



MATHS

NCERT - NCERT MATHS (GUJARATI ENGLISH)

PROGRESSIONS

Examples

1. For ths A.P. $\frac{1}{4}, -\frac{1}{4}, -\frac{3}{4}, -\frac{5}{4}$,

write the first term a and the common

difference d . And find the 7th term.



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2. Which of the following forms an AP? If they form an AP, then write the next two items?

(i) 4,10,16,22,..... , (ii) 1, - 1, - 3, - 5,....., (iii)

- 2, 2, - 2, 2, - 2,..... (iv) 1,1,1,2,2,2,3,3,3,.....,

(v) $x, 2x, 3x, 4x, \dots$



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3. find the 10th term of the AP : 5,1,-3,7,.....



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4. Which term of the AP: 21,18,15,..... Is -81 ?



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



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



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7. How many two-digit numbers are divisible by 3?



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8. Find the 11th term from the last of the AP series given below:

AP: 10,7,4,....., - 62



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9. A sum of 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.





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



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12. How many terms of the AP : 24 , 21, 18

Must be taken so that sum is 78 ?



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13. Find the sum of:

(i) the first 1000 natural numbers, (ii) the first n natural numbers.



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14. Find the sum of first 24 terms of the list of numbers whose n th term is given by

$$a_n = 3 + 2n$$



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15. 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

Solution :



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16. Write the GP if the first term $a=3$, and the common ratio $r=2$.



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17. Write GP. If $a=256, r = -\frac{1}{2}$



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18. Find the common ratio of the GP 25,
 $-5, 1, -\frac{1}{5}, \dots$



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19. Which of the following lists of numbers form GP?

(i) 3,6,12,.....

(ii) 64, - 32, 16,

(iii) $\frac{1}{64}$, $\frac{1}{32}$, $\frac{1}{8}$,.....



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20. Find the 20th and nth term of the GP.

$\frac{5}{2}$, $\frac{5}{4}$, $\frac{5}{8}$,.....



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21. Which terms of the GP: $2, 2\sqrt{2}, 4, \dots$ is 128 ?



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22. In a GP the 3rd term is 24 and 6th term is 192. Find the 10th term.



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1. Which of these are Arithmetic Progressions and why?

(a) 2,3,5,7,8,10,15,.....

(ii) 2,5,7,10,12,15,.....

(c) $-1, -3, -5, -7, \dots$



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2. Write 3 more Arithmetic Progressions.



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Do This

1. Write three examples for finite AP and three for infinite AP.



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2. Take any Arithmetic Progression.



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3. Add a fixed number to each and every term of AP. Write the resulting numbers as a list.



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4. Similarly subtract a fixed number from each and every term of AP. Write the resulting numbers as a list.



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5. Multiply or divide each term of AP by a fixed number and write the resulting numbers as a list.



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6. Find the sum of indicated number of terms in each of the following Aps

(i) 16, 11, 6,, 23 terms

(ii) $-0.5, -1.0, -1.5, \dots, 10$ terms

(iii) $-1, \frac{1}{4}, \frac{3}{2}, \dots, 10$ terms





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7. Find which of the following are not GPs

6,12,24,48,.....



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8. Find which of the following are not GPs

1,4,9,16,.....



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9. Find which of the following are not GPs

1, - 1, 1, - 1,.....



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10. Find which of the following are not GPs

- 4, - 20, - 100, - 500,.....



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Exercise 6 1

1. In which of the following situations, does the list of numbers involved form an arithmetic progression, and why?

The minimum taxi fare is additional km.

(ii) The amount of air present in a cylinder when a vacuum pump removes of the air remaining in the cylinder at a time.

(iii) 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.

(iv) The amount of money in the account every

year, when 10000 is deposited at compound interest at 8 % per annum.



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

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

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

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

$$(iv) a = -1, d = \frac{1}{2}$$

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



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3. For the following Aps, write the first term and the common difference:

$$(i) 3, 1, -1, -3, \dots$$

$$(ii) -5, -1, 3, 7, \dots$$

$$(iii) \frac{1}{3}, \frac{5}{3}, \frac{9}{3}, \frac{13}{3}, \dots$$

$$(iv) 0.6, 1.7, 2.8, 3.9, \dots$$



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

(i) $24m, 8m, 16, \dots$

(ii) $2, \frac{5}{2}, 3, \frac{7}{2}, \dots$

(iii) $-1.2, -3.2, -5.2, -7.2, \dots$

(iv) $-10, -6, -2, 2, \dots$

(v) $3, 3 + \sqrt{2}, 3 + 2\sqrt{2}, 3 + 3\sqrt{2}, \dots$

(vi) $0.2, 0.22, 0.222, 0.2222, \dots$

(vii) $0, -4, -8, -12, \dots$

(viii) $-\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, \dots$

(ix) 1,3,9,27,.....

(x) a,2a, 3a, 4a,.....

(xi) a, a^2, a^3, a^4, \dots

(xii) $\sqrt{2}, \sqrt{8}, \sqrt{18}, \sqrt{32}, \dots$

(xiii) $\sqrt{3}, \sqrt{6}, \sqrt{9}, \sqrt{12}, \dots$



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Exercise 6 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 n th term of the A.P.

S. No.	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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2. Find the

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

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



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3. Find the respective terms for the following

Aps:

(i) $a_1 = 2, a_3 = 26$ find a_2

(ii) $a_2 = 13, a_4 = 3$ find a_1, a_3

(iii) $a_1 = 5, a_4 = -22$ find a_1, a_3, a_4, a_5



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



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5. Find the number of terms in each of the following Aps,

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

(ii) $18, 15\left(\frac{1}{2}\right), 13, \dots - 47$.



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6. Check whether , -150 is a term fo the AP:

11,8,5,2,.....



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



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



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



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



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13. For what value of n , are the n th terms of two Aps $63 , 65 , 67 , \dots\dots$ and $3,10,17 , \dots$ equal ?



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



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15. Find the 20th term from the end of the AP: 3, 8, 13, ..., 253.



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16. 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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17. Subba Rao started his job in 1995 at a monthly salary of 5000 and received an increment of 200 each year. In which year did his salary reach 7000?



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Exercise 6 3

1. Find the sum of the following Aps,

(i) 2,7,12,.....to 10 terms.

(ii) $-37, -33, -29$, to 12 terms

(iii) $0.6, 1.7, 2.8, \dots$ to 100 terms

(iv) $\frac{1}{15}, \frac{1}{12}, \frac{1}{10}, \dots$ To 11 terms.



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2. Find the sums given below :

$$7 + 10\frac{1}{2} + 14 + \dots + 84$$



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3. In an AP:

(i) Given $a=5$, $d=3$, $a_n = 50$, find n and S_n

(ii) given $a=7$, $a_{13} = 35$, find d and S_{13} .

(iii) given $a_{12} = 37$, $d = 3$, find a and S_{12}

(iv) given $a_3 = 15$, $S_{10} = 125$, find d and a_{10}

(v) given $a=2$, $d= 8$, $S_n = 90$, find n and a_n

(vi) given $a_n = 4$, $d = 2$, $S_n = - 14$, find n
and a .

(vii) given $l=28$, $S= 144$, and there are total 9
terms, find a .



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4. 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 their sum?



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



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6. 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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7. Show that $a_1, a_2, \dots, a_n, \dots$ 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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8. 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 n th terms .



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



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10. 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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11. 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?



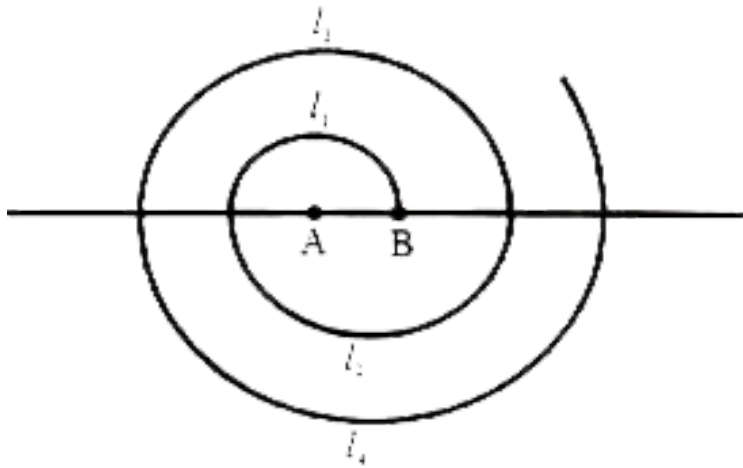
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12. A spiral is made up of successive semicircles, with centres alternately at A and B, starting with centre at A, of radii 0.5 cm, 1.0 cm, 1.5 cm, 2.0 cm, ... as shown in Figure. What is the total length of such a spiral made up of thirteen consecutive semicircles? (Take

$$\pi = \frac{22}{7})$$

[Hint : Length of successive semicircles is 11, 12, 13, 14, ... with centres at A, B, A, B, ...]

respectively.]



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13. 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. In

how many rows are the 200 logs placed and
how many logs are in the top row?



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14. In a bucket and ball race, a bucket is placed at the starting point, which is 5 m from the first ball, and the other balls are placed 3 m apart in a straight line. There are ten balls in the line.

A competitor starts from the bucket, picks up

the nearest ball, runs back with it, drops it in the bucket, runs back to pick up the next ball, runs to the bucket to drop it in, and she continues in the same way until all the balls are in the bucket. What is the total distance the competitor has to run? (Hint: To pick up the first ball and the second ball, the total distance (in metres) run by a competitor is $2 \times 5 + 2 \times (5+3)$]



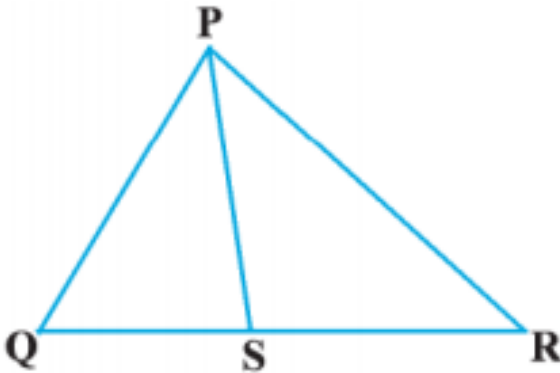
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1. In which of the following situations, does the list of numbers involved is in the form of a GP?

(i) Salary of Sharmila, when her salary is 5,00,000 for the first year and expected to receive yearly increase of 10%.

Number of bricks needed to make each step, if the stair case has total 30 steps, provided that bottom step needs 100 bricks and each successive step needs 2 brick less than the previous step.

Perimeter of the each triangle, when the mid points of sides of an equilateral triangle whose side is 24 cm are joined to form another triangle, whose mid points in turn are joined to form still another triangle and the process continues indefinitely.



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2. Write three terms of the GP when the first term 'a' and the common ratio 'r' are given?

(i) $a=4, r=3$

(ii) $a = \sqrt{5}, r = \frac{1}{5}$

(iii) $a = 81, r = -\frac{1}{3},$

(iv) $a = \frac{1}{64}, r = 2$



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3. Which of the following are GP? If they are in G.P. Write next three terms?

(i) 4,8,16,.....

(ii) $\frac{1}{3}, -\frac{1}{6}, \frac{1}{12}, \dots$

(iii) 5, 55, 555,

(iv) $-2, -6, -18, \dots$

(v) $\frac{1}{2}, \frac{1}{4}, \frac{1}{6}, \dots$

(iv) $3, -3^2, 3^3, \dots$

(vii) $x, 1, \frac{1}{x}, \dots (x \neq 0)$

(viii) $\frac{1}{\sqrt{2}}, -2, 4\sqrt{2}, \dots$

(ix) 0.4, 0.04, 0.004,

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4. Find x so that $x, x+2, x+6$ are consecutive terms of a geometric progression.



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Exercise 6 5

1. For each geometric progressions find the common ratio 'r'. And then find a_n .

(i) $3, \frac{3}{2}, \frac{3}{4}, \frac{3}{8}, \dots$

(ii) $2, -6, 18, -54$

(iii) $-1, -3, -9, -27, \dots$

(iv) $5, 2, \frac{4}{5}, \frac{8}{25}, \dots$



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2. Find the 10th and nth term of GP: 5, 25, 125,



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3. Find the indicated term of each Geometric Progression

(i) $a_1 = 9, r = \frac{1}{3}$, find a_7 ,

(ii) $a_1 = -12, r = \frac{1}{3}$, find a_6



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4. Which terms of the GP:

(i) 2, 8, 32, is 512?

(ii) $\sqrt{3}, 3, 3\sqrt{3}, \dots$ is 729?

(iii) $\frac{1}{3}, \frac{1}{9}, \frac{1}{27}, \dots$ is $\frac{1}{2187}$?



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5. Find the 12th term of a G.P. whose 8th term is 192, and the common ratio is 2.



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6. The 4th term of a geometric progression is $\frac{2}{3}$ and the seventh term is $\frac{16}{81}$. Find the geometric series.



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7. If the geometric progressions 162, 54, 18,.....

And $\frac{2}{81}, \frac{2}{27}, \frac{2}{9}, \dots$ Have their n th term

equal. Find the value of n .



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Optional Exercise For Extensive Learning

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

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



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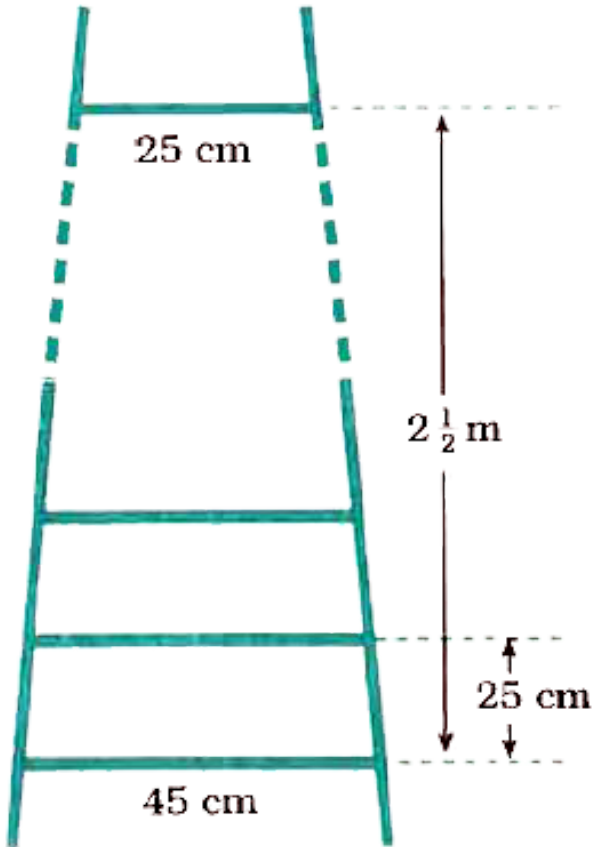
2. The sum of the third and the seventh term of an AP is 6 and their product is 8. Find the sum of first sixteen terms of the AP.



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3. A ladder has rungs 25 cm apart. (see the given 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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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 value of x .



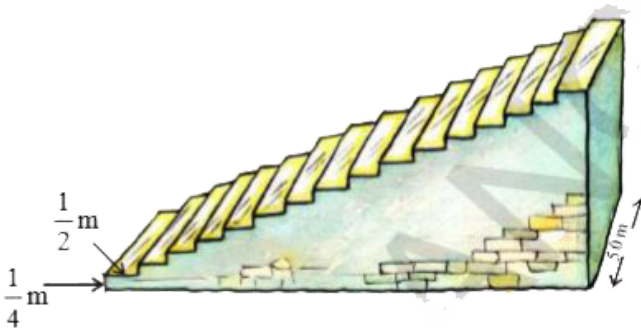
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5. A small terrace at a football ground comprises of 15 steps each of which is 50 m long and built of solid bricks. Each step has a

rise of $\frac{1}{4}$ m and a tread of $\frac{1}{2}$ m. Calculate the total volume of the terrace.

[Hint: Volume of the first step

$$= \frac{1}{4} \times \frac{1}{2} \times 50m^3]$$



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6. 150 workers were engaged to finish a piece of work in a certain number of days. Four

workers dropped from the work on the second day. Four workers dropped on third day and so on. It took 8 more days to finish the work. Find the number of days in which the work was completed. [Let the no.of days to finish the work is 'r' then

$$150x = \frac{x + 8}{2} [2 \times 150 + (x + 8 - 1)(-4)]$$



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7. A machine costs 5,00,000. If its value depreciates 15% in the first year, $13\left(\frac{1}{2}\right)\%$ in

the second year, 12% in the third year and so on. What will be its value at the end of 10 years, when all the percentages will be applied to the original cost?

[Total depression = $15 + 13\left(\frac{1}{2}\right) + 12 +$
.....10 terms

$$S_n = \frac{10}{2} [30 - 13.5] = 82.5 \%$$

\therefore after 10 years original cost = $100 - 82.5 =$
17.5, i.e. 17.5% of 5,00,000.



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