Making Yourself Smarter

Hacking your mental "software" on a shoestring budget.

Plea

I'm sure you've seen some of these problems before, give everyone a chance to think before you blurt out the answer.

Or Else

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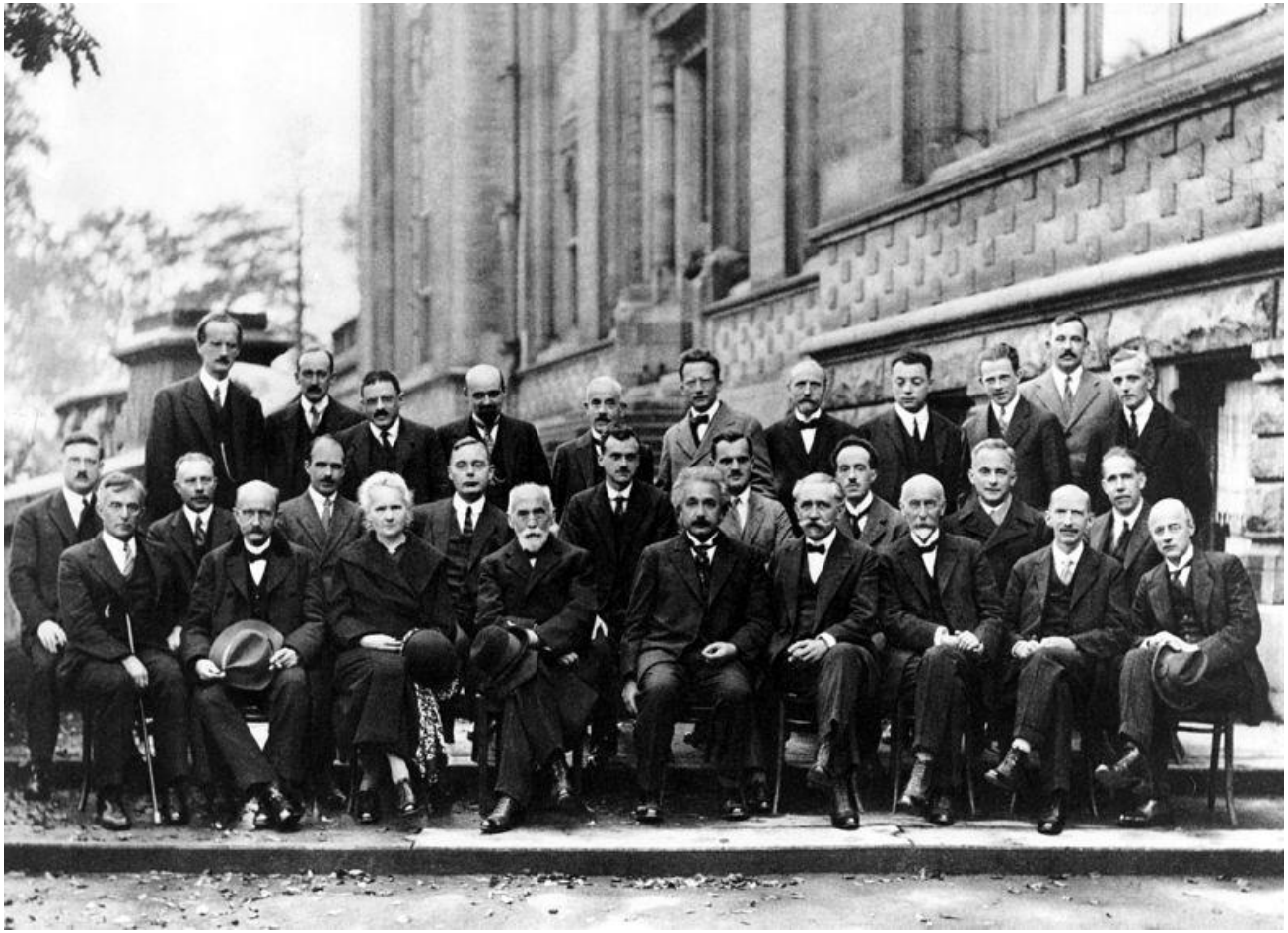
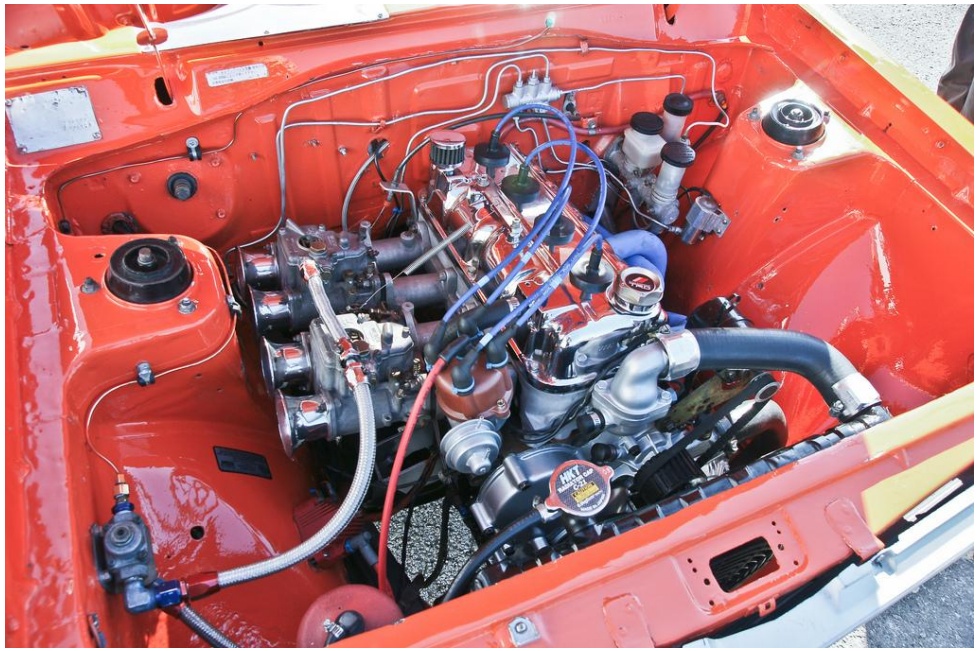
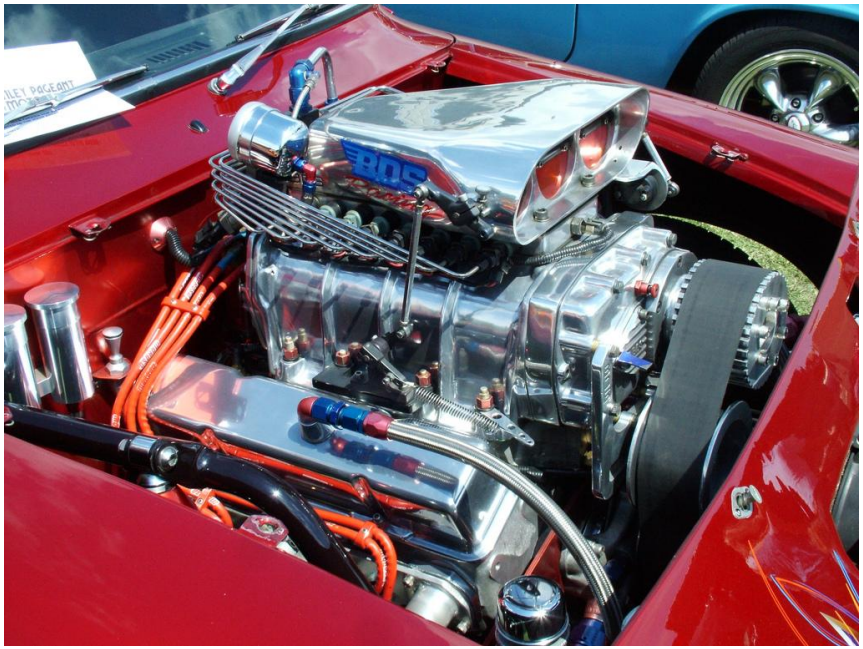
Wouldn't it be great to be?



You are stuck with your engine.





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How you drive is more important.

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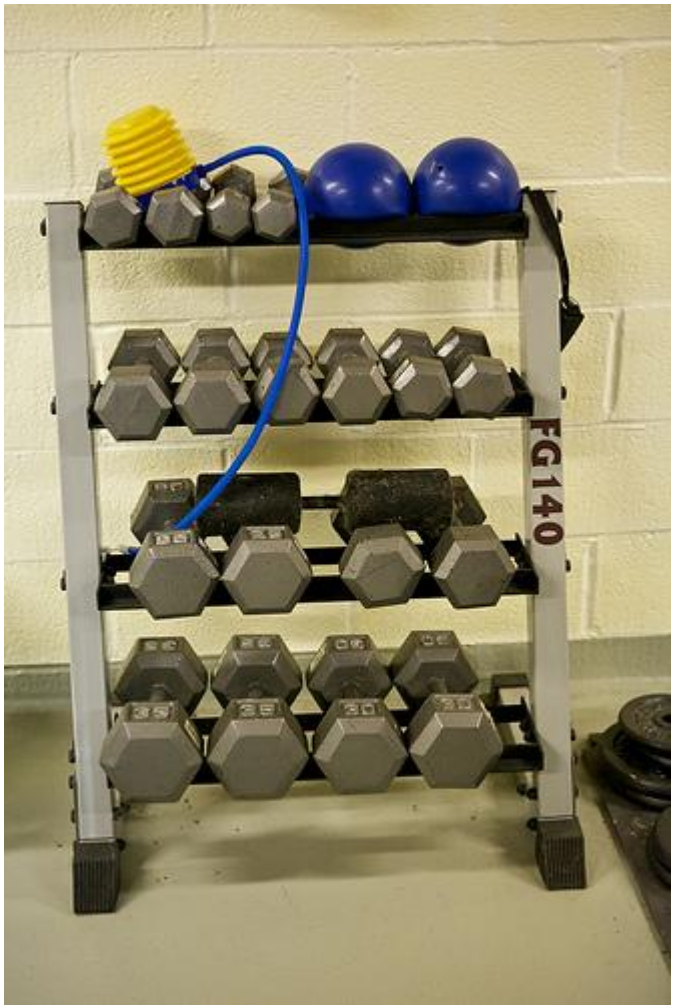
Collect the tools and work out!



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Warmup!

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An enlightening problem

You're in a room with three switches.

They control 3 light bulbs behind a closed door.

Once you leave the room you can't return.

How do you figure out which switch controls which light bulb?

Brilliant!

Turn on two switches.

Wait half hour.

Turn off one switch.

One is on, one is hot, and one is cold.

What did we do?

Eliminated impossibilities.

Took stock of what we knew.

Used outside knowledge.

Not so bad...

A tall order

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Scrambled?

You have a 100 story building and two super strong eggs.

From what floor can you drop an egg without breaking it (if it breaks at all)?

Test by dropping eggs.

Use the minimum number of drops

(presume murphy's law holds)

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Lets break an egg.

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What do we know?

Skipping more floors is bad if the egg breaks
(we need to check more)

Skipping floors is good if the egg doesn't break
(we got the preceding floors for free!)

Every jump we take, we can have to skip one less floor

What do we want?

Ideally our first drop should be:

#Drops if it breaks after the first drop

is equal to

#Drops in the left to get to the top if it doesn't break

A little piece of shell 3

First drop floor	drops on break	min drops remaining	min drops
1	0	2	3
2	*1*	*1*	*2*
3	2	0	3

A little piece of shell 5

First drop floor	drops on break	min drops remaining	min drops
1	0	4	5
2	1	3	4
3	*2*	*2*	*3*
4	3	1	4
5	4	0	5

A little piece of shell 8

First drop floor	drops on break	min drops remaining	min drops
1	0	5	6
2	1	4	5
3	*2*	*3*	*4*
4	3	3	4
5	4	2	5
6	5	2	6
7	6	1	7
8	7	0	8

A little piece of shell 10

First drop floor	drops on break	min drops remaining	min drops
1	0	4	5
2	1	4	5
3	*2*	*4*	*5*
4	3	3	4
5	4	3	5
6	5	3	6
7	6	2	7
8	7	2	8
9	8	1	9
10	9	0	10

Hard Boiled

Okay, this was a mean question...

Answer is an ugly math inequality

n for:

$$(n)(n-1)/2 > 100 \Rightarrow \sim 14$$

Yucky, lets say you aren't a math expert. You still got pretty close and you could probably get the answer by force if you had to by working out a big table. That's pretty good!

What did we do?

Looked at a small example.

Tried to find a small pattern and build on it.

Couldn't deduce the actual answer but we made good progress and got the 80% solution.

Lets play a game show!

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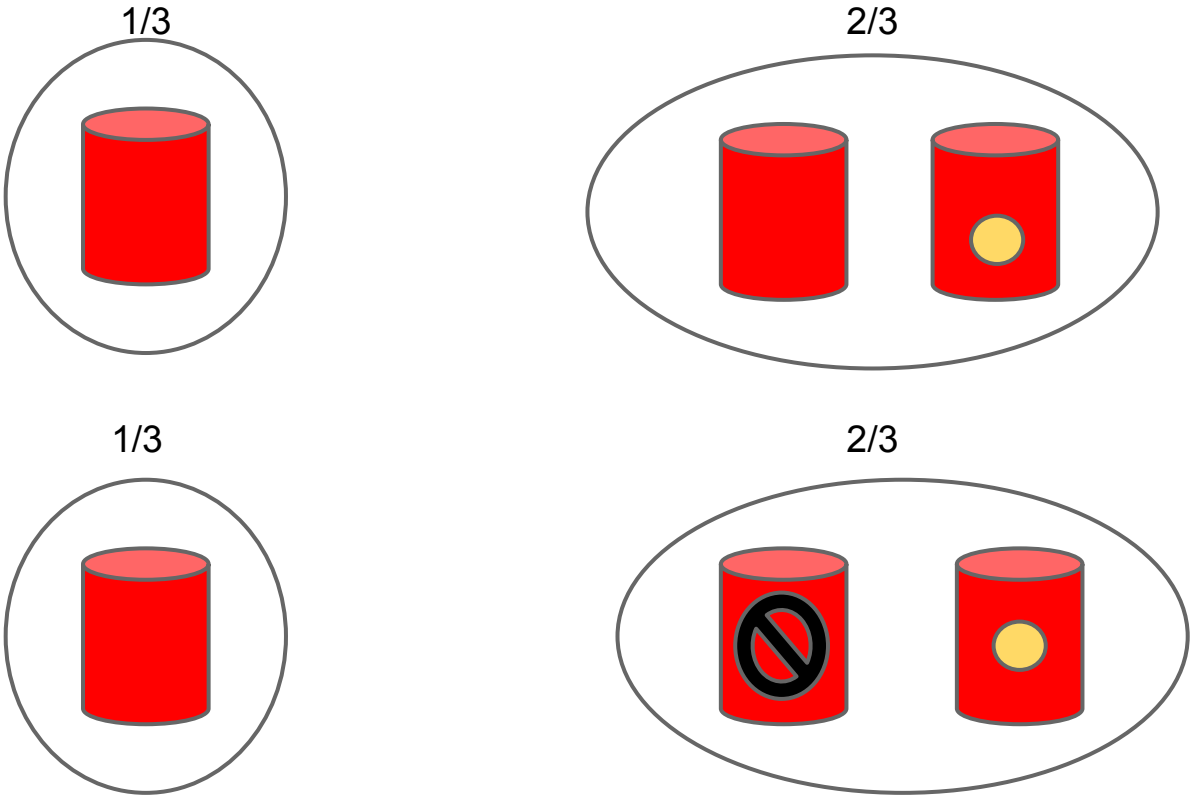
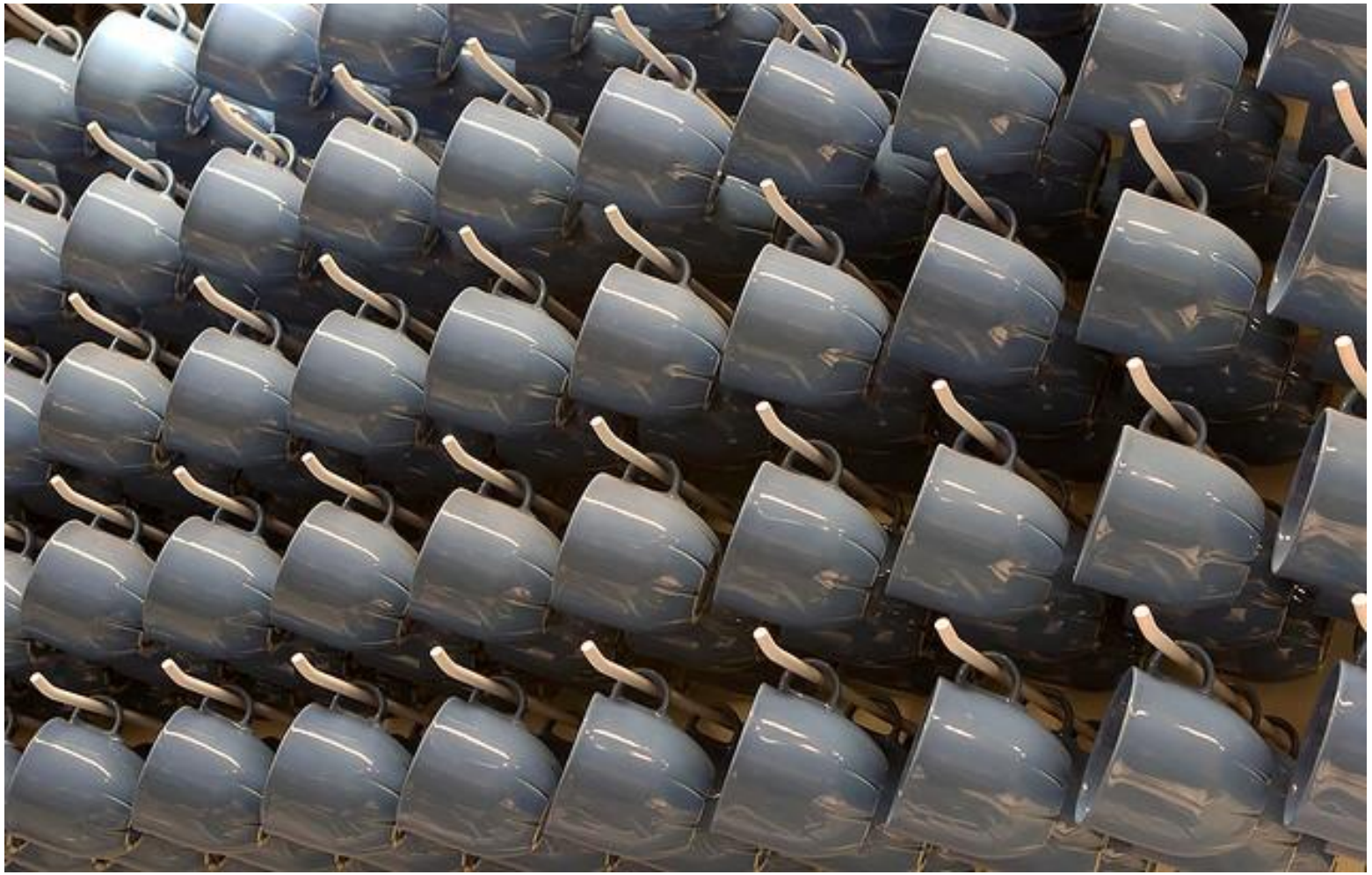
To switch or not to switch?

Hmm, intuition says it should be 50/50.

But after your choice:



What about 100 cups?



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What did we do?

Made a problem bigger so we could see the pattern more easily!

Changed the scale!

Enough Puzzles. Lets Play a Game!

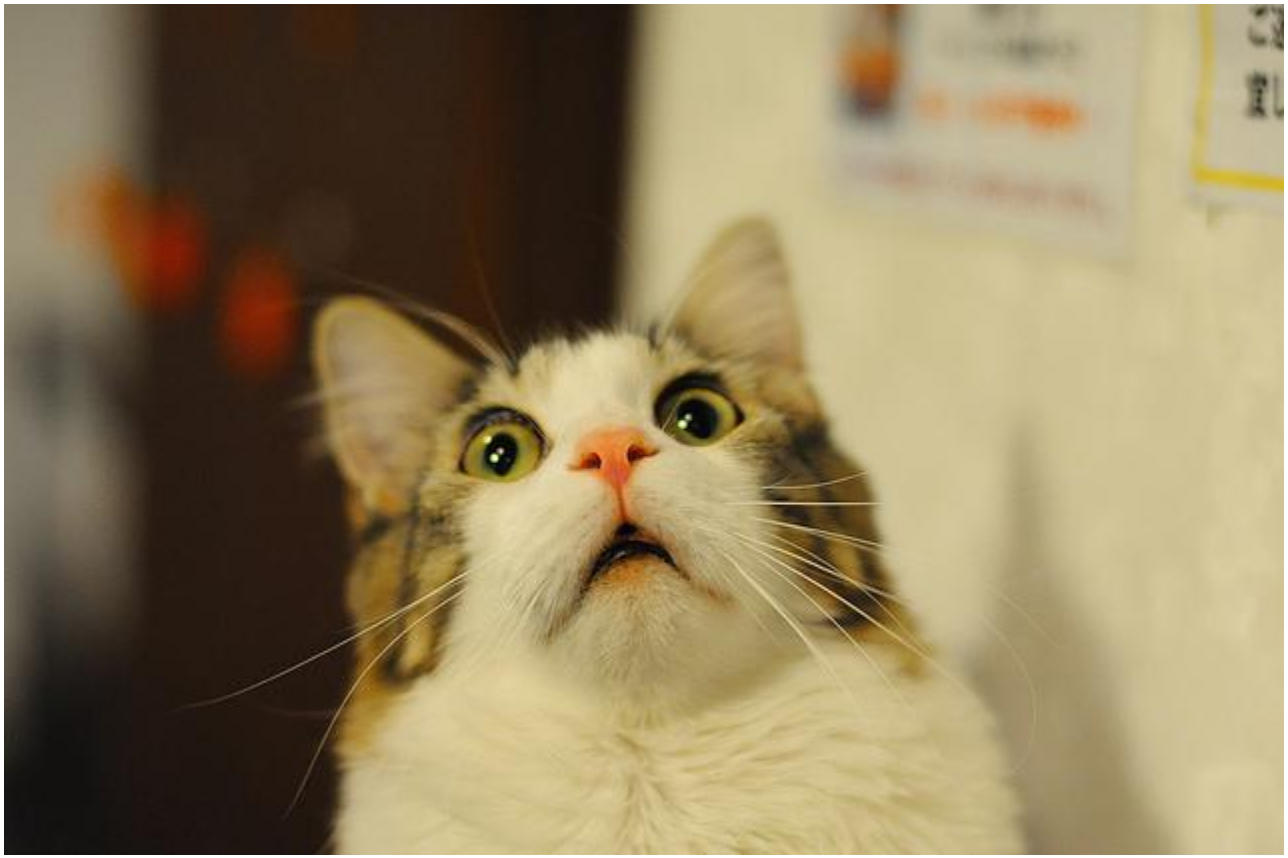
We start with the numbers

1 2 3 4 5 6 7 8 9

We take turns picking a number, and each number can be used only once.

The first person to pick three numbers that add up to 15 wins.

What the hey?



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We weren't playing the same game

8	1	6
3	5	7
4	9	2

What did we do?

Changed the representation of the problem.

Made a visualization.

A noisy problem

How many piano tuners are there in Charleston?

What did we do?

Started somewhere, didn't get stuck.

Substituted reasonable values for things we didn't know.

Determined a way to calculate the answer dependent on easily looked up information.

Speaking of Estimation

Lets play a carnival game.

No, you can't have the answer yet.

Pint is 33.5 cubic inches

starburst is roughly .5"x.5"x.25"

Best theoretical fit: 515 Candies

That seems a little high???

No, you can't have the answer yet . ll

Lets treat it like a cylinder,

(remember high school geometry?)

~ 7 candies high, ~1.5 candy radius,pi = ~3

~47 candies?

or a rectangle ~2x~3x~7 = ~41

But our theoretical fit was 515 so we're probably shade low even with pretty loose packing.

The Big Reveal

67 Candies

we were off low by 50%

What did we do?

Established a minimum and maximum values.

We used what we knew to make reasonable estimates.

We averaged together a couple of estimations to get a more accurate number and establish confidence.

Tired Yet?

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Lets summarize.

Eliminate impossibilities.

Take stock of what you know.

Use outside knowledge.

Look at small examples.

Change the scale.

Find a small pattern and build on it.

Start somewhere!

Use reasonable approximations for unknowns.

List the minimum/maximums (look for constraints).

Use good estimates as a starting point.

Make a visualization.

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But what does it mean?

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Use The Internets

You can find dozens of problems like this online for free, with solutions. Try them yourself first, then read the answer.

Other useful tips, play the "dual n-back game" it's been shown in studies to improve working memory.

Every new technique you learn adds something to your mental toolbox, when you're stuck, try running through your tools collection, something might just stick out.

Smartphones are great for looking up formula, etc

Last Minute Tips

Buy a whiteboard (or two). Sometimes the trick is writing down everything you know.

Wolfram Alpha (http://www.wolframalpha.com/) can do all kinds of math for you, for free.

Thanks!

Details

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Slides will be available at

infiniyinyourhands.net

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