1 | **Write the nth term of the following arithmetic sequences .**

a) 1 , 2 , 3 , . . .

b) 2 , 4 , 6 , . . .

c) 1 , 3 , 5 , . . .

Answer

a) n

b) $2n$

c) $2n - 1$

2 | **Write the nth term of the following arithmetic sequences .**

a) 1 , 2 , 3 , . . .

b) 5 , 10 , 15 , . . .

c) 7 , 12 , 17 , . . .

Answer

a) n

b) $5n$

c) $5n + 2$

3 | **Consider the arithmetic sequence $a + 1$, $a + 2$, $a + 3$, . . .**

a) What is the tenth term ?

b) What is the common difference   ?

c) What is the algebraic form ?

Answer
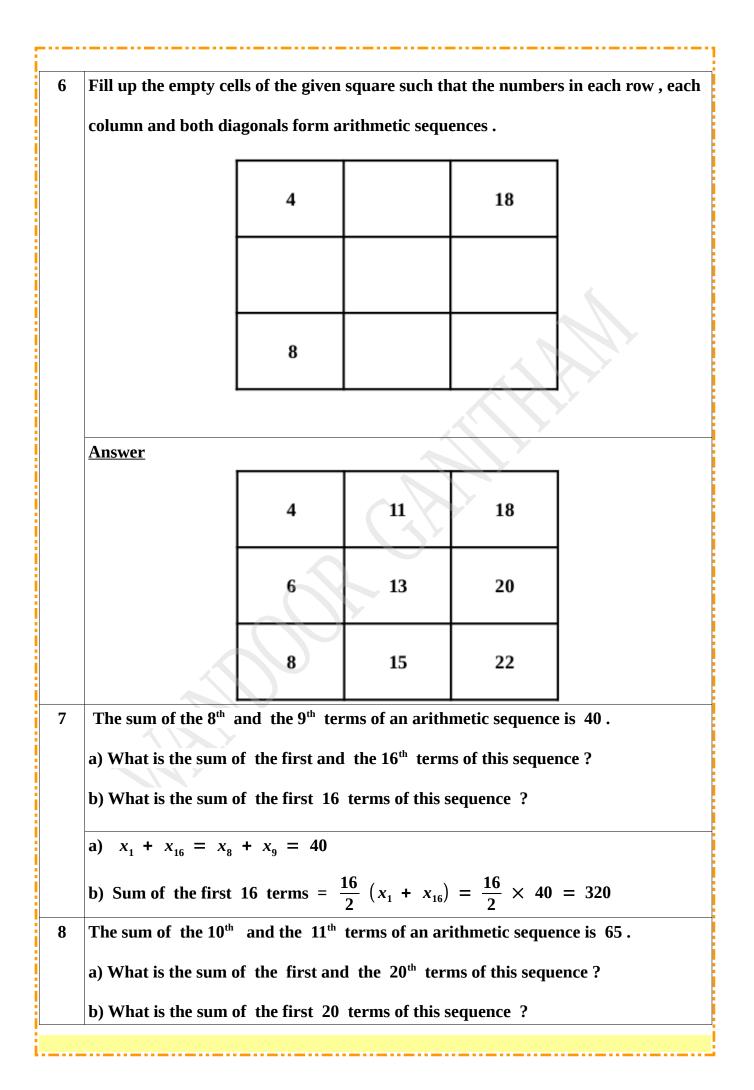
a) $a + 10$

b) 1

c) $a + n$

4	**Consider the arithmetic sequence $x - 1$, $x - 2$, $x - 3$, . . .**

a) What is the 20th term of this sequence ?

b) What is the common difference of this sequence ?

c) What is the algebraic form of this sequence ? |
| | **Answer**

a) $x - 20$

b) -1

c) $x - n$ |
| **5** | **Fill up the empty cells of the given square such that the numbers in each row , each column and both diagonals form arithmetic sequences .**

2		12
10			
	Answer

2	7	12
6	11	16
10	15	20	

6	Fill up the empty cells of the given square such that the numbers in each row , each column and both diagonals form arithmetic sequences .

4		18
8		

Answer

4	11	18
6	13	20
8	15	22

7	The sum of the 8th and the 9th terms of an arithmetic sequence is 40 .

a) What is the sum of the first and the 16th terms of this sequence ?

b) What is the sum of the first 16 terms of this sequence ?

a) $x_1 + x_{16} = x_8 + x_9 = 40$

b) Sum of the first 16 terms $= \dfrac{16}{2} \left(x_1 + x_{16} \right) = \dfrac{16}{2} \times 40 = 320$

8	The sum of the 10th and the 11th terms of an arithmetic sequence is 65 .

a) What is the sum of the first and the 20th terms of this sequence ?

b) What is the sum of the first 20 terms of this sequence ?

	Answer **a)** $x_1 + x_{20} = x_{10} + x_{11} = 65$ **b)** Sum of the first 20 terms $= \dfrac{20}{2}\left(x_1 + x_{20}\right) = \dfrac{20}{2} \times 65 = 650$
9	The sum of the first and the 7th terms of an arithmetic sequence is 22 **a)** What is the sum of the 3rd and the 5th terms of this sequence ? **b)** What is the 4th term of this sequence ? **c)** What is the sum of the first 7 terms of this sequence ?
	Answer **a)** $x_3 + x_5 = x_1 + x_7 = 22$ **b)** $x_4 = \dfrac{22}{2} = 11$ **c)** Sum of the first 7 terms $= 7 \times \textit{Middle term} = 7 \times x_4 = 7 \times 11 = 77$
10	The sum of the first and 11th terms of an arithmetic sequence is 40 . **a)** What is the sum of the 5th and 7th terms of this sequence ? **b)** What is the 6th term of this sequence ? **c)** What is the sum of the first 11 terms of this sequence ?
	Answer **a)** $x_5 + x_7 = x_1 + x_{11} = 40$ **b)** $x_6 = \dfrac{40}{2} = 20$ **c)** Sum of the first 11 terms $= 11 \times \textit{Middle term} = 11 \times x_6 = 11 \times 20 = 220$
11	5th term of an arithmetic sequence is 10 and the 10th term is 5 . **a)** What is the common difference of this sequence ? **b)** What is the 15th term of this sequence ? **c)** What is the sum of the first 29 terms of this sequence ?

	Answer a) $common\ difference = \dfrac{Term\ \ difference}{Position\ \ difference} = \dfrac{5-10}{10-5} = \dfrac{-5}{5} = -1$ b) $x_{15} = x_5 + 10\,d = 10 + \left[10 \times (-1)\right] = 10 - 10 = 0$ c) Sum of the first 29 terms $= 29 \times Middle\ \ term = 29 \times x_{15} = 29 \times 0 = 0$
12	10th term of an arithmetic sequence is 20 and the 20th term is 10 . a) What is the common difference of this sequence ? b) What is the 30th term of this sequence ? c) What is the sum of the first 59 terms of this sequence ?
	Answer a) $common\ difference = \dfrac{Term\ \ difference}{Position\ \ difference} = \dfrac{10-20}{20-10} = \dfrac{-10}{10} = -1$ b) $x_{30} = x_{10} + 20\,d = 20 + \left[20 \times (-1)\right] = 20 - 20 = 0$ c) Sum of the first 59 terms $= 59 \times Middle\ \ term = 59 \times x_{30} = 59 \times 0 = 0$
13	The sum of first 4 terms of an arithmetic sequence is 20 and the sum of first 8 terms is 72 . a) What is the sum of the first and the 4th terms of this sequence ? b) What is the sum of the first and the 8th terms of this sequence ? c) What is the common difference of this sequence ? d) What is the first term of this sequence ?
	Answer a) $x_1 + x_4 = \dfrac{20}{2} = 10$ b) $x_1 + x_8 = \dfrac{72}{4} = 18$

c)
$$x_1 + x_8 = 18 \quad -$$
$$x_1 + x_4 = 10$$
_____
$$0 + 4d = 8$$
$$d = \frac{8}{4} = 2$$

d) $x_1 + x_4 = 10 \implies x_1 + (x_1 + 3d) = 10$
$$2x_1 + 3d = 10$$
$$2x_1 + (3 \times 2) = 10$$
$$2x_1 + 6 = 10$$
$$2x_1 = 10 - 6 = 4$$
$$x_1 = \frac{4}{2} = 2$$

14 The sum of first 6 terms of an arithmetic sequence is 78 and the sum of first 14 terms is 406 .

a) What is the sum of the first and the 6th terms of this sequence ?

b) What is the sum of the first and the 14th terms of this sequence ?

c) What is the common difference of this sequence ?

d) What is the first term of this sequence ?

Answer

a) $x_1 + x_6 = \dfrac{78}{3} = 26$

b) $x_1 + x_{14} = \dfrac{406}{7} = 58$

	c) $\quad x_1 + x_{14} = 58 \;-$ $\qquad x_1 + x_6 = 26$ $\qquad \overline{\rule{3cm}{0.4pt}}$ $\qquad 0 + 8d = 32$ $\qquad\qquad d = \dfrac{32}{8} = 4$ **d)** $\quad x_1 + x_6 = 26 \;\;\Longrightarrow\;\; x_1 + \left(x_1 + 5d\right) = 26$ $\qquad\qquad\qquad\qquad\qquad 2x_1 + 5d = 26$ $\qquad\qquad\qquad\qquad\quad 2x_1 + \left(5 \times 4\right) = 26$ $\qquad\qquad\qquad\qquad\qquad 2x_1 + 20 = 26$ $\qquad\qquad\qquad\qquad\qquad\quad 2x_1 = 26 - 20 = 6$ $\qquad\qquad\qquad\qquad\qquad\quad x_1 = \dfrac{6}{2} = 3$
15	The sum of first 5 terms of an arithmetic sequence is 65 and the sum of first 10 terms is 230 . **a)** What is the third term of this sequence ? **b)** What is the sum of the 2nd and the 8th terms of this sequence ? **c)** What is the common difference of this sequence ? **d)** What is the algebraic form of this sequence ?
	<u>**Answer**</u> **a)** $\quad x_3 = \dfrac{65}{5} = 13$ **b)** $\quad x_3 + x_8 = \dfrac{230}{5} = 46$ **c)** $\quad 13 + x_8 = 46 \;\;\Longrightarrow\;\; x_8 = 46 - 13 = 33$ $\qquad common\;difference = \dfrac{Term\;\;difference}{Position\;\;difference} = \dfrac{33-13}{8-3} = \dfrac{20}{5} = 4$

	d) $x_1 = x_3 - 2d = 13 - (2 \times 4) = 13 - 8 = 5$
	$x_n = d\,n + f - d = 4n + 5 - 4 = 4n + 1$
16	The sum of first 3 terms of an arithmetic sequence is 33 and the sum of first 8 terms is 208 .
	a) What is the second term of this sequence ?
	b) What is the sum of the 2nd and the 7th terms of this sequence ?
	c) What is the common difference of this sequence ?
	d) What is the algebraic form of this sequence ?
	Answer
	a) $x_2 = \dfrac{33}{3} = 11$
	b) $x_2 + x_7 = \dfrac{208}{4} = 52$
	c) $11 + x_7 = 52 \implies x_7 = 52 - 11 = 41$
	$common\ difference = \dfrac{Term\ difference}{Position\ difference} = \dfrac{41-11}{7-2} = \dfrac{30}{5} = 6$
	d) $x_1 = x_1 - d = 11 - 6 = 5$
	$x_n = d\,n + f - d = 6n + 5 - 6 = 6n - 1$
17	The sum of the 6th and the 7th terms of an arithmetic sequence is 43 and the third term is 11 .
	a) What is the sum of the first and the 12th terms of this sequence ?
	b) What is the 10th term of this sequence ?
	c) What is the common difference of this sequence ?
	d) What is the algebraic form of this sequence ?
	Answer
	a) $x_1 + x_{12} = x_6 + x_7 = 43$

b) $x_3 + x_{10} = 43$ ==> $11 + x_{10} = 43$ ==> $x_{10} = 43 - 11 = 32$

c) $common\ difference = \dfrac{Term\ difference}{Position\ difference} = \dfrac{32-11}{10-3} = \dfrac{21}{7} = 3$

d) $x_1 = x_3 - 2d = 11 - (2 \times 3) = 11 - 6 = 5$

$x_n = d\ n + f - d = 3n + 5 - 3 = 3n + 2$

18	The sum of the 8th and the 9th terms of an arithmetic sequence is 74 and the sixth term is 27 .

a) What is the sum of the first and the 16th terms of this sequence ?

b) What is the 11th term of this sequence ?

c) What is the common difference of this sequence ?

d) What is the algebraic form of this sequence ?

Answer

a) $x_1 + x_{16} = x_8 + x_9 = 74$

b) $x_6 + x_{11} = 74$ ==> $27 + x_{11} = 74$ ==> $x_{11} = 74 - 27 = 47$

c) $common\ difference = \dfrac{Term\ difference}{Position\ difference} = \dfrac{47-27}{11-6} = \dfrac{20}{5} = 4$

d) $x_1 = x_6 - 5d = 27 - (5 \times 4) = 27 - 20 = 7$

$x_n = d\ n + f - d = 4n + 7 - 4 = 4n + 3$

19	Consider the arithmetic sequence 5 , 8 , 11 , . . .

a) What is the common difference of this sequence ?

b) How many times of the common difference is the difference between the 11th and first terms of this sequence ?

c) What is the difference between the 20th and the 10th terms of this sequence ?

d) What is the difference between the sum of the first 10 terms and the sum of the next 10 terms of this sequence ?

<u>**Answer**</u>

a) $8 - 5 = 3$

b) 10 times $\qquad\qquad\qquad (x_{11} - x_1 = 10d = 10 \times 3 = 30)$

c) $x_{20} - x_{10} = 10d = 10 \times 3 = 30$

d) $10 \times 30 = 300$

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20   Consider the arithmetic sequence   7 , 11 , 15 , . . .

a) What is the   common difference of this sequence ?

b) How many times of the common difference is the difference between the 21st

    and first terms of this sequence ?

c) What is the difference between the 40th and the 20th terms of this sequence?

d) What is the difference between the sum of the first 20 terms and the sum of the

    next 20 terms of this sequence ?

<u>**Answer**</u>

a) $11 - 7 = 4$

b) 20 times $\qquad\qquad\qquad (x_{21} - x_1 = 20d = 20 \times 4 = 80)$

c) $x_{40} - x_{20} = 20d = 20 \times 4 = 80$

d) $20 \times 80 = 1600$

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21 | The sum of first 10 terms of an arithmetic sequence and the sum of next 9 terms

  are equal . If the common difference is 2 ,

a) How many times of the common difference is the difference between the 11th

    and first terms of this sequence ?

b) What is the difference between the 19th and the 9th terms of this sequence ?

c) What is the 10th term of this sequence ?

d) What is the sum of the first 19 terms of this sequence ?

	Answer
	a) 10 times. $\qquad$ $\left(x_{11} - x_1 = 10d = 10 \times 2 = 20\right)$
	b) $x_{19} - x_9 = 10d = 10 \times 2 = 20$
	c) $x_{10} = 9 \times 10d = 9 \times 10 \times 2 = 180$
	d) Sum of the first 19 terms $= 19 \times Middle\ term = 19 \times x_{10} = 19 \times 180 = 3420$
22	The sum of first 8 terms of an arithmetic sequence and the sum of next 7 terms are equal. If the common difference is 5 ,
	a) How many times of the common difference is the difference between the 9th and the first terms of this sequence ?
	b) What is the difference between the 15th and the 7th terms of this sequence ?
	c) What is the 8th term of this sequence ?
	d) What is the sum of first 15 terms of this sequence ?
	Answer
	a) 8 times. $\qquad$ $\left(x_9 - x_1 = 8d = 8 \times 5 = 40\right)$
	b) $x_{15} - x_7 = 8d = 8 \times 5 = 40$
	c) $x_8 = 7 \times 8d = 7 \times 8 \times 5 = 280$
	d) Sum of the first 15 terms $= 15 \times Middle\ term = 15 \times x_8 = 15 \times 280 = 4200$
23	The angles of a quadrilateral are in arithmetic sequence . The smallest angle is 30^0
	a) What is the sum of the angles of a quadrilateral ?
	b) What is the sum of the measures of the smallest angle and the largest angle ?
	c) What is the common difference of this sequence ?
	d) What are the measures of other angles ?

Answer

a) 360^0 .

b) $x_1 + x_4 = \dfrac{360}{2} = 180^0$

c) $30 + x_4 = 180 \implies x_4 = 180 - 30 = 150^0$

$common\ difference = \dfrac{Term\ difference}{Position\ difference} = \dfrac{150-30}{4-1} = \dfrac{120}{3} = 40^0$

d) 30^0 , 70^0 , 110^0 , 150^0

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24 The angles of a hexagon are in arithmetic sequence . The smallest angle is 80^0.

a) What is the sum of the angles of a hexagon ?

b) What is the sum of the measures of the smallest angle and the largest angle ?

c) What is the common difference of this sequence ?

d) What are the measures of other angles   ?

Answer

a) 720^0

b) $x_1 + x_6 = \dfrac{720}{3} = 240^0$

c) $80 + x_6 = 240 \implies x_4 = 240 - 80 = 160^0$

$common\ difference = \dfrac{Term\ difference}{Position\ difference} = \dfrac{160-80}{6-1} = \dfrac{80}{5} = 16^0$

d) 80^0 , 96^0 , 112^0 , 128^0 , 144^0 , 160^0

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25 The angles of a pentagon are in arithmetic sequence . The smallest angle is 60^0.

a) What is the sum of the angles of a pentagon ?

b) If the angles are written in arithmetic sequence , what will be the third term   ?

c) What is the common difference of this sequence ?

d) What is the measure of the largest angle ?

Answer

a) 540^0

b) $x_3 = \dfrac{540}{5} = 108^0$

c) $common\ difference = \dfrac{Term\ \ difference}{Position\ \ difference} = \dfrac{108-60}{3-1} = \dfrac{48}{2} = 24^0$

d) $x_5 = x_1 + 4d = 60 + (4 \times 24) = 60 + 96 = 156^0$

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26 Look at the number pattern .

    1

    2   3   4

    5   6   7   8   9

    10 11 12 13 14 15 16

    ....

    ....

a) Write down the fifth line of this pattern .

b) How many numbers are there in the 10th line ?

c) What is the last number in the 9th line ?

d) What is the first number in the 10th line ?

e) What is the sum of the numbers in the 10th line ?

Answer.

a) 17 , 18 , 19 , 20 , 21 , 22 , 23 , 24 , 25

b) $(2 \times 10) - 1 = 19$

c) Last number in the 9th line $= 9^2 = 81$

d) First number in the 10th line $= 82$

e) Last number in the 10th line = 10^2 = 100

Sum of the numbers in the 10th line = $\dfrac{19}{2}$ $(82 + 100)$ = 1729

27	Look at the number pattern .

   1

   2   3   4

   5   6   7   8   9

  10   11   12   13 14   15   16

   ....

   ....

a) Write down the next two more lines of this pattern .

b) What is the last number in the 11th line ?

c) What is the first number in the 12th line ?

d) What is the last number in the 12th line ?

Answer.

a)   17 , 18 , 19 , 20 , 21 , 22 , 23 , 24 , 25

    26 , 27 , 28 , 29 , 30 , 31 , 32 , 33 , 34 , 35 , 36

b) Last number in the 11th line = 11^2 = 121

c) First number in the 12th line = 122

d) Last number in the 12th line = 12^2 = 144