

HINTS FOR TOWER BUILDING: Dynamics, Scoring

When designing and building a tower keep these principles in mind:

A. **Draw First:** First draw sketches of your tower. Then a **scale drawing** from *several* perspectives to get a basic design and to determine the amount and type of wood you will need. It is *much* easier to draw and redraw a diagram of a tower than to build and rebuild a tower.

B. **Keep your eye on the prize:** The prize is to design the *lightest* tower that will do the job (i.e. support 15,000 grams). The job is not to build the strongest or prettiest tower. (But somehow the best towers are almost always the most beautiful as well).

C. **Keep your other eye on the RULES:** The best, lightest, strongest and most beautiful tower ever built will be *disqualified* if it fails to meet any of the design requirements. **Read the rules**, design (draw) the tower to scale, **read the rules *again*** and redesign the tower again, and **read the rules once *again***.

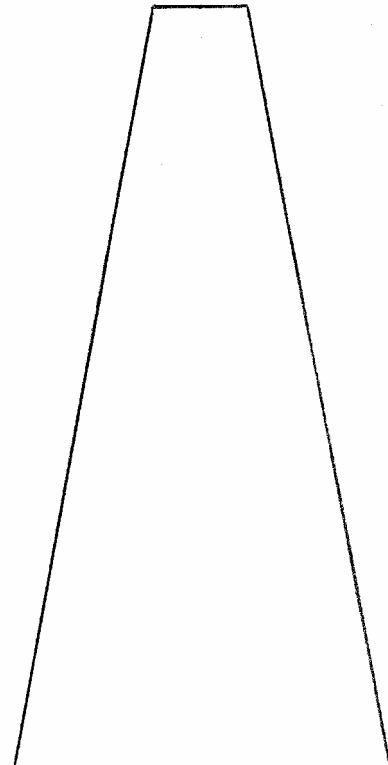
Most restrictive rules:

- 1) must be at least 400 mm tall, even under load
- 2) built only of wood and glue
- 3) glue must be only *between* pieces of wood
- 4) must span a 20 cm x 20 cm square hole in the support base
- 5) must support a block 50 mm x 50 mm x 20 mm at the top and allow for a "loading rod" to run from the top down the center of the tower to the actual load.

You are free to experiment with any type of wood.

D. Dynamics of Towers:

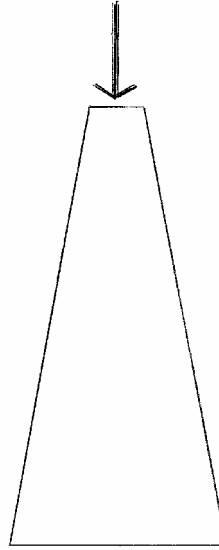
Simplest:



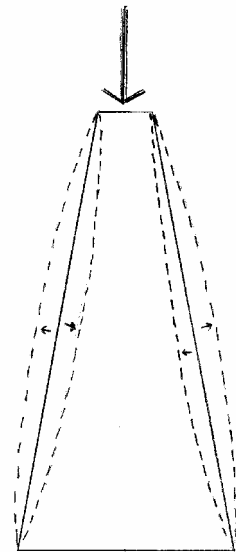
What will happen when force is applied?

Characteristics of wood:

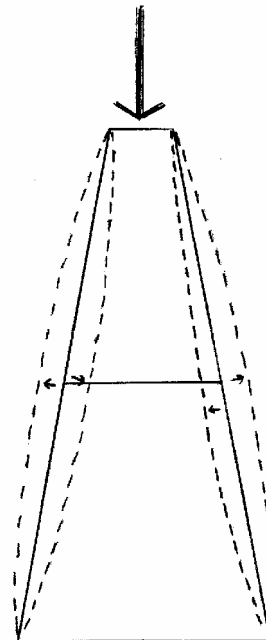
- 1) Very strong in stretching
- 2) Very strong in compression
- 3) Very **weak** in bending!



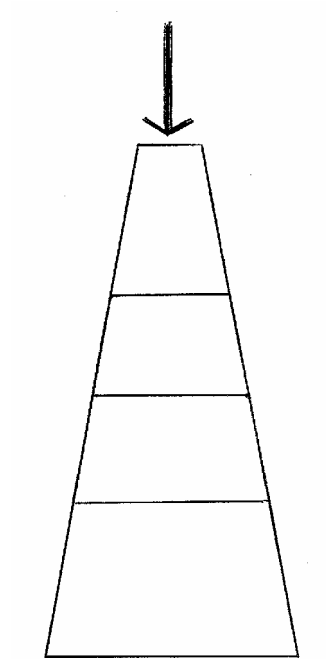
DEATH by BENDING!



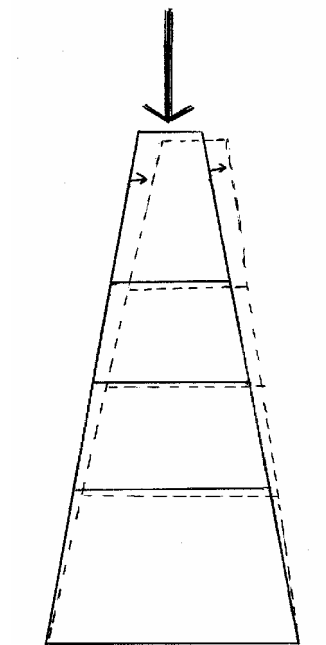
Stop the bending:



But more is needed:

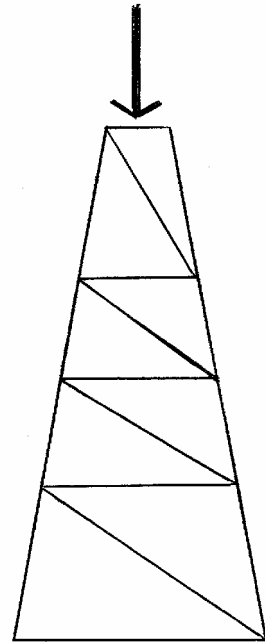


DEATH by TWISTING!

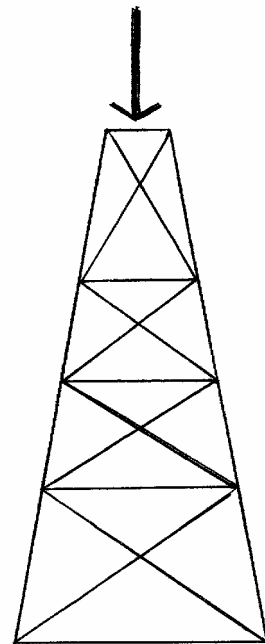


Reinforce (break up) rectangles with
TRIANGLES!

This will not twist to right - but
it is weaker to the left (depending
on the strength of the glueing).



Stronger - but heavier!



E. Scoring

- a) The score will be determined by the structural efficiency equation:
Load supported(gm)/mass of the tower (gm)

It makes ***NO SENSE*** to build a tower that will support more than 15 Kg!
- Must build, test, rebuild, retest, etc., etc.

- b) Towers that do not meet the specifications will place after those that do.