

ONLINE CLASS STD - X 2020-21 : MATHEMATICS

WORK SHEET - 1.1

Fill in the blanks given below .

Q₁. 1 , 2 , 3 , 4 , , ,

Q₂. 2 , 4 , 6 , 8 , , ,

Q₃. 3 , 6 , 9 , 12 , , ,

Q₄. 5 , 10 , 15 , 20 , , ,

Q₅. 11 , 22 , 33 , 44 , , ,

Let's try to write 5 more rows as shown above .

Q₆. , , , , ,

Q₇. , , , , ,

Q₈. , , , , ,

Q₉. , , , , ,

Q₁₀. , , , , ,

ONLINE CLASS STD - X 2020-21 : MATHEMATICS

WORK SHEET - 1.2

Fill in the blanks given below .

Q₁. 3 , 5 , 7 , 9 , , ,

Q₂. 5 , 8 , 11 , 14 , , ,

Q₃. 6 , 10 , 14 , 18 , , ,

Q₄. 10 , 16 , 22 , 28 , , ,

Q₅. 15 , 25 , 35 , 45 , , ,

Let's try to write 5 more rows as shown above .

Q₆. , , , , ,

Q₇. , , , , ,

Q₈. , , , , ,

Q₉. , , , , ,

Q₁₀. , , , , ,

ONLINE CLASS STD - X 2020-21 : MATHEMATICS

WORK SHEET - 1.3

Fill in the blanks given below .

Q₁. 1 , 5 , 9 , 13 , , ,

Q₂. 2 , 7 , 12 , 17 , , ,

Q₃. 4 , 11 , 18 , 25 , , ,

Q₄. 7 , 11 , 15 , 19 , , ,

Q₅. 10 , 18 , 26 , 34 , , ,

Let's try to write 5 more rows as shown above .

Q₆. , , , , ,

Q₇. , , , , ,

Q₈. , , , , ,

Q₉. , , , , ,

Q₁₀. , , , , ,

ONLINE CLASS STD - X 2020-21 : MATHEMATICS

WORK SHEET - 1.4

Fill in the blanks given below .

Q₁. 100 , 90 , 80 , 70 , , ,

Q₂. 72 , 70 , 68 , 66 , , ,

Q₃. 50 , 47 , 44 , 41 , , ,

Q₄. 85 , 80 , 75 , 70 , , ,

Q₅. 60 , 54 , 48 , 42 , , ,

Let's try to write 5 more rows as shown above .

Q₆. , , , , ,

Q₇. , , , , ,

Q₈. , , , , ,

Q₉. , , , , ,

Q₁₀. , , , , ,

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WORK SHEET - 1.5

Fill in the blanks given below .

Q₁. 2 , 4 , 8 , 16 , , ,

Q₂. 3 , 9 , 27 , 81 , , ,

Q₃. 1 , 10 , 100 , 1000 , , ,

Q₄. 2 , 10 , 50 , 250 , , ,

Q₅. 5 , 20 , 80 , 320 , , ,

Q₆. $\frac{1}{2}$, $\frac{2}{2}$, $\frac{3}{2}$, $\frac{4}{2}$, , ,

Q₇. $\frac{1}{3}$, $\frac{1}{6}$, $\frac{1}{9}$, $\frac{1}{12}$, , ,

Q₈. 1 , 4 , 9 , 16 , , ,

Q₉. 1 , 8 , 27 , 64 , , ,

Q₁₀. -1 , 1 , -1 , 1 , , ,

Q₁₁. 1 , 0 , 1 , 0 , , ,

Q₁₂. 1 , 2 , 3 , 0 , 1 , 2 , 3 , 0 , , ,

Q₁₃. 1 , 3 , 6 , 10 , 15 , 21 , , ,

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Discussion - 1

We have completed five worksheets so far .Let's discuss the questions of those worksheets

Worksheet 1.1

1 , 2 , 3 , 4 , 5 , ; 2 , 4 , 6 , 8 , 10 , ; 3 , 6 , 9 , 12 ,

are some questions in this worksheet.

Here we have written numbers according to particular rule , haven't we ?

What is the rule in each question ?

Here we start with 1 and adding 1 repeatedly , don't we ?

What about the next questions ?

Worksheet 1.2

3 , 5 , 7 , 9 ; 5 , 8 , 11 , 14 , : 6 , 10 , 14 , 8 ,

are some questions in this worksheet.

Here also we have written numbers according to a particular rule , haven't we ?

What is the rule in each question ?

Here we start with 3 and adding 2 repeatedly , don't we ?

What about the next questions ?

Worksheet 1.3

1 , 5 , 9 , 13 ; 2 , 7 , 12 , 17 , : ; 4 , 11 , 18 , 25 ,

are some questions in this worksheet.

Here also we have written numbers according to a particular rule , haven't we ?

What is the rule in each question ?

Here we start with 1 and adding 4 repeatedly , don't we ?

What about the next questions ?

Worksheet 1.4

100 , 90, 80 , 70 ; 72 , 70 , 68 , 66 , ; 50 , 47 , 44 , 41 ,

are some questions in this worksheet.

Here also we have written numbers according to a particular rule , haven't we ?

What is the rule in each question ?

Here we start with 100 and subtracting 10 repeatedly , don't we ?

What about the next questions ?

Worksheet 1.5

2, 4, 8, 16 ; $\frac{1}{2}$, $\frac{2}{2}$, $\frac{3}{2}$, $\frac{4}{2}$, ; $\frac{1}{3}$, $\frac{1}{6}$, $\frac{1}{9}$, $\frac{1}{12}$,

are some questions in this worksheet.

Here also we have written numbers according to a particular rule , haven't we ?

What is the rule in each question ?

In the first question , we start with 2 and multiplying by 2 repeatedly , don't we ?

In the sixth question , we have found out the halves of the counting numbers , haven't we ?

In the seventh question , we start with $\frac{1}{3}$ and dividing by 2 repeatedly , don't we ?

What about the other questions ?

Conclusion

A set of numbers written as the first , second , third and so on , according to a particular rule is called a Number sequence .

NB:

We have dealt with number sequences in the worksheets so far .

ONLINE CLASS STD - X 2020-21 : MATHEMATICS

WORK SHEET - 1.6

Let's try to make number sequences .

● *Multiply the natural numbers by 5 and add them to 2 .*

$$5 \times 1 + 2, 5 \times 2 + 2, 5 \times 3 + 2, 5 \times 4 + 2, 5 \times 5 + 2, \dots$$

$$= 5 + 2, 10 + 2, 15 + 2, 20 + 2, 25 + 2, \dots = 7, 12, 17, 22, 27, \dots$$

● *Multiply the natural numbers by 4 and subtract 1 from them .*

$$4 \times 1 - 1, 4 \times 2 - 1, 4 \times 3 - 1, 4 \times 4 - 1, 4 \times 5 - 1, \dots$$

$$= 4 - 1, 8 - 1, 12 - 1, 16 - 1, 20 - 1, \dots = 3, 7, 11, 15, 19, \dots$$

Write down the following number sequences .

Q₁. Multiples of 4 .

Q₂. Multiply the natural numbers by 3 and add them to 2 .

Q₃. Multiply the natural numbers by 10 and add them to 5 .

Q₄. Natural numbers ending in 1 .

Q₅. Natural numbers ending in 3 and 8 .

Q₆. Multiply the natural numbers by 2 and subtract 1 from them .

Q₇. Multiply the natural numbers by 6 and subtract 5 from them .

Q₈. Sequence got by starting with 10 and multiply by 2 repeatedly.

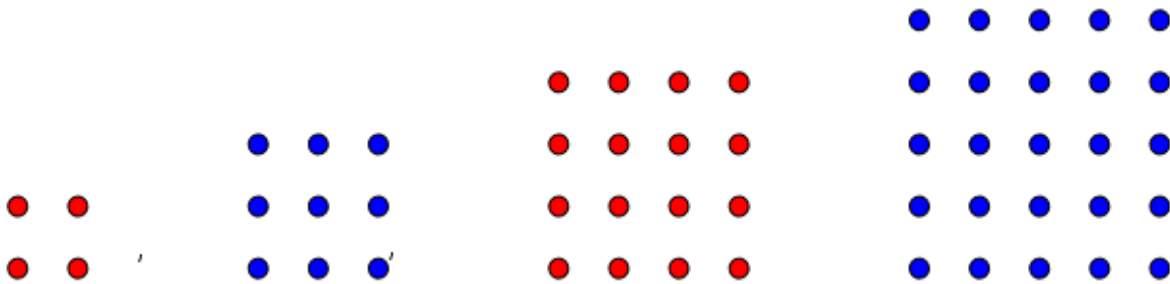
Q₉. Sequence got by starting with 1000 and divide by 2 repeatedly.

Q₁₀. The remainder obtained when each natural number is divided by 2 .

ONLINE CLASS STD - X 2020-21 : MATHEMATICS

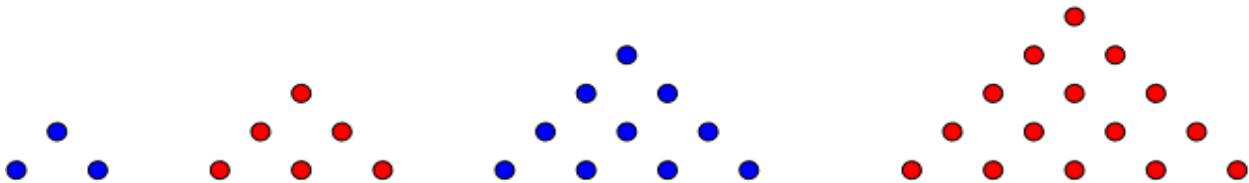
WORKSHEET - 1.7

1. Let's make squares with dots .



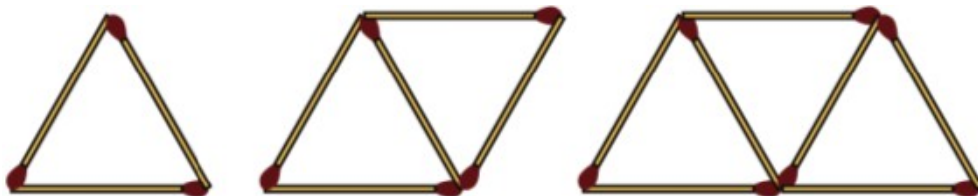
- a) How many dots are there in the first square ?
- b) If we continue this process , what is the number sequence obtained ?
- c) How many dots are there in the 10th square ?
- d) How many dots are there in the 40th square ?

2. Let's make triangles with dots .



- a) How many dots are there in the first triangle ?
- b) If we continue the this process , what is the number sequence obtained ?
- c) There are 55 dots in the 9th triangle . How many dots are there in the 10th triangle ?
- d) How many dots are there in the 12th triangle ?

3. Let's make the figures shown in the figure using matchsticks .

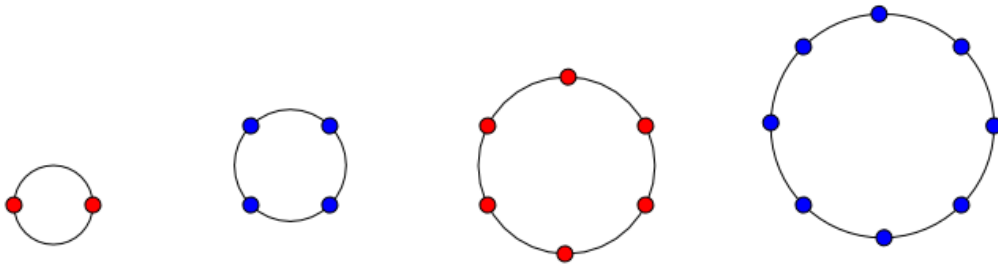


- a) How many matchsticks are there in the first figure (triangle) ?
- b) If we continue this process , what is the sequence of numbers of matchsticks used ?
- c) How many matchsticks are there in the 10th figure ?

ONLINE CLASS STD - X 2020-21 : MATHEMATICS

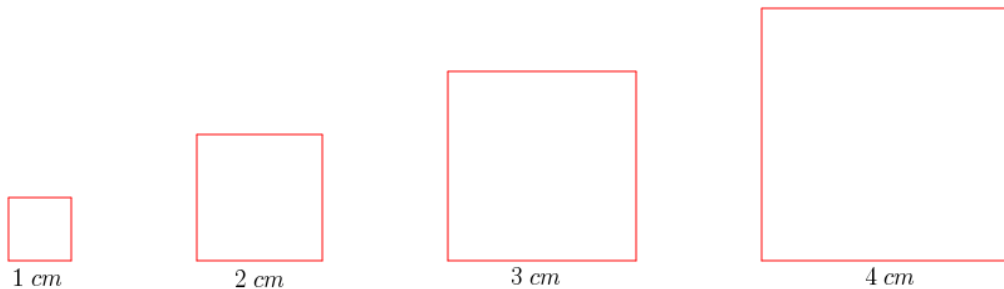
WORK SHEET - 1.8

1. In the figure some dots are marked on the circles



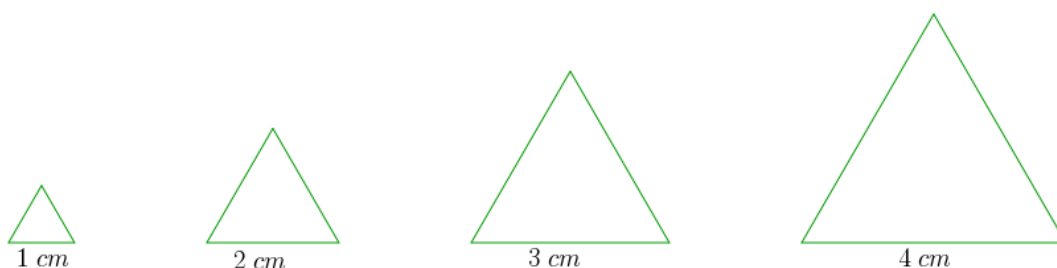
- If we continue this process, how many dots are there on the 5th circle?
- Write down the sequence of number of the dots on the circles obtained, if we continue this process?
- How many dots are there on the 100th circle?
- How many dots are there on the n^{th} circle?

2. In the figure some squares are drawn. Length of the sides of them are also shown in the figure.



- If we continue this process, what is the area of the 5th square?
- Write down the sequence of area of the squares obtained, if we continue this process?
- What will be the area of the 50th square?
- What will be the area of the n^{th} square?

3. In the figure some equilateral triangles are drawn. Length of the sides of them are also shown in the figure.



- If we continue this process, what is the perimeter of the 5th equilateral triangle?
- Write down the sequence of perimeter of the equilateral triangles obtained, if we continue this process?
- What will be the perimeter of the 60th equilateral triangle?
- What will be the perimeter of the n^{th} equilateral triangle?

ONLINE CLASS STD - X 2020-21 : MATHEMATICS

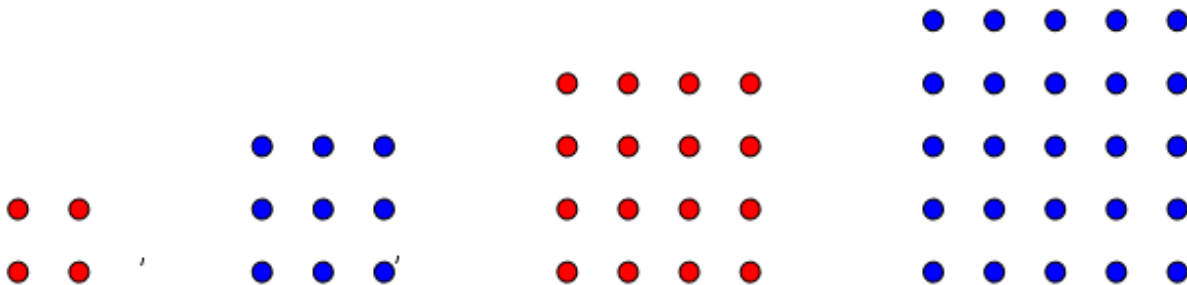
Discussion - 2

We have already learned that what is a number sequence ..

What have we seen in work sheets 1.7 and 1.8 ? We have tried to find any term of a sequence if its position is given .

The numbers in a number sequence are known as its "terms "

1.



It is asked to find the sequence of dots in each square in the first question of the worksheet 1.7 .

We have easily got 4 , 9 , 16 , 25 , 36 , 49 ,

How will we find the number of dots in the 10th square ? One method is write the sequence continuously .

But can we use that method to find the 40th term of this sequence ? Is it easy ?

If it is asked to find the 100th term , what will we do ?

So let's try to find another method .

Position of term	1	2	3	4	5	.....	40	100
Term	4 =2 ²	9 =3 ²	16 =4 ²	25 =5 ²	36 =6 ²	.....	?	?

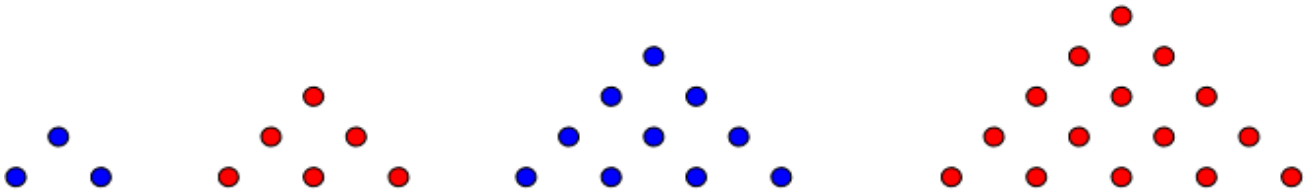
What will be the 40th term of this sequence ? It is 41² , isn't it ? ie, 41² = 1681

What will be the 100th term of this sequence ? 101² = 10201

So any term of this sequence can be found according to its position !

Is it possible in other questions ? Let's see.

2.



It is asked to find the sequence of dots in each triangle in the second question of the worksheet 1.7 .

We have easily got 3 , 6 , 10 , 15 , 21 , 28 ,36 ,45 , 55

Let's try to find each term of this sequence according to its position .

Position of term	1	2	3	4	5
Term	3 $= 1 + 2$	6 $= 1 + 2 + 3$	10 $= 1 + 2 + 3 + 4$	15 $= 1 + 2 + 3 + 4 + 5$	21 $= 1 + 2 + 3 + 4 + 5 + 6$

What will be the 10th term of this sequence ?

$1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10 + 11 = 66$, isn't it ? .

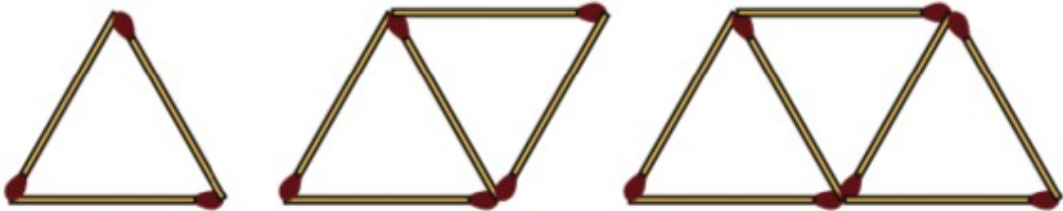
(It is given that 9th term is 55 . So 10th term is $55 + 11 = 66$. We can do like this)

What will be the 49th term of this sequence ? Here 48th term is not given . What will we do ?

49th term = $1 + 2 + 3 + 4 + 5 + 6 + \dots + 50 = 1275$.

($1 + 2 + 3 + 4 + 5 + 6 + \dots + 50 = ?$ We will study how to find this sum easily in this chapter later . Don't worry)

3.



It is asked to find the sequence of the number of matchsticks used in each figure in the third question of the worksheet 1.7 .

We have easily got 3 , 5 , 7 , 9 , 11 , 13 ,15 ,17 , 19

Let's try to find each term of this sequence according to its position .

Position of the term	1	2	3	4	5
Term	3 $= 2 + 1$ $= 2 \times 1 + 1$	5 $= 4 + 1$ $= 2 \times 2 + 1$	7 $= 6 + 1$ $= 2 \times 3 + 1$	9 $= 8 + 1$ $= 2 \times 4 + 1$	11 $= 10 + 1$ $= 2 \times 5 + 1$

This is the sequence obtained by adding 1 to the multiples of 2 .

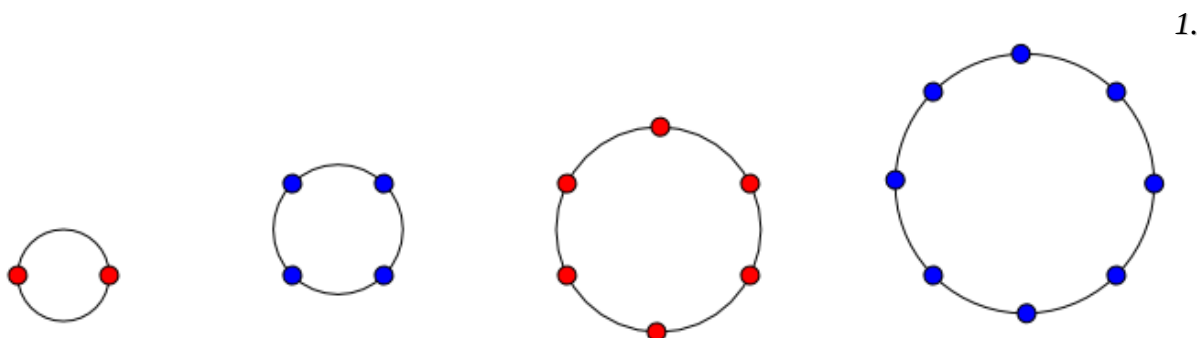
What will be the 10th term of this sequence ? $2 \times 10 + 1 = 20 + 1 = 21$, isn't it ? .

What will be the 100th term of this sequence ? $2 \times 100 + 1 = 200 + 1 = 201$.

(Is it easy to find the answers by writing the sequence continuously ?)

Now let's discuss the questions of worksheet 1.8

1.



We have easily got the sequence of dots in each figure . It is 2 , 4 , 6 , 8 , 10 ,

Let's try to find each term of this sequence according to its position .

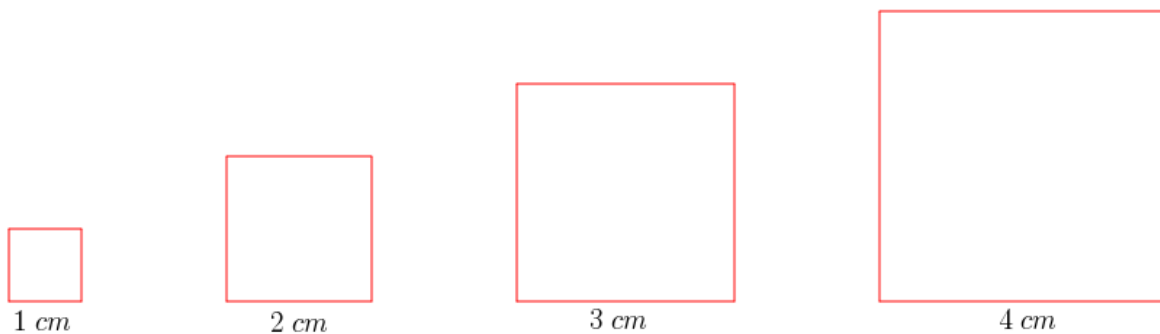
Position of the term	1	2	3	4	5
Term	2 $= 2 \times 1$	4 $= 2 \times 2$	6 $= 2 \times 3$	8 $= 2 \times 4$	10 $= 2 \times 5$

What will be the 100th term of this sequence ? $2 \times 100 = 200$, isn't it ?

What will be the 500th term of this sequence ? $2 \times 500 = 1000$

If so , what will be the nth term of this sequence ? $2 \times n = 2n$

2.



We have easily got the sequence of area of each square . It is 1 , 4 , 9 , 16 , 25 ,

Let's try to find each term of this sequence according to its position .

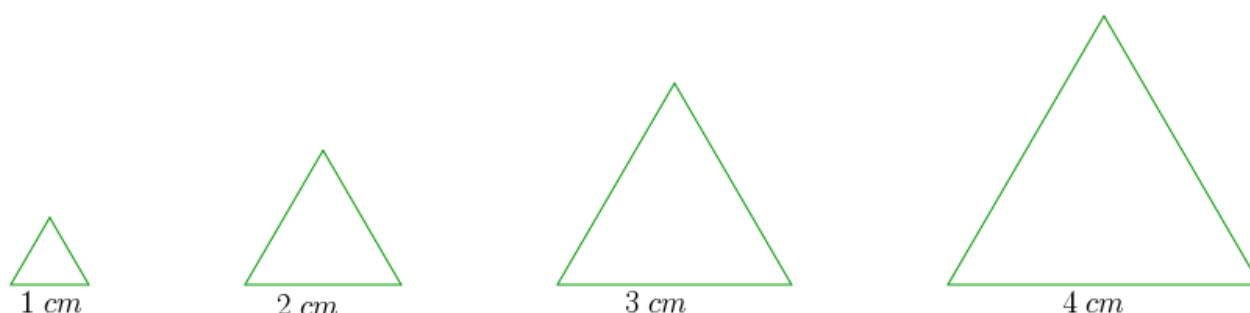
Position of the term	1	2	3	4	5
Term	1 $= 1 \times 1$ $= 1^2$	4 $= 2 \times 2$ $= 2^2$	9 $= 3 \times 3$ $= 3^2$	16 $= 4 \times 4$ $= 4^2$	25 $= 5 \times 5$ $= 5^2$

What will be the 50th term of this sequence ? $50 \times 50 = 50^2 = 2500$, isn't it ?

What will be the 100th term of this sequence ? $100 \times 100 = 100^2 = 10000$

If so , what will be the nth term of this sequence ? $n \times n = n^2$

3.



We have easily got the sequence of perimeter of each equilateral triangle .It is 3 , 6 , 9 , 12, 15 ,

Let's try to find each term of this sequence according to its position .

<i>Position of the term</i>	1	2	3	4	5
<i>Term</i>	3 $= 3 \times 1$	6 $= 3 \times 2$	9 $= 3 \times 3$	12 $= 3 \times 4$	15 $= 3 \times 5$

What will be the 60th term of this sequence ? $3 \times 60 = 180$,isn't it ?

What will be the 70th term of this sequence ? $3 \times 70 = 210$

If so , What will be the 100th term of this sequence ? $3 \times n = 3n$.

Findings

- There is a relationship between a term and its position of a number sequence .
- If a sequence is given we can find any term with the help of its position .

Conclusion

The algebraic expression of the relationship between the term and its position of a number sequence is known as its algebraic form .

NB :

Usually n^{th} term of a sequence is considered as its algebraic form .

Can we write the algebraic form of the sequences already we have discussed here ?

Complete the table given below .

<i>Sequence</i>	<i>Algebraic form { n^{th} term }</i>
4 , 9 , 16 ,25 , 36 ,	
3 , 6 , 10 ,15 , 21 ,28	
3 , 5 , 7 , 9 , 11 ,13 ,.....	
2 ,4 , 6 , 8 , 10 ,12,	
1 , 4 , 9 , 16 ,25 , 36 ,	
3 , 6 , 9 ,12 , 15 ,18 ,	

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ALGEBRAIC FORM OF A SEQUENCE

1. Sequence 4, 9, 16, 25, 36, 49,

Position of the term	1	2	3	4	5	n
Term	4 $=2^2$	9 $=3^2$	16 $=4^2$	25 $=5^2$	36 $=6^2$	.....	$= (n + 1)^2$

Algebraic form = $(n + 1)^2$

2. Sequence 3, 6, 10, 15, 21, 28, 36, 45, 55,

Position of the term	1	2	3	4	5
Term	3 $= 1 + 2$	6 $= 1 + 2 + 3$	10 $= 1 + 2 + 3 + 4$	15 $= 1 + 2 + 3 + 4 + 5$	21 $= 1 + 2 + 3 + 4 + 5 + 6$

n-th term = $1 + 2 + 3 + 4 + 5 + \dots + n + (n + 1)$

Algebraic form = $1 + 2 + 3 + 4 + 5 + \dots + n + (n + 1)$

3. Sequence 3, 5, 7, 9, 11, 13, 15, 17, 19,

Position of the term	1	2	3	4	5	.....	n
Term	3 $= 2 + 1$ $= 2 \times 1 + 1$	5 $= 4 + 1$ $= 2 \times 2 + 1$	7 $= 6 + 1$ $= 2 \times 3 + 1$	9 $= 8 + 1$ $= 2 \times 4 + 1$	11 $= 10 + 1$ $= 2 \times 5 + 1$	.....	$2 \times n + 1$

Algebraic form = $2 \times n + 1$

4. Sequence 1, 4, 9, 16, 25,

Position of the term	1	2	3	4	5	n
Term	1 $= 1 \times 1$ $= 1^2$	4 $= 2 \times 2$ $= 2^2$	9 $= 3 \times 3$ $= 3^2$	16 $= 4 \times 4$ $= 4^2$	25 $= 5 \times 5$ $= 5^2$	n^2

Algebraic form = n^2

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ALGEBRAIC FORM OF A SEQUENCE

1. Make the following number sequences , from the sequence of triangles , quadrilaterals , pentagons , hexagons and so on , of polygons .

a) Number of sides

b) Sum of inner angles

c) Sum of outer angles .

Answer

a) Sequence of the number of sides = 3 , 4 , 5 , 6 , 7 , 8 ,

Position of the term	1	2	3	4	5	.....	n
Term	3 = 1 + 2	4 = 2 + 2	5 = 3 + 2	6 = 4 + 2	7 = 5 + 2	.....	= n + 2

Algebraic form = $n + 2$

b) Sequence of the sum of inner angles = 180° , 360° , 540° , 720° , 900° ,

Position of the term	1	2	3	4	5	.....	n
Term	180 = 180 x 1	360 = 180 x 2	540 = 180 x 3	720 = 180 x 4	900 = 180 x 5	.....	= 180 x n

Algebraic form = $180 \times n$

c) Sequence of the sum of outer angles = 360° , 360° , 360° , 360° , 360° ,

Position of the term	1	2	3	4	5	n
Term	360	360	360	360	360	360

Algebraic form = 360

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ALGEBRAIC FORM OF A SEQUENCE

1. Make the following number sequences , from the sequence of equilateral triangles ,squares regular pentagons , regular hexagons and so on , of regular polygons .

- a) Number of sides
- b) Sum of inner angles
- c) One inner angle
- d) Sum of outer angles
- e) One outer angle

Answer .

a) Sequence of the number of sides = 3 , 4 , 5 , 6 , 7 , 8 ,

Position of the term	1	2	3	4	5	.....	n
Term	3 $= 1 + 2$	4 $= 2 + 2$	5 $= 3 + 2$	6 $= 4 + 2$	7 $= 5 + 2$	.....	$= n + 2$

Algebraic form = $n + 2$

b) Sequence of the sum of inner angles = 180° , 360° , 540° , 720° , 900° ,

Position of the term	1	2	3	4	5	.....	n
Term	180 $= 180 \times 1$	360 $= 180 \times 2$	540 $= 180 \times 3$	720 $= 180 \times 4$	900 $= 180 \times 5$	.....	$= 180 \times n$

$$\text{Algebraic form} = 180 \times n$$

c) Sequence of the measures of inner angle = $60^\circ, 90^\circ, 108^\circ, 120^\circ, \dots$

Position of the term	1	2	3	4	5	.....	n
Term	$\frac{180}{3}$	$\frac{360}{4}$	$\frac{540}{5}$	$\frac{720}{6}$	$\frac{900}{7}$	.....	$\frac{180 \times n}{n + 2}$ -

$$\text{Algebraic form} = \frac{180 \times n}{n + 2}$$

d) Sequence of the sum of outer angles = $360^\circ, 360^\circ, 360^\circ, 360^\circ, 360^\circ, \dots$

Position of the term	1	2	3	4	5	.....	n
Term	360	360	360	360	360	.....	360

$$\text{Algebraic form} = 360$$

e) Sequence of the measures of outer angle = $120^\circ, 90^\circ, 72^\circ, 60^\circ, \dots$

Position of the term	1	2	3	4	5	.....	n
Term	$\frac{360}{3}$	$\frac{360}{4}$	$\frac{360}{5}$	$\frac{360}{6}$	$\frac{360}{7}$	.....	$\frac{360}{n + 2}$

$$\text{Algebraic form} = \frac{360}{n + 2}$$

ONLINE CLASS STD - X 2020-21 : MATHEMATICS

WORK SHEET - 1.9

● Consider the sequence 4 , 7 , 10 , 13 , 16 ,

a) Algebraic form = $3n + 1$ (This sequence is obtained by adding 1 to the multiples of 3)

b) 20th term = $3 \times 20 + 1 = 60 + 1 = 61$

● Consider the counting numbers ending in 2 and 7 .

a) Sequence = 2 , 7 , 12 , 17 ,

b) Algebraic form = $5n - 3$ (This sequence is obtained by subtracting 3 from the multiples of 5)

c) 30th term = $5 \times 30 - 3 = 150 - 3 = 147$.

Let's try to solve the following .

Q₁ . Consider the sequence 5 , 9 , 13 , 17 , 21 ,

a) What is its algebraic form ?

b) What is its 50th term ?

Q₂ . Consider the sequence 8 , 14 , 20 , 26 , 32 ,

a) What is its algebraic form ?

b) What is its 40th term ?

Q₃ . Consider the sequence of odd numbers .

a) Write down the sequence ?

b) What is its algebraic form ?

c) What is its 100th term ?

Q₄ . Consider the counting numbers ending in 9 .

a) Write down the sequence ?

b) What is its algebraic form ?

c) What is its 30th term ?

Q₅ . Consider the sequence 4 , 16 , 36 , 64 , 100 ,

a) What is its algebraic form ?

b) What is its 20th term ?

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WORK SHEET - 1.10

Write down the following sequences

1. Multiply the natural numbers by 2.
2. Multiply the natural numbers by 6.
3. Multiply the natural numbers by 3 and add 1 to them .
4. Multiply the natural numbers by 5 and add 2 to them .
5. Multiply the natural numbers by 4 and subtract 3 from them .
6. Multiply the natural numbers by 7 and subtract 4 from them . .
7. Subtract the multiples of 10 from 100 .
8. Subtract the multiples of 5 from 50 .

We have already learned that numbers in a sequence are called its terms .

Usually we denote first term of a sequence as x_1 , second term as x_2 , third term as x_3 and so on

Complete the table below

Sequence	$x_2 - x_1$	$x_3 - x_2$	$x_4 - x_3$	$x_5 - x_4$
2 , 8 , 14 , 20 , 26 ,	$8 - 2 = 6$	$14 - 8 = 6$	$20 - 14 = 6$	$26 - 20 = 6$
7 , 12 , 17 , 22 , 27 ,				
1 , 5 , 9 , 13 , 17 ,				
4 , 7 , 10 , 13 , 16 ,				
3 , 10 , 17 , 24 , 31 ,				
2 , 4 , 6 , 8 , 10 ,				
6 , 12 , 18 , 24 , 30 ,				
45 , 40 , 35 , 30 , 25 ,				
90 , 80 , 70 , 60 , 50 ,				

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WORK SHEET - 1.12

Write down the following sequences

1. *Multiply the natural numbers by 7.*
2. *Multiply the natural numbers by 10 and add 3 to them .*
3. *Multiply the natural numbers by 8 and add 2 to them .*
4. *Multiply the natural numbers by 9 and subtract 1 from them .*
5. *Multiply the natural numbers by 6 and subtract 5 from them .*
6. *Subtract the multiples of 100 from 500 .*
7. *Subtract the multiples of 3 from 80 .*

Complete the table below

Sequence	Difference between two consecutive terms			
	$x_2 - x_1$	$x_3 - x_2$	$x_4 - x_3$	$x_5 - x_4$
5 , 8 , 11, 14 , 17 ,	$8 - 5 = 3$	$11 - 8 = 3$	$14 - 11 = 3$	$17 - 14 = 3$
6 , 11 , 16 , 21 , 26 ,				
2 , 6 , 10 , 14 , 18 ,				
3 , 11, 19 , 27 , 35 ,				
2 , 13 , 24 , 35 , 46 ,				
60 , 52 , 44 , 36, 28 ,				
50 , 43 , 36 , 29 , 22 ,				

Write down 5 more rows of the above table .

ONLINE CLASS STD - X 2020-21 : MATHEMATICS

WORK SHEET - 1.12

1. Complete the table given below .

Sequence	Difference between two consecutive terms			
	$x_2 - x_1$	$x_3 - x_2$	$x_4 - x_3$	$x_5 - x_4$
3 , 5 , 7 , 9 , 11 ,	$5 - 3 = 2$	$7 - 5 = 2$	$9 - 7 = 2$	$11 - 9 = 2$
5 , 9 , 13 , 17 , 21 ,				
8 , 14 , 20 , 26 , 32 ,				
2 , 11, 20, 29 , 38,				
1, 9 , 17, 25 , 33 ,				
10 , 21 , 32, 43 , 54 ,				

Write down five more rows of the table .

2. Complete the table given below .

Sequence	Difference between two consecutive terms			
	$x_2 - x_1$	$x_3 - x_2$	$x_4 - x_3$	$x_5 - x_4$
40 , 37 , 34, 31 , 28 ,	$37 - 40 = -3$	$34 - 37 = -3$	$31 - 34 = -3$	$28 - 31 = -3$
26 , 24 , 22 , 20 , 18 ,				
65, 61 , 57 , 53 , 49 ,				
50 , 41 , 32 , 23 , 14 ,				
100, 96 , 92 , 88 , 84 ,				
77 , 66, 55 , 44 , 33 ,				

Write down five more rows of the table .

ONLINE CLASS STD - X 2020-21 : MATHEMATICS

WORK SHEET - 1.13

- 1). Consider the sequence 1 , 2 , 3 , 4 , 5 ,
- a) What is the 6th term of this sequence ?
 - b) What is the 7th term of this sequence ?
 - c) What is the 8th term of this sequence ?
 - d) Which number is to be added to the first term of this sequence to get its 10th term ?
 - e) Which number is to be added to the first term of this sequence to get its 20th term ?
- 2). Consider the sequence 2 , 4 , 6 , 8 , 10 ,
- a) What is the 6th term of this sequence ?
 - b) What is the 7th term of this sequence ?
 - c) What is the 8th term of this sequence ?
 - d) Which number is to be added to the first term of this sequence to get its 10th term ?
 - e) Which number is to be added to the first term of this sequence to get its 15th term ?
- 3). Consider the sequence 5 , 8 , 11 , 14 , 17
- a) What is the 6th term of this sequence ?
 - b) What is the 7th term of this sequence ?
 - c) What is the 8th term of this sequence ?
 - d) Which number is added to the first term of this sequence to get its 10th term ?
 - e) Which number is added to the first term of this sequence to get its 13th term ?
- 4). Consider the sequence 100 , 98 , 96 , 94 , 92 ,
- a) What is the 6th term of this sequence ?
 - b) What is the 7th term of this sequence ?
 - c) What is the 8th term of this sequence ?
 - d) Which number is to be subtracted to the first term of this sequence to get its 10th term ?
 - e) Which number is to be subtracted to the first term of this sequence to get its 15th term ?

ONLINE CLASS STD - X 2020-21 : MATHEMATICS

WORK SHEET - 1.13 ANSWER

- 1). Consider the sequence 1 , 2 , 3 , 4 , 5 ,
- a) What is the 6th term of this sequence ? Ans: 6
 - b) What is the 7th term of this sequence ? Ans: 7
 - c) What is the 8th term of this sequence ? Ans: 8
 - d) Which number is to be added to the first term of this sequence to get its 10th term ? Ans: 9
 - e) Which number is to be added to the first term of this sequence to get its 20th term ? Ans: 19
- 2). Consider the sequence 2 , 4 , 6 , 8 , 10 ,
- a) What is the 6th term of this sequence ? Ans: 12
 - b) What is the 7th term of this sequence ? Ans: 14
 - c) What is the 8th term of this sequence ? Ans: 16
 - d) Which number is to be added to the first term of this sequence to get its 10th term ? Ans: 18
 - e) Which number is to be added to the first term of this sequence to get its 15th term ? Ans: 28
- 3). Consider the sequence 5 , 8 , 11 , 14 , 17
- a) What is the 6th term of this sequence ? Ans: 20
 - b) What is the 7th term of this sequence ? Ans: 23
 - c) What is the 8th term of this sequence ? Ans: 26
 - d) Which number is added to the first term of this sequence to get its 10th term ? Ans: 27
 - e) Which number is added to the first term of this sequence to get its 13th term ? Ans: 36
- 4). Consider the sequence 100 , 98 , 96 , 94 , 92 ,
- a) What is the 6th term of this sequence ? Ans: 90
 - b) What is the 7th term of this sequence ? Ans: 88
 - c) What is the 8th term of this sequence ? Ans: 86
 - d) Which number is to be subtracted to the first term of this sequence to get its 10th term ? 1
 - e) Which number is to be subtracted to the first term of this sequence to get its 15th term ? 28

ONLINE CLASS STD - X 2020-21 : MATHEMATICS

NOTE - 1.13

We have already learned about the arithmetic sequences in the last worksheet .

A sequence got by starting with any number and adding a fixed number repeatedly is called an arithmetic sequence .

(A sequence got by starting with any number and subtracting a fixed number repeatedly is also called an arithmetic sequence .)

We have seen that the difference between any two consecutive terms of an arithmetic sequence is a constant . This constant is known as the **common difference** of that sequence .

We can describe arithmetic sequences in another manner .

An arithmetic sequence is a sequence in which we get the same number on subtracting from any term , the term immediately preceding it .

Then how do we check a given sequence is an arithmetic sequence or not ?

We find out whether a given sequence is an arithmetic sequence by checking whether the difference between the terms is constant .

NB:

We know that the terms of a sequence are denoted as $x_1, x_2, x_3, x_4, x_5, \dots$

Let's solve the following questions

1.a) Write down the multiples of 3 ?

b) Check whether the above sequence is an arithmetic sequence or not ?

c) If it is an arithmetic sequence , what will be its common difference ?

Answer .

a) 3 , 6 , 9 , 12 , 15 ,

b) $x_2 - x_1 = 6 - 3 = 3$, $x_3 - x_2 = 9 - 6 = 3$, $x_4 - x_3 = 12 - 9 = 3$

$x_5 - x_4 = 15 - 12 = 3$

Since the difference between any two

consecutive terms is a constant , the given sequence is an arithmetic sequence .

c) Common difference = 3

2. a) Write down the sequence of odd numbers ?

b) Check whether the above sequence is an arithmetic sequence or not ?

c) If it is an arithmetic sequence , what will be its common difference ?

Answer .

a) 1 , 3 , 5 , 7 , 9 ,

$$b) \quad x_2 - x_1 = 3 - 1 = 2 \quad , \quad x_3 - x_2 = 5 - 3 = 2 \quad , \quad x_4 - x_3 = 7 - 5 = 2$$

$$x_5 - x_4 = 9 - 7 = 2$$

Since the difference between any two consecutive terms is a constant , the

given sequence is an arithmetic sequence .

c) Common difference = 2

3.a) Write down the squares of natural numbers ?

b) Check whether the above sequence is an arithmetic sequence or not ?

c) If it is an arithmetic sequence , what will be its common difference ?

Answer .

a) $1^2, 2^2, 3^2, 4^2, 5^2, \dots$ = 1 , 4 , 9 , 16 , 25 ,

$$b) \quad x_2 - x_1 = 4 - 1 = 3 \quad , \quad x_3 - x_2 = 9 - 4 = 5$$

Since the difference between two consecutive terms is not a constant , the given sequence is not

an arithmetic sequence .

(We don't want to take the difference of more consecutive terms , since the difference of terms is not a constant)

4.a) Write down the sequence of prime numbers ?

b) Check whether the above sequence is an arithmetic sequence or not ?

c) If it is an arithmetic sequence , what will be its common difference ?

Answer .

a) 2 , 3 , 5 , 7 , 11 ,

$$b) \quad x_2 - x_1 = 3 - 2 = 1 \quad , \quad x_3 - x_2 = 5 - 3 = 2$$

Since the difference between two consecutive terms is not a constant , the given sequence is not an arithmetic sequence .

ONLINE CLASS STD - X 2020-21 : MATHEMATICS

Discussion – 3

Have you noticed any special feature of the sequences in the worksheet 1.10 , 1.11 , 1.12 and 1.13 .

In worksheet 1.0 , sequences are made by multiplying natural numbers by fixed number and added to a number or subtract a number from them .

What are the common features of those sequences ?

Here we start with a number and add or subtract a fixed number repeatedly , don't we ?

Sequence	$x_2 - x_1$	$x_3 - x_2$	$x_4 - x_3$	$x_5 - x_4$
2 , 8 , 14 , 20 , 26 ,	$8 - 2 = 6$	$14 - 8 = 6$	$20 - 14 = 6$	$26 - 20 = 6$
7 , 12 , 17 , 22 , 27 ,	$12 - 7 = 5$	$17 - 12 = 5$	$22 - 17 = 5$	$27 - 22 = 5$
1 , 5 , 9 , 13 , 17 ,	$5 - 1 = 4$	$9 - 5 = 4$	$13 - 9 = 4$	$17 - 13 = 4$
4 , 7 , 10 , 13 , 16 ,	$7 - 4 = 3$	$10 - 7 = 3$	$13 - 10 = 3$	$16 - 13 = 3$
45 , 40 , 35 , 30 , 25 ,	$40 - 45 = - 5$	$35 - 40 = - 5$	$30 - 35 = - 5$	$25 - 30 = - 5$
90 , 80 , 70 , 60 , 50 ,	$80 - 90 = - 10$	$70 - 80 = - 10$	$60 - 70 = - 10$	$50 - 60 = - 10$

The difference between any two consecutive terms of these sequences are same , aren't they ?

In these sequences we start with a number and add or subtract this “difference” repeatedly to or from the first term

Haven't we done the same activity in worksheet 1.11 ?

What are the common features of the sequences in worksheet 1.12 ?

Sequence	Difference between two consecutive terms			
	$x_2 - x_1$	$x_3 - x_2$	$x_4 - x_3$	$x_5 - x_4$
3 , 5 , 7 , 9 , 11 ,	$5 - 3 = 2$	$7 - 5 = 2$	$9 - 7 = 2$	$11 - 9 = 2$
5 , 9 , 13 , 17 , 21 ,	$9 - 5 = 4$	$13 - 9 = 4$	$17 - 13 = 4$	$21 - 17 = 4$
8 , 14 , 20 , 26 , 32 ,	$14 - 8 = 6$	$20 - 14 = 6$	$26 - 20 = 6$	$32 - 26 = 6$

40 , 37 , 34, 31 , 28 ,	$37 - 40 = -3$	$34 - 37 = -3$	$31 - 34 = -3$	$28 - 31 = -3$
26 , 24 , 22 , 20 , 18 ,	$24 - 26 = -2$	$22 - 24 = -2$	$20 - 22 = -2$	$18 - 20 = -2$
65, 61 , 57 , 53 , 49 ,	$65 - 61 = -4$	$57 - 61 = -4$	$53 - 57 = -4$	$49 - 53 = -4$

Here also , we start with a number and add or subtract a fixed number repeatedly , don't we ?

The difference between any two consecutive terms of these sequences are same

What have we done in worksheet 1.13 ?

The first five terms of the sequences are given and we have found other terms here .

Here also , we start with a number and add or subtract a fixed number repeatedly , don't we ?

Such number sequences are known as Arithmetic sequences .

Is the set of natural numbers an arithmetic sequence ?

Findings

- A sequence got by starting with any number and adding a fixed number repeatedly is an arithmetic sequence .
- A sequence got by starting with any number and subtracting a fixed number repeatedly is an arithmetic sequence .
- The set of natural numbers is an arithmetic sequence .
- The sequences got by multiplying the natural numbers by a fixed number and add a number to this product is an arithmetic sequence .
- The sequences got by multiplying the natural numbers by a fixed number and subtract a number from this product is an arithmetic sequence .
- The multiples of a fixed number is subtracted continuously from a number is also gives an arithmetic sequence .
- The difference between any two consecutive terms of an arithmetic sequence is always a constant .

Conclusion.

*A sequence got by starting with any number and adding a fixed number repeatedly is called
an arithmetic sequence*

.

NB:

1. A sequence got by starting with any number and subtracting a fixed number repeatedly is also
an arithmetic sequence .

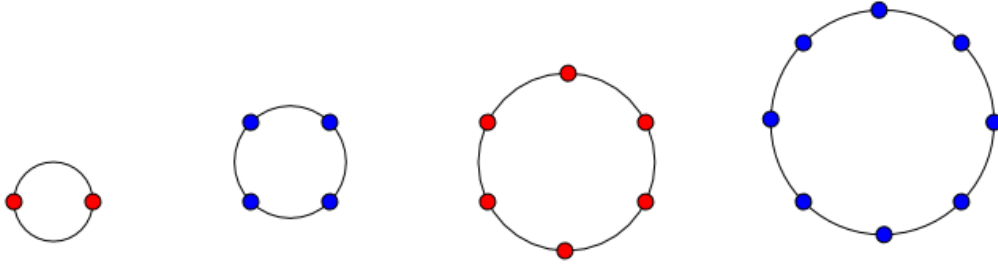
2. The difference between any two consecutive terms of an arithmetic sequence is always a constant .

This constant is known as the **common difference** of the arithmetic sequence .

ONLINE CLASS STD - X 2020-21 : MATHEMATICS

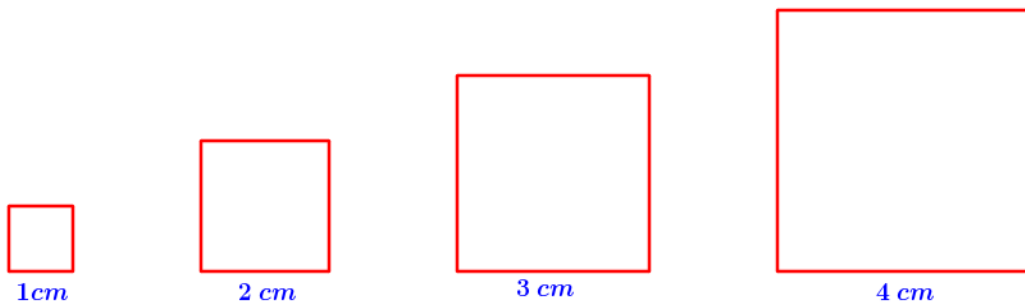
WORK SHEET - 1.14

1. In the figure some dots are marked on the circles .



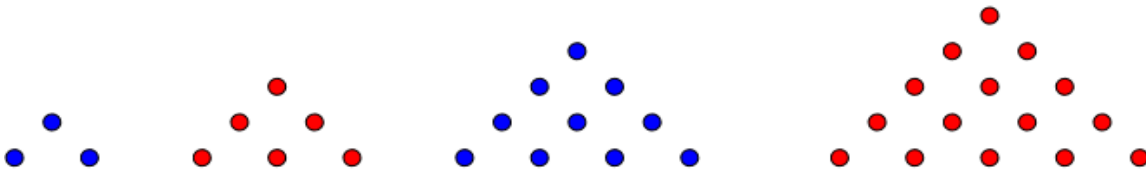
- How many dots are there on the first circle ?
- Write down the sequence of number of dots on the circles obtained , if we continue this process ?
- Check whether the above sequence is an arithmetic sequence or not ?
- If it is an arithmetic sequence , what will be its common difference ?

2. In the figure some squares are drawn . Length of the sides of them are also shown in the figure .



- What is the perimeter of the first square ?
- Write down the sequence of perimeter of the squares obtained , if we continue this process ?
- Check whether the above sequence is an arithmetic sequence or not ?
- If it is an arithmetic sequence , what will be its common difference ?

3. Let's make triangles with dots .

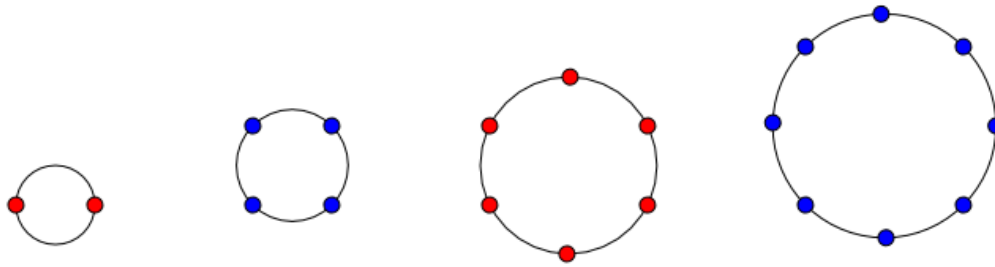


- How many dots are there in the first triangle ?
- Write down the sequence of number of the dots in the triangles obtained , if we continue this process ?
- Check whether the above sequence is an arithmetic sequence or not ?
- If it is an arithmetic sequence , what will be its common difference ?

ONLINE CLASS STD - X 2020-21 : MATHEMATICS

WORK SHEET - 1.14 ANSWER

1. In the figure some dots are marked on the circles .



a) How many dots are there on the first circle ?

Ans : 2

b) Write down the sequence of number of dots on the circles obtained , if we continue this process ?

Ans : 2 , 4 , 6 , 8 , 10 ,

c) Check whether the above sequence is an arithmetic sequence or not ?

Ans :

$$x_2 - x_1 = 4 - 2 = 2 , \quad x_3 - x_2 = 6 - 4 = 2 , \quad x_4 - x_3 = 8 - 6 = 2$$

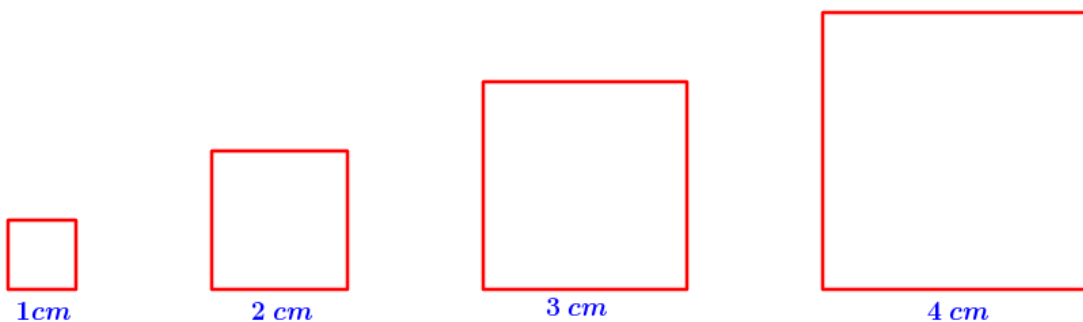
$$x_5 - x_4 = 10 - 8 = 2$$

Since the difference between any two consecutive terms of this sequence is a constant , it is an arithmetic sequence .

d) If it is an arithmetic sequence , what will be its common difference ?

Ans : Common difference = 2

2. In the figure some squares are drawn . Length of the sides of them are also shown in the figure .



a) What is the perimeter of the first square ?

Ans : 4

b) Write down the sequence of perimeter of the squares obtained , if we continue this process ?

Ans : 4 , 8 , 12 , 16 , 20 ,

c) Check whether the above sequence is an arithmetic sequence or not ?

Ans :

$$x_2 - x_1 = 8 - 4 = 4 , \quad x_3 - x_2 = 12 - 8 = 4 , \quad x_4 - x_3 = 16 - 12 = 4$$

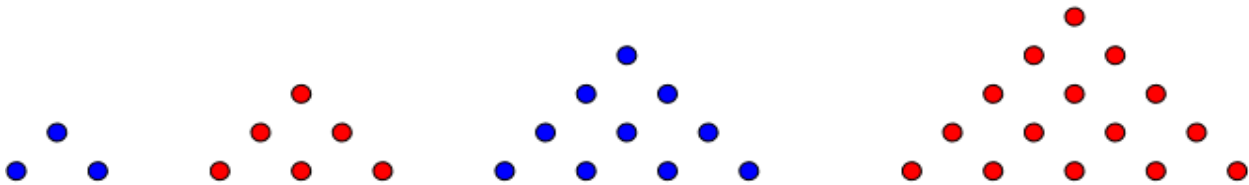
$$x_5 - x_4 = 20 - 16 = 4$$

Since the difference between any two consecutive terms of this sequence is a constant , it is an arithmetic sequence .

d) If it is an arithmetic sequence , what will be its common difference ?

Ans : Common difference = 4

3. Let's make triangles with dots .



a) How many dots are there in the first triangle ?

Ans : 3

b) Write down the sequence of number of the dots in the triangles obtained , if we continue this process ?

Ans : 3 , 6 , 10 , 15 , 21 ,

c) Check whether the above sequence is an arithmetic sequence or not ?

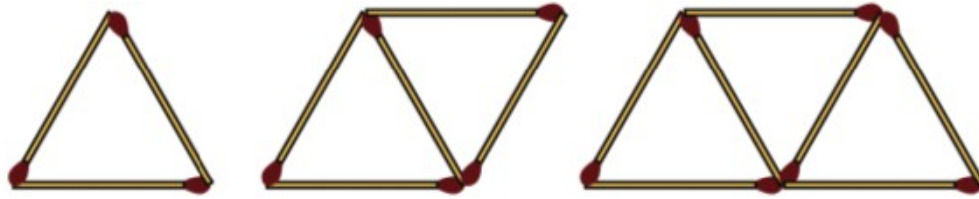
$$x_2 - x_1 = 6 - 3 = 3 , \quad x_3 - x_2 = 10 - 6 = 4$$

Since the difference between two consecutive terms of this sequence is not a constant , it is not an arithmetic sequence .

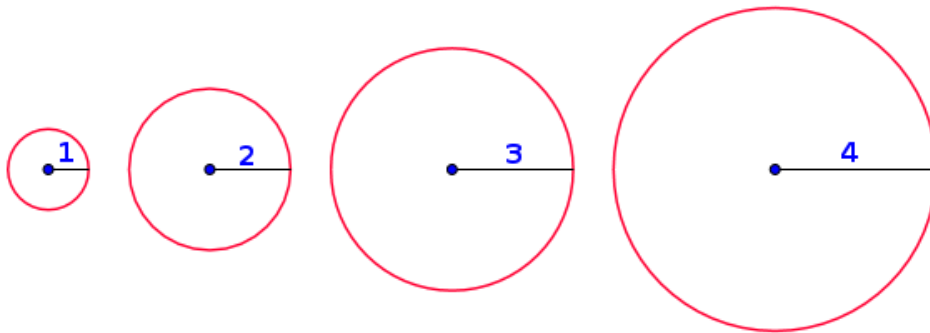
ONLINE CLASS STD - X 2020-21 : MATHEMATICS

WORK SHEET - 1.15

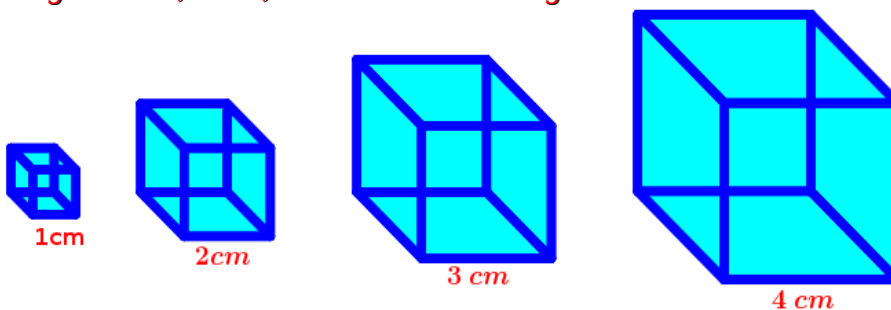
1. Let's make the figures shown in the figure using matchsticks .



- How many matchsticks are there in the first figure (triangle) ?
 - If we continue this process , write down sequence of numbers of matchsticks used in each figure ?
 - Check whether the above sequence is an arithmetic sequence or not ?
 - If it is an arithmetic sequence , what will be its common difference ?
2. In the figure circles of radii 1 cm , 2 cm , 3 cm and 4cm are drawn .



- What is the perimeter of the first circle ?
 - If we continue this process , write down the sequence of perimeter of the circles so obtained ?
 - Check whether the above sequence is an arithmetic sequence or not ?
 - If it is an arithmetic sequence , what will be its common difference ?
3. Cubes of base edges 1 cm , 2 cm , 3 cm and 4 cm are given below .

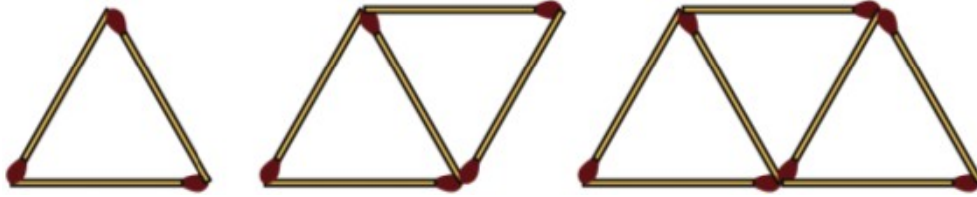


- What is the volume of the first cube ?
- If we continue this process , write down the sequence of volume of the cubes so obtained ?
- Check whether the above sequence is an arithmetic sequence or not ?
- If it is an arithmetic sequence , what will be its common difference ?

ONLINE CLASS STD - X 2020-21 : MATHEMATICS

WORK SHEET - 1.15 ANSWER

1. Let's make the figures shown in the figure using matchsticks .



a) How many matchsticks are there in the first figure (triangle) ?

b) If we continue this process , write down the sequence of numbers of matchsticks used in each figure ?

c) Check whether the above sequence is an arithmetic sequence or not ?

d) If it is an arithmetic sequence , what will be its common difference ?

Answer .

a) 3

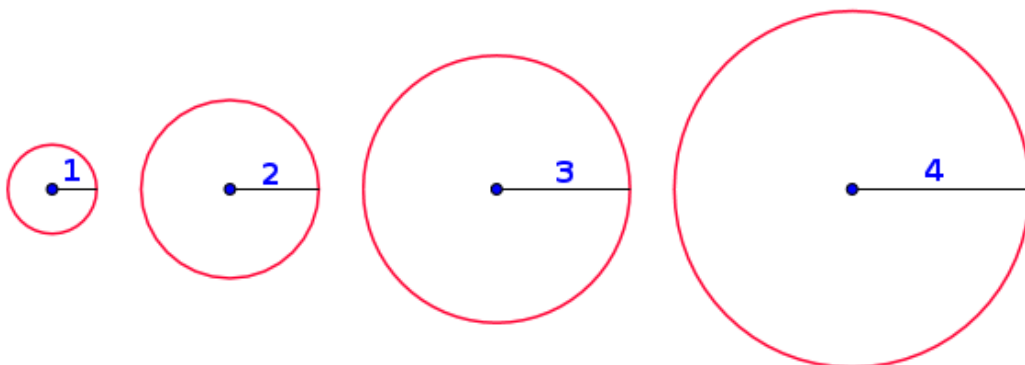
b) 3 , 5 , 7 , 9 , 11 ,

$$\begin{aligned} \text{c) } x_2 - x_1 &= 5 - 3 = 2 , \quad x_3 - x_2 = 7 - 5 = 2 , \quad x_4 - x_3 = 9 - 7 = 2 \\ x_5 - x_4 &= 11 - 9 = 2 \end{aligned}$$

Since the difference between any two consecutive terms of this sequence is a constant , it is an arithmetic sequence .

d) Common difference = 2

2. In the figure circles of radii 1 cm , 2 cm , 3 cm and 4cm are drawn .



a) What is the perimeter of the first circle ?

b) If we continue this process , write down the sequence of perimeter of the circles so obtained ?

c) Check whether the above sequence is an arithmetic sequence or not ?

d) If it is an arithmetic sequence , what will be its common difference ?

Answer.

a) $2\pi \text{ cm}$

b) $2\pi , 4\pi , 6\pi , 8\pi , 10\pi , \dots$

c) $x_2 - x_1 = 4\pi - 2\pi = 2\pi$, $x_3 - x_2 = 6\pi - 4\pi = 2\pi$, $x_4 - x_3 = 8\pi - 6\pi = 2\pi$

$$x_5 - x_4 = 10\pi - 8\pi = 2\pi$$

d) Common difference $= 2\pi$

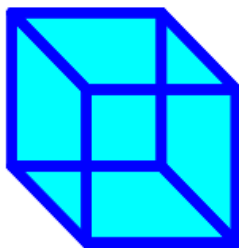
3. Cubes of base edges 1 cm , 2 cm , 3 cm and 4 cm are given below .



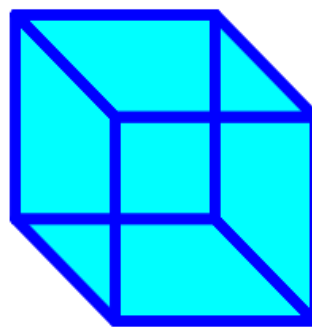
1 cm



2 cm



3 cm



4 cm

a) What is the volume of the first cube ?

b) If we continue this process , write down the sequence of volume of the cubes so obtained ?

c) Check whether the above sequence is an arithmetic sequence or not ?

d) If it is an arithmetic sequence , what will be its common difference ?

Answer.

a) $1^3 = 1 \text{ cm}^3$

b) $1^3 , 2^3 , 3^3 , 4^3 , 5^3 , \dots = 1 , 8 , 27 , 64 , 125 , \dots$

c) $x_2 - x_1 = 8 - 1 = 7$, $x_3 - x_2 = 27 - 8 = 19$

Since the difference between two consecutive terms of this sequence is not a constant , it is not an arithmetic sequence .

ONLINE CLASS STD - X 2020-21 : MATHEMATICS

WORK SHEET - 1.15 NOTE

1). Consider the arithmetic sequence 5, 8, 11, 14, 17,

a) Common difference of the sequence = $8 - 5 = 3$

b) Let's complete the table given below . . :

Term	First term + -----	First term + ----- x -----
$x_2 = 8$	$8 = 5 + 3$	$8 = 5 + 3 \times 1$
$x_3 = 11$	$11 = 5 + 6$	$11 = 5 + 3 \times 2$
$x_4 = 14$	$14 = 5 + 9$	$14 = 5 + 3 \times 3$
$x_5 = 17$	$17 = 5 + 12$	$17 = 5 + 3 \times 4$
$x_6 = 20$	$20 = 5 + 15$	$20 = 5 + 3 \times 5$
$x_7 = 23$	$23 = 5 + 18$	$23 = 5 + 3 \times 6$
$x_8 = 26$	$26 = 5 + 21$	$26 = 5 + 3 \times 7$
$x_9 = 29$	$29 = 5 + 24$	$29 = 5 + 3 \times 8$
$x_{10} = 32$	$32 = 5 + 27$	$32 = 5 + 3 \times 9$

2). Consider the arithmetic sequence 1, 5, 9, 13, 17,

a) Common difference of the sequence = $5 - 1 = 4$

b) Let's complete the table given below .

Term	First term + -----	First term + ----- x -----
$x_2 = 5$	$5 = 1 + 4$	$5 = 1 + 4 \times 1$
$x_3 = 9$	$9 = 1 + 8$	$9 = 1 + 4 \times 2$
$x_4 = 13$	$13 = 1 + 12$	$13 = 1 + 4 \times 3$
$x_5 = 17$	$17 = 1 + 16$	$17 = 1 + 4 \times 4$
$x_6 = 21$	$21 = 1 + 20$	$21 = 1 + 4 \times 5$
$x_7 = 25$	$25 = 1 + 24$	$25 = 1 + 4 \times 6$
$x_8 = 29$	$29 = 1 + 28$	$29 = 1 + 4 \times 7$
$x_9 = 33$	$33 = 1 + 32$	$33 = 1 + 4 \times 8$
$x_{10} = 37$	$37 = 1 + 36$	$37 = 1 + 4 \times 9$

ONLINE CLASS STD - X 2020-21 : MATHEMATICS

WORK SHEET - 1.16

1). Consider the arithmetic sequence 3, 5, 7, 9, 11,

a) What is the common difference of the sequence ?

b) Complete the table given below .

Term	First term + -----	First term + ----- x -----
$x_2 = 5$	$5 = 3 + 2$	$5 = 3 + 2 \times 1$
$x_3 = 7$	$7 = 3 + 4$	$7 = 3 + 2 \times 2$
$x_4 = \text{---}$	$\text{---} = \text{---} + \text{---}$	$\text{---} = \text{---} + \text{---} \times \text{---}$
$x_5 = \text{---}$	$\text{---} = \text{---} + \text{---}$	$\text{---} = \text{---} + \text{---} \times \text{---}$
$x_6 = \text{---}$	$\text{---} = \text{---} + \text{---}$	$\text{---} = \text{---} + \text{---} \times \text{---}$
$x_7 = \text{---}$	$\text{---} = \text{---} + \text{---}$	$\text{---} = \text{---} + \text{---} \times \text{---}$
$x_8 = \text{---}$	$\text{---} = \text{---} + \text{---}$	$\text{---} = \text{---} + \text{---} \times \text{---}$
$x_9 = \text{---}$	$\text{---} = \text{---} + \text{---}$	$\text{---} = \text{---} + \text{---} \times \text{---}$
$x_{10} = \text{---}$	$\text{---} = \text{---} + \text{---}$	$\text{---} = \text{---} + \text{---} \times \text{---}$

2). Consider the arithmetic sequence 4, 9, 14, 19, 24,

a) What is the common difference of the sequence ?

b) Complete the table given below .

Term	First term + -----	First term + ----- x -----
$x_2 = 9$	$9 = 4 + 5$	$9 = 4 + 5 \times 1$
$x_3 = 14$	$14 = 4 + 10$	$14 = 4 + 5 \times 2$
$x_4 = \text{---}$	$\text{---} = \text{---} + \text{---}$	$\text{---} = \text{---} + \text{---} \times \text{---}$
$x_5 = \text{---}$	$\text{---} = \text{---} + \text{---}$	$\text{---} = \text{---} + \text{---} \times \text{---}$
$x_6 = \text{---}$	$\text{---} = \text{---} + \text{---}$	$\text{---} = \text{---} + \text{---} \times \text{---}$
$x_7 = \text{---}$	$\text{---} = \text{---} + \text{---}$	$\text{---} = \text{---} + \text{---} \times \text{---}$
$x_8 = \text{---}$	$\text{---} = \text{---} + \text{---}$	$\text{---} = \text{---} + \text{---} \times \text{---}$
$x_9 = \text{---}$	$\text{---} = \text{---} + \text{---}$	$\text{---} = \text{---} + \text{---} \times \text{---}$
$x_{10} = \text{---}$	$\text{---} = \text{---} + \text{---}$	$\text{---} = \text{---} + \text{---} \times \text{---}$

3). Consider the arithmetic sequence 1, 11, 21, 31, 41, 51, and repeat the above activity .

ONLINE CLASS STD - X 2020-21 : MATHEMATICS

WORK SHEET - 1.16

1). Consider the arithmetic sequence 3, 5, 7, 9, 11,

a) What is the common difference of the sequence ? $5 - 3 = 2$

b) Complete the table given below .

Term	First term + -----	First term + ----- x -----
$x_2 = 5$	$5 = 3 + 2$	$5 = 3 + 2 \times 1$
$x_3 = 7$	$7 = 3 + 4$	$7 = 3 + 2 \times 2$
$x_4 = 9$	$9 = 3 + 6$	$9 = 3 + 2 \times 3$
$x_5 = 11$	$11 = 3 + 8$	$11 = 3 + 2 \times 4$
$x_6 = 13$	$13 = 3 + 10$	$13 = 3 + 2 \times 5$
$x_7 = 15$	$15 = 3 + 12$	$15 = 3 + 2 \times 6$
$x_8 = 17$	$17 = 3 + 14$	$17 = 3 + 2 \times 7$
$x_9 = 19$	$19 = 3 + 16$	$19 = 3 + 2 \times 8$
$x_{10} = 21$	$21 = 3 + 18$	$21 = 3 + 2 \times 9$

2). Consider the arithmetic sequence 4, 9, 14, 19, 24,

a) What is the common difference of the sequence ? $9 - 4 = 5$

b) Complete the table given below .

Term	First term + -----	First term + ----- x -----
$x_2 = 9$	$9 = 4 + 5$	$9 = 4 + 5 \times 1$
$x_3 = 14$	$14 = 4 + 10$	$14 = 4 + 5 \times 2$
$x_4 = 19$	$19 = 4 + 15$	$19 = 4 + 5 \times 3$
$x_5 = 24$	$24 = 4 + 20$	$24 = 4 + 5 \times 4$
$x_6 = 29$	$29 = 4 + 25$	$29 = 4 + 5 \times 5$
$x_7 = 34$	$34 = 4 + 30$	$34 = 4 + 5 \times 6$
$x_8 = 39$	$39 = 4 + 35$	$39 = 4 + 5 \times 7$
$x_9 = 44$	$44 = 4 + 40$	$44 = 4 + 5 \times 8$
$x_{10} = 49$	$49 = 4 + 45$	$49 = 4 + 5 \times 9$

3).Consider the arithmetic sequence 1 , 11 , 21 , 31 , 41 , 51 , and repeat the above activity .

3). 1 , 11 , 21 , 31 , 41 , 51 ,എന്നസമാന്തരശ്രേണി എടുത്ത് മുകളിലെ പ്രവർത്തനം തുടരുക.

a) Common difference of the sequence = $11 - 1 = 10$

<i>Term</i>	<i>First term + -----</i>	<i>First term + ----- x -----</i>
$x_2 = 11$	$11 = 1 + 10$	$11 = 1 + 10 \times 1$
$x_3 = 21$	$21 = 1 + 20$	$21 = 1 + 10 \times 2$
$x_4 = 31$	$31 = 1 + 30$	$31 = 1 + 10 \times 3$
$x_5 = 41$	$41 = 1 + 40$	$41 = 1 + 10 \times 4$
$x_6 = 51$	$51 = 1 + 50$	$51 = 1 + 10 \times 5$
$x_7 = 61$	$61 = 1 + 60$	$61 = 1 + 10 \times 6$
$x_8 = 71$	$71 = 1 + 70$	$71 = 1 + 10 \times 7$
$x_9 = 81$	$81 = 1 + 80$	$81 = 1 + 10 \times 8$
$x_{10} = 91$	$91 = 1 + 90$	$91 = 1 + 10 \times 9$

ONLINE CLASS STD - X 2020-21 : MATHEMATICS

WORK SHEET - 1.17

1). Consider the arithmetic sequence 6 , 8 , 10 ,

a) What is its common difference ?

b) Write down the next three terms of this sequence ?

c) Which number is to be added to the first term to get its 8th term ?

d) How many times of the common difference is to be added to the first term to get its 10th term ?

e) What is its 16th term ?

2). Consider the arithmetic sequence 1 , 4 , 7 ,

a) What is its common difference ?

b) Write down the next three terms of this sequence ?

c) Which number is to be added to the first term to get its 9th term ?

d) How many times of the common difference is to be added to the first term to get its 11th term ?

e) What is its 21th term ?

3). Consider the arithmetic sequence 2 , 7 , 12 ,

a) What is its common difference ?

b) Write down the next three terms of this sequence ?

c) Which number is to be added to the first term to get its 10th term ?

d) How many times of the common difference is to be added to the first term to get its 21th term ?

e) What is its 31th term ?

4). Consider the arithmetic sequence 3 , 13 , 23 ,

a) What is its common difference ?

b) Write down the next three terms of this sequence ?

c) Which number is to be added to the first term to get its 11th term ?

d) How many times of the common difference is to be added to the first term to get its 31th term ?

e) What is its 17th term ?

ONLINE CLASS STD - X 2020-21 : MATHEMATICS

WORK SHEET - 1.17 ANSWER

1). Consider the arithmetic sequence 6 , 8 , 10 ,

a) What is its common difference ? $8 - 6 = 2$

b) Write down the next three terms of this sequence ? 12 , 14 , 16

c) Which number is to be added to the first term to get its 8th term ? 14

d) How many times of the common difference is to be added to the first term to get its 10th term ? 9

e) What is its 16th term ? $6 + 15 \times 2 = 6 + 30 = 36$

2). Consider the arithmetic sequence 1 , 4 , 7 ,

a) What is its common difference ? $4 - 1 = 3$

b) Write down the next three terms of this sequence ? 10 , 13 , 16

c) Which number is to be added to the first term to get its 9th term ? 24

d) How many times of the common difference is to be added to the first term to get its 11th term ? 10

e) What is its 21th term ? $1 + 20 \times 3 = 1 + 60 = 61$

3). Consider the arithmetic sequence 2 , 7 , 12 ,

a) What is its common difference ? $7 - 2 = 5$

b) Write down the next three terms of this sequence ? 17 , 22 , 27

c) Which number is to be added to the first term to get its 10th term ? 45

d) How many times of the common difference is to be added to the first term to get its 21th term ? 20

e) What is its 31th term ? $2 + 30 \times 5 = 2 + 150 = 152$

4). Consider the arithmetic sequence 3 , 13 , 23 ,

a) What is its common difference ? $13 - 3 = 10$

b) Write down the next three terms of this sequence ? 33 , 43 , 53

c) Which number is to be added to the first term to get its 11th term ? 100

d) How many times of the common difference is to be added to the first term to get its 31th term ? 30

e) What is its 17th term ? $3 + 16 \times 10 = 3 + 160 = 163$

ONLINE CLASS STD - X 2020-21 : MATHEMATICS

Discussion - 4

Let's discuss again the arithmetic sequences in worksheet 1.17 .

1). Consider the arithmetic sequence 6 , 8 , 10 ,

Common difference of this sequence = $8 - 6 = 2$

Term				
First term	6			
Second term	8	$6 + 2$	$6 + 2 \times 1$	<i>Adding common difference to the first term</i>
Third term	10	$6 + 4$	$6 + 2 \times 2$	<i>Adding two times of the common difference to the first term .</i>
Fourth term	12	$6 + 6$	$6 + 2 \times 3$	<i>Adding three times of the common difference to the first term .</i>
Fifth term	14	$6 + 8$	$6 + 2 \times 4$	<i>Adding four times of the common difference to the first term .</i>
Sixth term	16	$6 + 10$	$6 + 2 \times 5$	<i>Adding five times of the common difference to the first term .</i>
Seventh term	18	$6 + 12$	$6 + 2 \times 6$	<i>Adding six times of the common difference to the first term .</i>
Eighth term	20	$6 + 14$	$6 + 2 \times 7$	<i>Adding seven times of the common difference to the first term .</i>
Ninth term	22	$6 + 16$	$6 + 2 \times 8$	<i>Adding eight times of the common difference to the first term .</i>
Tenth term	24	$6 + 18$	$6 + 2 \times 9$	<i>Adding nine times of the common difference to the first term .</i>

2). Consider the arithmetic sequence 1, 4, 7,

Common difference of this sequence = $4 - 1 = 3$

<i>Term</i>				
<i>First term</i>	1			
<i>Second term</i>	4	$1 + 3$	$1 + 3 \times 1$	<i>Adding common difference to the first term</i>
<i>Third term</i>	7	$1 + 6$	$1 + 3 \times 2$	<i>Adding two times of the common difference to the first term .</i>
<i>Fourth term</i>	10	$1 + 9$	$1 + 3 \times 3$	<i>Adding three times of the common difference to the first term .</i>
<i>Fifth term</i>	13	$1 + 12$	$1 + 3 \times 4$	<i>Adding four times of the common difference to the first term .</i>
<i>Sixth term</i>	16	$1 + 15$	$1 + 3 \times 5$	<i>Adding five times of the common difference to the first term .</i>
<i>Seventh term</i>	19	$1 + 18$	$1 + 3 \times 6$	<i>Adding six times of the common difference to the first term .</i>
<i>Eighth term</i>	22	$1 + 21$	$1 + 3 \times 7$	<i>Adding seven times of the common difference to the first term .</i>
<i>Ninth term</i>	25	$1 + 24$	$1 + 3 \times 8$	<i>Adding eight times of the common difference to the first term .</i>
<i>Tenth term</i>	28	$1 + 27$	$1 + 3 \times 9$	<i>Adding nine times of the common difference to the first term .</i>

3). Consider the arithmetic sequence 2 , 7 , 12 ,

Common difference of this sequence = $7 - 2 = 5$

Term				
<i>First term</i>	2			
<i>Second term</i>	7	2 + 5	2 + 5 x 1	<i>Adding common difference to the first term</i>
<i>Third term</i>	12	2 + 10	2 + 5 x 2	<i>Adding two times of the common difference to the first term .</i>
<i>Fourth term</i>	17	2 + 15	2 + 5 x 3	<i>Adding three times of the common difference to the first term .</i>
<i>Fifth term</i>	22	2 + 20	2 + 5 x 4	<i>Adding four times of the common difference to the first term .</i>
<i>Sixth term</i>	27	2 + 25	2 + 5 x 5	<i>Adding five times of the common difference to the first term .</i>
<i>Seventh term</i>	32	2 + 30	2 + 5 x 6	<i>Adding six times of the common difference to the first term .</i>
<i>Eighth term</i>	37	2 + 35	2 + 5 x 7	<i>Adding seven times of the common difference to the first term .</i>
<i>Ninth term</i>	42	2 + 40	2 + 5 x 8	<i>Adding eight times of the common difference to the first term .</i>
<i>Tenth term</i>	47	2 + 45	2 + 5 x 9	<i>Adding nine times of the common difference to the first term .</i>

4). Consider the arithmetic sequence 3 , 13 , 23 ,

Common difference of this sequence = $13 - 3 = 10$

Term				
First term	3			
Second term	13	$3 + 10$	$3 + 10 \times 1$	Adding common difference to the first term
Third term	23	$3 + 20$	$3 + 10 \times 2$	Adding two times of the common difference to the first term .
Fourth term	33	$3 + 30$	$3 + 10 \times 3$	Adding three times of the common difference to the first term .
Fifth term	43	$3 + 40$	$3 + 10 \times 4$	Adding four times of the common difference to the first term .
Sixth term	53	$3 + 50$	$3 + 10 \times 5$	Adding five times of the common difference to the first term .
Seventh term	63	$3 + 60$	$3 + 10 \times 6$	Adding six times of the common difference to the first term .
Eighth term	73	$3 + 70$	$3 + 10 \times 7$	Adding seven times of the common difference to the first term .
Ninth term	83	$3 + 80$	$3 + 10 \times 8$	Adding eight times of the common difference to the first term .
Tenth term	93	$3 + 90$	$3 + 10 \times 9$	Adding nine times of the common difference to the first term .

Findings

In all these sequences

- Second term is obtained by adding common difference to the first term .
- Third term is obtained by adding two times of the common difference to the first term .
- Fourth term is obtained by adding three times of the common difference to the first term .

- Fifth term is obtained by adding four times of the common difference to the first term
- Sixth term is obtained by adding five times of the common difference to the first term
- Seventh term is obtained by adding six times of the common difference to the first term
- Eighth term is obtained by adding seven times of the common difference to the first term
- Ninth term is obtained by adding eight times of the common difference to the first term
- Tenth term is obtained by adding nine times of the common difference to the first term

Conclusion

Let the first term of an arithmetic sequence be x_1 and its common difference be 'd'.

Second term = $x_1 + d$	16 th term = $x_1 + 15 d$
Third term = $x_1 + 2 d$	21 st term = $x_1 + 20 d$
Fourth term = $x_1 + 3 d$	31 st term = $x_1 + 30 d$
Fifth term = $x_1 + 4 d$	45 th term = $x_1 + 44 d$
Sixth term = $x_1 + 5 d$	51 st term = $x_1 + 50 d$
Seventh term = $x_1 + 6 d$	62 nd term = $x_1 + 61 d$
Eighth term = $x_1 + 7 d$	76 th term = $x_1 + 75 d$
Ninth term = $x_1 + 8 d$	84 th term = $x_1 + 83 d$
Tenth term = $x_1 + 9 d$	98 th term = $x_1 + 97 d$

If the first term of an arithmetic sequence is x_1 and its common difference is d , then its

$$= x_1 + (n - 1) d \quad n^{\text{th}} \text{ term}$$

ONLINE CLASS STD - X 2020-21 : MATHEMATICS

WORK SHEET - 1.18

Q). Consider the arithmetic sequence 6 , 10 , 14,

- a) What is the common difference of this sequence ?
- b) What is its 8th term ?
- c) What is the difference between 13th and 8th terms of this sequence ?
- d) How many times of the common difference is the difference between 13th and 8th terms ?

Answer.

a) Common difference = $10 - 6 = 4$

b) $x_8 = x_1 + 7d = 6 + 7 \times 4 = 6 + 28 = 34$

c) $x_{13} = x_1 + 12d = 6 + 12 \times 4 = 6 + 48 = 54$

$$x_{13} - x_8 = 54 - 34 = 20$$

d) $x_{13} - x_8 = 20 = 5 \times 4$

Term difference is 5 times its common difference .

Find the answers of the following questions

1). Consider the arithmetic sequence 5 , 7 , 9,

- a) What is the common difference of this sequence ?
- b) What is its 10th term ?
- c) What is the difference between 16th and 10th terms of this sequence ?
- d) How many times of the common difference is the difference between 16th and 10th terms ?

2). Consider the arithmetic sequence 1 , 11 , 21 ,

- a) What is the common difference of this sequence ?
- b) What is its 12th term ?
- c) What is the difference between 21st and 12th terms of this sequence ?
- d) How many times of the common difference is the difference between 21st and 12th terms ?

3) .Consider the arithmetic sequence 3 , 8 , 13 ,

- a) What is the common difference of this sequence ?
- b) What is its 9th term ?
- c) What is the difference between 17th and 9th terms of this sequence ?
- d) How many times of the common difference is the difference between 17th and 9th terms ?

4).Consider the arithmetic sequence 2 , 5 , 8 ,

- a) What is the common difference of this sequence ?
- b) What is its 8th term ?
- c) What is the difference between 12th and 8th terms of this sequence ?
- d) How many times of the common difference is the difference between 12th and 8th terms ?

5) .Consider the arithmetic sequence 4 , 10 , 16,

- a) What is the common difference of this sequence ?
- b) What is its 21st term ?
- c) What is the difference between 31st and 21st terms of this sequence ?
- d) How many times of the common difference is the difference between 31st and 21st terms ?

ONLINE CLASS STD - X 2020-21 : MATHEMATICS

WORK SHEET - 1.18 ANSWER

1). Consider the arithmetic sequence 5, 7, 9,

a) What is the common difference of this sequence ?

b) What is its 10th term ?

c) What is the difference between 16th and 10th terms of this sequence ?

d) How many times of the common difference is the difference between 16th and 10th terms ?

Answer.

a) Common difference = $7 - 5 = 2$

b) $X_{10} = X_1 + 9d = 5 + 9 \times 2 = 5 + 18 = 23$

c) $X_{16} = X_1 + 15d = 5 + 15 \times 2 = 5 + 30 = 35$

$$X_{16} - X_{10} = 35 - 23 = 12$$

d) $X_{16} - X_{10} = 12 = 6 \times 2$

Term difference is 6 times the common difference

2). Consider the arithmetic sequence 1, 11, 21,

a) What is the common difference of this sequence ?

b) What is its 12th term ?

c) What is the difference between 21st and 12th terms of this sequence ?

d) How many times of the common difference is the difference between 21st and 12th terms ?

Answer.

a) Common difference = $11 - 1 = 10$

b) $X_{12} = X_1 + 11d = 1 + 11 \times 10 = 1 + 110 = 111$

c) $X_{21} = X_1 + 20d = 1 + 20 \times 10 = 1 + 200 = 201$

$$X_{21} - X_{12} = 201 - 111 = 90$$

d) $X_{21} - X_{12} = 90 = 9 \times 10$

Term difference is 9 times the common difference .

3) .Consider the arithmetic sequence 3 , 8 , 13 ,

- a) What is the common difference of this sequence ?
- b) What is its 9th term ?
- c) What is the difference between 17th and 9th terms of this sequence ?
- d) How many times of the common difference is the difference between 17th and 9th terms ?

Answer.

- a) Common difference = $8 - 3 = 5$
- b) $x_9 = x_1 + 8d = 3 + 8 \times 5 = 3 + 40 = 43$
- c) $x_{17} = x_1 + 16d = 3 + 16 \times 5 = 3 + 80 = 83$
 $x_{17} - x_9 = 83 - 43 = 40$
- d) $x_{17} - x_9 = 40 = 8 \times 5$

Term difference is 8 times the common difference .

4).Consider the arithmetic sequence 2 , 5 , 8 ,

- a) What is the common difference of this sequence ?
- b) What is its 8th term ?
- c) What is the difference between 12th and 8th terms of this sequence ?
- d) How many times of the common difference is the difference between 12th and 8th terms ?

Answer.

- a) Common difference = $5 - 2 = 3$
- b) $x_8 = x_1 + 7d = 2 + 7 \times 3 = 2 + 21 = 23$
- c) $x_{12} = x_1 + 11d = 2 + 11 \times 3 = 2 + 33 = 35$
 $x_{12} - x_8 = 35 - 23 = 12$
- d) $x_{12} - x_8 = 12 = 4 \times 3$

Term difference is 4 times the common difference .

5) .Consider the arithmetic sequence 4 , 10 , 16,

- a) What is the common difference of this sequence ?
- b) What is its 21st term ?
- c) What is the difference between 31st and 21st terms of this sequence ?
- d) How many times of the common difference is the difference between 31st and 21st terms ?

Answer.

a) Common difference = $10 - 4 = 6$

b) $x_{21} = x_1 + 20 d = 4 + 20 \times 6 = 4 + 120 = 124$

c) $x_{31} = x_1 + 30 d = 4 + 30 \times 6 = 4 + 180 = 184$

$$x_{31} - x_{21} = 184 - 124 = 60$$

d) $x_{31} - x_{21} = 60 = 10 \times 6$

Term difference is 10 times the common difference .

ONLINE CLASS STD - X 2020-21 : MATHEMATICS

WORK SHEET - 1.19

1). Consider the arithmetic sequence 5 , 7 , 9 ,

Common difference of the sequence = $7 - 5 = 2$

Let's write first 15 terms of this sequence .

x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8	x_9	x_{10}	x_{11}	x_{12}	x_{13}	x_{14}	x_{15}
5	7	9	11	13	15	17	19	21	23	25	27	29	31	33

We know that the difference between any two consecutive terms of an arithmetic sequence is a constant .

Is there any peculiarity to the difference between any two terms of an arithmetic sequence ?

Let's check it.

Terms		Term difference	Common difference	Difference between the position of terms	
$x_1 = 5$	$x_5 = 13$	$13 - 5 = 8$	2	$5 - 1 = 4$	$8 = 2 \times 4$
$x_2 = 7$	$x_{10} = 23$	$23 - 7 = 16$	2	$10 - 2 = 8$	$16 = 2 \times 8$
$x_4 = 11$	$x_{11} = 25$	$25 - 11 = 14$	2	$11 - 4 = 7$	$14 = 2 \times 7$
$x_8 = 19$	$x_{13} = 29$	$29 - 19 = 10$	2	$13 - 8 = 5$	$10 = 2 \times 5$
$x_5 = 13$	$x_{15} = 33$	$33 - 13 = 20$	2	$15 - 5 = 10$	$20 = 2 \times 10$
$x_6 = \dots$	$x_9 = \dots$	$\dots - \dots = \dots$	\dots	$\dots - \dots = \dots$	$\dots = \dots \times \dots$
$x_{10} = \dots$	$x_{12} = \dots$	$\dots - \dots = \dots$	\dots	$\dots - \dots = \dots$	$\dots = \dots \times \dots$
$x_6 = \dots$	$x_9 = \dots$	$\dots - \dots = \dots$	\dots	$\dots - \dots = \dots$	$\dots = \dots \times \dots$
$x_5 = \dots$	$x_{14} = \dots$	$\dots - \dots = \dots$	\dots	$\dots - \dots = \dots$	$\dots = \dots \times \dots$
$x_8 = \dots$	$x_{11} = \dots$	$\dots - \dots = \dots$	\dots	$\dots - \dots = \dots$	$\dots = \dots \times \dots$

Complete the above table ?

2). Consider the arithmetic sequence 1, 4 , 7 , and repeat the above activity .

3). Consider the arithmetic sequence 2 , 7 , 12 , and repeat the above activity .

4). Consider the arithmetic sequence 3 , 7 , and repeat the above activity .

ONLINE CLASS STD - X 2020-21 : MATHEMATICS

WORK SHEET - 1.19 ANSWER

1). Consider the arithmetic sequence 5 , 7 , 9 ,

Common difference of the sequence $= 7 - 5 = 2$

Let's write first 15 terms of this sequence .

x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8	x_9	x_{10}	x_{11}	x_{12}	x_{13}	x_{14}	x_{15}
5	7	9	11	13	15	17	19	21	23	25	27	29	31	33

We know that the difference between any two consecutive terms of an arithmetic sequence is a constant .

Is there any peculiarity to the difference between any two terms of an arithmetic sequence ?

Let's check it.

Terms		Term difference	Common difference	Difference between the position of terms	
$x_1 = 5$	$x_5 = 13$	$13 - 5 = 8$	2	$5 - 1 = 4$	$8 = 2 \times 4$
$x_2 = 7$	$x_{10} = 23$	$23 - 7 = 16$	2	$10 - 2 = 8$	$16 = 2 \times 8$
$x_4 = 11$	$x_{11} = 25$	$25 - 11 = 14$	2	$11 - 4 = 7$	$14 = 2 \times 7$
$x_8 = 19$	$x_{13} = 29$	$29 - 19 = 10$	2	$13 - 8 = 5$	$10 = 2 \times 5$
$x_5 = 13$	$x_{15} = 33$	$33 - 13 = 20$	2	$15 - 5 = 10$	$20 = 2 \times 10$
$x_6 = 15$	$x_9 = 21$	$21 - 15 = 6$	2	$9 - 6 = 3$	$6 = 2 \times 3$
$x_{10} = 23$	$x_{12} = 27$	$27 - 23 = 4$	2	$12 - 10 = 2$	$4 = 2 \times 2$
$x_6 = 15$	$x_9 = 21$	$21 - 15 = 6$	2	$9 - 6 = 3$	$6 = 2 \times 3$
$x_5 = 13$	$x_{14} = 31$	$31 - 13 = 18$	2	$14 - 5 = 9$	$18 = 2 \times 9$
$x_8 = 19$	$x_{11} = 25$	$25 - 19 = 6$	2	$11 - 8 = 3$	$6 = 2 \times 3$

2). Consider the arithmetic sequence 1, 4, 7, and repeat the above activity .

x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8	x_9	x_{10}	x_{11}	x_{12}	x_{13}	x_{14}	x_{15}
1	4	7	10	13	16	19	22	25	28	31	34	37	40	43

Terms		Term difference	Common difference	Difference between the position of terms	
$x_1 = 1$	$x_5 = 13$	$13 - 1 = 12$	3	$5 - 1 = 4$	$12 = 3 \times 4$
$x_2 = 4$	$x_{10} = 28$	$28 - 4 = 24$	3	$10 - 2 = 8$	$24 = 3 \times 8$
$x_4 = 10$	$x_{11} = 31$	$31 - 10 = 21$	3	$11 - 4 = 7$	$21 = 3 \times 7$
$x_8 = 22$	$x_{13} = 37$	$37 - 22 = 15$	3	$13 - 8 = 5$	$15 = 3 \times 5$
$x_5 = 13$	$x_{15} = 43$	$43 - 13 = 30$	3	$15 - 5 = 10$	$30 = 3 \times 10$
$x_6 = 16$	$x_9 = 25$	$25 - 16 = 9$	3	$9 - 6 = 3$	$9 = 3 \times 3$
$x_{10} = 28$	$x_{12} = 34$	$34 - 28 = 6$	3	$12 - 10 = 2$	$6 = 3 \times 2$
$x_3 = 7$	$x_9 = 25$	$25 - 7 = 18$	3	$9 - 3 = 6$	$18 = 3 \times 6$
$x_5 = 13$	$x_{14} = 40$	$40 - 13 = 27$	3	$14 - 5 = 9$	$27 = 3 \times 9$
$x_8 = 22$	$x_{11} = 31$	$31 - 22 = 9$	3	$11 - 8 = 3$	$9 = 3 \times 3$

3). Consider the arithmetic sequence 2 , 7 , 12 , and repeat the above activity .

X₁	X₂	X₃	X₄	X₅	X₆	X₇	X₈	X₉	X₁₀	X₁₁	X₁₂	X₁₃	X₁₄	X₁₅
2	7	12	17	22	27	32	37	42	47	52	57	62	67	72

<i>Terms</i>		<i>Term difference</i>	<i>Common difference</i>	<i>Difference between the postion of terms</i>	
x₁ = 2	x₅ = 22	22 – 2 = 20	5	5 – 1 = 4	20 = 5 x 4
x₂ = 7	x₁₀ = 47	47 – 7 = 40	5	10 – 2 = 8	40 = 5 x 8
x₄ = 17	x₁₁ = 52	52 – 17 = 35	5	11 – 4 = 7	35 = 5 x 7
x₈ = 37	x₁₃ = 62	62 – 37 = 25	5	13 – 8 = 5	25 = 5 x 5
x₅ = 22	x₁₅ = 72	72 – 22 = 50	5	15 – 5 = 10	50 = 5 x 10
x₆ = 27	x₉ = 42	42 – 27 = 15	5	9 – 6 = 3	15 = 5 x 3
x₁₀ = 47	x₁₂ = 57	57 – 47 = 10	5	12 – 10 = 2	10 = 5 x 2
x₃ = 12	x₉ = 42	42 – 12 = 30	5	9 – 3 = 6	30 = 5 x 6
x₅ = 22	x₁₄ = 67	67 – 22 = 45	5	14 – 5 = 9	45 = 5 x 9
x₈ = 37	x₁₁ = 52	52 – 37 = 15	5	11 – 8 = 3	15 = 5 x 3

4). Consider the arithmetic sequence 3 , 7 , and repeat the above activity .

x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8	x_9	x_{10}	x_{11}	x_{12}	x_{13}	x_{14}	x_{15}
3	7	11	15	19	23	27	31	35	39	43	47	51	55	59

Terms		Term difference	Common difference	Difference between the position of terms	
$x_1 = 3$	$x_5 = 19$	$19 - 3 = 16$	4	$5 - 1 = 4$	$16 = 4 \times 4$
$x_2 = 7$	$x_{10} = 39$	$39 - 7 = 32$	4	$10 - 2 = 8$	$32 = 4 \times 8$
$x_4 = 15$	$x_{11} = 43$	$43 - 15 = 28$	4	$11 - 4 = 7$	$28 = 4 \times 7$
$x_8 = 31$	$x_{13} = 51$	$51 - 31 = 20$	4	$13 - 8 = 5$	$20 = 4 \times 5$
$x_5 = 19$	$x_{15} = 59$	$59 - 19 = 40$	4	$15 - 5 = 10$	$40 = 4 \times 10$
$x_6 = 23$	$x_9 = 35$	$35 - 23 = 12$	4	$9 - 6 = 3$	$12 = 4 \times 3$
$x_{10} = 39$	$x_{12} = 47$	$47 - 39 = 8$	4	$12 - 10 = 2$	$8 = 4 \times 2$
$x_3 = 11$	$x_9 = 35$	$35 - 11 = 24$	4	$9 - 3 = 6$	$24 = 4 \times 6$
$x_5 = 19$	$x_{14} = 54$	$54 - 19 = 36$	4	$14 - 5 = 9$	$36 = 4 \times 9$
$x_8 = 31$	$x_{11} = 43$	$43 - 31 = 12$	4	$11 - 8 = 3$	$12 = 4 \times 3$

ONLINE CLASS STD - X 2020-21 : MATHEMATICS

Discussion – 5

What have we seen in worksheets 1.18 , 1.19 ?

Difference between any two terms of the sequence 5 , 7 , 9 , is the product of the common difference and the difference of position of the terms .

Difference between any two terms of the sequence 1, 4 , 7 , is the product of the common difference and the difference of position of the terms .

Difference between any two terms of the sequence 2 , 7 , 12 , is the product of the common difference and the difference of position of the terms .

Difference between any two terms of the sequence 3 , 7 , 11 , is the product of the common difference and the difference of position of the terms .

That is the difference between any two terms of an arithmetic sequence is the product of the common difference and the difference of position of the terms .

What will we get when the term difference is divided by the position difference of the terms in an arithmetic sequence ?

It is the common difference !!!

Let's discuss the arithmetic sequences in the worksheet 1.19 again.

X₁	X₂	X₃	X₄	X₅	X₆	X₇	X₈	X₉	X₁₀	X₁₁	X₁₂	X₁₃	X₁₄	X₁₅
5	7	9	11	13	15	17	19	21	23	25	27	29	31	33

Terms		Term difference	Common difference	Position difference	<u>Term difference</u> <u>Position difference</u>
x₁ = 5	x₅ = 13	13 – 5 = 8	2	5 – 1 = 4	$\frac{8}{4} = 2$
x₂ = 7	x₁₀ = 23	23 – 7 = 16	2	10 – 2 = 8	$\frac{16}{8} = 2$

$x_4 = 11$	$x_{11} = 25$	$25 - 11 = 14$	2	$11 - 4 = 7$	$\frac{14}{7} = 2$
$x_8 = 19$	$x_{13} = 29$	$29 - 19 = 10$	2	$13 - 8 = 5$	$\frac{10}{5} = 2$
$x_5 = 13$	$x_{15} = 33$	$33 - 13 = 20$	2	$15 - 5 = 10$	$\frac{20}{10} = 2$

x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8	x_9	x_{10}	x_{11}	x_{12}	x_{13}	x_{14}	x_{15}
1	4	7	10	13	16	19	22	25	28	31	34	37	40	43

Terms		Term difference	Common difference	Position difference	$\frac{\text{Term difference}}{\text{Position difference}}$
$x_1 = 1$	$x_5 = 13$	$13 - 1 = 12$	3	$5 - 1 = 4$	$\frac{12}{4} = 3$
$x_2 = 4$	$x_{10} = 28$	$28 - 4 = 24$	3	$10 - 2 = 8$	$\frac{24}{8} = 3$
$x_4 = 10$	$x_{11} = 31$	$31 - 10 = 21$	3	$11 - 4 = 7$	$\frac{21}{7} = 3$
$x_8 = 22$	$x_{13} = 37$	$37 - 22 = 15$	3	$13 - 8 = 5$	$\frac{15}{5} = 3$
$x_5 = 13$	$x_{15} = 43$	$43 - 13 = 30$	3	$15 - 5 = 10$	$\frac{30}{10} = 3$

x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8	x_9	x_{10}	x_{11}	x_{12}	x_{13}	x_{14}	x_{15}
2	7	12	17	22	27	32	37	42	47	52	57	62	67	72

Terms		Term difference	Common difference	Position difference	$\frac{\text{Term difference}}{\text{Position difference}}$
$x_1 = 2$	$x_5 = 22$	$22 - 2 = 20$	5	$5 - 1 = 4$	$\frac{20}{4} = 5$

$x_2 = 7$	$x_{10} = 47$	$47 - 7 = 40$	5	$10 - 2 = 8$	$\frac{40}{8} = 5$
$x_4 = 17$	$x_{11} = 52$	$52 - 17 = 35$	5	$11 - 4 = 7$	$\frac{35}{7} = 5$
$x_8 = 37$	$x_{13} = 62$	$62 - 37 = 25$	5	$13 - 8 = 5$	$\frac{25}{5} = 5$
$x_5 = 22$	$x_{15} = 72$	$72 - 22 = 50$	5	$15 - 5 = 10$	$\frac{50}{10} = 5$

x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8	x_9	x_{10}	x_{11}	x_{12}	x_{13}	x_{14}	x_{15}
3	7	11	15	19	23	27	31	35	39	43	47	51	55	59

Terms		Term difference	Common difference	Position difference	$\frac{\text{Term difference}}{\text{Position difference}}$
$x_1 = 3$	$x_5 = 19$	$19 - 3 = 16$	4	$5 - 1 = 4$	$\frac{16}{4} = 4$
$x_2 = 7$	$x_{10} = 39$	$39 - 7 = 32$	4	$10 - 2 = 8$	$\frac{32}{8} = 4$
$x_4 = 15$	$x_{11} = 43$	$43 - 15 = 28$	4	$11 - 4 = 7$	$\frac{28}{7} = 4$
$x_8 = 31$	$x_{13} = 51$	$51 - 31 = 20$	4	$13 - 8 = 5$	$\frac{20}{5} = 4$
$x_5 = 19$	$x_{15} = 59$	$59 - 19 = 40$	4	$15 - 5 = 10$	$\frac{40}{10} = 4$

Finding

If any two terms of an arithmetic sequence are given , Common difference = $\frac{\text{Term difference}}{\text{Position difference}}$

Conclusion

The difference between any two terms of an arithmetic sequence is the product of the common difference and the difference of the position of the terms .

ONLINE CLASS STD - X 2020-21 : MATHEMATICS

WORK SHEET - 1.20

We have already learned the n^{th} term of a sequence is known as its algebraic form .

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

a) What is its common difference ?

b) What is its 11th term ?

c) What is its algebraic form ?

Answer .

a) Common difference = $8 - 5 = 3$

b) $X_{11} = X_1 + 10 \times d = 5 + 10 \times 3 = 5 + 30 = 35$

c) Algebraic form = $X_n = X_1 + (n - 1) d = 5 + (n - 1) 3$

$$= 5 + 3n - 3 = 5 - 3 + 3n = 2 + 3n$$

1) . Consider the arithmetic sequence 5 , 7 , 9 ,

a) What is its common difference ?

b) What is its 8th term ?

c) What is its algebraic form ?

2) . Consider the arithmetic sequence 7 , 12 , 17 ,

a) What is its common difference ?

b) What is its 7th term ?

c) What is its algebraic form ?

3) . Consider the arithmetic sequence 8 , 11 , 14 ,

a) What is its common difference ?

b) What is its 21st term ?

c) What is its algebraic form ?

4) . Consider the arithmetic sequence 13 , 23 , 33 ,

a) What is its common difference ?

b) What is its 15th term ?

c) What is its algebraic form ?

ONLINE CLASS STD - X 2020-21 : MATHEMATICS

WORK SHEET - 1.20 ANSWER

1) . Consider the arithmetic sequence 5 , 7 , 9 ,

a) What is its common difference ?

b) What is its 8th term ?

c) What is its algebraic form ?

Answer .

a) Common difference = $7 - 5 = 2$

b) $X_8 = X_1 + 7 \times d = 5 + 7 \times 2 = 5 + 14 = 19$

c) Algebraic form = $X_n = X_1 + (n - 1) d = 5 + (n - 1) 2$

$$= 5 + 2n - 2 = 5 - 2 + 2n = 3 + 2n$$

2) . Consider the arithmetic sequence 7 , 12 , 17 ,

a) What is its common difference ?

b) What is its 7th term ?

c) What is its algebraic form ?

Answer .

a) Common difference = $12 - 7 = 5$

b) $X_7 = X_1 + 6 \times d = 7 + 6 \times 5 = 7 + 30 = 37$

c) Algebraic form = $X_n = X_1 + (n - 1) d = 7 + (n - 1) 5$

$$= 7 + 5n - 5 = 7 - 5 + 5n = 2 + 5n$$

3) . Consider the arithmetic sequence 8 , 11 , 14,

a) What is its common difference ?

b) What is its 21st term ?

c) What is its algebraic form ?

Answer .

a) Common difference = $11 - 8 = 3$

$$b) X_{21} = X_1 + 20 \times d = 8 + 20 \times 3 = 8 + 60 = 68$$

$$c) \text{Algebraic form} = X_n = X_1 + (n-1)d = 8 + (n-1)3$$

$$= 8 + 3n - 3 = 8 - 3 + 3n = 5 + 3n$$

4). Consider the arithmetic sequence 13, 23, 33,

a) What is its common difference ?

b) What is its 15th term ?

c) What is its algebraic form ?

Answer .

$$a) \text{Common difference} = 23 - 13 = 10$$

$$b) X_{15} = X_1 + 14 \times d = 13 + 14 \times 10 = 13 + 140 = 153$$

$$c) \text{Algebraic form} = X_n = X_1 + (n-1)d = 13 + (n-1)10$$

$$= 13 + 10n - 10 = 13 - 10 + 10n = 3 + 10n$$

ONLINE CLASS STD - X 2020-21 : MATHEMATICS

WORK SHEET - 1.21

We know that n^{th} term of a sequence is considered as its algebraic form .

First term of an arithmetic sequence is denoted either by x_1 or f .

Algebraic form of an arithmetic sequence = $x_1 + (n - 1) d$ or $f + (n - 1) d$.

1. Find the algebraic form of the following arithmetic sequences .

a) 6 , 8 , 10 ,

b) 7, 10 ,13 ,

c) 9 , 14 , 19 ,

d) 10 , 17 , 24 ,

e) 13 , 23 , 33 ,

2. Complete the table given below .

Sequence	First term f	Common difference d	Algebraic form	$f - d$
6 , 8 , 10 ,				
7, 10 ,13 ,				
9 , 14 , 19 ,				
10 , 17 , 24 ,				
13 , 23 , 33 ,				

3. Try to write five more rows of the above table .

ONLINE CLASS STD - X 2020-21 : MATHEMATICS

WORK SHEET - 1.21 ANSWER

1. Find the algebraic form of the following arithmetic sequences .

a) 6 , 8 , 10 ,

Answer.

$$\text{Common difference} = 8 - 6 = 2$$

$$\text{Algebraic form} = x_n = f + (n-1)d = 6 + (n-1)2$$

$$= 6 + 2n - 2 = 6 - 2 + 2n = 4 + 2n$$

b) 7, 10, 13,

Answer.

$$\text{Common difference} = 10 - 7 = 3$$

$$\text{Algebraic form} = x_n = f + (n-1)d = 7 + (n-1)3$$

$$= 7 + 3n - 3 = 7 - 3 + 3n = 4 + 3n$$

c) 9 , 14 , 19 ,

Answer.

$$\text{Common difference} = 14 - 9 = 5$$

$$\text{Algebraic form} = x_n = f + (n-1)d = 9 + (n-1)5$$

$$= 9 + 5n - 5 = 9 - 5 + 5n = 4 + 5n$$

d) 10 , 17 , 24 ,

Answer.

$$\text{Common difference} = 17 - 10 = 7$$

$$\text{Algebraic form} = x_n = f + (n-1)d = 10 + (n-1)7$$

$$= 10 + 7n - 7 = 10 - 7 + 7n = 3 + 7n$$

e) 13 , 23 , 33 ,

Answer.

$$\text{Common difference} = 23 - 13 = 10$$

$$\text{Algebraic form} = x_n = f + (n - 1) d = 13 + (n - 1) 10$$

$$= 13 + 10n - 10 = 13 - 10 + 10n = 3 + 10n$$

2. Complete the table given below .

Sequence	First term f	Common difference d	Algebraic form	f - d
6 , 8 , 10 ,	6	2	$4 + 2n$	$6 - 2 = 4$
7, 10 ,13 ,	7	3	$4 + 3n$	$7 - 3 = 4$
9 , 14 , 19 ,	9	5	$4 + 5n$	$9 - 5 = 4$
10 , 17 , 24 ,	10	7	$3 + 7n$	$10 - 7 = 3$
13 , 23 , 33 ,	13	10	$3 + 10n$	$13 - 10 = 3$

3. Try to write five more rows of the above table .

Sequence	First term f	Common difference d	Algebraic form	f - d
5 , 7 , 9 ,	5	2	$3 + 2n$	$5 - 2 = 3$
6, 11 ,16 ,	6	5	$1 + 5n$	$6 - 5 = 1$
10 , 16 , 22 ,	10	6	$4 + 6n$	$10 - 6 = 4$
12, 16 , 20 ,	12	4	$8 + 4n$	$12 - 4 = 8$
9 , 17 , 25 ,	9	8	$1 + 8n$	$9 - 8 = 1$

ONLINE CLASS STD - X 2020-21 : MATHEMATICS

WORK SHEET - 1.22

1. Complete the table given below according to the table in the previous worksheet (1.21).

Sequence	First term f	Common difference d	Algebraic form	f - d
5 , 8 , 11 , + 3 n	.....
4 , 6 , 8, + 2 n	.....
7 , 13 , 19 , + 6 n	.....
11 , 21 , 31 , + 10 n	.....
8 , 13 , 18 , + 5 n	.....
8 , 14 , 20 ,	2 + n	.....
15 , 26 , 37,	4 + n	.....
20 , 35 , 50 ,	5 + n	.....
12 , 21 , 30 ,	3 + n	.....
30 , 50 , 70 ,	10 + n	.....

ONLINE CLASS STD - X 2020-21 : MATHEMATICS

WORK SHEET - 1.22 ANSWER

1. Complete the table given below according to the table in the previous worksheet (1.21).

Sequence	First term f	Common difference d	Algebraic form	f - d
5 , 8 , 11 ,	<u>5</u>	<u>$8 - 5 = 3$</u>	<u>$2 + 3n$</u>	<u>$5 - 3 = 2$</u>
4 , 6 , 8,	<u>4</u>	<u>$6 - 4 = 2$</u>	<u>$2 + 2n$</u>	<u>$4 - 2 = 2$</u>
7 , 13 , 19 ,	<u>7</u>	<u>$13 - 7 = 6$</u>	<u>$1 + 6n$</u>	<u>$7 - 6 = 1$</u>
11 , 21 , 31 ,	<u>11</u>	<u>$21 - 11 = 10$</u>	<u>$1 + 10n$</u>	<u>$11 - 10 = 1$</u>
8 , 13 , 18 ,	<u>8</u>	<u>$13 - 8 = 5$</u>	<u>$3 + 5n$</u>	<u>$8 - 5 = 3$</u>
8 , 14 , 20 ,	<u>8</u>	<u>$14 - 8 = 6$</u>	<u>$2 + 6n$</u>	<u>$8 - 6 = 2$</u>
15 , 26 , 37,	<u>15</u>	<u>$26 - 15 = 11$</u>	<u>$4 + 11n$</u>	<u>$15 - 11 = 4$</u>
20 , 35 , 50 ,	<u>20</u>	<u>$35 - 20 = 15$</u>	<u>$5 + 15n$</u>	<u>$20 - 15 = 5$</u>
12 , 21 , 30 ,	<u>12</u>	<u>$21 - 12 = 9$</u>	<u>$3 + 9n$</u>	<u>$12 - 9 = 3$</u>
30 , 50 , 70 ,	<u>30</u>	<u>$50 - 30 = 20$</u>	<u>$10 + 20n$</u>	<u>$30 - 20 = 10$</u>