

## CAMP 2023 Application

A Note for Parents

*We welcome all interested students, encourage those who feel shy to join, and offer scholarships to make attendance possible for students at all economic levels. We value the diversity of our student body, especially with groups traditionally underrepresented in the mathematical sciences.*

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March 2023

Dear Parent,

Thanks for helping your child apply to our Creative and Analytical Math Program. We've received the first part of the application, an online form. This packet is the other part.

Please print out this packet for your child and have them complete it by hand. They may use additional pages, of course. When they are done, please scan<sup>1</sup> and put together their work into a single, neatly organized PDF document. Email it to us at <[hello@bardmathcircle.org](mailto:hello@bardmathcircle.org)>.

**Please do not help your child solve the problems!**

But do make sure that they understand the instructions, including that we accept many students who do not answer all the questions. Then leave the questions for your child to puzzle over. Taking a few days to ponder the problems is fine. What is more important in determining suitability for the program is whether your child enjoys trying challenges or if they find them stressful or otherwise unpleasant.

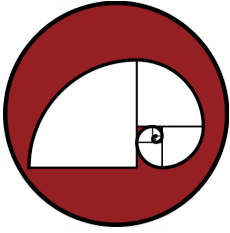
If appropriate, you may include a note about how your child engaged with this packet, and how you interacted with them throughout the process.

Sincerely,

*BARD MATH CIRCLE*

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<sup>1</sup>We recommend that you use a scanning app such as TinyScanner. Such apps produce very readable PDF scans.



## CAMP 2023 Application

A Note for Students

March 2023

Dear Student,

Thanks for applying to our Creative and Analytical Math Program. We've received the first part of your application, an online form. Now it's time for this Math Activity Packet. Please print this out and complete it by hand. You may use additional pages, of course. When you are done, please scan and return it as a single, organized, PDF document.

**Please solve the problems on your own! Use lots of scratch paper!**

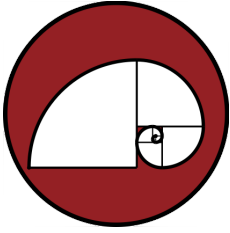
You may ask your adult for help in clarifying the instructions. It is important to know that we accept many students who do not answer all the questions. You may use a calculator on these activities, or write a computer program if you know how. (Most CAMP students have no programming experience; that's okay.) Take your time to puzzle over these problems. Taking a few days to ponder is fine.

If you enjoy working on these problems, especially the parts that you can't answer in less than five minutes, then you will probably enjoy attending CAMP this summer. If you don't enjoy this application, then you might find CAMP to be stressful or otherwise unpleasant.

Please consider asking your adult to write a note about how they were part of the application process for CAMP.

Sincerely,

*BARD MATH CIRCLE*

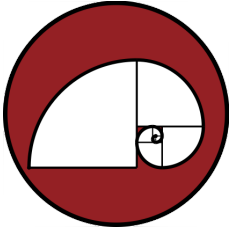


## CAMP 2023 Application

Student Paragraph

**Name:**

Please tell us why you want to attend the Bard Math Circle CAMP.  
(Write 2–3 sentences, or more if you like. You may describe what math you have especially enjoyed figuring out, or any information we should take into consideration.)



## CAMP 2023 Application

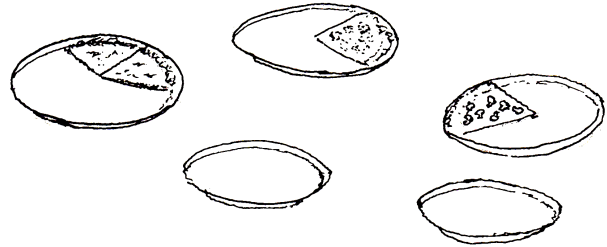
Leftover Pizza, Icing on the Cake,  
Matched Gloves, and Ice Cream

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**Instructions:** Solve the following problems, writing your answers clearly. We're very interested in *how* you solved them, so please write out your steps. Feel free to be creative, except don't search the internet. You may use a calculator and/or write a computer program. If you do, please let us know. Feel free to use additional pages to write out your answers.

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1. [**Leftover Pizza**] For a party, I ordered several pizzas all the same, medium size, but had them cut into different-size slices. After the party, there were some leftovers:  $\frac{1}{4}$  of the mushroom pizza,  $\frac{1}{3}$  of the broccoli one, and  $\frac{2}{5}$  of the plain.



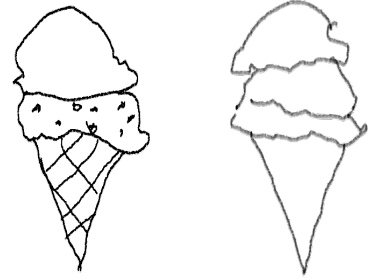
Leftover Pizza

Will I be able to place them all on one of the pans, without overlapping, to put them in the freezer for some quick dinners? Will they fit exactly, will there be extra space on the pan for some left over, or will I need to use a second pan (or overlap them)? If there is extra space on the pan, how much is there? If I need a second pan, what part of that second pan will be covered by pizza? Explain how you know.

2. [**Icing on the Cake**] I was icing only the top of a cake and made 1 cup of icing. When  $\frac{2}{3}$  of the cake-top was iced, I'd used  $\frac{3}{4}$  of a cup of the icing. Do I have enough to ice the whole cake? Will there be icing left over? Or do I need to make more icing? If so, how much would I need to make?

3. [**Matched Gloves**] At the end of the school year, there is pile of gloves in the lost and found. Sorting through them you find that two thirds of the left gloves match three fifths of the right gloves, with each pair of gloves different from every other pair. What fraction of the gloves had matches?

4. **[Ice Cream Cones]** My local ice cream store has 12 flavors today, so I could get any of 12 different single-scoop cones. But I want 2 scoops in a cone and I want them to be different flavors. I also care which flavor is on top – the one that will get eaten first – so vanilla on top of chocolate is different from chocolate on top of vanilla.



(a) How many 2-scoop, different cones could be made, if “different” means at least one of the flavors is different or the position is different?

(b) How many 3-scoop cones could be made with the same conditions?

**Remember:** We're very interested in *how* you solved these problems, so please write out enough so that we can understand your reasoning.

5. **[Ice Cream Bowls]** I decided that I don't want to have to eat one flavor first, so instead, I had the store put the scoops into a bowl. Now the order in which they were put in doesn't matter.



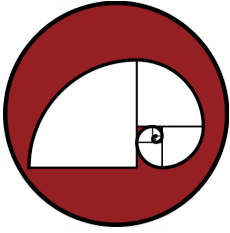
(a) How many 2-scoop bowls could be made with 2 different flavors?

(b) How many 3-scoop bowls?



6. [**Fractions**] When fractions are added or subtracted, it is usual to find a common denominator, change (when necessary) the fractions to equivalent ones with that denominator, and then to perform the arithmetic. When we multiply fractions, their product has their common denominator (before we simplify, when appropriate).

What is the role of a common denominator when a fraction is divided by a fraction? For example, when  $\frac{3}{4}$  is divided by  $\frac{2}{3}$ , how can you use a common denominator?



## CAMP 2023 Application

Computer Science and Programming Experience

One of the great things about CAMP is the opportunity to write computer programs to further explore mathematics. We understand that you may not have any previous programming experience, or you might be quite accomplished! Describe your Computer Science (CS) and Programming knowledge and background in the following questions. If you don't have any relevant experience, no worries! Just write "N/A" and leave the rest blank. Or take a risk and fill in your best guesses. Please complete this section without checking reference material, just use what you know in your head.

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1. What programming languages have you worked with?

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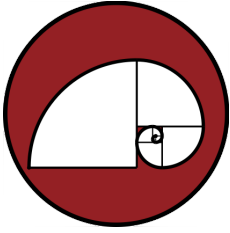
2. Describe your favorite programming achievement.

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3. Variables. Feel free to respond N/A to the following questions if you are not sure, or if they do not apply:

- What is a variable in CS?
  
  
  
  
  
  
  
  
  
  
  - How do you declare a variable in your favorite programming language?
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4. Write a short function to print out "Bard CAMP 2023" in your favorite programming language.



## CAMP 2023 Application Checklist

When you have completed this packet,

- Please organize your pages and scan them as one PDF document. If you don't have a flatbed scanner, we recommend a smartphone app like **Tiny Scanner**, for both Android and iPhone. The results are quite good.
- Email the PDF to [<hello@bardmathcircle.org>](mailto:hello@bardmathcircle.org). Use the subject line:  
"2023 CAMP Math Activity Packet:<Student Name>"
- If things are going slowly and you won't finish in a timely manner, please send a friendly email to [<hello@bardmathcircle.org>](mailto:hello@bardmathcircle.org).