

# 7.2 Arithmetic Sequence

①

Common difference

Ex. 3, 6, 9, 12 ...  
 $\downarrow \quad \downarrow \quad \downarrow$   
 $+3 \quad +3 \quad +3$

Common difference = d  
 is +3

$$6 - 3 = 3$$

$$9 - 6 = 3$$

Common difference  $d = a_{n+1} - a_n$

**Ex 1**

-9, -7, -5, -3, -1, ...  
 $\downarrow \quad \downarrow \quad \downarrow \quad \downarrow$   
 $+2 \quad +2 \quad +2 \quad +2$

$$d = -7 - (-9) = -7 + 9 = (+2)$$

**Ex 2**

Find 1st 5 terms

a)  $a_1 = 7$  first term

$$d = -3$$

n: 1 2 3 4 5  
 7 4 1 -2 -5  
 $\downarrow \quad \downarrow \quad \downarrow \quad \downarrow$   
 $-3 \quad -3 \quad -3 \quad -3$

n	$a_n$	$d = -3$
1	7	
2	$7 + (-3) = 4$	
3	$7 + (-3) + (-3) = 1$	
4	$7 - 3 - 3 - 3 = -2$	
5	$7 - 3 - 3 - 3 - 3 = -5$	

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

**Ex 3** Find  $a_{13}$  and  $a_n$  for sequence

$-3, 1, 5, 9, \dots$   
 $\quad \quad \quad \vee \quad \vee \quad \vee$   
 $\quad \quad \quad +4 \quad +4 \quad +4$

$d = 4 \quad a_1 = -3$

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

$$a_{13} = -3 + (13-1)4$$

$$a_{13} = -3 + 12(4) = -3 + 48 = \boxed{45 = a_{13}}$$

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

need  $a_1$  and  $d$   
 $a_1 = -3 \quad d = +4$

$$a_n = -3 + (n-1)4$$

$$a_n = -3 + 4n - 4$$

$$\boxed{a_n = 4n - 7}$$

**Ex 4** Determine  $a_n$  and  $a_{18}$  for sequence

with  $a_2 = 9$  and  $a_3 = 15$

$$a_1 = ? \quad d = +6$$

$$a_1 = 3$$

1	2	3
3	9	15
	∨	∨
	+6	+6

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

$$a_n = 3 + (n-1)6$$

$$= 3 + 6n - 6$$

$$\boxed{a_n = 6n - 3}$$

$$a_{18} = 6(18) - 3$$

$$a_{18} = 108 - 3$$

$$\boxed{a_{18} = 105}$$