

**College Guild**  
PO Box 6448, Brunswick ME 04011

# LOGIC & PUZZLES

## Unit 1 of 3

Welcome to College Guild's Creative Logic and Puzzles course. I hope you find these units entertaining and thought provoking. Most questions have more than one (several, in fact) good answer(s), so take your time and enjoy. Here are some guidelines for all CG courses:

- 1- Answer all the questions that are in bold print. When we receive a completed Unit back, you'll be sent the next one, along with your original work and feedback from your reader. You don't need to return the questions – it saves us both postage.
- 2- Take the time to read the questions thoroughly and find the most creative way to word your answers. There is no specific deadline to complete any Unit, but we would get concerned if we hadn't heard back from you in 2-3 months. You can ask for an extension if your own circumstances make that necessary. Remember how often the mail service loses things and if you don't hear back from us after a month, write to make sure your Unit was received and the next Unit sent out.

\*\*\*\*\*

### PART 1 - INTRODUCTION

When we hear the word “role” we think of acting. An actress plays the role of “heroine”, or an actor plays the role of “leading man” or “villain”.

But people everywhere play roles, not just actors. A baseball team has an “ace” pitcher and a “clutch hitter”. A school has “class clowns”, “teacher’s pets”, “bookworms”, etc. Roles are how we define ourselves. They are often what other people think of when they think of us.

A role need not be fixed. When the “class clown” gets home from school, maybe he’s an “ace” on the basketball court. Take a minute and think of what roles you play.

#### **1. What roles do you play? List as many as you can.**

For any of the roles you have written down, are you the only one in the world who plays this role?

...Probably not. A role is a feature that other people - practically anyone – would be able to recognize. Every baseball team seems to have a clutch hitter and an ace pitcher. These are not real positions on the team – you will not find “clutch hitter” printed on a baseball card – but they are roles.

Roles are not rigid like baseball positions, or jobs, or titles. Take another example. England does not have a President like the United States. The head of the English government is called the Prime Minister. Even so, who in the United States would you say plays the same role as the Prime Minister in England? One answer is below.

#### **2. Who in the United States plays the same role that the Prime Minister plays in England?**

Answer: The President of the United States plays the same role that the Prime Minister plays in England.

For us to come up with this answer, we have to form the notion of a role that both the President and Prime Minister play. The role is not “President”, because England has no such thing, and the role is not “Prime Minister”, because the United States has no such thing. The role is more abstract. It is more about what they do than what they are called or what their job title is. In this case, the role is something like “head of the country”.

Here’s another example. Think about it and give your answer before reading on.

### 3. Who in baseball plays the same role as the quarterback in football? Why?

This question is a little more difficult. There is no obvious right answer, but if you wrote “no one” or “nobody”, go back and try again; give the *best* answer you can, even if it is not perfect!

Forced to choose, the answer most people would give is “the pitcher”. In baseball, the pitcher plays a role similar to that of the quarterback in football. To see why this is a good answer, you need only look for the similarities. Both the pitcher and the quarterback are the primary ball throwers. Both control the flow of the game. Again, notice that the role is more about what they *do* than what they are called or what their job title is. (Are there other positions in baseball that *do* the same thing(s) a quarterback does in football?)

### 4. Whether or not you answered “the pitcher”, explain why you chose your answer.

It is important to think over why you chose the answer you did. Identifying roles for abstract problems like this is a skill that is probably uniquely human. If you hear that computers are becoming as smart as humans, don’t believe it! There is no computer on earth that can give a reasoned answer to Question 3.

We’ll come back to more puzzles like this a little later. On the next page are some “formalized” puzzles which do not require knowledge of a failed topic such as football or baseball. All you need to know for these next puzzles is the counting order – 1, 2, 3, 4, and so on – and that 4 is one bigger than 3.

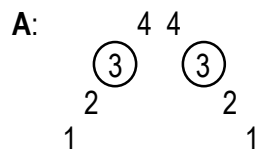
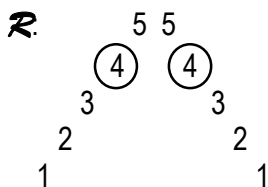
The form of each example question is, What in sequence **A** plays the same role as **x** in sequence **R**? The letter **R** is used to indicate the “reference sequence”. Let’s work one out first.

### 5. What number in A plays the same role as the number 4 in R? Why?

**R** : 1 2 3 4 5 5 4 3 2 1

**A**: 1 2 3 4 4 3 2 1

**R** counts from 1 to 5 and then from 5 back down to 1. **R** is symmetric: it is the same front-to-back as it is back-to-front. The middle of **R** is the pair 5 5. The central pair 5 5 is flanked by 4’s, so one role of 4 in **R** is to flank the central pair 5 5. Since **R** counts up and then back down, it makes a little “hill” with 4 being the step just beneath the 5 5 at the “peak”. **A** is also like a little hill, with a 3 being the step just beneath the “peak” 4 4.



Drawn this way, it seems clear that the best answer is 3.

Are there any other valid answers to the Question 5? Another answer I can think of is 4. There are at least two reasons why one might pick 4:

1. 4 simply plays the role of itself (as the number that comes after 3), so 4 plays itself in sequence R and in sequence A.
2. In both R and A, 4 is the fourth element in the sequence.

**6. Is 4 as good an answer as 3? Why or why not?  
Are there any other good answers? If so, list them.**

Here's another example. Try to work this one before going on to the explanation.

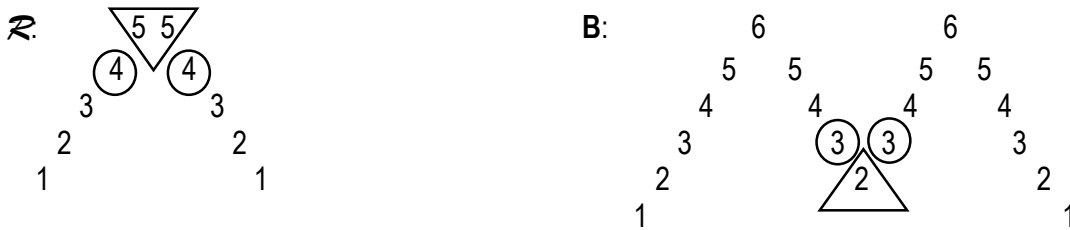
**7. What in B plays the same role as the number 4 in R? Why?**

**R** : 1 2 3 4 5 5 4 3 2 1                      **B**: 1 2 3 4 5 6 5 4 3 2 3 4 5 6 5 4 3 2 1

There is no center pair here, and sequence B rises and falls more than once, but it is symmetric.

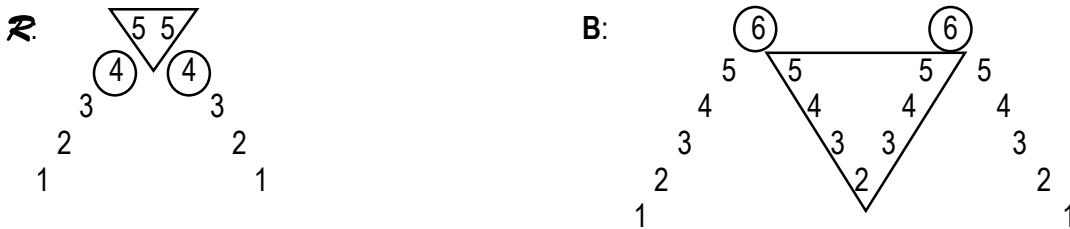
----- EXPLANATION -----

Maybe the most straightforward answer is that R's central pair 5 5 is similar to B's center "valley" 2. In each sequence, everything to the left of the triangle is the mirror image of everything to the right side of the triangle. And so, in sequence B the 3's on either side of "valley 2" play the same role as the 4's in sequence R. One answer then, is 3.



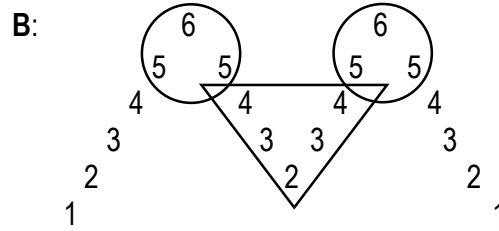
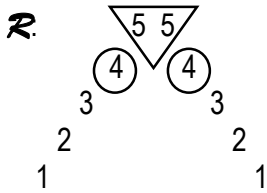
The triangle in R maps to the triangle in B, and the circles in R map to the circles in B. But 3 is not the only answer. One possible problem with 3 is that by choosing it, we seem to implicate all of the 3's in B; this includes not only the two 3's in the middle, but also the 3 on the left side and the 3 on the right side. (Of course, you may disagree that this is a problem!)

How about 6? Is this any better?



6 does not have the problems that 3 has, but a choice of 6 implies that the "center" of B is 5-4-3-2-3-4-5. B's center is supposed to play the same role as R's center 5-5, but 5-4-3-2-3-4-5 just seems big compared to 5-5, especially when we are saying that B's 6 plays the same role as R's 4.

Hmmm...What about 5-6-5?



This would seem to take care of the problems we had with 3 and also with 6. A choice of 5-6-5 implies that B's center is 4-3-2-3-4. Not perfect, but not bad, either.

These are not the only answers. Can you give any more? Go back to Question 7 on the previous page and write down all of the answers you can think of.

Following are several puzzles for you to work out. They ask the same question: "What number in the second sequence plays the same role as 4 in the first sequence?" Some of these are more difficult!

The puzzles start with "formalized" number puzzles and end with some more word puzzles. By now you should know that there is not always just one good answer – there may be several.

Take your time. Good luck!

## PART 2 - PUZZLES

8. What in D plays the same role as the number 4 in **R**? Why?

**R:** 1 2 3 4 5 5 4 3 2 1      **D:** 1 1 1 1 2 1 1 2 1 1 1 1 1 1 2 2 3 3 4 4 5 4 4 3 3 2 2 1 1

9. What in E plays the same role as the number 4 in **R**? Why?

**R:** 1 2 3 4 5 5 4 3 2 1      **E:** 1 7 7 6 5 4 3 2 1

10. What in F plays the same role as the number 4 in **R**? Why?

**R:** 1 2 3 4 5 5 4 3 2 1      **F:** 1 1 1 1 1 1 1 1 2 2 2 2 3 3 3 4 3 3 3 2 2 2 2 1 1 1 1 1 1 1 1

11. What in G plays the same role as the number 4 in **R**? Why?

**R:** 1 2 3 4 5 5 4 3 2 1      **G:** 1 2 3 4 5 6 7 8

12. What in H plays the same role as the number 4 in **R**? Why?

**R:** 1 2 3 4 5 5 4 3 2 1      **H:** 1 2 3 4 5 1 2 3 4 5

13. What in I plays the same role as the number 4 in  $\mathcal{R}$ ? Why?

$\mathcal{R}$ : 1 2 3 4 5 5 4 3 2 1      I: 1 1 1 1 1 1 1 1 1 1

14. What in J plays the same role as the number 4 in  $\mathcal{R}$ ? Why?

$\mathcal{R}$ : 1 2 3 4 5 5 4 3 2 1      J: 6 9 7 3 9 4 1 6 6

Please note that in the questions below, the first sequence has been changed!

15. What in K plays the same role as the number 4 in  $\mathcal{S}$ ? Why?

$\mathcal{S}$ : 2 2 4 4 5 5 6 6 8 8      K: 1 1 3 3 5 5 7 7 9 9

16. What in L plays the same role as the number 4 in  $\mathcal{T}$ ? Why?

$\mathcal{T}$ : 4      L: 1 3 3 2 9 12 4 6 2 3 0 20 1 3 7

17. What in M plays the same role as the number 1 in  $\mathcal{U}$ ? Why?

$\mathcal{U}$ : 1 1 1 1 1 1 1      M: 1 2 3 4 5 1 2 3 4 5

Now, let's try some word problems.

18. What in an ocean plays the same role as a desert on land? Why?

19. What in a rock and roll band plays the same role as a teacher in kindergarten? Why?

20. What in summer plays the same role as a snowball fight in winter? Why?

21. What to an artist plays the same role as fish to a fisherman? Why?

22. What in darkness plays the same role as color in sunlight? Why?

23. What for the future plays the same role as nostalgia for the past? Why?

24. Write down your own questions. These can be "formal" (number) puzzles or word puzzles. Answer them if you would like, or just leave them as questions.

\*\*\*\*\*

*Remember: First names only & please let us know if your address changes*