The Problem Solver

Mathematical Problem–Solving Newsletter for High School Students and Teachers

FREE ONLINE MATHEMATICS DIAGNOSTIC TESING SERVICE THROUGH CAL STATE FULLERTON

The Mathematics Diagnostic Testing Project (MDTP) is available online and offers assessments for students in grades 6–12 that will identify any misconceptions in math content critical for advancing to the next level of the math sequence. Fall is a good time to use the <u>free</u> MDTP tests to reveal strengths with which your students begin the school year as well as areas where students need help or "additional learning."

The MDTP site at Cal State Fullerton can assist your math department to set up online testing accounts that will allow teachers to assess their students and get the results that can be analyzed and shared as a Professional Learning Community (PLC) of those teaching the same course.

Teachers who wish to assess the mathematical understanding of students with limited English but fluent in Spanish may access many of the MDTP tests translated into Spanish.

MDTP FIELD TESTERS NEEDED

The Mathematics Diagnostic Testing Project (MDTP) relies on teachers to field test assessments developed by the MDTP Test Development Group. Statistical analyses of the results allow our MDTP statisticians to identify items that are good predictors of student success in the next course in the secondary school math sequence.

- Assessment of Preparedness *Field Test for 8th Grade Mathematics (8M4OD25)
- Second Year Algebra Readiness Field Test* Parallel Versions D, E, and F (SR45D25, SR45E25, SR45F25)
- Quantitative Reasoning Readiness *Field Test (QR45D25)
- Calculus Readiness Field Test* (CR45D25)

To be an MDTP field tester, please email the CSUF MDTP Coordinator at mdtp@fullerton.edu.

FALL MATH ASSESSMENTS FOR MIDDLE SCHOOL

The Math Diagnostic Testing Project (MDTP) offers free assessments for fifth, sixth, seventh, and eighth grade students that provide feedback for teachers on concepts mastered and concepts with incomplete learning. For 5th grade we have the Assessment of Preparedness for 6th Grade Math; for 6th grade we have the Grade 7 Math Readiness Test; for 7th grade we have the Grade 8 Math Readiness Test; and for 8th grade we have the Algebra 1/Integrated Math 1 Readiness Test.These assessments can be given in the fall to identify concepts students should know to begin their new course, providing teachers with specific items needing a quick review or deeper learning.

All assessments are online and can be accessed at:
https://mdtp.ucsd.edu/assessments/readiness-tests.html.

Contact the MDTP site at Cal State Fullerton to get help with setting up an account and registering your students to take the assessments.

FALL MATH ASSESSMENTS FOR HIGH SCHOOL

The Math Diagnostic Testing Project (MDTP) offers free assessments for high school students that provide feedback for teachers on concepts mastered and concepts with incomplete learning. MDTP assessments are available for a traditional math sequence or integrated math sequence. These assessments can be given in the fall to identify concepts students should know to begin their new course, providing teachers with specific items needing a quick review or deeper learning.

All assessments are online and can be accessed at:
https://mdtp.ucsd.edu/assessments/readiness-tests.html.

Contact the MDTP site at Cal State Fullerton to get help with setting up an account and registering your students to take the assessments. Here is a sample problem from the Mathematical Analysis Readiness Test:

If $9^x = 3^{1-2x}$, then $x =$

(A) $-\dfrac{1}{3}$

(B) $-\dfrac{1}{4}$

(C) $\dfrac{1}{4}$

(D) $\dfrac{1}{3}$

(E) $\dfrac{1}{2}$

The entire practice test can be accessed on the MDTP Diagnostic Testing platform. Please contact the CSUF MDTP coordinator for access.

MDTP ASSESSMENTS

Grade–Level Assessments of Preparedness
- Assessment of Preparedness for 6th Grade Mathematics (6M35A2O*)
  available in Spanish
- Assessment of Preparedness for 7th Grade Mathematics (7M4OA24, 7M4OA15*)
  available in Spanish, Armenian, Russian, Ukrainian, Korean
- Assessment of Preparedness for 8th Grade Mathematics (8M4OA15*)
  available in Spanish
- Assessment of Preparedness Field Test for 8th Grade Mathematics** (8M4OD25)

Course–Level Readiness Tests
- Algebra 1/Integrated Math 1 Readiness Tests Parallel Versions (AM45A24, AM45B24, AM45C24)
- Algebra 1/Integrated Math 1 Readiness Test (AM45A19*)
  available in Spanish
- Geometry Readiness Test (GR45A19*)
  available in Spanish
- Integrated Second Year Readiness Test (ISR45A2O*)
  available in Spanish, Armenian, Russian, Ukrainian, Korean
- Second Year Algebra Readiness Field Test** Parallel Versions (SR45D25, SR45E25, SR45F25)
- Second Year Algebra Readiness Test (SR45A19*)
  available in Spanish
- Integrated Third Year Readiness Test (ITR45A2O*)
  available in Spanish
- Quantitative Reasoning Readiness Field Test** (QR45D25)
- Precalculus Readiness Test (PR45A22)
- Calculus Readiness Field Test** (CR45D25)
- Calculus Readiness Test (CR45A12)

9th Grade Assessments
- 9th Grade Assessment (9A4OA19)
- Geometry Assessment (GA4OD19)
- Integrated Second Year Assessment (ISA4OD19)

Written Response Items

Formative Constructed Response Items

Learn more about these assessments [here](#).

Contact our office for help accessing these assessments: mdtp@fullerton.edu.

OPPORTUNITY FOR YOUR MOST TALENTED MATH STUDENT(S)

If you have a unique student for whom the content is trivial and is seeking to be challenged mathematically, consider encouraging that student to attend the Fullerton Mathematics Circle. Under the guidance of internationally recognized mathematician, Dr. Bogdan Suceava and CSU Fullerton mathematics majors, middle and high school students tackle mind-stretching math problems designed to expand their knowledge of algebra, number theory, probability, and geometry. The Circle meets at Cal State Fullerton on Saturdays, once a month. Parents seeking opportunities for their exceptional child to expand their mathematical knowledge and experience, will appreciate knowing about the Fullerton Mathematics Circle.

### Fullerton Mathematical Circle
Department of Mathematics
Coordinators: Dr. Shoo Seto and Dr. Bogdan Suceavă

Meeting in Room MH 390
Main Campus, CSUF

CALIFORNIA STATE UNIVERSITY
FULLERTON

Our Tradition and Our Goal

Fullerton Mathematical Circle (established in September 2011) has already built a tradition of excellence and academic quality. Our Math Circle is an outreach program of the Department of Mathematics at Cal State Fullerton offering a free enrichment program to interested young gifted mathematicians. The project consists of offering mathematical sessions for gifted middle school and high school students. In our real-life events, each session begins with a mini-lecture, and then the students are divided into small groups thereby enabling active engagement in the problem solving process. We are currently focusing our sessions on challenging and interesting problems accessible at high-school level, as presently explored in California curriculum, although many of our themes could be accessible to interested middle-school students who are familiar with fundamental algebra. For more information, contact Prof. Bogdan Suceava at bsuceava@fullerton.edu. You are welcome to join at any time, as our sessions are designed to be independent from one another.
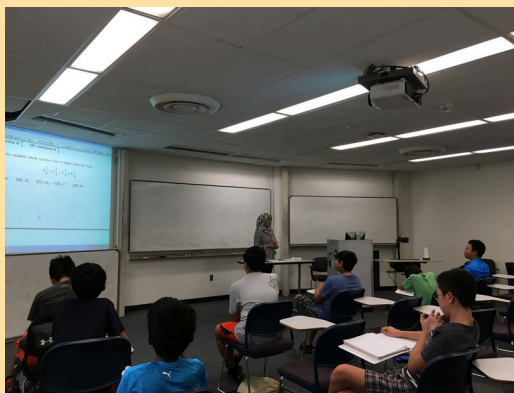
This image is from one of our previous Math Circle sessions, from a workshop for students in grades 7-8.

Our Events in the Fall of 2025

In the Fall 2025, our meetings will take place Saturday morning, from 10:00 am to noon, on the following dates
- September 6
- September 13
- September 27
- October 11
- October 25
- November 8
- December 13

Additionally, our students who already built a portofolio of solutions to problems or other nice mathematical ideas are encouraged to participate to present their work. One of the interesting events we are recommending you to consider is the following venue, which will host a Student Presentations:
- October 18: the MAA Meeting at Cal State Fullerton, see http://sections.maa.org/socalnv/

MASTER OF ARTS IN MATHEMATICS

The Master of Arts in Mathematics provides advanced study for students with one or more of the following interests: a Ph.D. programin mathematics or mathematics education, teaching in high schoolor community college, or using mathematical analysis in government, business or industry. Three options are offered under the Master of Arts in Mathematics program: (1) Teaching, (2) Applied Mathematics, and (3) Statistics.

The Teaching Mathematics option is designed for those individuals who are presently teaching mathematics at the secondary or community college level. Students must have completed courses in linear algebra, modern algebra, and advanced calculus with at least a "B" (3.0) average. In addition, students should have completed a minimum of one year of full-time teaching.

The Applied Mathematics option is designed specifically for individuals who are seeking, or who currently hold positions that involve mathematics or quantitative applications. Students must have completed one semester of mathematical probability and one semester of advanced calculus with grade of "B" (3.0) or better in each course.

The Statistics program is designed for full-time and part-time students seeking to meet the growing demand for professionals with knowledge and training in data science and quantitative analysis. There are excellent job prospects for graduates of the program in industry, business, and government agencies. The courses must be selected from our regular course offerings at the undergraduate and graduate level.

For more information about the Masters of Arts in Mathematics program at California StateUniversity, Fullerton, write to the following coordinators at:

Department of Mathematics
California State University, Fullerton
800 N. State College Blvd.
Fullerton, CA 92831

(1) Teaching – Dr. Armando Martinez-Cruz
(2) Applied Mathematics – Dr. Charles Lee
(3) Statistics – Dr. Mori Jamshidian

Math Master's Degree Programs website:
https://www.fullerton.edu/math/programs/

ENROLL AS A MATHEMATICS MAJOR AT
CALIFORNIA STATE UNIVERSITY, FULLERTON

California State University, Fullerton offers several concentrations as mathematics major:

(1) Pure Mathematics Concentration, for the student planning on pursuing an advanced degree in mathematics.

(2) Applied Mathematics Concentration, for the student planning on a career in business, industry, or government

(3) Probability and Statistics Concentration, for the students planning on a career in an industry using mathematics as an analytic or descriptive tool, e.g. actuarial science.

(4) Teaching Mathematics Concentration, for the student planning to teach at the secondary school level.

(5) Actuarial Science Concentration, for students who seek a career in analyzing the financial costs of risk and uncertainty in the insurance industry.

For more information about applying at California State University, Fullerton as Mathematics major, write to:

Dr. Adam Glesser, Chair
Department of Mathematics
California State University, Fullerton
P.O. Box 6850
Fullerton, CA 92834–6850
Math Department website: http://math.fullerton.edu

MATHEMATICS TEACHERS NEEDED!

Make a difference; add to your enjoyment of life; multiply the benefits of teaching; divide your time along interesting math courses; and feel the power of accomplishment, thus bringing order to your life goals.

HIGH SCHOOL MATH TEACHERS:

If any of your senior students are planning to attend California State University, Fullerton as a Math major for the Spring 2027 semester and want to be a high school math teacher, let us know so that we can help them in the advising process. Either you or the students may contact Dr. Cherie Ichinose (**cichinose@fullerton.edu**) to convey this information. Please provide the names of interested students and their high schools. If they wish to be contacted, include their email addresses.

RESEARCH STUDY

Science and Mathematics high-school teachers

We invite you to participate in our survey on data science education and teacher training. Your insights will help shape the future of data science education!

ELIGIBILITY

- Current teacher, past teacher, or teacher candidate
- Math, science, and/or computer science teachers

STUDY REQUIREMENT

Complete a short 10-15 minute survey

QUESTIONS?

Contact: Datascienceforhs@gmail.com

SCAN OR CLICK THE QR CODE TO ACCESS THE SURVEY
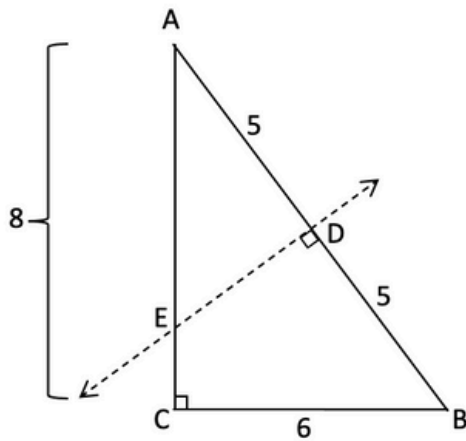
SURVEY WILL BE AVAILABLE UNTIL DECEMBER 1ST, 2025

IRB #HSR-24-25-370

In right triangle ABC with hypotenuse $\overline{AB}$, $AC = 8$ and $BC = 6$. Point D is the midpoint of $\overline{AB}$, and the perpendicular bisector of $\overline{AB}$ intersects $\overline{AC}$ at E. Compute DE.
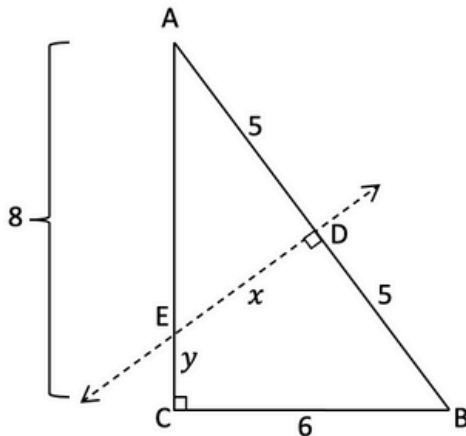
SOLUTION

Solution 1

$$(AC)^2 + (BC)^2 = (AB)^2$$
$$8^2 + 6^2 = (AB)^2$$
$$100 = (AB)^2$$
$$10 = AB$$

$\therefore AD = BD = 5$ since $\overleftrightarrow{ED}$ is   the perpendicular bisector of $\overline{AB}$.

Since $\angle B$ and $\angle AED$ are both complements of $\angle A$, they are congruent to each other, so $\triangle ACB \sim \triangle ADE$ by the AA similarity property.

$$\therefore \frac{BC}{DE} = \frac{AC}{AD}$$
$$\frac{6}{DE} = \frac{8}{5}$$
$$8DE = (6)(5)$$
$$DE = \frac{30}{8} = \frac{15}{4}$$

Solution 2

Let $DE = x$ and $EC = y$. Note that $EB = EA$ since E is on the perpendicular bisector of AB.

1) $(8 - y)^2 = x^2 + 5^2$
2) $(8 - y)^2 = y^2 + 6^2$

Solving for y:
$$64 - 16y + y^2 = y^2 + 36$$
$$64 - 36 = 16y$$
$$\frac{28}{16} = y$$
$$\frac{7}{4} = y$$

Substituting into 1):
$$\left(8 - \frac{7}{4}\right)^2 = x^2 + 25$$
$$(\frac{32 - 7}{4})^2 = x^2 + 25$$
$$\frac{625}{16} - \frac{400}{16} = x^2$$
$$\frac{225}{16} = x^2$$
$$\frac{15}{4} = x$$