



Group Warm-up (10 minutes)

Each row in the Williams Theater has 6 seats more than the row in front of it. The first row has 18 seats and there are a total of 20 rows.

1. The 20th row is 66 meters long, how wide is each seat? (assume seats touch)
2. How many seats are there in Row 1, Row 2, Row 3, ..., Row 20?
3. What is the total seating capacity of the stadium?

An **arithmetic sequence** is a sequence in which each term differs from the previous one by the same fixed number.

For example:

- 2, 5, 8, 11, 14, ...
- 31, 27, 23, 19,

$\{u_n\}$ is **arithmetic** $\Leftrightarrow u_{n+1} - u_n = d$ for all positive integers n and d is a constant called the **common difference**.

Suppose the first term of an arithmetic sequence is u_1 and the common difference is d .

Then $u_2 = u_1 + d$, $u_3 = u_1 + 2d$, $u_4 = u_1 + 3d$, and so on.

$$\text{Hence, } u_n = u_1 + (n - 1)d$$

The coefficient of d is one less than the subscript.

Example 1

Consider the sequence 2, 9, 16, 23, 30, ...

- a. Show that the sequence is arithmetic.
- b. Find the formula for the general term u_n .
- c. Find the 100th term of the sequence.
- d. Is 828 a member of the sequence?
- e. Is 2341 a member of the sequence?

Example 2

Find k given that $3k + 1$, k , and 3 are consecutive terms of an arithmetic sequence.

Example 3

Find the general term u_n for an arithmetic sequence with $u_3 = 8$ and $u_8 = -17$.

Example 4

Insert four numbers between 3 and 12 so that all six numbers are in arithmetic sequence.

