

# 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 .

GHS ANCHACHAVADI  
**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 .

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

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 .

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

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

3). 1, 11, 21, 31, 41, 51, ..... എന്നുസമാന്തരശ്രേണി 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 8<sup>th</sup> term ?
- d) How many times of the common difference is to be added to the first term to get its 10<sup>th</sup> term ?
- e) What is its 16<sup>th</sup> 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 9<sup>th</sup> term ?
- d) How many times of the common difference is to be added to the first term to get its 11<sup>th</sup> term ?
- e) What is its 21<sup>th</sup> 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 10<sup>th</sup> term ?
- d) How many times of the common difference is to be added to the first term to get its 21<sup>th</sup> term ?
- e) What is its 31<sup>th</sup> 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 11<sup>th</sup> term ?
- d) How many times of the common difference is to be added to the first term to get its 31<sup>th</sup> term ?
- e) What is its 17<sup>th</sup> 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 8<sup>th</sup> term ? 14

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

e) What is its 16<sup>th</sup> 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 9<sup>th</sup> term ? 24

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

e) What is its 21<sup>th</sup> 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 10<sup>th</sup> term ? 45

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

e) What is its 31<sup>th</sup> 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 11<sup>th</sup> term ? 100

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

e) What is its 17<sup>th</sup> 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 =  $8 - 6 = 2$

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

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



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

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

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

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

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

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

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

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

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

# ONLINE CLASS STD - X 2020-21 : MATHEMATICS

## WORK SHEET - 1.18

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

- What is the common difference of this sequence ?
- What is its 8<sup>th</sup> term ?
- What is the difference between 13<sup>th</sup> and 8<sup>th</sup> terms of this sequence ?
- How many times of the common difference is the difference between 13<sup>th</sup> and 8<sup>th</sup> terms ?

Answer .

- Common difference =  $10 - 6 = 4$
- $x_8 = x_1 + 7d = 6 + 7 \times 4 = 6 + 28 = 34$
- $x_{13} = x_1 + 12d = 6 + 12 \times 4 = 6 + 48 = 54$   
 $x_{13} - x_8 = 54 - 34 = 20$
- $x_{13} - x_8 = 20 = 5 \times 4$

Term difference is 5 times its common difference .

---

Find the answers of the following questions

- Consider the arithmetic sequence 5 , 7 , 9, .....

  - What is the common difference of this sequence ?
  - What is its 10<sup>th</sup> term ?
  - What is the difference between 16<sup>th</sup> and 10<sup>th</sup> terms of this sequence ?
  - How many times of the common difference is the difference between 16<sup>th</sup> and 10<sup>th</sup> terms ?

- Consider the arithmetic sequence 1 , 11 , 21 , .....

  - What is the common difference of this sequence ?
  - What is its 12<sup>th</sup> term ?
  - What is the difference between 21<sup>st</sup> and 12<sup>th</sup> terms of this sequence ?
  - How many times of the common difference is the difference between 21<sup>st</sup> and 12<sup>th</sup> terms ?

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

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

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

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

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

- a) What is the common difference of this sequence ?
- b) What is its 21<sup>st</sup> term ?
- c) What is the difference between 31<sup>st</sup> and 21<sup>st</sup> terms of this sequence ?
- d) How many times of the common difference is the difference between 31<sup>st</sup> and 21<sup>st</sup> 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 10<sup>th</sup> term ?

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

d) How many times of the common difference is the difference between 16<sup>th</sup> and 10<sup>th</sup> 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 12<sup>th</sup> term ?

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

d) How many times of the common difference is the difference between 21<sup>st</sup> and 12<sup>th</sup> 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 9<sup>th</sup> term ?

c) What is the difference between 17<sup>th</sup> and 9<sup>th</sup> terms of this sequence ?

d) How many times of the common difference is the difference between 17<sup>th</sup> and 9<sup>th</sup> terms ?

Answer.

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

b)  $X_9 = X_1 + 8 d = 3 + 8 \times 5 = 3 + 40 = 43$

c)  $X_{17} = X_1 + 16 d = 3 + 16 \times 5 = 3 + 80 = 83$

$$X_{17} - X_9 = 83 - 43 = 40$$

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 8<sup>th</sup> term ?

c) What is the difference between 12<sup>th</sup> and 8<sup>th</sup> terms of this sequence ?

d) How many times of the common difference is the difference between 12<sup>th</sup> and 8<sup>th</sup> terms ?

Answer.

a) Common difference =  $5 - 2 = 3$

b)  $X_8 = X_1 + 7 d = 2 + 7 \times 3 = 2 + 21 = 23$

c)  $X_{12} = X_1 + 11 d = 2 + 11 \times 3 = 2 + 33 = 35$

$$X_{12} - X_8 = 35 - 23 = 12$$

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 21<sup>st</sup> term ?

c) What is the difference between 31<sup>st</sup> and 21<sup>st</sup> terms of this sequence ?

d) How many times of the common difference is the difference between 31<sup>st</sup> and 21<sup>st</sup> 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 .

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

Terms		Term difference	Common difference	Difference between the position of terms	
$x_1 = 2$	$x_5 = 22$	$22 - 2 = 20$	5	$5 - 1 = 4$	$20 = 5 \times 4$
$x_2 = 7$	$x_{10} = 47$	$47 - 7 = 40$	5	$10 - 2 = 8$	$40 = 5 \times 8$
$x_4 = 17$	$x_{11} = 52$	$52 - 17 = 35$	5	$11 - 4 = 7$	$35 = 5 \times 7$
$x_8 = 37$	$x_{13} = 62$	$62 - 37 = 25$	5	$13 - 8 = 5$	$25 = 5 \times 5$
$x_5 = 22$	$x_{15} = 72$	$72 - 22 = 50$	5	$15 - 5 = 10$	$50 = 5 \times 10$
$x_6 = 27$	$x_9 = 42$	$42 - 27 = 15$	5	$9 - 6 = 3$	$15 = 5 \times 3$
$x_{10} = 47$	$x_{12} = 57$	$57 - 47 = 10$	5	$12 - 10 = 2$	$10 = 5 \times 2$
$x_3 = 12$	$x_9 = 42$	$42 - 12 = 30$	5	$9 - 3 = 6$	$30 = 5 \times 6$
$x_5 = 22$	$x_{14} = 67$	$67 - 22 = 45$	5	$14 - 5 = 9$	$45 = 5 \times 9$
$x_8 = 37$	$x_{11} = 52$	$52 - 37 = 15$	5	$11 - 8 = 3$	$15 = 5 \times 3$

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.*

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

Terms		Term difference	Common difference	Position difference	$\frac{\text{Term difference}}{\text{Position difference}}$
$x_1 = 5$	$x_5 = 13$	$13 - 5 = 8$	2	$5 - 1 = 4$	$\frac{8}{4} = 2$
$x_2 = 7$	$x_{10} = 23$	$23 - 7 = 16$	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  $n^{\text{th}}$  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 11<sup>th</sup> 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 8<sup>th</sup> 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 7<sup>th</sup> 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 21<sup>st</sup> 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 15<sup>th</sup> 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 8<sup>th</sup> 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 7<sup>th</sup> 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 21<sup>st</sup> 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 15<sup>th</sup> 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  $n^{\text{th}}$  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.

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

$$\begin{aligned}\text{Algebraic form} = X_n &= f + (n-1)d = 6 + (n-1)2 \\ &= 6 + 2n - 2 = 6 - 2 + 2n = 4 + 2n\end{aligned}$$

b) 7, 10, 13, .....

Answer.

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

$$\begin{aligned}\text{Algebraic form} = X_n &= f + (n-1)d = 7 + (n-1)3 \\ &= 7 + 3n - 3 = 7 - 3 + 3n = 4 + 3n\end{aligned}$$

c) 9 , 14 , 19 , .....

Answer.

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

$$\begin{aligned}\text{Algebraic form} = X_n &= f + (n-1)d = 9 + (n-1)5 \\ &= 9 + 5n - 5 = 9 - 5 + 5n = 4 + 5n\end{aligned}$$

d) 10 , 17 , 24 , .....

Answer.

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

$$\begin{aligned}\text{Algebraic form} = X_n &= f + (n-1)d = 10 + (n-1)7 \\ &= 10 + 7n - 7 = 10 - 7 + 7n = 3 + 7n\end{aligned}$$

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

<b>6, 11, 16, .....</b>	<b>6</b>	<b>5</b>	<b><math>1 + 5n</math></b>	<b><math>6 - 5 = 1</math></b>
<b>10, 16, 22, .....</b>	<b>10</b>	<b>6</b>	<b><math>4 + 6n</math></b>	<b><math>10 - 6 = 4</math></b>
<b>12, 16, 20, .....</b>	<b>12</b>	<b>4</b>	<b><math>8 + 4n</math></b>	<b><math>12 - 4 = 8</math></b>
<b>9, 17, 25, .....</b>	<b>9</b>	<b>8</b>	<b><math>1 + 8n</math></b>	<b><math>9 - 8 = 1</math></b>

# 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 ).

<i>Sequence</i>	<i>First term f</i>	<i>Common difference d</i>	<i>Algebraic form</i>	<i>f - d</i>
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 ).

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

# ONLINE CLASS STD - X 2020-21 : MATHEMATICS

## Discussion- 6

We have already learned that the algebraic form of a sequence is the relationship between each of its term and its position .

Also we know that usually  $n^{\text{th}}$  term of a sequence is taken as its algebraic form .

What have seen in worksheets 1.20 , 1.21 and 1.22 ?

We have written the algebraic form of given arithmetic sequences , haven't we ?

Let's check whether the algebraic form of the arithmetic sequences have any common feature.

Let's start from worksheet 1.12 .

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

Is there any relation among the columns of the above table to the column of algebraic form of the arithmetic sequences ?

What is the algebraic form of the sequence 6 , 8 , 10 , ..... ? It is  $4 + 2n$  .

What is the common difference of the sequence ? It is 2 .

What is the difference between the first term and common difference ? It is 4 .

Check other sequences also .

Now let's check worksheet 1.22

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

Is there any relation among the columns of the above table to the column of algebraic form of the arithmetic sequences ?

What is the algebraic form of the sequence 5, 8, 11, ....., ? It is  $2 + 3n$  .

What is the common difference of the sequence ? It is 3 .

What is the difference between the first term and common difference ? It is 2 .

Check other sequences also .

## Findings.

<i>Sequence</i>	<i>Algebraic form</i>	<i>Common difference d</i>	<i>Difference between first term and common difference  f - d</i>
6 , 8 , 10 , .....	$4 + 2n$	2	$6 - 2 = 4$
7, 10 ,13 , .....	$4 + 3n$	3	$7 - 3 = 4$
9 , 14 , 19 , .....	$4 + 5n$	5	$9 - 5 = 4$
10 , 17 , 24 , .....	$3 + 7n$	7	$10 - 7 = 3$
13 , 23 , 33 , .....	$3 + 10n$	10	$13 - 10 = 3$
5 , 8 , 11 , .....	$2 + 3n$	3	$5 - 3 = 2$
4 , 6 , 8 , .....	$2 + 2n$	2	$4 - 2 = 2$
7 , 13 , 19 , .....	$1 + 6n$	6	$7 - 6 = 1$
11 , 21 , 31 , .....	$1 + 10n$	10	$11 - 10 = 1$
8 , 13 , 18 , .....	$3 + 5n$	5	$8 - 5 = 3$
8 , 14 , 20 , .....	$2 + 6n$	6	$8 - 6 = 2$
15 , 26 ,37 , .....	$4 + 11n$	11	$15 - 11 = 4$

20 , 35 , 50 , .....	$5 + 15 n$	15	$20 - 15 = 5$
12 , 21 , 30 , .....	$3 + 9 n$	9	$12 - 9 = 3$
30 , 50 , 70 , .....	$10 + 20 n$	20	$30 - 20 = 10$

- The coefficient of  $n$  in the algebraic form of any arithmetic sequence is its common difference .
- Algebraic form = Difference between first term and common difference + common difference  $\times n$

Conclusion .

The algebraic form of an arithmetic sequence is  $f - d + d n$

NB:

The above formula can be expressed as in the form  $d n + f - d$

Mathematical proof:

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

Algebraic form =  $n^{\text{th}}$  term

$$= f + (n - 1) d$$

$$= f + n d - d = f - d + n d$$

$$x_n = d n + f - d$$

# ONLINE CLASS STD - X 2020-21 : MATHEMATICS

## WORK SHEET - 1.22 NOTE

Q. What is the algebraic form of the arithmetic sequence 5, 8, 11, ..... ?

Answer .

$$\text{Algebraic form} = d n + f - d = 3 n + 5 - 3 = 3 n + 2$$

$$d = 8 - 5 = 3$$

We can write the algebraic form of an arithmetic sequence without using the formula .

a) Consider the arithmetic sequence 5, 8, 11, ..... .

$$\text{Common difference} = 8 - 5 = 3$$

Let's write down the terms of this sequence .

$$5 = 3 + 2 = 3 \times 1 + 2$$

$$8 = 6 + 2 = 3 \times 2 + 2$$

$$11 = 9 + 2 = 3 \times 3 + 2$$

$$14 = 12 + 2 = 3 \times 4 + 2$$

$$17 = 15 + 2 = 3 \times 5 + 2$$

*The terms of this sequence are obtained by adding 2 to the multiples of 3*

$$n^{\text{th}} \text{ term of this sequence} = 3 \times n + 2 \implies \text{Algebraic form} = 3 n + 2$$

b) Consider the arithmetic sequence 6, 11, 16, ..... .

$$\text{Common difference} = 11 - 6 = 5$$

Let's write down the terms of this sequence .

$$6 = 5 + 1 = 5 \times 1 + 1$$

$$11 = 10 + 1 = 5 \times 2 + 1$$

$$16 = 15 + 1 = 5 \times 3 + 1$$

$$21 = 20 + 1 = 5 \times 4 + 1$$

$$26 = 25 + 1 = 5 \times 5 + 1$$

*The terms of this sequence are obtained by adding 1 to the multiples of 5 .*

$$n^{\text{th}} \text{ term of this sequence} = 5 \times n + 1 \implies \text{Algebraic form} = 5 n + 1$$

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

$$\text{Common difference} = 5 - 1 = 4$$

Let's write down the terms of this sequence .  $\Rightarrow$

$$1 = 4 - 3 = 4 \times 1 - 3$$

$$5 = 8 - 3 = 4 \times 2 - 3$$

$$9 = 12 - 3 = 4 \times 3 - 3$$

$$13 = 16 - 3 = 4 \times 4 - 3$$

$$17 = 20 - 3 = 4 \times 5 - 3$$

The terms of this sequence are obtained by subtracting 3 from the multiples of 4 .

$$n^{\text{th}} \text{ term of this sequence} = 4 \times n - 3 \Rightarrow \text{Algebraic form} = 4n - 3$$

d) Consider the arithmetic sequence 6 , 16 , 26 , ..... .

$$\text{Common difference} = 16 - 6 = 10$$

Let's write down the terms of this sequence .

$$6 = 10 - 4 = 10 \times 1 - 4$$

$$16 = 20 - 4 = 10 \times 2 - 4$$

$$26 = 30 - 4 = 10 \times 3 - 4$$

$$36 = 40 - 4 = 10 \times 4 - 4$$

$$46 = 50 - 4 = 10 \times 5 - 4$$

The terms of this sequence are obtained by subtracting 4 from the multiples of 10

$$n^{\text{th}} \text{ term of this sequence} = 10 \times n - 4 \Rightarrow \text{Algebraic form} = 10n - 4$$

e) Consider the arithmetic sequence 98 , 96 , 94 ..... .

$$\text{Common difference} = 96 - 98 = -2$$

Let's write down the terms of this sequence .

$$98 = 100 - 2 = 100 - 2 \times 1$$

$$96 = 100 - 4 = 100 - 2 \times 2$$

$$94 = 100 - 6 = 100 - 2 \times 3$$

$$92 = 100 - 8 = 100 - 2 \times 4$$

$$90 = 100 - 10 = 100 - 2 \times 5$$

*The terms of this sequence are obtained by subtracting the multiples of 2 from 100 .*

$$n^{\text{th}} \text{ term of this sequence} = 100 - 2 \times n \implies \text{Algebraic form} = 100 - 2n$$

f) Consider the arithmetic sequence 46 , 42 , 38 .....

$$\text{Common difference} = 42 - 46 = -4$$

Let's write down the terms of this sequence .

$$46 = 50 - 4 = 50 - 4 \times 1$$

$$42 = 50 - 8 = 50 - 4 \times 2$$

$$38 = 50 - 12 = 50 - 4 \times 3$$

$$34 = 50 - 16 = 50 - 4 \times 4$$

$$30 = 50 - 20 = 50 - 4 \times 5$$

*The terms of this sequence are obtained by subtracting the multiples of 4 from 50*

$$n^{\text{th}} \text{ term of this sequence} = 50 - 4 \times n \implies \text{Algebraic form} = 50 - 4n$$

Let's try to complete the table given below.

<i>Arithmetic sequence</i>	<i>Algebraic form</i>
4 , 7 , 10 , .....	
10 , 19 , 28, .....	
9 , 17 , 25 , .....	
5 , 11 , 17 , .....	
4 , 11 , 18 , .....	
97 , 94 , 91 .....	
34 , 28 , 22 , .....	



# ONLINE CLASS STD - X 2020-21 : MATHEMATICS

## WORK SHEET - 1.23

1) Consider the arithmetic sequence 4, 7, 10 .....

a) What is its common difference ?

b) What is the difference between its first term and common difference ?

c) What is its algebraic form ?

d) Find the position of 151 in this sequence ?

2) Consider the arithmetic sequence 8, 13, 18 .....

a) What is its common difference ?

b) What is the difference between its first term and common difference ?

c) What is its algebraic form ?

d) Find the position of 103 in this sequence ?

3) 5<sup>th</sup> term of an arithmetic sequence is 23 and its 10<sup>th</sup> term is 43 .

a) What is its common difference ?

b) What is its first term ?

c) What is algebraic form ?

d) What is the remainder when each term of this sequence is divided by its common difference?

4) Consider the arithmetic sequence 10, 14, 18 .....

a) What is its common difference ?

b) What is its 10<sup>th</sup> term ?

c) What is the difference between its 10<sup>th</sup> term and first term ?

d) Can the difference between any two terms of this sequence be 80 ? Give reason ?

5) Consider the arithmetic sequence 7, 13, 19 .....

a) What is its common difference ?

b) What is its 12<sup>th</sup> term ?

c) What is the difference between its 12<sup>th</sup> term and first term ?

d) Is 71 a term of this sequence ? Give reason ?

# ONLINE CLASS STD - X 2020-21 : MATHEMATICS

## WORK SHEET - 1.23 ANSWER

1) Consider the arithmetic sequence 4, 7, 10 .....

- What is its common difference ?
- What is the difference between its first term and common difference ?
- What is its algebraic form ?
- Find the position of 151 in this sequence ?

Answer.

a) Common difference =  $7 - 4 = 3$

b)  $f - d = 4 - 3 = 1$

c) Algebraic form =  $d n + f - d = 3 n + 1$

d) Take  $X_n = 151$

$$3 n + 1 = 151 \implies 3 n = 151 - 1 \implies 3 n = 150 \implies n = \frac{150}{3} = 50$$

50<sup>th</sup> term of this sequence is 151 .

2) Consider the arithmetic sequence 8, 13, 18 .....

- What is its common difference ?
- What is the difference between its first term and common difference ?
- What is its algebraic form ?
- Find the position of 103 in this sequence ?

Answer.

a) Common difference =  $13 - 8 = 5$

b)  $f - d = 8 - 5 = 3$

c) Algebraic form =  $d n + f - d = 5 n + 3$

d) Take  $X_n = 103$

$$5 n + 3 = 103 \implies 5 n = 103 - 3 \implies 5 n = 100 \implies n = \frac{100}{5} = 20$$

20<sup>th</sup> term of this sequence is 103

3) 5<sup>th</sup> term of an arithmetic sequence is 23 and its 10<sup>th</sup> term is 43 .

a) What is its common difference ?

b) What is its first term ?

c) What is algebraic form ?

d) What is the remainder when each term of this sequence is divided by its common difference?

Answer.

$$a) \text{ Common difference} = \frac{x_{10} - x_5}{10 - 5} = \frac{43 - 23}{10 - 5} = \frac{20}{5} = 4$$

$$b) f = x_5 - 4d = 23 - 4 \times 4 = 23 - 16 = 7 .$$

$$c) \text{ Algebraic form} = dn + f - d = 4n + 7 - 4 = 4n + 3 .$$

d) 3

4) Consider the arithmetic sequence 10 , 14 , 18 .....

a) What is its common difference ?

b) What is its 10<sup>th</sup> term ?

c) What is the difference between its 10<sup>th</sup> term and first term ?

d) Can the difference between any two terms of this sequence be 80 ? Give reason ?

Answer.

$$a) \text{ Common difference} = 14 - 10 = 4$$

$$b) x_{10} = f + 9d = 10 + 9 \times 4 = 10 + 36 = 46$$

$$c) x_{10} - f = 46 - 10 = 36$$

$$d) \text{ Term difference} = 80 \quad ( = 4 \times 20 )$$

Since the term difference is exactly divisible by the common difference , the difference of two terms of this sequence can be 80 .

5) Consider the arithmetic sequence 7 , 13 , 19 .....

a) What is its common difference ?

b) What is its 12<sup>th</sup> term ?

c) *What is the difference between its 12<sup>th</sup> term and first term ?*

d) *Is 71 a term of this sequence ? Give reason ?*

Answer.

a) *Common difference* =  $13 - 7 = 6$

b)  $x_{12} = f + 11d = 7 + 11 \times 6 = 7 + 66 = 73$

c)  $x_{12} - f = 73 - 7 = 66$

d) *Term difference* =  $71 - 7 = 64$

*Since the term difference is not exactly divisible by the common difference , 71 is not a term of this sequence . ( 64 is not exactly divisible by 6 )*

# ONLINE CLASS STD - X 2020-21 : MATHEMATICS

## WORK SHEET - 1.23 NOTE

Q. Consider the arithmetic sequence 5 , 9 , 13 .....

- What is its common difference ?
- What is the difference between its first term and common difference ?
- What is its algebraic form ?
- Find the position of 121 in this sequence ?

Answer .

a)  $d = 9 - 5 = 4$

b)  $f - d = 5 - 4 = 1$

c)  $x_n = d n + f - d = 4 n + 1$

d) Take  $x_n = 121$

$$4 n + 1 = 121 \implies 4 n = 121 - 1 \implies 4 n = 120 \implies n = \frac{120}{4} = 30$$

30<sup>th</sup> term of this sequence is 121.

Q. Consider the arithmetic sequence 7 , 10 , 13 .....

- What is its common difference ?
- What is its 10<sup>th</sup> term ?
- What is the difference between its 10<sup>th</sup> and first terms ?
- Can the difference between its 10<sup>th</sup> and first terms be exactly divided by the common difference?
- Is 52 a term of this sequence ?

Answer .

a)  $d = 10 - 7 = 3$

b)  $x_{10} = f + 9 d = 7 + 9 \times 3 = 7 + 27 = 34$

c) Term difference =  $34 - 7 = 27$

d) The term difference can be exactly divided by the common difference . (  $27 = 3 \times 9$  )

e) Term difference =  $52 - 7 = 45$  (  $45 = 3 \times 15$  ) .Since the term difference can be exactly

divided by the common difference , 52 is a term of this sequence .

Q. Consider the arithmetic sequence 8 , 14 , 20 .....

- a) What is its common difference ?
- b) What is its 12<sup>th</sup> term ?
- c) What is the difference between its 12<sup>th</sup> and first terms ?
- d) Can the difference between its 12<sup>th</sup> and first terms be exactly divided by the common difference ?
- e) Can the difference of any two terms of this sequence be 100 ? Why ?

Answer .

- a)  $d = 14 - 8 = 6$
- b)  $x_{12} = f + 11d = 8 + 11 \times 6 = 8 + 66 = 74$
- c) Term difference =  $74 - 8 = 66$
- d) The term difference can be exactly divided by the common difference . (  $66 = 6 \times 11$  )
- e) 100 is not exactly divisible by 6 . Since the term difference is not exactly divisible by the common difference , the difference of any two terms of this sequence can not be 100 .

NB :

**Term difference = Common difference  $\times$  Position difference**

The difference of any two terms of an arithmetic sequence can be exactly divided by its common difference .

Using this result we can check whether a number is a term of a given arithmetic sequence or not

Step 1 : First find the difference between that number and any term of the sequence .

Step 2: Check whether this difference can be exactly divided by the common difference .

If the term difference can be exactly divided by the common difference , the given number will be a term of the sequence , otherwise not .