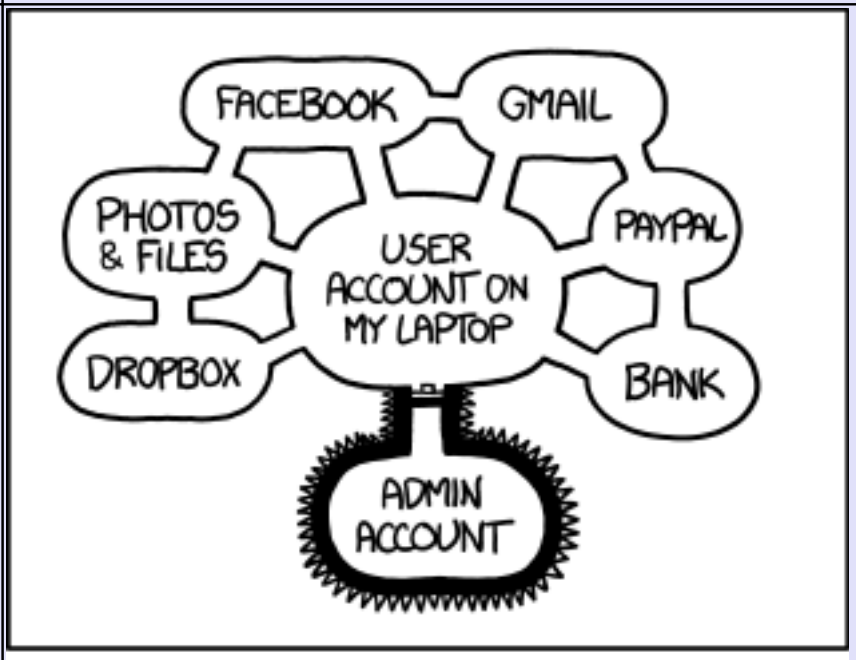
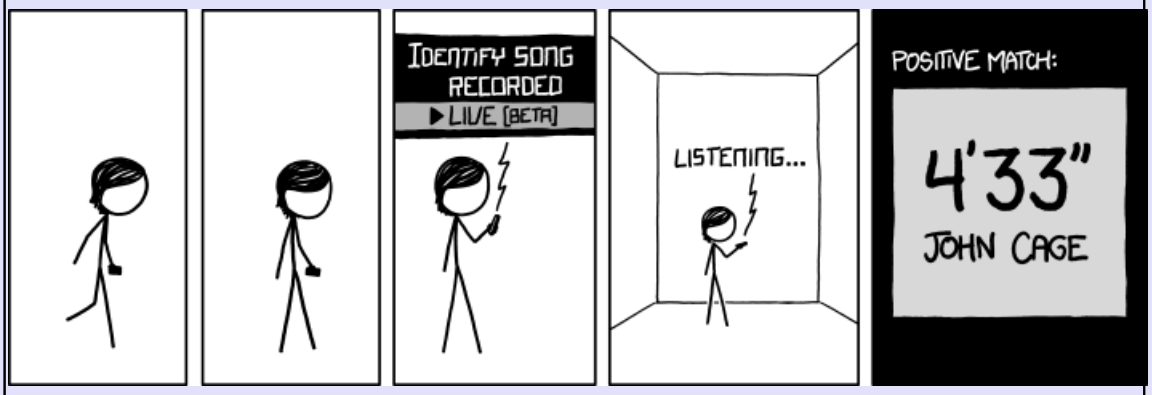
xkcd Web Scraping Demo

XKCD (7 recent comics)

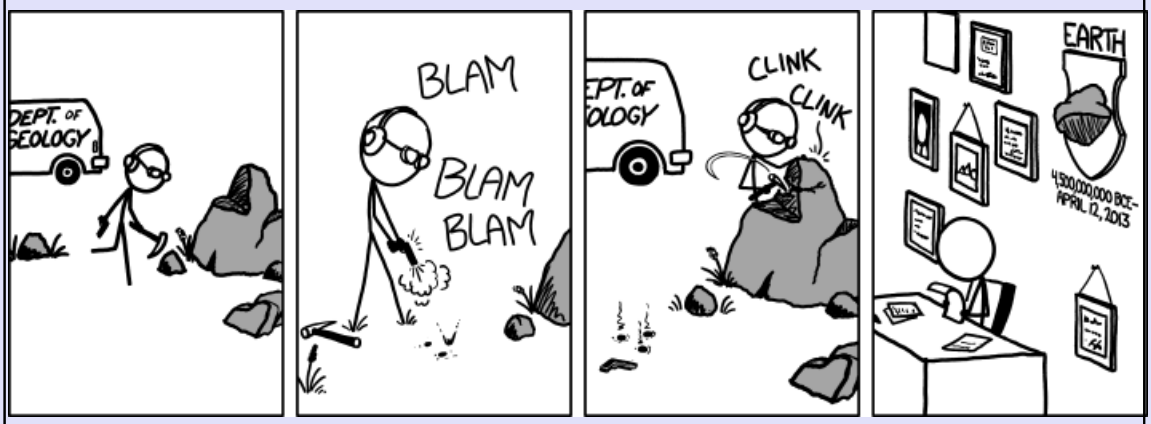
Title	Image
Authorization *Friday* *May 17, 2013* Before you say anything, no, I know not to leave my computer sitting out logged in to all my accounts. I have it set up so after a few minutes of inactivity it automatically switches to my brother's.	 IF SOMEONE STEALS MY LAPTOP WHILE I'M LOGGED IN, THEY CAN READ MY EMAIL, TAKE MY MONEY, AND IMPERSONATE ME TO MY FRIENDS, BUT AT LEAST THEY CAN'T INSTALL DRIVERS WITHOUT MY PERMISSION.
Silence *Wednesday* *May 15, 2013* All music is just performances of 4'33" in studios where another band happened to be playing at the time.	

xkcd Web Scraping Demo

Geologist

Sunday
May 12, 2013

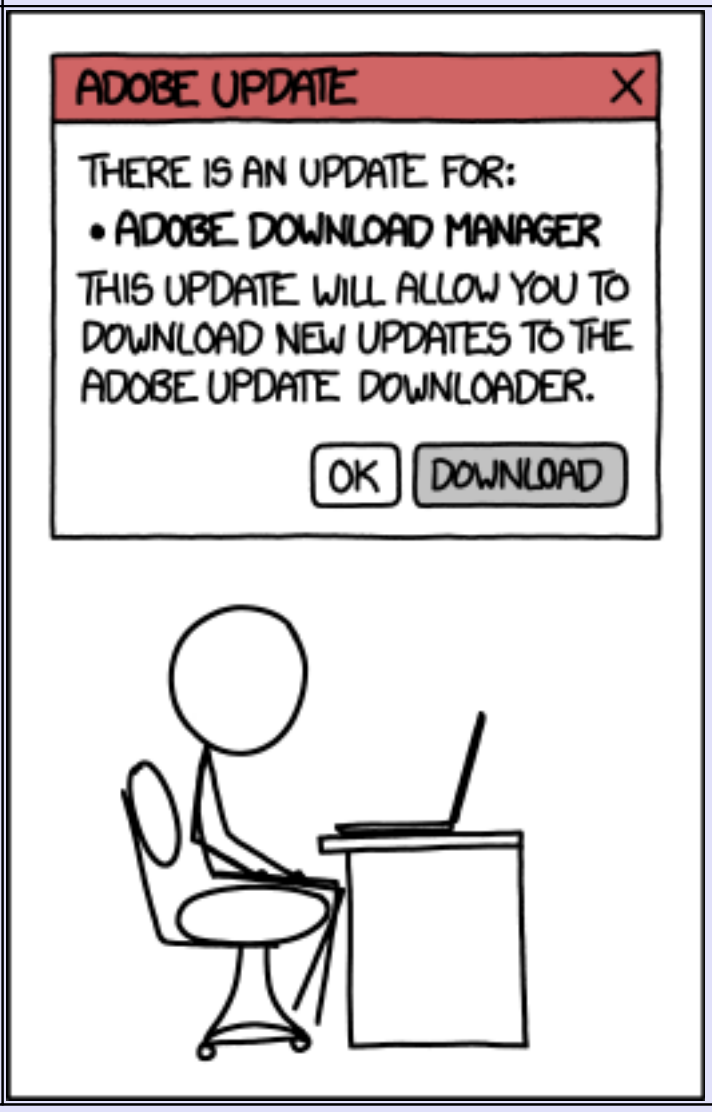
'It seems like it's still alive, Professor.' 'Yeah, a big one like this can keep running around for a few billion years after you remove the head."



All Adobe Updates

Friday
May 10, 2013

ALERT: Some pending mandatory software updates require version 21.1.2 of the Oracle/ Sun Java(tm) JDK(tm) Update Manager Runtime Environment Meta-Updater, which is not available for your platform.

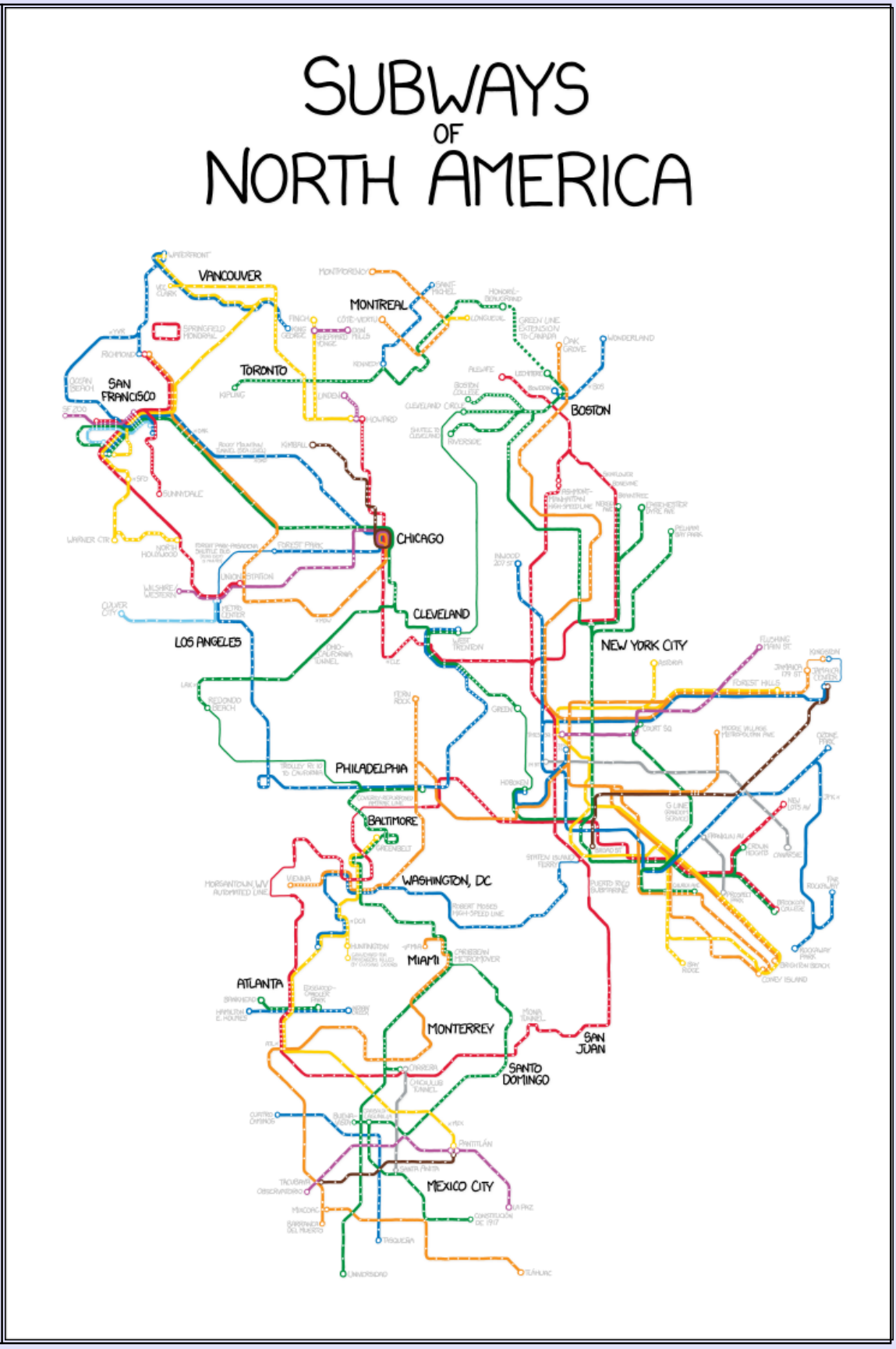


xkcd Web Scraping Demo

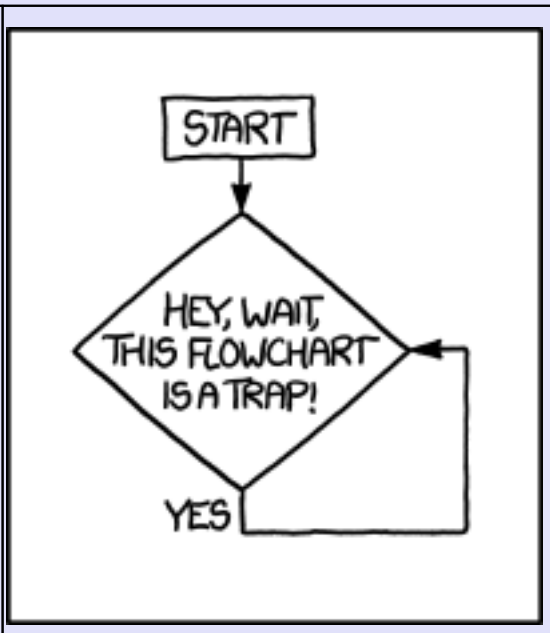
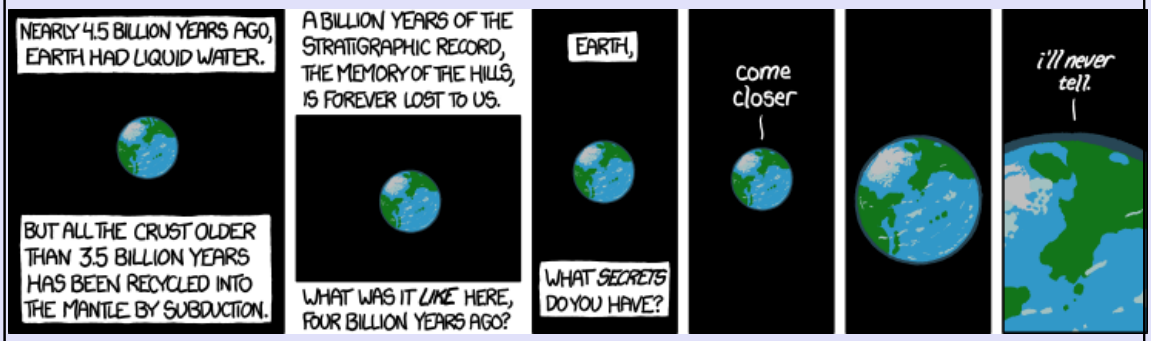
Subways

Wednesday
May 8, 2013

About one in three North American subway stops are in NYC.



xkcd Web Scraping Demo

Flowchart *Sunday* *May 5, 2013* The way out is to use the marker you have to add a box that says 'get a marker' to the line between you and 'start', then add a 'no' line from the trap box to 'end'.	
Stratigraphic Record *Friday* *May 3, 2013* All we have are these stupid tantalizing zircons and the scars on the face of the Moon.	

What If? (3 recent articles)

Spiders vs. the Sun

> *Which has a greater gravitational pull on me: the Sun, or spiders? Granted, the Sun is much bigger, but it is also much further away, and as I learned in high school physics, the gravitational force is proportional to the square of the distance.*
> *[—Marina Fleming]*

Note: This is a spider-heavy article. I can be a little anxious about spiders myself, so my research for this article involved a lot of opening PDFs while squinting and leaning back from the screen. If you're a serious arachnophobe, you might want to skip this one.

In the literal sense, this question is totally reasonable, although it would be easy to

xkcd Web Scraping Demo

rephrase it to be completely incoherent.

The gravitational pull from a *single* spider, no matter how heavy, will never beat out the Sun. The goliath bird-eating spider weighs as much as a large apple. Even if, God forbid, you were as close as possible to one of them, the pull from the Sun would still be 50 million times stronger.

What about *all* the spiders in the world?

There's a well-known factoid that claims you're always within a few feet of a spider. Is this true? Arachnologist Chris Buddle wrote a good article on this question; as you might expect, it's not literally true. Spiders don't live in the water, so you can get away from them by swimming, and there aren't as many spiders in buildings as in fields and forests. But if you're anywhere near the outdoors, even in the Arctic tundra, there are probably spiders within a few feet of you.

Regardless of whether the factoid is precisely true or not, there are an awful lot of spiders out there. Exactly how many is hard to say, but we can do some rough estimation. A 2009 study actually measured the total mass of spiders in sample areas in Brazil. They found one-digit numbers of milligrams of spider per square meter of forest floor. If we guess that about 10% of the world's land area hosts this density of

xkcd Web Scraping Demo

spiders, and there are none anywhere else, we come up with 200 million kilograms worldwide.

Even if our numbers are off wildly, it's enough to answer Marina's question. If we assume the spiders are distributed evenly across the surface of the Earth, we can use Newton's shell theorem to determine their collective gravitational pull on objects outside the Earth. If you do that math, you find that the Sun's pull is stronger by *13 orders of magnitude*.

Now, this calculation makes some assumptions that aren't true. Spider distributions are discrete, not continuous, and some areas have more spiders than others. What if there happen to be a *lot* of spiders near you?

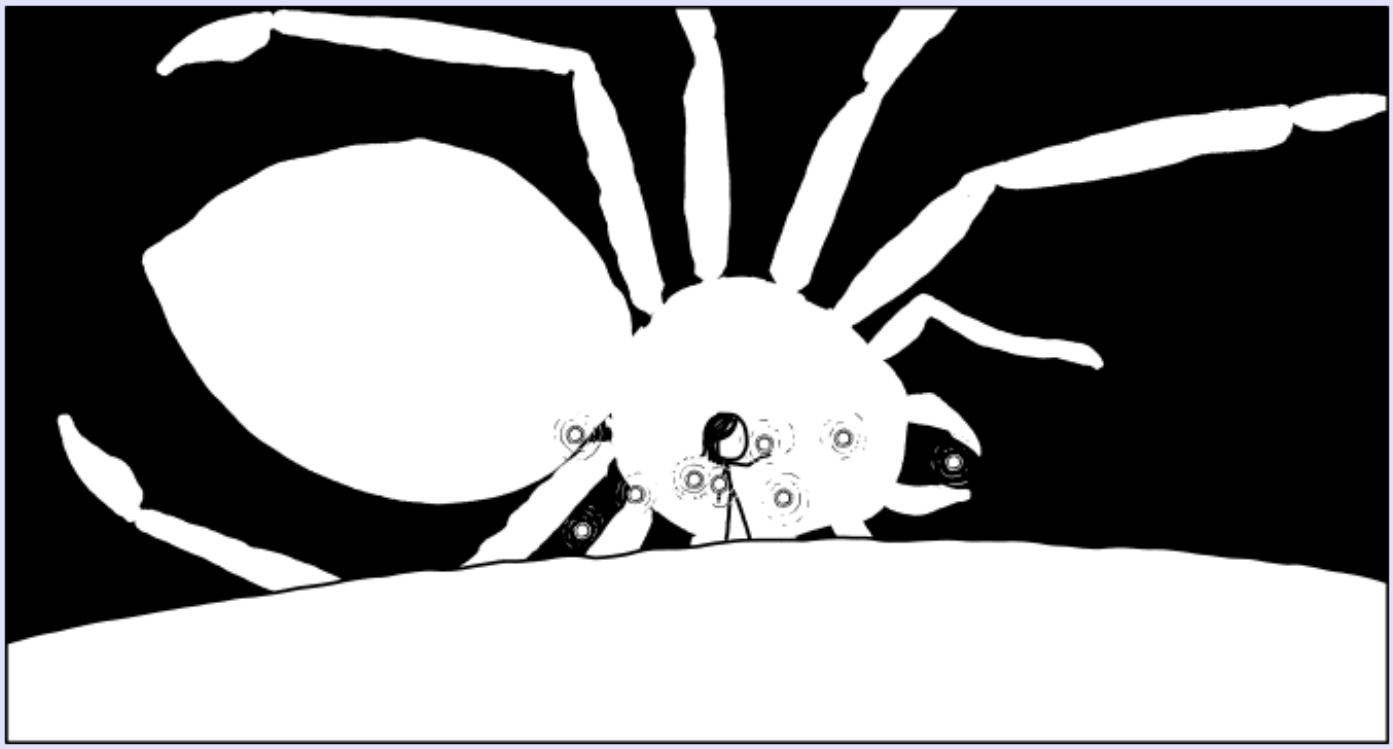
In 2009, the Back River Wastewater Treatment Plant found themselves dealing with what they called an "extreme spider situation." An estimated 80 million orb-weaving spiders had colonized the plant, covering every surface with heavy sheets of web. The whole thing is detailed in a fascinating and horrifying article published by the Entomological Society of America.

What was the total force of gravity from all those spiders? First we need their mass; according to a paper titled *Sexual Cannibalism in Orb-Weaving Spiders: An Economic Model*, it's about 20 grams for males and several times that for females. So even if you were standing next to the Black River Wastewater Treatment Plant in 2009, the pull of all the spiders inside would still be only 1/50,000,000th that of the Sun.

No matter which way you look at it, the bottom line is that we live our lives surrounded by tiny spiders on a world completely dominated by a gigantic star.

Hey, at least it's not the other way around.

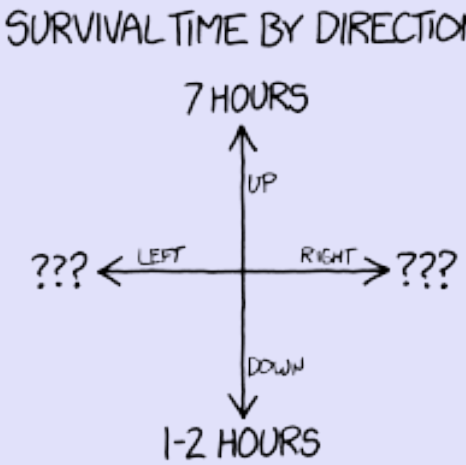
xkcd Web Scraping Demo



Digging Downward

> *What would happen if I dug straight down, at a speed of 1 foot per second? What would kill me first?*
> *[Jack Kaunis]*

This question is the reverse of question #64, which asked how you'd die if you *rose* steadily at a foot per second. Digging at the same rate would kill you more quickly.



After you get through the surface layers, temperatures rise pretty steadily as you go deeper, a trend that continues all the way to the core.

In some areas, where the hot magma is closer to the surface, the ground gets hotter

xkcd Web Scraping Demo

more quickly.

The Southern Methodist University Geothermal Lab has produced some superb maps showing the temperature of deep rocks in different parts of the United States. If you look at the map of the 3.5 km layer, you see that at that depth, most of the US is colored greenish-yellow, representing temperatures somewhere around 100°C—with one glaring exception. In northwest Wyoming, there's a circle of ground colored bright red, where the rock is much hotter than normal. That circle is the Yellowstone supervolcano.

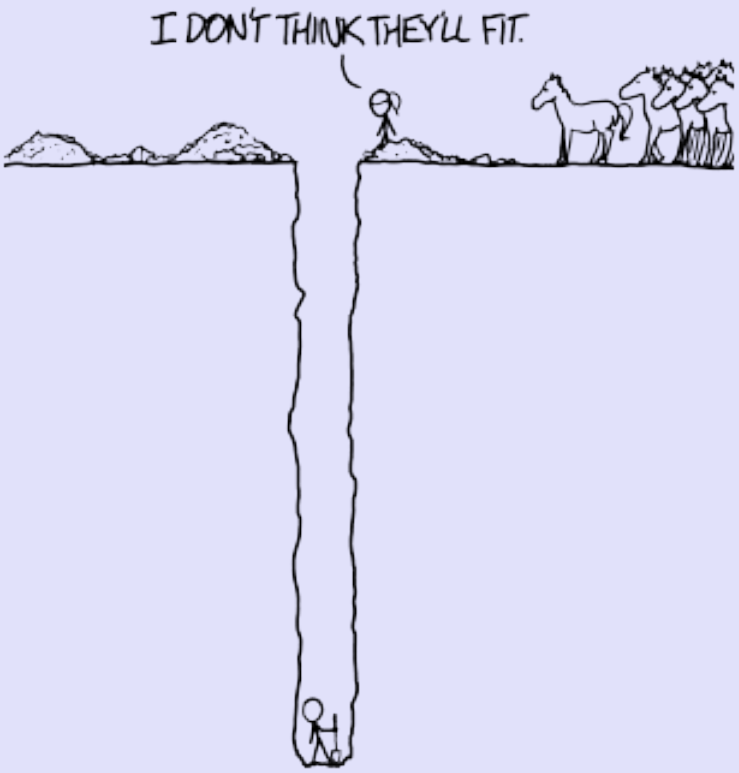
The SMU maps show that even if you avoided digging in Yellowstone, you'd quickly encounter temperatures too hot for an unprotected human. The ground typically gets hotter at an average of about 35°C per kilometer, so at a rate of a foot per second, you'd encounter lethal heat within an hour or two.

But wait a moment.

Let's say your hole is about a meter wide. At the rate you're digging, you have to remove roughly half a ton of material every second.

No human would be capable of lifting that *first* foot of material out of the hole so quickly, and it only gets worse after that. After a minute of digging, you'd be 60 feet down, and would have to lift all that rock and dirt a huge distance vertically to get it out of the hole. The power required to do that lifting—just after the first minute—would be roughly 150 horsepower.

xkcd Web Scraping Demo



Even if you're not doing the lifting yourself, the way your question is worded makes it pretty clear that *you* are in this hole. Whatever process you're using is going to require huge amounts of energy to lift all that rock, and that energy is inevitably going to result in the hole being heated somehow. Even if the layer you're digging through wasn't hot when you started, it will be.

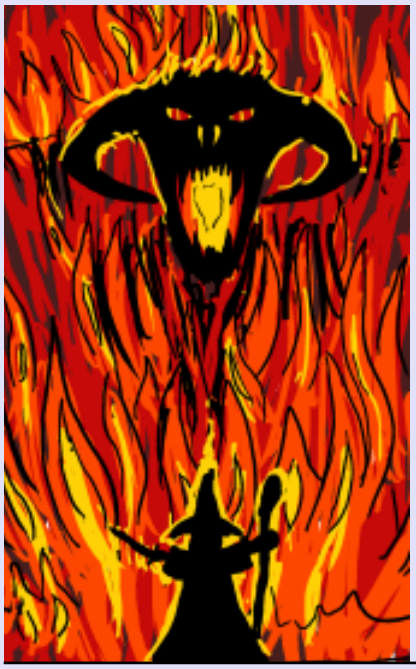
What if we assume you're protected against the heat from the ground (and the digging mechanism)? Well, in that case, the pressure would become a problem. As you go deeper, air pressure increases. Below about 5 km, the pressure is high enough that oxygen becomes toxic.

So what if you're protected against the heat, pressure, *and* the digging process?

Well, at that point, we've redefined the rules so much that I'm not sure it makes sense to try to calculate an answer. The question—"what would kill you if you kept digging downward"—has left the realm of physics and become fantasy.

Which, come to think of it, makes the answer perfectly clear.

xkcd Web Scraping Demo

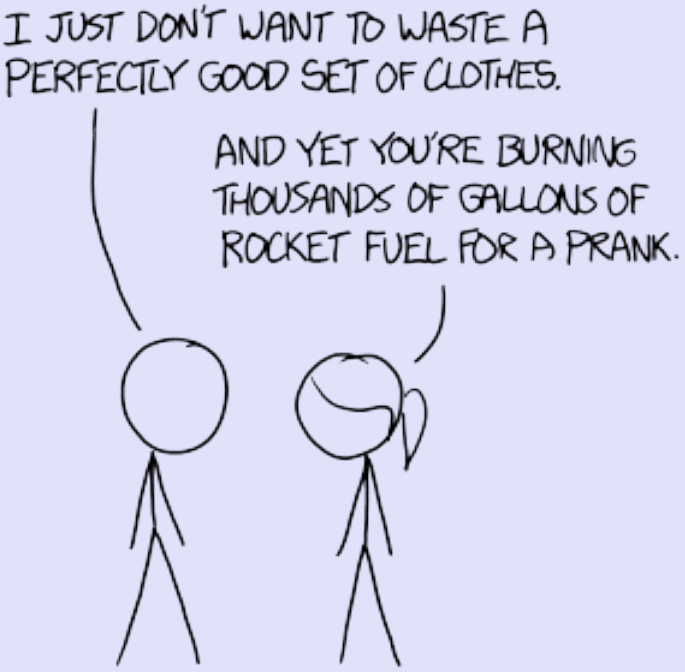


Space Burial

> *I've often joked I'd like to have my remains put into orbit. Not in a "scatter my ashes" sense, but, like, "throw my naked corpse out the airlock" sense. Honestly, my main motivation is to baffle someone in the distant future, but it's an interesting scientific question: what would happen to my body in orbit over the course of years, decades or centuries?*
> *[—Tim in Fremont]*

This isn't really relevant, but I have to ask: Is there a reason you specifically wanted your corpse to be naked? Just making things extra weird for the technicians loading up the capsule and/or throwing you out of the airlock?

xkcd Web Scraping Demo



If you tried this, the first thing that would happen to your corpse would be that it would dry out. This would probably start before you made it to space; the dry, climate-controlled air in the pre-launch waiting area would help draw moisture from your body.

In the *Manual of Forensic Taphonomy*, Franklin Damann and David Carter outline the process of human decomposition. According to them, it takes a lot of effort to keep corpses from drying out during the embalming process. In extremely dry environments like the Atacama Desert in Chile, "spontaneous mummification" can occur—and space is even drier than Chile.

Once your body made it to space, this process would ramp up quickly. Most of the "ecology" responsible for decomposing your corpse would be killed off quickly by the drying process (along with the lack of oxygen, temperature swings, and solar radiation levels), so your body wouldn't decay very much. Instead, you'd become a freeze-dried mummy, after losing about 80% of your body weight in water.

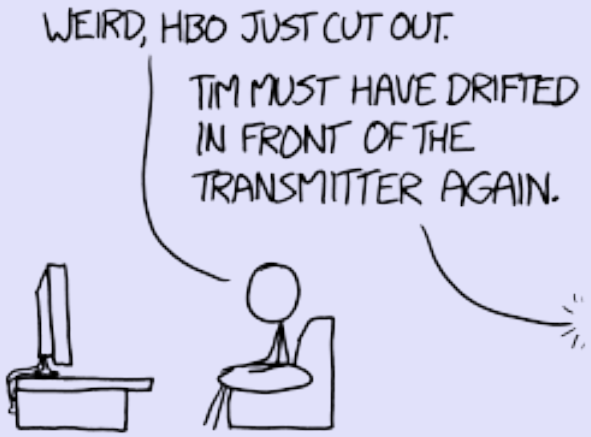
What happens next depends on exactly where in space you are.

If you're in an orbit that passes near the Earth, your orbit will quickly decay, and before long you'll re-enter the atmosphere and burn up.

If you're in a slightly higher orbit, you'll last longer, but you'd also be in the zone where space debris was thickest. Impacts with small bits of debris would start to leave pits and scars on your surface; they would often find these on Space Shuttle windows after a flight. Eventually, probably after a few decades, you'd probably have a violent collision with something.

xkcd Web Scraping Demo

Higher orbits are safer. If you were some distance away from the Earth, near where geosynchronous satellites orbit, there would be less debris to run into. Furthermore, for large, dense objects, orbits out there are stable for a very long time. You could spend centuries drifting among TV broadcast satellites.



If you wanted to last even longer, you could launch yourself away from Earth completely, finding a quiet and stable orbit somewhere in interplanetary space. There, over the course of millennia, you'd be slowly baked by the Sun's radiation and pitted and powdered by micrometeorites.

But if your goal is to weird out future space travelers, that might not be the best plan. Space is big; if someone randomly stumbles on your corpse, it suggests that there must be a *lot* of people zipping around the solar system. And if space travel has become that common, there will be *lots* of corpses floating around; discovering yours will be more archaeologically exciting than anything. You'll be stuck in a lab or museum somewhere and contribute to someone's research paper—a bland end to your exciting prank.

Unless, of course, you happen to be found by the only people in space even weirder than you.

xkcd Web Scraping Demo