### Numerical patterns

**ALGEBRA**

11

**Metallic Numbers**

The metallic numbers are the set of numbers that have common characteristics, the property is called metal. The best known of the family is the gold number (golden ratio), which has been used as a base proportion to compose music and design sculptures, paintings and buildings.

Consider the sequence 1, 1, 2, 3, 5, 8, 13, 21, ... given by the law of recurrence *an*+1 = *an* + *an*-1 and calculate the quotient



**1**

Generalize the previous result, taking as values of a1 and a2 the numbers that you consider appropriate and calculating 25 or 30 terms (uses the recursive rule *an*+1 = *an* + *an*-1). Discuss the results you got with your neighbor.



**2**

Considered the succession given by the recursive rule *an*+1 = *an* + 2*an*-1, where *a*1 =*a* 3 y *a*2 = 7, and calculates the thirty-first terms. Next, consider the succession of the quotients converges to the



**3**

Copper number σ*Cu*

Study the succession of quotients Part of the values a1= 4 and a2= 9 and uses the recursive rule



**4**

*an*+1 = 2*an* + *an*-1. Check that the silver number is obtained.



Choose different values of b1 and b2 for the recursive rule and check that the succession of



**5**

quotients of tend to the bronze number.

Use the recursive rule from two arbitrary generators and verifies that the succession of



**6**

quotients generates a new metallic number.

From the values a1 = 5 and a2 = 1 and the recursive rule an + 1 = 2an + 2an-1, check that the sequence of



**7**

quotients generates a platinum number.

Generalize the results obtained in the previous activities. Check that the same results are obtained, regardless of the generating elements and the number of terms of the sequence and note that the number obtained depends solely on the recursive rule.



**8**

Solve different quadratic equations of the type x2 - px - q = 0 for various values of p and q, being p



**9**

and q natural numbers. Check that the solutions in the equation are irrational numbers and define the

numerical succession that generates them.

Note that the bronze and nickel numbers have the same decimal part. Check if you can generalize the condition you have considered, solving different equations.



**10**

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