Section A.F Arithmetic and Geometric Sequences

# Objective 1: Identifying Arithmetic Sequences

An **arithmetic sequence** is a sequence in which each term is found by adding a constant $d$ to the previous term. The constant $d$ is called the **common difference** of the sequence.

**General Term of an Arithmetic Sequence:**

The general term $a\_{n}$ of an arithmetic sequence is given by

$$a\_{n}=a\_{1}+\left(n-1\right)d$$

where $a\_{1}$ is the first term and $d$ is the common difference.

a. Find the $25^{th}$ term of an arithmetic sequence if the first term is $-7.5$ and the common difference is $4$.

b. Find the first term of an arithmetic sequence if the $100^{th}$ term is $175$ and the common difference is $\frac{5}{3}$.

c. Consider a job offer with a starting annual salary of $\$32,000$ with a guaranteed raise of $\$960$ each year. Write a formula to represent the salary after working for $n$ years.

# Objective 2: Identifying Geometric Sequences

A **geometric sequence** is a sequence in which each term is found by multiplying the previous term by a constant $r$. The constant $r$ is called the **common ratio** of the sequence.

**General Term of a Geometric Sequence:**

The general term $a\_{n}$ of a geometric sequence is given by

$$a\_{n}=a\_{1}⋅r^{n-1}$$

where $a\_{1}$ is the first term and $r$ is the common ratio.

a. Find the $10^{th}$ term of a geometric sequence if the first term is $-7.5$ and the common ratio is $4$.

b. Find the first term of a geometric sequence if the $6^{th}$ term is $175$ and the common ratio is $\frac{5}{3}$.

c. Consider a job offer with a starting annual salary of $\$32,000$ with a guaranteed raise of $3\%$ each year. Write a formula to represent the salary after working for $n$ years.

Determine if the sequence is arithmetic, geometric, or neither. If it is arithmetic, state the common difference. If it is geometric state the common ratio.

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| d. $17, 14, 11, 8,…$ | e. $\frac{1}{2},\frac{2}{3},\frac{3}{4},\frac{4}{5},…$ |
| f. $-1,\frac{1}{2},-\frac{1}{4},\frac{1}{8},,…$ | g. $\sqrt{2}, 2, 2\sqrt{2}, 4, ….$ |
| h. $2, 5, 10, 17, …$ | i. $3t, 5t, 7t, 9t, …$ |