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Question No # 01

Find the 36^{th} term of the arthemetic Sequence whose 3^{rd} term is 7^{th} and 8^{th} term is 17.

Solution No # 01

Let a be the First term and d be the common differance of the arthemetic Sequnce.

Then

$$a_n = a + (n-1)d \quad n \geq 1$$

$$\Rightarrow \quad a_3 = a + (3-1)d$$

and

$$a_8 = a + (8-1)d$$

Given data

$$a_3 = 7 \text{ and } a_8 = 17$$

Therfore

$$7 = a + 2d \longrightarrow (1)$$

$$17 = a + 7d \longrightarrow (2)$$

Subtracting (1) from (2)

$$10 = 5d$$

$$\Rightarrow \quad d = 2$$

Subsituting

$d = 2$ in (1) we have

$$7 = a + 2(2)$$

Which gives

$$a = 3$$

Thus,

$$a_n = a + (n-1)d$$

$a_n = 3 + (n-1)2$ (Using values of a and b)

Hence the value of 36th term is

$$a_{36} = 3 + (36-1)2$$

$$= 3 + 70$$

$$= 73 \longrightarrow \text{Answer!}$$

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Question No # 02

Find $fog(x)$ and $gof(x)$ of the Functions $f(x) = 2x+3$ and $g(x) = -x^2+5$

Solution:-

$f(x) = 2x+3$

and

$g(x) = -x^2+5$

$=$ $fog(x)$ and $gof(x)$

$fog(x) = gof(x)$

$fog(x) = 2(g(x))+3$

$= 2(-x^2+5)+3$

$= -2x^2+10+3$

$= -2x^2+13$

$gof(x)$

$= -(2x+3)^2+5$

$= -(2x^2+3^2+5)$

$= -2x^2-9+5$

$= -2x^2-4$

$= -2(x^2+2)=0$

$= \frac{-\cancel{2}}{\cancel{2}}(x^2+2)=\frac{0}{-2}$

$gof(x) = (x^2+2)$ Ans.

Solution No #03:-

$n \geq 1$

$$1^2 + 2^2 + 3 + \ldots + n^2 = \frac{n(n+1)(2n+1)}{6}$$

For

$n = 1$

R.H.S of P(1)

$$\frac{1(1+1)(2(1)+1)}{6}$$

$$= \frac{(1)(2)(3)}{6} = \frac{6}{6} = 1$$

Suppose p(n) is true for

$n \geq 1$

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$$= 1^2+2^2+3^2+n^2 = \frac{n(n+1)(2n+1)}{6}$$

R.H.S

To prove $(n+1)$ is true

$$1^2+2^2+3^2 --- +(n+1)^2 = \frac{(n+1)((n+1)+1)(2(n+1)+1)}{6}$$

$$1^2+2^2+3^2 --- +(n+1)^2$$

$$= 1^2+2^2+3^2 --- +n^2 (n+1)^2$$

$$= \frac{n(n+1)(2n+1)}{6} + (n+1)^2$$

$$= (n+1)\left[\frac{n(2n+1)}{6} + (n+1)\right]$$

$$= (n+1)\left[\frac{n(2n+1)+6(n+1)}{6}\right]$$

$$= \frac{(n+1)(n+2)(2n+3)}{6}$$

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$$= \frac{(n+1)(n+1+1)(2(n+1)+1)}{6}$$

—— x ——— x ——— x

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Question No # 04:-

Types of Relation:-

The relation the connection between the two given Sets. Also, there are type of relations Stating the Connection between the Sets. Hence there are a types of relations.

Types:-

1) Empty relation:

A empty relation ~~or~~ is one in which there is no relation between any elements of a Sets.

For example:

If Set

$A = \{1, 2, 3,\}$ then one of the void relation can be $R = \{x, y\}$ Where, $|x - y| = 8$ For empty relation $R = \emptyset \subset A \times A$

2) Inverse Relation:

Inverse relation is seen when a set

has element which are inverse pairs of another set.

For example:

If Set $A = \{(a,b), (c,d)\}$

Then the inverse relation will $R^{-1} = \{(b, a), (d, c)\}$

So For an inverse relation

$R^{-1} = \{(b, a) : (a, b)\} \in R\}$

) Universal Relation:

A Universal is a type of relation in each every element of a set is related to each other.

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For example:

A = {a, b, c} Now one of the Universal relation will be R = {x, y}

Where $|x - y| \geq 0$ For Universal relation

$R = A \times A$

4) Symmetric Relation.

In a Symmetric relation If a = b is a true. b = a is also true.

In ~~Order~~ other word a relation R is Symmetric only if $(b, a) \in R$ is true when $(a, b) \in R$

example of Symmatric relation

$R = \{(1,2)\ (2,1)\}$ for a Set $A = \{1, 2\}$ that is Symmatric relation.

$aRb \Rightarrow bRa,\ \forall a, b \in A$

5) Transitive Relation.

Transitive relation If $(x, y) \in R\ (y, z) \in R$ Then $(x, z) \in R$ For transitive relation.

aRb and $bRc \Rightarrow aRc \ \forall a, b, c \in A$

6) Reflexive Relation:

In reflexive relation every element maps to itself

Example.

$A = \{1, 2\}$

Now an example of Reflexive relation will R $= \{(1,1)(2,2), (1,2), (2,1)$

$(a, a) \in R$

——— × ——— × ———

Answer No # 05

How many different license plates are possible:

Solution:-

Numbers of possible license Plates

License Plates have three upper Case latter followed by 3 digits.

$= 26 \times 26 \times 26 \times 10 \times 10 \times 10$

At each position only of the 26 letters Can be placed

At each of ~~The~~ these Position any of 10 digit Can be Placed.

Hence;

Number of possible license plates

$= \cancel{17576} = \boxed{17576000}$

(B) How many license plates could begin A and end on 0

Solution;

A license plate contains 3 letter forward by 3 digit while the first letter need to A and the last digit need to 0

First letter 1 way (needs to be A)

Second letter 26 ways

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thuird letter 26 ways

First digit 10 ways
Second digit 10 ways
third digit 1 way (need to be 0)

Using multiplication rule

$1 \times 26 \times 26 = 676$ begin with A

$10 \times 10 \times 1 = 100$ end with 0

$1 \times 26 \times 26 \times 10 \times 10 \times 1$

$= 26^3 \times 10^3 = \boxed{67600}$

(c) Solution:

A license cantions 3 letters ~~by~~ Followed by 3 digit while the license plaits start with POR.

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First letter 1 way (P)

Second letter 1 way (Q)
Thired letter 1 way (R)

first digit 10 ways
Second digit 10 ways
3th digit 10 ways

Using multiplication rule:-

$1 \times 1 \times 1 \times 10 \times 10 \times 10 = 10^3 = \boxed{1000}$ Ans

There are 1000 possible license plates beginning with PQR.

—x —x —x —x