Arithmetic Sequence

eg. $2, 4, 6, \boxed{8}, 10 \ldots.$

1st term

$a = T_1$

$T_3 = 6$

$T_1 = 2$, $a = 2$

Common difference

d

$d = 2$

Rule: $T_4 = 2 \times 4 = 8$

$T_{10} = 2 \times 10 = 20$

$\overset{+d}{\frown}\,\overset{+d}{\frown}\,\overset{+d}{\frown}\,\overset{+d}{\frown}$

$6, 8, 10 \ldots 12 \quad 14$

$a = 6$ $d = 2$

$T_5 = 14$

Rule : $T_5 = 6 + (4)(2)$

$T_{20} = 6 + (19)(2)$

✳ $T_n = a + (n-1)d$

Example 1

Find the nth term (T_n) of the arithmetic sequence:

$$-2, \quad 3, \quad 8, \quad 13, \quad \ldots..$$

and hence find   (i) T_{20} (ii) T_{21} (iii) $T_{21} - T_{20}$.

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

$a = -2 \qquad d = 5$

$T_n = -2 + (n-1)5 \quad = -2 + 5n - 5$

$T_n = -7 + 5n$

$T_{20} = -7 + 5(20) = 93$

$T_{21} = -7 + 5(21) = 98$

$T_{21} - T_{20} = 98 - 93 = 5$

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3. Find the number of terms in each of the following arithmetic sequences:

(i) $-5, -1, 3, 7, \ldots..\,\boxed{75}$ (ii) $2, 5, 8, 11, \ldots… 59$ (iii) $-\frac{3}{2}, -1, -\frac{1}{2}, 0, \ldots.$

(i) $a = -5 \qquad d = 4 \qquad T_n = 75 \qquad n = ?$

$T_n = a + (n-1)d$ $\Rightarrow \quad 75 = -5 + (n-1)4$

$75 = -5 + 4n - 4$
$75 = -9 + 4n$
$84 = 4n$
$21 = n \quad \checkmark$

$\Rightarrow T_{21} = 75$

check: $T_{21} = -5 + (20)4 = 75 \quad \checkmark$