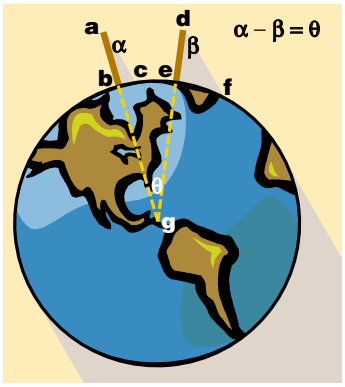
NOTES FROM THE EDITOR

Scott L. Melnick



One of my favorite stories to have made the Internet rounds is the one about a particular physics exam. According to the story (a confirmed urban legend—but still a great story), a question on an exam at the University of Copenhagen asked: "Describe how to determine the height of a skyscraper with a barometer."

One student answered that you should tie a long piece of string to the neck of the barometer and lower it from the roof of the skyscraper. The length of the string plus the length of the barometer will equal the height of the building.

The infuriated examiner failed the student, who then complained since his answer would indisputably yield the correct answer.

An arbiter decided to give the student another chance and called the student in and gave him six minutes to provide a verbal answer that showed at least a minimal familiarity with the basic principles of physics. The student sat quietly for five minutes before the arbiter reminded him that time was running out. The student explained he had several relevant answers, but couldn't decide which to use.

Finally, the student explained that you could take the drop the barometer off the roof, and measure the time it takes to hit the ground. The height of the building could then be derived using the formula $H = 0.5gt^2$.

Or, he added, you could tie a short piece of string to the barometer and swing it like a pendulum, first on the ground and then on the roof of the skyscraper. The height can be determined by the difference in the gravitational restoring force $T = 2\pi(1/g)^{1/2}$.

Or, you could walk up the emergency stairs, marking off the height of the skyscraper in barometer lengths, and then add them up.

And if you wanted to be boring and orthodox about it, you could use the barometer to measure the air pressure on the roof of the skyscraper and on the ground and convert the difference in millibars into feet to give the height of the building.

Of course, the best solution would be to simply knock on the janitor's door and say, "I'm willing to give you this nice new barometer if you tell me the height of this building."

According to the myth, the student was Niels Bohr, the most famous Dane to win the Nobel Prize for physics.

A number of schools are now participating in an exhibition to use similar creativity to derive the circumference of the earth. It turns out that more than 2000 years ago, Greek scholars used a fairly simple technique to arrive at an amazingly accurate answer. Essentially, the scholar, Eratosthenes, decided that since the earth was round, you merely needed to divide it into sections, measure the size of one section, and as long as you could determined the central angle of your slice, you could determine the number of sections in the entire circle and hence the circumference of the whole circle.

The technique he used was ingenious. Realizing that the sun was far enough away from the earth that its rays essentially struck all points in a more or less parallel manner, he and an associate placed two equal sticks in the ground at locations in two cities. Then, at high noon on the same day, they measured the length of the shadow. By subtracting the top angle formed in one city by the top angle formed in the other city, they determined the central angle as though the two sticks met in the center of the earth. After pacing out the distance between the two cities, he derived a pretty accurate number as to the actual circumference of the earth. For a more detailed explanation, visit

http://k12science.ati.stevens-tech.edu/noonday/details.html.

I thought it would be fun for MSC readers to duplicate the experiment. All you need is a partner in another city (it can be someone from your own company, a client, or even your cousin!). We'll also duplicate the experiment using a couple of AISC Regional Engineers. We've picked June 20th for the experiment. If you participate, send me your results. As incentive, we'll give whoever comes closest to the actual circumference of the earth two free registrations to next year's North American Steel Construction Conference (hey, we're talking a value of almost $1,000). We'll also send the next 25 closest calculations a free "Steel Fanatic" baseball cap.

If you have any questions, email me at melnick@aisc.org—although most of the answers can be found if you visit:

http://k12science.ati.stevens-tech.edu/noonday/details.html.

Scott Melnick

Editorial Contacts

Editorial Offices
Modern Steel Construction
One E. Wacker Dr., Suite 3100
Chicago, IL 60601
312.670.2400 tel
312.670.0341 fax

Editor & Publisher
Scott L. Melnick
312.670.8314
melnick@modernsteel.com

Senior Editor
Keith A. Grubb, P.E., S.E.
312.670.8318
grubb@modernsteel.com

Associate Editor
Karen Thornton
312.670.8316
thornton@modernsteel.com

Address Changes/Subscriptions
312.670.5444 tel
312.670.5403 fax
kingston@modernsteel.com

Advertising Contact

Account Manager
John A. Byrne
847.699.6049 tel
847.699.8681 fax
byrne@modernsteel.com

2400 E. Devon Ave., Suite 380
Des Plaines, IL 60018

To receive advertising information, contact John Byrne or view it online:
www.modernsteel.com

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