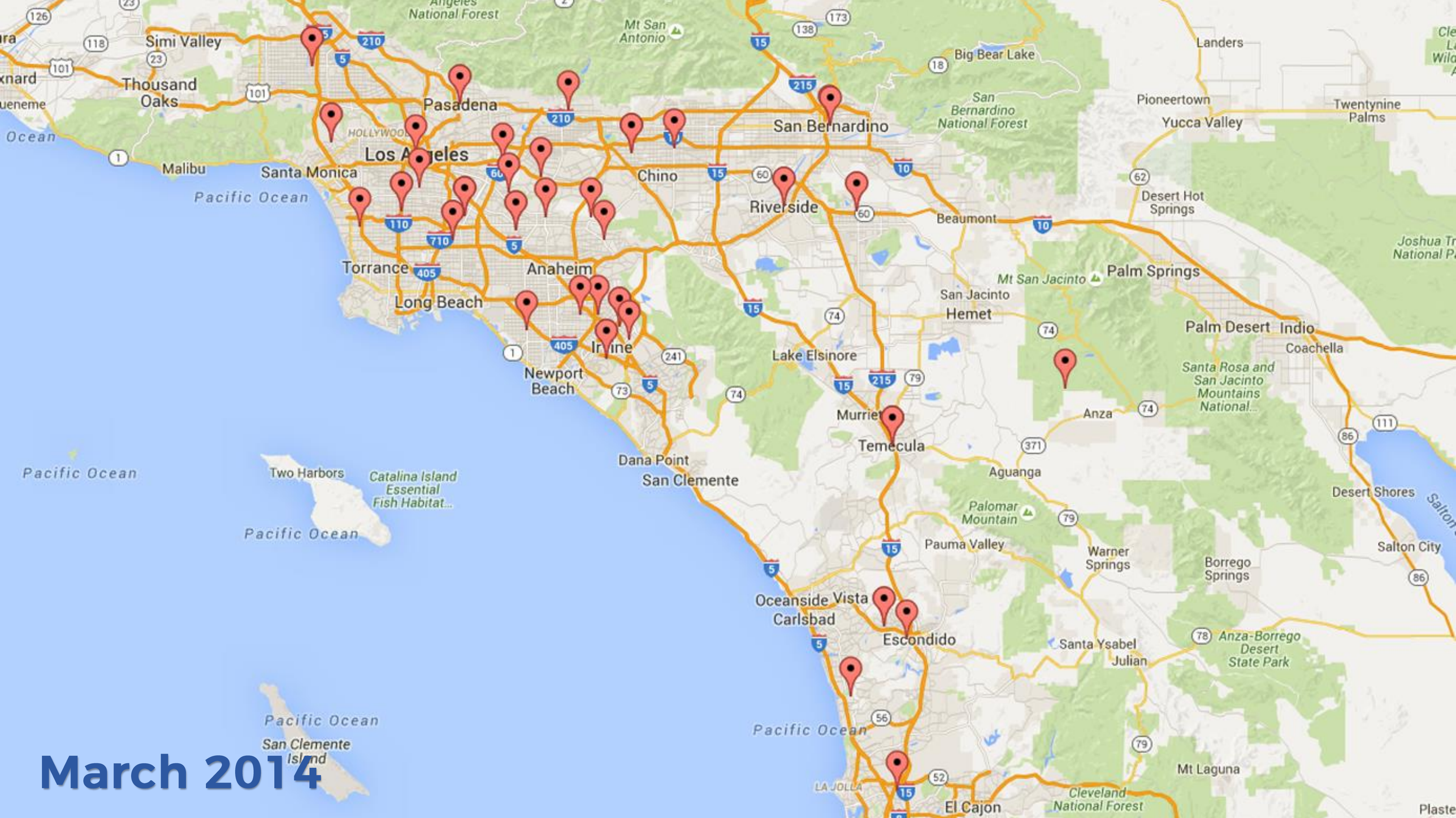
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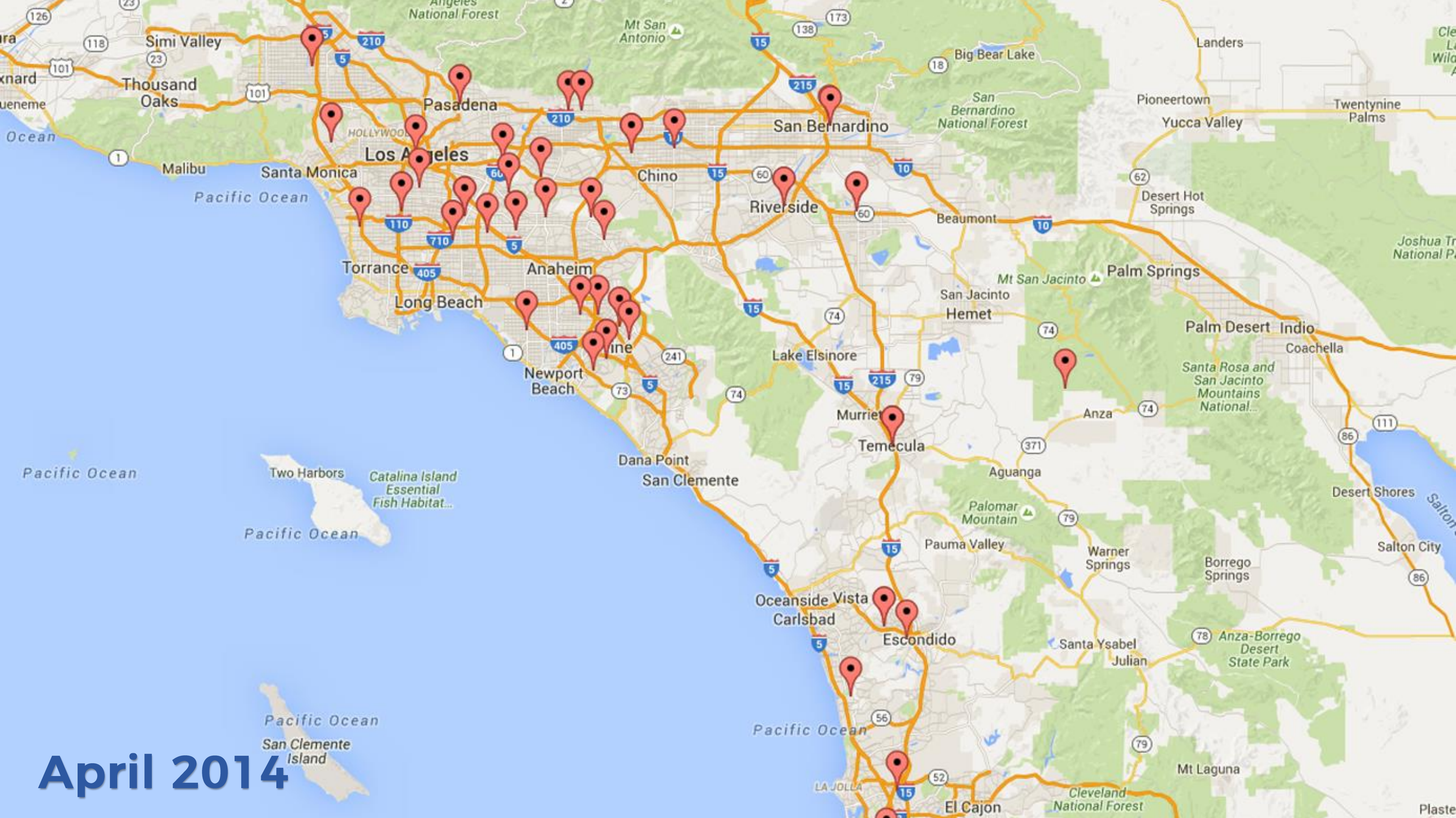
March 2014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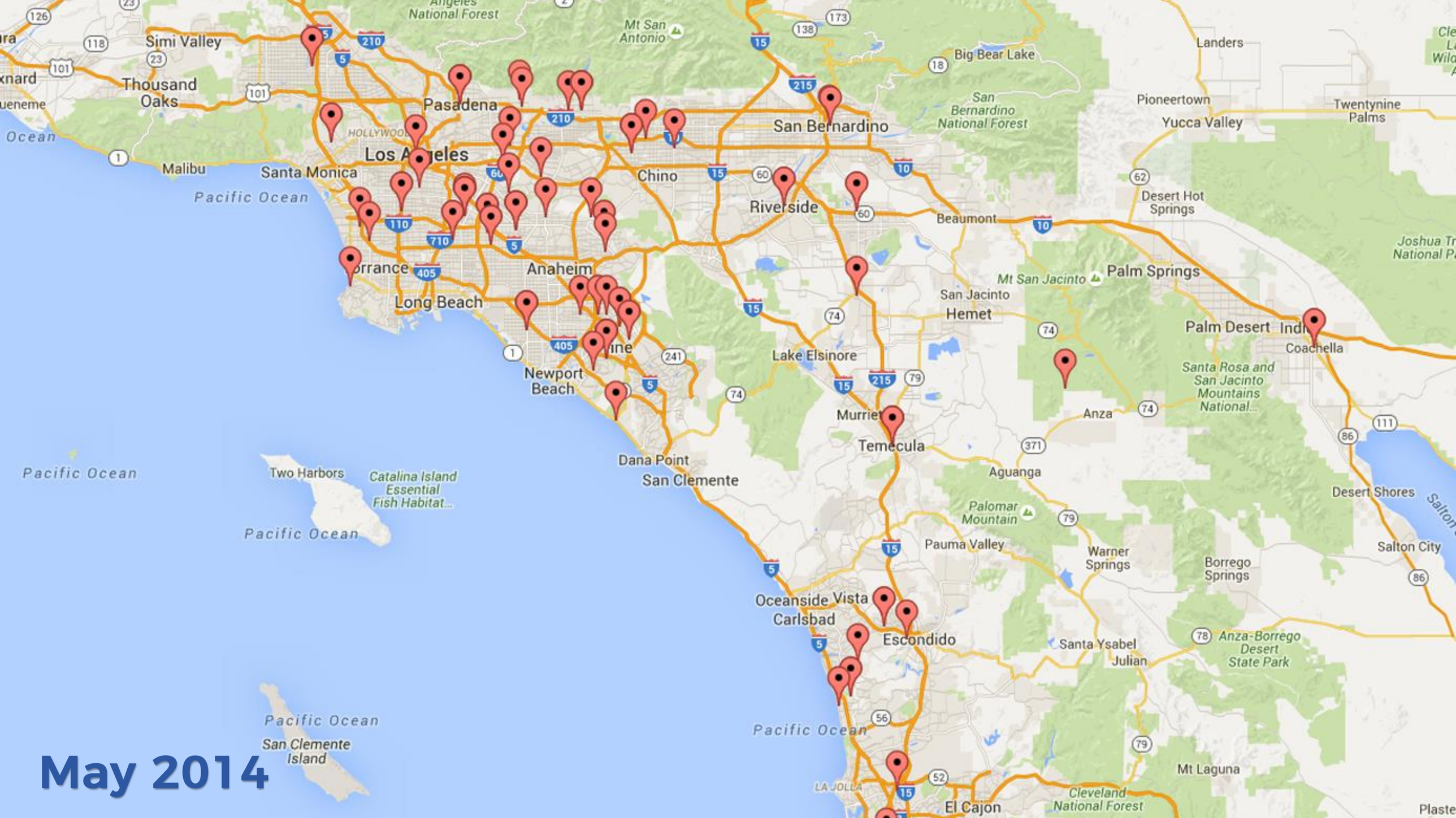
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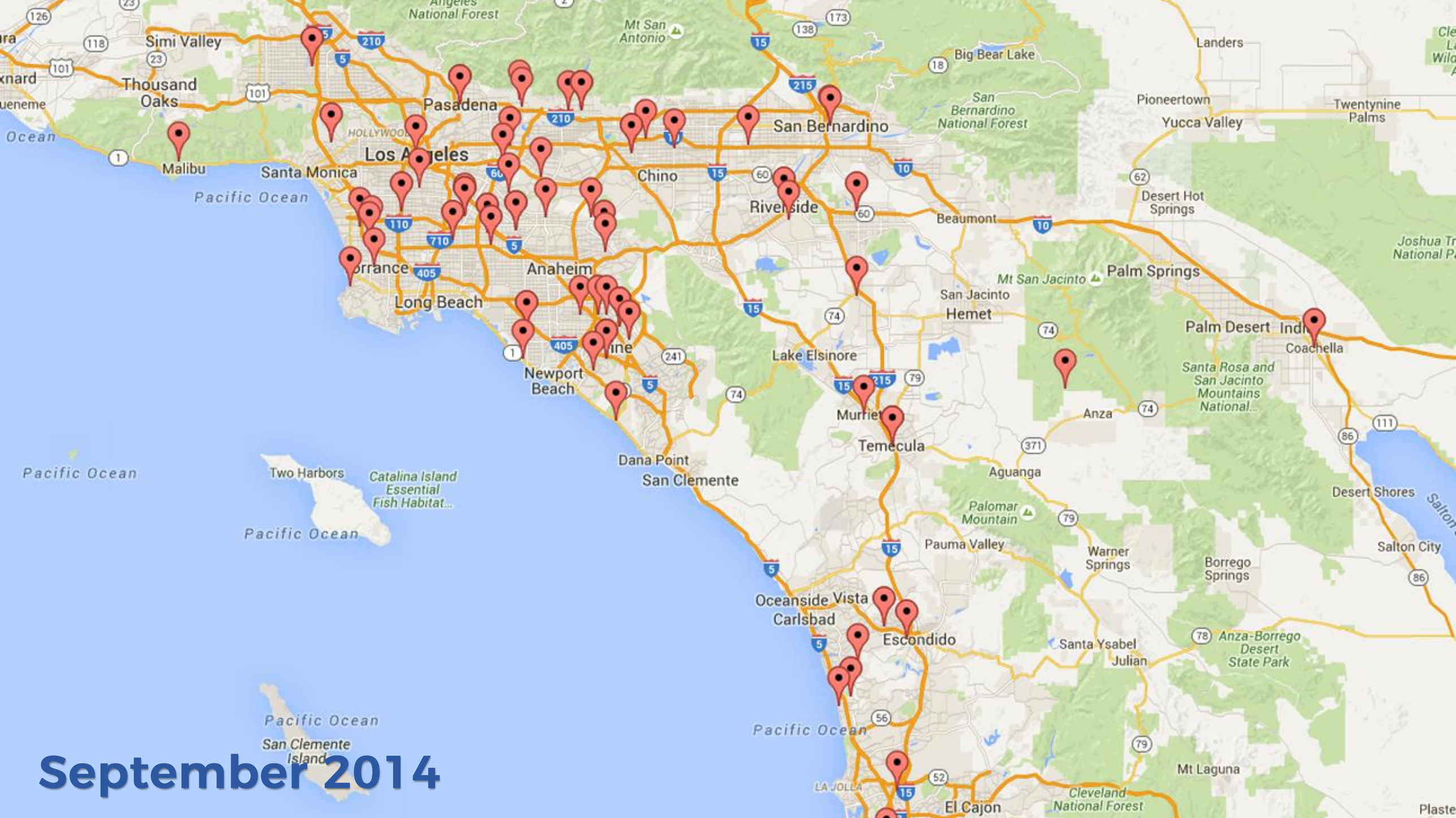

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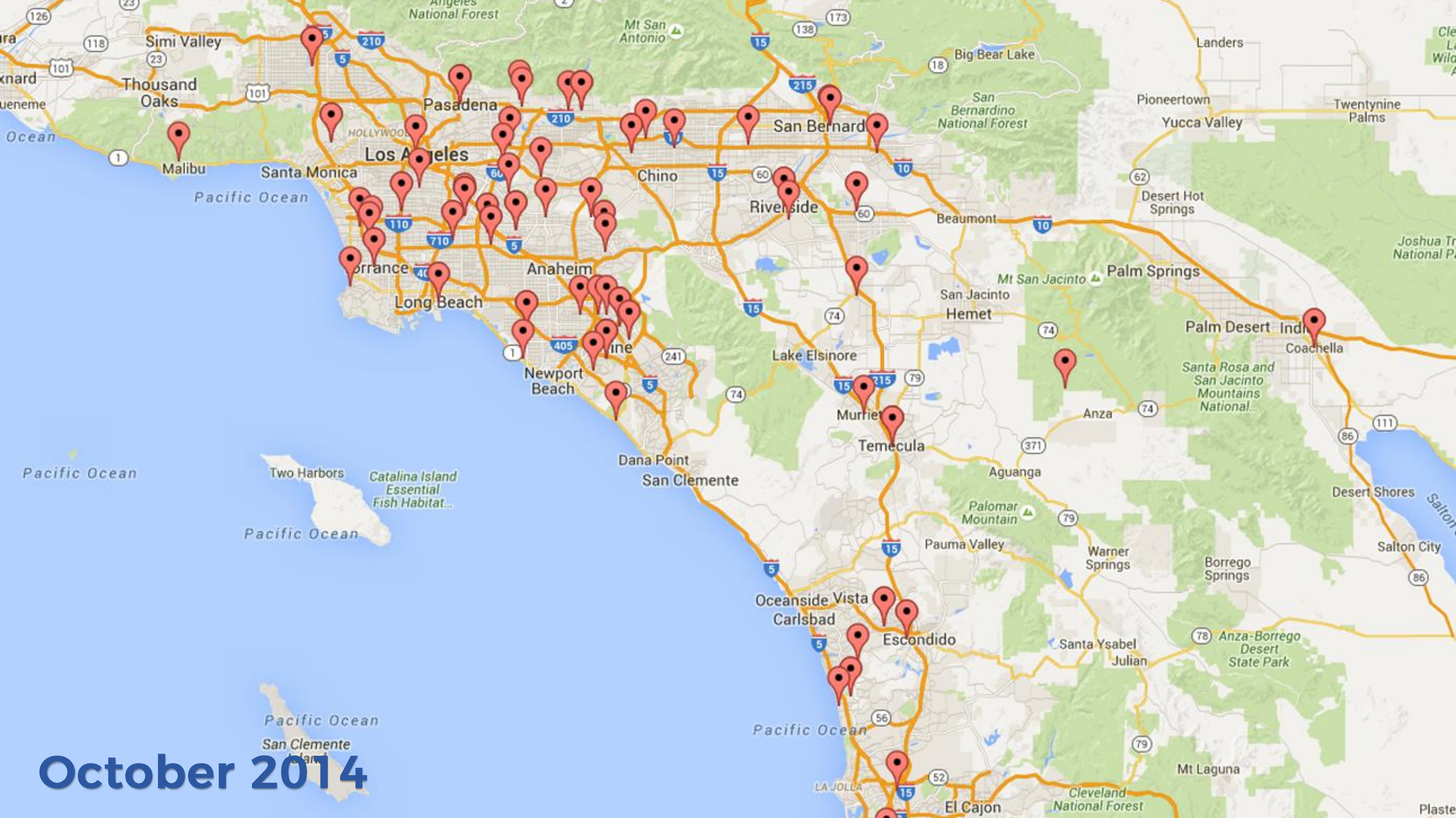

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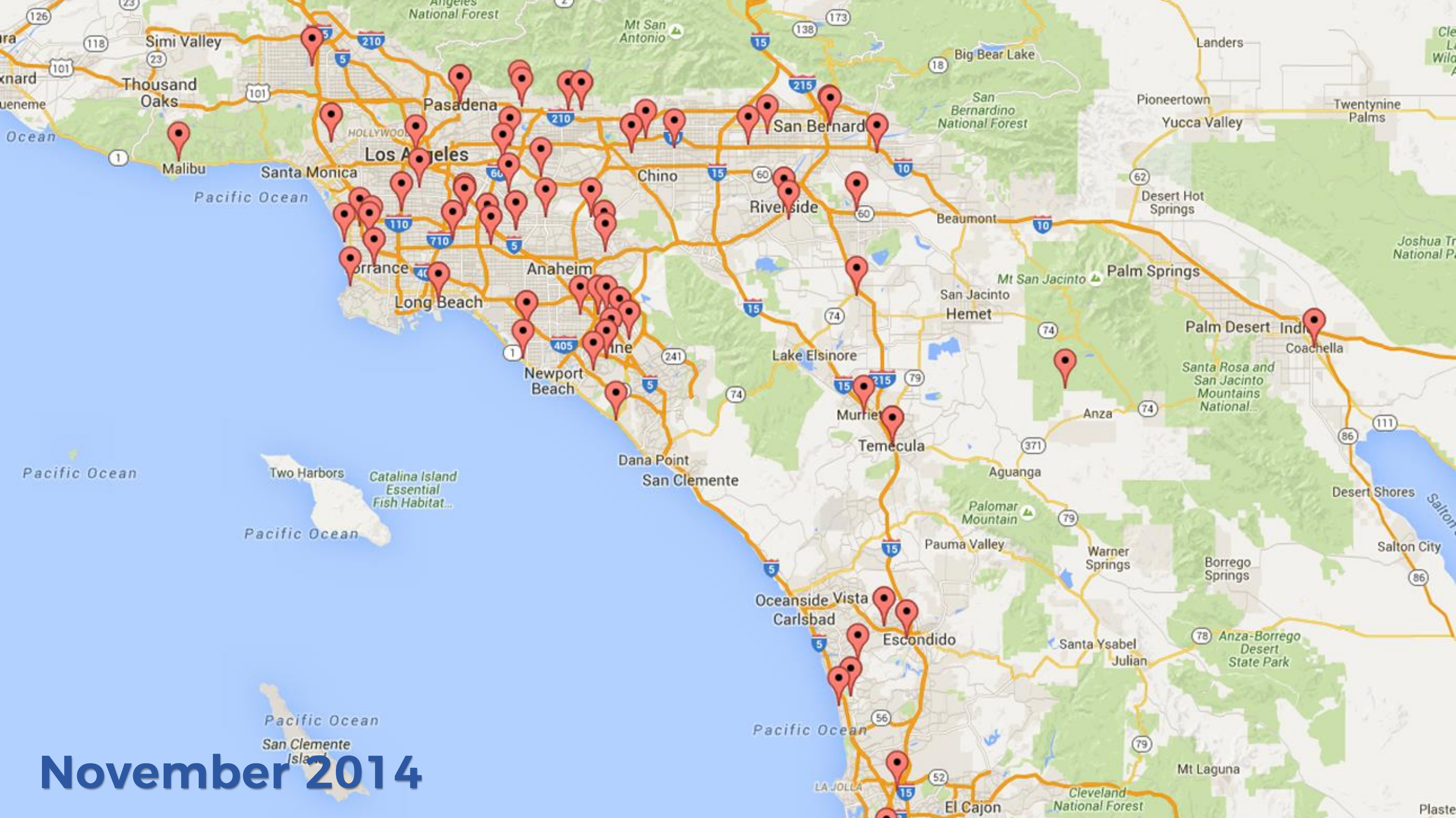

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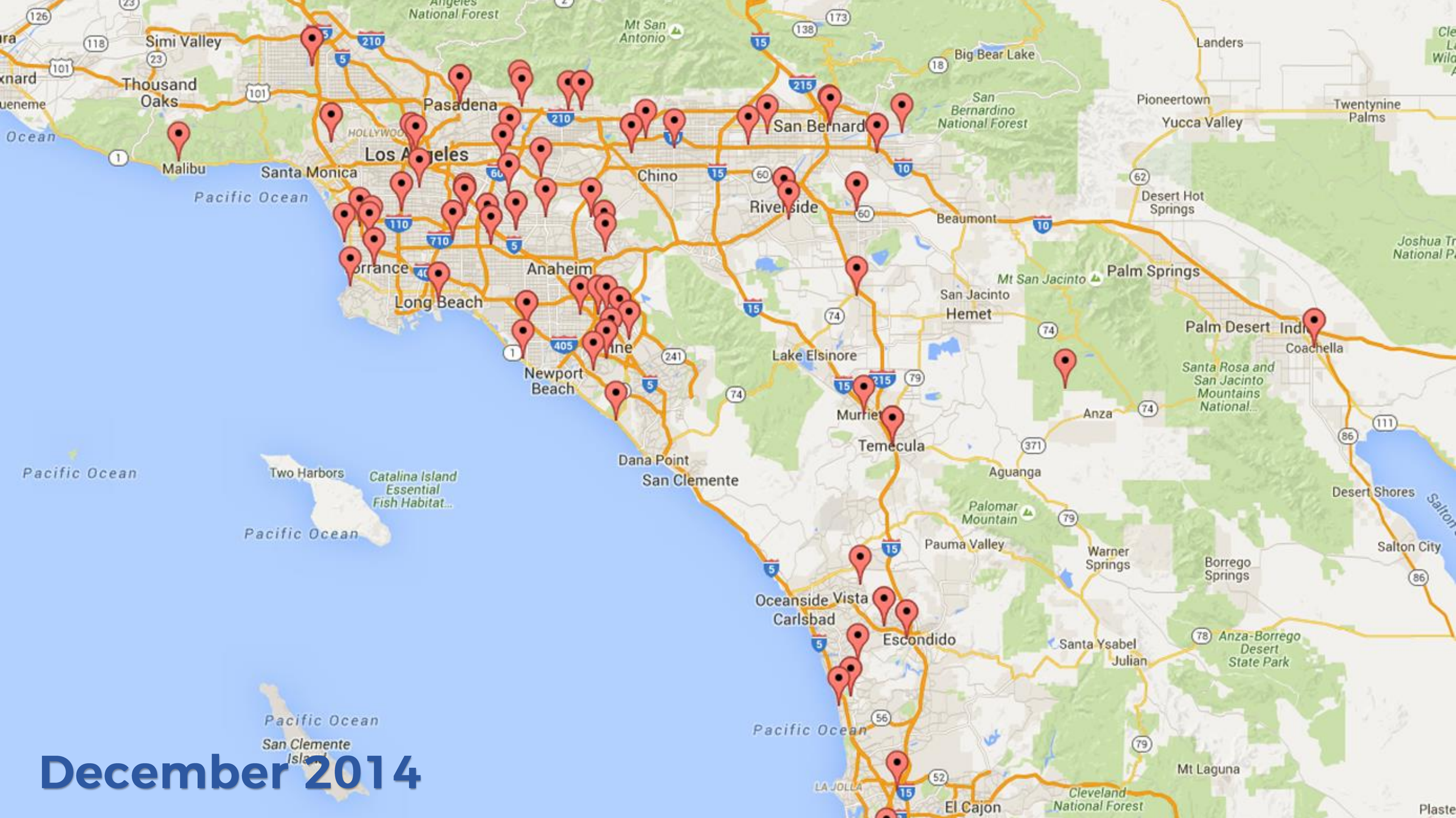

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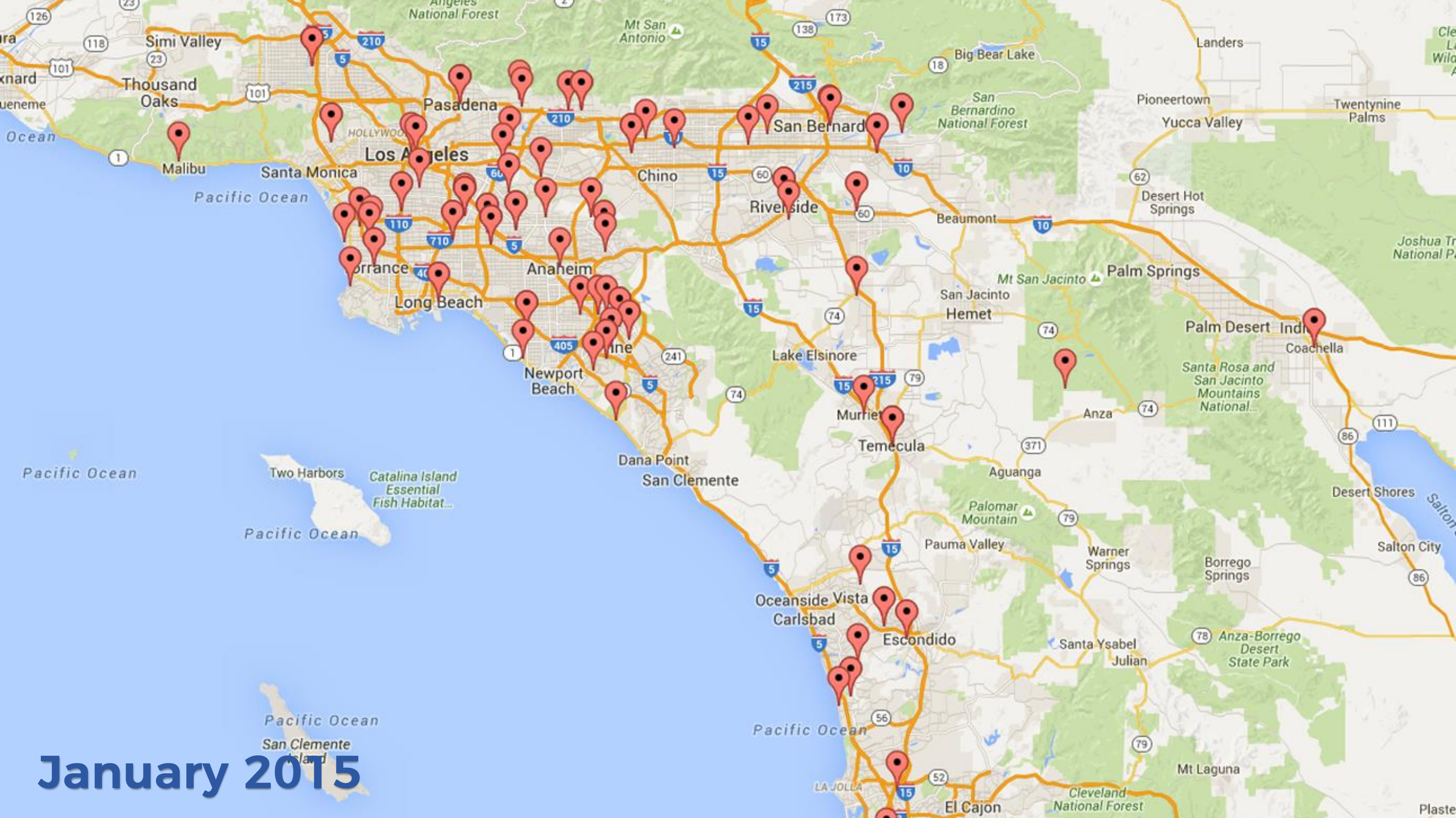

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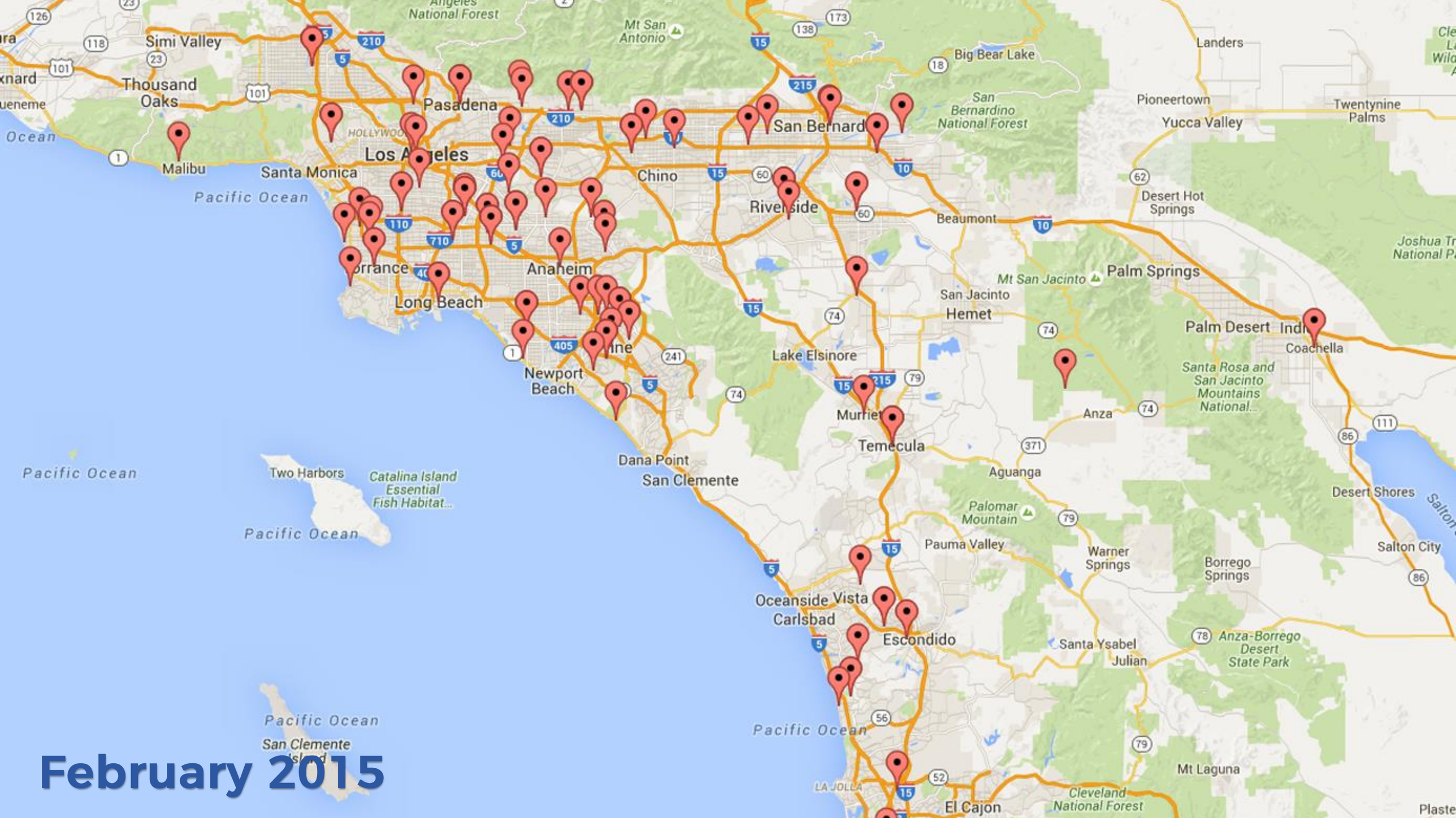

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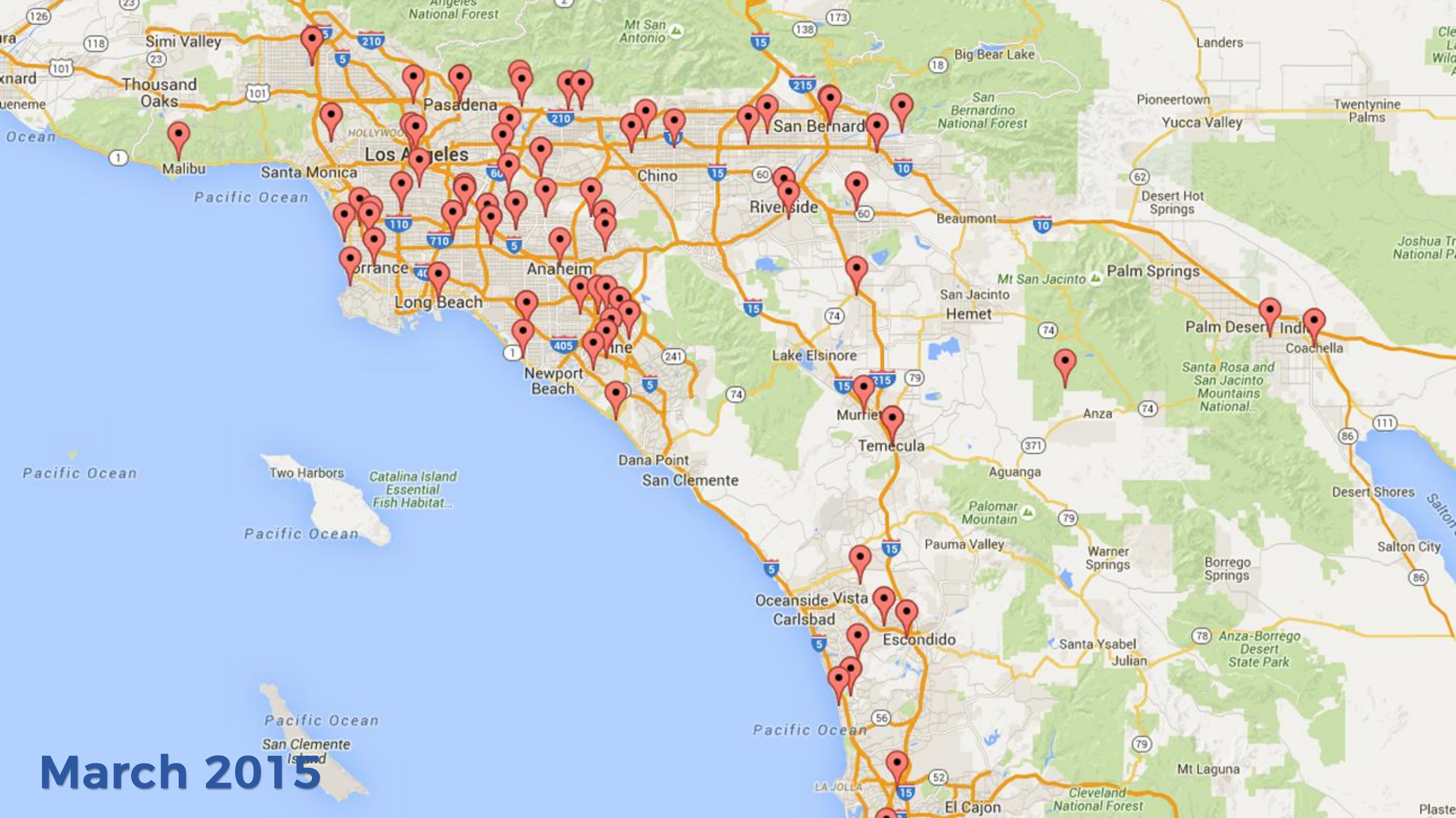
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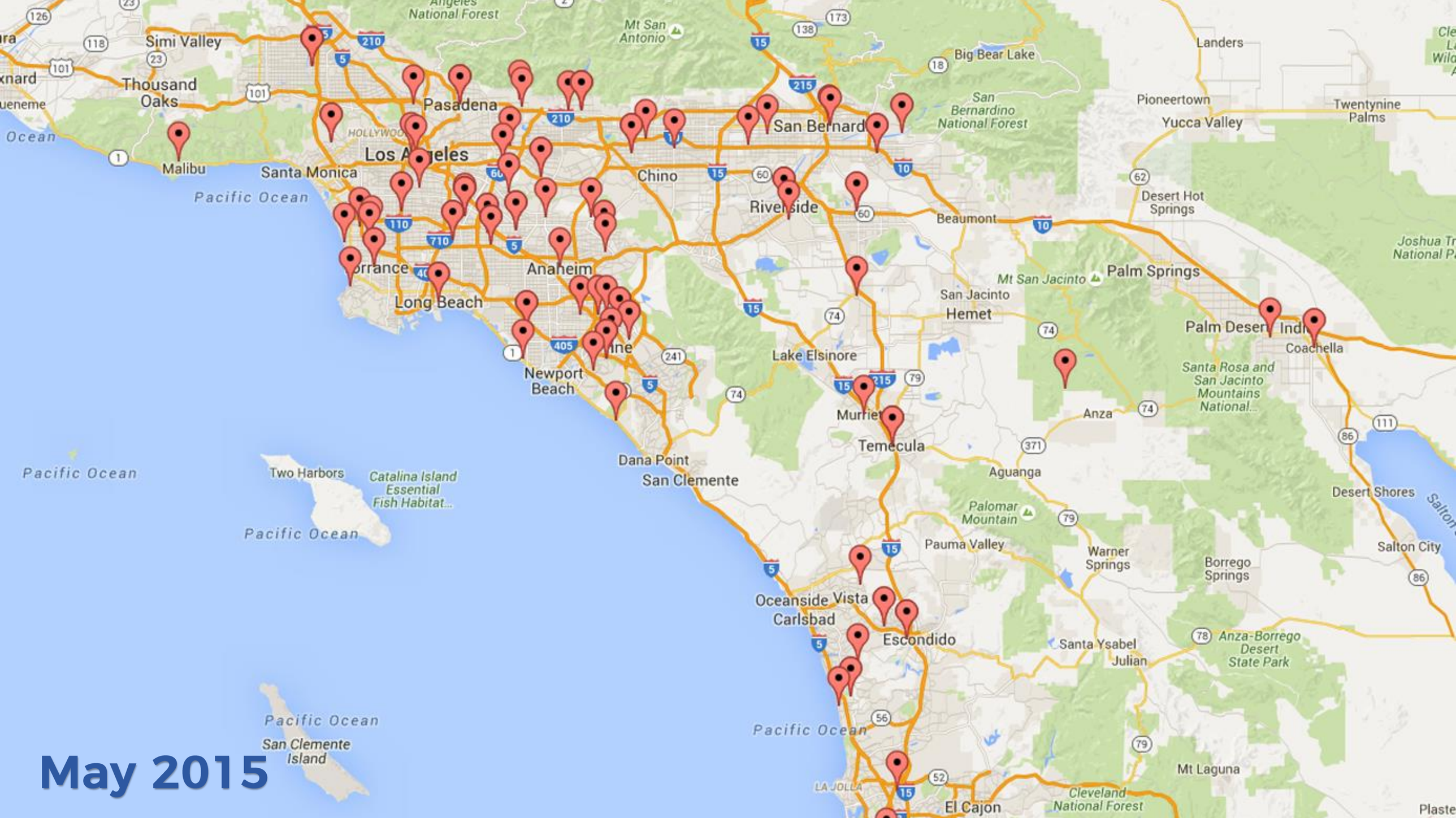
March 2015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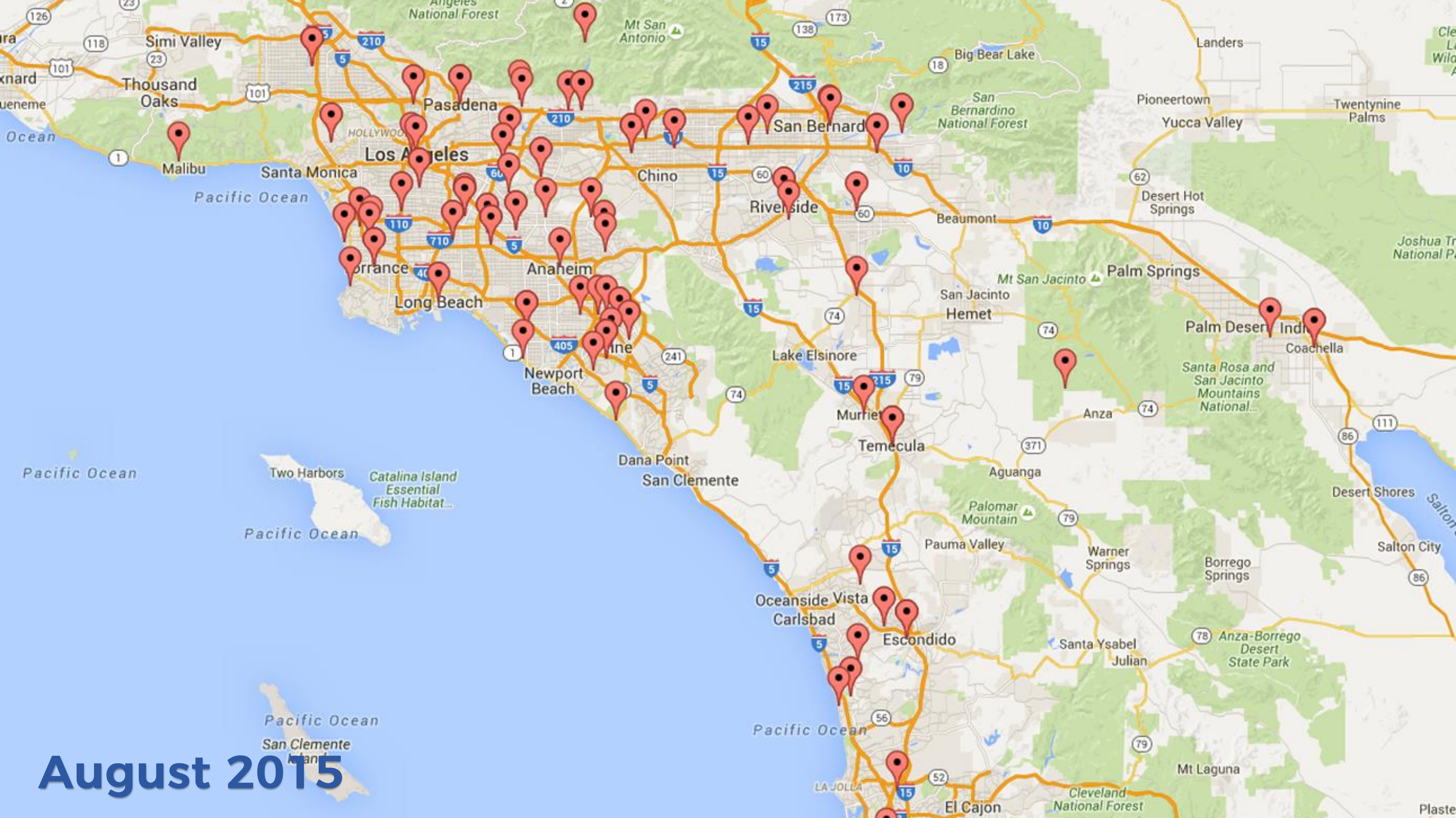
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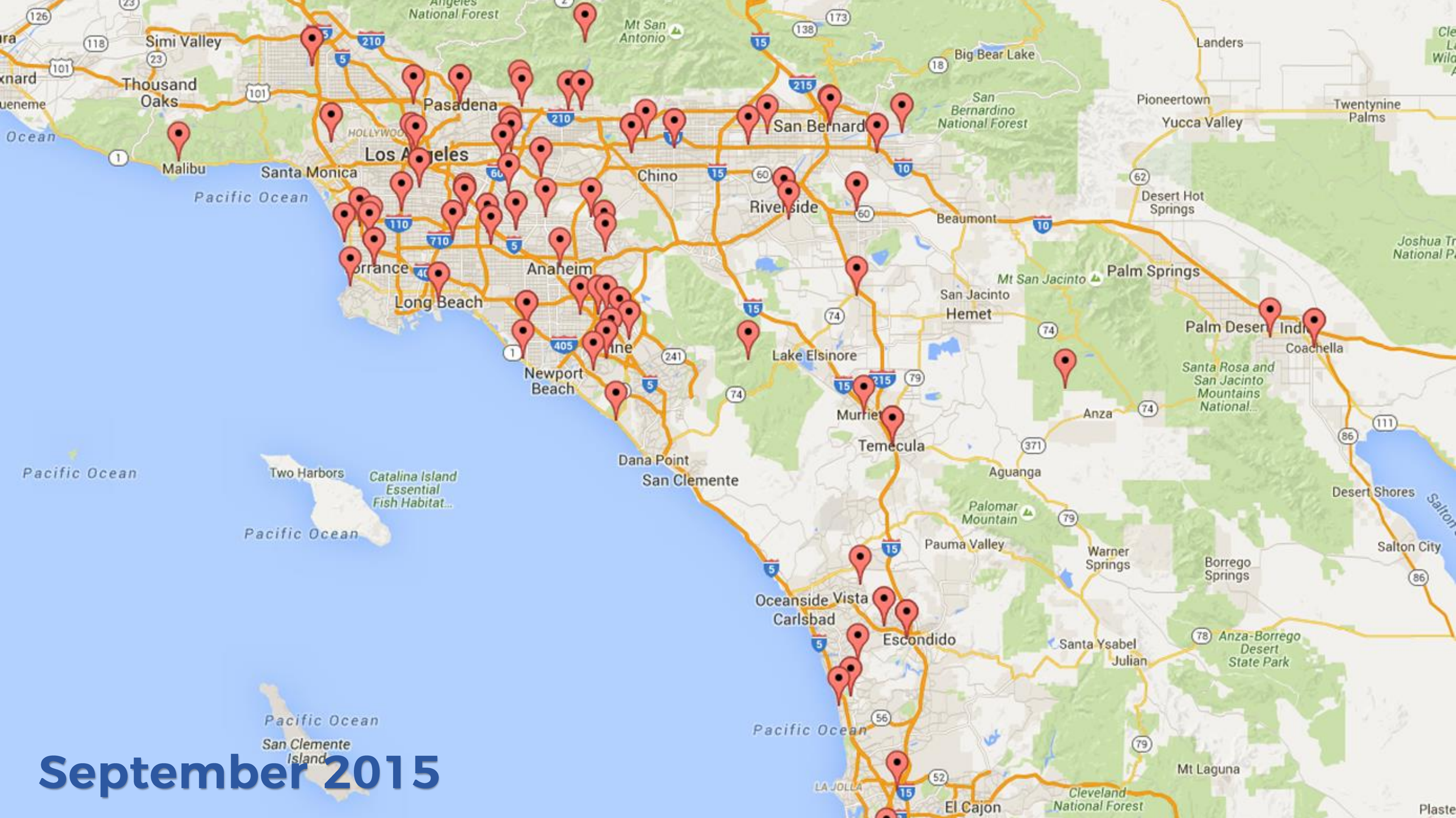
August 2015



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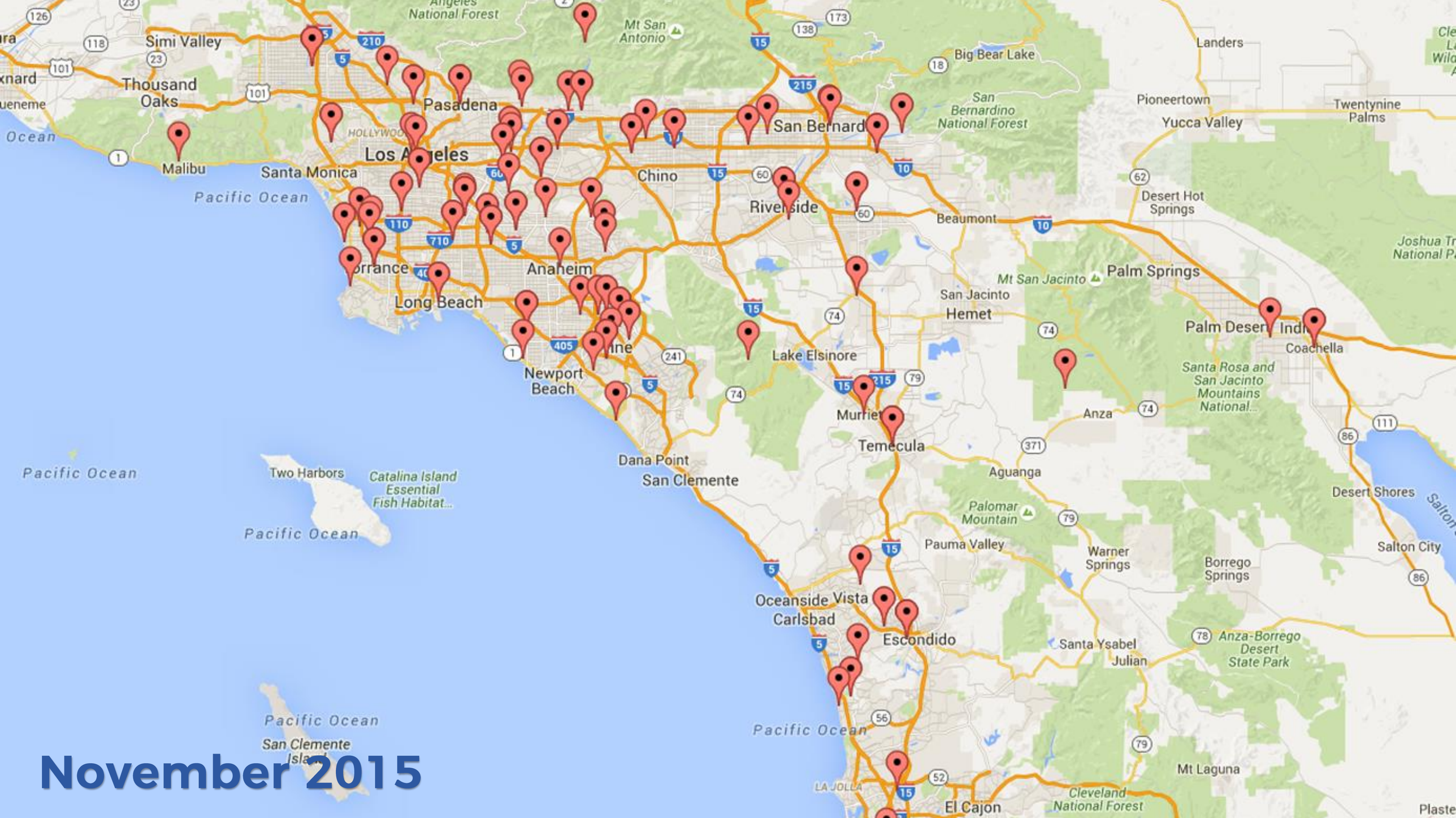

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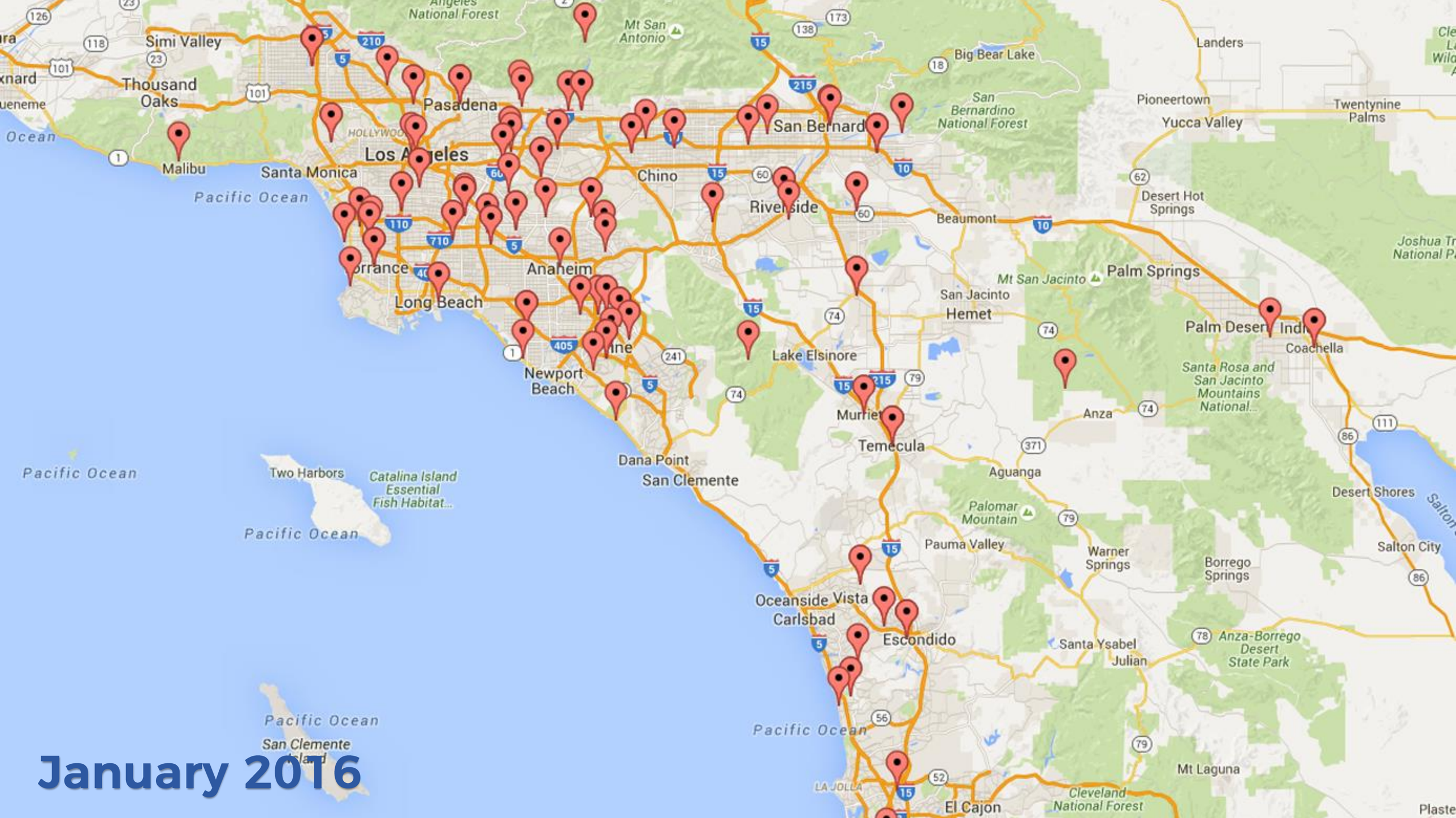

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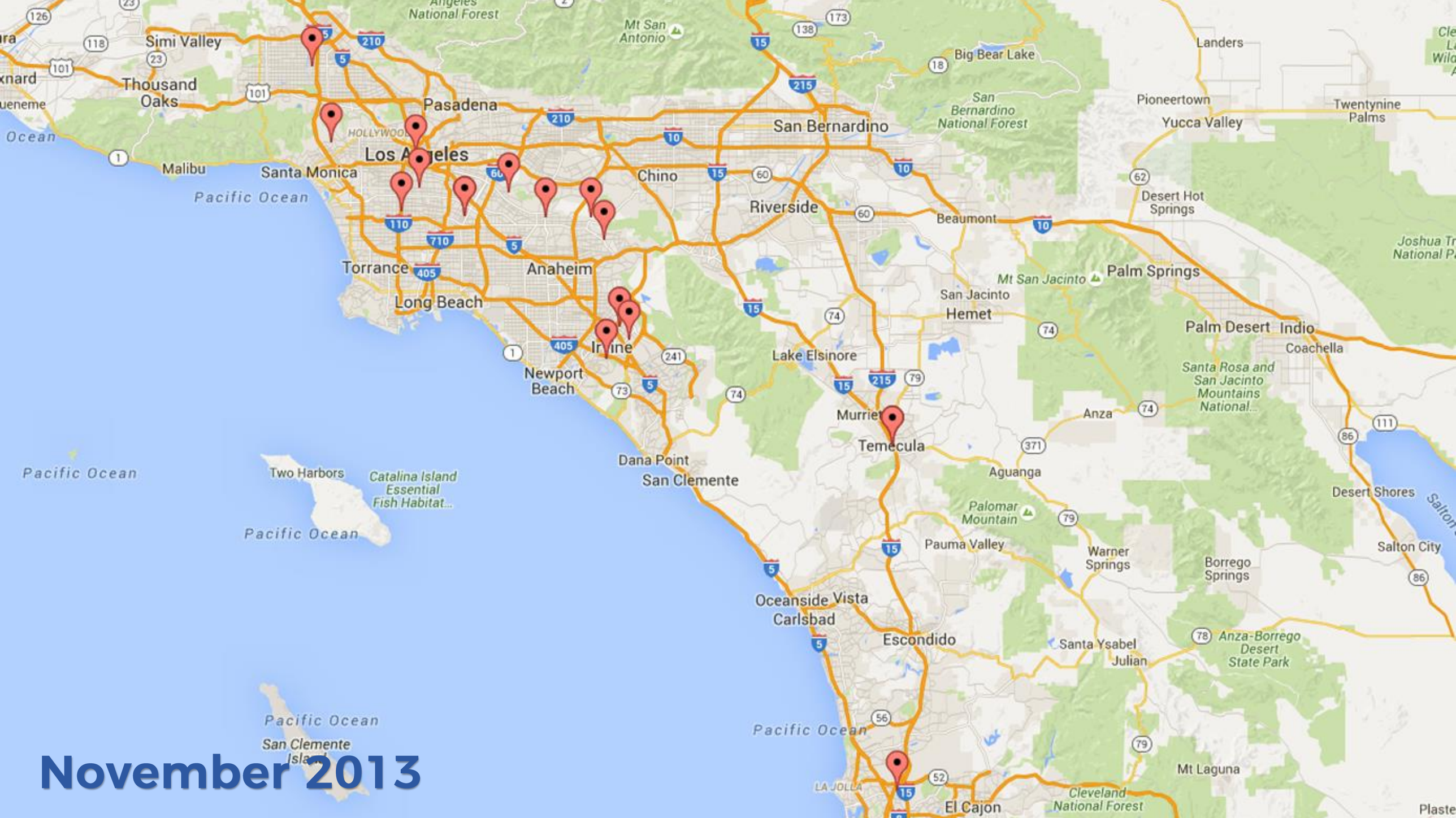

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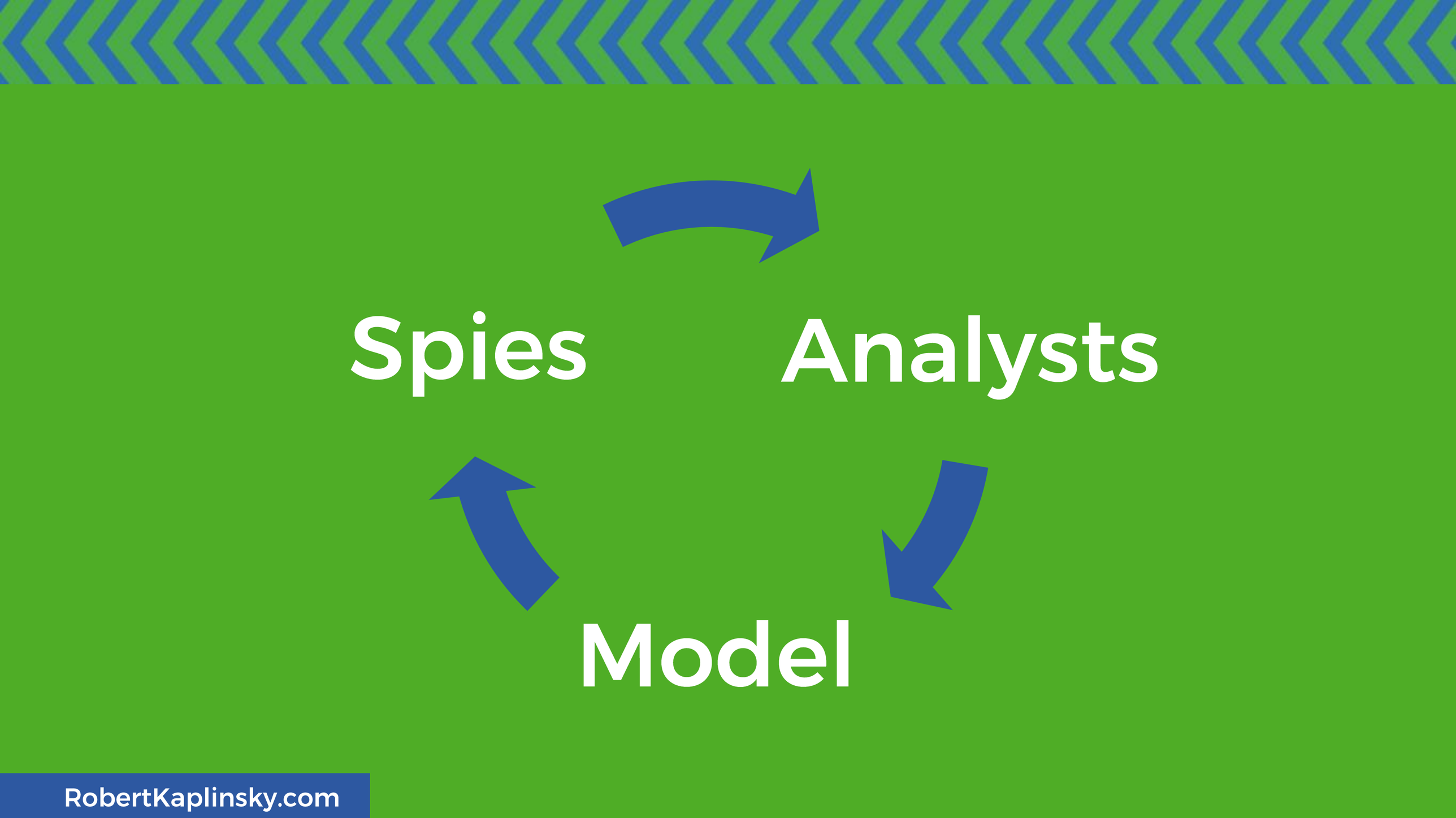
Spies
Analysts
Model

All models are wrong, but some are useful.

GEORGE E. P. BOX

Classic Mix

20 Singles

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20 INDIVIDUAL BAGS: 1 OZ. EACH, TOTAL NET WT. 20 OZ. (1 LB. 4 OZ.) 567 g

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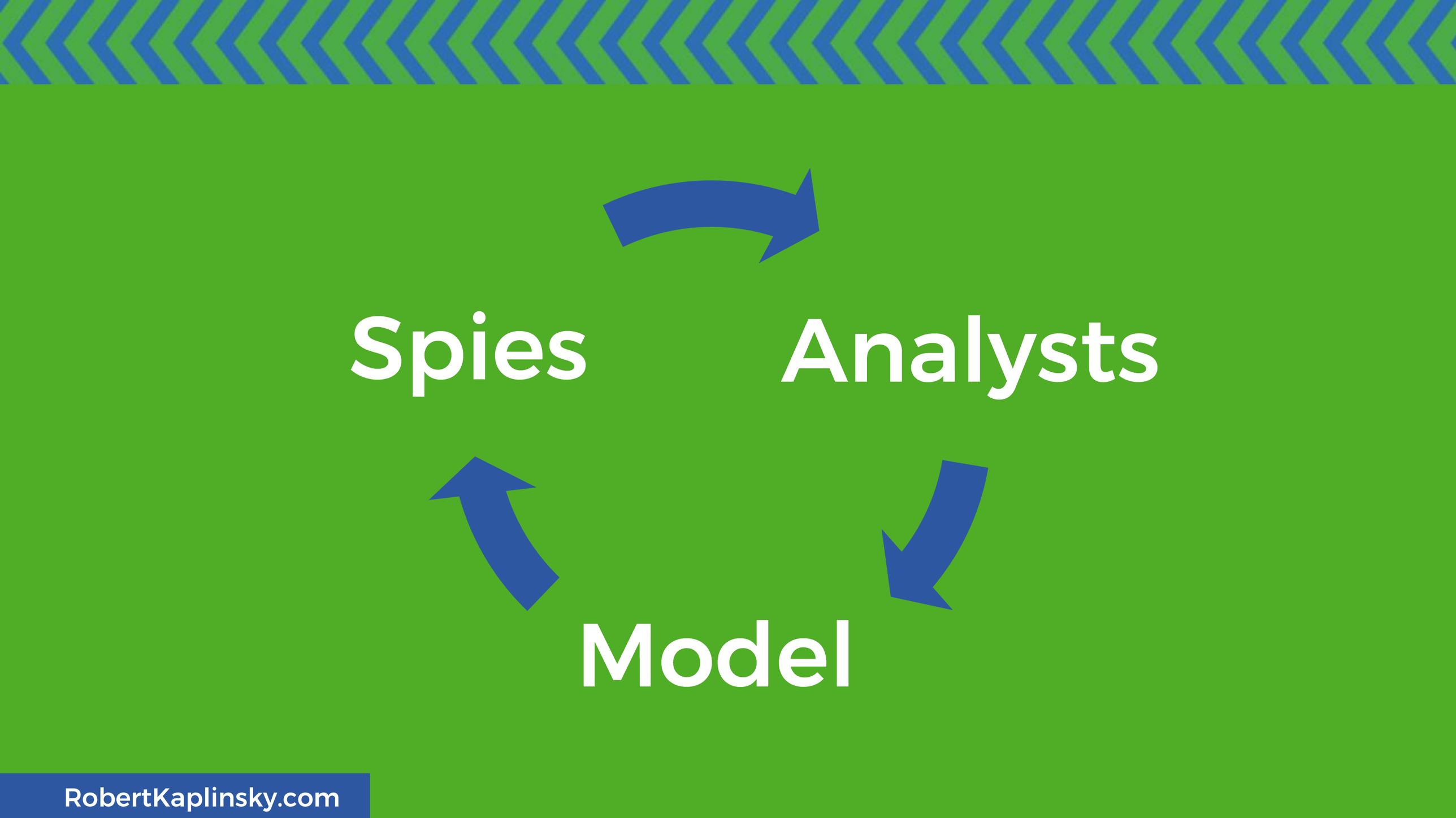

Spies
Analysts
Model

THINKING TIME

RobertKaplinsky.com

Robert Kaplinsky
@robertkaplinsky

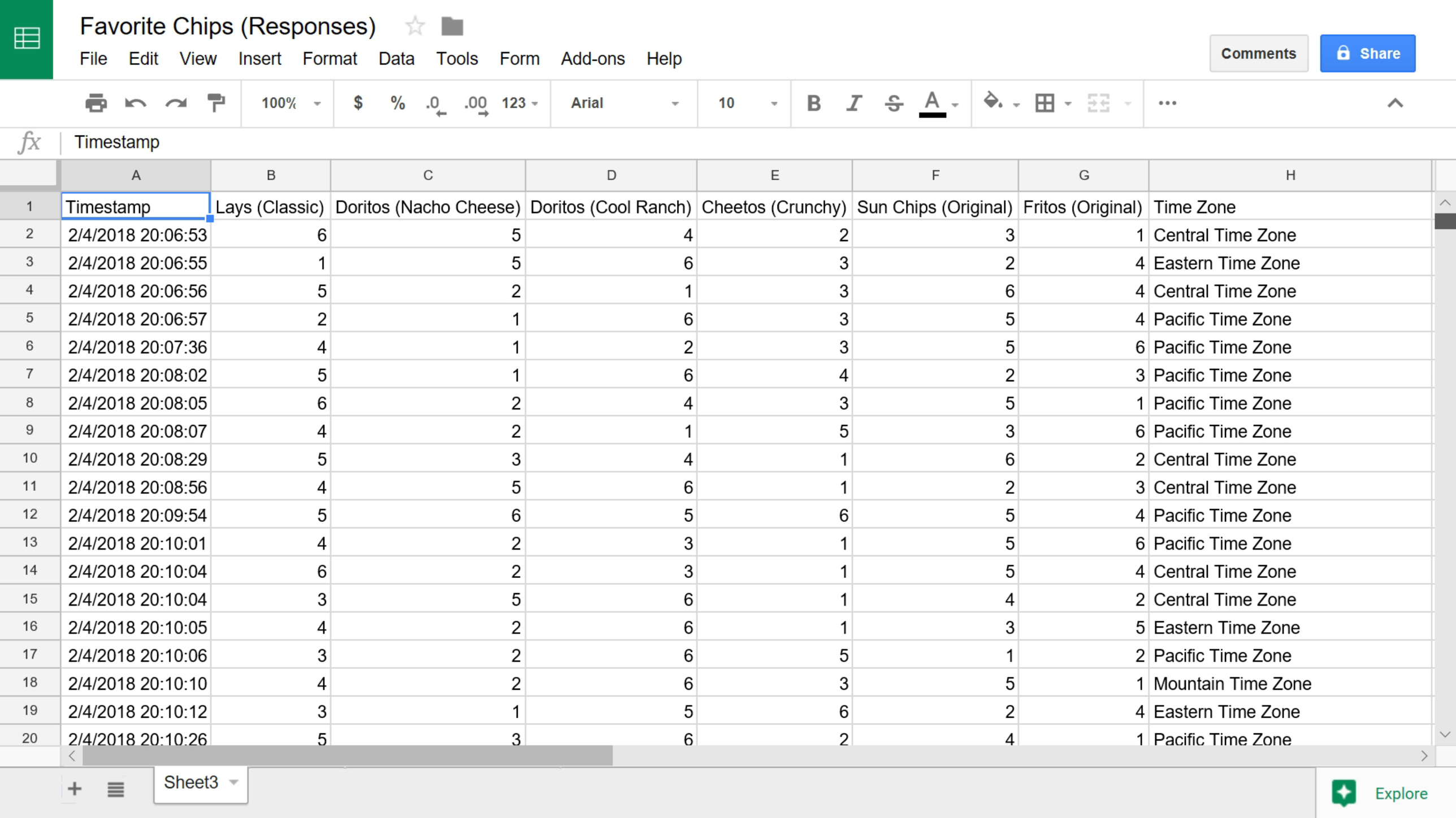
Hey #MTBoS, can you do me a favor and complete this 3 question anonymous survey about your favorite chips? I need data for a presentation. Please RT.
goo.gl/forms/etPtujII… #iteachmath

Favorite Chips
Please complete this anonymous survey. I'll be using this data in a presentation.
docs.google.com

8:05 PM - 4 Feb 2018

63 Retweets **45** Likes

18 63 45



	A	B	C	D	E	F	G	H
1	Timestamp	Lays (Classic)	Doritos (Nacho Cheese)	Doritos (Cool Ranch)	Cheetos (Crunchy)	Sun Chips (Original)	Fritos (Original)	Time Zone
2	2/4/2018 20:06:53	6	5	4	2	3	1	Central Time Zone
3	2/4/2018 20:06:55	1	5	6	3	2	4	Eastern Time Zone
4	2/4/2018 20:06:56	5	2	1	3	6	4	Central Time Zone
5	2/4/2018 20:06:57	2	1	6	3	5	4	Pacific Time Zone
6	2/4/2018 20:07:36	4	1	2	3	5	6	Pacific Time Zone
7	2/4/2018 20:08:02	5	1	6	4	2	3	Pacific Time Zone
8	2/4/2018 20:08:05	6	2	4	3	5	1	Pacific Time Zone
9	2/4/2018 20:08:07	4	2	1	5	3	6	Pacific Time Zone
10	2/4/2018 20:08:29	5	3	4	1	6	2	Central Time Zone
11	2/4/2018 20:08:56	4	5	6	1	2	3	Central Time Zone
12	2/4/2018 20:09:54	5	6	5	6	5	4	Pacific Time Zone
13	2/4/2018 20:10:01	4	2	3	1	5	6	Pacific Time Zone
14	2/4/2018 20:10:04	6	2	3	1	5	4	Central Time Zone
15	2/4/2018 20:10:04	3	5	6	1	4	2	Central Time Zone
16	2/4/2018 20:10:05	4	2	6	1	3	5	Eastern Time Zone
17	2/4/2018 20:10:06	3	2	6	5	1	2	Pacific Time Zone
18	2/4/2018 20:10:10	4	2	6	3	5	1	Mountain Time Zone
19	2/4/2018 20:10:12	3	1	5	6	2	4	Eastern Time Zone
20	2/4/2018 20:10:26	5	3	6	2	4	1	Pacific Time Zone

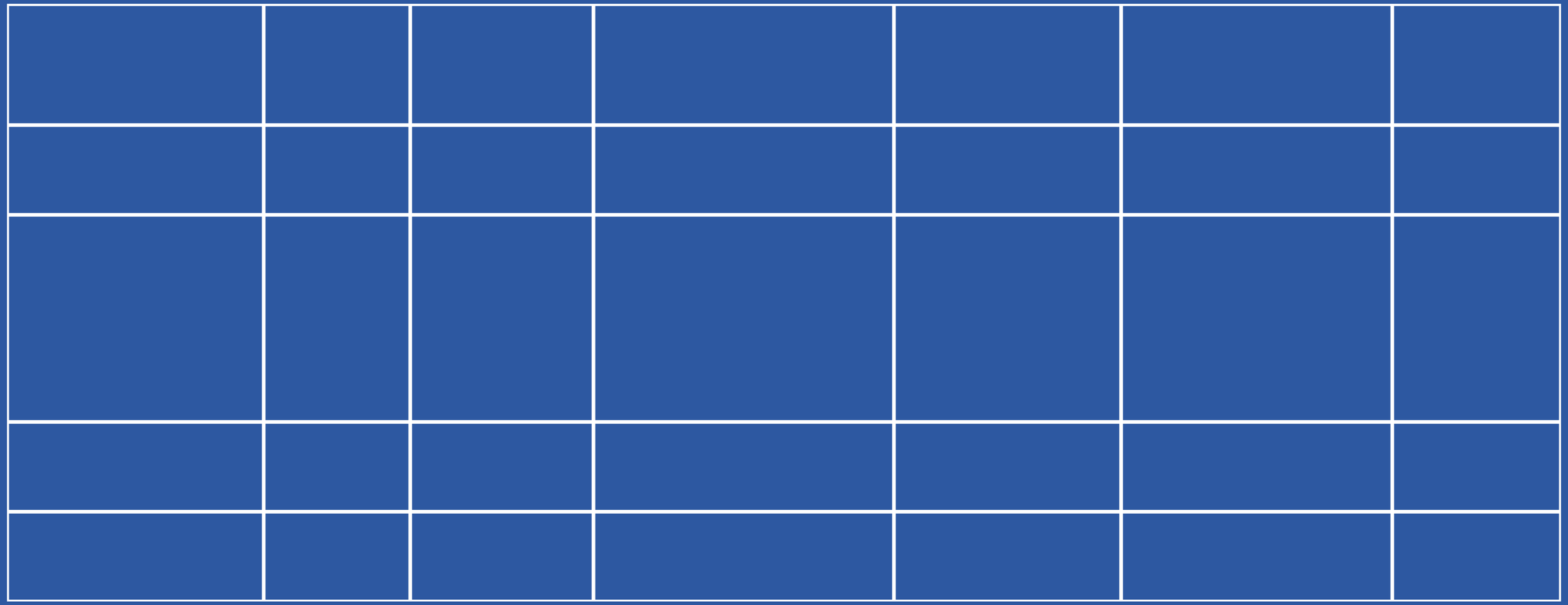
THINKING TIME

- The available data includes:
  - Lays, Nacho Cheese Doritos, Cool Ranch Doritos, Cheetos, Sun Chips, and Fritos ranked from 1 to 6
  - Geographic region: West, Central, or Eastern

ANALYSTS' JOB FOR THE TOP 1

1. Count all the first place votes for each chip type.
2. Divide the total first place votes for each chip type by the total number of votes.
3. Multiply that fraction by 20 to find how many bags there would be in a twenty pack, rounding as necessary.

ANALYSTS' EXAMPLE



ANALYSTS' JOB FOR THE TOP 4

1. Count all the first, second, third, and fourth place votes for each chip type.
2. Multiply the first place votes by four, the second place votes by three, the third place votes by two, and the fourth place votes by one.
3. Add the weighted votes for each chip type and divide by the total number of weighted votes.
4. Divide the weighted votes for each chip type by the total number of votes.
5. Multiply that fraction by 20 to find how many bags there would be in a twenty pack, rounding as necessary.

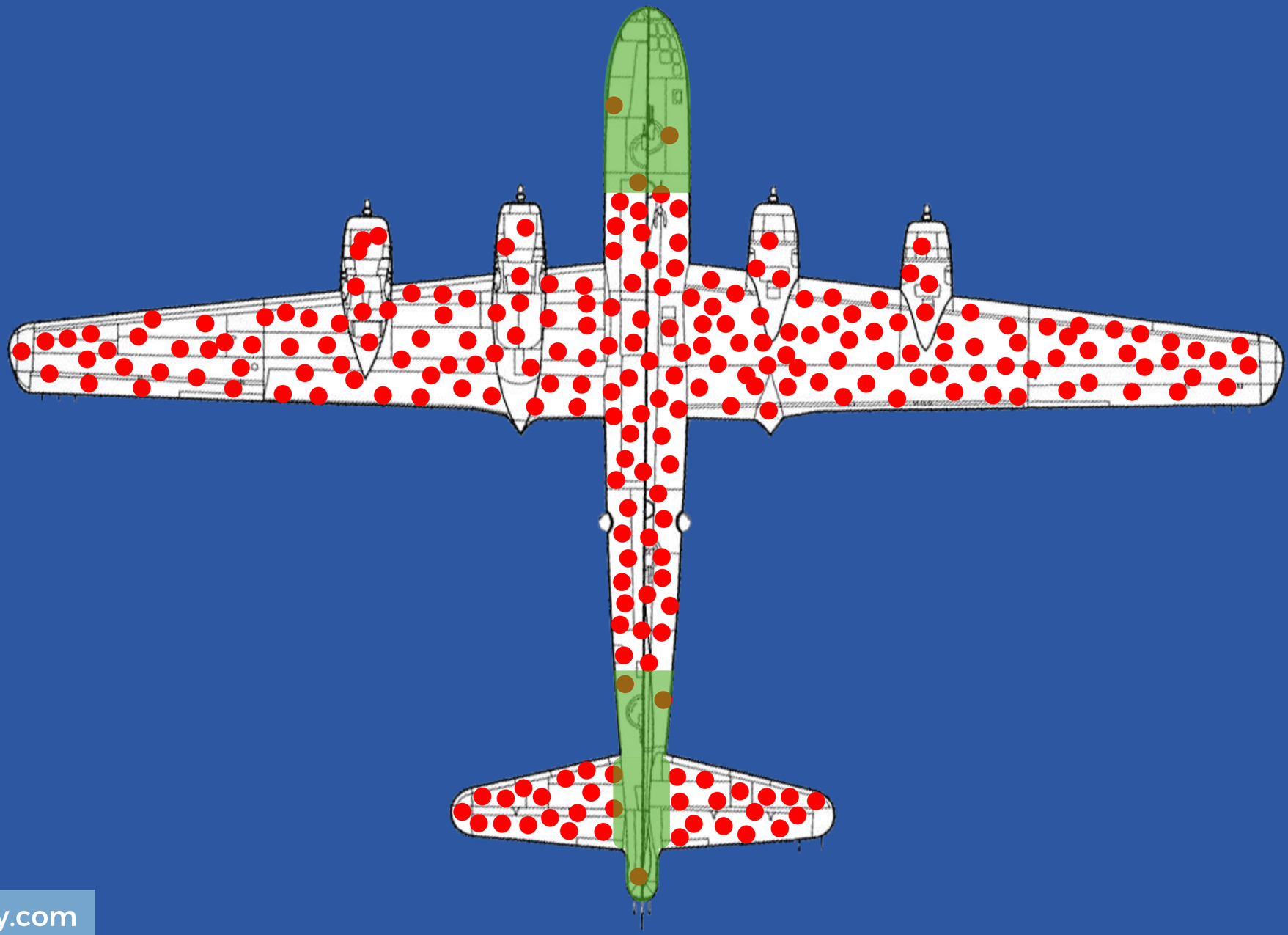
ANALYSTS' EXAMPLE

CHIP BAG RESULTS

MATH MODELING

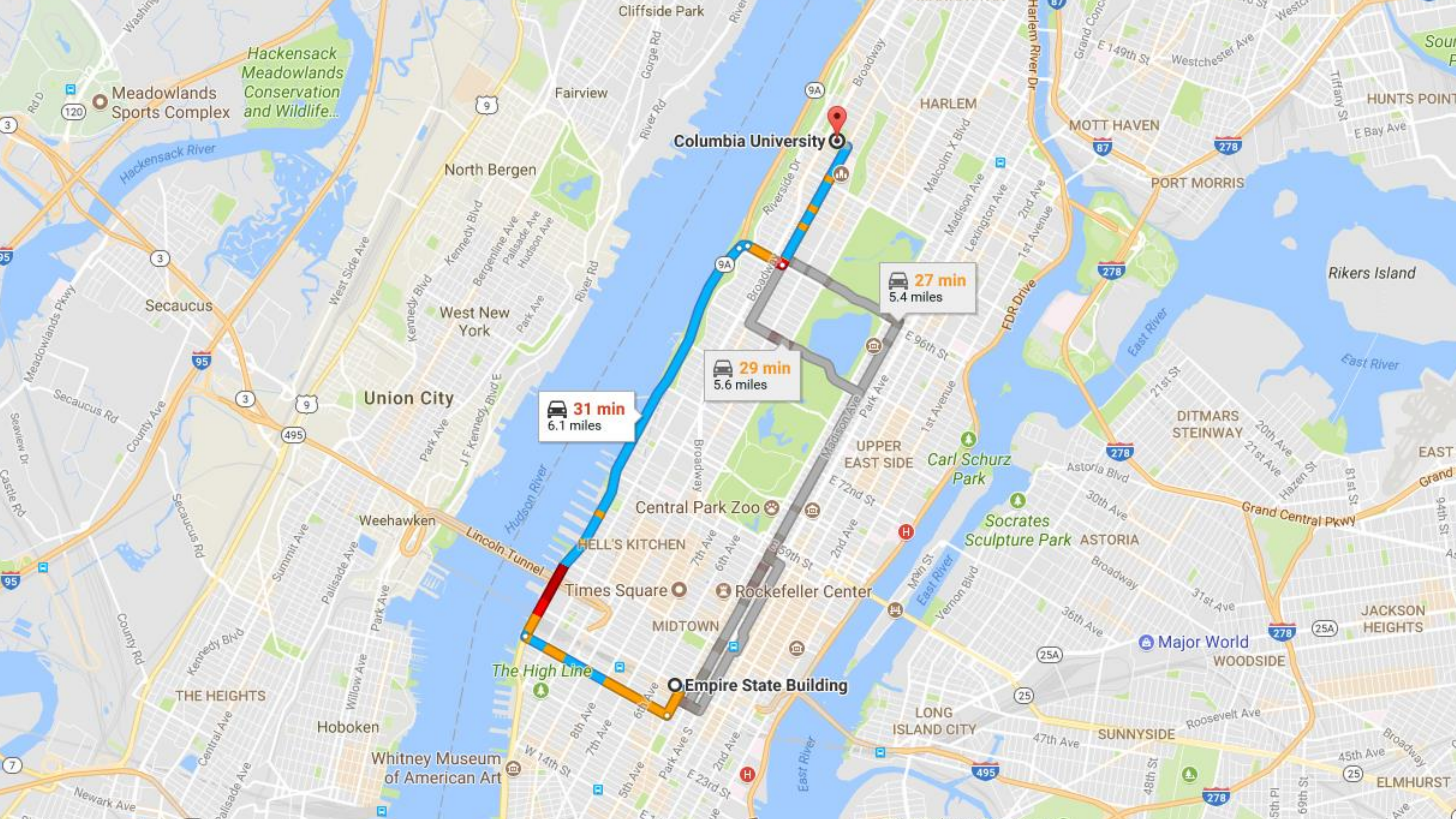
- [x] HOW DO WE MAKE SENSE OF MATH MODELING?
- [ ] IS IT JUST ANSWERING QUESTIONS?
- [ ] HOW DO YOU PROFIT FROM MATH MODELING?
- [ ] HOW DO WE HELP OUR STUDENTS IMPROVE?


224612



RobertKaplinsky.com

- ~~How do we protect our planes?~~
- ~~Which parts of the plane are being hit by the most bullets?~~
- Which parts of the plane are the most critical to protect?


Columbia University
Empire State Building
31 min
6.1 miles
29 min
5.6 miles
27 min
5.4 miles
Cliffside Park
Fairview
North Bergen
West New York
Union City
Weehawken
Secaucus
Hoboken
Hackensack Meadowlands Conservation and Wildlife...
Meadowlands Sports Complex
Hackensack River
Hudson River
Lincoln Tunnel
HARLEM
MOTT HAVEN
HUNTS POINT
PORT MORRIS
Rikers Island
East River
UPPER EAST SIDE
Carl Schurz Park
HELL'S KITCHEN
Central Park Zoo
Times Square
Rockefeller Center
MIDTOWN
The High Line
THE HEIGHTS
Whitney Museum of American Art
Socrates Sculpture Park
ASTORIA
DITMARS STEINWAY
JACKSON HEIGHTS
Major World
WOODSIDE
LONG ISLAND CITY
SUNNYSIDE
ELMHURST
Grand Central Pkwy
FDR Drive
Harlem River Dr
Broadway
Riverside Dr
Madison Ave
Park Ave
E 96th St
E 72nd St
59th St
E 23rd St
W 14th St

- ~~How do we find the fastest route for each customer?~~
- How do we find the fastest route for each customer without impacting our other customers?

Classic Mix

20 Singles

4 LAY'S® Classic Potato Chips, 4 DORITOS® Nacho Cheese Flavored Tortilla Chips, 2 DORITOS® COOL RANCH® Flavored Tortilla Chips, 4 CHEETOS® Crunchy Cheese Flavored Snacks, 2 SUNCHIPS® Original Multigrain Snacks, 4 FRITOS® Original Corn Chips (All 1 OZ. Each)

20 INDIVIDUAL BAGS: 1 OZ. EACH, TOTAL NET WT. 20 OZ. (1 LB. 4 OZ.) 567 g

⚠ WARNING: PREVENT ENTANGLEMENT AND STRANGULATION. KEEP THIS BAG AWAY FROM YOUNG CHILDREN. IT IS NOT A TOY.

- ~~How many of each flavor should we put in a package?~~
- ~~How many of each flavor should we put in a package for each region?~~
- How can we determine if the extra cost of creating different packages will make us more money?

Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later.

CCSS MATH PRACTICE 4

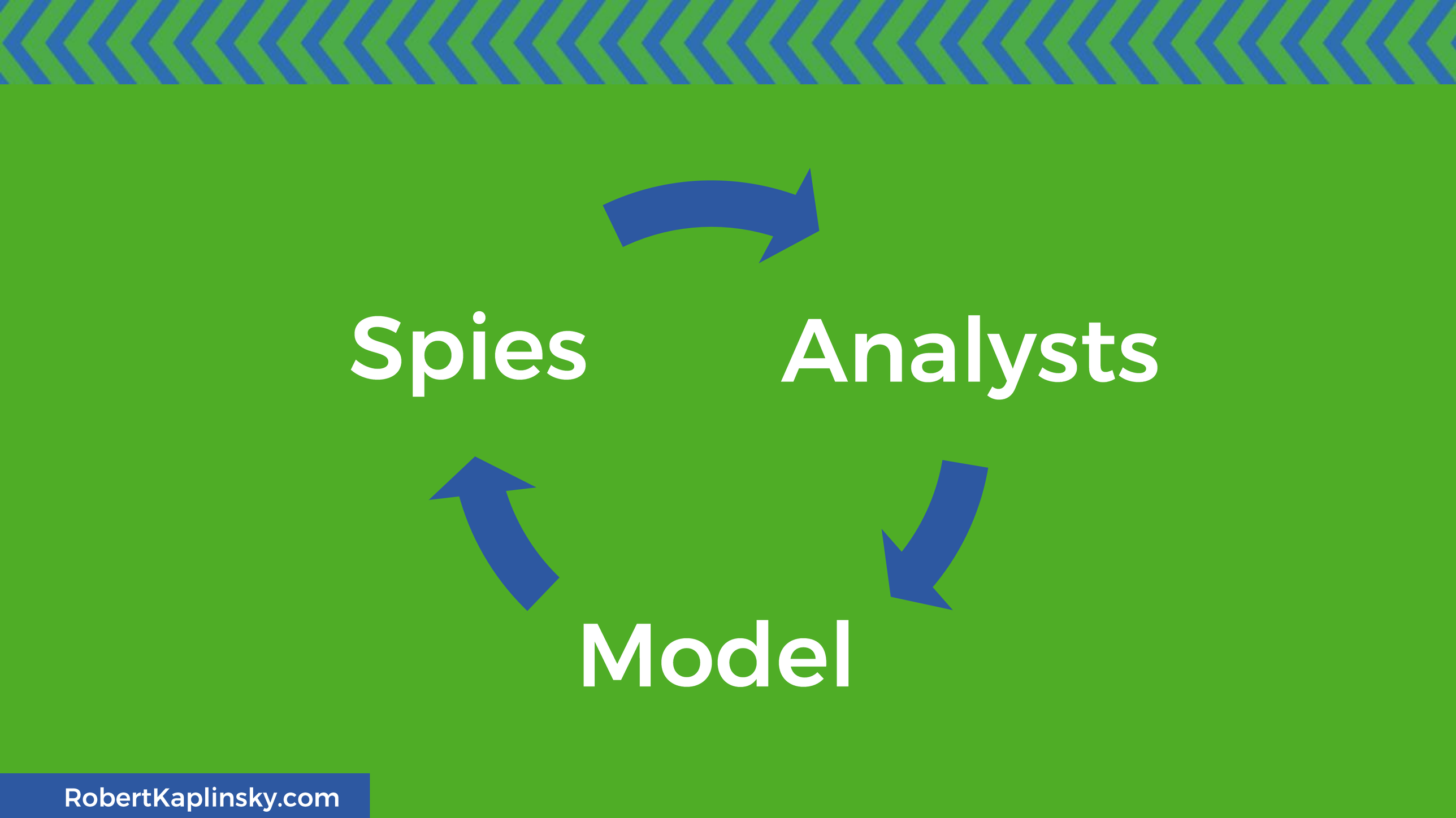
They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

CCSS MATH PRACTICE 4

MATH MODELING

- [x] HOW DO WE MAKE SENSE OF MATH MODELING?
- [x] IS IT JUST ANSWERING QUESTIONS?
- [ ] HOW DO YOU PROFIT FROM MATH MODELING?
- [ ] HOW DO WE HELP OUR STUDENTS IMPROVE?


TARGET
TARGET PARKING


Spies
Analysts
Model

THINKING TIME

RobertKaplinsky.com

They used 25 products for a pregnancy prediction' score including:

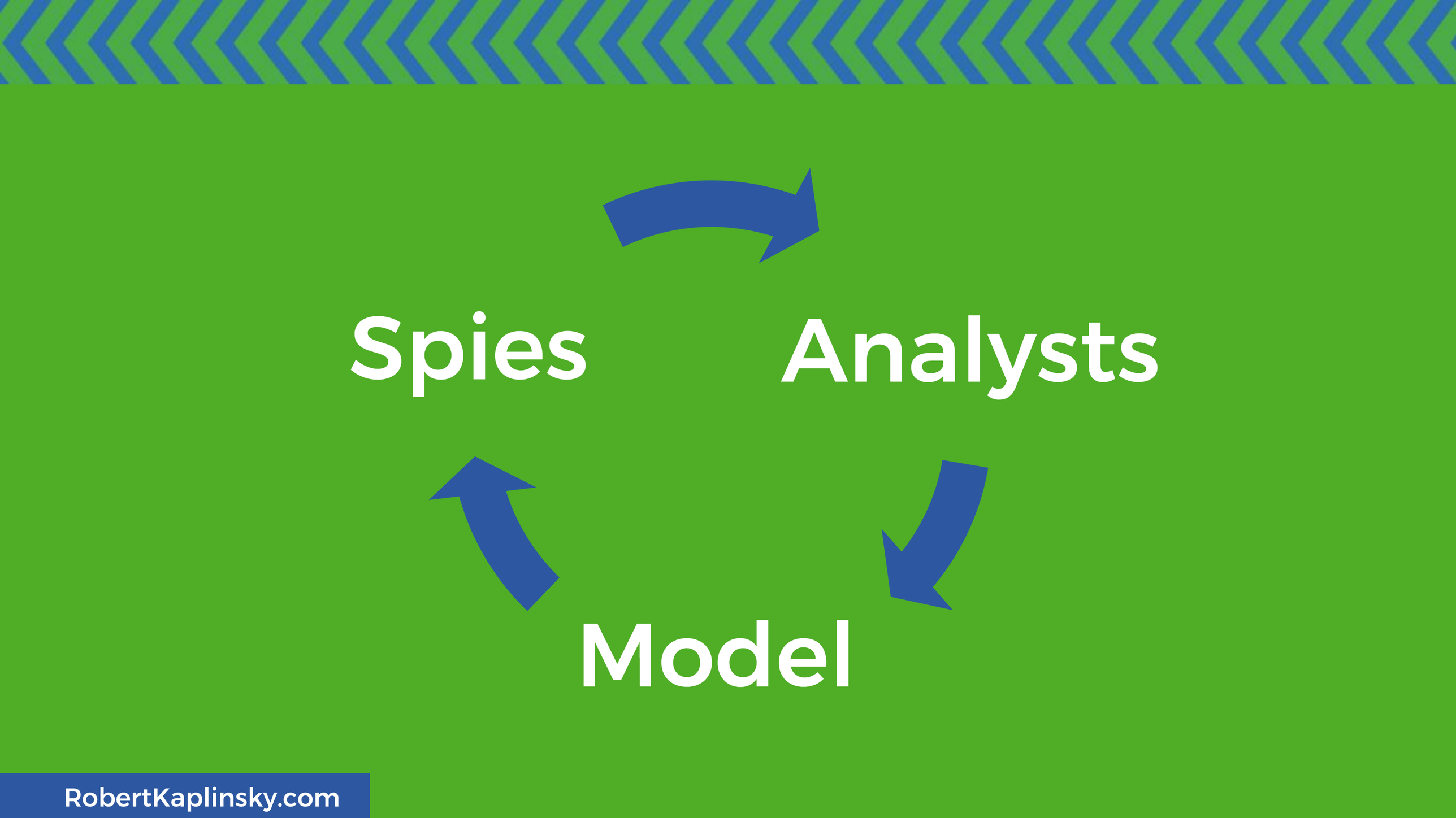
- unscented lotion
- mineral supplements
- cotton balls

Source: New York Times

ANALYSTS' EXAMPLE

1. Add the number of bottles of unscented lotion, jars of mineral supplements, and bags of cotton balls.
2. Multiply that times the day of the week.
3. Click your heels twice.
4. Repeat the phrase "There's no place like home!"


UNITED


Spies
Analysts
Model

THINKING TIME

RobertKaplinsky.com

Priority is determined by:

- passenger's fare class
- itinerary
- frequent flyer program membership
- check-in time

Source: United Airlines

Search

Robert | Home

Robert Kaplinsky

News Feed

Messenger

Watch

Marketplace

Explore

Pages

Events

Groups

Friend Lists

On This Day 3

Insights

Games 7

Fundraisers

Live Video

Pokes

See More...

Create

Ad · Page · Group · Event · Fundraiser

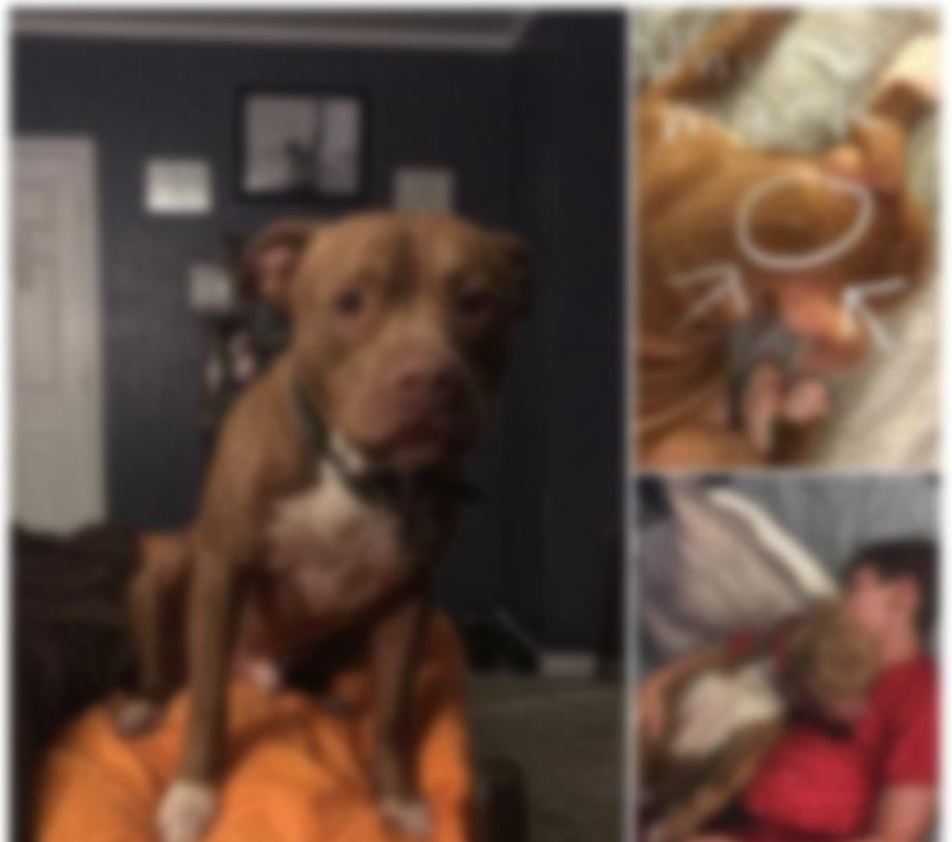
Make Post | Photo/Video Album | Live Video

What's on your mind, Robert?

Photo/Video | Feeling/Activity | ...

[redacted] shared Jennifer Tune Jernigan's post.

[redacted]



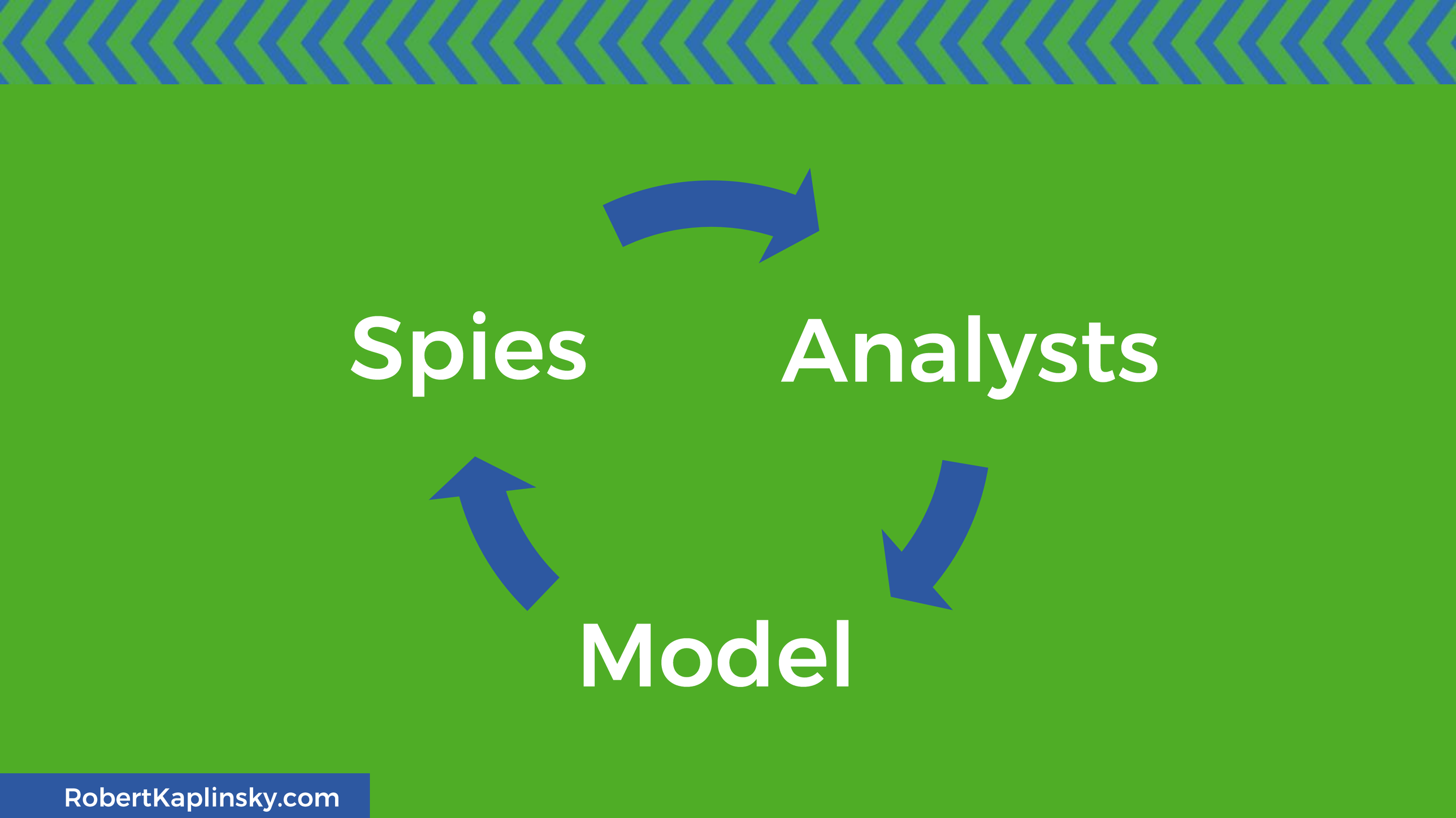
Trending

[redacted]

Watchlist: Latest Episodes

See All

Sponsored | Create Ad


Spies
Analysts
Model

THINKING TIME

RobertKaplinsky.com

The stories that show in your News Feed are influenced by:

- friends you interact with the most
- the number of comments and likes a post receives
- what kind of story it is (ex: photo, video, status update)

Source: Facebook

NEW & INTERESTING FINDS ON AMAZON EXPLORE

PRIME

Prime members save on
eys at Whole Foods

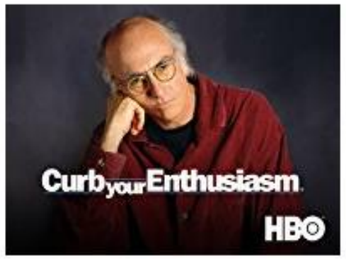
FRESH

NOW AVAILABLE
Try our selection

WHOLE FOODS MARKET

VIDEO

Recommended for you:
Curb Your Enthusiasm Seaso...



MUSIC

Recommended for you:
The Hamilton Mixtape [Expli...

MEET ALEXA

Voice control your world with
Echo & Alexa devices

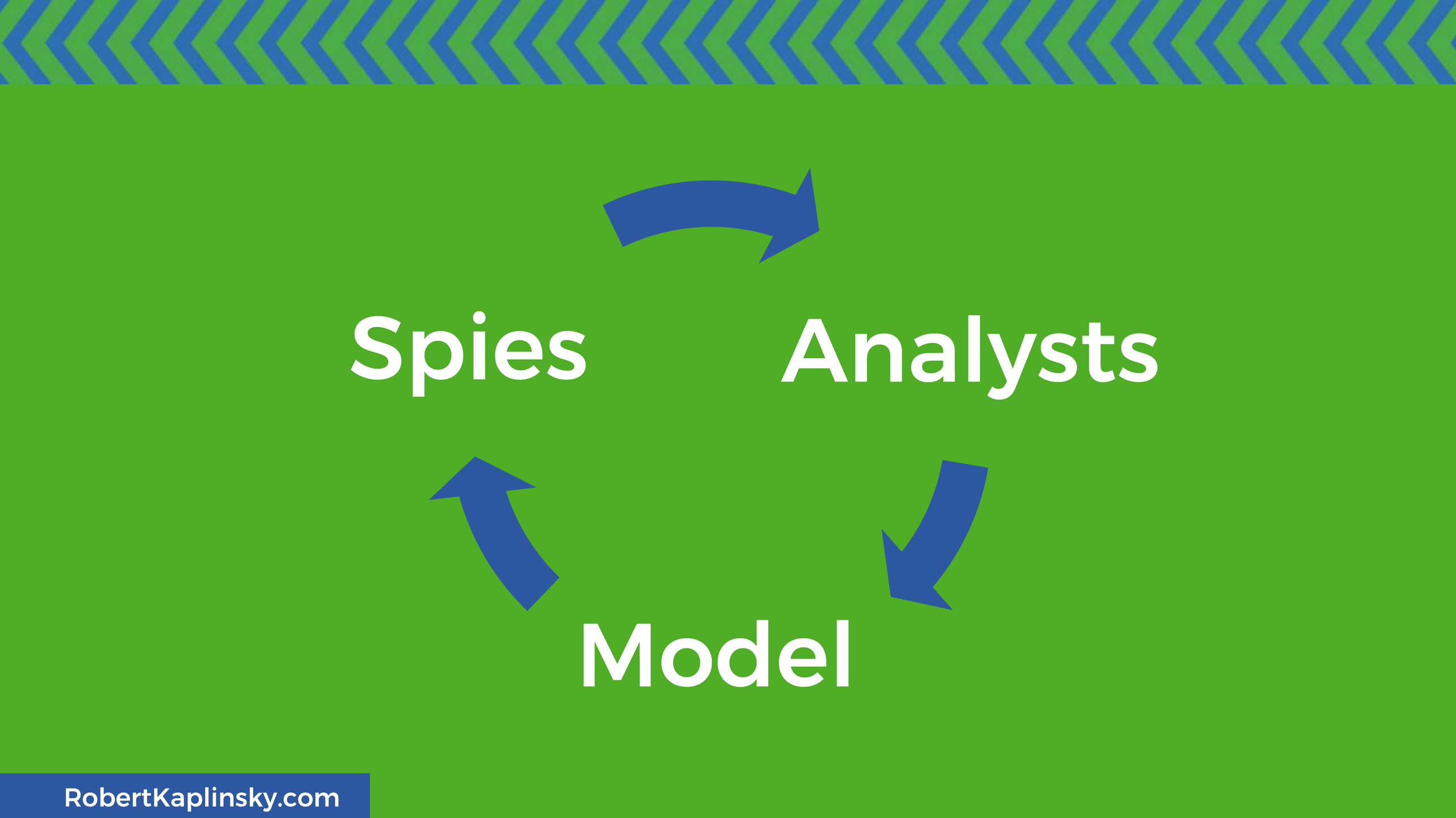
RECENT VIEWS

View your browsing history

Related to items you've viewed

See more

Verizon Prepaid. Save up to


Spies
Analysts
Model

THINKING TIME

RobertKaplinsky.com

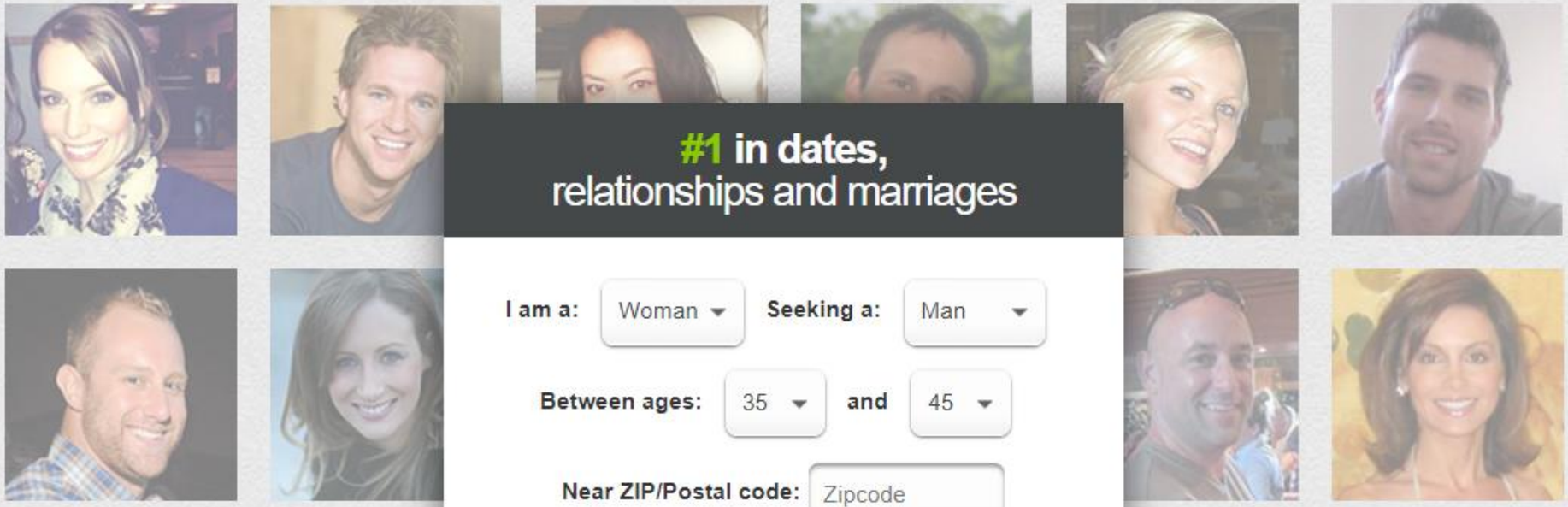
Amazon's recommendation system is based on:

- what a user has bought in the past
- which items they have in their shopping cart
- items they've rated and liked
- what other customers have viewed and purchased

Source: Fortune

match Member Sign In »

Take the free personality test from Chemistry.com »



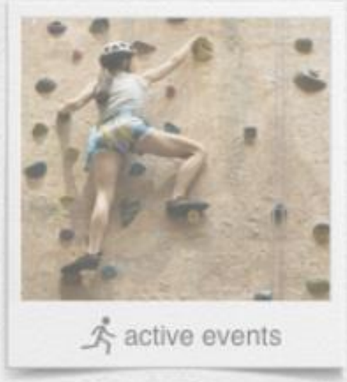
#1 in dates, relationships and marriages

I am a: Woman Seeking a: Man

Between ages: 35 and 45

Near ZIP/Postal code: Zipcode

View Photos »



Do fun stuff, meet cool people

matchevents

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Your Privacy

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Dating Articles and Advice
How Online Dating Works

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Promotions & Sponsorships

THINKING TIME

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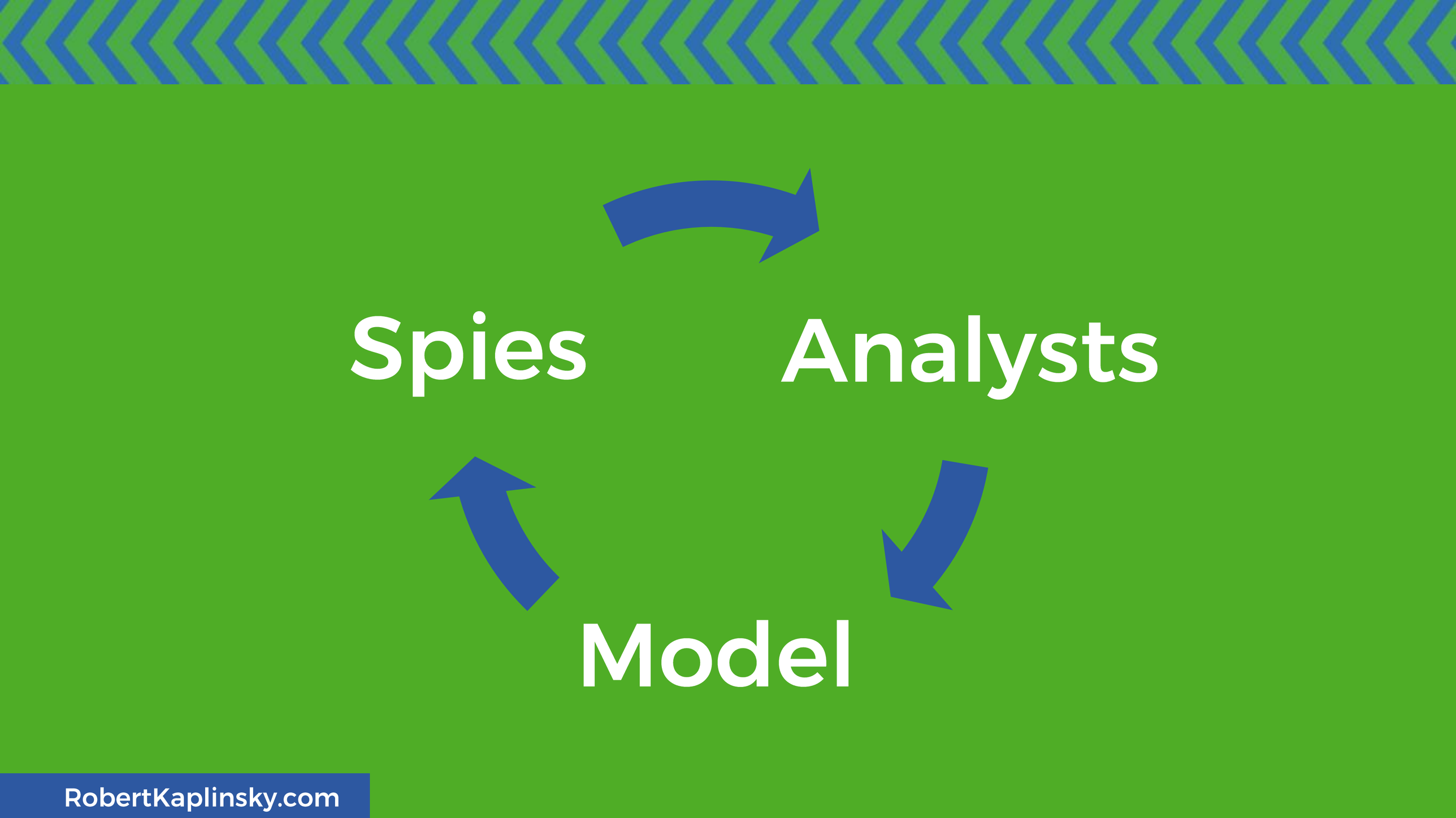
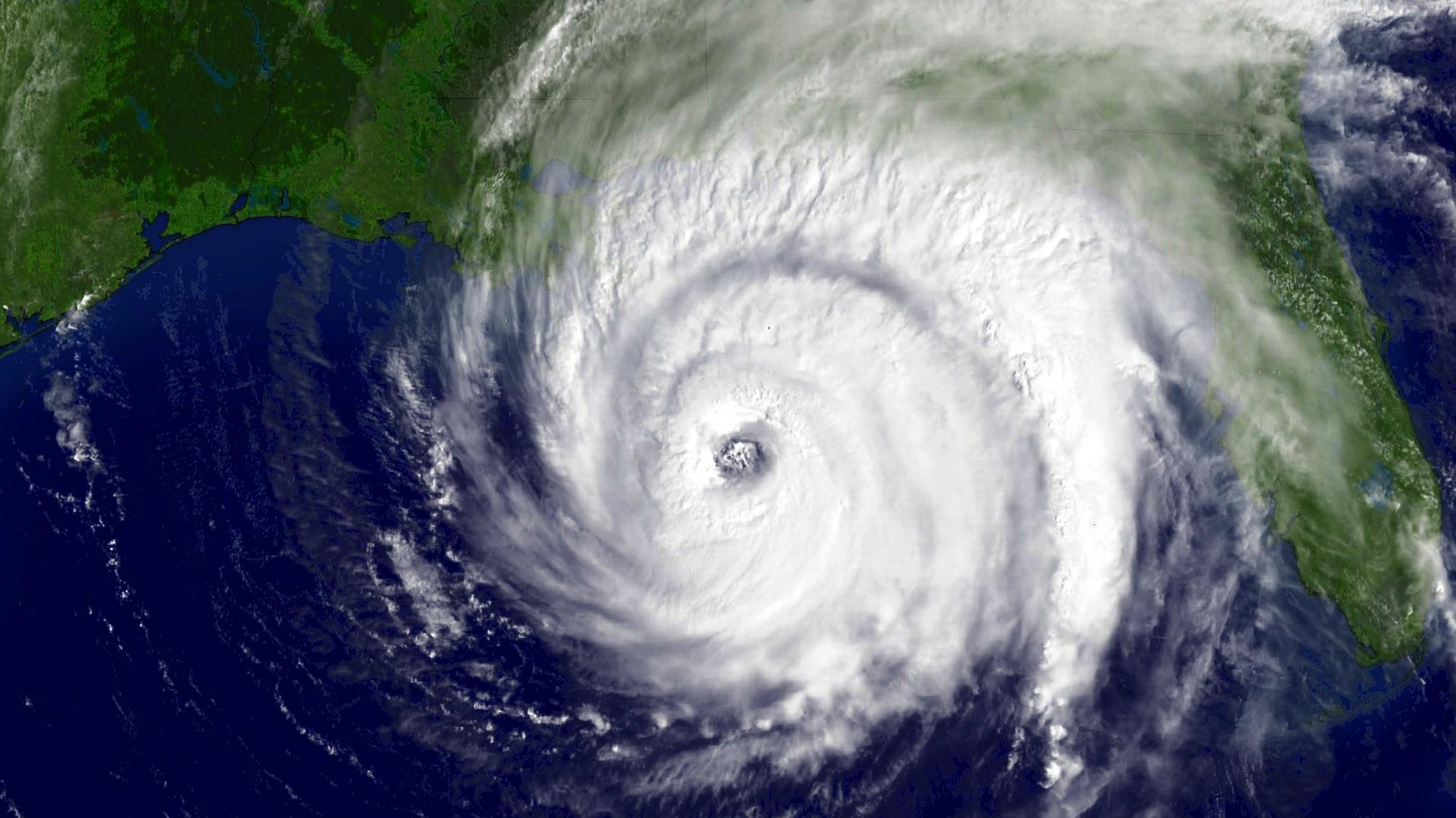

Spies
Analysts
Model

The four main components of the equations are:

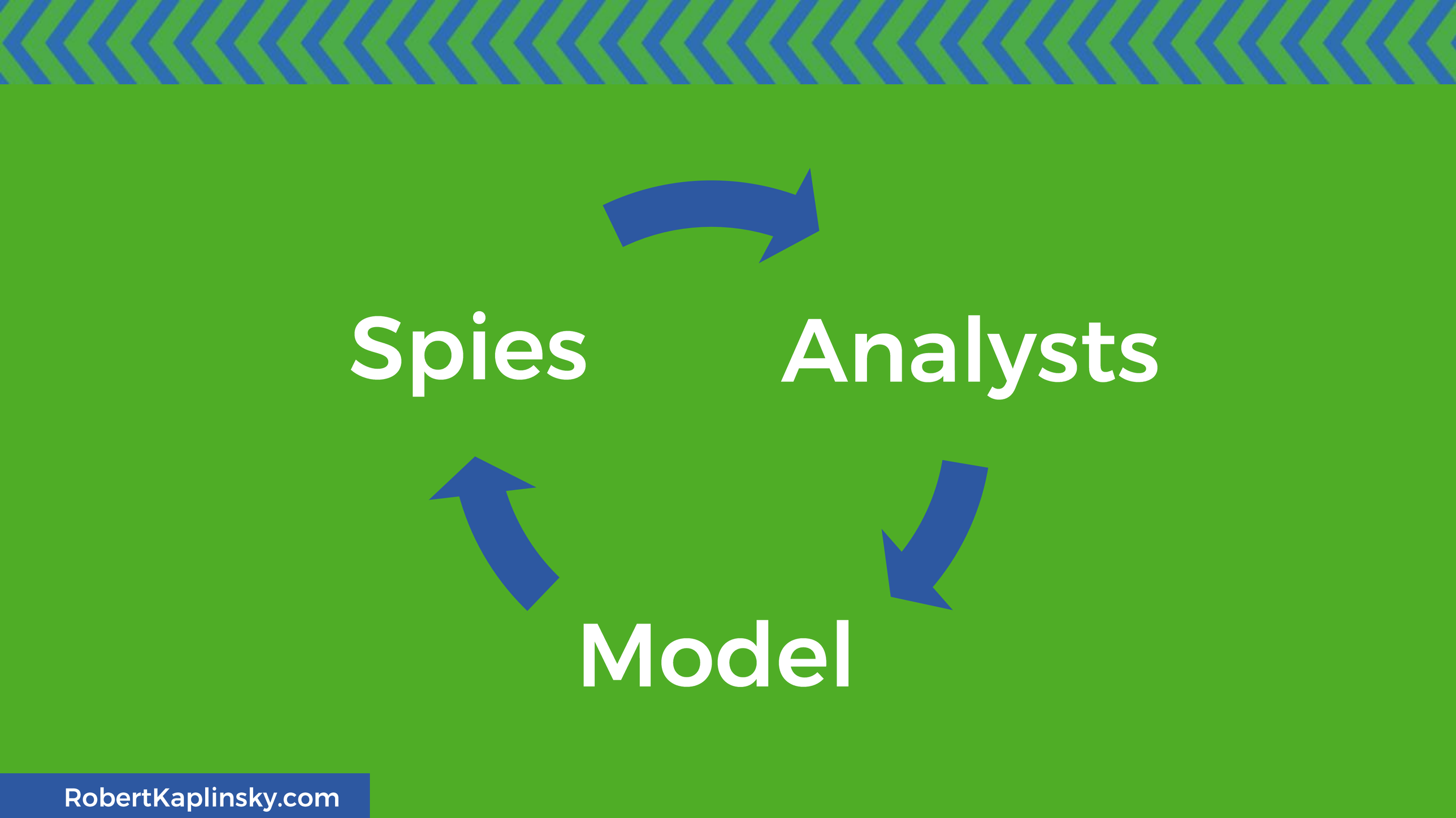
- what you say
- what you do
- what people like you do
- historical data

Source: Mashable



THINKING TIME

RobertKaplinsky.com


Spies
Analysts
Model


WAFFLE HOUSE
WAFFLE HOUSE

The index has three levels:

- Green: full menu - restaurant has power and damage is limited.
- Yellow: limited menu - no power or only power from a generator, or food supplies may be low.
- Red: the restaurant is closed - indicating severe damage.

Source: Wikipedia

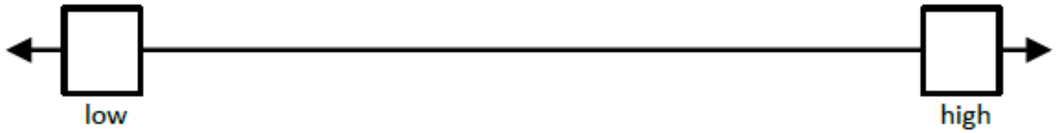
MORE EXAMPLES

- How does US News and World Reports rank colleges?
- How does Google know which results to show?
- How do sports teams know who to draft?
- How does SpaceX make boosters land standing up?
- How does Zillow estimate home prices?
- How does Pandora know what music to play?
- How did the BCS rank college football teams?
- How do they figure out who should speak at a conference?

MATH MODELING

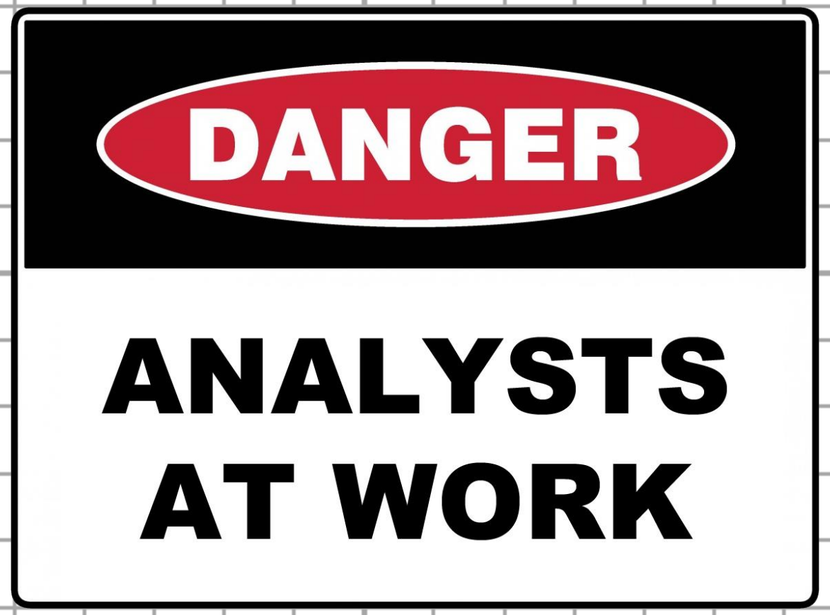
- [x] HOW DO WE MAKE SENSE OF MATH MODELING?
- [x] IS IT JUST ANSWERING QUESTIONS?
- [x] HOW DO YOU PROFIT FROM MATH MODELING?
- [ ] HOW DO WE HELP OUR STUDENTS IMPROVE?

Name: _____ Period: _____ Date: _____

What problem are you trying to figure out?	What estimates do you have?
	 Place your estimate on the number line.
What info do you already know about the problem?	What info do you need about the problem?
What is your conclusion? How did you reach that conclusion?	

TOP SECRET! SPIES ONLY

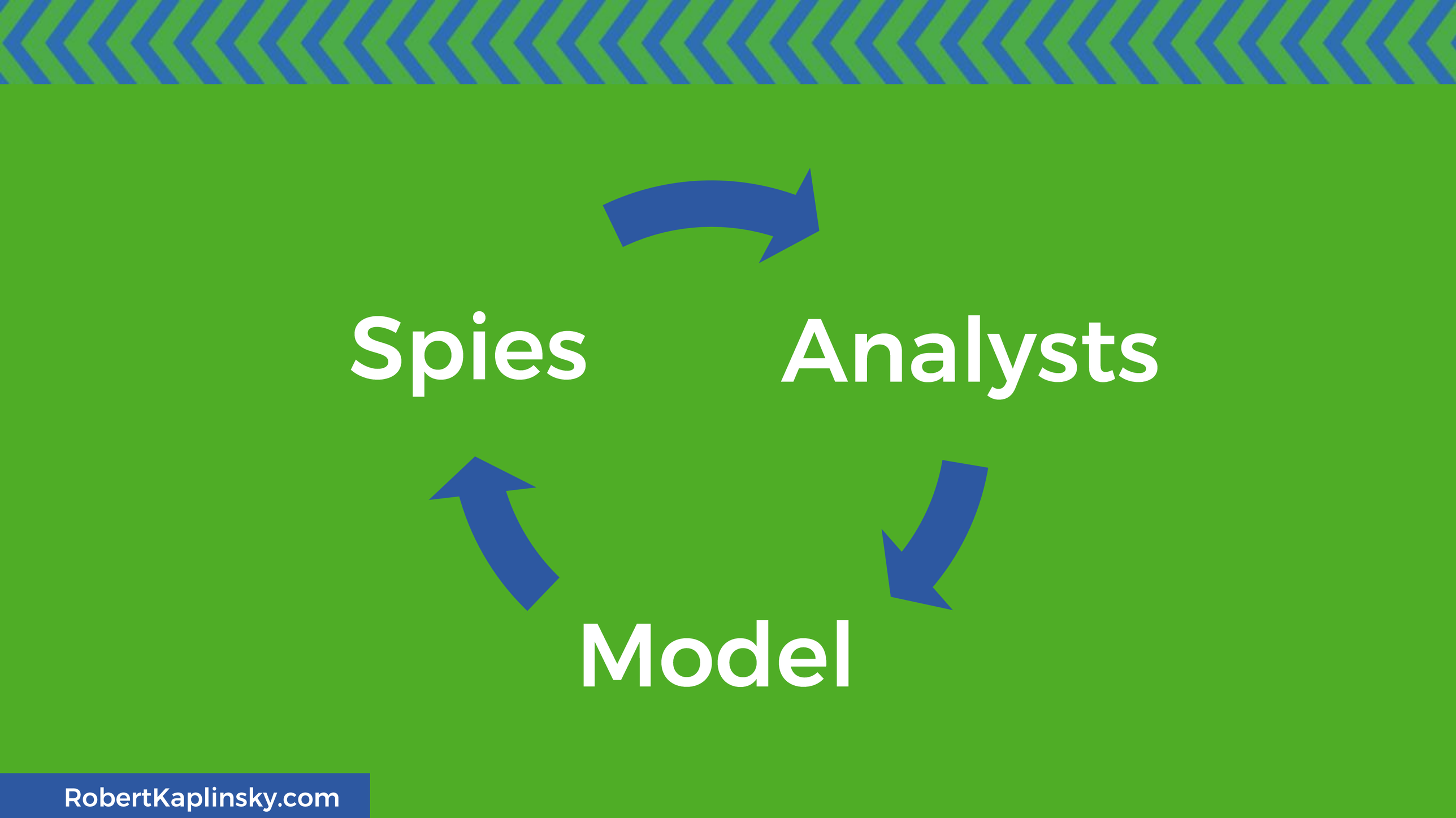
Your work



MODELING EXAMPLES

- ❑ MIDDLE SCHOOL
- ❑ HIGH SCHOOL

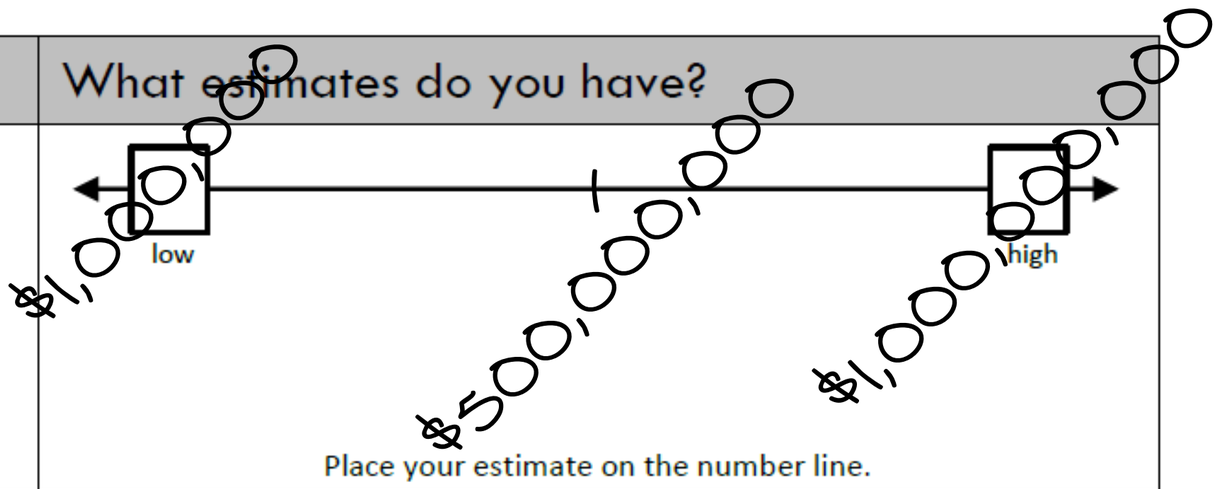

IVE
FOX NEWS
Junction


Spies
Analysts
Model

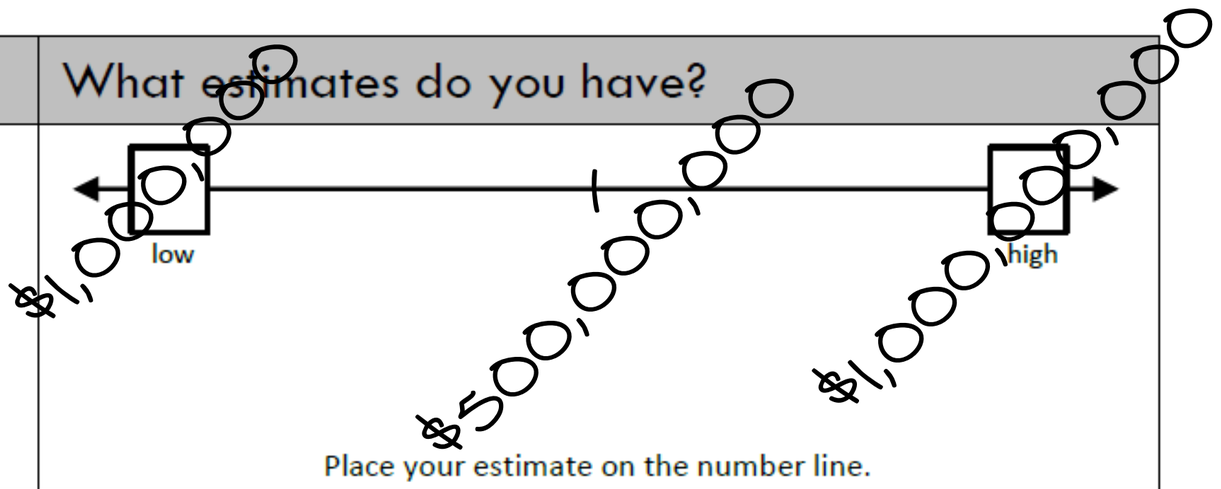
THINKING TIME

RobertKaplinsky.com

Name: _____ Period: _____ Date: _____

What problem are you trying to figure out?	What estimates do you have?
How much money was that?	 Place your estimate on the number line.
What info do you already know about the problem?	**What info do you need about the problem?**
• There is a lot of money. • It is in a pile. • It is in bundles.	• Is it all the same denomination? • ~~How much does one bill weigh?~~ • ~~How much does all the money weigh?~~
What is your conclusion? How did you reach that conclusion?	

Name: _____ Period: _____ Date: _____

What problem are you trying to figure out?	What estimates do you have?
How much money was that?	
What info do you already know about the problem?	**What info do you need about the problem?**
• There is a lot of money. • It is in a pile. • It is in bundles.	• Is it all the same denomination? • How many rows and columns are there? • How many bills are in one stack?
What is your conclusion? How did you reach that conclusion?	


PGR
SIEDO

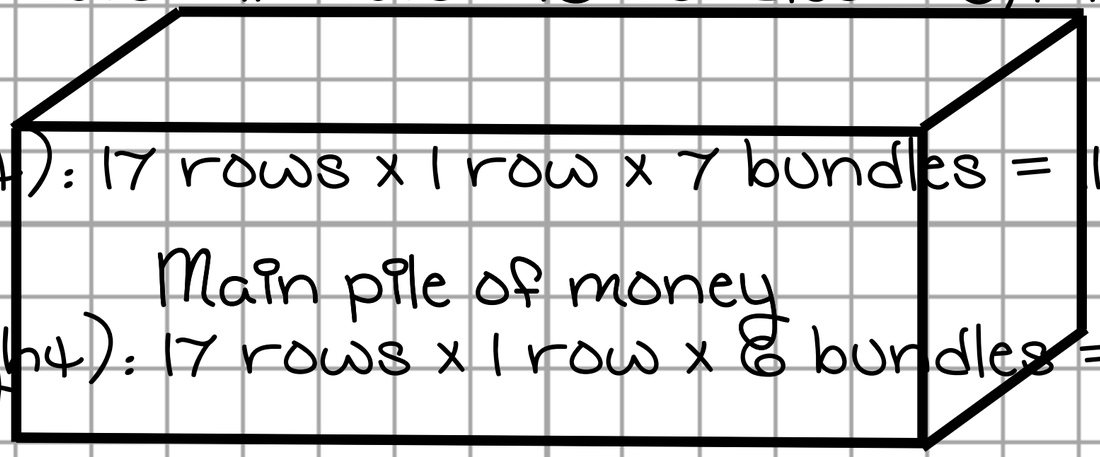

PGR
SIEDO
PGR
SIEDO

Your work

Main pile: 34 rows x 11 rows across x 10 bundles = 3,740 bundles

Small pile (left): 17 rows x 1 row x 7 bundles = 119 bundles

Small pile (right): 17 rows x 1 row x 8 bundles = 136 bundles



Total bundles: 3,740 + 119 + 136 = 3,961 bundles

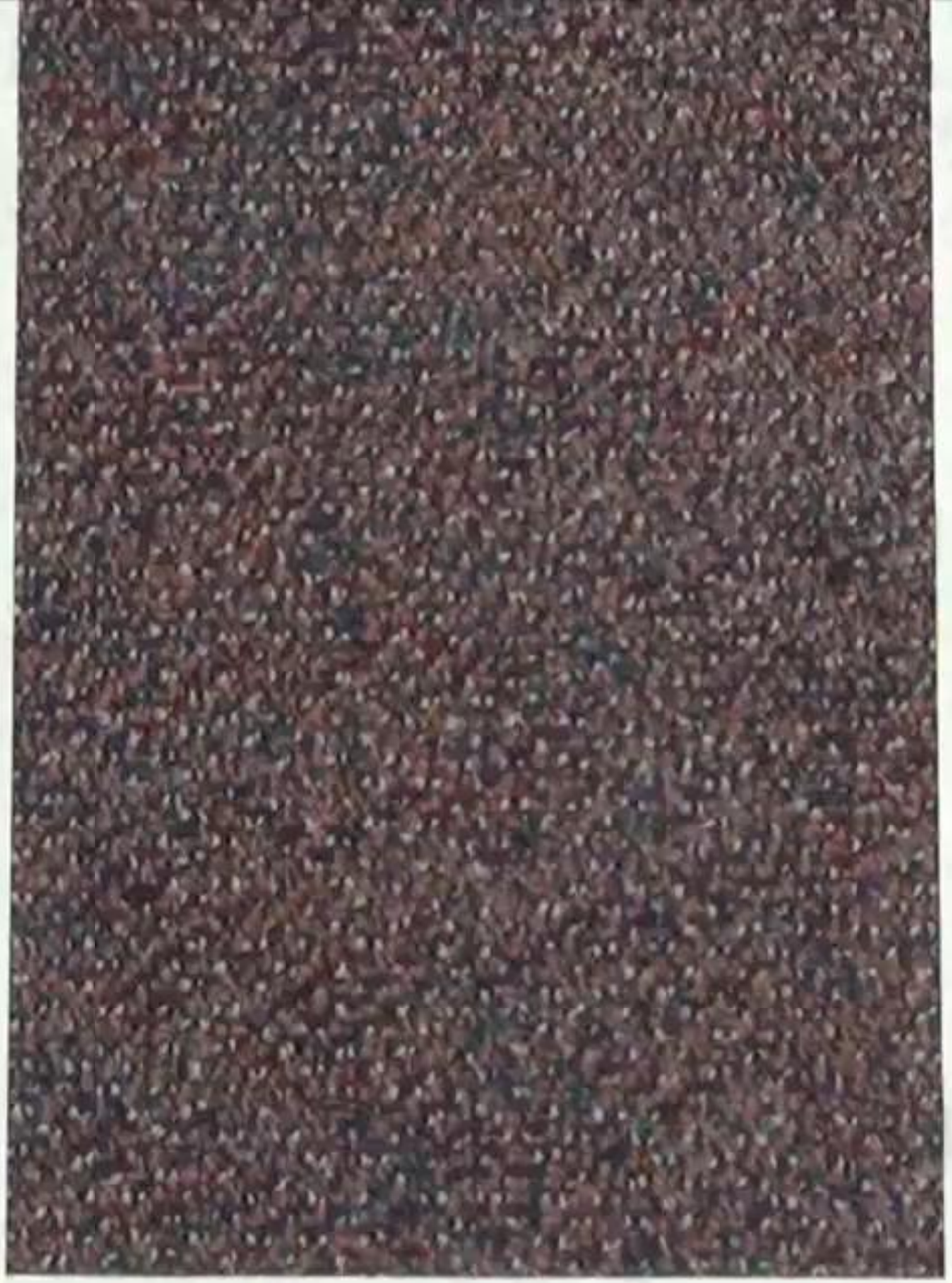
Total money: 3,961 bundles x $50,000 per bundle = $198,050,000

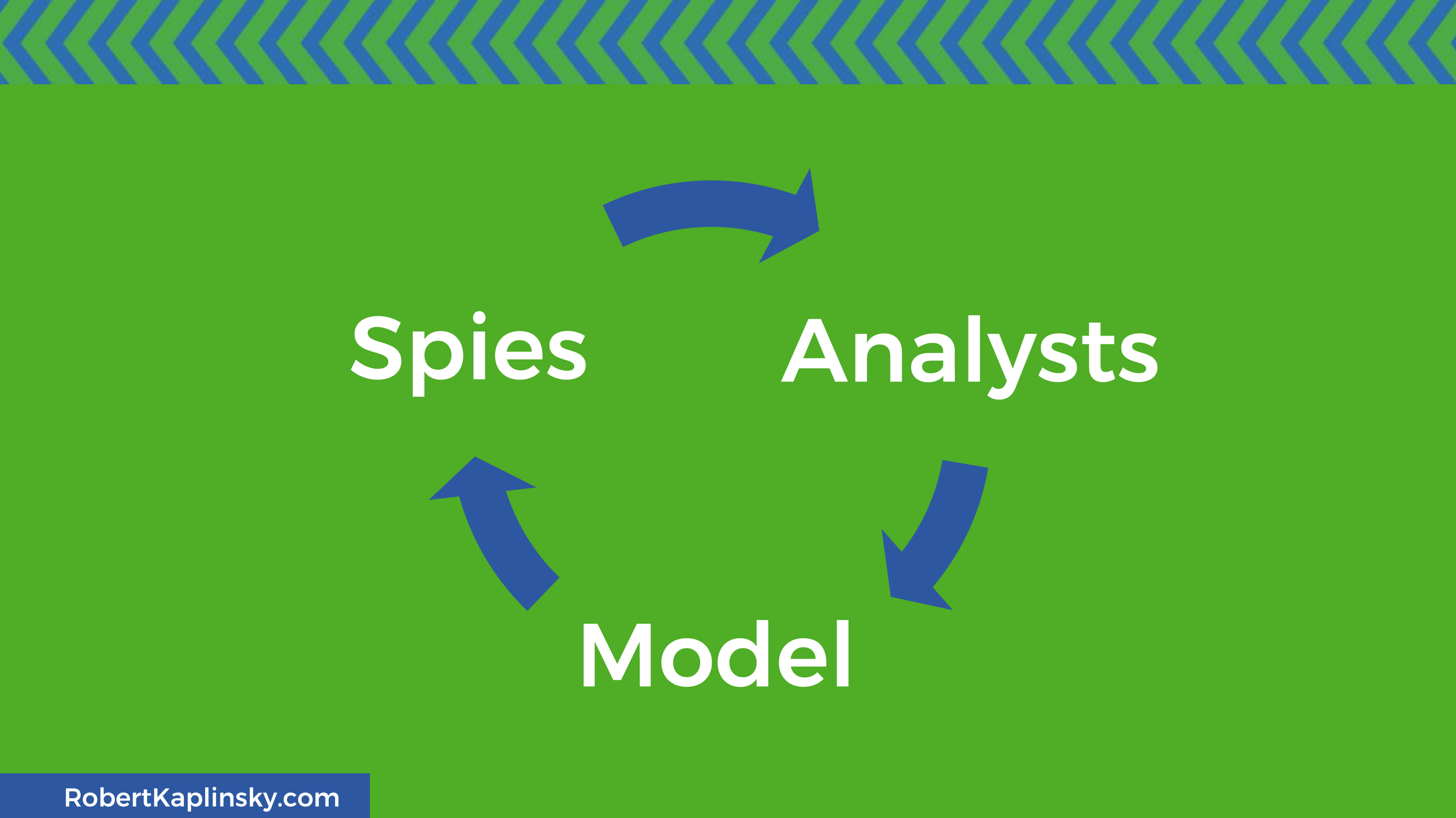

FOX
FOX NEWS

MODELING EXAMPLES

- [x] MIDDLE SCHOOL
- [ ] HIGH SCHOOL


NON-STAGGERED
STAGGERED

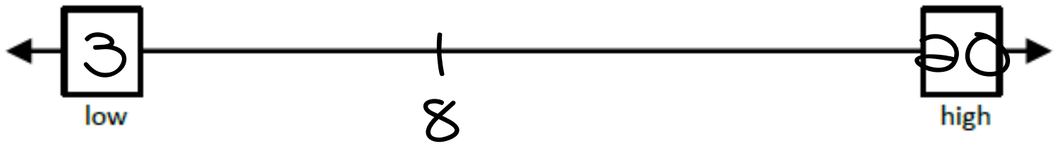



Spies
Analysts
Model

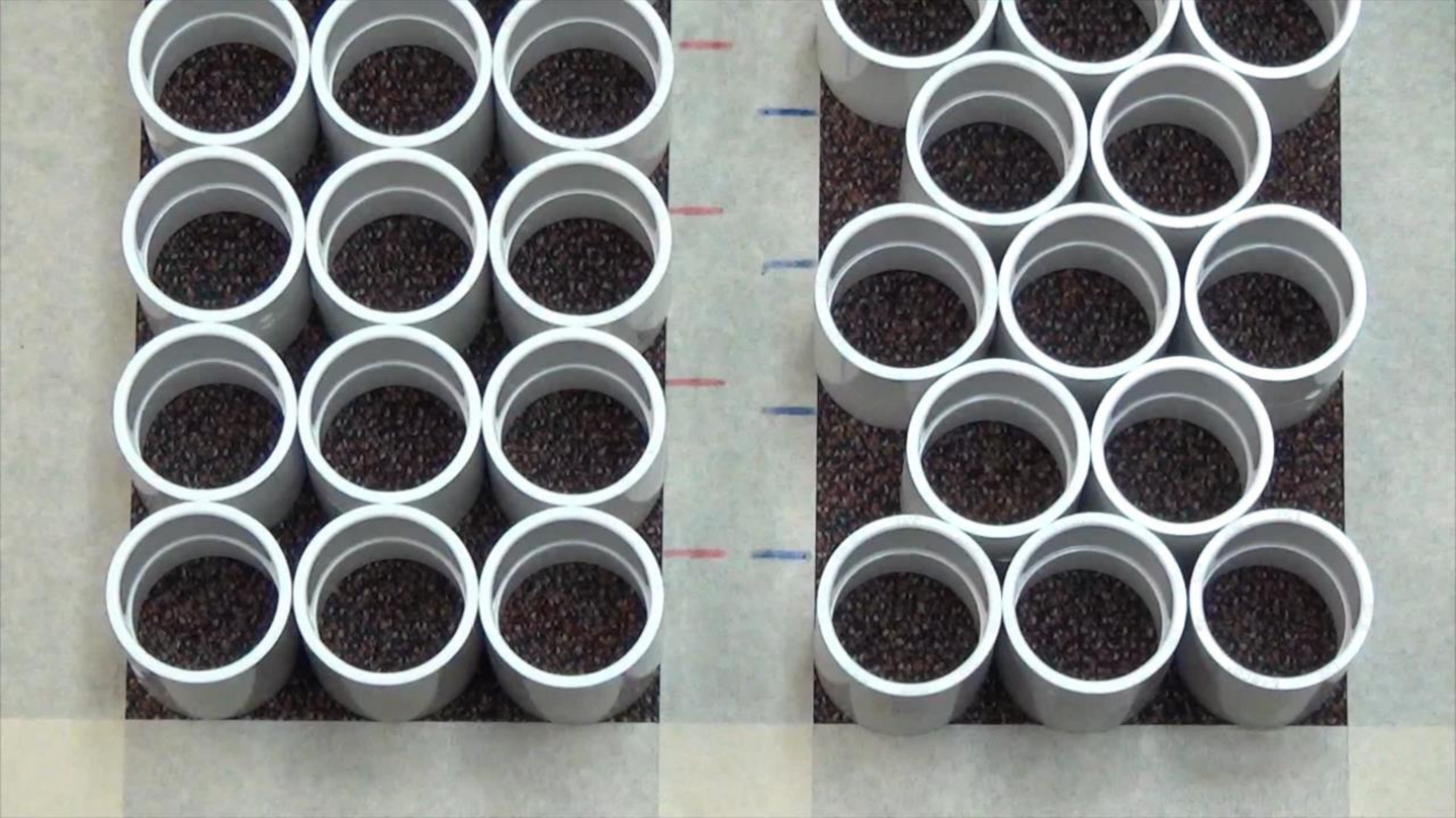
THINKING TIME

RobertKaplinsky.com

Name: _____ Period: _____ Date: _____

What problem are you trying to figure out?	What estimates do you have?
How much shorter are 20 layers of non-staggered pipes?	 (in inches) Place your estimate on the number line.
What info do you already know about the problem?	**What info do you need about the problem?**
• One pile of pipes is staggered. • One pile of pipes is not staggered. • We have to compare 20 layers of each.	• What are the dimensions of a pipe? • What units are we using to measure?
What is your conclusion? How did you reach that conclusion?	


6
7

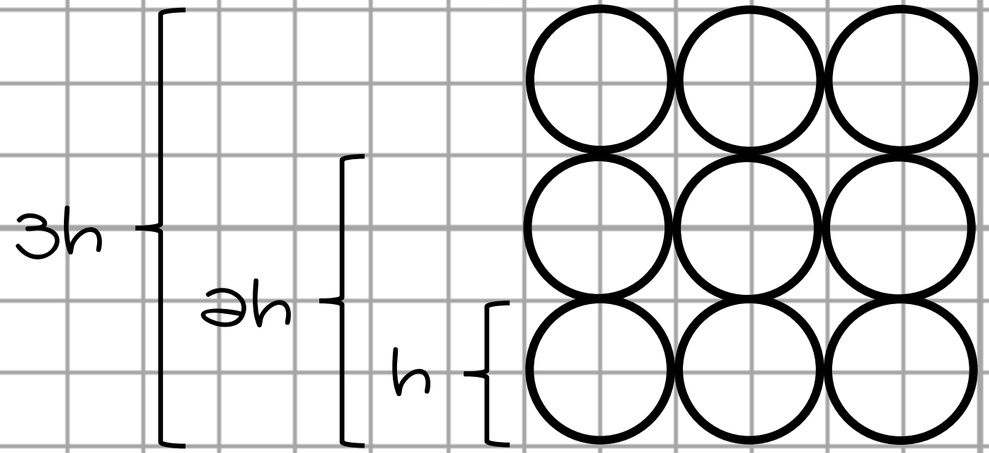


THINKING TIME

RobertKaplinsky.com

Your work

Non-staggered pipes



1 pipe = h cm

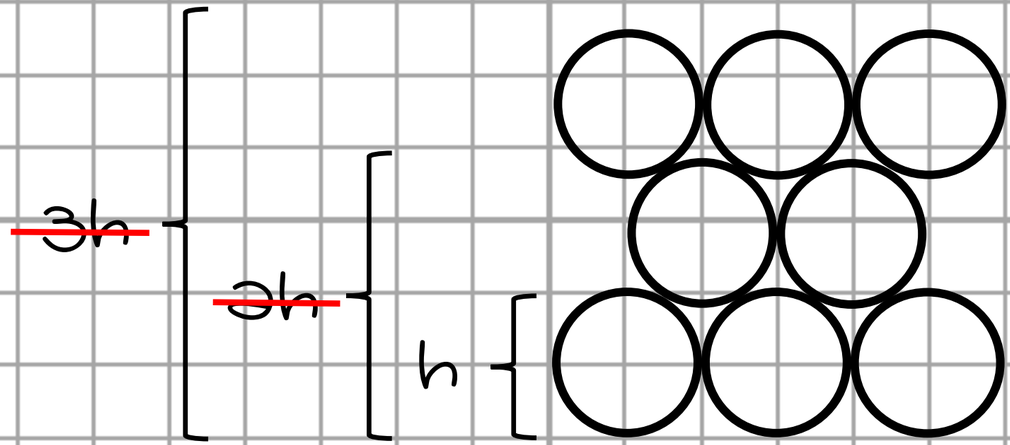
2 pipes = 2h cm

3 pipes = 3h cm

⋮

20 pipes = 20h cm

Staggered pipes



1 pipe = h cm

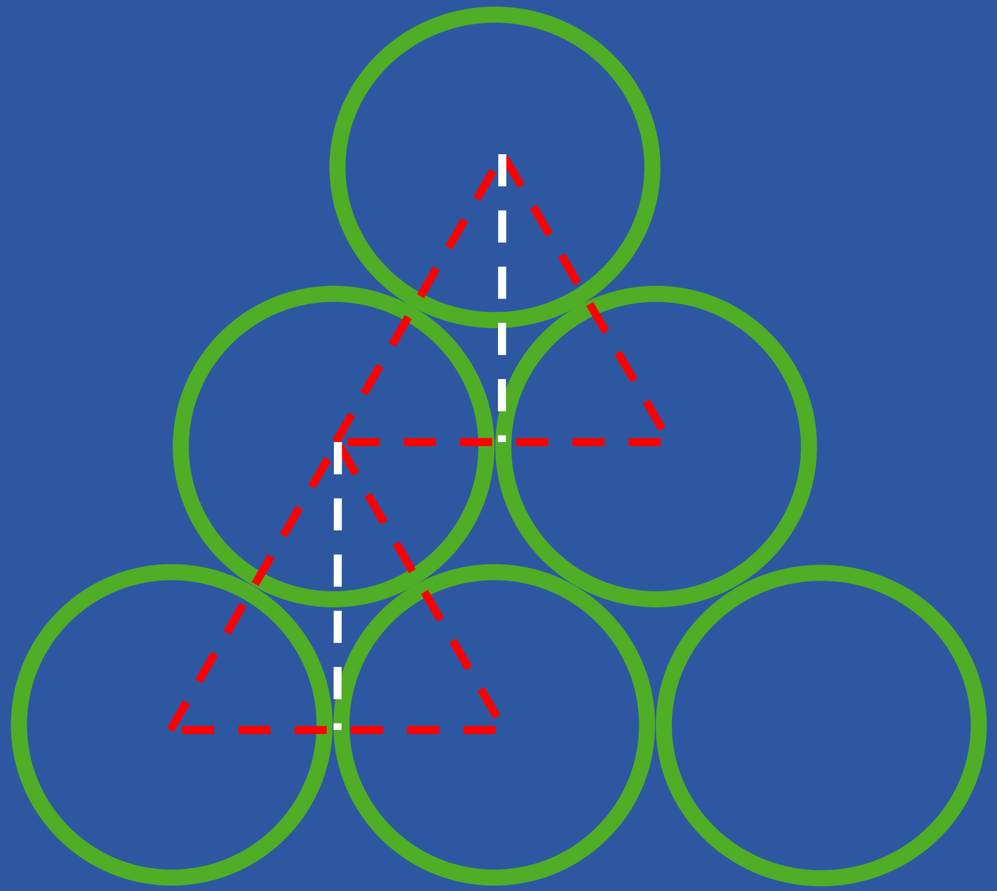
2 pipes = 33 cm

3 pipes = 33 cm

⋮

20 pipes = 33 cm

STAGGERED PIPES



MODELING EXAMPLES

- ☑ MIDDLE SCHOOL
- ☑ HIGH SCHOOL

MATH MODELING

- ☑ HOW DO WE MAKE SENSE OF MATH MODELING?
- ☑ IS IT JUST ANSWERING QUESTIONS?
- ☑ HOW DO YOU PROFIT FROM MATH MODELING?
- ☑ HOW DO WE HELP OUR STUDENTS IMPROVE?

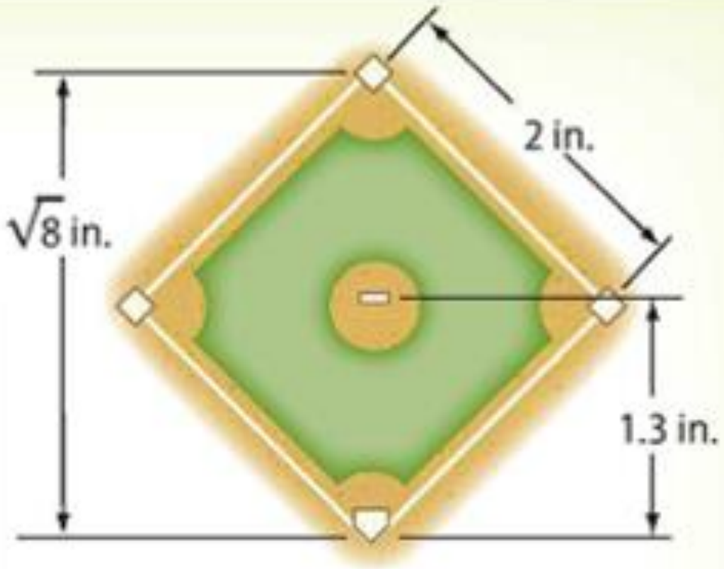
Real-World Link

Common Core State Standards

Content Standards
8.NS.1, 8.NS.2, 8.EE.2

Mathematical Practices
1, 3, 4, 6

Sports Major League baseball has rules for the dimensions of the baseball diamond. A model of the diamond is shown.



1. On the model, the distance from the pitching mound to home plate is 1.3 inches. Is 1.3 a rational number? Explain.

2. On the model, the distance from first base to second base is 2 inches. Is 2 a rational number? Explain.

3. The distance from home plate to second base is $\sqrt{8}$ inches. Using a calculator, find $\sqrt{8}$. Does it appear to terminate or repeat?

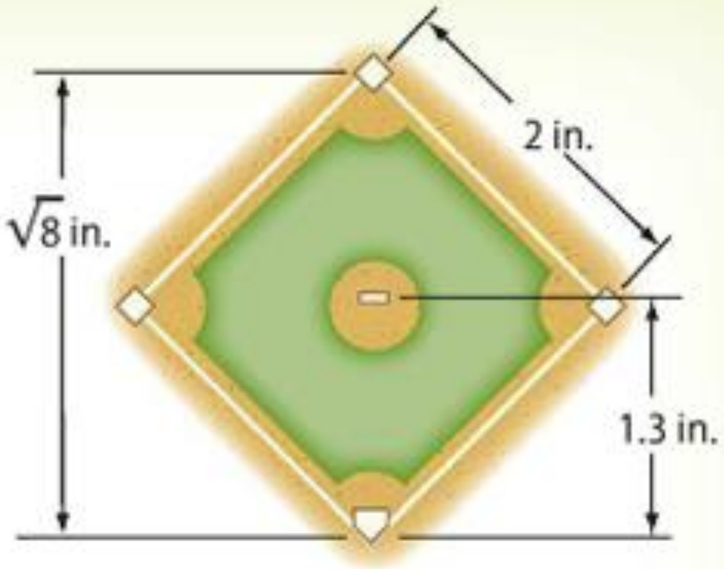
Real-World Link

Common Core State Standards

Content Standards
8.NS.1, 8.NS.2, 8.EE.2

Mathematical Practices
1, 3, 4, 6

Sports Major League baseball has rules for the dimensions of the baseball diamond. A model of the diamond is shown.



1. On the model, the distance from the pitching mound to home plate is 1.3 inches. Is 1.3 a rational number? Explain.

2. On the model, the distance from first base to second base is 2 inches. Is 2 a rational number? Explain.

3. The distance from home plate to second base is $\sqrt{8}$ inches. Using a calculator, find $\sqrt{8}$. Does it appear to terminate or repeat?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DISCUSSION TIME

- What previous understandings of mathematical modeling were confirmed?
- How has your understanding of mathematical modeling shifted?
- What would you recommend math teachers do differently?

GOALS

- ☑ WHAT IS INTELLIGENCE?
- ☑ WHY DON'T STUDENTS REMEMBER?
- ☑ WHAT MATHEMATICS IS IMPORTANT?

PBL RESOURCES

- Problem-based lesson search engine:
  robertkaplinsky.com/prbl-search-engine
- My lessons (Middle, and High School)
  robertkaplinsky.com/lessons
- Dan Meyer (Middle and High School)
  threeacts.mrmeyer.com
- Andrew Stadel (Middle School)
  www.estimation180.com/lessons.html

Robert Kaplinsky

Home

How I Can Help You

Real World Problems

My workshops help teachers implement problem-based lessons by helping them experience them from both student and teacher perspective, leading to increase students' success with performance tasks and the Common Core State Standards.

Depth of Knowledge

Problems at higher depth of knowledge levels have the potential to challenge your most talented student yet remain accessible to everyone. I can help teachers develop best practices for implementing them so that students persevere longer towards finding the solution.

Search

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First Name

Lessons

View all | Kinder | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | Alg 1 | Geo | Alg 2

How Much Money Were Those Pennies?

How Can We #SaveNelly?

How Many Chip Bags Will There Be?

How Can We Make Stronger Passwords?

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First Name

Robert Kaplinsky's Problem-Based Lessons

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	A	B	C	D	E	F	G	H	
1	Lesson	Concept / Skill	Standard 1	Standard 2	Standard 3	Standard 4	Standard 5	Standard 6	Stan 7
2	How Much Money Were Those Pennies?	Money, Multiplying Decimals, Proportions	4.MD.2	5.NBT.5	5.NBT.7	7.RP.3			
3	How Can We #SaveNelly?	Dividing Decimals	6.NS.3						
4	How Many Chip Bags Will There Be?	Ratio and Proportions, Population Sampling	6.RP.3	6.RP.3c	7.RP.2	7.RP.3	7.SP.1	7.SP.2	
5	How Can We Make Stronger Passwords?	Permutations, Combinations, Probability, Exponents, Exponential Growth	7.SP.8	8.EE.1	S-MD.7	S-CP.5	S-CP.9		
6	How Many Hot Dogs And Buns Should He Buy?	Least Common Multiple (LCM)	6.NS.4						
7	What Does 2000 Calories Look Like?	Unit Rates, Ratios, Solving Equations, and Solving Inequalities	6.EE.3	6.EE.4	6.EE.5	6.EE.6	6.EE.7	6.EE.8	6.RP.2
8	How Much Money Are The Coins Worth?	Decimal Operations and Coin Counting	2.MD.8	5.NBT.7	6.NS.3				
9	How Many Times Will A Case of Paper Jam?	Interpreting Percentages	6.RP.3c	7.RP.3					
10	How Many Soda Combinations Are There On A Coke Freestyle?	Counting, Composing, and Decomposing Numbers	K.CC.5	K.CC.6	K.OA.1	K.OA.2	K.OA.3	K.OA.4	K.NBT
11	What Should The Freeway Sign Show?	Fractions on Number Lines, Converting Units, Decimal and Fraction Operations	3.NF.1	3.NF.2	3.NF.2a	3.NF.2b	3.NF.3	3.NF.3a	4.MD.
12	How Fast Was The Fastest Motorcycle Speeding Ticket Ever?	Converting Units and Unit Rates	5.MD.1	6.RP.3d	7.RP.1	N.Q.1			
13	How Much Did Patrick Peterson Lose By Not Cashing His Check?	Compound and/or Simple Interest	7.RP.3	N-RN.2	A-SSE.1	A-SSE.3c	A-SSE.4	A-REI.11	F-IF.4
14	How Many Biscuits Can You Make?	Dividing Fractions and Mixed Numbers	5.NF.7	5.NF.7a	5.NF.7b	5.NF.7c	6.NS.1		
15	How Much Bigger Should They Make Zoolander's School?	Scale and Proportions	5.NF.5A	7.RP.2	7.G.1				
16	Where Is The Freeway Sign Located?	Identifying Fractions on a Number Line	3.NF.1	3.NF.2	3.NF.2a	3.NF.2b	3.NF.3	3.NF.3a	3.NF.3
17	How Far Apart Are Exits On A Ring Road?	Arc length measures	G-C.5						
18	How Much Is One Third Of A Cup Of Butter?	Identifying Fractions on a Number Line	3.NF.1	3.NF.2	3.NF.2a	3.NF.2b	3.NF.3	3.NF.3a	3.NF.3
19	How Do Skytypers Write Messages?	Transformations (Rotations, Reflections, Dilations, and Translations)	8.G.1	8.G.2	8.G.3	8.G.4	G-CO.2	G-CO.3	G-CO
20	How Big Is The Bermuda Triangle?	Coordinate Geometry: Area of Triangle	G-GPE.7						
21	What Fraction Of Children Are In The Right Car Seat?	Representing and Comparing Fractions	3.NF.1	3.NF.2	3.NF.3	4.NF.1	4.NF.2		
22	How Much Did The Temperature Drop?	Absolute Value	6.NS.7c	7.NS.1c					
23	How Much Shorter Are Staggered Pipe Stacks?	Circles, Pythagorean Theorem, trigonometric ratios, and linear functions	8.G.7	A-CED.1	A-CED.3	A-CED.4	A-SSE.1a	A-SSE.1b	A-SSE
24	How Do You Write A Check To Pay For Something?	Expanded Form	2.NBT.3	4.NBT.2	5.NBT.3a				
25	How Can We Correct The Scarecrow?	Pythagorean Theorem	8.G.6	G-SRT.4					
26	How Much Does A 100×100 In-N-Out Cheeseburger Cost?	Building and Interpretting Linear Functions	8.F.1	8.F.3	8.F.4	8.F.5	F-IF.4	F-IF.5	F-IF.6
27	How Can We Water All Of The Grass?	Circles, Pythagorean Theorem, trigonometric ratios	7.G.4	8.G.7	G-SRT.8	G-MG.1	G-MG.3		
28	How Much Money IS That?!	Volume of rectangular prism	5.MD.3	5.MD.4	5.MD.5	5.MD.5b	5.MD.5c	6.G.2	7.G.6
29	How Much Money Should Dr. Evil Demand?	Exponential Growth	N-RN.2	A-SSE.1	A-SSE.3c	A-SSE.4	A-REI.11	F-IF.4	F-IF.7
30	How Tall Is Mini-Me?	Scale and Dividing Decimals	5.NF.5	5.NF.5a	5.NF.5b	6.NS.3			
31	How Did They Make Ms. Pac-Man?	Transformations (Rotations, Reflections, and Translations)	8.G.1	8.G.2	8.G.3	8.G.4	G-SRT.2	G-CO.4	G-CO
32	Which Ticket Option Is The Best Deal?	Unit Rates and Ratios	6.RP.2	6.RP.3	6.RP.3a	6.RP.3b			
33	How Far Apart Are The Freeway Exits?	Fractions on a Number Line and Subtracting Fractions	3.NF.2	3.NF.2b	4.NF.2	4.NF.3a	4.NF.3c	4.NF.3d	5.NF.1
34	Do We Have Enough Paint?	Area	3.MD.5	3.MD.6	3.MD.7				

Sheet1

Scary & Dangerous

WHAT DO WE KNOW ABOUT EDUCATION?

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