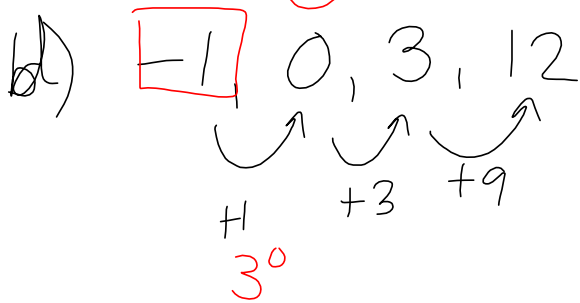
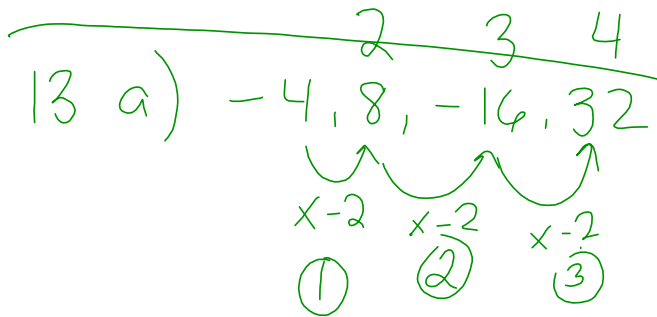


16a) 2, 6, 12, 20, 30  
 V V V V  
 4 6 8 10  
 2(2) 2(3) (2)4

$t_n = t_{n-1} + 2n$



$t_n = t_{n-1} + 3^{n-2}$



$-4(-2)^{n-1}$

b)  $\frac{1}{1}, \frac{2}{3}, \frac{3}{5}, \frac{4}{7}$

$\frac{n}{2n-1}$

## 6.2 - Arithmetic Sequences

A sequence where there is a common difference,  $d$ , between consecutive terms. The same value is added or subtracted to a term to generate the next term.

$d = t_2 - t_1$

eg. 3, 5, 7, 9, 11, ...  $d = 2$

5, 1, -3, -7, ...  $d = -4$

0, 5, 10, 15, 20, ...  $d = 5$

$5 - 3 = 2$

Notice the pattern:

$1, 4, 7, 10, 13$   
 $1, 1 + 1(3), 1 + 2(3), 1 + 3(3), 1 + 4(3)$   
 $a, a + 1d, a + 2d, a + 3d, a + 4d$

$a = 1 \quad d = 3$

always 1 less than term #

**Arithmetic Sequence Formula**

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

where  $a$  is the first term and  $d$  is the common difference

Ex. 1 Determine  $t_n$  for each.

This means find the general formula which works to find any term in the sequence.  
Must be simplified.

a) 7, 3, -1, -5, ...

$a=7$   
 $d=-4$

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

$$= 7 + (n-1)(-4)$$

$$= 7 - 4n + 4$$

$t_n = 11 - 4n$

b) -5, -3, -1, 1, ...

$a=-5$   
 $d=2$

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

$$= -5 + (n-1)(2)$$

$$= -5 + 2n - 2$$

$t_n = 2n - 7$

Ex. 2 Determine the # of terms in each sequence.

a) 2, 5, 8, ..., 155  $n=?$

$a=2$   
 $d=3$

$t_n = 155$

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

$$155 = 2 + (n-1)(3)$$

$$\frac{153}{3} = \frac{(n-1)(3)}{3}$$

$$51 = n-1$$

$$52 = n$$

b) 1, -1, -3, ..., -199

$a=1$   
 $d=-2$

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

$$-199 = 1 + (n-1)(-2)$$

$$-200 = \frac{(n-1)(-2)}{-2}$$

$$100 = n-1$$

$$101 = n$$

Ex. 3 Insert two numbers between 17 and 59, so that the four numbers form an arithmetic sequence.

17, 31, 45, 59

$d$     $d$     $d$

$$\frac{59-17}{3}$$

$$= \frac{42}{3}$$

$$= 14$$

$a=17$   
 $n=4$   
 $t_n=59$   
 $d=?$

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

$$59 = 17 + (3)(d)$$

$$d=14$$

4. Determine,  $a$ ,  $d$ , and  $t_n$  for each arithmetic sequence.

Solve algebraically

a)  $t_4 = 13$ ,  $t_{17} = 39$

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

$$13 = a + (4-1)d$$

$$13 = a + 3d \quad \textcircled{1}$$

$$39 = a + (17-1)d$$

$$39 = a + 16d \quad \textcircled{2}$$

$$13 = a + 3d \quad \textcircled{1}$$

$$\begin{array}{r} \textcircled{2} - \textcircled{1} \\ \hline \frac{26}{13} = \frac{13d}{13} \\ 2 = d \end{array}$$

Sub  $d=2$  into  $\textcircled{1}$

$$13 = a + 3(2)$$

$$13 - 6 = a$$

$$7 = a$$

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

$$t_n = 7 + (n-1)(2)$$

$$t_n = 7 + 2n - 2$$

$$t_n = 5 + 2n$$

b)  $t_{10} = -67$ ,  $t_{43} = -298$

$$a = -4$$

$$d = -7$$

$$t_n = -7n + 3$$

p. 385 #3abfh, 4bc, 6,  $\textcircled{7}$ , 9ac  
10ac, 11ac, 13, 15, 20, 21

p. 385 #3abfh, 4bc, 6, 7, 9ac,  
10ac, 11ac, 13, 15, 20, 21

