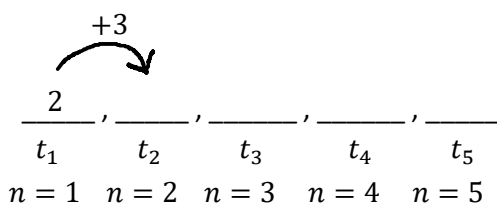


C11 - 1.1 - Arithmetic Means Notes

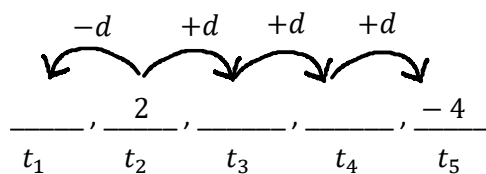
Write the first terms 5 of the sequence

$$t_1 = 2, d = 3$$



$$\textcircled{2, 5, 8, 11, 14}$$

$$t_2 = 2, t_5 = -4 \quad \text{Logic}$$



$$\begin{array}{r} 2 + 3d = -4 \\ -2 \quad \quad -2 \\ \hline 3d = -6 \\ \frac{3d}{3} = \frac{-6}{3} \\ \hline d = -2 \end{array} \quad 5 - 2 = 3$$

$$\textcircled{d = -2}$$



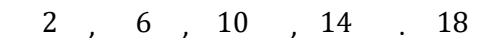
$$\textcircled{4, 2, 0, -2, -4}$$

$$t_7 = 26, t_{95} = 378$$

Logic

$$\begin{array}{r} 26 + 88d = 378 \\ -26 \quad \quad -26 \\ \hline 88d = 352 \\ 88d \quad 352 \\ \hline \frac{88}{88} = \frac{352}{88} \\ \hline d = 4 \end{array}$$

$$95 - 7 = 88$$



$$\textcircled{2, 6, 10, 14, 18}$$

$$\begin{array}{l} 2 + 3 = 5 \\ 5 + 3 = 8 \\ \dots \end{array}$$

$t_1 = 1st \text{ term (aka: "a or } u_1\text{")}$
 $d = \text{common difference}$
 $t_n = \text{term } n, \text{ every term}$
 $n = \text{Term \#, or \# of terms}$

OR

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

$t_2 = 2, t_5 = -4$ Systems of Equations

$t_n = t_1 + (n - 1)d$	$t_n = t_1 + (n - 1)d$
$t_2 = t_1 + (2 - 1)d$	$t_5 = t_1 + (5 - 1)d$
$2 = t_1 + d$	$-4 = t_1 + 4d$

\downarrow

$$t_1 = 2 - d \longrightarrow -4 = (2 - d) + 4d$$

$$-4 = 2 + 3d$$

$$t_1 = 2 - (-2) \longleftarrow \textcircled{d = -2}$$

$$\textcircled{t_1 = 4}$$

$$\begin{array}{l} 2 - 2 = 0 \\ 0 - 2 = -2 \\ \dots \\ 2 + 2 = 4 \end{array}$$

OR

$t_n = t_1 + (n - 1)d$	$t_n = t_1 + (n - 1)d$
$t_7 = t_1 + (7 - 1)(4)$	$t_2 = 2 + (2 - 1)(4)$
$26 = t_1 + 24$	

$\textcircled{t_1 = 2} \qquad \textcircled{t_2 = 6}$

$$\begin{array}{l} 26 - 4 = 22 \\ 22 - 4 = 18 \\ 18 - 4 = 14 \\ 14 - 4 = 10 \\ \dots \end{array}$$

C11 - 1.1 - Arithmetic Sequences Notes

2,5,8 ...

$d = ?$

$t_n = ?$

$t_{10} = ?$

$t_n = 53, n = ?$

$$\begin{array}{ccccccc} & +3 & & +3 & & & \\ & \curvearrowright & & \curvearrowright & & & \\ \frac{2}{t_1} & , & \frac{5}{t_2} & , & \frac{8}{t_3} & , & \frac{?}{t_4} \dots \frac{?}{t_{10}} \dots \frac{53}{t_n} \\ n = 1 & & n = 2 & & n = 3 & & n = 4 & & n = 10 & & n = ? \end{array}$$

_____, _____, _____ ... _____ ... _____

$t_1 = 2$

Difference

$$\begin{aligned} d &= t_n - t_{n-1} \\ d &= 8 - 5 \end{aligned}$$

$$\begin{aligned} d &= t_n - t_{n-1} \\ d &= 5 - 2 \end{aligned}$$

$d = t_n - t_{n-1}$

A term subtracted by the term before it
 $t_{n-1} = \text{term before } t_n$

$d = 3$

$d = 3$

Arithmetic: d must always be the same

Find the General term $t_n = ?$

General term formula

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

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

$t_n = 2 + 3n - 3$

$t_n = 3n - 1$

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

The first term
 plus 'n - 1' differences

What is the tenth term t_{10} ?

Or, Start from beginning

$t_n = 3n - 1$

$t_{10} = 3(10) - 1$

$t_{10} = 29$

Check your answer:
 2,5,8,11,14,17,20,23,26,29



$$\begin{aligned} t_n &= t_1 + (n - 1)d \\ t_{10} &= 2 + (10 - 1)3 \\ t_{10} &= 2 + 27 \\ \text{t}_{10} &= 29 \end{aligned}$$

Remember: You could have also added the common difference repeatedly

53 is what term, $t_n = 53, n = ?$

$t_n = 3n - 1$

$53 = 3n - 1$

$+1 \quad +1$

$54 = 3n$

$\frac{54}{3} = \frac{3n}{3}$

$18 = n$

$n = 18$

Check your answer:

2,5,8,11,14,17,20,23,26,29,32,35,38,41,44,47,50,53

