Ask An Anthropologist
activity for classroom and home

by **Amy Peterson**

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About the Author

Amy Peterson is a graduate student with the Institute of Human Origins at Arizona State University. Her research interests include paleoanthropology, functional morphology, and the evolution of the pelvis in early hominins.

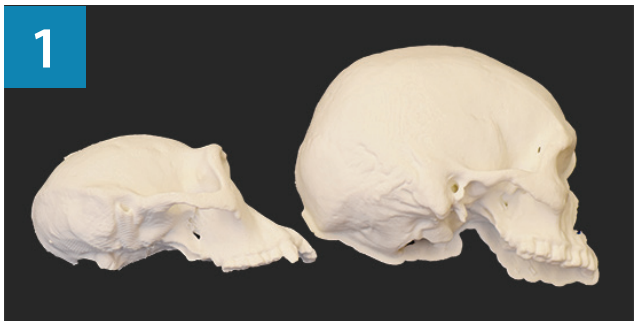
Learn More

This is a companion PDF for the online article:

Head to Head
askananthropologist.asu.edu/experiments/head-to-head

Head to Head

Which skull holds the biggest brain?



Animals with bigger brains have bigger skulls. We can compare the size of these skulls by seeing how much water they hold. Which brain do you think is biggest?

Start with the chimp skull. Turn it upside down. Use the pitcher to fill it with water

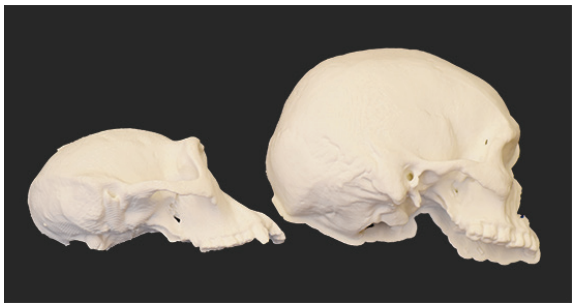
Now, carefully pour the water from the skull into the beaker. Look at the lines on the side of the beaker to see how many milliliters (ml) of water were in the skull.

Fill that information in on a data sheet.

Try the same thing with the other skulls. Which one holds the most water? Do your results surprise you?

Humans developed a large brain for our body size.

The modern human brain is the largest and most complex of any living primate. As you discovered in this activity, it is also larger than the brains of our ancient human ancestors. Our ancestors had brains closer in size to a chimpanzee than to a modern human. What made these ancestors special?



Chimpanzee skull compared to human skull.

Like all living things, early humans evolved in response to their environment. As they faced new environmental challenges, hominid bodies grew bigger and their brains became more complex. In fact, human brain size has tripled over the course of human evolution!

It's not just the size of our brains that counts—it's also the complexity. After all, elephants, whales, and dolphins have larger brains than we do. Humans are so intelligent because some areas of our brain are especially well developed compared to other animals. We have a very large neocortex, which is the exterior layer of our brains. This area controls language, thinking, and fine motor skills—allowing us to communicate, make and use tools, and many other things.

Among human beings, relative brain size doesn't determine intelligence. Some people do have bigger heads (and brains), but they aren't necessarily smarter. We all have the same type of brain that works the same way.

Our large brains do come at a cost. Human brains use up about 20% of our daily energy for our entire bodies, even though the brain only accounts for 2% of our body mass. We have use our intelligence to get food to feed our brains!

Lucy (Australopithecus afarensis) had a much smaller cranial capacity than the average human has today.

Facilitator Guide

Learning objectives

1. Humans developed a large brain for our body size.
2. The modern human brain is the largest and most complex of any living primate.
3. It's not just the size of our brains that counts—it's also the complexity.

Materials

- Replica human skull half
- Replica chimp skull half
- Replica hominin skull half (STS 71)
- Pitcher of water (will need to refilled periodically)
- Graduated cylinder/beaker, 500 mL capacity
- Tray to help contain spills
- Towels to mop up spills
- Graduated cylinder, 500 mL capacity
- Table sign

Notes to presenter

Depending on the skulls you use for this activity, some small holes (foramina) may need to be plugged with clay or glue to make a watertight seal so the water will not leak out.

Safety

Mop up spills promptly to avoid slip hazards.

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