

## Function-Generating Problems

A gambler bets 3 dollars on the first spin of a roulette wheel. Each time he loses he doubles his bet. He has lost  $n$  times in a row. How do we express  $A_{n+1}$ , the amount of his bet for the next (the  $n+1$ ) spin?

- Perhaps you can do this in your head, but making a table will illustrate the process.

### A Table

# of spins	Amount bet, A
1	3
2	$3 * 2 = 6$
3	$3 * 2^2 = 12$
4	$3 * 2^3 = 24$
5	$3 * 2^4 = 48$

Pattern:  $A_{n+1} = 3 * 2^n$

## Handball Tournament Problem

- In a single-elimination tournament with  $n$  participants, how many games must be played?
- Solve by building up a table of values in the series.

## Induction Proofs

- Ideally, table generating can then get enough insight to make a good guess about the conclusion of a series.
- Later you will formalize this by using induction to prove that your guesses are correct.

(Aside: Why should CS students take a math minor? Not because they need the math itself. Rather, because it teaches you to think straight.)

## Reading Comprehension

- This is critical to our success, both as a student and in later life.
- So it benefits us to do better at it.
- As a reader, visualizing the material is the most powerful way to “see” what is being communicated.

## Example

A seashore is a better place than the street. At first it is better to run than to walk. You may have to try several times. It takes some skill but it's easy to learn. Even young children can have fun.

Once successful, complications are minimal. Birds seldom get too close. Too many people doing the same thing, however, can cause problems. One needs lots of room. Beware of rain; it ruins everything. If there are no complications, it can be very peaceful. A rock will serve as an anchor. If things break loose from it, however, you will not get a second chance.

## Context

- The passage probably doesn't make sense until you know what it is about (flying kites). Then you can visualize it.
- If you were given a test on your comprehension of the passage, the result would depend greatly on whether you knew the context or not.

## Visualization and Comprehension

Even when discussing numeric problems, "seeing" the relationship is important.

As Jack walked to town he met three beggars. He gave them each 4 dollars. That left only 2 dollars for himself, but he didn't care. He was happy.

How much money did Jack start with?

## Example

Jack stuffed the 16 dollars into his wallet and decided to go to town to buy a toy. He left his house and walked a half-mile when he met the beggar. The man seemed so poor that Jack gave him half the money in his wallet. About every half-mile he was approached by another beggar, each more wretched than the last. He met the third one just at the outskirts of town. Jack gave to each one half the money in his wallet. As he left the third beggar and entered the town he saw that he had only 2 dollars left but he didn't care. He was happy.

## Passage Comprehension

Eighty students served in this experiment on problem solving. Each student received one of four similar problems (referred to as problems A, B, C, and D). Since we were interested in the effects of distraction, half the students worked on their problem with music playing; half worked in silence. The ten students in each condition consisted of one eight-year-old, four ten-year-olds, and five twelve-year-old children.

## Questions

1. How many conditions were there? What were they?
2. Why does the author refer to ten students?
3. How many ten-year-olds served in this experiment?

The questions are easy... but you might not have gotten the necessary information out of the passage from unguided reading. It is hard to train yourself to pull out all the information without being primed by a question to answer.

A table of information might help.

## Another Passage

Thirty-six students (eighteen males and eighteen females) served in an experiment on problem solving. Each of these students received three problems, A, B, and C. Since each subject was receiving all three problems, the sequence of problem presentation was varied. All possible permutations (BCA, CAB, etc.) were used. Three males and three females were assigned to each of the six different sequences.

## Questions

- Why were there six different sequences? Could there have been more than this number? What were these six sequences.
- Did the number of students used, thirty six, strike you as unusual? Why did the experiment use such a number instead of a nice, round number like thirty or forty? What other numbers might the experimenter have used?

## Memory Test 1

1. Baseball
2. Record
3. Officer
4. Spoon
5. Carpet
6. Chair
7. Palace
8. Gloves
9. Radio
10. Flower

## Memory

- We often need to memorize stuff
  - Vocabulary for language class
  - Remembering an errand or task
- Making a mental image of what you read helps you with recalling the information later.
- This can help you with studying – actively work to make mental images of what you are studying.
- It works with “arbitrary lists” to associate each item with an image.

## Memory Aids

- Many schemes associate a word on a list with some sort of mental image to help remember.
- They often involve a “trigger” of some sort to invoke the associated image.
  - To remember an errand on the way home, store a bizarre picture in your mind that will be triggered naturally along the way.
  - Mnemonic devices
  - Using a “house” with “rooms” for association
  - Nursery rhyme (using a “strategy” or “plan”)



## Nursery Rhyme “Plan”

1. One is a bun
2. Two is a shoe
3. Three is a tree
4. Four is a door
5. Five is a hive
6. Six are sticks
7. Seven is heaven
8. Eight is a gate
9. Nine is a line
10. Ten is a hen

## Memory Test 2

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|--------------------|----------------|
| 1. One is a bun    | 1. Ashtray     |
| 2. Two is a shoe   | 2. Firewood    |
| 3. Three is a tree | 3. Picture     |
| 4. Four is a door  | 4. Cigarette   |
| 5. Five is a hive  | 5. Table       |
| 6. Six are sticks  | 6. Matchbook   |
| 7. Seven is heaven | 7. Glass       |
| 8. Eight is a gate | 8. Lamp        |
| 9. Nine is a line  | 9. Shoe        |
| 10. Ten is a hen   | 10. Phonograph |