$\sqrt{CCML}$ Video Contest – Meet 3 2024-2025

Guidelines

- Students from each half of your team (frosh/sophomore or junior/senior) from your school may submit up to two videos on the given problem. Each video submitted must be produced by different students, but must all be from the appropriate grade band. If your school decides to submit two f/s videos, there should be different students in each video.

- Each video should be no more than SIX minutes in length. Note that this does not mean that you have to fill the entire six minutes.

- The problems are to be solved and the videos produced by student groups. The bulk of the work should be done by students. A parent or teacher holding a camera is fine, but solving a problem for the students is not.

- Videos must be produced by a group of at least two students, and at most five students. Each participating student's contribution should be made evident either from an appearance in the video or a credit at the beginning or end of the video. Indicate names of all students involved (maximum of 5) in credits or introductions at the beginning or end of the video.

- The top f/s video and j/s video from your school with earn points for your overall team score according to the attached rubric.

- Creative solutions and presentations are encouraged, but correct math is paramount. Please make the focus of your video the mathematics. If you have a creative context, great, but it should not be the focus of your video. Soundtracks should not distract or interfere with the explanation of the solution.

- Note that calculators can generally be used for exploration and conjecture, but rigorous solutions are required to earn full credit. It is generally not sufficient simply to refer to a graph or use a solver when completing a problem.

Submission

- Coaches should ensure that no more than two videos per grade band are submitted.

- **Make sure that videos are viewable by anyone with the link!**

- Coaches should upload videos to Google drive and share access with Michael Caines (macaines@cps.edu). Please use the following naming conventions for the videos: **school_level_teamnumber_contestnumber_year**. For example, a submission for CCML 3 for a f/s team from Kelly in the 2015−2016 school year should be named as follows, **kelly_fs_team1_contest3_1516**. A submission from a j/s team from Lakeview should be named **lakeview_js_team1_contest3_1516**

- **All submissions must be shared by 5pm on Tuesday, January 21, 2025.**

Please direct any questions about the contest to Michael Caines (macaines@cps.edu). Coaches who are interested in helping judge the submissions should email Michael Caines by the submission deadline.

Problems:

- **Frosh/Sophomore Problems:**

(a) How many diagonals does a regular dodecagon have?

(b) If three vertices of a regular dodecagon are chosen at random, what is the probability that they are vertices of a right triangle?

(c) If three diagonals of a regular dodecagon are chosen at random, what is the probability that they are mutually parallel?

- **Junior/Senior Problems:**

In the following problems, $\langle x, y \rangle$ denotes a two-dimensional vector with $x, y \in \mathbb{R}$.

Let $f\left(\langle x, y \rangle\right) = \left(\frac{1}{x^2 + y^2}\right)\langle x, -y \rangle$ and $g\left(\langle x, y \rangle\right) = \langle x^2 - y^2, 2xy \rangle$.

(a) Determine any fixed points of f.

(b) Determine any fixed points of g.

(c) Solve $f\left(<x, y>\right) = g\left(<x, y>\right)$ for $<x, y>$.

Bonus question: What is this problem *really* about?

CCML Video Contest Rubric

Team Name: _____ Contest:_____ Year:_____

	0	1	2	
Part (a)	• No attempt is made, or the work contains profound errors.	• Problem contains some good work, but also nontrivial errors. • Explanation of work is unclear.	• Problem contains only trivial errors or no errors. • Explanation of work is clear.	

	0	1	2	3
Part (b)	• No attempt is made, or the work contains profound errors.	• Problem contains some good work, but also multiple nontrivial errors. • Explanation of work is unclear.	• Problem contains no more than one nontrivial error. • Explanation of work is generally clear.	• Problem contains only trivial errors or no errors. • Explanation of work is clear.

	0	1	2	3
Part (c)	• No attempt is made, or the work contains profound errors.	• Problem contains some good work, but also multiple nontrivial errors. • Explanation of work is unclear.	• Problem contains no more than one nontrivial error. • Explanation of work is generally clear.	• Problem contains only trivial errors or no errors. • Explanation of work is clear.

	0	1	2
Presentation	• Images are sloppy or out of focus. • Audio is difficult to hear.	• Audio/video are clear. • Presentation is organized well	• Presentation is truly creative and engaging.

Score: _____ / 10

Notes: