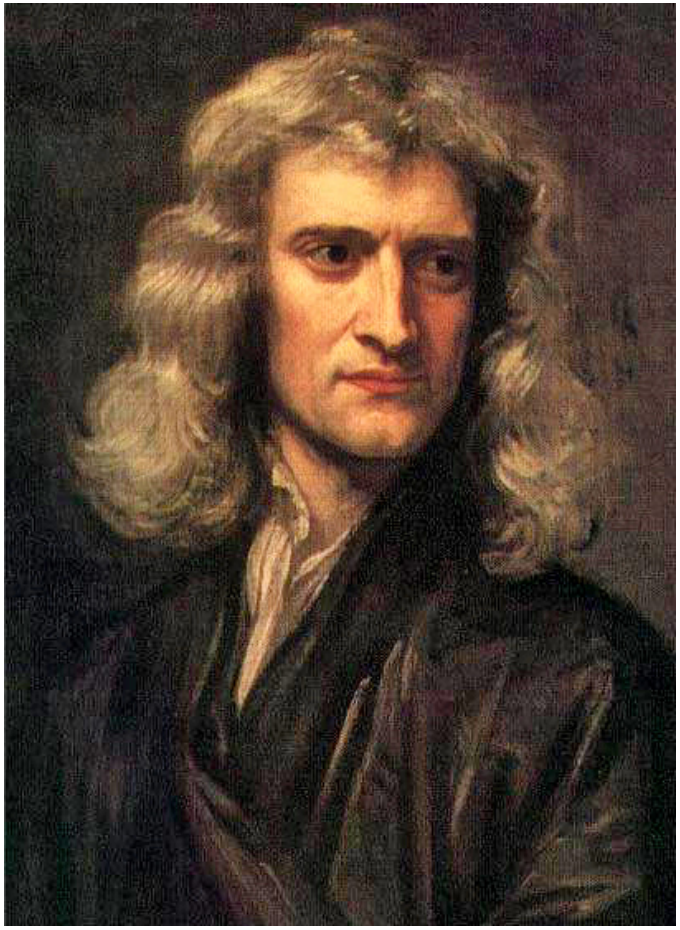
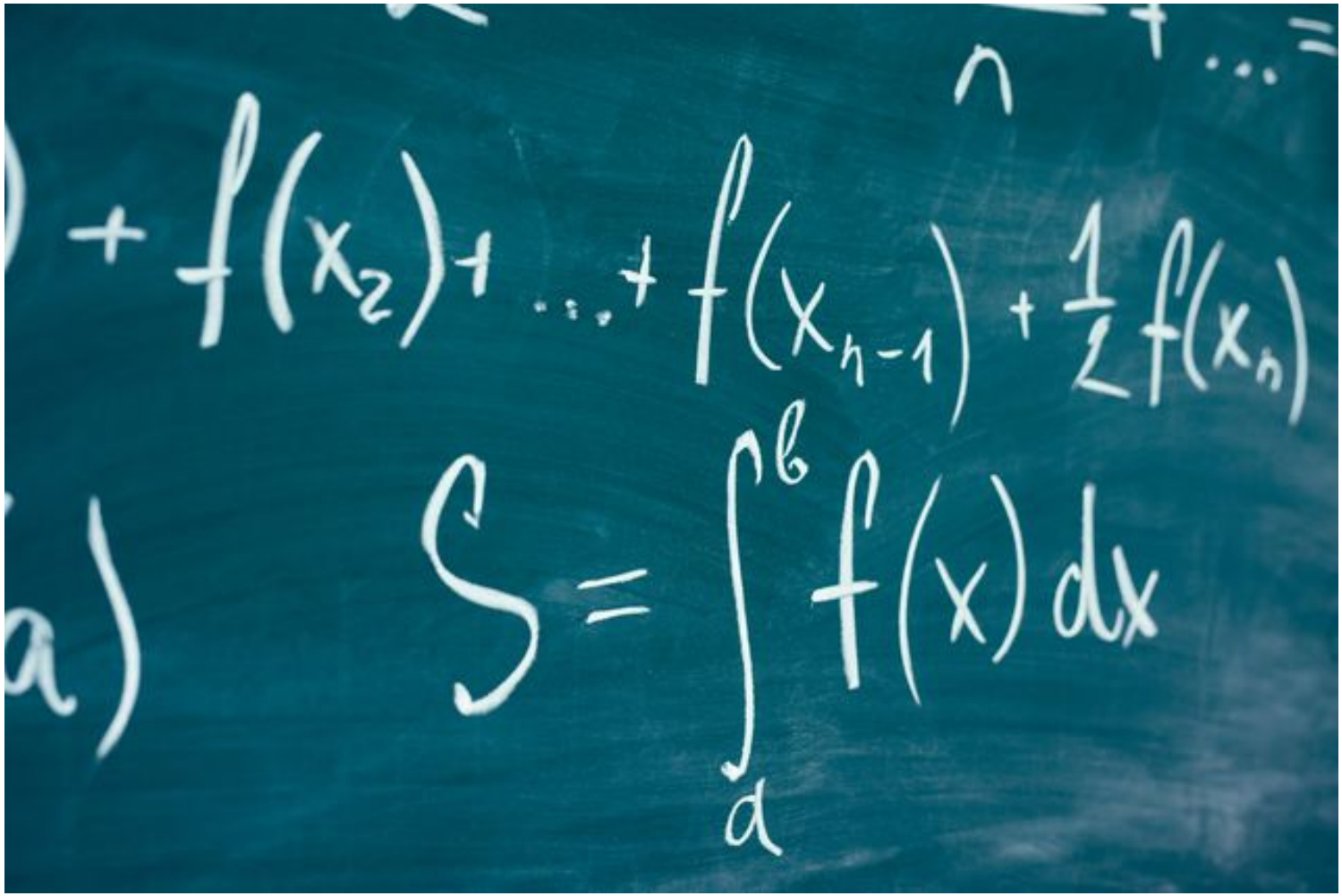

BREATHING NEW
WHITE*
INTO
AGE-YELLOWED
BRICKS
Brian Hirt
LOLUG / GtwLUG

Isaac Newton sez...

"If I have seen further (than others), it is by standing on the shoulders of giants."



“It was my understanding there would be no math...”



On the shoulders of John Tooker (and others)

jtooker

HOME ANDROID BLOG MY RESUME LEGO PAGE

Last Modified October 26, 2014

Search

LEGO Whitening

My biggest complaint about LEGOs in terms of quality was that older pieces, especially white ones, would yellow over time, especially in direct sunlight.

LEGO Whitening - Photo courtesy of Eggy Pop

The yellowing is due to a chemical process, which can be reversed using hydrogen peroxide (H_2O_2)and Oxy-clean.

View my Android Applications

Pitch (Card Game)
Retro Football
Engineering Calculator

Tip Jar

Tip with Bitcoin at:
1LxZq4eHEpoPkYUAshcVcSf7ueksSo51ny

You are the 13th visitor today
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How to keep those Lego bricks brilliant white

Michael Schulte

10/27/14 2:12pm • Filed to: LEGO

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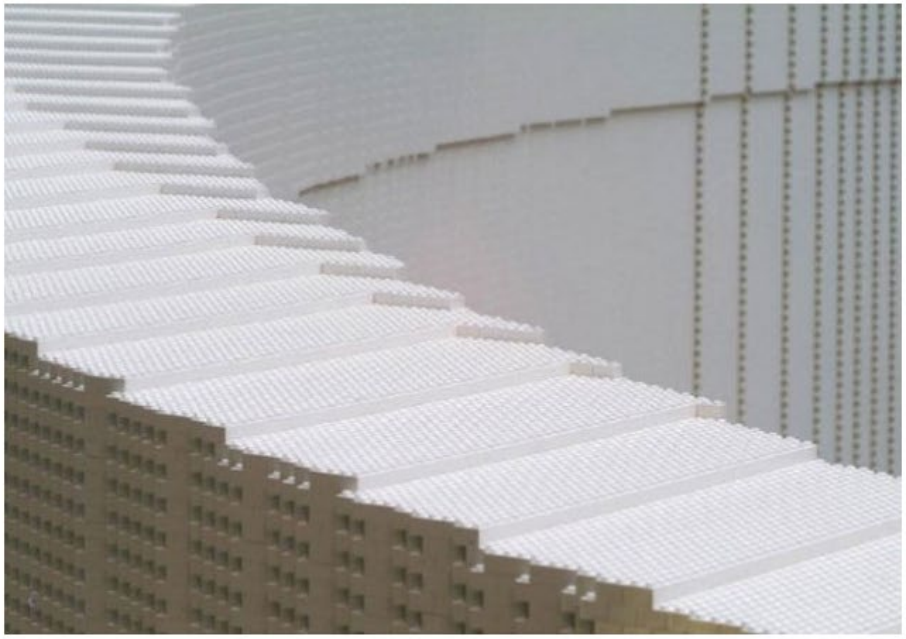


John Tooker has put up an excellent guide to taking care of the yellowing of your white Lego brick utilizing hydrogen peroxide and a dash of the ever famous Oxy-clean. It is a problem that has plagued Lego modelers and old computer equipment collectors for decades, over time and with light exposure, this stuff starts looking gross.

Sincerest Thanks!

To friends who donated age-yellowed tiles for my experiments

- Justin Chrisp
- Dale Johnson
- Rita Livengood
- Denise Wally

Gotta crack a few eggs to make an omelet...

So what's going on?

Bromine is going on.

- From the Greek word *bromos* meaning stench
- Elemental state
  - Brown liquid
  - Corrosive to human tissue
  - Offgasses toxic vapor
  - Unstable (forms compounds easily)
- Compounds
  - Bromides and bromine oxides
  - Can be colorless and nontoxic

LEGO adds a bromine compound to ABS plastic as a fire retardant*

The good news...

– Keeps consumers safe

The bad news...

- Ultraviolet (UV) light, typically UV in sunlight, breaks down the compound and frees the bromine atoms.
- These stay trapped on the surface of the ABS plastic.
- This happens in all bricks but is less noticeable in darker colors

More good news, though...

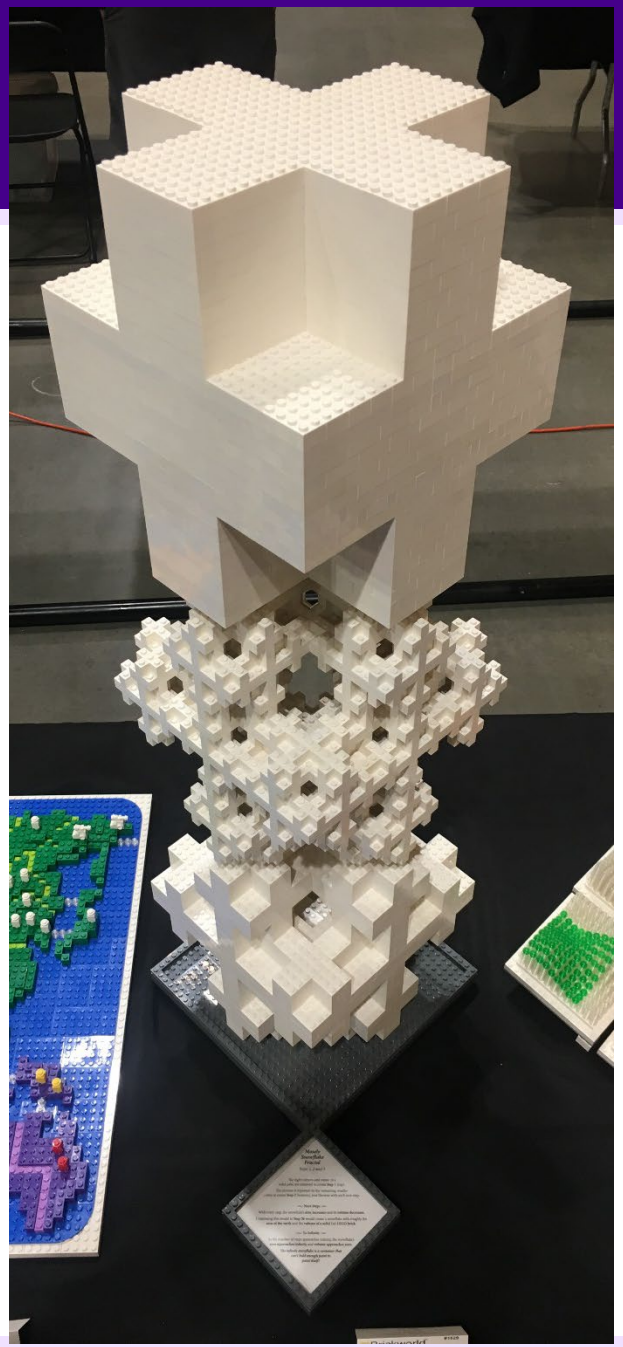
- The chemical reaction is reversible
  - UV light (the original culprit!) speeds the reverse reaction between the free bromine and oxygen (from the hydrogen peroxide, H_2O_2, solution)
- https://www.eurobricks.com/forum/index.php?/forums/topic/7167-brick-de-yellowing-techniques/&page=8

Whitening technique
The Internet agrees!

- Start with white LEGO bricks
  - [or light grey/bley bricks]
  - [or blue bricks]
- and submerge in 3% H_2O_2
  - [or 35% H_2O_2]
- [Also add OxiClean detergent]
- [and also add heat]
- Let sit for 6 hours
  - [or 24 hours]
  - [or 7 days]
- in sunlight
  - [or ambient indoor light]
  - [or under an LED UV light]
- WHEW!

First try...

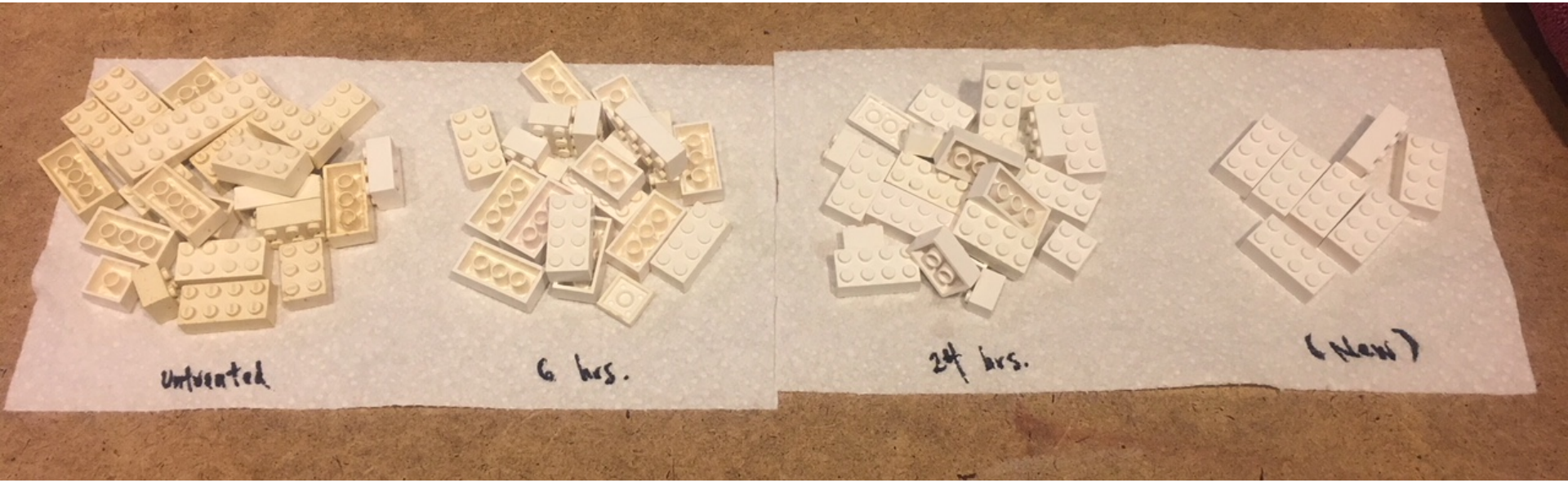
- Not an experiment – just tried one configuration
  - Submerged parts in 3% H_2O_2 in an open plastic tub
  - Variable sunlight outdoors for around 1 week, stirred occasionally
  - Worked OK
  - Didn’t document with pictures, but many bricks appear in this MOC



Second try...

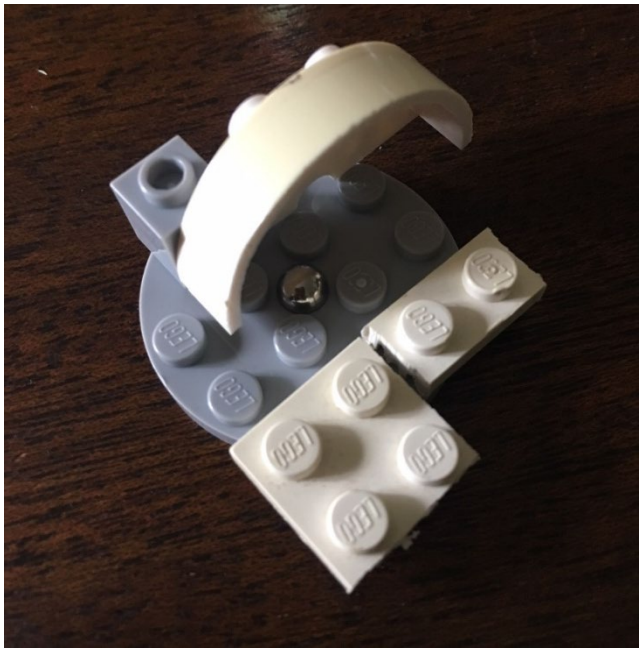
- Experiment
- Constants
  - Solution: 3% H_2O_2 + OxiClean
  - Light: LED UV
- Variable: Time periods
  - Photographed after 0 hours
  - Photographed after 6 hours
  - Photographed after 24 hours

Sort of fudged it...



Third try…

- Constants
  - Cut apart LEGO bricks (less fudge)
  - Oriented straight at UV light source (even less fudge)

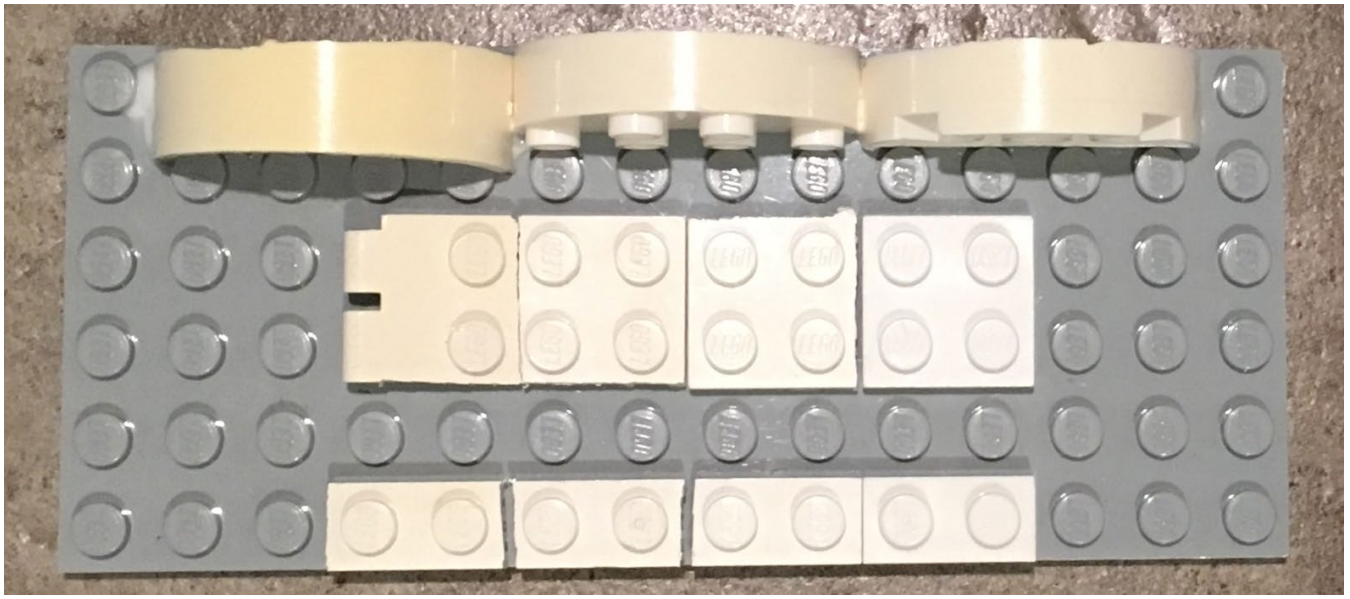


Third try…

- LED UV light at 6 inches (fudge free!?)

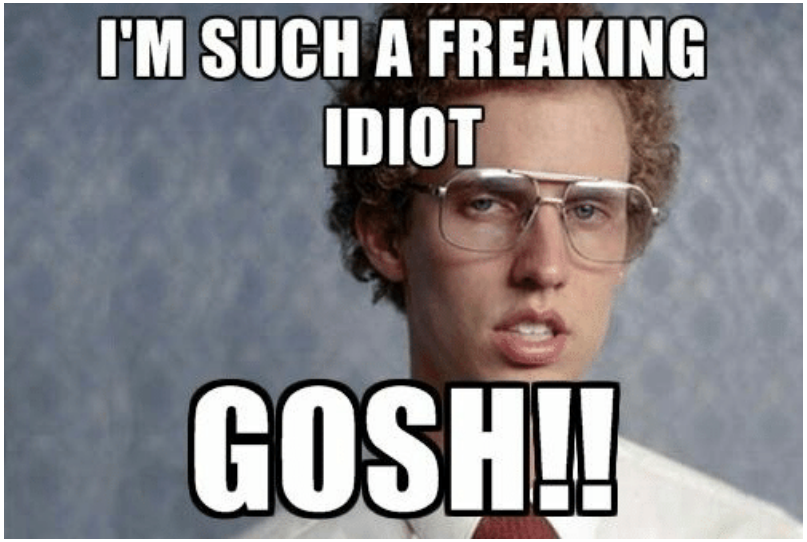
Third try…

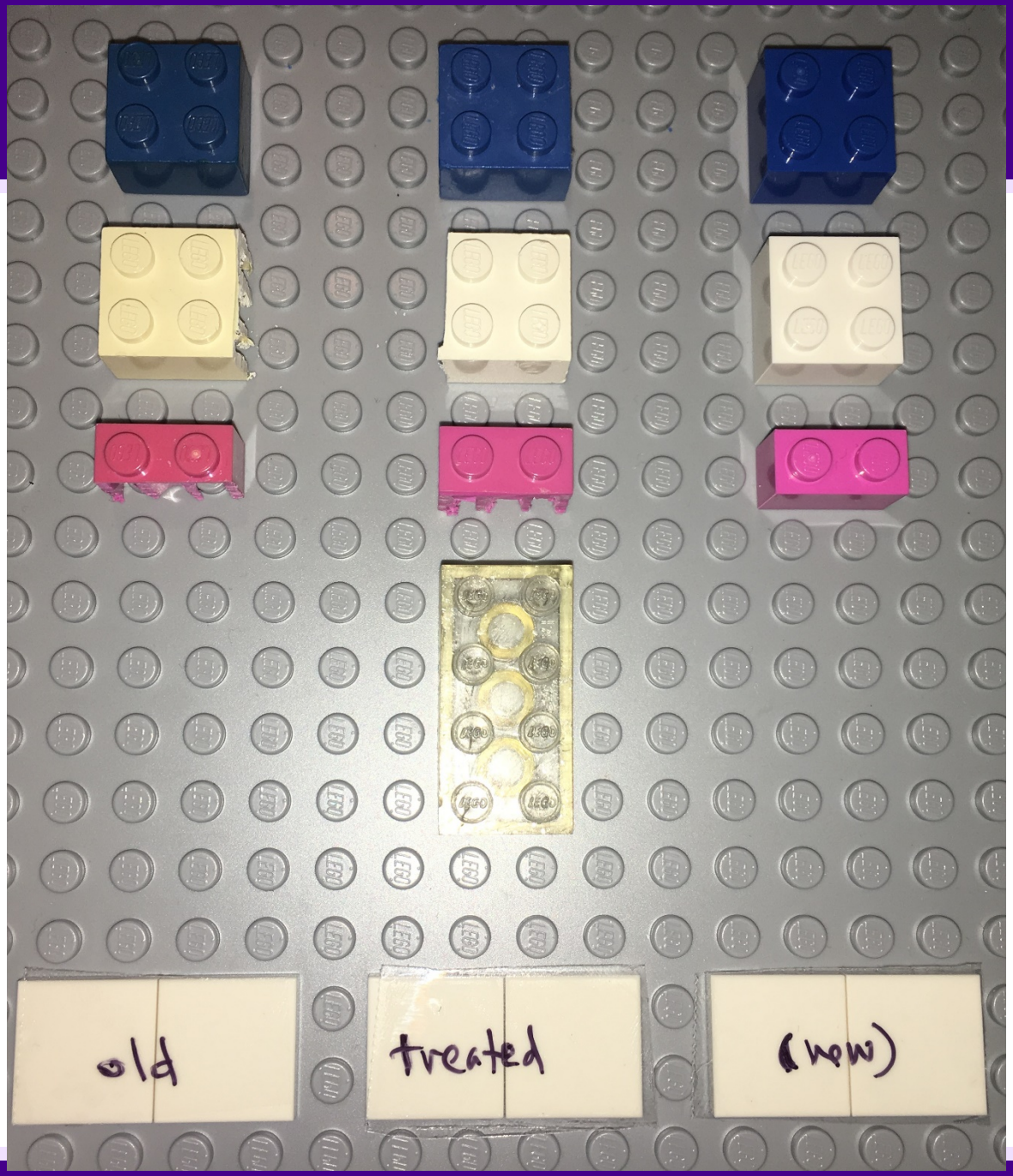
- Variable: Solution
  - None
  - 3% H_2O_2
  - 3% H_2O_2 + OxiClean detergent



Does it work with colored bricks?

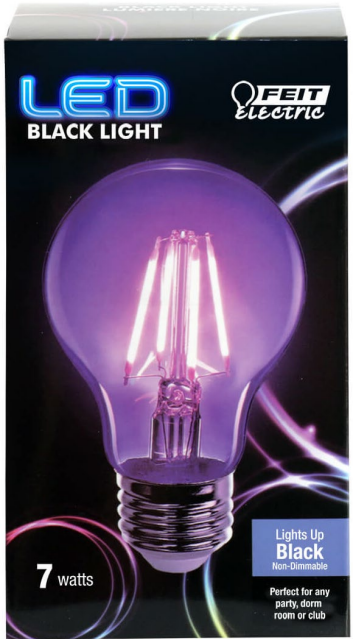
- Tested with Dark Pink and Blue bricks
- But first, why not Light Bley?



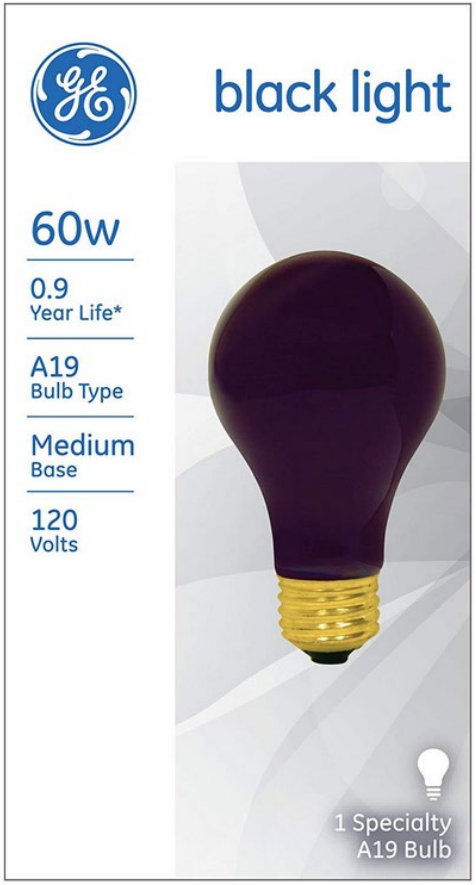

old
treated
(now)

Do all UV lights work the same?

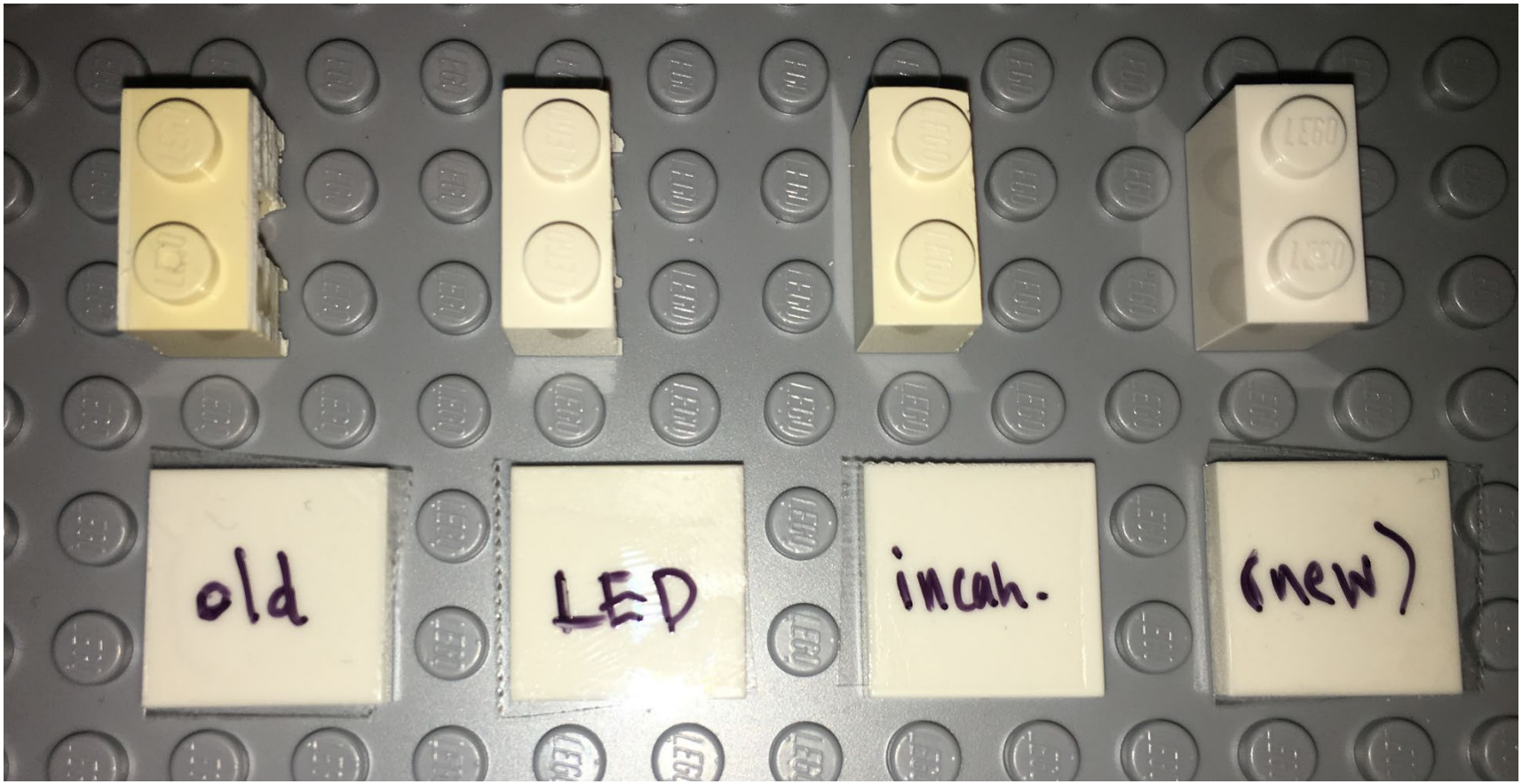
- Tested with LED versus Incandescent



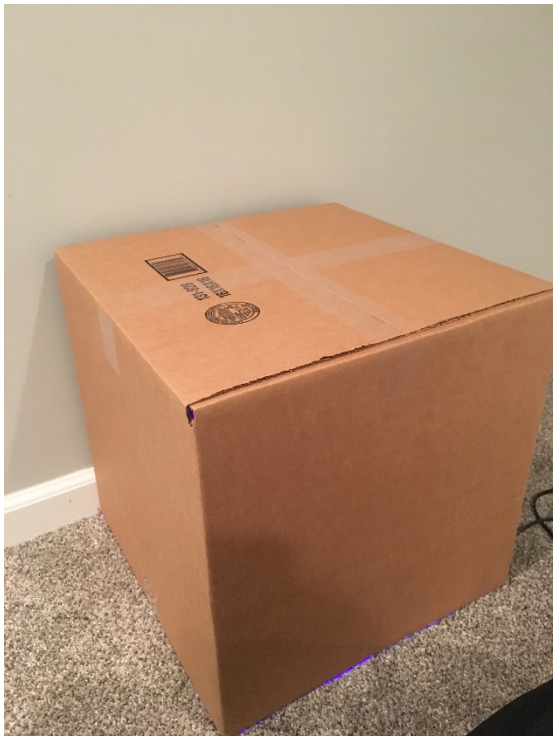
versus



LED vs. Incandescent



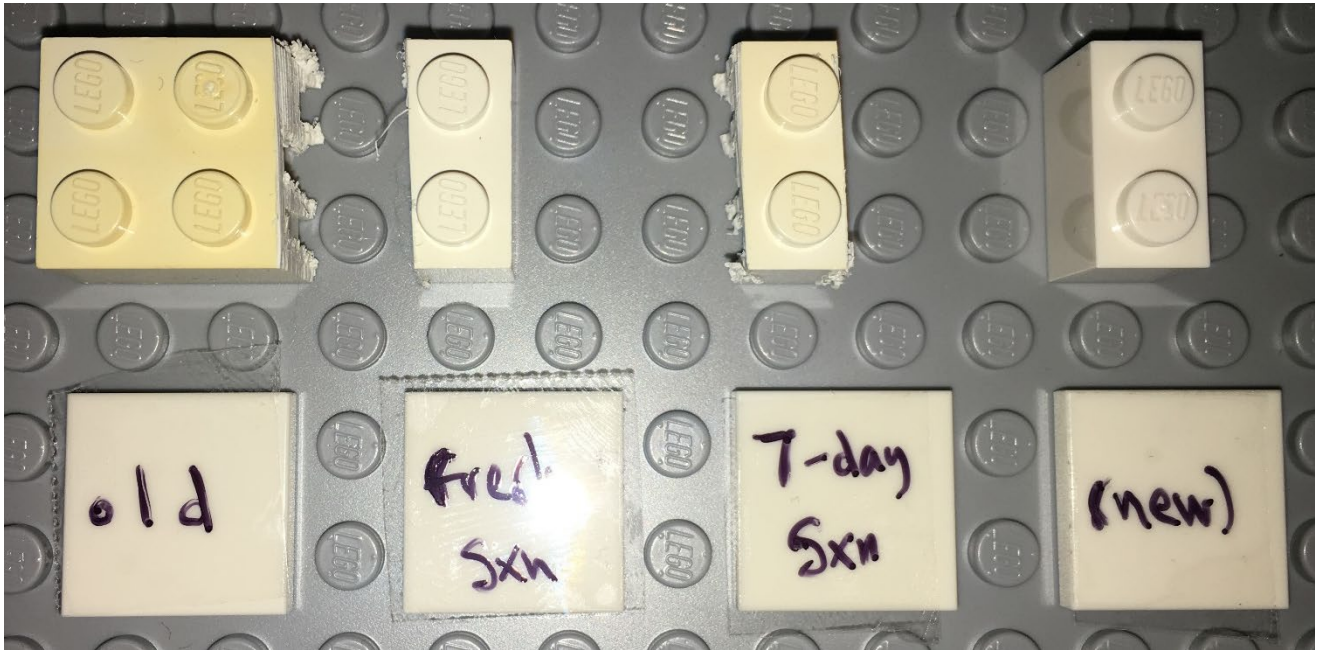
And a word about heat...



VERY HOT with an incandescent!

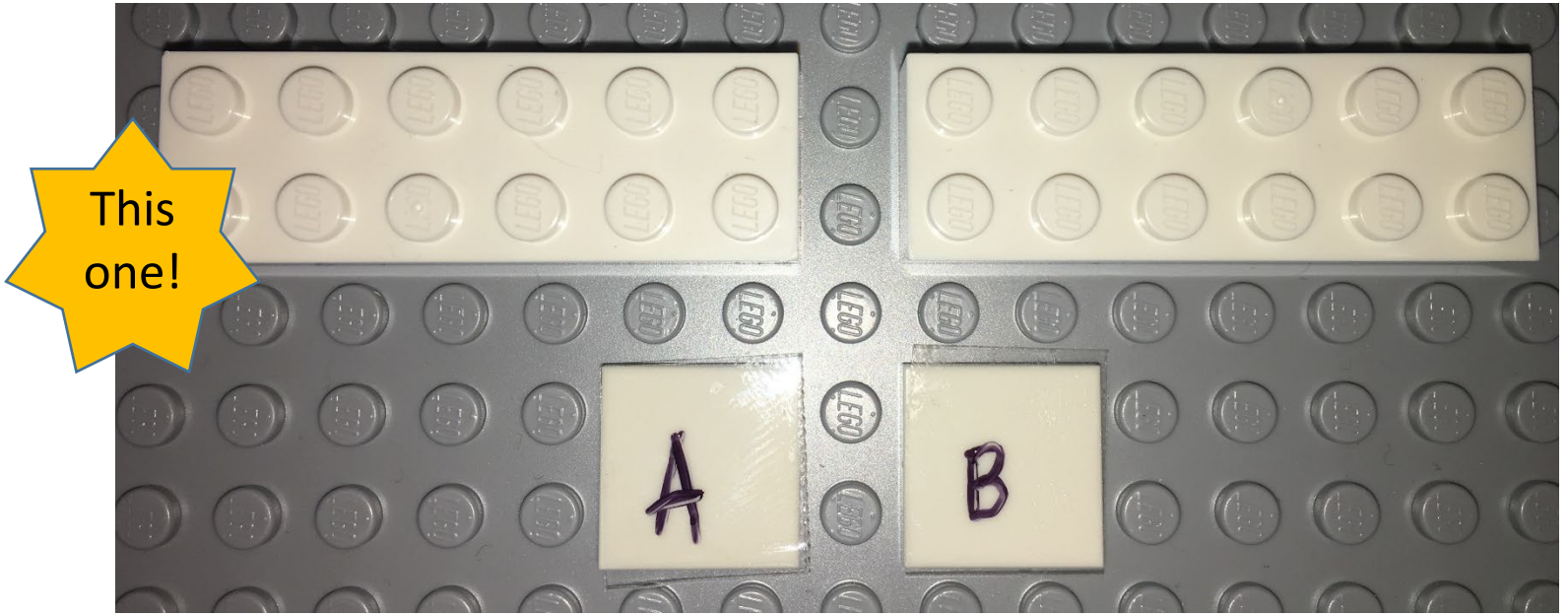
Does old hydrogren peroxide still work?

- Myth versus fact on H_2O_2 decomposition
- Tested with fresh versus 7-day-old solutions



Will your other bricks get ruined...

- Eventually, but not that quickly
- One of these brick was exposed for 7 days straight...



One AFOL's opinion on a good method (maybe the "right" one)

- **White bricks** for sure. YMMV with other colors
- **3% H_2O_2**
  - Use precautions around eyes.
  - Seriously.
  - 35% is both dangerous/unnecessary
- **Add OxiClean** (or similar)
  - Not more than ~1 tsp. per 32 oz. bottle of H_2O_2
  - Make sure it dissolves
  - Newer Oxiclean has a surface foam – doesn't seem to matter

One AFOL's opinion on a good method (continued)

- **Submerge bricks**
- **Keep uncovered**
  - Lid may filter out UV
- Expose to LED UV light for **12 to 48 hours**
  - Stir occasionally if orientation is not fixed
- **Protect your other bricks** from UV
  - (Out of principle.... I guess)
- **Wash and dry** thoroughly afterward

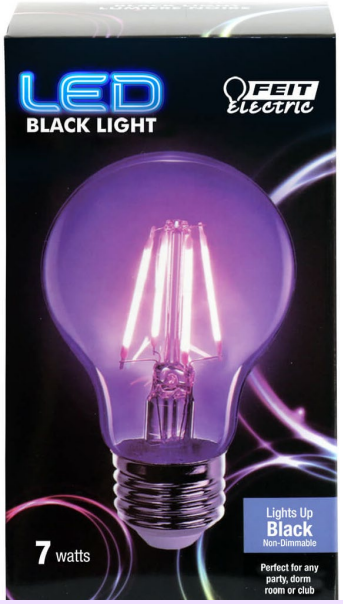
Materials

First aid aisle

Hardware store

With the laundry detergents

Ace Hardware or https://www.amazon.com/Electric-A19-BLB-LED-Non-Dimmable/dp/B0787DCR5N



More Q's, and maybe A's

- Does heat make a difference?
  - Likely not
  - Can deform bricks
- Does UVA versus UVB make a difference
  - Beyond my capacity to test

More Q's, and maybe A's

- Does this make bricks more brittle?
  - Trans, made of polycarbonate instead of ABS, heckyeah!

- Possibly also more "grippy"

More Q's, and maybe A's

- Wait, do you even know what you're talking about
  - Possibly not
  - Youtube video "Restoring a Pair of Junk DualShock 2 Controllers"
  - https://www.youtube.com/watch?v=1y8KIjjAtFc

The two big questions...

- Do newer bricks still turn yellow?
  - Yes! 😣
- Can you repeat the process when bricks re-yellow?
  - Yes! 😊

Your questions...?

- Thanks!!!