NAME:_____

A Great MATH Debate!

The time has come to put your mathematical skills to the ultimate test—in a debate! You and your team will construct an argument defending/promoting your client. Your arguments must be solid, grounded in math, and clear.

Which is the bigger threat to humanity, overpopulation or outbreak? Consider:

1. A disease outbreak began (with one case) in December of last year. The disease then rapidly spread. By September, more than 8,000 cases are reported. Let $x = 0$ represent last December (when there was only one case).

2. The population of Earth is said to have reached 2 billion by 1927. Research more data about the global population growth on Earth. Let x=0 represent 1927.

Can you model the data to make predictions? Which is the bigger threat?

Your team will present your case to the class on _____ .

You are welcome to use the board, poster paper, markers, etc in your presentation. Make sure there is a strong component of math in your reasoning. This should include any appropriate graphs and calculations/predictions.

Points will be earned for
*Excellent, prepared presentations
*Well explained mathematical reasoning
*Convincing arguments
*Thoughtful responses to other teams' arguments
*Respectful listening

Points will be deducted for
*Lack of preparation
*Arguments without warrants
*Talking out of turn
*Unprofessionalism/distractions

Our Growing Population

It took most of human history for the Earth's human population to reach 1 billion. This occurred in 1804. By 1927, the population had already grown to 2 billion. Human population has continued to grow at an increasing rate, and in 2011, scientists estimated that the global population reached 7 billion. Is this a problem?!

1) Let x=0 represent the year 1927. What x-value will represent the year 2011?

2) Create an equation of the form $y = ae^{kx}$ to model the population growth using the given information, where the input (x) represents the number of years since 1927 and the output (y) is the Earth's population in billions. *(Find values for* a *and* k *that create an exponential equation that will model the data.)*
   Please round your *k* to 4 decimal places.

A Shrinking Population

The World Health Organization (WHO) reported an Ebola outbreak in Africa beginning in December 2013, when one two-year old child died of the disease. The disease then rapidly spread. By September of 2014, just over 8,000 cases were reported.

1) Let x=0 represent the month December of 2013 (when there was only one case). What x-value will represent
   a. September of 2014?
   b. February of 2015?

2) Create an equation of the form $y = ae^{kx}$ to model the growth of Ebola cases using the given information, where the input (x) represents the number of months since December of 2013 and the output (y) is the number of Ebola cases. *(Find values for* a *and* k *that create an exponential equation that will model the data.)*
   Please round your *k* to 4 decimal places.

DEBATE ROLES

1. OPENING SPEAKER – This student presents the initial case for her team. As this is the first speech, it can be pre-written. The speech should have at least three arguments, with warrants, supported by mathematical or textual evidence.

   Time: 3 minutes

2. QUESTION ASKER – This student asks questions of an opposing team. Some of these questions can be prepared ahead of time, though the best questions are inspired by the statements made in the opposing team's opening arguments.

3. QUESTION ANSWERER – This student is responsible for answering the questions of the opposing team. She will need to be able to think quickly on her feet and will ideally use evidence to make strong answers to the questions posed.

   Time: 5 minutes

4. CLOSING SPEAKER – This student provides a summary of the reasons why her team should win the debate. Given the often unpredictable nature of debates, this student will have to be skilled at producing a persuasive speech based on the arguments that have been created in the debate.

   Time: 2 minutes

5. TEAM MANAGER – This student is responsible for the entire team. They should make sure everyone knows their roles well, help teammates in developing arguments, remind team members to be on time, and be ready to stand in for any absent team members on the day of the debate. (It is good to request copies of all work/speeches from teammates!)