

# UNIT 2



# QUADRATICS



**Many real-life situations involve non-linear relationships and functions. Businesses use quadratic functions to describe the parabolic path of projectiles.**

**In this chapter, you will look at ways to solve problems involving non-linear, and in particular, quadratic functions and relationships.**

## Definitions:

**Sequence** ➡ **An ordered arrangement of numbers, symbols, or pictures in which each item or term follows another according to a rule.**

1, 4, 7, 10, 13, . . .

**Term** ➡ **Each item in a sequence. The symbol  $t_1$  represents the first term in a sequence,  $t_2$  represents the second term and so on.**

$$t_1 = 1$$


$$t_4 = 10$$

**Infinite Sequence** ➡ A sequence that continues indefinitely and can be written as  $\{t_1, t_2, t_3, \underline{\underline{\dots}}\}$

**Finite Sequence** ➡ A sequence that eventually terminates (ends) and can be written as  $\{t_1, t_2, t_3, \dots, t_n\}$ , where  $t_n$  represents the last or  $n^{\text{th}}$  term.

**Sequence of Differences**  $\Rightarrow$  **A sequence created from another sequence by subtracting the value of each term in the original sequence from the next term in that sequence.**

**For Example:** the sequence of differences for  $\{1, 3, 5, 7, 9, \dots\}$  is  $\{3-1, 5-3, 7-5, 9-7, \dots\}$  or  $D_1 = \{2, 2, 2, 2, \dots\}$


**Arithmetic Sequence**  **A sequence created by adding any real number to each successive term.**  
(common difference)  
 $D$ , is a constant

**Remember:** Adding a negative integer is equivalent to subtracting a positive number.

**Formula:**

$$t_n = a + (n-1)d$$

$a = t_1$



$$t_n = t_1 + (n - 1)d$$

**$t_1$  = first term**

**$d$  = common difference**

$$d = t_2 - t_1 = t_3 - t_2 = t_4 - t_3 = t_5 - t_4$$

$n$  = # of terms

## Homework

$$t_n = t_1 + (n-1)d$$

①  $-1, 1, 3, 5, 7, 9, \dots$

$$t_1 = -1$$

$$\begin{aligned} d &= 1 - (-1) \\ &= 1 + 1 \\ &= 2 \end{aligned}$$

$$t_n = t_1 + (n-1)d$$

$$t_n = -1 + (n-1)2$$

$$t_n = -1 + 2n - 2$$

$$\boxed{t_n = 2n - 3}$$

B Find the indicated term

①  $t_{18} = ?$   $\underline{-3}, 0, 3, 6, 9, \dots$

$$t_1 = -3$$

$$d = 3$$

$$n = \underline{18}$$

$$t_n = t_1 + (n-1)d$$

$$t_{18} = -3 + (18-1)3$$

$$t_{18} = -3 + 17(3)$$

$$t_{18} = -3 + 51$$

$$t_{18} = 48$$



C.

①  $\textcircled{1}, 4, 7, 10, \dots, \underline{178}$

$$t_1 = 1$$

$$d = 3$$

$$t_n = 178$$

$$n = ?$$

$$t_n = t_1 + (n-1)d$$

$$178 = 1 + (n-1)3$$

$$178 = 1 + 3n - 3$$

$$178 = 3n - 2$$

$$\frac{180}{3} = \frac{3n}{3}$$

$$\boxed{60 = n}$$

178 is the 60<sup>th</sup> term.