

Here in the lab, we're big believers in testing. We test everything. Soil. Rock. Geosynthetics. Each other. And a recent conversation about testing got us to thinking: what is the big deal about testing? Is it a) measurement matters b) assessments help us determine truth c) it's fun or d) all of the above. If you guessed D, we'd agree. So, let's do an examination of examinations.

TRUE OR  FALSE:

## TESTING MATTERS

Any evaluation of evaluations has to start with the advent of the scientific method. And though there's been debate over variations of it, and certainly early historical accounts of observation and inquiry, most agree that it was ancient Greeks who engaged in the earliest forms of what is today recognized as rational theoretical science. Towards the middle of the 5th century B.C., some elements of scientific tradition were already heavily established. That was before Plato, a pretty impressive figure in his own right, mentored his student, Aristotle, who later argued the differences between inductive and deductive reasoning, and became the father of the whole concept of scientific method. You know, things like empiricism, universal truths, and scientific inquiry and demonstration.

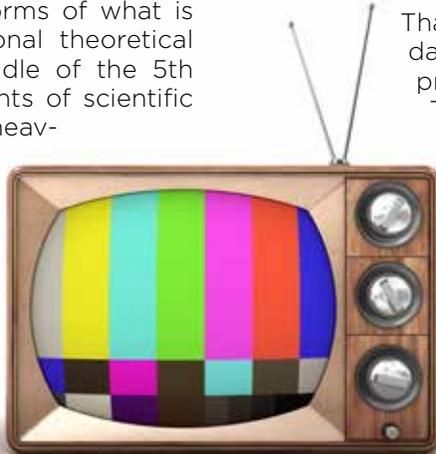
In the meantime, in the 3rd and 4th centuries B.C., the Greek physicians Herophilos and Erasistratus of Chios—thankfully no Starbucks barista had to note their names on a coffee cup—employed experiments to further their medical research. Erasistratus is remembered for his study of repeatedly weighing a caged bird and noting its weight loss between feeding times. We're just glad we weren't in that lab when the bird turned hangry.

### Let's get geotechnical

That's all very interesting, you may say, but what does this have to do with testing? Or, more importantly, geotechnical testing? Good questions, indeed. Leave it to you to keep us on point.

Humans were using soil as a material for flood control, irrigation, burial sites, building foundations, and likely mud pies, dat-

ing back to at least 2000 B.C. in ancient places like Egypt, Mesopotamia and the oddly named Fertile Crescent. As cities expanded, so did foundations, however they did so without any theoretical basis for soil design.



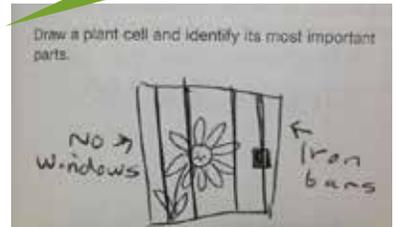
That is, until several foundation-related engineering problems (Hello, Leaning Tower of Pisa, we're talking to you), prompted scientists to take a more, well, science-based approach to examining the subsurface. The earliest advances occurred in the development of earth pressure theories for the construction of retaining walls. Henri

Gautier, a French Royal Engineer, recognized the "natural slope" of different soils in 1717, an idea later known as the soil's angle of repose. Of course, modern geotechnical engineering began in 1925 with Karl Terzaghi. The father of modern soil mechanics and geotechnical engineering, Terzaghi developed the principle of effective stress, and demonstrated that the shear strength of soil is controlled by effective stress, among other theoretical frameworks.

### Ancient Chinese secret?

Of course, our field isn't the only one with such heavy reliance on testing. The standardized test—or what would later become known as the bane of our existence, the SAT—was invented in ancient China. The imperial examination was developed to select able candidates for specific government positions in 605 A.D. It was abolished by the Qing Dynasty 1300 years later in 1905. Guess they'd found all the leaders they needed by then.

*"Dear Math, please grow up and solve your own problems, I'm tired of solving them for you."*



## Q+A

1. What is it that lives if it is fed, and dies if you give it a drink?
2. What is it that if you have it, you want to share it, and if you share it, you do not have it?
3. If a plane crashes on the border between the United States and Canada, where do they bury the survivors?
4. If you had only one match and entered a dark room containing an oil lamp, some kindling wood, and a newspaper, which would you light first?
5. If Mrs. John's bungalow is decorated completely in pink, with the walls, carpet, and furniture all shades of pink, what color are the stairs?
6. How could a man go outside in the pouring rain without protection, and not have a hair on his head get wet?
7. "The attorney is my brother," testified the accountant. But the attorney testified he did not have a brother. Who is lying?
8. What do you call a woman who knows where her husband is all the time?

{ answers on the back }

The British civil service was influenced by the Chinese imperial examination and recruited of civil servants based on merit, as defined by examination. Locally, standardized testing became widespread during both World War I and World War II, as tests were used to determine the mental aptitude of recruits to the military.

### How smart is that?

Then, of course, there's the intelligence test, designed to measure, uh, intelligence. Your intelligence quotient (IQ)—the abbreviation "IQ" was coined by the psychologist William Stern for the German term *Intelligenzquotient*, his term for a scoring method for intelligence tests at University of Breslau in 1912—is a score determined by dividing a person's mental age score, obtained by administering an intelligence test, by the person's chronological age, both expressed in terms of years and months. The resulting fraction is multiplied by 100 to obtain the IQ score. If you followed that, score an extra point for yourself.

In case you're wondering about the term "mental age score," French psychologist Alfred Binet, together with Victor Henri and Théodore Simon published the Binet-Simon test, in 1905, which focused on verbal abilities. It was intended to identify intellectual disabilities in school children, but in specific contradistinction to claims made by psychiatrists that these children were "sick" (not "slow") and should therefore be removed from school and cared for in asylums. The score on the Binet-Simon scale would reveal the child's mental age. For example, a six-year-old child who passed all the tasks usually passed by six-year-olds—but nothing beyond—would have a mental age that matched his chronological age, 6.0.

Interestingly, raw scores on IQ tests for many populations

Answers: 1. Fire, 2. A secret, 3. Survivors are not buried, 4. The match, 5. There are no stairs, because bungalows do not have a second floor, 6. He is bald, 7. Neither one, because the accountant was his sister, 8. A widow.

have been rising at an average rate that scales to three IQ points per decade since the early 20th century, a phenomenon called the Flynn effect. So that must mean we're all much "older" now. Wiser, too?



## TEST FOR FUN

You can't swing a dead cat without hitting an online test, whether a BuzzFeed quiz that probes what kind of tree you'd be or a social media quizlet that asks you to review colors. If you're all amped up on assessments after reading this, first thank you, and second, here are five of our favorites.

### What personality type are you?

[16personalities.com](http://16personalities.com)

### How emotionally intelligent are you?

[greatergood.berkeley.edu](http://greatergood.berkeley.edu)

### How smart are you?

[iqtest.com](http://iqtest.com)

### What should you do with your life?

[sokanu.com](http://sokanu.com)

### What's your sexuality?

[vistriai.com/kinseyscaletest](http://vistriai.com/kinseyscaletest)

## ASHES, ASHES

What do you get when you burn coal? Ashes, of course. And here at Geotechnics, we test a lot of Coal Combustion Products during the course of a week. Fly ash. Gypsum. Bottom Ash. And we're happy to help our clients determine the unique qualities of each variety. To learn more about testing CCP's or ask a question to stump the expert, give Randy O'Rourke a shout at (412) 823-7600.



Our three facilities serve projects across the country.	Pittsburgh – 544 Braddock Avenue • East Pittsburgh, PA 15112 • Phone (412) 823-7600 • <a href="mailto:nmelaro@geotechnics.net">nmelaro@geotechnics.net</a> or <a href="mailto:jpkline@geotechnics.net">jpkline@geotechnics.net</a>
	Raleigh – 2200 Westinghouse Boulevard • Raleigh, NC 27604 • Phone (919) 876-0405 • <a href="mailto:msmith@geotechnics.net">msmith@geotechnics.net</a>
	Nashville – 13 Industrial Park Drive, Suite 500 • Hendersonville, TN 37075 • Phone (615) 590-7695 • <a href="mailto:dsmith@geotechnics.net">dsmith@geotechnics.net</a>