

Engineering Design

(using popsicle sticks)

The goal in the following challenges/puzzles is to create a new 'design/structure' by **moving** (changing the location) a specific number of popsicle sticks OR **removing** (taking completely away!) a specific number of popsicle sticks so that the new structure satisfies the challenge.

The challenges start fairly easy, and get more difficult as you solve each challenge. (Notice that the first challenge has you dealing with 4 popsicle sticks, then 3 sticks, then 2 sticks for a few challenges until finally..., the 'hardest' challenge requires that you move ONLY 1 popsicle stick!!!)

Read the instructions carefully as each challenge may require you to do something COMPLETELY DIFFERENT from the previous challenge.

*** For the challenges that involve squares, each popsicle stick cannot be by itself, in other words... **EVERY POPSICLE STICK MUST BE A SIDE OF A SQUARE!!!**

*** The very last two challenges are MUCH harder than the earlier ones, but they can be solved! 😊

Have an open mind and have fun solving these challenges!

For starters: How many popsicle sticks do you need to make 2 squares that are both the same size?

Hint: You CANNOT break any of the popsicle sticks!!!

Engineering-Design with Popsicle Sticks

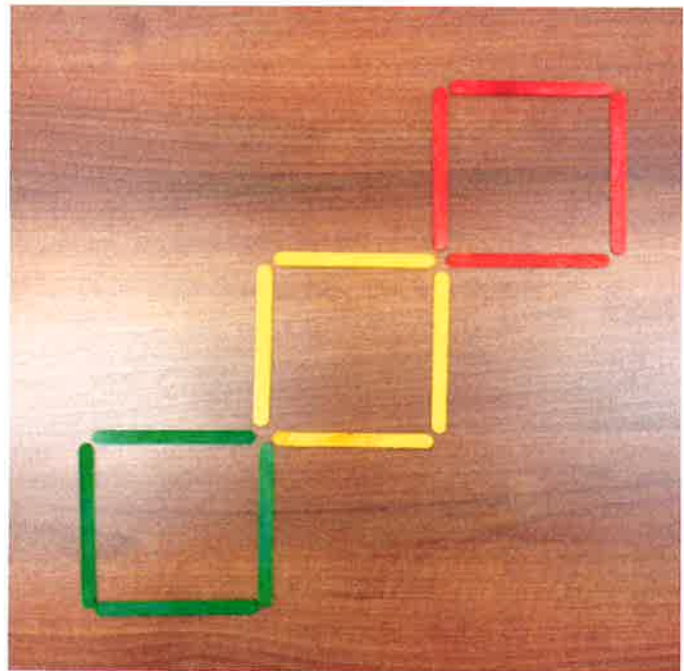
MOVING 4 sticks: (An easy challenge to start with...)

Uh-oh, we have a 3 bedroom condo/apartment and we need to add another bedroom (square) that is the same size as the other 3 bedrooms (squares) but we cannot use any extra materials. (That means we can ONLY use the 12 sticks provided!)

Arrange your 12 Popsicle sticks exactly as they appear in the picture to the right >>>

Make sure you have a yellow square in the middle, a green square on the bottom and a red square on the top.

Notice that the squares are NOT sitting directly on top of each other!



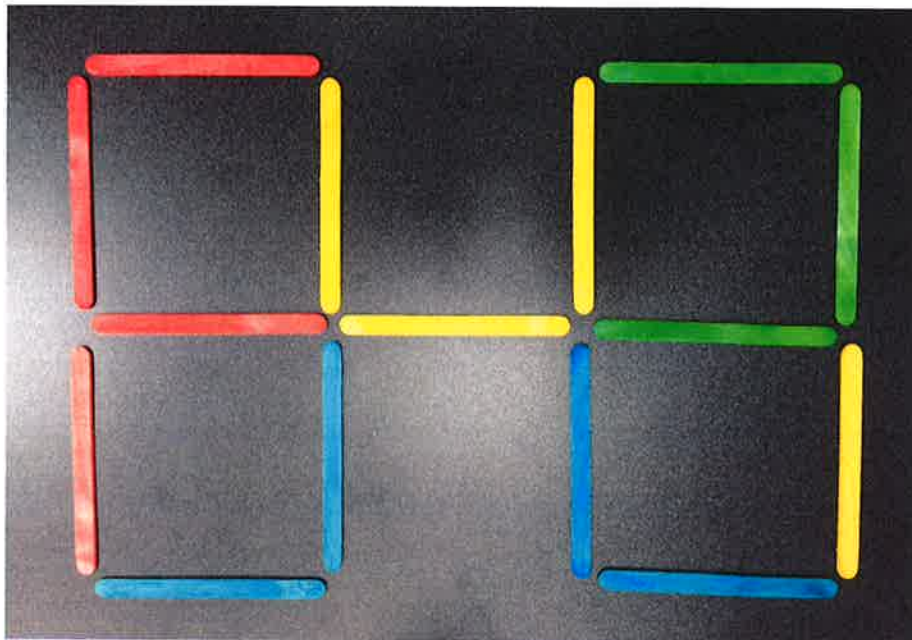
To do: Move **ONLY four (4)** Popsicle sticks, to end up with a FOUR square (room) 'condo'. All the squares (rooms) have to be the same size and every Popsicle stick should be part of a square (room)!!!

Engineering-Design with Popsicle Sticks

MOVING 2 sticks:

Try to add another bedroom (square) the same size as the existing 4 bedrooms (squares) by moving **ONLY 2** Popsicle sticks. You must **move** the 2 sticks to different locations and they cannot be stacked on top of another stick **AND** there cannot be any stick (s) poking out like a wall.

Arrange your Popsicle sticks **exactly** like the picture below. (Notice that you are using ONLY 15 sticks)



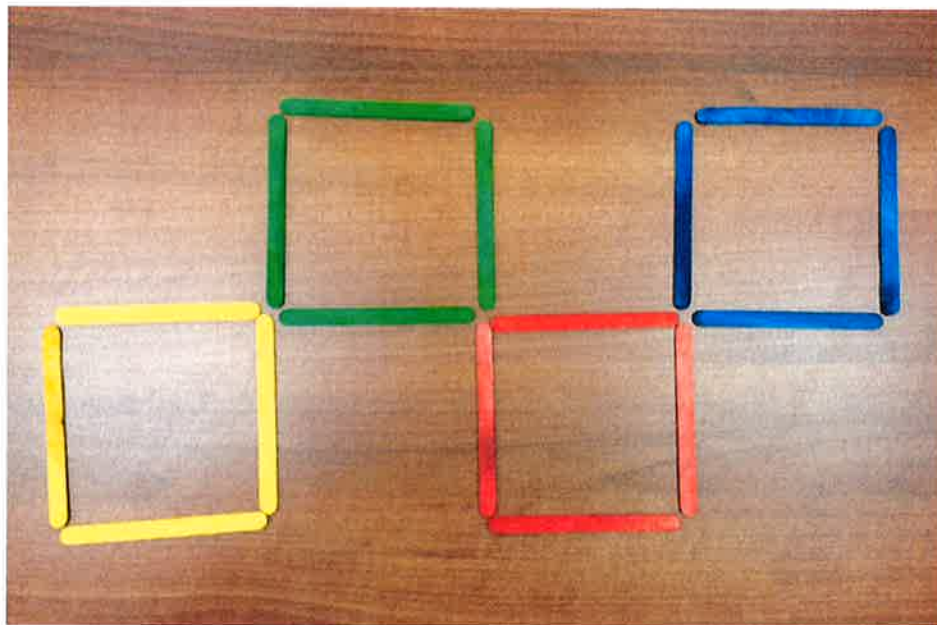
To do: **Move ONLY 2 sticks** so that you end up with a total of FIVE (5) squares.

Engineering-Design with Popsicle Sticks

MOVING 2 sticks: (very challenging!)

Try to add another bedroom (square) the same size as the existing 4 bedrooms (squares) by moving ONLY 2 Popsicle sticks. You must move the 2 sticks to different locations. *For the record, a little old lady from Baton Rouge solved this problem in less than 20 seconds and said: "I just moved the ones I thought needed to be moved!"*

Arrange your Popsicle sticks so they look like the picture below. You should have a yellow square on the left, followed by a green square, then a red square and finally a blue square is on the right side. Now check to make sure the green and blue squares are above the yellow and red squares. *But NOT sitting directly above them!*



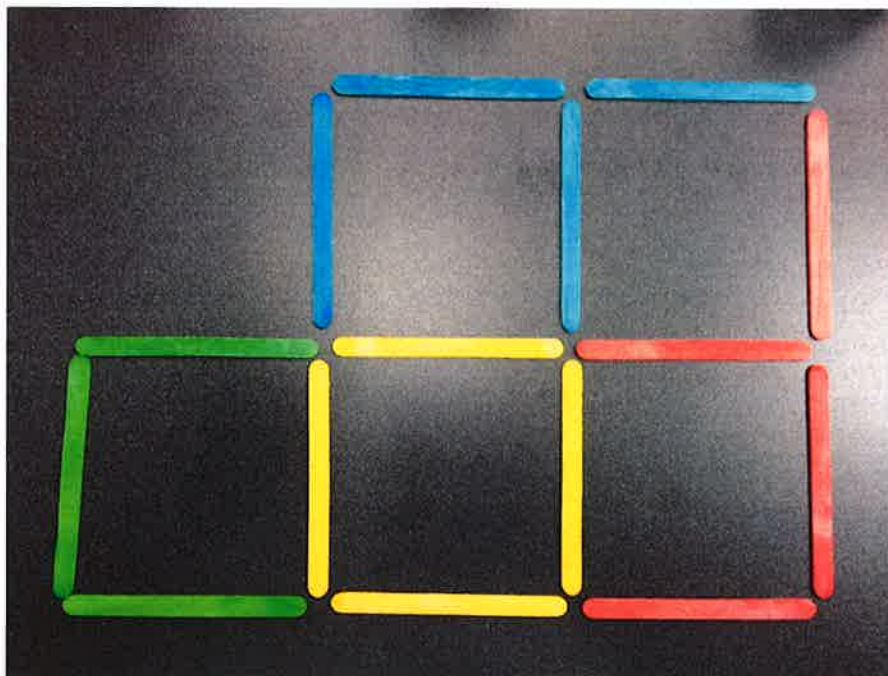
To do: Move only 2 sticks so you end up with 5 squares that are all the same size!

Engineering-Design with Popsicle Sticks

REMOVING 3 sticks: (Think outside the box for this one!)

Remove 3 Popsicle sticks so that you end up with just THREE squares that are the SAME size!

Arrange the **15** Popsicle sticks so they look similar to the picture below:



To do: **REMOVE 3** Popsicle sticks so that you end up with just THREE (3) squares! (All the squares should be the same size and each Popsicle stick MUST be part of a square!)

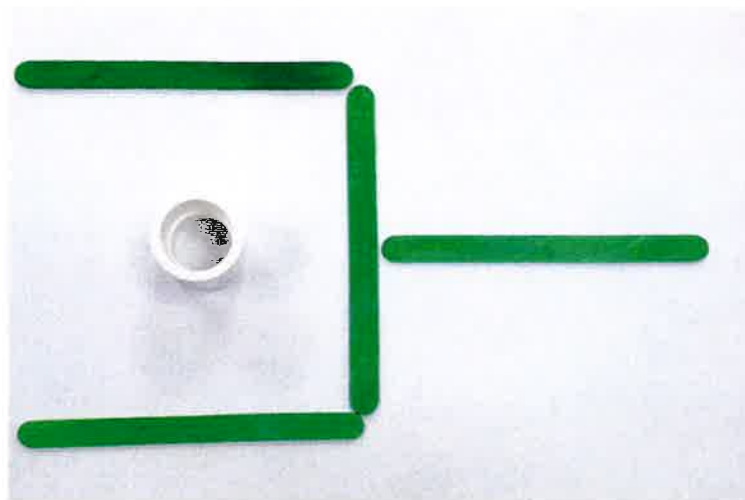
Engineering-Design with Popsicle Sticks

Moving just 2 sticks: (This can be quite a challenge!)

A very big **Thank You** to Nick (a regular Science Saturday visitor) for showing this to LIGO-SEC!

Some contractors did NOT follow directions and mistakenly put the 'water fountain' inside the walls of the building in the picture below. Can you move **just two sticks** (walls) so that the 'water fountain' will be located **outside** the walls of the building? (This might turn out harder than it seems...)

Arrange your Popsicle/craft sticks so they look similar to the picture below:



To do: **Move ONLY TWO** Popsicle/craft sticks so that the 'water fountain' is now located outside the walls of the building. The building must have the same shape!

Hint: The building will not be facing the same direction!

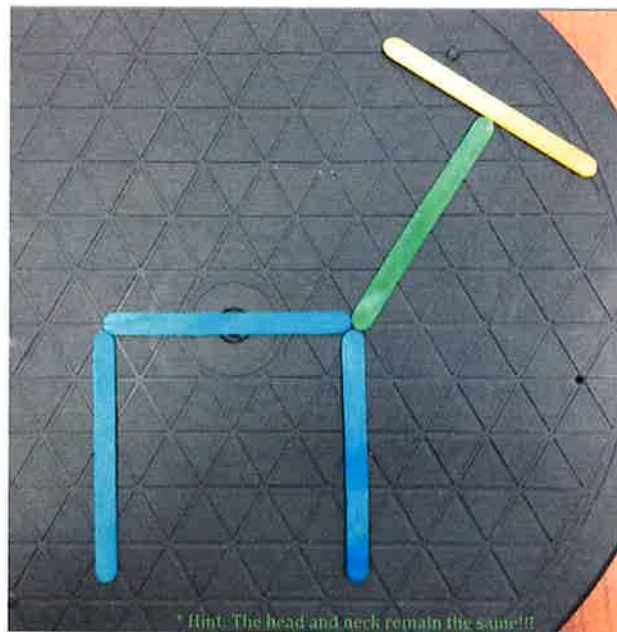
Engineering-Design with Popsicle Sticks

MOVING just 1 stick: (So simple, yet can be so tough...)

Change the direction this lamb is facing by moving the location of JUST (1) Popsicle stick.

Arrange your Popsicle sticks so they look similar to the lamb in the picture below. Look at the picture carefully!!!

Notice that the lamb is facing to the right...



To do: Move ONLY ONE Popsicle stick so that this lamb faces the opposite direction (to the left!).