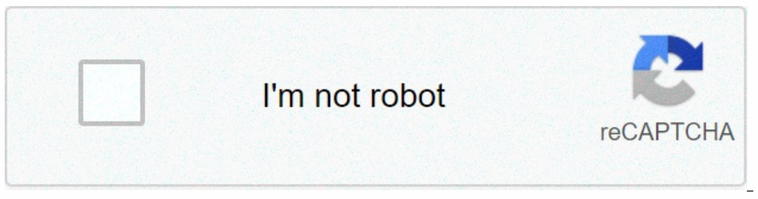

Continue

Popsicle stick tower to hold weight

12th class physical exercise: Given 200 Popsicle sticks, build a tower at least a metre high that can support 10 physics books. The record for this physics course is 18 books, about 72 pounds. Can it be done? Can anyone support over seventy pounds of books with a Popsicle stick structure? You bet, here's how we did it... Any and all projects should start with research: We looked at many websites that try to gain insight and inspiration from other people's past experiences. This work is a common physics class challenge, certainly documented. It was, but not in good, so this page was created to add some details to this documentation; Here's an answer. You can use a limited set of resources to create something that is amazing??? We visited many websites and saw a short boxy design on one that could be customized to suit our needs (which were for a much larger tower). The details were missing, but the basic box of sticks was visible. We also saw an educational TV show about Comstock Lode (a major silver mine) and a German mining engineer who developed square sets that allowed miners to extract the ore while preventing the collapse of the mine. We are referring to another source of information.... Philipp Deidesheimer was a graduate of the Freiberg School of Mines, the world's largest institute of mining technology, a science that Americans were just beginning to understand. He practiced his profession in California for several years. After only weeks in the Comstock areas, it developed a new timber square set system, a deep mining support technique so effective that it opened Comstock to much greater penetration and was implemented immediately across the West and globally. The square sets were large interlocking woods that were added onto a cubic arrangement as the miners dug away at the ore body. That was enough inspiration to get us started. We knew we could make a stable, scalable, interlocking structure that could support huge weight from simple box like shapes. The modular, interconnected approach seemed easier to build and replicate; the most logical approach given to the project. Our design allows each load bearing the vertical radius to be abutted against a horizontal diagonal member. Each language from the above cube fits in a groove in the adjacent cube. This allows him to carry weight without slipping to the side and breaking the joint. Each member of the stack while connecting and each load a lower member with its weight distributed horizontally. This structure prevents twisting and allows stacking by distributing the load from each section in horizontal bundles of the next section. Stick alignment and uniform stick displacement were critical the parts should all have the same measure. Single units are mandatory. Make each unit as square and normal as possible. Ever since we were dealing with wood, we've used What's the matter with you? Elmer's wood ® from Borden®. Others in the category used sticky glue and hot glue with less success; Use the right glue for the job! Each foot must be 10 sticks high (yielding 1.05 meters total height for our tower) To capture twist torsion, cross straps are necessary, even sturdy feet can collapse due to twisting. Most towers we see have cross reinforcement, so this is a well-known and recognized method of solving the problem of shear twisting under vertical pressure. Learn from what has happened before you. Read the instructions for the glue. Follow them. He says to tighten in place until it dries; we did this with weights (rocks) when building flat modules and with clothing pins when assembling modules in a tower. Attention to the basic principles ensures the success of the final project. Some contests limit the amount of glue, it didn't, so glue was applied generously; many times for each audience. Plenty of glue ensured that the sticks would be butchered before a joint came undoing. Instead of measuring things, we decided to use a standard 1 PSWU (Popsicle stick width unit) to align the sticks. This provided a consistent measure for sticking the guidelines and stick placement. Give yourself plenty of time; start working on the award as soon as possible. If things go wrong, you can still adapt and change the design. Glue takes a long time to dry. Depending on your work area, perhaps only a few modules can be under construction at a time. You also want a day or so for the final gluing to heal completely. We got better and better at making the boxes as we gained experience. This means that some of our previous boxes were less expensive... If we had unlimited Popsicle sticks some of the first boxes would have been reconstructed. Process Square. Each glued compound is a Popsicle stick width from the edge of the stick. To align the sticks and ensure the square we used several rock slabs that I had in my collection (I am a geologist and I have collected numerous examples of building stones), you can use a builder's square or other straight edges for alignment. We set the sticks out two-by-two and glued only the second stick, removing the outside-one before the glue set for our base units. Once the glue dried on this basic square, a cross brace was diagonally placed. We had to make sure that this prop was either in or out. with the module we were building. This becomes clear when you start building (we made some false starts at the beginning). When two squares with opposite cross-irons were glued and dried, we joined them with horizontal steps to form a cube. The first two bottom sticks were glued, weighed, and allowed to dry, then the structure flipped over and two sticks were added to the opposite side of the cube. A cross brace was glued diagonally to these sticks (weighted in place of the allow to dry). A cube is born. There are two interconnected types. an inner stick cube and an outer stick cube. These alternate in the structure of the tower. Sticks bearing load (vertically) rest directly on horizontal rods. The cross supports in the second section were designed to be opposite (opposite) to those in the first section. If the first module can be though as having Z supports, the second module can be seen as having S supports. Our first cube was so poorly aligned and the cross supports were not installed properly for scalability. would not be symmetrically interconnected. We broke the sticks apart before the glue put on it's maximum and recycled these sticks later in the process. Elmer wood glue makes a bond that is stronger than the wood itself, so rescuing a bad module had become better before the glue was fully healed. Care must be taken to avoid busting the sticks instead of the stuck joint (a kitchen knife and gentle persuasion helped). To re-stream: make square frames, join squares into cubes, join cubes in a tower ... Pretty simple, huh? A picture equals a thousand words. Here are a few thousand words.... The basic building unit? each glued compound is a Popsicle stick width from the far end of a stick. Notice that the cross-bracket is at the bottom of this square. There are overs and unders in this building process or internally and externally in the stack. One is glued (under rock weights), basic materials, and the first square sets. Join two final sections to form a frame. Rocks act like clamps to ensure a strong glue on the wooden bond. Modules assembled, tight and dried. assembly tower 8 out of 10 stacked. Clothing pins act as a clamp while joint foot glue creates. Common foot detail. Notice the double sticks, out for the top box, inside for the bottom. Also notice the abundant glue! The weight! A physics book, about 4 pounds each. How many physics books can be stacked in the tower??? The results Our first attempt was 26 physics books. just to make out a classmate's (Manuel) 25 books... That's all right. This tower knocked the best hands down, what else can this tower hold? We quickly run out of books, so the teacher suggested putting the students in it instead. First was Katie (about £105). He noted grit, but the tower stood tall. He then replaced another female student named Cassie (about £110). This tower easily supported its weight. He then replaced another student, (about £150). No problem, this tower can gain more weight than that. Then Mr. Acines; The physics teacher himself. About 200 pounds. The Tower is still without a phase. Then Zach. about 230-240 pounds. He's still standing 30. Eventually we got the biggest person available, a football player nicknamed Big John at £285 sitting on it... The tower is still standing. Erect. John weighs the equivalent of about 71 physics books. We have exceeded the record (18 books) by far. We ran out of time before we found new or inventive ways to destroy the tower... came home intact and we have yet to make it fail or push it past it's weight limit... but we plan to . . . bwa-ha-ha-ha. Conclusion In the end, this plan scored a total of over 712 points out of a possible 100 to test ... far surpassing everyone's original goal and imagination. It created a little school disturbance as other classes in the hallway had to come and see what the fuss was all about. Everyone was stunned. How much weight can a Popsicle stick tower support? We have not yet discovered what it will take to exceed the boundaries of our modular square diagonal structure. Hopefully this page will help guide you in our effort to find the structural limit of glue and simple Popsicle sticks. It has to fail somewhere, we just haven't found that limit yet. Good luck with your work. I hope this page was helpful in overcoming your popsicle stick tower target. Let us know via an email to phillipatphilliphansel.com if this page was a help for you. Created on ... 13 December 2004By Mr Phillip Sand Hansel II and his wonderful son