

## Friends You Can Count On

### Level A

The friends in your class like to exchange stickers. You decide to give each classmate 3 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 stickers 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.



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### 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:

<b>Cones</b>	<b>Yogurt</b>	<b>Toppings</b>
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.



## Friends You Can Count On:

### Level C

You have a friendship club. There are 12 members in your club. On the twelfth day of each month, you have a friendship call. Each member of the club talks to every other member by phone that day so that all members express their 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 4 new friends, how many conversations would 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.



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### 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. You and your 5 friends have decided that no matter whose ticket is selected, the 6 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 will 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 will get a pizza lunch this month? Show how you found your answers.

What are the chances that you and your friends will win 3 pizza lunches 3 months in a row? Explain your solution.

In your history class, you are studying exploration to the New World and are writing an essay on explorers. Your teacher has planned to celebrate Indigenous Peoples Day by choosing one essay, chosen at random, and awarding a pizza lunch for 2 to the writer of that essay. 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 either from the spirit rally or from the essay contest? Explain your method.

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





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### Level E

The local newspaper in your community conducted a survey. The survey sampled workers at one employer in the community about the use of drugs. On the anonymous survey, 12% of the workers indicated that they experimented with or were currently using drugs. The employer is concerned and decides to drug test all 1,200 employees. If an employee fails a test, they will be fired.

Most of the workers 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? Would 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? Would you still test positive?”

You know that this drug test will cause a lot of anxiety at work. The employer feels pressure to take action. You want to stop the employer from testing all the workers. You know it will take a convincing argument to change their minds. You must find a way to show that the test may hurt some employees.

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

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

You are getting ready to present your argument to the employer. What mathematical arguments can you present to argue against general drug testing for all employees?

