

Arithmetic Sequences (Worksheet #1)

A

$$1. \quad -1, 1, 3, 5, 7, 9, \dots$$

$\begin{array}{cccccc} \downarrow & \downarrow & \downarrow & \downarrow & \downarrow & \\ 2 & 2 & 2 & 2 & 2 & \end{array}$

$$\begin{aligned} t_1 &= -1 \\ d &= 2 \\ t_n &= t_1 + (n-1)d \\ t_n &= -1 + (n-1)2 \\ t_n &= -1 + 2n - 2 \\ t_n &= 2n - 3 \end{aligned}$$

$$2. \quad 2, 6, 10, 14, 18, \dots$$

$\begin{array}{cccc} \downarrow & \downarrow & \downarrow & \downarrow \\ 4 & 4 & 4 & 4 \end{array}$

$$\begin{aligned} t_1 &= 2 \\ d &= 4 \\ t_n &= t_1 + (n-1)d \\ t_n &= 2 + (n-1)4 \\ t_n &= 2 + 4n - 4 \\ t_n &= 4n - 2 \end{aligned}$$

$$3. \quad -1, -3, -5, -7, -9, \dots$$

$$\quad \quad \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow$$

$$\quad \quad \quad -2 \quad -2 \quad -2 \quad -2$$

$$t_1 = -1$$

$$d = -2$$

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

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

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

$$t_n = -2n + 1$$

$$4. \quad 2, -1, -4, -7, -10, \dots$$

$$\quad \quad \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow$$

$$\quad \quad \quad -3 \quad -3 \quad -3 \quad -3$$

$$t_1 = 2$$

$$d = -3$$

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

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

$$t_n = 2 - 3n + 3$$

$$t_n = -3n + 5$$

$$5. \quad -1, \underset{\substack{\vee \\ 3}}{2}, \underset{\substack{\vee \\ 3}}{5}, \underset{\substack{\vee \\ 3}}{8}, \underset{\substack{\vee \\ 3}}{11}, \dots$$

$$t_1 = -1$$

$$d = 3$$

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

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

$$t_n = -1 + 3n - 3$$

$$t_n = 3n - 4$$

$$6. \quad 5, \underset{\substack{\vee \\ -4}}{1}, \underset{\substack{\vee \\ -4}}{-3}, \underset{\substack{\vee \\ -4}}{-7}, \underset{\substack{\vee \\ -4}}{-11}, \dots$$

$$t_1 = 5$$

$$d = -4$$

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

$$t_n = 5 + (n-1)(-4)$$

$$t_n = 5 - 4n + 4$$

$$t_n = -4n + 9$$

B.1. t_{18} for $-3, 0, 3, 6, 9, \dots$

$$t_1 = -3$$

$$d = 3$$

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

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

$$t_n = -3 + 3n - 3$$

$$t_n = 3n - 6$$

$$\begin{array}{cccc} \downarrow & \downarrow & \downarrow & \downarrow \\ 3 & 3 & 3 & 3 \end{array}$$

To find t_{18} :

$$n = 18$$

$$t_n = 3n - 6$$

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

$$t_{18} = 54 - 6$$

$$t_{18} = 48$$

2. t_{75} for $1, 3, 5, 7, \dots$

$$t_1 = 1$$

$$d = 2$$

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

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

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

$$t_n = 2n - 1$$

To find t_{75} :

$$n = 75$$

$$t_n = 2n - 1$$

$$t_{75} = 2(75) - 1$$

$$t_{75} = 150 - 1$$

$$t_{75} = 149$$

3. t_{45} for $0, -2, -4, -6, -8, \dots$

$$t_1 = 0$$

$$d = -2$$

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

$$t_n = 0 + (n-1)(-2)$$

$$t_n = 0 - 2n + 2$$

$$t_n = -2n + 2$$

To find t_{45} :

$$n = 45$$

$$t_n = -2n + 2$$

$$t_{45} = -2(45) + 2$$

$$t_{45} = -90 + 2$$

$$t_{45} = -88$$

C.1. 1, 4, 7, 10, ..., 178
 \downarrow \downarrow \downarrow
 3 3 3

← LAST TERM!

$$t_1 = 1$$
$$d = 3$$
$$t_n = 178$$

$$t_n = t_1 + (n-1)d$$
$$t_n = 1 + (n-1)3$$
$$t_n = 1 + 3n - 3$$
$$t_n = 3n - 2$$

Since $t_n = 178$

$$178 = 3n - 2$$
$$178 + 2 = 3n$$
$$\frac{180}{3} = \frac{3n}{3}$$
$$60 = n$$

178 is the 60th term.

$$2. \quad 9, 5, 1, -3, \dots, -47$$

$\begin{array}{c} \vee \quad \vee \quad \vee \\ -4 \quad -4 \quad -4 \end{array}$

$$\begin{aligned} t_1 &= 9 \\ d &= -4 \\ t_n &= -47 \end{aligned}$$

$$\begin{aligned} t_n &= t_1 + (n-1)d && \text{Since } t_n = -47 \\ t_n &= 9 + (n-1)(-4) && -47 = -4n + 13 \\ t_n &= 9 - 4n + 4 && -47 - 13 = -4n \\ t_n &= -4n + 13 && \frac{-60}{-4} = \frac{-4n}{-4} \\ &&& 15 = n \end{aligned}$$

-47 is the 15th term.

$$3. \frac{1}{2}, \frac{3}{4}, 1, \frac{5}{4}, \dots, \frac{19}{4}$$

Common Denominator

$$\frac{2}{4}, \frac{3}{4}, \frac{4}{4}, \frac{5}{4}, \dots, \frac{19}{4}$$

$\vee \quad \vee \quad \vee$
 $\frac{1}{4} \quad \frac{1}{4} \quad \frac{1}{4}$

$t_1 = \frac{1}{2} \text{ or } \frac{2}{4}$	$t_n = t_1 + (n-1)d$	Since $t_n = \frac{19}{4}$
$d = \frac{1}{4}$	$t_n = \frac{2}{4} + (n-1)\frac{1}{4}$	$\frac{19}{4} = \frac{1n}{4} + \frac{1}{4}$
$t_n = \frac{19}{4}$	$t_n = \frac{2 + 1n - 1}{4}$	$\frac{19-1}{4} = \frac{1n}{4}$
	$t_n = \frac{1n + 1}{4}$	$\frac{18}{4} = \frac{1n}{4}$
		$18(4) = 4(1n)$
		$\frac{72}{4} = \frac{4n}{4}$
		$18 = n$

$\frac{19}{4}$ is the 18th term.