RD SHARMA

Solutions

Class 10 Maths

Chapter 9

Ex 9.2

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1. For the following arithmetic progressions write the first term a and the common difference d:

(i) $-5,-1,3,7,.....$

(ii) $\frac{1}{5},\frac{3}{5},\frac{5}{5},\frac{7}{5},.....$

(iii) 0.3, 0.55, 0.80, 1.05,.....

(iv) $-1.1,-3.1,-5.1,-7.1,.....$

Sol:

We know that if a is the first term and d is the common difference, the arithmetic progression is $a,a+d,a+2d+a+3d,.....$

(i) $-5,-1,3,7,.....$

Given arithmetic series is

$-5,-1,3,7.....$

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This is in the form of $a, a+d, a+2d+a+3d, \ldots\ldots\ldots\ldots$ by comparing these two

$a=-5, a+d=1, a+2d=3, a+3d=7, \ldots\ldots\ldots$

First term $(a)=-5$

By subtracting second and first term, we get

$(a+d)-(a)=d$

$-1-(-5)=d$

$4=d$

Common difference $(d)=4.$

(ii) $\frac{1}{5}, \frac{3}{5}, \frac{5}{5}, \frac{7}{5}, \ldots\ldots\ldots\ldots$

Given arithmetic series is,

$\frac{1}{5}, \frac{3}{5}, \frac{5}{5}, \frac{7}{5}, \ldots\ldots\ldots\ldots$

This is in the form of $\frac{1}{5}, \frac{2}{5}, \frac{5}{5}, \frac{7}{5}, \ldots\ldots\ldots\ldots$

$a, a+d, a+2d, a+3d, \ldots\ldots$

By comparing this two, we get

$a=\frac{1}{5}, a+d=\frac{3}{5}, a+2d=\frac{5}{5}, a+3d=\frac{7}{5}$

$\boxed{\textit{First term } \cos=\frac{1}{5}}$

By subtracting first term from second term, we get

$d=(a+d)-(a)$

$d=\frac{3}{5}-\frac{1}{5}$

$d=\frac{2}{5}$

$\boxed{\textit{common difference}(d)=\frac{2}{5}}$

(iii) 0.3, 0.55, 0.80, 1.05, ...

Given arithmetic series,

0.3, 0.55, 0.80, 1.05, ...

General arithmetic series

$a, a+d, a+2d, a+3d, \ldots\ldots$

By comparing,

$a=0.3, a+d=0.55, a+2d=0.80, a+3d=1.05$

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First term $(a) = 0.3$.

By subtracting first term from second term. We get

$d = (a+d) - (a)$

$d = 0.55 - 0.3$

$d = 0.25$

Common difference (d) $= 0.25$

(iv) $-1.1, -3.1, -5.1, -7.1, ...$

General series is

$a, a+d, a+2d, a+3d, ...$

By comparing this two, we get

$a = -1.1, a+d = -3.1, a+2d = -5.1, a+3d = -71$

First term $(a) = -1.1$

Common difference $(d) = (a+d) - (a)$

$= -3.1 - (-1.1)$

Common difference (d) $= -2$

2. Write the arithmetic progressions write first term a and common difference d are as follows:

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

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

(iii) $a = -1.5, d = -0.5$

Sol:

We know that, if first term $(a) = a$ and common difference $= d$, then the arithmetic series is, $a, a+d, a+2d, a+3d, ...$

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

Given first term $(a) = 4$

Common difference $(d) = -3$

Then arithmetic progression is,

$a, a+d, a+2d, a+3d, ...$

$\Rightarrow 4, 4-3, a+2(-3), 4+3(-3), ...$

$\Rightarrow 4, 1, -2, -5, -8, ...$

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

Given,

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First term $(a) = -1$

Common difference $(d) = \frac{1}{2}$

Then arithmetic progression is,

$\Rightarrow a, a+d, a+2d, a+3d, ...$

$\Rightarrow -1, -1+\frac{1}{2}, -1+2\frac{1}{2}, -1+3\frac{1}{2}, ...$

$\Rightarrow -1, \frac{-1}{2}, 0, \frac{1}{2}, ...$

(iii) $a = -1.5, d = -0.5$

Given

First term $(a) = -1.5$

Common difference $(d) = -0.5$

Then arithmetic progression is

$\Rightarrow a, a+d, a+2d, a+3d, ...$

$\Rightarrow -1.5, -1.5-0.5, -1.5+2(-0.5), -1.5+3(-0.5)$

$\Rightarrow -1.5, -2, -2.5, -3, ...$

Then required progression is

$-1.5, -2, -2.5, -3, ...$

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3. In which of the following situations, the sequence of numbers formed will form an A.P.?

(i) The cost of digging a well for the first metre is Rs 150 and rises by Rs 20 for each succeeding metre.

(ii) The amount of air present in the cylinder when a vacuum pump removes each time $\frac{1}{4}$ of their remaining in the cylinder.

Sol:

(i) Given,

Cost of digging a well for the first meter $(c_1) = Rs.150.$

Cost rises by $Rs.20$ for each succeeding meter

Then,

Cost of digging for the second meter $(c_2) = Rs.150 + Rs\ 20$

$= Rs\ 170$

Cost of digging for the third meter $(c_3) = Rs.170 + Rs\ 20$

$= Rs\ 210$

Thus, costs of digging a well for different lengths are

$150, 170, 190, 210, ...$

Clearly, this series is in $A \cdot p$.

With first term $(a)=150$, common difference $(d)=20$

(ii) Given

Let the initial volume of air in a cylinder be V liters each time $\frac{3^{th}}{4}$ of air in a remaining i.e.,

$1-\frac{1}{4}$

First time, the air in cylinder is $\frac{3}{4}V$.

Second time, the air in cylinder is $\frac{3}{4}V$.

Third time, the air in cylinder is $\left(\frac{3}{4}\right)^2 V$.

Therefore, series is $V,\ \frac{3}{4}V,\left(\frac{3}{4}\right)^2 V,\left(\frac{3}{4}\right)^3 V,\ldots\ldots$

4. Show that the sequence defined by $a_n = 5n - 7$ is an A.P., find its common difference.

Sol:

Given sequence is

$a_n = 5n-7$

n^{th} term of given sequence $(a_n)=5n-7$

$(n+1)^{th}$ term of given sequence $(a_n+1)-a_n$

$=(5n-2)-(5n-7)$

$=5$

$\therefore d=5$

5. Show that the sequence defined by $a_n = 3n^2 - 5$ is not an A.P.

Sol:

Given sequence is,

$a_n = 3n^2-5.$

n^{th} term of given sequence $(a_n)=3n^2-5$

$(n+1)^{th}$ term of given sequence $(a_n+1)=3(n+1)^2-5$

$=3\left(n^2+1^2+2n.1\right)-5$

$=3n^2+6n-2$

$\therefore$ The common difference $(d)=a_n+1-an$

$d=\left(3n^2+6n-2\right)-\left(3n^2-5\right)$

$=3a^2+6n-2-3n^2+5$

$=6n+3$

Common difference (d) depends on 'n' value

$\therefore$ given sequence is not in $A.p$

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