## Exercise 10(B) Page No: 140

**1. In an A.P., ten times of its tenth term is equal to thirty times of its $30^{th}$ term. Find its $40^{th}$ term.**
**Solution:**

Given condition,
$10\ t_{10} = 30\ t_{30}$ in an A.P.
To find: $t_{40}$ = ?
We know that,
$t_n = a + (n - 1)d$
So,
$10\ t_{10} = 30\ t_{30}$
$10(a + (10 - 1)d) = 30(a + (30 - 1)d)$
$10(a + 9d) = 30(a + 29d)$
$a + 9d = 3(a + 29d)$
$a + 9d = 3a + 87d$
$2a + 78d = 0$
$2(a + 39d) = 0$
$a + 39d = a + (40 - 1)d = t_{40} = 0$
Therefore, the $40^{th}$ term of the A.P. is 0

**2. How many two-digit numbers are divisible by 3?**
**Solution:**

The 2-digit numbers divisible by 3 are as follows:
12, 15, 18, 21, ………, 99
It's seen that the above forms an A.P. with
a = 12, d = 3 and last term($n^{th}$ term) = 99
We know that,
$t_n = a + (n - 1)d$
So,
$99 = 12 + (n - 1)3$
$99 = 12 + 3n – 3$
$99 = 9 + 3n$
$3n = 90$
$n = 90/3 = 30$
Hence, the number of 2-digit numbers divisible by 3 is 30

**3. Which term of A.P. 5, 15, 25 ………… will be 130 more than its $31^{st}$ term?**
**Solution:**

Given A.P. is 5, 15, 25, ……
a = 5, d = 10
From the question, we have
$t_n = t_{31} + 130$
We know that,

$t_n = a + (n - 1)d$
So,
$5 + (n - 1)10 = 5 + (31 - 1)10 + 130$
$10n – 10 = 300 + 130$
$10n = 430 + 10 = 440$
$n = 440/10 = 44$
Thus, the $44^{th}$ term of the given A.P. is 130 more than its $31^{st}$ term.

**4. Find the value of p, if x, 2x + p and 3x + 6 are in A.P**
**Solution:**

Given that,
x, 2x + p and 3x + 6 are in A.P
So, the common difference between the terms must be the same.
Hence,
$2x + p – x = 3x + 6 – (2x + p)$
$x + p = x + 6 – p$
$2p = 6$
$p = 3$

**5. If the $3^{rd}$ and the $9^{th}$ terms of an arithmetic progression are 4 and -8 respectively, which term of it is zero?**
**Solution:**

Given in an A.P.
$t_3 = 4$ and $t_9 = -8$
We know that,
$t_n = a + (n - 1)d$
So,
$a + (3 - 1)d = 4$ and $a + (9 - 1)d = -8$
$a + 2d = 4$ and $a + 8d = -8$
Subtracting both the equations we get,
$6d = -12$
$d = -2$
Using the value of d,
$a + 2(-2) = 4$
$a – 4 = 4$
$a = 8$
Now,
$t_n = 0$
$8 + (n - 1)(-2) = 0$
$8 – 2n + 2 = 0$
$10 – 2n = 0$
$10 = 2n$
$n = 5$
Thus, the $5^{th}$ term of the A.P. is zero.

**6. How many three-digit numbers are divisible by 87?**
**Solution:**

The 3-digit numbers divisible by 87 are starting from:
174, 261, ……. , 957
This forms an A.P. with a = 174 and d = 87
And we know that,
$t_n = a + (n - 1)d$
So,
957 = 174 + (n - 1)87
783 = (n - 1)87
(n - 1) = 9
n = 10
Thus, 10 three-digit numbers are divisible by 87.

**7. For what value of n, the $n^{th}$ term of A.P 63, 65, 67, …….. and $n^{th}$ term of A.P. 3, 10, 17,…….. are equal to each other?**
**Solution:**

Given,
$A.P._1$ = 63, 65, 67, ……..
a = 63, d = 2 and $t_n = 63 + (n - 1)2$
$A.P._2$ = 3, 10, 17, ……..
a = 3, d = 7 and $t_n = 3 + (n - 1)7$
Then according to the question,
$n^{th}$ of $A.P._1$ = $n^{th}$ of $A.P._2$
63 + (n - 1)2 = 3 + (n - 1)7
60 + 2n – 2 = 7n – 7
58 + 7 = 5n
n = 65/5 = 13
Therefore, the $13^{th}$ term of both the A.P.s is equal to each other.

**8. Determine the A.P. whose $3^{rd}$ term is 16 and the $7^{th}$ term exceeds the $5^{th}$ term by 12.**
**Solution:**

Given,
$t_3$ of an A.P. = 16 and
$t_7 = t_5 + 12$
We know that,
$t_n = a + (n - 1)d$
So,
$t_3 = a + (3 - 1)d = 16$
a + 2d = 16 …… (i)
And,
a + (7 - 1)d = a + (5 - 1)d + 12
6d = 4d + 12

2d = 12
d = 6
Using ‘d’ in (i) we get,
a + 2(6) = 16
a + 12 = 16
a = 4
Hence, after finding the first term = 4 and common difference = 6 the A.P. can be formed.
i.e. 4, 10, 16, 22, 28, …….