

THE CONSTRUCTION OF THE ARK – PART 1

INTRODUCTION

- For most in the world, the thought of Noah’s ark and a global flood are merely unrealistic myths or fairy tales
- Even those who do believe in a worldwide flood and an actual ark, often have a wrong view of the ark
- The ark is often depicted as a small, cramped boat with giraffe heads sticking out of the top, like some kind of overgrown houseboat
- However, the Bible presents the ark and flood as real history

THE BUILDING OF THE ARK

- The actual account in Genesis of the construction of the ark is quite brief...only vv. 14-16
- The command to build a large boat would have been likely shocking and startling to those living at that time
- The ordinary hydrological cycle that we are familiar with today was not in operation prior to the flood
- Genesis 2:5-6 says that “the Lord God had not sent rain upon the earth” and that “a mist used to rise from the earth and water the whole surface of the ground” in the initial creation
- It is unclear if that system was still in operation 1600 years later at the time of Noah
- Did it rain before the flood? → We cannot know for sure

Yes

- Although there was a “mist” that watered the surface of the ground, the text does not require it to be the only water source after Adam’s creation
- The water cycle (water evaporation, cloud formation, precipitation) likely was in existence prior to the flood because of the presence of the sun and seas (Gen 1:10, 15), both necessary components for the water cycle
- The presence of the rainbow (Gen 9:13) does not imply that God had never set a rainbow in the clouds before but only that, from then on, the rainbow would serve as a reminder of God’s promise to never again send a worldwide Flood

No

- No mention is made of rain on the earth until the flood (Gen 7:4, 12)...the earth could have been sufficiently watered by the mist (Gen 2:6) and rivers (Gen 2:10)...also part of Adam’s responsibility in the garden may have been to provide irrigation to the plants (Gen 2:15)
- The vapor canopy that may have existed prior to the flood would have ruled out rain showers
- The rainbow's appearance to Noah may have been its first occurrence in the sky (Gen 9:13)
- Perhaps the “things not yet seen” in Hebrews 11:7 refers to rain (although it more likely refers to the catastrophic worldwide flood)

Hebrews 11:7 ~ By faith Noah, being warned by God about things not yet seen, in reverence prepared an ark for the salvation of his household...

- Conclusion: All we can be certain of is that God did not send rain on the earth until after He created man

Its Structure

Genesis 6:14 ~ Make for yourself an ark of gopher wood; you shall make the ark with rooms, and shall cover it inside and out with pitch.

- Noah was to build an “ark” – this is the same word used for the much smaller vessel in which Moses’ parents placed him when he was a baby

Exodus 2:3 ~ But when she could hide him no longer, she got him a wicker **basket** and covered it over with tar and pitch. Then she put the child into it and set it among the reeds by the bank of the Nile.

- The word “ark” (*tebah*) seems to be derived from an Egyptian word meaning “box” or “chest”
- It would make sense that Moses would use an Egyptian-based word since he would have been fluent in Egyptian
- Hence, he chose that word to describe both the box he was placed in as a baby and the ark he was to build
- Although the ark was not in view when God announced the 120-year grace period in Gen 6:3, it is likely that Noah had about a century to construct it
- He also probably had help in constructing it...certainly from his sons...and possibly from others
- We know that only 8 people were saved by being on the ark

Genesis 7:13 ~ On the very same day Noah and Shem and Ham and Japheth, the sons of Noah, and Noah’s wife and the three wives of his sons with them, entered the ark,

1 Peter 3:20 ~ who once were disobedient, when the patience of God kept waiting in the days of Noah, during the construction of the ark, in which a few, that is, eight persons, were brought safely through the water.

- But we don’t know exactly how many people were involved in building it
- It is possible that Noah had help from extended family members, like Methuselah or Lamech
- Another possibility is that Noah hired people to help him build it
- Although we can’t be dogmatic about this, it is very possible that more than 8 people were involved in the construction of the ark
- “However, nothing indicates that they could not – or that they did not – build the Ark themselves in the time allotted. The physical strength and mental processes of men in Noah’s day was at least as great (quite likely, even superior) to our own. They certainly would have had efficient means for harvesting and cutting timber, as well as for shaping, transporting, and erecting the massive beams and boards required.”¹
- Additionally, bronze and steel technology had been around for generations ever since Tubal-Cain began working with bronze and iron (Gen 4:22)
- And with such long life-spans, technology could rapidly increase in the 1,656 years from Adam to the Flood



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¹ Ken Ham, *The New Answers Book 1*, 126.

² <https://answersingenesis.org/noahs-ark/how-many-people-built-the-ark/>

- Much technology would have been available to Noah in the building of the ark
- “*Permitted materials and hardware: (Technology of ancient civilizations) Wood: Accurately sawn to fixed sectional dimensions. An up/down saw driven by flowing water or animal draft power, for instance. Sawing is a key technology. Metals: bronze and iron (cast and/or hand forged). Ceramics: fired and glazed pots, oil lamps, stoneware, small glass panes. Other: leather, bone, animal, and resin glues. Fasteners: wooden pegs, metal rods, spikes, and straps. Basic processing/cooking/distilling of pitch/glues. Hand tools in bronze and iron: Drilling auger or spade bit, hand saws, axes, chisels. Measurement: basic surveying, water levels. Lifting and carrying devices: cranes, winches, wheels, rollers, rope, and pulleys. Special long lead-time methods: Planting and harvesting old-growth trees, training trees into shapes (arborsculpture), breeding and training of animals.*”³
- Noah was to make it out of “gopher wood” (not related to the animal)
- The English word “gopher” is simply a transliteration of the Hebrew word *gopher* (a *hapax legomena*, so we can’t look at other occurrences of the word to help identify it)
- We don’t know for sure what kind of wood this was
- Some have suggested that it was cedar, cypress, pine, or teak which has natural oils that make it resistant to mildew and rot and it low-maintenance
- Some have also suggested that gopherwood is not a type of tree but rather a process that makes the wood very hard
- The Hebrew word *gopher* is very close to the word *kopher* which refers to “resin”
- The LXX translates this as “Therefore, make for yourself a chest of squared timbers”
- This assumes that the word “gopher” refers to lumber that had already been cut and processed
- But the Hebrew text seems to refer to the wood itself
- Regardless of its identity, it would have been strong enough to construct a ship of this size
- “Actually, to show how wood is perfectly adequate for the Ark, a recent study soaked various types of wood, including teak, in both fresh and salt water for a year, to mimic conditions in the Flood. The study concluded: The bottom line is that the mechanical properties and consequential dimensional stability of gopher wood would not have changed significantly by water immersion (30% maximum), even if it was in salt water and even if there were no pitch to cover the wood. This 30% reduction is not enough to diminish the structural integrity of the ark. So even plain untreated wood would have been good enough to keep the Ark intact.”⁴
- Some have wondered whether a wooden vessel as large as Noah’s ark would have been able to survive the stresses at sea⁵
- It is true that large wooden ships tend to flex in rough seas which makes them prone to leakage
- This was usually related to the fact that carvel-built hulls (plank-on-frame construction) lack resistance to racking under extreme pressures
- Racking occurs when a square or rectangular shape distorts to a parallelogram shape under stress
- Even caulking between planks, iron straps, and steel plates didn’t fully stop this from happening
- Thus, a new wooden ship did not stay tight for very long...even fitting two pins in each plank didn’t fully stop it

³ <https://answersingenesis.org/noahs-ark/noahs-ark-made-of-wood/>

⁴ Jonathan Sarfati, *The Genesis Account*, 496-497.

⁵ This section taken from <https://answersingenesis.org/noahs-ark/noahs-ark-made-of-wood/>

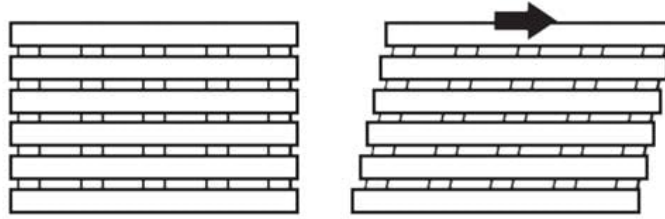


Figure 4. racking: without bracing, a plank-on-frame structure distorts to a parallelogram under shear loading.

- So how would a ship the size of Noah's ark to avoid such racking?
- Some have suggested that the laws of physics would have been supernaturally suspended to keep it afloat
- But this assumes that Noah's ark was built with a carvel hull which may not have been the case
- It may have been built using an internal structural frame of 2-foot thick beams and a planking layer of 1 foot
- Internal Framing

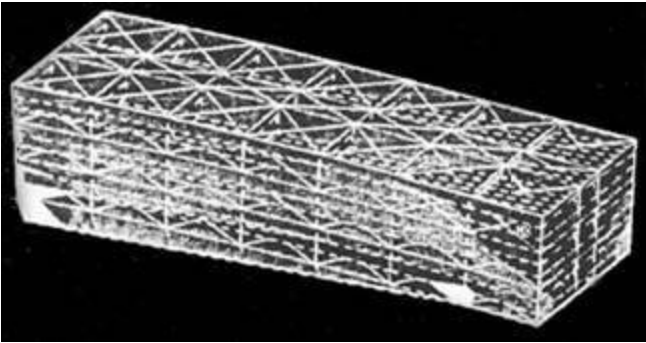
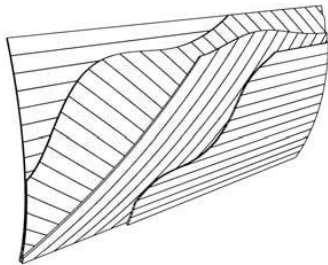


Figure 5. Lattice of 2 feet (0.5m) square beams. The ark may well have been constructed by joint structures of frames and plates. The frame structure of thick beams (50 cm x 50 cm) could have been installed in longitudinal, transverse, and diagonal directions, and connected to each other at each end. The plate structure may have been attached to the frame structure to make the shell, deck, and compartments using thick boards (30cm).

- External Planking - there are several ways to create this integrated "plate structure"

Diagonal planking. The definitive way to build a strong wooden hull is to use multiple diagonal layers laminated together



Mortise and tenon planking A spectacular (almost unbelievable) solution to shearing between planks

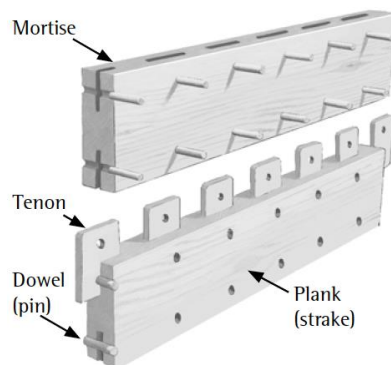
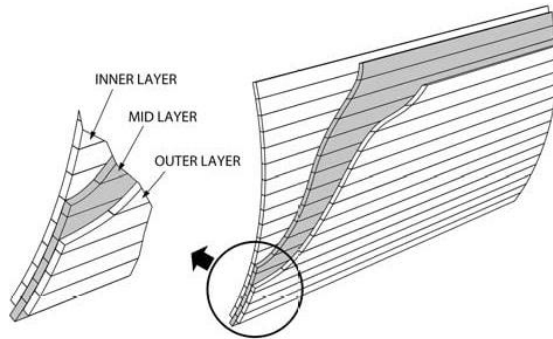
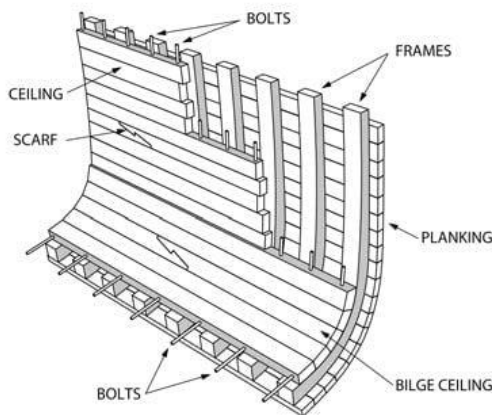


Figure 8. Mortise and tenon planking

Multiple layers of planking. Simple but effective. Each successive layer of overlapping planking dramatically increases the shear resistance of the planking system.



Edge bolted. The easy way to do mortise and tenon is to use vertical pins (drift bolts) to connect horizontal members (strakes) together.



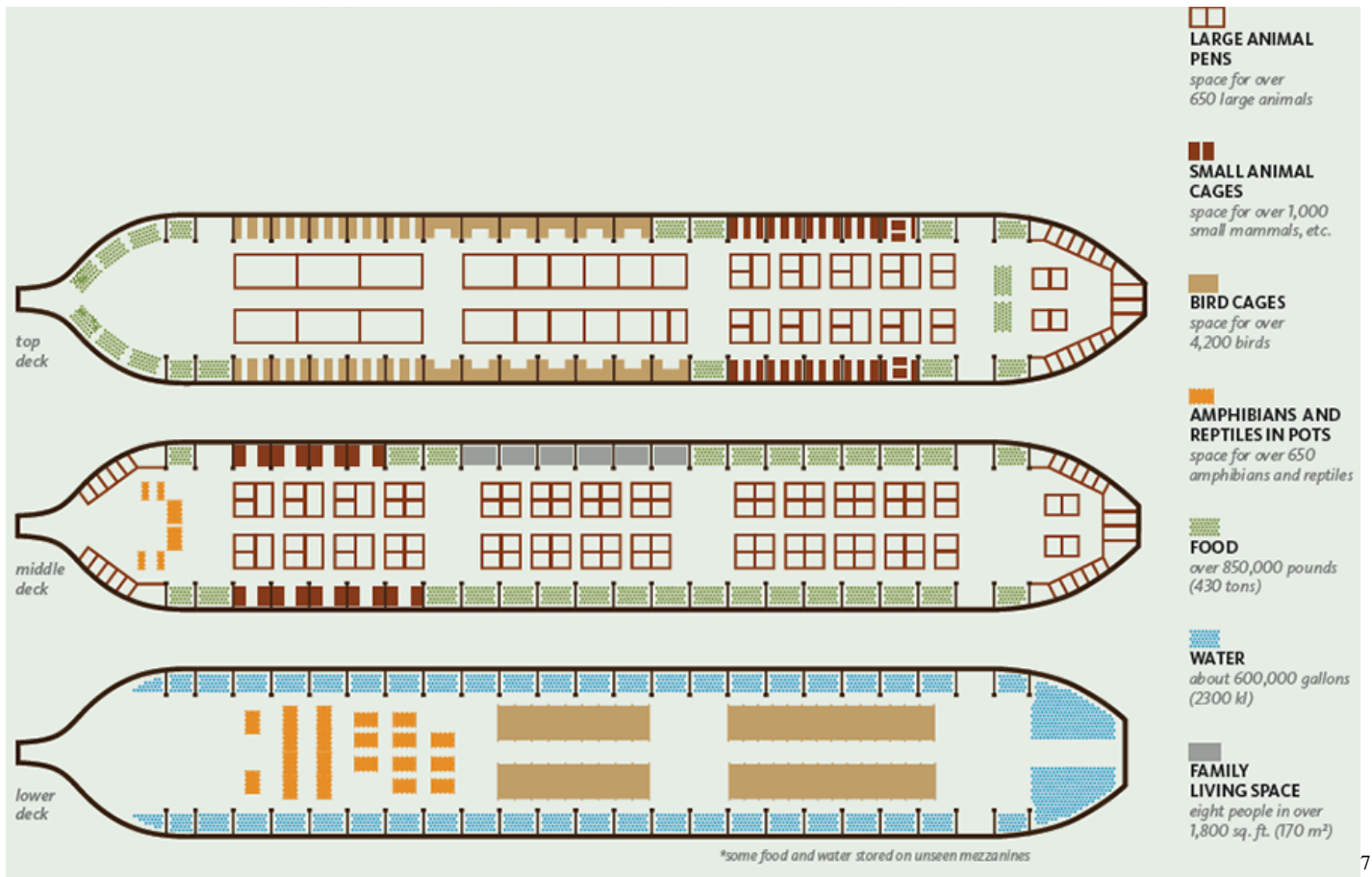
Its Rooms

Housing

- The ark was also to contain “rooms” (*qinnim*), literally “nests,” which would have enabled Noah to care for all the animals
- These “nests” would have likely included small, dark spaces where animals would have felt more secure in such tight quarters, perhaps many of them in cages
- It would have also likely included pens of sorts where pairs of the same “kinds” of animals would be grouped
- A couple of low-tech housing methods could have been used by Noah:
 - Poststal – an area of stalls where waste builds up which is repeatedly covered with straw, sawdust, peat moss, etc. to reduce moisture content and odor; could be easily utilized for an entire year without cleaning out
 - Grupstal – a stall area where the animals face out with a gutter in between; “The grupstal requires less straw than the potstal, because the waste products can easily be pushed into the gutter. On the Ark, waste could have been washed into the sea with the ample water available from the rains.”⁶

⁶ Sarfati, *The Genesis Account*, 498.

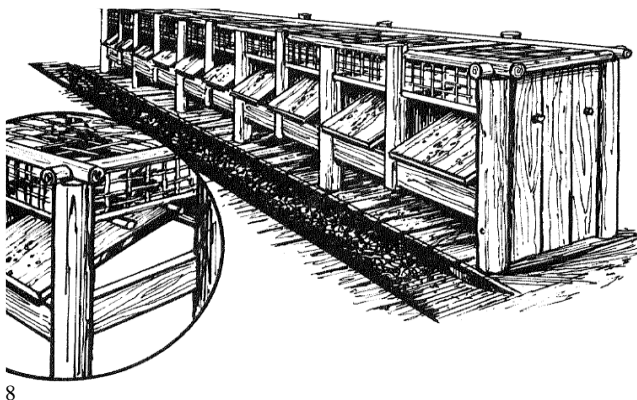
- There would have been plenty of room to house the many animals and to store food and water for them



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Waste

- Some could have become insect food
- Some could have been stored in empty food containers
- Some could have been composted by worms (vermicomposting)
- Some could have been jettisoned from the ark after it had been collected via slatted, grooved, or sloped floors beneath cages or via bamboo carrying urine



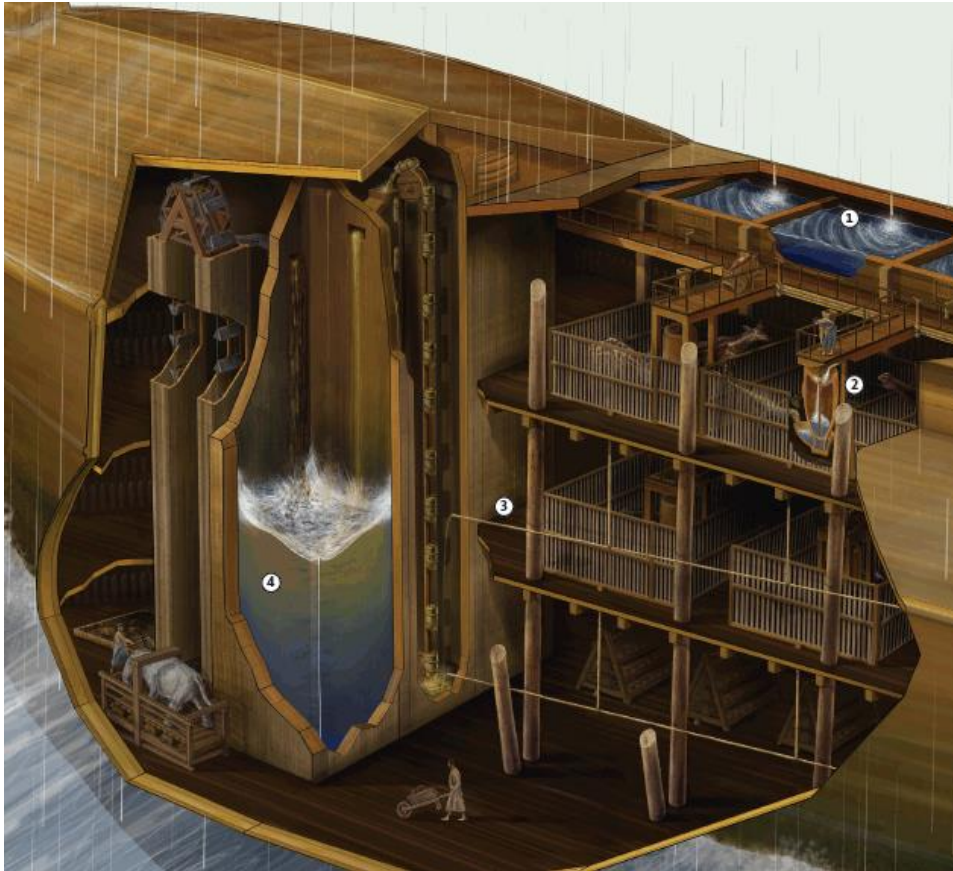
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⁷ <https://answersingenesis.org/noahs-ark/fantastic-voyage-how-could-noah-care-animals/>

⁸ Sarfati, *The Genesis Account*, 518.

Water

- Fresh water could have been stored in containers on the ark
- It could have also been collected from rainwater that fell on the ark's large roof surface



Its Pitch

- Noah was to “cover it inside and out with pitch”
- The words “cover” (*kaphar*) and “pitch” (*kopher*) are related to each other so literally this phrase could be translated “cover the ark with a covering” or “pitch it with pitch”
- This pitch would have likely been collected from pine resin
- An obvious reason for the pitch would have been waterproofing
- But it also would have likely acted as a preservative for the wood and provided a strong impact resistance, increasing the structural integrity of the ark
- The same Hebrew word is also the one translated at “atone” or “atonement”
- Some have attempted to read deep spiritual truth into this: They conclude that the pitch used in the construction of the ark not only was used to physically protect the ark, but also indicates a deeper meaning in the protection from fiery judgment in hell
- Although the ark is a picture of salvation from judgment, it is wrong to infuse deeper spiritual truths into specific details of the ark

⁹ <https://answersingenesis.org/noahs-ark/fantastic-voyage-how-could-noah-care-animals/>

Its Size

Genesis 6:15 ~ This is how you shall make it: the length of the ark three hundred cubits, its breadth fifty cubits, and its height thirty cubits.

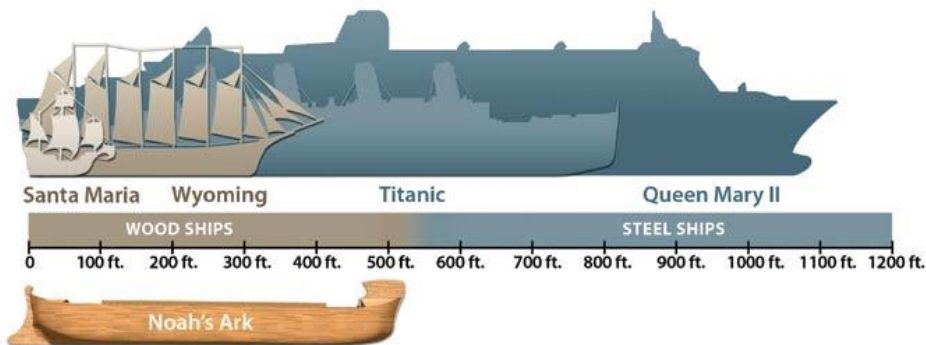
- The cubit was defined as the length of the forearm from elbow to fingertip
- Ancient cubits vary anywhere from 17.5 to 22 inches

The length of a cubit was based on the distance from the elbow to the fingertips, so it varied between different ancient groups of people. Here are some samples from Egypt, Babylon, and ancient Israel:

Culture	Inches (centimeters)
Hebrew (short)	17.5 (44.5)
Egyptian	17.6 (44.7)
Common (short)	18 (45.7)
Babylonian (long)	19.8 (50.3)
Hebrew (long)	20.4 (51.8)
Egyptian (long)	20.6 (52.3)

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- Assuming a conservative 18-inch cubit, the ark would have been at least 450 feet long, 75 feet wide, and 45 feet high
- That is bigger than any seagoing vessel ever built until the 1800s and probably one of the largest wooden ships of all time
- In the Western world, wooden sailing ships rarely got much bigger than about 330 feet long

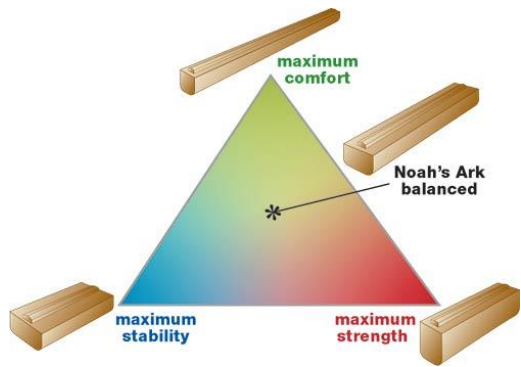


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- The displacement of water of a ship the size of the ark would have been 43,000 tons
- Archimedes principle states that the buoyant force is equal to the weight of the water displaced
- He said: “Any object, totally or partially immersed in a fluid or liquid, is buoyed up by a force equal to the weight of the fluid displaced by the object”
- If the weight of the water displaced is less than the weight of the object, the object will sink
- If the weight of the water displaced is more than the weight of the object, the object will float
- A ship that size would have been incredibly stable, even in the tumultuous waters of the flood
- A ship with such barge-like proportions would be almost impossible to capsize
- It would also be ideal for comfort because the ark’s shape would tend to resist the rotational motions that destabilize a boat and make the ride uncomfortable

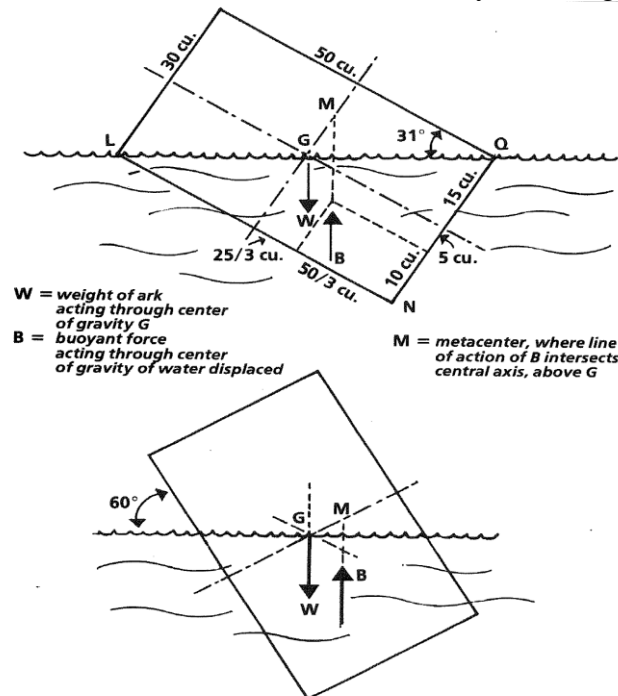
¹⁰ <https://answersingenesis.org/noahs-ark/what-did-noahs-ark-look-like/>

¹¹ <https://answersingenesis.org/the-flood/global/was-there-really-a-noahs-ark-flood/>



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- There are three main types of rotation in ships (and aircraft):
 - Yaw – rotation about a vertical axis where the bow and stern move alternately left and right (not dangerous to a ship)
 - Pitch – rotation about a lateral axis (an imaginary line left to right) where the bow and stern move alternately up and down (not likely to cause a ship to capsize)
 - Roll – rotation about a longitudinal axis (an imaginary line from bow to stern) where the ship tends to tip to the side (by far the greatest danger facing large ships)
- With its unique proportions, the ark would not have been susceptible at all to rolling
- “Rolling is by far the greatest danger. However, this is most likely from ‘breaching’ waves, i.e. hitting the side. Since the Ark would mostly be aligned in the direction of wave travel, breaching waves would be infrequent. And the Ark has a ‘backup’ in case of a breaching wave. That is, the Ark was much wider than it was high. It would have been almost impossible to tip over – even if the Ark were somehow tipped over 60 degrees, it could still have righted itself...But it would be almost impossible to tip the Ark even a fraction of this.”¹³
- Most scholars believe the ark would not have tilted much beyond 3 degrees, even in hurricane force winds



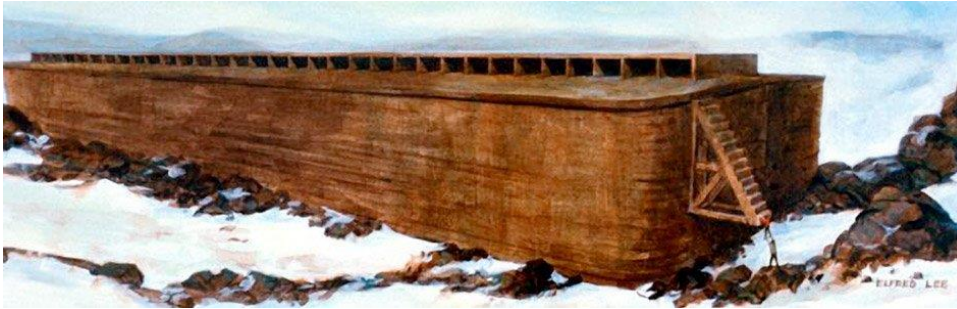
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¹² <https://answersingenesis.org/noahs-ark/thinking-outside-the-box/>

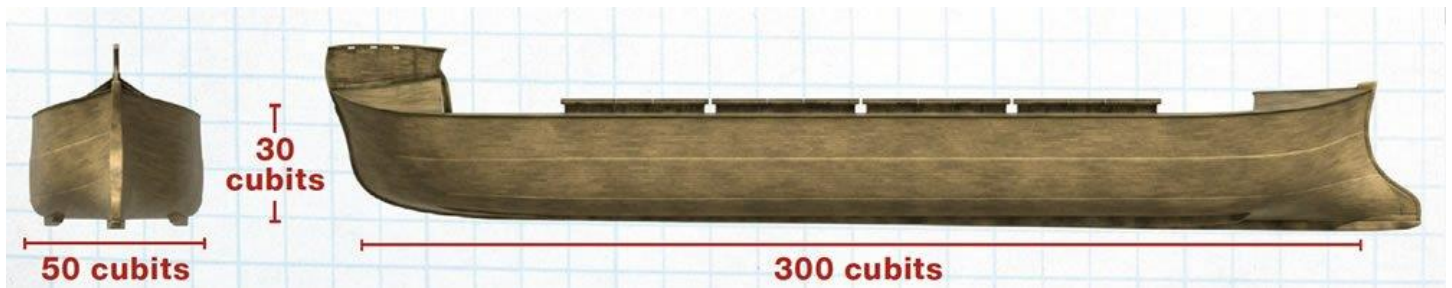
¹³ Sarfati, *The Genesis Account*, 503.

¹⁴ *Ibid*, 504.

- What did the ark look like? → We do not really know because the only description of it occurs in Gen 6:14-16
- Traditionally, it was assumed that the ark was basically a rectangular box



- But the Bible does not say the Ark must be a rectangular box
- It could have been more streamlined with a wind-catching obstruction on the bow to prevent it from taking the full brunt of waves and wind on the side

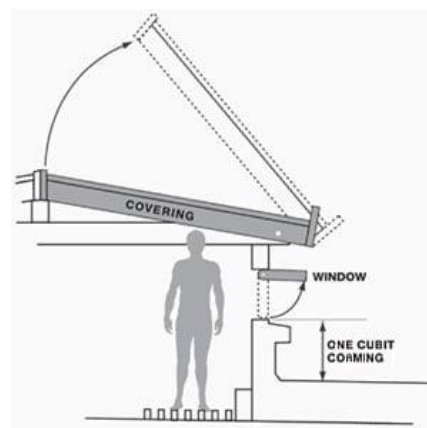


- But the Bible does not specify the exact design of the ark

Its Features

Genesis 6:16 ~ You shall make a window for the ark, and finish it to a cubit from the top; and set the door of the ark in the side of it; you shall make it with lower, second, and third decks.

- The window would have been a hole to let light in
- It would have also allowed for good ventilation and to dissipate excess animal heat
- Any opening on the deck of a ship needs a wall (or a coaming) to prevent water from flowing in, especially when the ship rolls
- In the drawing to the right, the window is finished “to a cubit from the top”



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- It also had a door in the side
- And it had 3 decks, probably each about 15 feet tall
- The carrying capacity of the ark would have been around 1.5 million cubic feet of space
- This would have been equal to about 522 standard railroad box cars or about 340 semi-trailers
- The deck area of the ark would have been equivalent to about 22 basketball courts
- There would have been more than enough space to house over 100,000 sheep-sized animals along with whatever food would have been needed