Mathematics Club
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arithmetic and geometric progression
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Arithmetic Progression:

An *arithmetic progression* is a sequence of numbers where each term is a sum of the preceding one and a fixed number. This fixed number is called the *common difference*.

In the sequence of the numbers

3, 5, 7, 9, 11, ...

each term is greater than the preceding one by two units.

Geometric Progression:

A *geometric progression* is a sequence of numbers where each term is a product of the preceding one and a fixed number. This fixed number is called the *common ratio*.

In the sequence of numbers

3, 6, 12, 24, ...

each term is two times bigger than the preceding one.

Problems:

On a string of 33 pearls, the middle pearl is the largest and most expensive of all. Starting from one end, each pearl is worth £100 more than the one before, up to the middle. From the other end, each pearl is £150 more than the one before, up to the middle. The string of pearls is worth £65,000. What is the value of the middle pearl?

A circle is completely divided into n sectors in such a way that the angles of the sectors are in arithmetic progression. If the smallest of these angles is 8 degrees, and the largest is 52 degrees, calculate n.

Suppose a cockroach starts at one end of a 1000 meter elastic tightrope and runs towards the other end at a speed of one meter per second. At the end of every second, the tightrope stretches uniformly and instantaneously, increasing its length by 1000 meters each time throughout the whole string. Does the cockroach reach the other end and how long does it take?

You want to pick some mangoes from a tree that is surroundedj by seven walls with seven guards, one at each gated wall. To get to the tree you tell each guard that you will give him half of all the mangoes you have but that guard must give you back one mango. The question is, what is the minimum number of mangoes you must pick to satisy these conditions and have atleast one mango left when you exit the seventh gate?

Two trains leave two towns that are fifty miles apart. They travel towards each other at rate of 30 mph and 20 mph respectively. A bumblebee flying at the rate of 50 mph starts out just as the faster train departs the train station, and flies to the slower train. The bee then turns around and goes back to meet the faster train. Then it turns around again, and it keeps flying back and forth between the trains until the trains meet. How far does the tired bumblebee fly?

An ant of negligible size walks out a distance of 1 from the origin. Down the x-axis. It then turns left and goes up ½ from its current point. If the ant continues turning left, going the half the distance it previously went, and repeating the pattern, where does the ant eventually end up?

We are given the following information:
A happy bug splits into a sad bug and a blank bug.
A sad bug splits into 2 happy bugs.
A blank bug splits into a sad bug and a happy bug.
The generation starts off with 1 happy bug which splits and forms
the 2nd generation.
The bugs die when they split. The bugs live the same amount of life.
How many of each kind are there in the first five generations?