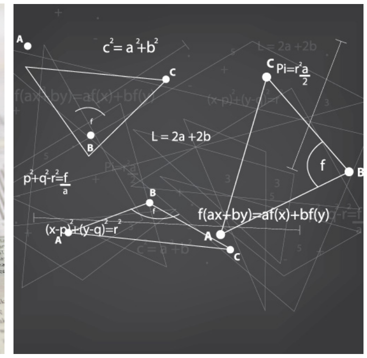
Cambridge College

SCHOOL OF EDUCATION

Math Matters

The Golden Ratio

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The Golden Ratio (a.k.a. Golden Mean) was discovered by the ancient Greeks and was considered a thing of great beauty. It was a ratio revered through the ages. A rectangle whose length-to-width ratio is the Golden Mean is a Golden Rectangle. [Sidebar 1: put a "co" in front of rectangle and you get co-rectangle because it is made from four correct a.k.a. right angles.] I've read that buildings constructed in the early nineteenth century had their window dimensions in this ratio because it made these buildings more aesthetically pleasing to the eyes – possibly a big deal to city newcomers.

But if it was the Greek mathematicians who created the Golden Rectangle, it was Western bankers who created the Gold Card. What we want to do is to see if there is any connection. This will require both algebraic and geometric manipulation – in the right proportions of course.

First the algebra: A line-segment [A, C] divided by point B so that AB/BC = AC/AB is divided into Golden Ratio proportions. By letting x = AB and making the distance from B to C = 1, we have x/1 = (x + 1)/ x. See Figure 1 which is helpful. Cross-multiplying yields the quadratic $x^2 - x - 1 = 0$. Applying the quadratic formula gives us: x = (1 + √5)/2. [Sidebar 2: the other solution to the quadratic equation, (1 – √5)/2, interestingly, is the additive-inverse of its multiplicative-inverse.] This is an irrational number which we will prove in our next installment using only geometric means (no pun intended).

Figure 1 A ———————— B ———— C

The Golden Rectangle has proportions 1 by x. It is well known and easily proved that if one cuts a square from the Golden Rectangle the remaining rectangle is similar to the original – golden but less gold (i.e., we get a smaller golden rectangle). Hence, one way to determine if a gold card is a Golden Rectangle is to take a credit card, snip-off a square shape, and compare the remaining rectangle somehow with the original. But on second thought, this may not be a good idea. Instead we turn to geometry.

Take one of your credit cards and trace it on a page of paper. Label its end-points A, B, C, & D as in Figure 2. The height of your traced rectangle will be 1 by agreement. Using a compass, (the circle-making kind – unless, of course, you find yourself lost), drop the rectangle's height onto its base creating a square within. Bisect the base of this square, and label the midpoint A'. Now place the needle-end of your compass at A' and the pencil-end at D. Your compass should span the hypotenuse of the triangle A, A', D. From Pythagoras' Theorem, the length of this line-segment is √ (1 + ¼) = ½ √5. Swinging the pencil-end of your compass so that it lands on the rectangle's base, marks a distance of ½ + ½ √5. The Golden Ratio! The only remaining question is did the pencil-end of your compass end at B? Yes, No, Close? If it didn't, ask for a platinum card and try again!

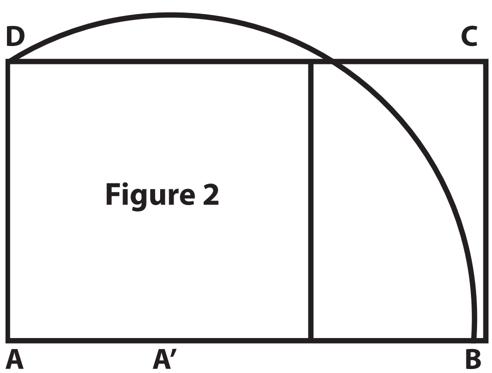

Figure 2

Future editions of the Math Newsletter will be only distributed electronically. To access these, please visit the news and events section, which can be found under *About Cambridge College* at **cambridgecollege.edu.**

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We hope you enjoy the third installment of the Cambridge College Mathematics Newsletter. Our hope is to share interesting articles and information on math topics for middle and high school teachers and students.

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Master of Education in Mathematics (1-6, 5-8, or 8-12)

Initial Licensure

Credits: 33 **Credits for Licensure: 38**

The Mathematics Education program prepares students to effectively teach mathematics at the elementary (1-6), middle (5-8), and high school levels (8-12). Students learn the concepts, language, and procedures of mathematics; and develop competence in mathematics and interest in applying it to the world around them. The program builds on the College's successful student-centered curriculum that links theory and practice in a collaborative learning environment.

Master of Education in General Science (1-6 or 5-8)

Initial Licensure

Credits: 32 **Credits for Licensure: 35**

The General Science Education program provides essential science content, integrated with best practices in hands-on, inquiry-based science education. The curriculum is firmly rooted in the Massachusetts science education model with a balance of earth, life, physical and engineering sciences. Students experience a blend of seated and online content science courses.

At Cambridge College locations outside of Massachusetts, the above programs are currently non-licensure only.

STEM Certificates

Mathematics Specialist Certificate

Credits: 12

This program is best suited for current classroom teachers who wish to add mathematics as a new subject area to their professional skills and to new teacher candidates entering the teaching profession who are non-mathematics majors.

STEM Certificate

Credits: 12

The STEM Certificate in Science, Technology, Engineering and Mathematics provides early childhood, elementary, special education and middle school educators with the core background skills and content knowledge necessary to become highly-qualified mathematics, science and engineering educators serving our younger students. The courses combine math, science and engineering content with methodology at the elementary and middle school levels. The 12 graduate credits include both seated and online courses, making for a very user friendly learning experience.

For more information on the School of Education's STEM Degree and Certificate Programs, contact admissions at 1-800-829-4723.

The Teacher Education Program at Cambridge College is awarded TEAC accreditation by the Inquiry Brief Commission of the Council for the Accreditation of Educator Preparation (CAEP) for a period of five years, from May 2014-May 2019. The accreditation does not include individual education courses that the EPP offers to P-12 educators for professional development, re-licensure, or other purposes.