Ben Orlin's "Just-so Stories of Mathematical Scaling"

"Fables and math have a lot in common. Both come from dusty, moth-eaten books. Both are inflicted upon children. And both seek to explain the world through radical acts of simplification. […] By exaggerating a few features and neglecting all the rest, they help explain why our world is the way it is." Ben Orlin

What about you? Can you explain the following statements?

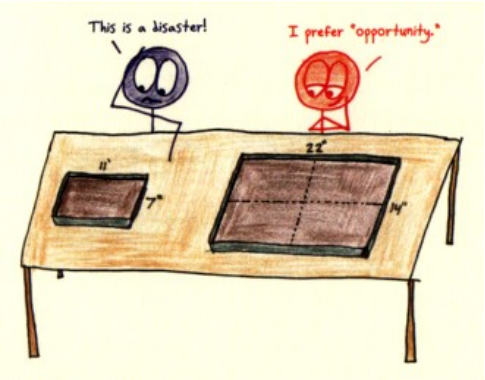
1. Big pans make better brownies. **Right.**	**2. Chares, the sculptor of the Colossus of Rhodes, took his own life before his masterpiece was finished.** **Right.**
3. Giants exist. **Wrong.**	**4. No ant fears heights.** **Right.**

1. Why do big pans make better brownies?

You and I are baking. But when the oven is preheated, the cupboards defy us. The only available pan has double the dimensions of the one suggested by the cookbook. We adjust the recipe and when we have just finished a forgotten cupboard reveals the pans we'd been looking for all along. We blame each other, then laugh, because who can stay mad when chocolate glory is so close at hand?

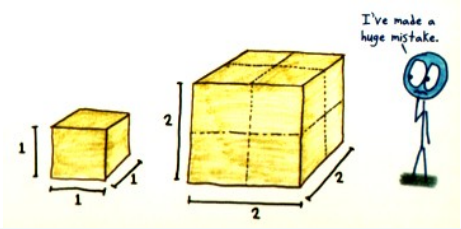
We now face a choice: **Shall we bake the brownies in the one big pan, or in the small ones? And what does it mean to "adjust the recipe"?**

This is a fable, so we shall ignore the details. Forget over temperature, cooking times, heat flow, and minimizing the dishes to clean. Focus instead on one matter: size itself.



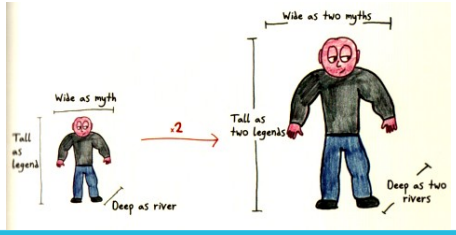
2. Why did the ambitious sculptor take his own life?

About 2300 years ago, the Greek island of Rhodes repelled an attack from Alexander the Great. In a mood of self-congratulation, the people commissioned local sculptor Chares to build a magnificent commemorative statue. Legend tells that Chares originally planned a 50-foot bronze sculpture. "What if we supersize it?" said the Rhodians. "You know, double the height? How much would that cost?"
"Double the price, of course," said Chares.
"We'll take it!" said the Rhodians.
So, why did Chares take his own life before the masterpiece was finished?



3. Why aren't there giants?

King Kong, the three-story ape. Paul Bunyan, the lumberjack whose footsteps carved out lakes. Shaquille O'Neal, the mythical seven-foot one, 325-pound basketball player who could do everything except make three throws. You know these stories, and you know just as well that they are fantasies, legends, wide-eyed fictions.
Let's say a giant is twice the size of a human being.
Then there cannot be such a thing as giants. Why is it so, according to maths?



4. Why does no ant fear heights?

Ants are horrifying. They lift objects 50 times their body mass, work together in flawless coordination, and thrive on every corner of the planet. This global army of weightlifting pincer-jawed telepaths outnumbers humans by a factor of millions. Visions of their alien faces would keep me up at night if not for one redeeming fact: Ants are very, very small.
So, why does no ant fear heights? And what do maths and physics tell you they should actually fear?

