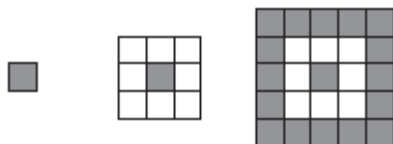


Applications of Arithmetic & Geometric Series & Sequences

1. Jill is laying 1 foot by 1 foot tiles that each have 1 gray side and 1 white side in a room that measures 25 feet by 25 feet. She lays a gray tile in the center of the room. Next, she lays a ring of white tiles around the center tile. Then, she lays a ring of gray tiles around the white tiles and continues in this manner.



- Determine the pattern in the number of tiles added in each ring.
 - Write an explicit formula to represent the number of tiles added in ring n .
 - Determine the number of tile rings that must be added around the center tile to completely fill the room's floor.
 - Determine the number of tiles needed to completely cover the floor.
 - Jill only has enough money to buy 400 tiles. She decides to lay as many complete rings around the center tile as she can. How many complete rings can Jill lay with 400 tiles? Of the 400 tiles how many will Jill use if she only lays complete rings?
2. A soccer tournament has 64 participating teams. In the first round of the tournament, 32 games are played, with the winning team from each game moving on to the next round. In the second round, 16 games are played, with the winning team from each game moving on to the next round. This pattern continues until one team emerges as the winner of the tournament. How many games are played in the tournament to determine the winner?

Natural numbers start with 1 and increase by 1 each time, i.e. (1, 2, 3, 4, 5, 6, ...)

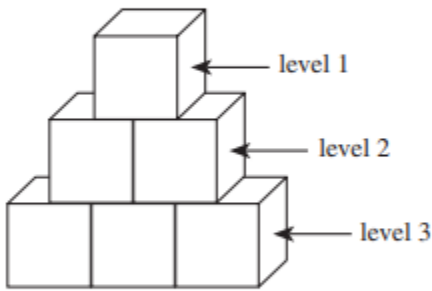
Whole numbers start with 0 and increase by 1 each time, i.e. (0, 1, 2, 3, 4, 6, ...)

- Find the sum of the first 50 natural numbers.
- Find the sum of the first 30 odd natural numbers.
- Find the sum of the first 15 whole numbers.

6. Serena paid \$8700 to attend college her freshman year, then found out that her cost would increase by 8% each year she stayed in college. If it takes Serena 6 years to graduate, how much will it cost her to complete college?
7. At six years old, Tanya is a prolific block builder. Her mother walked into the playroom to find that Tanya had built a wall with blocks. On further inspection her mother realized that there was a pattern to how the wall was built. The top row contained 1 block, the next row contained 7 blocks, the next row contained 13 blocks, and the bottom row contained 55 blocks. In total, there were 10 rows. Determine how many blocks Tanya used to build her wall.
8. Malinda and Otto are a song writing team. During their first year of collaboration they wrote only 3 songs but in each succeeding year they were able to triple the number of songs written each year. Determine how many songs they were able to write in the fourth year.

ACT Practice:

9. The first term is 1 in the geometric sequence 1, -3, 9, -27, What is the SEVENTH term of the geometric sequence?
- A. -243
B. -30
C. 81
D. 189
E. 729
10. On the first day of school, Mr. Vilani gave his third-grade students 5 new words to spell. On each day of school after that, he gave the students 3 new words to spell. In the first 20 days of school, how many new words had he given the students to spell?
- A. 28
B. 62
C. 65
D. 68
E. 152
11. Carmen is playing with blocks. She arranges stacks of blocks so that each successive level of blocks has 1 fewer block than the level below it and the top level has 1 block. Such a stack with 3 levels is shown below. Carmen wants to make such a stack with 12 levels. How many blocks would she use to build this stack?
12. What is the sum of the first 4 terms of the arithmetic sequence in which the 6th term is 8 and the 10th term is 13 ?
- F. 10.5
G. 14.5
H. 18
J. 21.25
K. 39.5
13. The sum of an infinite geometric series with first term a and common ratio $r < 1$ is given by $\frac{a}{1-r}$. The sum of a given infinite geometric series is 200, and the common ratio is 0.15. What is the second term of this series?
- F. 25.5
G. 30
H. 169.85
J. 170
K. 199.85



- A. 66
B. 78
C. 132
D. 144
E. 156