



## Part 1: The Joy of Jenga



Key

Jenga is played with 54 blocks that are stacked in groups of three to form a tower. Players take turns to remove a block from a tower and balance it on top, creating a taller and increasingly unstable structure. If the tower falls during your turn, you lose the game. Each block is three times as long as it is wide, and one fifth as thick as its length.

1. When the tower is first built, it is 27 centimeters tall. What is the thickness/height of each block? What is the length and width of each block?

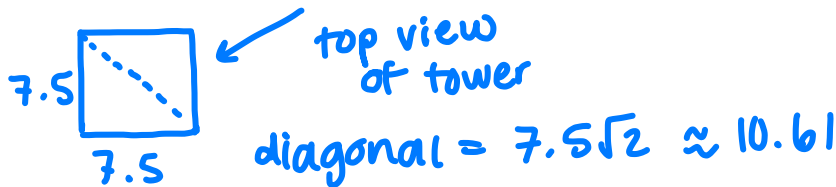
54 blocks makes 18 layers since there are 3 blocks per layer.

$$\frac{27}{18} = 1.5 \text{ cm thickness per block}$$

$$1.5 \times 5 = \text{length} = 7.5 \text{ cm}$$

$$\frac{7.5}{3} = \text{width} = 2.5 \text{ cm}$$

2. Amazon boasts that the Jenga game comes in a "tube-shaped package with a handle for carrying and easy clean up." If the tower stands upright in the container, what are the minimum dimensions of the tube? What is its volume?



This must be the minimum diameter of the case. The height needs to be a bit bigger than 27 cm.



$$V = \pi \left( \frac{10.61}{2} \right)^2 \cdot 27 = 2387.18 \text{ cm}^3$$

3. Do you think this carrying case is the optimal way of storing the tower or is there a case that would use less material? Give a mathematical argument.

A cylinder is not optimal because there's extra space in there so more material is needed than necessary.

less surface area

$$\text{SA of cylinder case} = 2\pi(5.305)^2 + (2\pi(5.305))(27) = 1076.8 \text{ cm}^2$$

A prism w/ dimensions

$$7.5 \times 7.5 \times 27 \text{ has an SA of } 2(7.5)^2 + 4(7.5 \times 27) = 922.5 \text{ cm}^2$$

## Part 2: Jumbo Jenga

You can also buy a jumbo yard-game sized version of Jenga. The length of a jumbo block is 7.5 inches.



### About this item

- ✓ **GIANT SIZE:** Comes with 54 large precision-crafted wood blocks - 7.5" x 7.5" x 1.5" timbers for a full 27" storey / 2.5 ft. tall tower - the HIGHEST in the market!! (Can grow to 27" feet while playing) + Enjoy the free Wood Care Oil along with another small gift that awaits you inside.
- ✓ **PLAY ANYWHERE:** Perfect for indoor or outdoor events such as parties, BBQ's, tailgating, group events, camping and much more. Use a permanent marker to add numbers on each block and write down rules corresponding to each number to add spice to the game or play it as a drinking game.
- ✓ **EASY TO CARRY:** Includes heavy duty, high-quality & high-strength 10 Oz Canvas carry bag for easy storage and transport.
- ✓ **SUPERSIZE YOUR GAME TO SUPERSIZE YOUR FUN!** Gather round your friends to entertain any crowd, or play alone, designed for ages 8 to infinity! Makes for a very interesting and exciting gift. No complicated or awkward trying-to-figure-this-game-out eternity of rules in front of everybody.
- ✓ **UNBEATABLE QUALITY:** Sustainably sourced from kiln dried New Zealand Pinewood. SANDED ROUND EDGES TO PROTECT FROM PAINFUL SPLINTERS \*Costs us more but your safety is our priority\*. NO splitting, cracking, twisting, & warping on blocks. Extra Smooth Finish for great playability. We offer a 30 day, no questions asked, 100% money back guarantee. It's simple! If you don't like it, ship it back and get a refund!

4. Figure out the other dimensions of a jumbo Jenga block. How tall is this tower at the beginning of the game?

7.5" length      width =  $\frac{7.5}{3} = 2.5"$       18 x 1.5 = 27 inches tall to start.  
 thickness/height =  $\frac{7.5}{5} = 1.5"$

5. How many times bigger is this tower than the original Jenga tower?

27 inches vs. 27 cm      The Jumbo tower is 2.54 x as tall.  
 1 inch = 2.54 cm

6. The tower grows as players continue stacking blocks on top. What is the tallest this tower can get? Explain your reasoning.

*Requires making assumptions*  
 It depends on how many rounds are played.  
 Assume a block is taken from each layer → that adds some layers will have 2 blocks removed. Add 3 more layers.  
 9 layers x 1.5 in = 13.5 in  
 27 + 13.5 = 40.5 in

7. If we were to design a case for this game, what would be its minimum volume?

$2387.18 \text{ in}^3$        $7.5 \times 7.5 \times 27$

8. Does the way the blocks are arranged in the case matter? How do you think the manufacturer decides on the dimensions of the case?

*The optimal container minimizes surface area + cost!*  
 It doesn't affect the volume but it does affect the dimensions of the case + thus the surface area. Manufacturers would want to minimize material.