



# MATHS

## BOOKS - R G PUBLICATION

### ARITHMETIC PROGRESSION

#### Example

1. Is the series 1,6,11,16,21,..... Is an AP?



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2. Find AP whose first term 'a' and common difference 'd' are given below:(i) $a=3,d=-2$

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3. Find AP whose first term 'a' and common difference 'd' are given below:(ii) $a=2,d=-1/2$

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4. Find AP whose first term 'a' and common difference 'd' are given below:(iii)  $a=8,d=4$

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5. Find AP whose first term 'a' and common difference 'd' are given below:(iv) $a=1, d=1/2$

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6. Find the common difference of the following AP:  
(i) 6, 1, -4, -9, -14, .....

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7. Find the common difference of the following AP:

(ii) 0.6, 1.7, 2.8, 3.9, .....



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8. Find the common difference of the following AP:

(iii)  $1/3, 5/3, 9/3, 13/3, \dots$



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9. Find the  $9^{th}$  and  $13^{th}$  term of the AP 3, 7, 11, 15.



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10. Find the 7<sup>th</sup> term of the AP  $13/5, 7/5, 1/5, -1, \dots$



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11. Which term of the AP  $4, 9, 14, 19, \dots$  is 124?



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12. How many terms in the series  $3, 6, 9, 12, \dots, 111$ ?



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**13.** The  $8^{th}$  and  $102^{nd}$  term of an AP are respectively 23 and 305. Find the first term and common difference of the AP.



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**14.** How many numbers of two digit are divisible by 5?



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**15.** Which term of the AP 5,15,25,..... is 130 more than the  $31^{th}$  term?



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## Exercise

1. In which of the following situations, does the list of numbers involved make an arithmetic progression, and why? (i) The taxi fare after each km when the fare is Rs 15 for the first km and Rs 8 for each additional km.



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2. In which of the following situations, does the list of numbers involved make an arithmetic progression, and why? (ii) The amount of air present in a cylinder when a vacuum pump removes  $\frac{1}{4}$  of the air remaining in the cylinder at a time.



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3. In which of the following situations, does the list of numbers involved make an arithmetic progression, and why? (iii) The cost of digging a well after every metre of digging, when it costs Rs 150 for



the first metre and rises by Rs 50 for each subsequent metre.



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4. Write first four terms of the AP, when the first term  $a$  and the common difference  $d$  are given as follows:

(i)  $a=10, d=10$



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5. Write first four terms of the AP, when the first term  $a$  and the common difference  $d$  are given as follows:

(ii)  $a=-2, d=0$



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6. Write first four terms of the AP, when the first term  $a$  and the common difference  $d$  are given as follows:

(iii)  $a=4, d=-3$



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7. Write first four terms of the AP, when the first term  $a$  and the common difference  $d$  are given as follows:

(iv)  $a=-1, d=1/2$



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8. Write first four terms of the AP, when the first term  $a$  and the common difference  $d$  are given as follows:

(v)  $a = -1.25, d = -0.25$



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9. For the following AP s, write the first term and the common difference: (i)  $3, 1, -1, -3, \dots$



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10. For the following AP s,write the first term and the common difference:(ii)-5,-1,3,7,.....



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11. For the following AP s,write the first term and the common difference:(iii) $1/3, 5/3, 9/3, 13/3, \dots$



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12. For the following AP s,write the first term and the common difference:(iv)0.6,1.7,2.8,3.9,.....



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**13.** Which of the following are APs ?If they form an AP,find the common difference  $d$  and write three more terms.(i) 2,4,8,16,....



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**14.** Which of the following are APs ?If they form an AP,find the common difference  $d$  and write three more terms.(ii)  $2, 5/2, 3, 7/2, \dots$



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**15.** Which of the following are APs ?If they form an AP,find the common difference  $d$  and write three more terms.(iii)-1.2,-3.2,-5.2,-7.2,.....



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**16.** Which of the following are Aps ?If they form an AP,find the common difference  $d$  and write three more terms.(iv)-10,-6,-2,2,.....



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17. Which of the following are Aps ?If they form an AP,find the common difference d and write three more terms.(v) $3, 3 + \sqrt{2}, 3 + \sqrt{2}, 3 + 3\sqrt{2}, \dots$



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18. Which of the following are APs ?If they form an AP,find the common difference d and write three more terms.(vi) $0.2, 0.22, 0.222, 0.2222, \dots$



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**19.** Which of the following are Aps ?If they form an AP,find the common difference  $d$  and write three more terms.(vii)  $0,-4,-8,-12,\dots$



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**20.** Which of the following are APs ?If they form an AP,find the common difference  $d$  and write three more terms.(viii)  $-1/2,-1/2,-1/2,-1/2,\dots$



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21. Which of the following are Aps ?If they form an AP,find the common difference  $d$  and write three more terms.(ix) 1,3,9,27,.....



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22. Which of the following are APs ?If they form an AP,find the common difference  $d$  and write three more terms.(x)  $a, 2a, 3a, 4a, \dots$



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**23.** Which of the following are APs ?If they form an AP,find the common difference  $d$  and write three more terms.(xi) $a, a^2, a^3, a^4, \dots$



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**24.** Which of the following are APs ?If they form an AP,find the common difference  $d$  and write three more terms.(xii) $\sqrt{2}, \sqrt{8}, \sqrt{18}, \sqrt{32}, \dots$



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25. Which of the following are Aps ?If they form an AP,find the common difference d and write three more terms.(xiii)  $\sqrt{3}, \sqrt{6}, \sqrt{9}, \sqrt{12}, \dots$



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26. Which of the following are APs ?If they form an AP,find the common difference d and write three more terms.(xiv)  $1^2, 3^2, 5^2, 7^2, \dots$



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27. Which of the following are Aps ?If they form an AP,find the common difference  $d$  and write three more terms.(xv) $1^2, 5^2, 7^2, 7^3, \dots$

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28. Fill in the blanks in the following table,given that  $a$  is the first term, $d$  the common difference and  $a_n$  the term of the AP:

	$a$	$d$	$n$	$a_n$
(i)	7	3	8	...
(ii)	-18	...	10	0
(iii)	...	-3	18	-5
(iv)	-18,9	2.5	...	3.6
(v)	3.5	0	105	....

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**29.** Choose the correct choice in the following and

justify:(i) 30th term of the AP:10,7,4,..... Is

a)97 b)77 c)-77 d)-87

A. 97

B. 77

C. -77

D. -87

**Answer:**



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**30.** Choose the correct choice in the following and

justify:(ii) 11th term of the AP:  $-3, -\frac{1}{2}, 2, \dots$ , is

a)28 b)22 c)-38 d)-48

A. 28

B. 22

C. -38

D.  $-48\left(\frac{1}{2}\right)$

**Answer:**



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31. In the following APs ,find the missing terms in the boxes:

2, , 26

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32. In the following Aps ,find the missing terms in the boxes:

, 13, , 3

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33. In the following Aps ,find the missing terms in the boxes:

$$5, \square, \square, 9\frac{1}{2}$$

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34. In the following APs ,find the missing terms in the boxes:

$$-4, \square, \square, \square, \square, 6$$

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35. In the following APs ,find the missing terms in the boxes:

, 38, , , , -22



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36. Which term of the AP:3,8,13,18,.....78?



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**37.** Find the number of terms in each of the following

APs :(i) 7, 13, 19, ....., 205.



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**38.** Find the number of terms in each of the following

APs :(ii) 18,  $15\frac{1}{2}$ , 13, ....., -47



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**39.** Check whether -150 is a term of the AP: 11, 8, 5, 2, .....



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**40.** Find the 31st term of an AP whose 11th term is 38 and the 16th term is 73.

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**41.** An AP consists of 50 terms of which 3rd term is 12 and the last term is 106. Find the 29th term.

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**42.** If the 3rd and the 9th terms of an AP are 4 and -8 respectively, which term of this AP is zero ?

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**43.** The 17th term of an AP exceeds its 10th term by 7. Find the common difference.

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**44.** Which term of the AP: 3,15,27,39,... Will be 132 more than its 54th term?

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45. Two AP s have the same common difference. The difference between their 100th terms is 100, what is the difference between their 1000th terms?



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46. How many three-digit numbers are divisible by 7?



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47. How many multiples of 4 lie between 10 and 250?



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**48.** For what value of  $n$  are the  $n$ th terms of two AP :63,65,67,.....and 3,10,17,....equal?



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**49.** Determine the AP whose third term is 16 and the 7th term exceeds the 5th term by 12.



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**50.** Find the 20th term from the last term of the AP:3,8,13,....243.



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51. The sum of the 4th and 8th terms of an AP is 24 and the sum of the 6th and 10th terms is 44. Find the first three terms of the AP.



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52. Subba Rao started work in 1995 at an annual salary of ₹ 5000 and received an increment of ₹ 200 each year. In which year did his income reach ₹ 7000?



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**53.** Ramkali saved ₹ 5 in the first week of a year and then increased her weekly savings by ₹ 1.75. If in the week, her weekly saving become ₹20.75. Find  $n$ .

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**54.** Find the sum of the following AP s: (i) 2, 7, 12, ..... to 10 terms.

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**55.** Find the sum of the following AP s:  
(ii) -37, -33, -29, ..... to 12 terms.





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56. Find the sum of the following AP s:

(iii) 0.6, 1.7, 2.8, ... to 100 terms



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57. Find the sum of the following AP s:

(iv)  $1/15, 1/12, 1/10, \dots$  to 12 terms.



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58. Find the sums given below :(i)

$$7 + 10\left(\frac{1}{2}\right) + 14 + \dots + 84$$



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59. Find the sums given below :(ii)  $34+32+30+\dots+10$



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60. Find the sums given below :(iii)  $-5+(-8)+(-11)+\dots+(-230)$



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61. In an AP:(i) given  $a=5, d=3, a_n = 50$ , find  $n$  and  $S_n$



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62. In an AP:(ii) given  $a=7, a_{13} = 35$ , find  $d$  and  $S_{13}$ .



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63. In an AP:(iii) given  $a_{12} = 37, d=3$ , find  $a$  and  $S_{12}$ .



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**64.** In an AP:(iv) given  $a_3 = 15$ ,  $S_{10} = 125$ , find  $d$  and  $a_{10}$

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**65.** In an AP:(v) given  $d=5$ ,  $S_9 = 75$ , find  $a$  and  $a_9$ .

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**66.** In an AP:(vi) given  $a=2$ ,  $d=8$ ,  $S_n = 90$ , find  $n$  and  $a_n$

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67. In an AP:(vii) given  $a=8, a_n = 62, S_n = 210$ , find  $n$  and  $d$



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68. In an AP:(viii) given  $a_n = 4, d = 2, S_n = -14$ , find  $n$  and  $a$ .



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69. In an AP:(ix) given  $a=3, n=8, S=192$ , find  $d$ .



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70. In an AP:(x)given  $l=28,S=144$ ,and there are total 9 terms.Find a.

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71. How many terms of the AP:9,17,25,..... Must be taken to give a sum of 636?

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72. The first term of an AP is 5,the last term is 45 and the sum is 400.Find the number of terms and the common difference.



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**73.** The first and last terms of an AP are 17 and 350 respectively. If the common difference is 9, how many terms are there and what is their sum?



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**74.** Find the sum of first 22 terms of an AP in which  $d=7$  and 22nd term is 149.



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75. Find the sum of first 51 terms of an AP whose second and third terms are 14 and 18 respectively.



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76. If the sum of 7 terms of an AP is 49 and that of 17 terms is 289, find the sum of  $n$  terms.



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77. Show that  $a_1, a_2, \dots, a_n$  form an AP where  $a_n$  is defined as below: (i)  $a_n = 3 + 4n$  Also, find the sum of the first 15 terms in each case.







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**78.** Show that  $a_1, a_2, \dots, a_n, \dots$  form an AP where  $a_n$  is defined as below: (i)  $a_n = 9 - 5n$  Also, find the sum of the first 15 terms in each case.



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**79.** If the sum of the first  $n$  terms of an AP is  $4n - n^2$ , what is the first term (that is  $S_1$ )? What is the sum of first two terms? What is the second term? Similarly, find the 3rd, the 10th and  $n$ th terms.



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**80.** Find the sum of the first 40 positive integers divisible by 6.



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**81.** Find the sum of the first 15 multiples of 8.



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**82.** Find the sum of all the odd numbers between 0 and 50.



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**83.** A contract of construction job specifies a penalty for delay of completion beyond a certain date as follows: ₹200 for the first day, ₹250 for the second day, ₹300 for the third day etc. the penalty for each succeeding day being ₹50 more than for the preceding day. How much does a delay of 30 days cost the contractor?

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**84.** A sum of ₹700 is to be used to give seven cash prizes to students of a school for their overall

academic performance. If each prize is ₹20 less than its preceding prize, find the value of each of the prizes.



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**85.** In a school, students thought of planting trees in and around the school to reduce air pollution. It was decided that the number of trees that each section of each class will plant will be the same as the class in which they are studying e.g. a section of I class will plant 1 tree, a section of II class will plant 2 trees and so on, a section of XII class will plant 12 trees. There

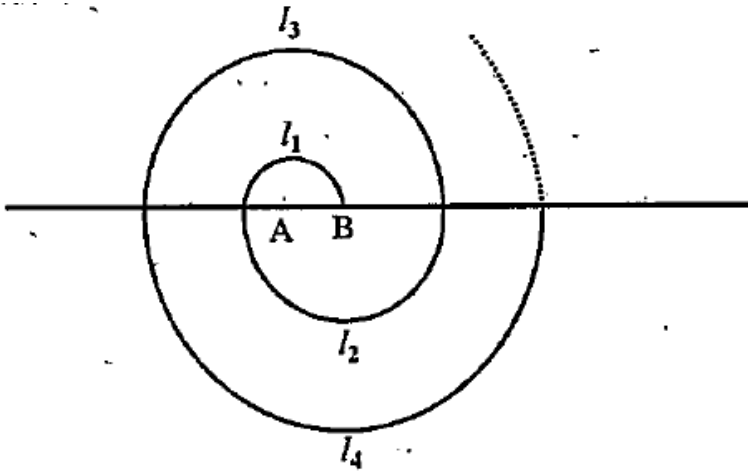
are three sections of each class. Find out how many trees were planted.



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**86.** A spiral is made up of successive semicircles, with centers alternately at A and B, starting with centre at A, of radio 0.5 cm, 1.0 cm, 1.5 cm, 2.0 cm, .... as shown in fig. What is the total length of such a spiral made up

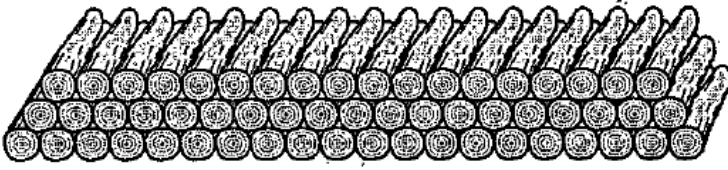
of thirteen consecutive semicircles (Take  $\pi = \frac{22}{7}$ )



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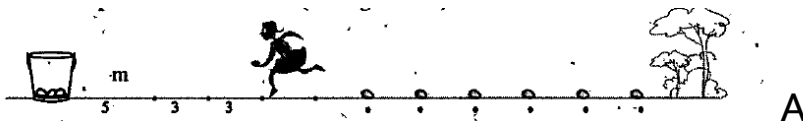
**87.** 200 logs are stacked in the following maner:20 logs in the bottom row,19 in the next row,18 in the row next to it and so on (see figure).In how many rows the 200 logs are placed and how many logs are

in the top row?



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**88.** In a potato race a bucket is placed at the starting point which is 5 m from the first potato and the other potatoes are placed 3 m apart in a straight line. There are ten potatoes in the line (see fig. below).



competitors starts from the bucket picks up the nearest potato, runs back with it, drops it in the

bucket, runs back up the next potato, runs to the bucket to drop it in and she continues in the same way until all the potatoes are in the bucket. What is the distance the competitor has to run?

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89. Which term of the AP: 121, 117, 113, ..., is its first negative term?

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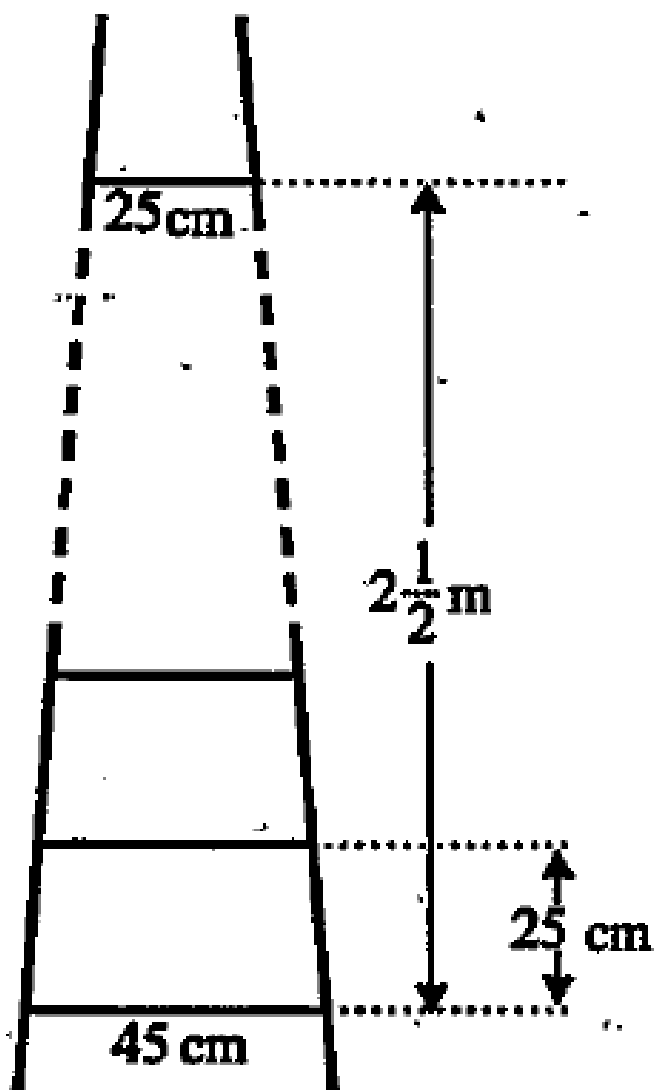
**90.** The sum of the third and the seventh terms of an AP is 6 and their product is 8. Find the sum of first sixteen terms of the AP.



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**91.** A ladder has rungs 25 cm apart. (see Fig.) The rungs decrease uniformly in length from 45 cm at the bottom to 25 cm at the top. If the top and the bottom rungs are  $2\frac{1}{2}$  m apart. What is the length

of the wood required for the rungs?



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**92.** The houses of a row are numbered consecutively from 1 to 49. Show that there is a value of  $x$  such that the sum of the numbers of the houses preceding the house numbered  $x$  is equal to the sum of the numbers of the houses following it. Find the value of  $x$ .

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**93.** Define arithmetic Progression.

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**94.** Find the  $n$ th term of 6,8,10,....



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**95.** Write the common difference of an A.P. Whose  $n$ th term is  $a_n = 3n + 7$



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**96.** The first term of an AP is 6 and the common difference is 2, then determine the 15th term.



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**97.** Find the 20th term from the last term of the AP:3,8,13,....253.

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**98.** Find the value of  $x$  if  $2x, x+10$  and  $3x+2$  are in A.P.

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**99.** If  $x, 2x+p$  and  $3x+6$  are three consecutive terms of an A.P.then find the value of  $p$ .

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**100.** Find the sum of first  $n$  even natural numbers.

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**101.** Find the sum of first twelve multiple of 7.

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**102.** If the sum of  $n$  terms of an A.P is  $S_n = 3n^2 + 5n$

then find the Common difference:

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103. If  $\frac{4}{5}, a, 2$  are three consecutive terms of an A.P. then  $a =$

a)  $\frac{5}{4}$  b)  $\frac{9}{5}$  c)  $\frac{7}{5}$  d) 5

A.  $\frac{5}{4}$

B.  $\frac{9}{5}$

C.  $\frac{7}{5}$

D. 5

**Answer:**



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**104.** The first term of an AP is  $a$  and its common difference is  $d$  then its 10th term will be

a)  $d+10a$  b)  $a+10d$  c)  $a+9d$  d)  $d+9a$

A.  $d+10a$

B.  $a+10d$

C.  $a+9d$

D.  $d+9a$

**Answer:**



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**105.** Which term of the A.P. 72, 63, 54, ... is '0'?

a) 9th b) 8th c) 10th d) 11th

A. 9th

B. 8th

C. 10th

D. 11th

**Answer:**



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**106.** The first two terms of an AP are -5 and 6. Its 21st term will be \_\_\_

a)215 b)-215 c)115 d)-115

A. 215

B. -215

C. 115

D. -115

**Answer:**



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107. The next term of the AP  $\sqrt{2}, \sqrt{8}, \sqrt{18}, \dots$  will be

A.  $\sqrt{32}$

B.  $\sqrt{107}$

C.  $\sqrt{108}$

D.  $\sqrt{147}$

**Answer:**



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**108.** The next term of the AP  $\sqrt{27}, \sqrt{48}, \sqrt{75}, \dots$  will be

A.  $\sqrt{105}$

B.  $\sqrt{107}$

C.  $\sqrt{108}$

D.  $\sqrt{147}$

**Answer:**



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**109.** If the  $n$ th term of an AP is  $(3n+5)$  then its common difference is

a)2 b)3 c)4 d)5

A. 2

B. 3

C. 4

D. 5

**Answer:**



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**110.** The 4th term from the end of the A.P.  $-11, -8, -5, \dots, 49$

is

a)37 b)40 c)43 d)58

A. 37

B. 40

C. 43

D. 58

**Answer:**



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**111.** The sum of first 16 term of the AP 10,6,2,...will be

a)320 b)-320 c)-352 d)400

A. 320

B. -320

C. -352

D. 400

**Answer:**



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**112.** How many terms of the AP.3,7,11,15,...will make the sum 406\_\_\_\_\_

a)10 b)12 c)14 d)40

A. 10

B. 12

C. 14

D. 40

**Answer:**



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**113.** The sum of first 20 terms of the AP:1,3,5,7,9,.....is

a)264 b)400 c)472 d)563

A. 264

B. 400

C. 472

D. 563

**Answer:**



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114. The sum of  $n$  terms of the A.P.

$\sqrt{2}, \sqrt{8}, \sqrt{18}, \sqrt{32}, \dots$  is

a)  $\frac{1}{2}n(n+1)$  b)  $2n(n+1)$  c)  $1$  d)  $\frac{1}{\sqrt{2}}n(n+1)$

A.  $\frac{1}{2}n(n+1)$

B.  $2n(n+1)$

C.  $1$

D.  $\frac{1}{\sqrt{2}}n(n+1)$

**Answer:**



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**115.** The sum of first  $n$  odd natural number is

A.  $n^2$

B.  $2n+1$

C.  $2n-1$

D.  $n^2 - 1$

**Answer:**



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**116.** The sum of first 100 natural number is

a)5000 b)4950 c)5050 d)5150

A. 5000

B. 4950

C. 5050

D. 5150

**Answer:**



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**117.** The sum of all 2-digit numbers divisible by 5 is

a)945 b)1035 c)1230 d)1245

A. 945

B. 1035

C. 1230

D. 1245

**Answer:**



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**118.** If  $4, x_1, x_2, x_3, 28$  are in A.P then  $x_3 =$

a)19 b)22 c)23 d)Cannot be determined

A. 19

B. 22

C. 23

D. Cannot be determined

**Answer:**



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**119.** If the first, second and last term of an AP are  $a$ ,  $b$  and  $2a$  respectively, its sum is

A.  $\frac{ab}{b - a}$

B.  $\frac{2ab}{2(b - a)}$

C.  $\frac{3ab}{2(b - a)}$

D. None of these

**Answer:**



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**120.**

If

$S_n$  denotes the  $\sum$  of the first  $n$  terms of an AP and if

$S_{2n} = 3S_n$  then  $S_{3n} : S_n$  is equal to

A. 4

B. 6

C. 8

D. 10

**Answer:**



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**121.** The  $n$ th term of an A.P the sum of whose  $n$  term is  $S_n$  is \_\_\_\_\_

A.  $S_n + S_{n-1}$

B.  $S_n - S_{n+1}$

C.  $S_n - S_{n-1}$

D.  $S_n - S_{n+1}$



**Answer:**



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**122.** If  $\frac{1}{x+2}, \frac{1}{x+3}, \frac{1}{x+5}$  are in A.P then the value of x will be

a)1 b)2 c)3 d)5

A. 1

B. 2

C. 3

D. 5

**Answer:**



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