FREE NCERT SOLUTIONS

CLASS - 10

ARITHMETIC PROGRESSIONS

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EXERCISE 5.1 - Question No. 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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EXERCISE 5.1 - Question No. 2

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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EXERCISE 5.1 - Question No. 3

For the following APs, write the first term and the common difference: $(iii) 1/3,5/3,9/3,11/3.....`$

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EXERCISE 5.1 - Question No. 4

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, . . . (ii) $2, \frac{5}{2}, 3, \frac{7}{2}, \ldots$ (iii) $-1.2, -3.2, -5.2, -7.2, \ldots$ (iv) $-10, -6, -2, 2 \ldots$.

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EXERCISE 5.2 - Question No. 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:

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EXERCISE 5.2 - Question No. 2

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

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EXERCISE 5.2 - Question No. 3

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

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EXERCISE 5.2 - Question No. 4

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

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EXERCISE 5.2 - Question No. 5

Find the number of terms in each of the following APs : (i) 7, 13, 19, . . . , 205 (ii) $18,\ 15\frac{1}{2},\ 13,\ \ldots,\ 47$

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EXERCISE 5.2 - Question No. 6

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

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EXERCISE 5.2 - Question No. 7

Find the 31^{st} term of an AP whose 11^{th} term is 3 8 and the 16^{th} term is 73.

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EXERCISE 5.2 - Question No. 8

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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EXERCISE 5.2 - Question No. 9

If the 3rd and the 9^{th} terms of an AP are 4 and -8 respectively, which term of this AP is zero?

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EXERCISE 5.2 - Question No. 10

The 17^{th} term of an AP exceeds its 10^{th} term by 7. Find the common difference.

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EXERCISE 5.2 - Question No. 11

Which term of the AP: 3, 15, 27, 39, . . . will be 132 more than its 54^{th} term?

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EXERCISE 5.2 - Question No. 12

Two APs have the same common difference. The difference between their 100^{th} terms is 100, what is the difference between their 1000^{th} terms?

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EXERCISE 5.2 - Question No. 13

How many threedigit numbers are divisible by 7?

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EXERCISE 5.2 - Question No. 14

How many multiples of 4 lie between 10 and 250?

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EXERCISE 5.2 - Question No. 15

For what value of n, are the with terms of two APs: 63, 65, 67, . . .

and 3, 10, 17, . . . equal?

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EXERCISE 5.2 - Question No. 16

Determine the AP whose third term is 16 and the 7^{th} term exceeds the 5^{th} term by 12.

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EXERCISE 5.2 - Question No. 17

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

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EXERCISE 5.2 - Question No. 18

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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EXERCISE 5.2 - Question No. 19

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

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EXERCISE 5.2 - Question No. 20

Ramkali saved Rs 5 in the first week of a year and then increased her weekly savings by Rs 1.75. If in the nth week, her weekly savings become Rs 20.75, find n.

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EXERCISE 5.3 - Question No. 1

Find the sum of the following APs : (i) 2, 7, 12, . . . , to 10 terms.

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EXERCISE 5.3 - Question No. 2

Find the sums given below : (i) $7 + 10\frac{1}{2} + 14 + .. + \dot{8}4$ (ii)

$34 + 32 + 30 + .. + \dot{1}0$ (iii) $5 + (8) + (-11) + .. + \dot{(}230)$

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EXERCISE 5.3 - Question No. 3

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

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EXERCISE 5.3 - Question No. 4

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

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EXERCISE 5.3 - Question No. 5

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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EXERCISE 5.3 - Question No. 6

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

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EXERCISE 5.3 - Question No. 7

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

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EXERCISE 5.3 - Question No. 8

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

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EXERCISE 5.3 - Question No. 9

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.

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EXERCISE 5.3 - Question No. 10

Show that $a_1, a_2, \ldots, a_n, \ldots$ form an AP where a_n is defined as below : (i) $a_n = 3 + 4n$ (ii) $a_n = 9 - 5n$ Also find the sum of the first 15 terms in each case.

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EXERCISE 5.3 - Question No. 11

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 the nth terms.

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EXERCISE 5.3 - Question No. 12

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

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EXERCISE 5.3 - Question No. 13

Find the sum of the first 15 multiples of 8.

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EXERCISE 5.3 - Question No. 14

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

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EXERCISE 5.3 - Question No. 15

A contract on construction job specifies a penalty for delay of completion beyond a certain date as follows: Rs 200 for the first day, Rs 250 for the second day Rs 300 for the third day, etc., the penalty for each succeeding day being Rs 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?

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EXERCISE 5.3 - Question No. 16

A sum of Rs 700 is to be used to give seven cash prizes to students of a school for their overall academic performance. If each prize is Rs 20 less than its preceding prize, find the value of each of the prizes.

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EXERCISE 5.3 - Question No. 17

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 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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EXERCISE 5.3 - Question No. 18

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 Figure. What is the total length of such a spiral made up of thirteen consec

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EXERCISE 5.3 - Question No. 19

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 Figure). In how may rows are the 200 logs placed and how many logs are in the top row?

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EXERCISE 5.3 - Question No. 20

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 Figure). A competitor starts from the bucket, picks up the nearest potato, runs back with it, drops 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? [Hint : To pick up the first potato and the second potato, the total distance (in metres) rim by a competitor is $2 \times 5 + 2 \times (5 + 3)$]

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EXERCISE 5.4 - Question No. 1

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

[Hint : Find n for $a_n < 0$]

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EXERCISE 5.4 - Question No. 2

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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EXERCISE 5.4 - Question No. 3

A ladder has rungs 25 cm apart, (see Figure). 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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EXERCISE 5.4 - Question No. 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. Find this va

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EXERCISE 5.4 - Question No. 5

A small terrace at a football ground comprises of 15 steps each of which is 50 m long and built of solid concrete. Each step has a rise of $\frac{1}{4}$ m and a tread of $\frac{1}{2}$ m. (see Figure). Calculate the total volume of concrete required to build the ter

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SOLVED EXAMPLES - Question No. 1

For the AP : $\frac{3}{2}, \frac{1}{2}, -\frac{1}{2}, -\frac{3}{2}, ;$ write the first term a and the common difference d.

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SOLVED EXAMPLES - Question No. 2

Which of the following list of numbers does form an AP? If they form an AP. write the next two terms : (i) 4, 10, 16. 22, . . . (ii) 1,-1, -3,-5, . . . (iii) -2,2,-2,2, . . . (iv)1,1,1,2,2,2,3,3,3, . . .

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SOLVED EXAMPLES - Question No. 3

Find the 10^{th} term of the AP : 2, 7, 12, . . .

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SOLVED EXAMPLES - Question No. 4

Which term of the AP : 21, 18, 15,... is 81 ? Also, is any term 0?

Give reason for your answer.

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SOLVED EXAMPLES - Question No. 5

Determine the AP whose 3^{rd} term is 5 and the 7^{th} term is 9.

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SOLVED EXAMPLES - Question No. 6

Check whether 301 is a term of the list of numbers 5, 11, 17, 23, . .

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SOLVED EXAMPLES - Question No. 7

How many twodigit numbers are divisible by 3?

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SOLVED EXAMPLES - Question No. 8

Find the 11^{th} from the last term (towards the first term) of the AP : 10, 7, 4, ..., 62.

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SOLVED EXAMPLES - Question No. 9

A sum of Rs 1000 is invested at 8% simple interest per year.

Calculate the interest at the end of each year. Do these interests

form an AP? If so, find the interest at the end of 30 years making

use of this fact.

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SOLVED EXAMPLES - Question No. 10

In a flower bed, there are 23 rose plants in the first row, 21 in the

second, 19 in the third, and so on. There are 5 rose plants in the last

row. How many rows are there in the flower bed?

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SOLVED EXAMPLES - Question No. 11

Find the sum of the first 22 terms of the AP : 8,3,-2, ...

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SOLVED EXAMPLES - Question No. 12

If the sum of the first 14 terms of an AP is 1050 and its first term is 10, find the 20^{th} term.

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SOLVED EXAMPLES - Question No. 13

How many terms of the AP : 24, 21,18,... must be taken so that their sum is 78?

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SOLVED EXAMPLES - Question No. 14

Find the sum of : (i) the first 1000 positive integers (ii) the first n positive integers

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SOLVED EXAMPLES - Question No. 15

Find the sum of first 24 terms of the list of numbers whose nth term is given by $a_n = 3 + 2n$

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SOLVED EXAMPLES - Question No. 16

A manufacturer of TV sets produced 600 sets in the third year and 700 sets in the seventh year. Assuming that the production increases uniformly by a fixed number every year, find : (i) the production in the 1st year (ii) the production in the 10th year (iii) the total production in first 7 years

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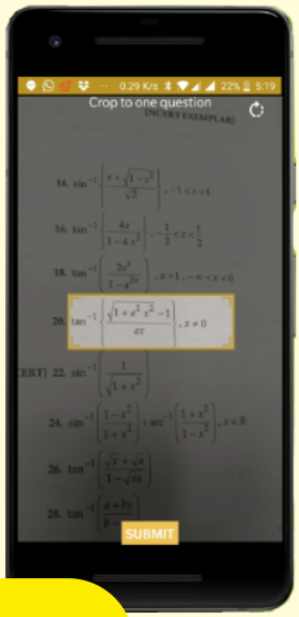

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