

11-1 Arithmetic Sequences

Objective: Use arithmetic sequences.
Find arithmetic means.

Sequence: A sequence is a list of numbers in a particular order. Each number in a sequence is called a term. $2, 4, 6, 8, \dots$

Arithmetic Sequence is a sequence in which each term after the first is found by adding a constant, called the difference, to the previous term.

$$a_n = a_1 + (n-1)d, \text{ where } n \text{ is any positive integer.}$$

$3, 5, 7, 9, 11, \dots$
 $+2 \quad +2 \quad +2$
 $d = +2$

a_n is the n th term, a_1 is the first term, d is positive or negative, depending on if increasing or decreasing. *common difference*

EX 1. Find the next 4 terms: $-8, -6, -4, \dots$

$$d = a_2 - a_1$$

$$d = -6 - (-8) = 2$$

$$d = +2$$

$$-2, 0, 2, 4$$

EX 2. **Rent-A-Crane**

Months	Cost
1	75,000
2	90,000
3	105,000
4	120,000

A. How much does it cost to rent the crane for 12 months?

$$d = 15,000 \quad a_n = a_1 + (n-1)d \quad n=12$$

$$a_{12} = 75,000 + (12-1)(15,000)$$

$$a_{12} = 240,000$$

B. How much for 24 months? $n=24$

$$a_{24} = 75,000 + (24-1)(15,000)$$

$$a_{24} = 420,000$$

EX 3. Write an equation for the n th term of the sequence $-8, -6, -4, \dots$

"general"

$$a_n = a_1 + (n-1)d$$

$$a_n = -8 + (n-1)2$$

Simplify \rightarrow

$$a_n = -8 + 2n - 2$$

$$a_n = 2n - 10$$

This Answer!

Arithmetic Mean: Sometimes you are given 2 terms of a sequence, but they are not successive terms. The terms between any 2 non-successive terms of an arithmetic sequence are called arithmetic means.

EX 4. Find the 3 arithmetic means between 21 and 45.

$$21, \underline{27}, \underline{33}, \underline{39}, 45$$

$$\begin{array}{r} 45 \\ -21 \\ \hline 24 \div 4 = 6 = d \end{array}$$

EX 5. Find 4 arithmetic means between 16 and 91.

$$16, \underline{31}, \underline{46}, \underline{61}, \underline{76}, 91$$

$$\begin{array}{r} 91 \\ -16 \\ \hline 75 \div 5 = 15 = d \end{array}$$