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How many seconds old is the earth

Describing a person as "down to earth" is the same as saying that he or she is "grounded." In other words, it's like saying that the person is "the salt of the earth." To say the least, this person certainly does not have his or her "head in the clouds." What all of these idioms are trying to convey is a person who is humble, self-aware and pragmatic – a person whose head hasn't filled up with so much idealism and fanciful nonsense that it could balloon and lift them off their feet.In truth, it's not humility but gravity – the natural phenomenon pulling matter together – that keeps humans and other objects grounded. If our planet were to lose gravity for even five seconds, it would spell the end of life on Earth as we know it.Gravity pulls objects toward one another. The more massive an object is, the stronger its gravitational pull. The closer you are to an object, the stronger its gravitational pull. Earth, of course, is massive and very close to us. Its gravity is what keeps people walking on the ground and what causes feathers and textbooks to fall to the floor when dropped [source: Caltech].The sun is much, much bigger than Earth – more than 1 million copies of our planet could fit inside it. The sun's gravity is what keeps our planet and others orbiting around that burning-hot star [source: NASA].Without gravity, humans and other objects would become weightless. Ever see movies where astronauts are fumbling around trying to plant their country's flag on the moon? The reason they bounce up and down is that the moon is much smaller than, and therefore has much less gravity than, Earth. Same goes for when we see astronauts floating around weightless in their spacecrafts: The farther they get from Earth, the less the planet's gravity pulls them to the ground [source: Gannon].If Earth suddenly lost all of its gravity, we wouldn't just start floating. The lack of any forceful gravitational pull would turn humans – and anything else with mass, like cars and buildings – into very fast-moving tumbleweeds. That's because the planet would continue spinning, without exerting gravity to keep objects tied to it [source: Domanico].A loss of gravity would also mean that the planet would stop pulling down air, water and Earth's atmosphere. That's where the apocalyptic devastation somewhere along the lines of a Michael Bay movie come in. A sudden and significant loss of air pressure would immediately shatter everyone's inner ear. Think about the pressure that builds when you're flying or scuba diving; this would be much more intense and immediate. Concrete structures would crumble as oxygen – an important binding agent – left the planet [source: Cote].What's H2O without the O? That's right, water would become hydrogen gas, causing immediate explosions among every living cell. Sure, it would be over in five seconds, but none of us would be around by the time the gravity came back [source: Cote]. Super-Earths And Life is a course about life on Earth, alien life, how we search for life outside of Earth, and what this teaches us about our place in the universe. In the past decade astronomers have made incredible advances in the discovery of planets outside our solar system. Thirty years ago, we knew only of the planets in our own solar system. Now we know of thousands circling nearby stars. Meanwhile, biologists have gained a strong understanding of how life evolved on our own planet, all the way back to the earliest cells. We can describe how simple molecules can assemble themselves into the building blocks of life, and how those building blocks might have become the cells that make up our bodies today. Super-Earths And Life is all about how these fields, astronomy and biology, together with geology, can help answer one of our most powerful and primal questions: are we alone in the universe? HarvardX requires individuals who enroll in its courses on edX to abide by the terms of the edX honor code: . HarvardX will take appropriate corrective action in response to violations of the edX honor code, which may include dismissal from the HarvardX course; revocation of any certificates received for the HarvardX course; or other remedies as circumstances warrant. No refunds will be issued in the case of corrective action for such violations. Enrollees who are taking HarvardX courses as part of another program will also be governed by the academic policies of those programs. HarvardX pursues the science of learning. By registering as an online learner in an HX course, you will also participate in research about learning. Read our research statement: to learn more. Harvard University and HarvardX are committed to maintaining a safe and healthy educational and work environment in which no member of the community is excluded from participation in, denied the benefits of, or subjected to discrimination or harassment in our program. All members of the HarvardX community are expected to abide by Harvard policies on nondiscrimination, including sexual harassment, and the edX Terms of Service. If you have any questions or concerns, please contact harvardx@harvard.edu and/or report your experience through the edX contact form: . How life may have arisen on Earth How we discover planets around other stars What makes a planet favorable for life How we search for life in our universe This course consists of seven modules, which investigate questions like: What is life? How did it arise? How does it change over time? What is a planet? How do we find and learn about planets outside our solar system? How has the Earth changed over time? What do these changes mean for the evolution and survival of living things? How do geological processes shape planets? How do these processes contribute to life? How many habitable planets are there? How can we search for life? Harvard UniversityDimitar SasselovReceive an instructor-signed certificate with the institution's logo to verify your achievement and increase your job prospectsAdd the certificate to your CV or resume, or post it directly on LinkedInGive yourself an additional incentive to complete the courseedX, a non-profit, relies on verified certificates to help fund free education for everyone globallyAmazing course. It gives a strong foundation on how life might have arisen on Earth, and how to look for other habitable planets in the universe. This is a good introduction to astrobiology, with sections on life on Earth and the search for extrasolar planets, and how these two subjects come together to determine how we might look for life on other planets. The content is clear and informative, and the instructors are knowledgeable and engaging (including the guest lecturers). If humanity continues sucking up resources at its current rate, we will need a second planet to meet our material needs by 2030 and the equivalent of 2.8 planets by 2050. That's the conclusion of the World Wildlife Fund's biennial "Living Planet Report", which evaluates our ecological footprint-the total demand on Earth's ecosystems. The good news is, we can still turn things around.The WWF's ecological footprint metric tracks "the area of biologically productive land and water required to provide the renewable resources people use, and includes the space needed for infrastructure and vegetation to absorb waste carbon dioxide (CO2)." According to the organization, our footprint exceeded the planet's capacity by 50% in 2007. It has doubled in size since 1966. But humanity can still save itself-at least on the carbon footprint front:WWF is currently carrying out a new analysis that shows how it is possible to ensure that global temperatures stabilize at less than two degrees Celsius above pre-industrial levels whilst providing clean energy for the world. Using solutions with today's technology only, this involves some aggressive action to improve energy efficiency in buildings, appliances, transportation and industry...We estimate that such measures will allow 95 per cent of all energy to be provided from renewable sources.A stabilized temperature won't solve all of our problems, however. Even with reduced CO2 emissions, the report says we would still need two planets by 2050 if 9.2 billion people were to munch on the diet of today's average Italian. Why have Italians been singled out? We're waiting for a response from the WWF on that one, but presumably the answer is because it is a fairly average Western diet, and despite all that healthy olive oil, it's also high in meat and dairy. If the planet is to sustain all of us, we will have to make better use of existing land and sacrifice our penchant for meat and dairy products. That won't be easy, especially for developed countries. But until we find another Earth-like planet to settle on, it is a mathematical necessity.Ariel Schwartz can be reached on Twitter or by email. This site is not available in your country For nearly four years, NASA's Kepler spacecraft whisked through space, surveying our corner of the galaxy. It monitored more than 150,000 stars, looking for planets about the size of Earth that belonged to other solar systems. The mission didn't disappoint; Kepler found countless examples of a type of planet known as a super-Earth. These faraway planets might remind you of home — they're rocky, smaller than gas giants, located near their star and sport a relatively thin atmosphere. But they're way larger than the blue marble: These super-Earths are a honking two to 10 times bigger in mass than our Earth. Because there are so many super-Earths out there, it begs the question: What would happen to our planet if it were two or even 10 times the size it is now? Related: What if the Earth was flat?It's possible that Earth and the other inner planets of our solar system were headed in that direction, Mickey Rosenthal, a doctoral candidate studying planet formation at the University of California, Santa Cruz, told Live Science. One theory is that the gargantuan planet Jupiter became so large that it cut off access to cosmic building blocks needed to make the inner planets bigger — effectively starving them, Rosenthal said. No matter the reason for Earth's current size, there's no way to truly know what would happen to Earth if it were super. But scientists have some ideas based on what they've learned about our faraway cousins.For starters, you'd be shorter — you, Mount Everest and every tree in California's Sequoia National Park — because if you increase the size of a planet and keep everything else identical, gravity increases, too. If Earth were twice its size, you'd be heavier, because the force of gravity increases as the planet's density and radius increase. It would take more energy to resist gravitational pull, so the structures we have today wouldn't be strong enough to stand as tall as they do now. With a larger planet and stronger gravitational field, Earth would also experience more collisions, Rory Barnes, a theorist who studies planet habitability at the University of Washington, told Live Science. As a superplanet, Earth's greater gravitational pull would effectively attract more and larger asteroids, so "Armageddon-type" collisions would become more of a concern than they are now, Barnes said. If the hypothetical super-Earth were even bigger, say, 10 times its current mass, dramatic changes could start happening in Earth's interior. The iron core and liquid mantle would also be 10 times larger, and with more gravity acting on a larger mass, the pressure beneath Earth's surface would increase. This high pressure could cause the iron core to solidify, Barnes said. As of now, convection currents in our partially liquid core generate Earth's magnetic field. But if the core solidified, the currents would stop and the magnetic field could be weakened or eliminated, Barnes said. If our magnetic field faded or disappeared, it would be very bad for life on Earth, Barnes said. Our magnetic field "shields life on the planet from the nastiness of space," Barnes noted. Without it, charged particles flying through space, also called solar storms, could slam into Earth. And these tiny particles can cause all kinds of problems, including breaking up DNA and increasing the risk of cancer, he said.Barnes also pointed out that a larger interior could make super-Earth more volcanically active than it is now. As the radius of the planet increases, there's more energy inside and fewer places for that energy to escape. More volcanic eruptions wouldn't be surprising, he said. Plate tectonics, too, would be different on a super-Earth. But the exact effect is still an open question. A larger mantle would also be hotter, possibly causing more vigorous convection currents that would push plates around more. In contrast, it's possible that under the high pressure, the crust would be totally fused together and plate tectonics wouldn't exist at all.Based on the super-Earths that scientists have found so far, we can't really be certain Earth would even be habitable if it were a super-Earth. The Kepler space telescope was best at detecting planets close to their star — much closer than Earth is to the sun. Most super-Earths known to science are almost as close to their star as Mercury is to our sun. For Earth to be comparable, it would need to have an orbit of about 100 days, said Hilke Schlichting, an associate professor of astrophysics at the University of California, Los Angeles. That orbit might be habitable in systems with a star smaller than the sun, but if our Earth were that close to our sun, all of the water on the planet would vaporize, Schlichting said. In other words, Earth would be out of the habitable zone and, in essence, would become a steam planet, she said.Surprisingly, many of the super-Earths discovered so far seem to be water rich, like entire water worlds, Rodrigo Luger, the Flatiron Research Fellow at the Simon Foundation's Center for Computational Astrophysics in New York City, said in an interview. It's possible that these planets formed from large pieces of ice and then later migrated close to their stars, which prompted their ice to melt, he said. However, these planets might not be habitable, since their deep oceans plummet to a solid ice layer. This ice is not formed by low temperatures, but by the intense pressure of the super-deep ocean, which forces water molecules into a solid state. This ice layer blocks any interaction between the atmosphere and the planet's interior, meaning there is no carbon cycle (a process in which carbon cycled through the atmosphere, ocean, and crust) or no mineral exchange (which regulates Earth's long term temperature via an interaction between atmosphere and the mantle), according to Luger. That doesn't promote habitability — at least for life as we know it. The reality is that scientists have more questions about super-Earths than they have answers. And we don't fully understand the physics of our own interior, much less that of a planet many solar systems away, Luger said. We don't know what would happen if Earth were supersized or closer to the sun. But, so far, it seems very fortunate that we aren't living on a planet that's any of those things.Editor's note: This story was updated to note that if Earth were twice its mass, gravity would increase, but not by twice as much. Also, to clarify that super-Earths are planets that are between two and 10 times the mass of our planet.Originally published on Live Science.

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