Breaking down 'Super Smash Bros. Ultimate' characters based on science

Jul 17, 2019 · 10:44 AM

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Since the December 2018 release of *Super Smash Bros. Ultimate*, players have been pondering all types of questions: Who's the strongest character? How do the game's physics compare to previous installments of the game?

These questions are important, but what if we took *Smash* at face-value—like it was operating according to real-life Earth physics? Let's take a look at two instances in *Smash* through a scientific lens.

Could Peach really use a parasol to fly around?

Image via SmashBros.com

When you press Up+B on the controller in *Smash*, the Princess Peach character from the *Mario* game series whips out a parasol and floats to safety.

This image of a person floating around with an umbrella is nothing new; Mary Poppins is a famous example. But you may have wondered if Peach really should be able to fly around with an umbrella.

Taking a cue from Mary Poppins

Image via Disney.com

Physics students from the University of Leicester already investigated the Mary Poppins problem by using aerodynamics and making simplifying assumptions like ignoring the weight of the umbrella.

If you apply the analysis in this paper, you'll find that Peach can float with her umbrella if her weight is balanced out by “lift”—a force that pushes up against gravity. Lift depends on the wind speed and the geometry of the object of interest, among other things.

The calculations make use of a few parameters like Peach's weight and the diameter of her parasol. You can figure out the latter by comparing Peach's height of 5 feet, 5 inches to her umbrella at the 3-second mark in the video below, and approximate its diameter as 2 feet, 4 inches.

13: Peach – Super Smash Bros. Ultimate

Turns out that Peach will only float if she's being blown upward by a hurricane. She needs a wind speed of over 80 miles per hour, which is strong enough to destroy buildings and wreak widespread devastation.

Alternatively, Peach can float in much calmer weather if her parasol is much larger. If a fan was blowing upward at Peach with a gentle breeze of 0.2 mph, Peach's parasol would need a diameter of more than 370 times its original, which is roughly equal to 40 adult giraffes stacked on top of each other.

Verdict

Obviously, Peach needs to buy a bigger umbrella. Or maybe she's helping herself float with Peach magic, like when you hold down the jump button.

Why isn't Samus being crushed when she stuffs herself into that tiny sphere?

Image courtesy of SmashBros.com

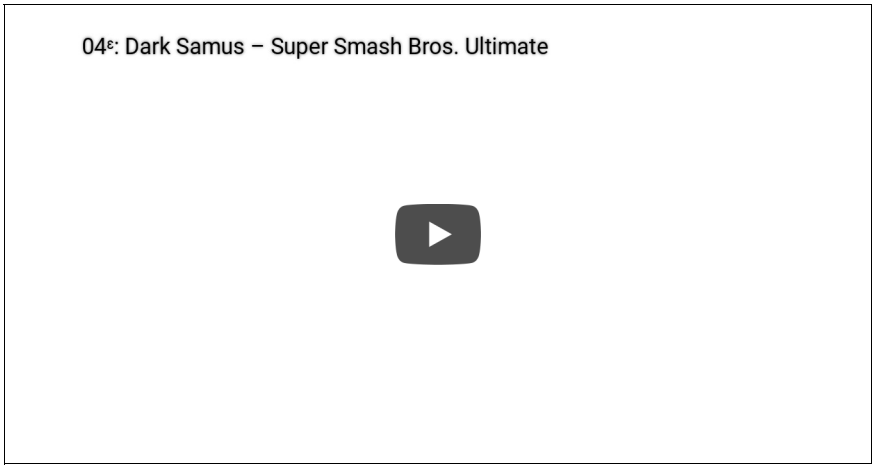
When you press Down+B on the controller in *Super Smash Bros.*, *Metroid* heroine Samus Aran transforms into a glowing, metal sphere called a Morph Ball. Since this sphere is much smaller than Samus herself, you may have wondered why she isn't being crushed.

Morph Ball: Bigger than Samus

To figure out whether Samus can fit in the Morph Ball, you need to calculate how much

space she takes up in the world—her volume—versus the Morph Ball.

To do that, you need some dimensions. In the *Smash* video of Dark Samus below at the 13-second mark, the ball's diameter clocks in at one-third of Samus's height. Since Samus's official height in *Metroid* is 6 feet, 3 inches, the Morph Ball must be a little over 2 feet—or about 3 soccer balls placed side by side.



Crunching the numbers—which involves Samus's weight, the average density of a human, and an equation for the volume of a sphere—shows that the ball is about 50 percent bigger, volume-wise, than Samus's regular form despite its shorter height.

Side note: *This calculation uses her weight with the suit on, as I couldn't find an official value for Zero Suit Samus. Even so, a lighter Samus would mean she could fit into the Morph Ball more easily.*

Samus Aran, the contortionist

Samus can fit in the sphere if she liquefies herself, but can she squish in without radically changing her body? Assuming that Samus has access to all of that space in the Morph Ball—yes, if she's a contortionist. Contortionists can squeeze into positions that most people can't handle because their bodies contain a higher ratio of stretchy proteins compared to the average human.

And it does seem plausible that contortionists can fit into spaces that are just barely bigger than their bodies. The contortionist in this video squeezes into a box with a volume that is only 8 percent bigger than his own. (In case you're wondering, his height and weight are 6 feet and 183 lbs, which is very similar to Samus's 198 pounds and 6 feet, 3 inches.)

If the same is true for Samus, she can squeeze into the Morph Ball and still have 1.3 cubic feet of space—about 5 basketballs—for anything else she has to cram inside.

No human on Earth, however, can match the speed of Samus's contortions in *Super Smash Bros.* In the Dark Samus video above, Samus takes 0.2 seconds to transform into the Morph Ball—a bit slower than a blink and almost 25 times faster than the Guinness World Record for the fastest time someone has crammed themselves into a box.

Verdict:

Samus is probably okay since she hasn't exploded from transforming. But she probably

has some tricks in store, like morphing into an energy ball or having a suit that quickly twists her in just the right way.

Curious about other takes? A bunch of folks, including The Game Theorists and Gnoggin, have put their own spin on this very situation.

Alane Lim is an independent creator and not a representative of Bing or Microsoft.

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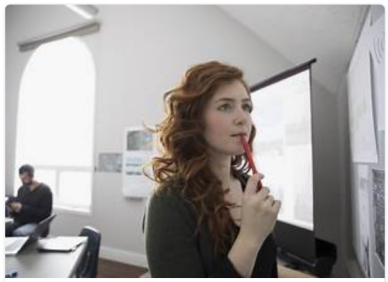

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