QB365

Important Questions - Sequences and Series

11th Standard CBSE

Mathematics

Reg.No. :

Time : 01:00:00 Hrs

Total Marks : 50

Section-A

1) FInd the Sum of all natural numbers between 250 and 1000 which are exactly divisible by 3. **2**

2) Find the sum of all natural numbers lying betrween 100 and 1000,which arte multiples of 5. **2**

3) In an AP, the pth term is q and the (p+q)th term is 0.Then , find the qth term. **2**

4) Find the term of the following GP. (ii) 4th term from the end of the GP. **2**

5) Insert three numbers between $\frac{1}{3}$ and 432, so that the resulting sequence is a GP. **2**

6) Show that the ratio of the sum of the first n terms of a GP to the sum of terms form(n+1)th to (2n)th term is $\frac{1}{r^n}$. **2**

Section-B

7) The sum of the some terms of a Gp is 315 whose first term and the common ratio are 5 and 2, respectively.Find the last term and the number of terms. **3**

8) Find the 20th term a_{20} of the sequence, whose nth term is **3**

$a_n = \frac{n(n-2)}{n+3}$

9) Let the sequence a_n is defined as follows $a_1=2$, $a_n= a_{n-1}+3$ for $n \geq 2$. **3**

Find first five terms and write corresponding series.

10) Write the first five terms of each of the following sequence whose nth terms are **3**

(ii) $a_n = (-1)^{n+1} 3^{n+2}$

11) Find the indicated terms in each of the sequence, where nth terms are given. **3**

$a_n = \frac{n^2}{2^n}$, a_7

12) Write the first five terms of each of the sequence and obtain the corresponding series. **3**

(i) $a_1 = 3$, $a_n = 3a_{n-1}+2$, $\forall$ n >1

Section-C

13) Between 1 and 31, m AM's have been inserted in such a way that the ratio of the 7th and (m-1)th means is 5:9,Find the value of m. **4**

14) Three numbers are in AP. If their sum is 27 and the product 648, find the numbers. **4**

15) If a,b,c are in AP and b,c,d are in GP and $\frac{1}{c}, \frac{1}{d}, \frac{1}{e}$ are in AP, then prove that a,c,e are in GP. **4**

16) If $x = a + \frac{a}{r} + \frac{a}{r^2} + \ldots \infty$,$y = b - \frac{b}{r} + \frac{b}{r^2} + \ldots \infty$ and $z = c + \frac{c}{r} + \frac{c}{r^2} + \ldots \infty$, then prove that $\frac{xy}{z} = \frac{ab}{c}$. **4**

17) Rajeev buys a scooter for Rs.22000.He pays Rs 4000 cash and agrees to pay the balance in annual instalment of Rs 1000 plus 10% interest on the unpaid amount. How much will scooter cost him? **4**

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Section-A

1) 156375 **2**

2) 98450 **2**

3) $T_q = 9$ **2**

4) 6 **2**

5) (2, 12, 72) or (-2, 12, -72) **2**

6) Let the GP is $\underbrace{ar, ar^2, ar^3, ar^4, ar^5, \ldots, ar^{n-1}}_{n \text{ terms}},$ **2**

$$\underbrace{ar^n, ar^{n+1}, \ldots, ar^{2n-1}}_{n \text{ terms}}$$

Now, required ratio= $\dfrac{\frac{a(r^n-1)}{r-1}}{\frac{ar^n(r^n-1)}{r-1}}$

Section-B

7) Given,a=5,r=2 and S_n=315 **3**

Therefore,315 $= \dfrac{5(2^n-1)}{2-1} \Rightarrow n = 6$

Ans.T_6=160

8) We have, $a_n = \dfrac{n(n-2)}{n+3}$ **3**

On putting n = 20, we get $a_{20} = \dfrac{20(20-2)}{20+3}$

$\Rightarrow \quad a_{20} = \dfrac{20 \times 18}{23} = \dfrac{360}{23}$

9) We have a_1=2 and a_n= a_{n-1}+3 **3**

On putting n=2, we get $a_2 = a_1 + 3 = 2 + 3 = 5$

On putting n=3, we get $a_3 = a_2 + 3 = 5 + 3 = 8$

On putting n=4, we get $a_4 = a_3 + 3 = 8 + 3 = 11$

On putting n=5, we get $a_5 = a_4 + 3 = 11 + 3 = 14$

Thus, first five terms of given sequence are 2, 5, 8, 11 and 14. Also, the corresponding series is

2 + 5 + 8 + 11 + 14 +........

10) 27, -81, 243, -729, 2187 **3**

11) $a_7 = \dfrac{49}{128}$ **3**

12) We have, $a_1 = 3$, $a_n = 3a_{n-1}+2$ for all n > 1. **3**

On putting n = 2, we get $a_2 = 3a_{2-1} + 2 = 11$

On putting n = 3, we get $a_3 = 3a_{3-1} + 2 = 35$

On putting n = 4, we get $a_4 = 3a_{4-1} + 2 = 107$

On putting n = 5, we get $a_5 = 3a_{5-1} + 2 = 323$

$\therefore$ Sequence is 3, 11, 35, 107, 323, ...

$\therefore$ Series is 3 + 11 + 35 + 107 + 323 + ...

Section-C

13) Let $A_1, A_2, A_3, A_4, \ldots, A_m$ be m AM's between 1 and 31 are in AP. **4**

Therefore, $1, A_1, A_2, A_3, A_4, \ldots, A_m$ 31 are in AP.

Here, the total number of terms is m+2 and

$T_{m+2} = 31$

$\Longrightarrow 1 + (m + 2 - 1)d = 31 \quad \Longrightarrow (m+1)d = 30$

$\Longrightarrow d = \frac{30}{m+1}$ ....(i)

$\therefore \quad A_7 = T_8 = a + 7d$

$= 1 + 7 \times \frac{30}{m+1} = \frac{m+211}{m+1}$ [from Eq.(i)]

$A_{m-1} = T_m = 1 + (m-1)d = 1 + (m-1)d = 1 + (m-1)\frac{30}{m+1}$

$= \frac{m+1+30m-30}{m+1}$ [from Eq.(i)]

$= \frac{31m-29}{m+1}$

$\therefore \quad \frac{A7}{Am-1} = \frac{(m+211)/(m+1)}{(31m-29)/m+1} = \frac{m+211}{31m-29} \quad \Longrightarrow m = 14$

14) 6, 9, 12 or 12, 9, 6 **4**

15) b,c,d are in GP. **4**

$\Rightarrow \quad C^2 = bd$ ....(ii)

Similarly, $\frac{1}{c}, \frac{1}{d}, \frac{1}{e}$ are in AP.

$\Rightarrow \frac{2}{d} = \frac{1}{c} + \frac{1}{e}$

$\Rightarrow \quad d = \frac{2ce}{c+e}$

On putting the values of b and d from Eq.(i) and (iii), in Eq.(ii), we get

$$c^2 = \left(\frac{a+c}{2}\right) \times \left(\frac{2ce}{c+e}\right) \Rightarrow \quad c^2 \quad = ae$$

Therefore, a,c,e are in GP.

16) Clearly, x,y, and z are the sums of inifinite geometric progessions. **4**

$$x = \frac{a}{1-\frac{1}{r}} = \frac{ar}{r-1}, y = \frac{b}{1-\left(-\frac{1}{r}\right)} = \frac{br}{1+r}$$

and $$z = \frac{c}{1-\frac{1}{r^2}} = \frac{cr^2}{r^2-1}$$

Now, $$xy = \left(\frac{ar}{r-1}\right)\left(\frac{br}{r+1}\right) = \frac{abr^2}{r^2-1}$$

$$\Rightarrow \frac{xy}{z} = \left\{\left(\frac{abr^2}{r^2-1}\right) \div \frac{cr^2}{(r^2-1)}\right\} = \frac{ab}{c}$$

17) Rs.39100 **4**