

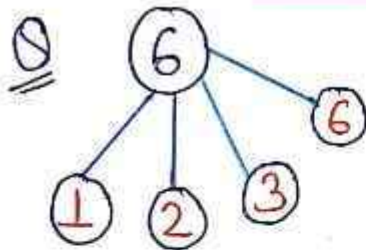
NUMBER SYSTEM

CLASS-4

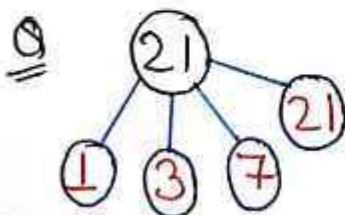
Factors गुणनखंड

- 1) No. of factor (गुणनखंडों की संख्या)
- 2) No. of even factors (सम गुणनखंडों की संख्या)
- 3) No. of odd factors (विषम गुणनखंडों की संख्या)
- 4) Sum of factors (गुणनखंडों का योग)
- 5) Sum of even factors (सम गुणनखंडों का योग)
- 6) Sum of odd factors (विषम गुणनखंडों का योग)
- 7) Prime factors (अभाज्य गुणनखंड)

Factor (गुणनखंड)

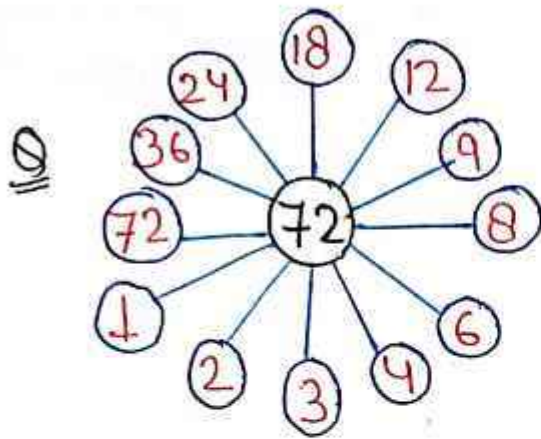


- Total = 4
- सम / Even = 2
- विषम / Odd = 2



- Total = 4
- Even / सम = 0
- Odd / विषम = 4

↳ Universal factor
↳ प्रत्येक संख्या का गुणनफल



- Total = 12
- सम / Even = 9
- विषम / Odd = 3

Q 6

$$\begin{array}{r} 2 \overline{) 6} \\ 3 \overline{) 3} \\ 1 \end{array}$$

$$6 = 2^1 \times 3^1$$

$$\begin{array}{ccc} 1 & 2^0 & 3^0 \\ 2^1 & \times & 3^1 \end{array}$$

1, 3, 2, 6

a $\downarrow$ base
b $\rightarrow$ Power

$$2^0 = 1$$

$$(\text{any number})^0 = 1$$

Q 12

$$12 = 2^2 \times 3^1$$

$$\begin{array}{ccc} 1 & 2^0 & 3^0 \\ 2^1 & \times & 3^1 \\ 2^2 & \times & 3^2 \end{array}$$

$$\begin{array}{r} 2 \overline{) 12} \\ 2 \overline{) 6} \\ 3 \overline{) 3} \\ 1 \end{array}$$

1, 3, 2, 6, 4, 12

$$12 = 2^2 \times 3^1$$

$$\begin{array}{cc} \downarrow & \downarrow \\ \{ 2^0 & 3^0 \\ 2^1 & 3^1 \\ 2^2 & \} \end{array}$$

$$3 \times 2 = 6$$

* $a^p \times b^q \times c^r \Rightarrow$ जहाँ $a, b, c = \text{Prime (अभाज्य)}$

No. of factors

गुणनखंडों की संख्या $= (p+1) \times (q+1) \times (r+1)$

- $10 = 2 \times 5$
- $100 = 2^2 \times 5^2$
- $1000 = 2^3 \times 5^3$

Q 1800

$$\begin{array}{l} 18 \times 100 \\ \swarrow \quad \downarrow \\ 2 \times 9 \quad 2^2 \times 5^2 \\ 2^1 \times 3^2 \times 2^2 \times 5^2 \end{array}$$

$$1800 = 2^3 \times 3^2 \times 5^2$$

$$\text{Total} = (3+1) \times (2+1) \times (2+1) \\ 4 \times 3 \times 3 = 36$$

$$\begin{array}{r|l} 2 & 1800 \\ \hline 2 & 900 \\ \hline 2 & 450 \\ \hline 3 & 225 \\ \hline 3 & 75 \\ \hline 5 & 25 \\ \hline 5 & 5 \\ \hline & 1 \end{array}$$

$$\text{सम/Even} = 2 \times (2^2 \times 3^2 \times 5^2)$$

$$\begin{array}{c} \downarrow \\ (2+1) \times (2+1) \times (2+1) \\ 3 \times 3 \times 3 = 27 \end{array}$$

$2 \times \text{any whole no.} = \text{सम}$
 किसी पूर्ण संख्या Even

Q 64000

$$\begin{array}{l} \downarrow \\ 64 \times 1000 \\ \downarrow \quad \downarrow \\ 2^6 \quad 2^3 \times 5^3 \\ 2^9 \times 5^3 \end{array}$$

$$\text{सम गुणनखंड} = 2 \times (2^8 \times 5^3)$$

$$\begin{array}{c} (8+1) \times (3+1) \\ 9 \times 4 = 36 \end{array}$$

$$\begin{aligned}
 & \text{Q } 7200 \\
 & \quad \downarrow \\
 & 72 \times 100 \\
 & \quad \downarrow \quad \downarrow \\
 & 8 \times 9 \quad 2^2 \times 5^2 \\
 & \quad \downarrow \quad \downarrow \\
 & 2^3 \times 3^2 \times 2^2 \times 5^2 \\
 & \quad 2^5 \times 3^2 \times 5^2
 \end{aligned}$$

$$\begin{aligned}
 \text{सम Factors} &= 2 \times (2^4 \times 3^2 \times 5^2) \\
 & (4+1) \times (2+1) \times (2+1) \\
 & 5 \times 3 \times 3 = 45
 \end{aligned}$$

$$\begin{aligned}
 & \text{Q } 3^2 \times 5^2 \\
 & \text{सम गुणखंड} = 0
 \end{aligned}$$

$$\begin{aligned}
 & \text{Q } 2^3 \times 3^2 \times 5^2 \\
 & \text{विषम गुणखंड} = (2+1) \times (2+1) \\
 & \text{odd factors} \quad 3 \times 3 = 9
 \end{aligned}$$

$$\text{Q } 144$$

$$\begin{aligned}
 & \quad \downarrow \\
 & 16 \times 9 \\
 & \quad \downarrow \quad \downarrow \\
 & 2^4 \times 3^2
 \end{aligned}$$

$$\begin{aligned}
 144 &= 2^4 \times 3^2 \\
 \text{Total} &\Rightarrow (4+1) \times (2+1) \\
 & 5 \times 3 = 15 \\
 \text{सम/Even} &\Rightarrow 2 \times (2^3 \times 3^2) \\
 & (3+1) \times (2+1) \\
 & 4 \times 3 = 12 \\
 \text{विषम/Odd} &= 2^4 \times 3^2 \\
 & (2+1) = 3
 \end{aligned}$$

$$\begin{array}{r|l}
 2 & 144 \\
 \hline
 2 & 72 \\
 \hline
 2 & 36 \\
 \hline
 2 & 18 \\
 \hline
 3 & 9 \\
 \hline
 3 & 3 \\
 \hline
 & 1
 \end{array}$$

- 1) How many positive factors are there of 40?
40 के धनात्मक गुणनखंड कितने हैं?

$$\begin{array}{c}
 40 \\
 \downarrow \\
 4 \times 10 \\
 \downarrow \quad \downarrow \\
 2^2 \times 2^1 \times 5^1 \\
 2^3 \times 5^1 \\
 (3+1) \times (1+1) \\
 4 \times 2 = 8
 \end{array}$$

$$\begin{array}{l}
 \text{Even/सम} = 2 \times (2^2 \times 5^1) \\
 (2+1) \times (1+1) \\
 3 \times 2 = 6
 \end{array}$$

$$\begin{array}{l}
 \text{Odd/विषम} = 2^0 \times 5^1 \\
 (1+1) = 2
 \end{array}$$

- 2) How many positive factors does 288 have?
288 के कितने धनात्मक गुणनखंड हैं?

$$\begin{array}{c}
 288 \\
 \downarrow \\
 2^1 \times 144 \\
 \swarrow \searrow \\
 16 \times 9 \\
 \downarrow \quad \downarrow \\
 2^4 \times 3^2 \\
 2^5 \times 3^2
 \end{array}$$

$$\begin{array}{l}
 2^5 \times 3^2 \\
 (5+1) \times (2+1) \\
 6 \times 3 = 18
 \end{array}$$

$$\begin{array}{r|l}
 2 & 288 \\
 \hline
 2 & 144 \\
 \hline
 2 & 72 \\
 \hline
 2 & 36 \\
 \hline
 2 & 18 \\
 \hline
 3 & 9 \\
 \hline
 3 & 3 \\
 \hline
 & 1
 \end{array}$$

- 3) What is the number of divisors of 1000 (excluding 1 and 1000)?
1000 के विभाजक की संख्या क्या है (1 और 1000 को छोड़कर)?



$$\begin{aligned}
 &1000 \\
 &\downarrow \\
 &2^3 \times 5^3 \\
 &(3+1) \times (3+1) \\
 &4 \times 4 = 16 \\
 &16 - 2 = 14
 \end{aligned}$$

- 4) What is the number of factors of 105?
105 के गुणनखंडों की संख्या क्या है?



$$\begin{aligned}
 &105 \\
 &\swarrow \searrow \\
 &15 \times 7 \\
 &\swarrow \searrow \\
 &3 \times 5 \\
 &3 \times 5 \times 7
 \end{aligned}$$

$$\begin{aligned}
 &3^1 \times 5^1 \times 7^1 \\
 &(1+1) \times (1+1) \times (1+1) \\
 &2 \times 2 \times 2 \\
 &8
 \end{aligned}$$

$$\begin{array}{r|l}
 3 & 105 \\
 \hline
 5 & 35 \\
 \hline
 7 & 5 \\
 \hline
 & 1
 \end{array}$$

- 5) What is the number of ^{factor}divisors of 360?
360 के भाजक की संख्या कितनी है?



$$\begin{aligned}
 &360 \\
 &\swarrow \searrow \\
 &36 \times 10 \\
 &\swarrow \searrow \quad \downarrow \\
 &4 \times 9 \quad 2 \times 5 \\
 &\downarrow \quad \downarrow \\
 &2^2 \times 3^2 \times 2^1 \times 5 \\
 &2^3 \times 3^2 \times 5^1 \\
 &(3+1) \times (2+1) \times (1+1) \\
 &4 \times 3 \times 2 = 24
 \end{aligned}$$

- 6) How many positive factors are there in 325?
325 के कितने धनात्मक गुणनखंड हैं?



$$\begin{aligned}
 &325 \\
 &\downarrow \\
 &25 \times 13 \\
 &\downarrow \\
 &5^2 \times 13^1 \\
 &(2+1) \times (1+1) \\
 &3 \times 2 = 6
 \end{aligned}$$

$$\begin{array}{r|l}
 5 & 325 \\
 \hline
 5 & 65 \\
 \hline
 13 & 13 \\
 \hline
 & 1
 \end{array}$$

7) How many total factors can be there of 6480?
6480 के कुल कितने गुणनखंड हो सकते हैं?



$$\begin{aligned}
 &6480 \\
 &\downarrow \\
 &648 \times 10 \\
 &\swarrow \quad \searrow \quad \swarrow \quad \searrow \\
 &8 \times 81 \quad 2 \times 5 \\
 &\downarrow \quad \downarrow \\
 &2^3 \times 3^4 \times 2^1 \times 5^1 \\
 &2^4 \times 3^4 \times 5^1 \\
 &(4+1) \times (4+1) \times (1+1) \\
 &5 \times 5 \times 2 \\
 &50
 \end{aligned}$$

8) How many factors will the number 12288 have?
12288 संख्या के कितने गुणनखंड होंगे?



$$\begin{aligned}
 &12288 \quad 2^{12} \times 3^1 \\
 &\downarrow \\
 &16 \times 768 \quad (12+1) \times (1+1) \\
 &\swarrow \quad \searrow \quad 13 \times 2 = 26 \\
 &4 \times 192 \\
 &\swarrow \quad \searrow \\
 &16 \times 12 \\
 &16 \times 4 \times 16 \times 12 \\
 &2^4 \times 2^2 \times 2^4 \times 2^2 \times 3
 \end{aligned}$$

$$\begin{array}{r|l}
 2 & 12288 \\
 \hline
 2 & 6144 \\
 \hline
 2 & 3072 \\
 \hline
 2 & 1536 \\
 \hline
 2 & 768 \\
 \hline
 2 & 384 \\
 \hline
 2 & 192 \\
 \hline
 2 & 96 \\
 \hline
 2 & 48 \\
 \hline
 2 & 24 \\
 \hline
 2 & 12
 \end{array}$$

$$\begin{array}{r|l}
 2 & 6 \\
 \hline
 3 & 3 \\
 \hline
 & 1
 \end{array}$$

9) Find the total number of factors of the number 480.
संख्या 480 के गुणनखंडों की कुल संख्या आत कीजिए।



$$\begin{aligned}
 &480 \\
 &\downarrow \\
 &48 \times 10 \\
 &\downarrow \quad \downarrow \\
 &16 \times 3 \quad 2 \times 5 \\
 &\downarrow \\
 &2^4 \times 3^1 \times 2^1 \times 5 \\
 &2^5 \times 3^1 \times 5^1 \\
 &(5+1) \times (1+1) \times (1+1) \\
 &6 \times 2 \times 2 \\
 &24
 \end{aligned}$$

$$\begin{array}{r|l}
 2 & 480 \\
 \hline
 2 & 240 \\
 \hline
 2 & 120 \\
 \hline
 2 & 60 \\
 \hline
 2 & 30 \\
 \hline
 3 & 15 \\
 \hline
 5 & 5 \\
 \hline
 & 1
 \end{array}$$

1. How many positive factors are there in 24?

24 के कितने धनात्मक गुणनखंड हैं?

- 1. 3
- 2. 4
- 3. 6
- 4. 8

2. Find the number of factors of 30.

30 के गुणनखंडों की संख्या ज्ञात कीजिए।

- 1. 5
- 2. 10
- 3. 8
- 4. 9

3. How many positive factors are there in 36?

36 के कितने धनात्मक गुणनखंड हैं?

- 1. 4
- 2. 6
- 3. 9
- 4. 12

4. How many positive factors are there in 112?

112 के कितने धनात्मक गुणनखंड हैं?

- 1. 9
- 2. 10
- 3. 8
- 4. 7

5. How many total factors can 1540 have?

1540 के कुल कितने गुणनखण्ड हो सकते हैं?

- (a) 26
- (b) 22
- (c) 20
- (d) 24

6. How many total factors can 2400 have?

2400 के कुल कितने गुणनखण्ड हो सकते हैं?

- a) 36
- b) 40
- c) 35
- d) 30

7. What is the total number of factors of the number 840 excluding 1 and the number itself?

संख्या 840 के गुणनखण्डों की कुल संख्या 1 और स्वयं संख्या को छोड़कर कितनी है?

- a) 28 b) 31
- c) 30 d) 29

8. Find the total number of factors of 3600.

3600 के कुल गुणनखण्डों की संख्या ज्ञात करें।

- (a) 45 (b) 44
- (c) 43 (d) 42

9. How many multiples of the number 4000 are there?

संख्या 4000 के कितने गुणक हैं?

(a) 25

(b) 24

(c) 27

(d) 26

10. How many total factors are there in 10500?

10500 के कुल कितने गुणनखंड हैं ?

(a) 46

(b) 48

(c) 50

(d) 44

ANSWER SHEET

1	2	3	4	5	6	7	8	9	10
D	C	C	B	D	A	C	A	B	B



Sol. 1

24 के कुल गुणनखण्ड

$$\begin{array}{r}
 2 \overline{) 24} \\
 2 \overline{) 12} \\
 2 \overline{) 6} \\
 3 \overline{) 3} \\
 1
 \end{array}
 \quad
 \begin{array}{l}
 2^3 \times 3^1 \\
 (3+1) \times (1+1) \\
 \Rightarrow 8
 \end{array}$$

Sol. 2

$$\begin{array}{r}
 2 \overline{) 30} \\
 3 \overline{) 15} \\
 5 \overline{) 5} \\
 1
 \end{array}
 \quad
 \begin{array}{l}
 2^1 \times 3^1 \times 5^1 \\
 \Rightarrow 2 \times 2 \times 2 \\
 \Rightarrow 8
 \end{array}$$

Sol. 3

36 के कुल गुणनखण्ड

$$\begin{array}{r}
 2 \overline{) 36} \\
 2 \overline{) 18} \\
 3 \overline{) 9} \\
 3 \overline{) 3} \\
 1
 \end{array}
 \quad
 \begin{array}{l}
 2^2 \times 3^2 \\
 \Rightarrow 3 \times 3 \\
 \Rightarrow 9
 \end{array}$$

Sol. 4 112 के गुणनखण्ड ?

$$\begin{array}{r}
 2 \overline{) 112} \\
 2 \overline{) 56} \\
 2 \overline{) 28} \\
 2 \overline{) 14} \\
 7 \overline{) 7} \\
 1
 \end{array}
 \quad
 \begin{array}{l}
 2^4 \times 7^1 \\
 \Rightarrow 5 \times 2 \\
 \Rightarrow 10
 \end{array}$$

Sol. 5

$$1540 = 2^2 \times 5^1 \times 7^1 \times 11^1$$

$$\Rightarrow 3 \times 2 \times 2 \times 2$$

$$\Rightarrow 24$$

Sol. 6

2400 के गुणनखण्ड

$$\begin{array}{l}
 2400 \Rightarrow 2^5 \times 3^1 \times 5^2 \\
 \Rightarrow (5+1)(1+1)(2+1) \\
 6 \times 2 \times 3 \\
 \Rightarrow 36
 \end{array}$$

Sol. 7

$$\begin{array}{r}
 8 \overline{) 840} \\
 3 \overline{) 105} \\
 5 \overline{) 35} \\
 7 \overline{) 7} \\
 1
 \end{array}
 \quad
 \begin{array}{l}
 2^3 \times 3^1 \times 5^1 \times 7^1 \\
 (3+1)(1+1)(1+1)(1+1) \\
 4 \times 2 \times 2 \times 2 \\
 \Rightarrow 32 - 2 \\
 \Rightarrow 30
 \end{array}$$

Sol. 8

3600 के कुल गुणनखण्ड

$$\begin{array}{l}
 3600 = 2^4 \times 5^2 \times 3^2 \\
 \Rightarrow 5 \times 3 \times 3 \Rightarrow 45
 \end{array}$$

Sol. 9

4000 के गुणनखण्ड

$$\begin{array}{l}
 4000 \Rightarrow 2^5 \times 5^3 \\
 \Rightarrow 6 \times 4 \Rightarrow 24
 \end{array}$$

Sol. 10

10500 के कुल गुणनखण्ड

$$\begin{array}{l}
 10500 \Rightarrow 2^2 \times 3^1 \times 5^3 \times 7^1 \\
 \Rightarrow 3 \times 2 \times 4 \times 2 \\
 \Rightarrow 48
 \end{array}$$