

\sqrt{CCML} Video Contest – Meet 4 2020-2021

Guidelines

- Students from each half of your team (freshman/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 will 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.

Submission

- Coaches should ensure that no more than two videos per grade band are submitted.
- Coaches should upload videos to Google drive and share access with Michael Caines (macaines@cps.edu). **You must set the permissions on the video so that anyone with the link can view.** 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, March 2, 2021.**

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:

- **Freshman/Sophomore Problems:**

- (a) What is the distance between the lines given by $y = x - 2$ and $y = x + 2$?
- (b) Give the length of the shortest path in the plane that starts at $(1,1)$, touches the x -axis, and then touches the y -axis, before finally ending at $(2,5)$.
- (c) A road is to be built from Dotsville at $(-5, 5)$ to Pointsburg at $(5, -2)$. However, the River Vertical, given by $1 \leq x \leq 2$, and the River Horizontal, given by $3 \leq y \leq 4$, are in the way. Accordingly, two bridges will need to be built, each crossing perpendicular to a given river.

What is the length of the shortest possible road from Dotsville to Pointsburg?

- **Junior/Senior Problems:**

- (a) For sequence $\{q_n\}$, $q_1 = 2$ and $q_2 = 1$. Let A be the value of $\sum_{n=1}^{10} q_n$ if $\{q_n\}$ is an arithmetic sequence, and let G be the value of $\sum_{n=1}^{10} q_n$ if $\{q_n\}$ is a geometric sequence. Determine A and G .

- (b) Let $\{a_n\}$ be a geometric sequence with $a_1 = 1$ and $a_4 = 2$. Give the sum of all possible complex values of $\sum_{n=1}^{10} a_n$.

- (c) Compute, with justification, $\sum_{n=1}^{\infty} \frac{2n}{3^n}$.

CCML Video Contest Rubric

Team Name: _____ Contest: _____ Year: _____

Part (a)	0	1		2
	<ul style="list-style-type: none"> No attempt is made, or the work contains profound errors. 	<ul style="list-style-type: none"> Problem contains some good work, but also nontrivial errors. Explanation of work is unclear. 	<ul style="list-style-type: none"> Problem contains only trivial errors or no errors. Explanation of work is clear. 	
Part (b)	0	1	2	3
	<ul style="list-style-type: none"> No attempt is made, or the work contains profound errors. 	<ul style="list-style-type: none"> Problem contains some good work, but also multiple nontrivial errors. Explanation of work is unclear. 	<ul style="list-style-type: none"> Problem contains no more than one nontrivial error. Explanation of work is generally clear. 	<ul style="list-style-type: none"> Problem contains only trivial errors or no errors. Explanation of work is clear.
Part (c)	0	1	2	3
	<ul style="list-style-type: none"> No attempt is made, or the work contains profound errors. 	<ul style="list-style-type: none"> Problem contains some good work, but also multiple nontrivial errors. Explanation of work is unclear. 	<ul style="list-style-type: none"> Problem contains no more than one nontrivial error. Explanation of work is generally clear. 	<ul style="list-style-type: none"> Problem contains only trivial errors or no errors. Explanation of work is clear.
Presentation	0		1	2
	<ul style="list-style-type: none"> Images are sloppy or out of focus. Audio is difficult to hear. 		<ul style="list-style-type: none"> Audio/video are clear. Presentation is organized well 	<ul style="list-style-type: none"> Presentation is truly creative and engaging.

Score: _____ / 10

Notes: