Problem of the Month
Friends You Can Count On

Level A:

The friends in your class like to exchange stickers. You decide to give each classmate three stickers. You have 19 classmates. How many stickers will you need?
Show how you figured it out.

Your best friend decides to give each classmate 4 stickers. How many will your best friend need to give away?

Two more classmates join your class. You and your best friend give them stickers also. How many total stickers were exchanged? Explain how you figured it out.

Your younger brother wants to give some stickers to his classmates. Explain to him how to figure out how many he needs to bring to class.

Level B:

You and your friend went to a frozen yogurt store. You both like to get frozen yogurt cones with different toppings. The store has a sign showing the different kinds of cones, yogurt and toppings you can buy:

Cones	Yogurt	Toppings
Sugar Cone	Vanilla	Oreo Cookie
Chocolate Dip Cone	Chocolate	Reese's Pieces
	Strawberry	Rainbow Sprinkles
		Gummy Bears

You and your friend wonder how many different cones you can make? Find all the different combinations of cones, yogurt and toppings you can make and explain how you know you have found all of them.

How would your numbers change if the store added a waffle cone? Explain.

Level C:

You have a friendship club. There are 12 members in your club. The 12th day of each month, you have a friendship call. Each member of the club talks to every other member that day by phone. This way everybody expresses his or her friendship with each other. How many conversations are made on that day?

How many conversations occur each year? Show how you figured it out.

If the club adds four new friends, how many conversations will occur each month? Explain your solution.

Suppose another friendship club likes your friendship conversation idea, but wants to know how they can figure out how many conversations will occur given any number of members? Explain how they can figure out the total number of conversations for each month.

Level D:

Your school has a lunchtime spirit rally each month. To encourage students to attend the rally, there is a drawing for a pizza lunch with you and your five friends. You and your friends have decided that no matter whose ticket is selected, the six of you will choose each other to share in the pizza party. You estimate that about 150 students attend the rally.

What is the probability that you personally win the lunch for your friends?

What is the probability that you will get to attend the pizza lunch this month?

What are the chances that none of you get a pizza lunch this month? Show how you found your answers.

What are the chances that you and your friends will win three pizza lunches three months in a row? Explain your solution.

In your history class, you are studying exploration to the New World. Your teacher has planned to celebrate Columbus Day by awarding a pizza lunch for two to the best essay writer on the life and voyages of the explorer. You and your best friend are in the same class and have agreed to share lunch with each other if either essay is selected. Suppose all of the 28 students have an equal chance of having their essay selected, what are your chances of having a free pizza lunch during the month of October? Explain your method.

Explain how you might improve your chances of winning a free pizza lunch. Use mathematics in your explanation.

Level E:

A survey was conducted by the local newspaper in your community. The survey sampled students in your school about the use of drugs. It stated that through the anonymous survey that 12% of the students indicated that they experimented with or currently use drugs. The survey has alarmed the community. Parents and community members are very concerned. The school board has been discussing the issue of drugs. They want to take strong action.

You have just learned that the school board is considering requiring a drug test for all the 1,200 students who attend your school. A test would be given twice a year. If a student failed the drug test, then the student would be expelled from school.

Most of the students are upset and nervous about such a test. They are saying, "How do we know the tests are accurate?" "What if you are taking medication for some ailment, will that indicate that you are taking illegal drugs?" "What happens if you get a false positive reading?" "How long after you take a drug will the test show positive?" "What if you stopped taking a prescribed drug for more than three months, will you still test positive?"

You want to be a friend to your school and classmates.   You know that this drug test will cause a crisis at your school. The school board feels a lot of pressure to take action. You want to stop the school board from voting for this drug test. You know it will take a convincing argument to change their minds. If you are not careful in your presentation, it may look like you are defending drug use. That is the last thing that you need to have happen. You must find a way to defend the innocent and show that some students may get hurt by the test.

You decide to research the test. You call the drug testing company that the school board is considering hiring and ask for documentation on their tests. In their literature, it states that the tests are accurate 96% of the times they are administered.

You start to consider the information you have available. If the newspaper survey was accurate that 12% take drugs, how many of the students at your school supposedly take drugs? How many students are drug-free? If all the students are required to take the drug test, how many of the students' tests will be accurate? How many of the tests will be inaccurate? How many students who do not take drugs will have a test that wrongly shows that they do take drugs? How many of the students who use drugs (either experimentally or regularly) will have an accurate test?

You are getting ready to present your argument to the board. Write an open letter to the board using mathematics to argue against general drug testing for all students.