MATHS

BOOKS - SWAN PUBLICATION

ARITHMETIC PROGRESSIONS

Exercise 5 1

1. In which of the following situations, does the list of numbers involved make an arithmetic progression, and why ? :- The taxi

fare after each km when the fare is $ 15 for the first km and $ 8 for each additional km.

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

3. In which of the following situations, does the list of numbers involved make an arithmetic progression, and why ? :-The cost of digging a well after every metre of digging, when it costs $150 for the first metre and rises by $50 for each subsequent metre.

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4. The amount of money in the account every year, when Rs 10000 is deposited at compound

interest at 8% per annum.

5. Write first four terms of the AP, when the first term a and the common difference d are given as follows :- a=10, d=10 .

6. Write first four terms of the AP, when the first term a and the common difference d are

given as follows :- a=-2 , d=0 .

7. Write first four terms of the AP, when the first term a and the common difference d are given as follows :- a=4, d= -3.

8. Write first four terms of the AP, when the first term a and the common difference d are

given as follows :- a=-1 , d$\frac{1}{2}$.

9. Write first four terms of the AP, when the first term a and the common difference d are given as follows :- a=-1.25 , d=-0.25 .

10. For the following A.P.s, write the first term and the common difference :- 3,1,-1,-3.... .

11. For the following A.P.s, write the first term and the common difference :- -5,-1,3,7,... .

12. For the following A.P.s, write the first term and the common difference :-

$$\frac{1}{3}, \frac{5}{3}, \frac{9}{3}, \frac{13}{3}, \ldots$$

13. For the following A.P.s, write the first term and the common difference :- 0.6, 1.7, 2.8, 3.9... .

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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. :- 2,4,8,16 .

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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. :- 2,5/2,3,7/2 ,.... .

16. Which of the following are APs ? If they form an AP,find the common difference d and write three more terms. :- -1.2,-3.2, -5.2, -7.2, ...

17. Which of the following are APs ? If they form an AP,find the common difference d and write three more terms. :- -10, -6, -2,2,...

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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. :-

$3, 3 + \sqrt{2}, 3 + 2\sqrt{2}, 3 + 3\sqrt{2}, ...$

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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. :- 0.2, 0.22, 0.222, 0.2222, ...

20. Which of the following are APs ? If they form an AP,find the common difference d and write three more terms. :- 0,-4,-8,-12, ...

21. Which of the following are Aps? If they form an AP, find the common difference d and write three more terms.

$$-\frac{1}{2}, \ -\frac{1}{2}, \ -\frac{1}{2}, \ -\frac{1}{2}, ...$$

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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. :- 1,3,9,27, ...

23. Which of the following are APs ? If they form an AP,find the common difference d and write three more terms. :- a,2a,3a,4a , ...

24. Which of the following are APs ? If they form an AP,find the common difference d and write three more terms. :- $a, a^2, a^3, a^4, ...$

25. Which of the following are APs ? If they form an AP,find the common difference d and write three more terms. :- $\sqrt{2}$, $\sqrt{8}$, $\sqrt{18}$, $\sqrt{32}$, ...

26. Which of the following are APs ? If they form an AP,find the common difference d and write three more terms. :- $\sqrt{3}$, $\sqrt{6}$, $\sqrt{9}$, $\sqrt{12}$, ...

27. Which of the following are APs ? If they form an AP,find the common difference d and write three more terms. :- 1^2, 3^2, 5^2, 7^2, ...

28. Which of the following are APs ? If they form an AP,find the common difference d and write three more terms. :- 1^2, 5^2, 7^2, 73, ...

Exercise 5 2

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

a	d	n	a_n
7	3	8	...
-18	...	10	0
...	-3	18	-5
-18.9	2.5	...	3.6
3.5	0	105	...
.

2. Choose the correct choice in the following and justify :- 30th term of the AP : 10, 7, 4........ Is

    A. 97

    B. 77

    C. -77

    D. -87

Answer: C

3. Choose the correct choice in the following and justify :- 11th term of the AP : -3, $-\dfrac{1}{2}$, 2,....... Is

    A. 28

    B. 22

    C. -38

    D. $-48\dfrac{1}{2}$

Answer: B

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

(i) 2, ☐, 26

(ii) ☐, 13, ☐, 3

(iii) 5, ☐, ☐, $9\frac{1}{2}$

(iv) −4, ☐, ☐, ☐, ☐, 6

(v) ☐, 38, ☐, ☐, ☐, −22

5. In the following APs,find the missing terms in the boxes :- □ , 13, □ , 3 .

6. In the following APs,find the missing terms in the boxes :- 5, □ , □ , $9\dfrac{1}{2}$.

7. In the following APs,find the missing terms in the boxes :- -4, ☐, ☐, ☐, ☐ 6 .

8. In the following APs,find the missing terms in the boxes :- ☐ , 38, ☐ , ☐ , ☐ , -22 .

9. Which term of the A.P. 3, 8, 13, 18,............ is 78?

10. Find the number of terms in each of the following APs :- 7, 13, 19,..., 205 .

11. Find the number of terms in each of the following APs :- $18, 15\frac{1}{2}, 13...., -47$.

12. Is -150 a term of AP 11, 8, 5,2,...? Why?

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

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14. An AP consists of 50 terms of which 3rd term is 12 and the last term is 106. Find the

29th term.

15. If the 3rd and 9th terms of an A.P. are 4 and

- 8 respectively, which term of this A.P. is zero.

16. The 17th term of an AP exceeds its 10th

term by 7. Find the common difference,

17. Which term of the A.P. 3, 15, 27, 39, ... will be 132 more than its 54th term?

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18. Two APs 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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19. How many three-digits numbers are divisible by 7 ?

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

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21. For what value of n, are the nth terms of two A.P.s 63, 65, 67... and 3, 10, 17... equal?

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22. Determine the A.P. whose third term is 16 and 7th term exceeds the 5th term by 12.

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

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

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25. 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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26. Ramkali saved $ 5 in the first week of a year and then increased her weekly saving by $1.75.If in the nth week, her weekly saving becomes $20.75, find n .

Exercise 5 3

1. Find the sum of the following APs :- 2, 7, 12, ...

to 10 terms.

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2. Find the sum of the following APs :- - 37, - 33,

- 29,... to 12 terms

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3. Find the sum of the following APs :- 0.6, 1.7, 2.8, ... to 100 terms.

4. Find the sum of the following APs :- $\dfrac{1}{15}$, $\dfrac{1}{12}$, $\dfrac{1}{10}$,.... To 11 terms .

5. Find the sums given below :- $7+10\dfrac{1}{2}$ +14+....+84 .

6. Find the sums given below :- 34 + 32 + 30 + ... + 10 .

7. Find the sums given below :- - 5 + (- 8) + (- 11)

+...+ (- 230).

8. In an AP :- given a = 5, d = 3, a_n = 50 find n

and S_n.

9. In an AP :- given a = 7, a_{13} = 35 find d and S_{13}.

10. In an AP :- given a_{12} = 37, d = 3, find a and S_{12}.

11. In an AP :- given a_3 = 15, d , S_{10}=125 find d and a_{10}.

12. In an AP :- given d = 5, S_9=75, find a and a_9.

13. In an AP :- given a = 2, d = 8, S_n = 90 find n and a_n.

14. In an AP :- given a = 8, a_n = 62. S_n=210, find n and d .

15. In an AP :- given a_n = 4, d=2, S_n=-14, find n

and a .

16. In an AP :- given a = 3, n = 8, S = 192, find d.

17. In an AP :- given l = 28, S = 144, and there are total 9 terms. Find a.

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18. How many terms of the A.P : 9, 17, 25... must be taken to give a sum of 636 ?

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19. 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.

20. 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 ?

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

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

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

24. Show that $a_1, a_2, \ldots a_n, \ldots$ form an AP where an is defined as below,- $a_n = 3 + 4n$ Also find the sum of the first 15 terms in each case.

25. Show that $a_1, a_2, \ldots, a_n, \ldots$ form an AP where an is defined as below,- $a_n = 9 - 5n$

Also find the sum of the first 15 terms in each case.

26. 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 two terms ? What is the second term ? Similarly, find the 3rd, the 10th and the nth terms.

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

28. Find the sum of first 15 multiples of 8.

29. Find the sum of the odd numbers between 0 and 50.

30. A contract on 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 money the contractor has to pay as penalty, if he has delayed the work by 30 days ?

31. 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.

32. In a school, student thought of planting trees in and around the school to reduce air pollution. It was decided that 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 Class I will plant 1 tree, a section of Class II will plant 2 trees and so on till Class XII. There are three sections of each class. How many trees will be planted by the students ?
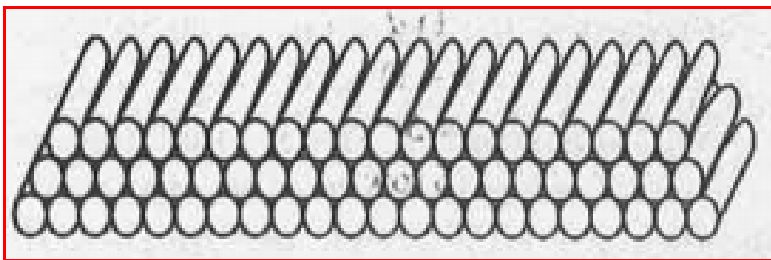
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33. A spiral is made up of successive semicircles, with centres alternately at A and B, starting with centre at A, of radii 0.5 cm, 1.0 cm, 1.5 cm, 2.0 cm, ... as shown in Fig. What is the total length of such a spiral made up of thirteen consecutive semicircles ?
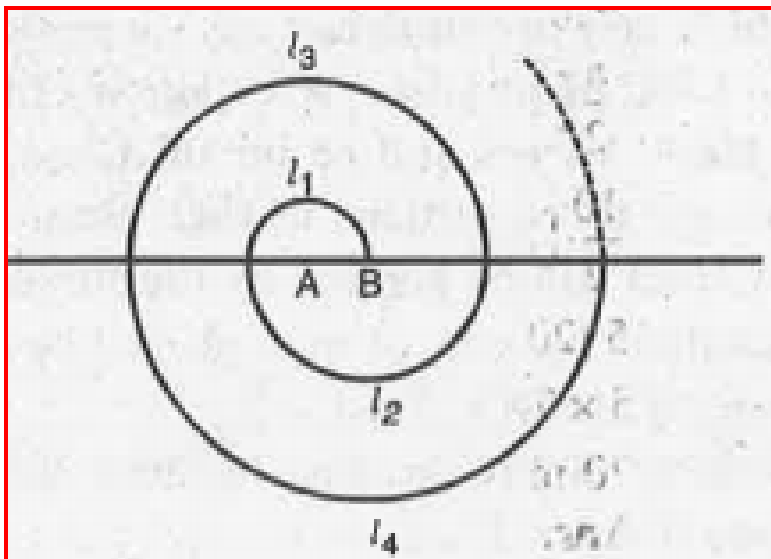
34. 200 logs are stacked in the following manner : 20 logs in the bottom row, 19 in the next row, 18 in the row next to it and so on (see Fig), in how many rows are the,200 logs placed and how many logs are in the top row ?

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

5m   3m   3m
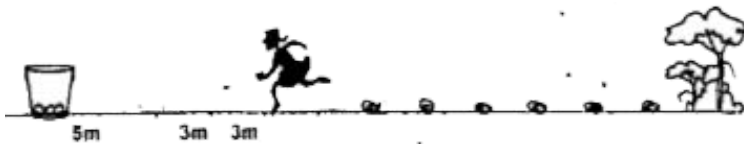
Each competitor starts from the bucket, picks up the nearest potato, runs back with it, dorps it in the bucket, runs back to pick up the next potato, runs to the bucket to drop it in and she continues in the same way until all the

potatoes are in the bucket. What is the total distance the competitor has to run?

Exercise 5 4

1. Which term of the A.P. 121, 117, 113, ... is its first negative term ?

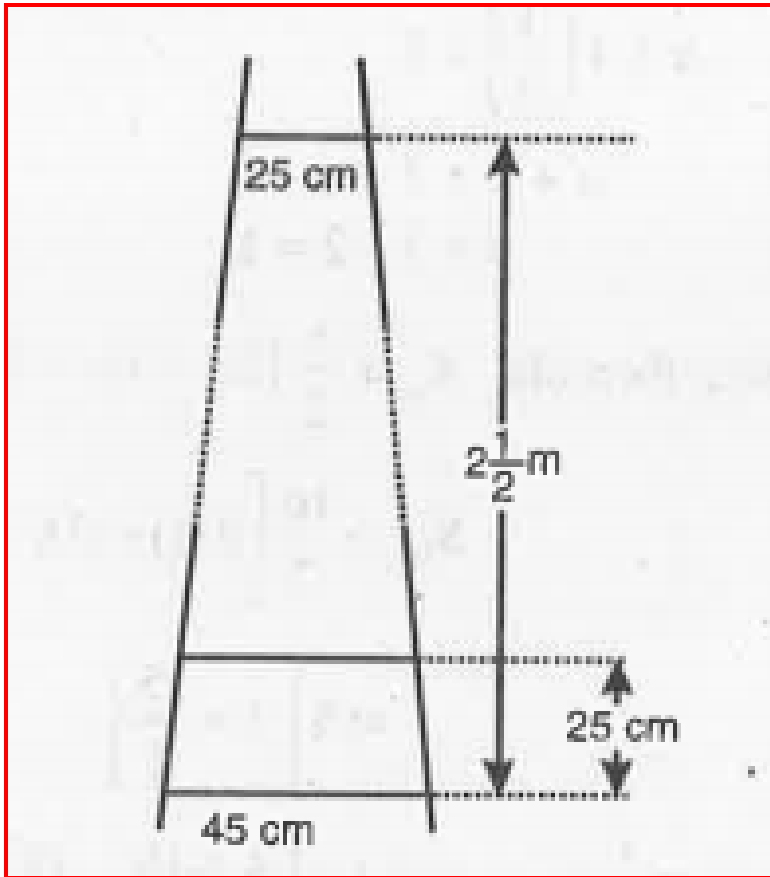**2.** The sum of the third and the seventh term of an A.P. is 6 and their product is 8. Find the sum of first sixteen terms of an A.P.

3. 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 bottom rungs are $2\dfrac{1}{2}$ m apart, what is the length of the wood required for the rungs
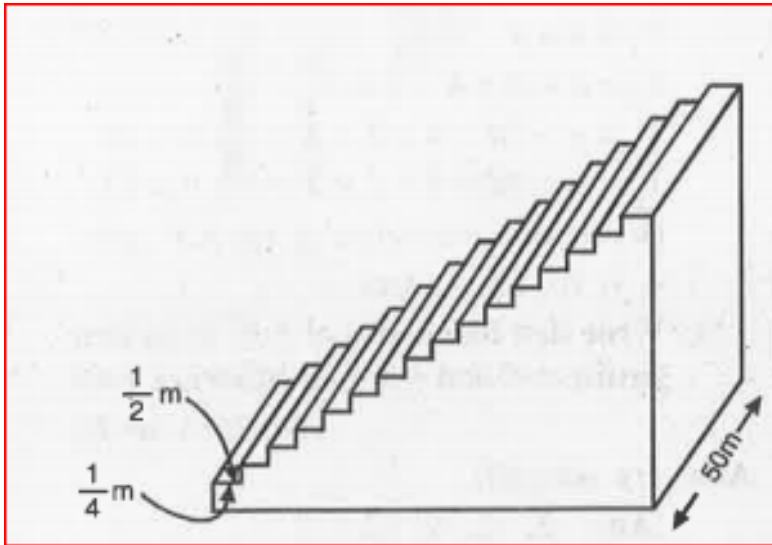
?

4. 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 and find this value of x.

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5. A small terrace at a football ground comprises of 15step each of which is 50m long

and built of solid concrete. Each step has a rise of $\dfrac{1}{4}$ m and a tread of $\dfrac{1}{2}$ m (see fig.) Calculate the total volume of concrete required to build the terrace.