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NAME:

X

SECOND TERM

MATHEMATICS WORKSHEET – ARITHMETIC PROGRESSIONS

Don't forget:-

- **Arithmetic progression (or Arithmetic sequence)** is a sequence if the difference of a term and its predecessor is always a constant, i.e.,  $a_n - a_{n-1} = d$ , where  $d$  is the **common difference**. The successive term of an AP are  $a, a + d, a + 2d, a + 3d, \dots$
- **General Term:-** General term or  $n^{\text{th}}$  term of an A.P is  $a_n = a + (n - 1)d$ , where  $a$  = first term,  $d$  = common difference. ( $a_n = t_n$ )
- If three terms,  $a, b, c$  are in A.P, then  $b - a = c - b$ , i.e.,  $2b = a + c$ .
- **Sum of 1<sup>st</sup> n terms of an A.P:-**  $S_n = \frac{n}{2}[2a + (n - 1)d]$ , where  $a$  = first term and  $d$  = common difference.  
Or  $S_n = \frac{n}{2}[a + l]$ , where  $l$  is last term as  $l = a_n$ .
- **Number of terms:-**  $n = \frac{l - a}{d} + 1$ , where  $l$  = last term,  $a$  = first term.
- **Sum of 1<sup>st</sup> n natural numbers:-**  $\frac{n(n + 1)}{2}$ . **Sum of 1<sup>st</sup> n even numbers:-**  $n(n + 1)$
- **Sum of 1<sup>st</sup> n odd numbers:-**  $n^2$ , where  $n$  is number of terms.

1. The 7<sup>th</sup> term of an A.P. is 32 and its 13<sup>th</sup> term is 62. Find the A.P.
2. Find the sum of the 1<sup>st</sup> 25 terms of an A.P. whose  $n^{\text{th}}$  term is given by  $t_n = 2 - 3n$ .
3. Which term of the A.P. 3, 10, 17,..... Will be 84 more than its 13<sup>th</sup> term.
4. The 8<sup>th</sup> term of an A.P. is 32 and its 12<sup>th</sup> term is -39. Find A.P.
5. The  $n^{\text{th}}$  term of an A.P. is given by  $t_n = 4n - 5$ . Find the sum of the first 25 terms of the A.P.

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6. The  $n^{\text{th}}$  term of an A.P. is given by  $t_n = 5n - 3$ . Find the sum of the first 20 terms of the A.P.
7. If the sum of  $1^{\text{st}}$   $n$  terms of an A.P. is given by  $S_n = 3n^2 + 2n$ . Find  $n^{\text{th}}$  term of the A.P.
8. If  $m$  times the  $m^{\text{th}}$  term of an A.P. is equal to  $n$  times its  $n^{\text{th}}$  term, find its  $(m+n)^{\text{th}}$  term.
9. How many terms of the A.P. 3, 5, 7,..... must be taken so that the sum is 120.
10. If the sum of  $1^{\text{st}}$   $n$  terms of an A.P. is given by  $S_n = 2n^2 + 5n$ , find the  $n^{\text{th}}$  term of the A.P.
11. Find the sum of  $1^{\text{st}}$  15 terms of an A.P. whose  $n^{\text{th}}$  is  $9 - 5n$ .
12. Find the number of terms of the A.P. 54, 51, 48,..... so that their sum is 513.
13. The  $8^{\text{th}}$  term of an A.P. is zero. Prove that its  $38^{\text{th}}$  term is triple of its  $18^{\text{th}}$  term.
14. Find the sum of all two digit positive numbers divisible by 3.
15. Which term of the A.P. 5, 9, 13,..... Is 81? Also find the sum  $5 + 9 + 13 + \dots + 81$ .
16. The sum of three numbers in A.P. is 27 and their product is 405. Find the numbers.
17. Find the sum of all the natural numbers less than 100 which are divisible by 6.
18. Using A.P. find the sum of all 3-digit natural numbers which are multiple of 7.
19. Which term of the A.P. 3, 15, 27, 39,..... will be 132 more than its  $54^{\text{th}}$  term.
20. The first term, common difference and last term of an A.P. are 12, 6, 252 respectively. Find the sum of all terms of this A.P.
21. Show that  $a - b, a$  and  $a + b$  form consecutive terms of an A.P.
22. The  $3^{\text{rd}}$  term of an A.P. is  $p$  and  $4^{\text{th}}$  term is  $q$ . Find the  $10^{\text{th}}$  term.
23. Determine  $k$  so that  $k + 2, 4k - 6$  and  $3k - 2$  are the three consecutive term of an A.P.
24. A thief runs away from a police station with a uniform speed of 100m/minutes. After one minutes a policeman runs behind the thief to catch him. He goes at speed of 100m/minutes in first minute and increases his speed 10m each succeeding minute. After how many minutes, the policeman will catch the thief.
25. Determine  $k$  so that  $4k + 8, 2k^2 + 3k + 6$  and  $3k^2 + 4k + 4$  are the three consecutive term of an A.P.
26. The  $p^{\text{th}}$  term of an A.P. is  $q$  and  $q^{\text{th}}$  term is  $p$ . Find the  $(p + q)^{\text{th}}$  term.

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27. If the  $p^{\text{th}}$  term of an A.P. is  $\frac{1}{q}$  and the  $q^{\text{th}}$  term is  $\frac{1}{p}$ , show that the sum of  $pq$  terms is  $\frac{1}{2}(pq + 1)$ .
28. In an A.P. the first term is 8,  $n^{\text{th}}$  term is 33 and the sum to  $1^{\text{st}}$   $n$  terms is 123. Find  $n$  and  $d$ .
29. In an A.P. the sum of  $1^{\text{st}}$   $n$  terms is  $\frac{3n^2}{2} + \frac{13}{2}n$ . Find its  $25^{\text{th}}$  term.
30. Find the sum of the first 25 terms of an A.P. whose  $n^{\text{th}}$  term is given by  $a_n = 7 - 3n$ .
31. Find the sum of the  $1^{\text{st}}$  25 terms of an A.P. whose  $n^{\text{th}}$  term is given by  $a_n = 2 - 3n$ .
32. Find the sum of
  - i) the first 15 multiples of 8.
  - ii) the first 40 positive integers divisible by a) 3 b) 5 d) 6.
  - iii) all 3-digit natural numbers which are divisible by 13.
33. How many terms of the A.P. 63, 60, 57, ... must be taken so that their sum is 693.
34. If the  $n^{\text{th}}$  term of an A.P. is  $(2n + 1)$ , find the sum of  $1^{\text{st}}$   $n$  terms of the A.P.
35. Find the  $10^{\text{th}}$  term from the end of the A.P. 8, 10, 12, ..., 126.
36. Find the  $8^{\text{th}}$  term from the end of the A.P. 7, 10, 13, ..., 184.
37. Find the term of A.P. 9, 12, 15, ... which is 39 more than its  $36^{\text{th}}$  term.
38. Which terms of the A.P. 8, 14, 20, 26, ... will be 72 more than its  $41^{\text{st}}$  term.
39. For what value of  $n$ , the  $n^{\text{th}}$  terms of the A.P. 63, 65, 67, ... and 3, 10, 17, ... are equal.
40. The  $7^{\text{th}}$  term of an A.P. is 32 and its  $13^{\text{th}}$  term is 62. Find the A.P.
41. Jasleen saved ₹5 in the first week of the year and then increased her weekly savings by ₹1.75 each week. In what week will her weekly savings be ₹20.75.
42. Suba Rao started work in 1995 at an annual salary ₹ 5000 and received a ₹200 raise each year. In what year did his annual salary will reach ₹7000.
43. If  $p^{\text{th}}$  term of an A.P. is  $q$  and  $q^{\text{th}}$  term is  $p$ . Prove that its  $n^{\text{th}}$  term is  $(p + q - n)$ .
44. Which term of the A.P. 5, 15, 25, ... will be 130 more than its  $31^{\text{st}}$  term.
45. For what value of  $n$  is the  $n^{\text{th}}$  term of the following two A.P.'s same
  - i) 1, 7, 13, 19, ...
  - ii) 69, 68, 67, ...

Prepared BY: ABDURAHIMAN K

AI-HIJAS INTERNATIONAL SCHOOL, JEDDAH(IGCSE). [rahman2ark@gmail.com](mailto:rahman2ark@gmail.com),  
00966501079040.

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