

If the number 18601X57Y is divisible by 72, Find the value of (X + Y)?

A) 6

B) 2

~~C) 8~~

D) 4

$$\frac{18601X57Y}{72} \text{ is divisible by } R$$

(For 8)

$$\frac{57Y}{8} \text{ is divisible by } R = 0$$

$$Y = 6$$

$$72 = 8 \times 9$$

(For 9)

$$\frac{1+8+6+0+1+5+7+X+Y}{9} \text{ is divisible by } R = 0$$

$$\frac{28+X+Y}{9} \text{ is divisible by } R = \frac{28+6+0}{9} \text{ is divisible by } R = \frac{34+X}{9} \text{ is divisible by } R$$

$$X = 2$$

$$X + Y = 2 + 6 = 8$$



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aishwarya khair good evening sir

E

Eti Khatri good evening sir

👤

pritee good evening sir

If the number 715X423 is divisible by 3 (X denotes the missing digit in the thousandths place), then the smallest whole number in the place of X is _____. [GATE 2018, 1 MARK (EC)]

~~A) 0~~

B) 2

C) 5

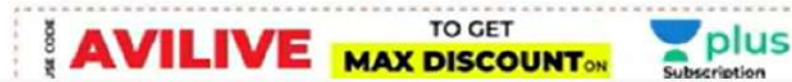
D) 6

$$\frac{715X423}{3} \text{ } /R = 0$$

$$\frac{7+1+5+X+4+2+3}{3} \text{ } /R = \frac{22+X}{3} \text{ } /R$$

$$= \frac{1+X}{3} \text{ } /R$$

$$X = 2$$



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Factorization

↳ Break the number

Prime No → 2, 3, 5, 7, 11, 13, 19, ...

Composite No → 4, 6, 8, 9, 10, ...

$$\begin{array}{ccccc} 4 & 6 & 8 & 9 & 10 \\ \downarrow & \downarrow & \downarrow & \downarrow & \downarrow \\ 2^2 & 2 \times 3 & 2^3 & 3^2 & 2 \times 5 \end{array}$$

Prime factorization of a number

Number of factor:-

Ex $12 = \underbrace{2^2 \times 3}_{\text{factorization}}, \text{ Factors } \rightarrow 1, 2, 3, 4, 6, 12$

$(2^0, 2^1, 2^2) (3^0, 3^1)$

$(3) \times 2 = 6$

$2^0 \times 3^0, 2^1 \times 3^0, 2^2 \times 3^0, 2^0 \times 3^1, 2^1 \times 3^1, 2^2 \times 3^1$
1 2 4 3 6 12

No of factors = $3 \times 2 = 6$

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Number of factor:-

Ex $12 = \underbrace{2^2}_{\text{factorization}} \times 3^1$, Factor of 1, 2, 3, 4, 6, 12

$(2^0, 2^1, 2^2) (3^0, 3^1)$

$(3) \times 2 = (6)$

$2^0 \times 3^0, 2^1 \times 3^0, 2^2 \times 3^0, 2^0 \times 3^1, 2^1 \times 3^1, 2^2 \times 3^1$
1 2 4 3 6 12

No of factor = $3 \times 2 = (2+1)(1+1)$
 $= \underline{\underline{6}}$

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$$\text{If } N = P_1^a \times P_2^b \times P_3^c \times P_4^d \dots \dots \dots$$

$$\text{No of factor} = (a + 1)(b + 1)(c + 1)(d + 1) \dots \dots$$

eg $120 = 12 \times 10 = 2^2 \times 3 \times 2 \times 5 = 2^3 \times 3^1 \times 5^1$
 ↳ Prime Factorization

No of Factors = $(3+1)(1+1)(1+1) = 4 \times 2 \times 2 = 16$

eg $(75) \Rightarrow 3 \times 5^2$
 $(2+1)(1+1) = 6$



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Niharika Walla clear sir , crystal clear

$$12 \rightarrow 1, 2, 3, 4, 6, 12 \quad (6)$$

$$15 \rightarrow 1, 3, 5, 15 \quad (4)$$

$$4^2 = 16 \rightarrow 1, 2, 4, 8, 16 \Rightarrow \text{No of factors} = \text{odd} (5)$$

$$6^2 = 36 \rightarrow 1, 2, 3, 4, 6, 9, 12, 18, 36 \quad (9)$$

$$120 \rightarrow 1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 24, 30, 40, 60, 120$$

$$\text{If } \underline{N} = P_1^a \times P_2^b \times P_3^c \times P_4^d \dots \dots \dots$$

$$\underline{\text{Product of factor}} = N^{\frac{\text{Number of factor}}{2}}$$

eg $12 = 2^2 \times 3$

No of factor = $3 \times 2 = 6$

Product of factor = 12^3

eg $36 \rightarrow 1, 2, 3, 4, 6, 9, 12, 18, 36$

$(36^4 \times 6) = 6^8 \times 6 = 6^9$

$36^{\frac{9}{2}} = 6^9$

~~1)~~ A prime number has 2 factor

$$3 \rightarrow 1, 3 \quad 7 \rightarrow 1, 7$$

~~2)~~ Only the square of a prime number has exactly 3 factors.

$$3^2 \rightarrow (2+1) = 3$$

$$7^2 \rightarrow (2+1) = 3$$

~~3)~~ Only a perfect square has odd number of factor and other every number has even number of factors.

53:00 / 1:00:55

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Perfect Number:- If sum of all factors of a number(excluding no) is equal to original number then number is called perfect number.

$\times 4 \rightarrow 1, 2$
 $6 \rightarrow 1, 2, 3, \cancel{6}$
 $1 + 2 + 3 = 6$

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Mahima Sharma Aur sir...for odd no.of factor



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2) Which one of the following is perfect number? [DMRC]

(A) 3
~~1~~
①

(B) 4
~~1, 2~~
1, 2

(C) 5
~~1~~
1

~~(D) 6~~

xx
Perfect
Nos
[6 ✓
28 ✓
496 ✓
8128 ✓

Home Work Question

How many number less than 1000 will have exactly 3 factors?

(A) 5

(B) 31

✓ (C) 11

(D) 9

$(\text{Prime no})^2$
↓
Exactly factor

$2^2, 3^2, 5^2, 7^2, 11^2, 13^2, 17^2, 19^2, 23^2, 29^2, 31^2, \cancel{37^2}$



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Harsh good evening sir

Factorial $\rightarrow !$

$$9! = 9 \times 8! = 9 \times 8 \times 7! = 9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1$$

$$\frac{49 \times 50 \times 51}{3!} \mid R = 0$$

$$\frac{123 \times 124 \times 125}{3!} \mid R = 0$$

$3 \times 4 \times 5$ divisible by $3!$

$3 \times 4 \times 5 \times 6$ " " $4!$

$(n-1)n(n+1)$ " " $3!$

Note:- Product of n consecutive number is always divisible by $n!$



Aptitude for GATE/ESE/PSUs/AE/JE/College Placement, Topic- Factorial

1) $(n^2 - 4)n(n^2 - 1)$ where $n > 48$, is divisible by which number

A) 24

B) 20

C) 18

D) 49

MSQ

$$(n^2 - 4)n(n^2 - 1) = (n^2 - 2^2)n(n^2 - 1^2)$$

$$[a^2 - b^2 = (a - b)(a + b)]$$

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

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

↳ 5 consecutive numbers

$$5! = 5 \times 4 \times 3 \times 2 \times 1 = 120$$

Factor of 120 →

1	2	3	4	5	6	8	10
120	60	40	30	24	20	15	12

$$\frac{36}{6} | R = 0 \quad 6 \rightarrow 1, 2, 3, 6$$

$$\frac{32}{8} | R = 0 \quad 8 \rightarrow 1, 2, 4, 8$$



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Ankit kumar Yadav okk sir

$$\underline{\underline{28}} = \underline{\underline{2^2 \times 7}}$$

↳ Factorization

No of 2's → 2

No of 7's → 1

No of 3's → 0

$$\underline{\underline{25!}} = \underline{\underline{15 \times 14 \times \dots}}$$

↳ Factorization

No of 2's →

No of 3's →

No of 5's →

27:10 / 1:06:15

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Kuldeep Salvi yes sir

❖ What is highest power of 2 in 10!

$10! = 1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8 \times 9 \times 10$

multiple of 2 = $\left[\frac{10}{2}\right] = 5$
 " " 4 = $\left[\frac{10}{4}\right] = 2$
 " " 8 = $\left[\frac{10}{8}\right] = 1$ } Total 2 = $5 + 2 + 1 = 8$

$$\begin{bmatrix} 10 \\ 2 \end{bmatrix} + \begin{bmatrix} 10 \\ 4 \end{bmatrix} + \begin{bmatrix} 10 \\ 8 \end{bmatrix} = \begin{bmatrix} 10 \\ 2 \end{bmatrix} + \begin{bmatrix} 10 \\ 2 \end{bmatrix} \frac{1}{2} + \begin{bmatrix} 10 \\ 4 \end{bmatrix} \frac{1}{2}$$

4 $\sqrt{105}$



...

-
-
-

 maneesh pal 2^2.7^1

Ques Find number of 2's in 100!

Method
Prime Nos \Rightarrow

2	100
2	50
2	25
2	12
2	6
2	3
	1

(97)

2^{97}

Find No of 4 in 100!

4 \rightarrow Composite No

4 $\rightarrow 2 \times 2$

$$100! \rightarrow 2^{97} = (2^{96}) \times 2$$

$$= (2^2)^{48} \times 2$$

48

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last page sir,

Ques Find highest power of 3 in 100!
3 → Prime Number

$$\begin{array}{r|l} 3 & 100 \\ \hline 3 & 33 \\ 3 & 11 \\ 3 & 3 \\ & 1 \end{array} \quad \left. \vphantom{\begin{array}{r|l} 3 & 100 \\ \hline 3 & 33 \\ 3 & 11 \\ 3 & 3 \\ & 1 \end{array}} \right\} (48)$$

348

Ques Find H.P. of 6 in 100!

6 → Composite No

$$6 \rightarrow 2 \times 3$$

↓ ↓

97 48

(2 × 3)⁴⁸

44:10 / 1:06:15

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Mahima Sharma 48

Ques Find H.P. of 5 in 100!
 $5 \rightarrow$ Prime No 5^{24}

$$\begin{array}{r|l} 5 & 100 \\ \hline 5 & 20 \\ & 4 \end{array} \} (24)$$

Ques Find no of zero in the end of 100!

$$10 \rightarrow 2 \times 5$$

$$\downarrow \quad \downarrow$$

$$97 \quad (24)$$

24 zero

$$14 \rightarrow (2) \times (7)$$

48:19 / 1:06:15

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A Alisha Salmani 24

Home Work Question

The highest power of 3^2 which exactly divides $20!$ is

(A) 3

(B) 2

(C) 5

[DRDO-2009]

(D) 4

$$\begin{array}{r} 3 \overline{) 20} \\ 3 \overline{) 6} \\ \underline{2} \end{array} \} 3^8 \Rightarrow (3^2)^4$$



#Bases_BaseConversion #NumberSystem #GeneralAptitude

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E Eti Khatri Good evening sir

Dishank Sanyal 🤔🤔🤔