$\sqrt{CCML}$ Video Contest – Meet 5 2016-2017

The CCML is pleased to announce the CCML Video Contest for the 2016 − 2017 season. Each half (freshman/sophomore or junior/senior) of your team can submit up to two video solutions to the problems below.

Judging

The video submissions can earn your team points toward your overall total on contest day. Here are the 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 FOUR minutes in length for the f/s problem, and no more than SIX minutes in length for the j/s problem.

- 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.

- Points will be awarded as follows.

    - Videos will be ranked by correctness of solution, thoroughness of explanation, and creativity. You do not have to prove everything that you say, but justification of big ideas is important when possible. The top videos will earn 5, 4, 3, 2, or 1 points each, respectively, for placing in the top five.

- 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 select the best two videos for each grade level to submit for judging.

- 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, March 28, 2017.**

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 Problem:**

(a) Consider the 3-dimensional figure with vertices $N(0,0,0)$, $I(0,2,0)$, $C(0,2,3)$, $E(0,0,3)$, $M(6,0,0)$, $A(6,2,0)$, $T(6,2,3)$, $H(6,0,3)$. Compute the length NT.

(b) Give the same figure as in part (a), determine the tangent of $\angle HNT$.

(c) Given regular tetrahedron $OWME$ with P the midpoint of $\overline{OE}$, determine the tangent of $\angle PMW$.

- **Junior/Senior Problem:**

(a) If the zeros of $x^3 - 6x^2 + kx + 42$ form an arithmetic progression, determine the value of k.

(b) If z is a (possibly nonreal) zero of $x^4 + x^3 + 5x^2 - 10x + 6$, then $2z$ is a zero of $x^4 + bx^3 + cx^2 + dx + e$. Compute $b + c + d + e$.

(c) Give all values of x such that $x^6 = 1$ but $x^3 \neq 1$.