|  |
| --- |
| A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a set of numbers, called the terms of the sequence, in a specific order. Look for a pattern in the information given in the table below representing a women’s crew team.    What pattern do you notice in the Distances?  This is an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ sequence, since the difference between successive terms is constant (adding the same number each time). The difference between the terms is called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, *d*. To find the common difference, you always take the previous term and subtract it from the successive term.  **Example 1:** **Find the next three terms in each arithmetic sequence by using the common difference.**   1. -26, -22, -18, -14,… b) 15, 9, 3, -3, …   d = \_\_\_\_\_\_\_\_\_ d = \_\_\_\_\_\_\_\_\_\_  Next 3 terms: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Next 3 terms: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  *\*\*It is important to check that the common difference works throughout the entire sequence!\*\** |
| |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **Amount of Flu Patients** | **4** | **8** | **16** | **32** | **64** |   What pattern do you notice in the amount of flu patients?  In a ***geometric sequence***, the first term is nonzero and each term after the first is found by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the previous term by a constant, r, called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The common ratio can be found by dividing any term by its previous term. |
| **Example 2: Find Terms of Geometric Sequences**  **Find the next three terms in each geometric sequence by using the common ratio.**   1. 1, -4, 16, -64, … b) 9, 3, 1, , …   r = \_\_\_\_\_\_\_\_\_ r = \_\_\_\_\_\_\_\_\_\_  Next 3 terms: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Next 3 terms: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   1. -3, 15, -75, 375, … d) 24, 36, 54, 81, …   r = \_\_\_\_\_\_\_\_\_ r = \_\_\_\_\_\_\_\_\_  Next 3 terms: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Next 3 terms: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| **Example 3: Identify Geometric and Arithmetic Sequences**  **Determine whether each sequence is *arithmetic, geometric, or neither*. Explain.**   1. 256, 128, 64, 32, … b) 4, 9, 12, 18, … 2. -20, -15, -10, -5, …. d) 2, 8, 14, 22, …. 3. 1, 3, 9, 27, … f) 94, 79, 64, 49, …. |
| ***Arithmetic Key Concept:*** The nth term of an arithmetic sequence with the first term a1 and common difference, d, is given by the explicit formula:  an = a1+ (n – 1)d, where n is a positive integer. |
| ***Geometric Key Concept:*** The nth term of a geometric sequence with the first term, , and common ratio, r, is given by the following formula:  an = a1· (r)n-1, where n is any positive integer and , r 0. |
| **Example 4:** Write an equation for the nth term of the sequence -12, -8, -4, 0, …   1. Is the sequence arithmetic or geometric? Find the common difference/ratio. 2. Substitute a1 and d in the formula an = a1 + (n – 1)d and simplify 3. Find a9, the 9th term of the sequence using your formula from number 2. |
| **Example 5:** Write an equation for the nth term of the sequence -6, 12, -24, 48, … Then, find the 9th term.  **Step 1:** Determine if the sequence is arithmetic or geometric. Find the common difference or ratio.  **Step 2:** Substitute  and the common ratio into the formula.  **Step 3:** Find the a8, the 8th term of the sequence by substituting 8 in for n. |
| **Example 6: Graph the first five terms of the sequence shown in the table below.** |
| http://aharri5on.files.wordpress.com/2014/05/cp21.png   1. Is the sequence discrete or continuous? How are graphs of arithmetic sequences and linear functions similar? Different? 2. What is the common difference? 3. Find the 32nd term of the sequence. 4. Which term of the sequence is 96? |
| **You try:**   1. Write an equation for the nth term of the geometric sequence 96, 48, 24, 12, … Then find the 10th term of the sequence. 2. Write an equation for the nth term of the arithmetic sequence 3, -10, -23, -36, ….. Find the 15th term of the sequence. 3. Write an equation for the nth term of the sequence -9, 27, -81,… Then find the 15th term of the sequence. 4. The graph of an arithmetic function is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (choose one: linear/quadratic/exponential).   The graph of a geometric function is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (choose one: linear/quadratic/exponential).   1. Challenge: Find the 8th term of a geometric sequence for which and the common ratio is 3. |