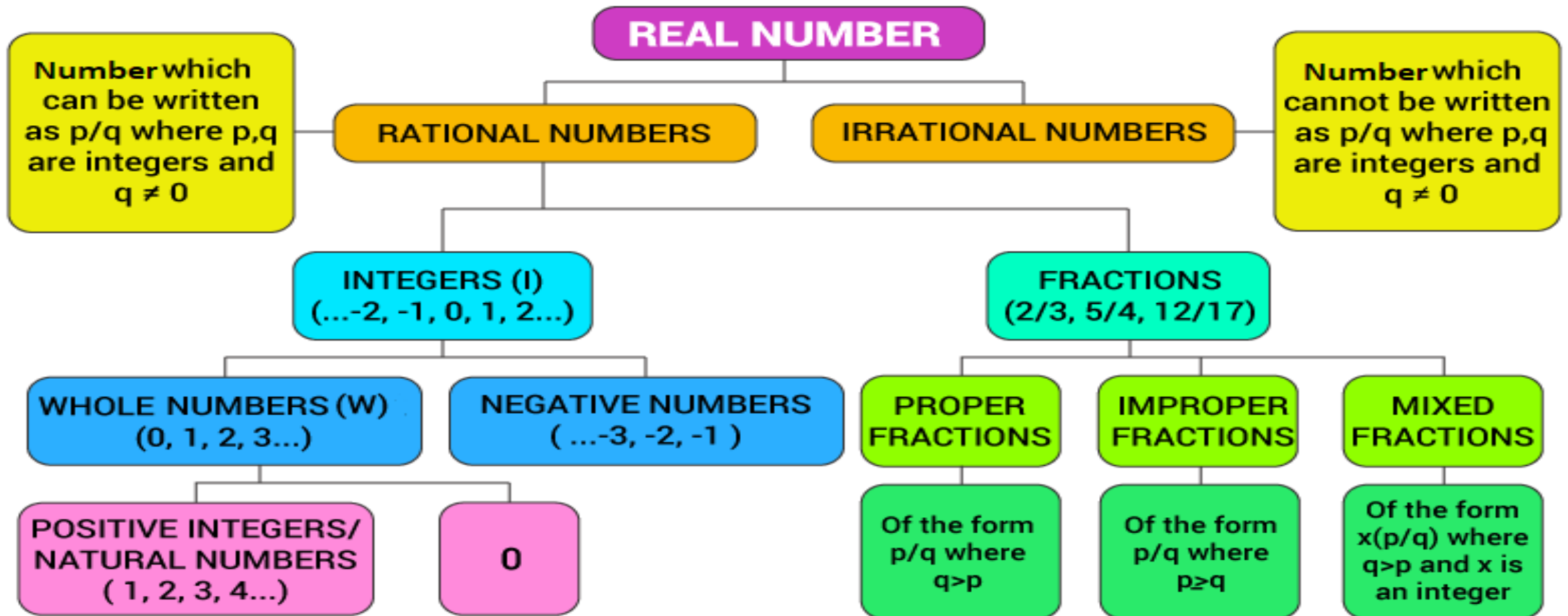


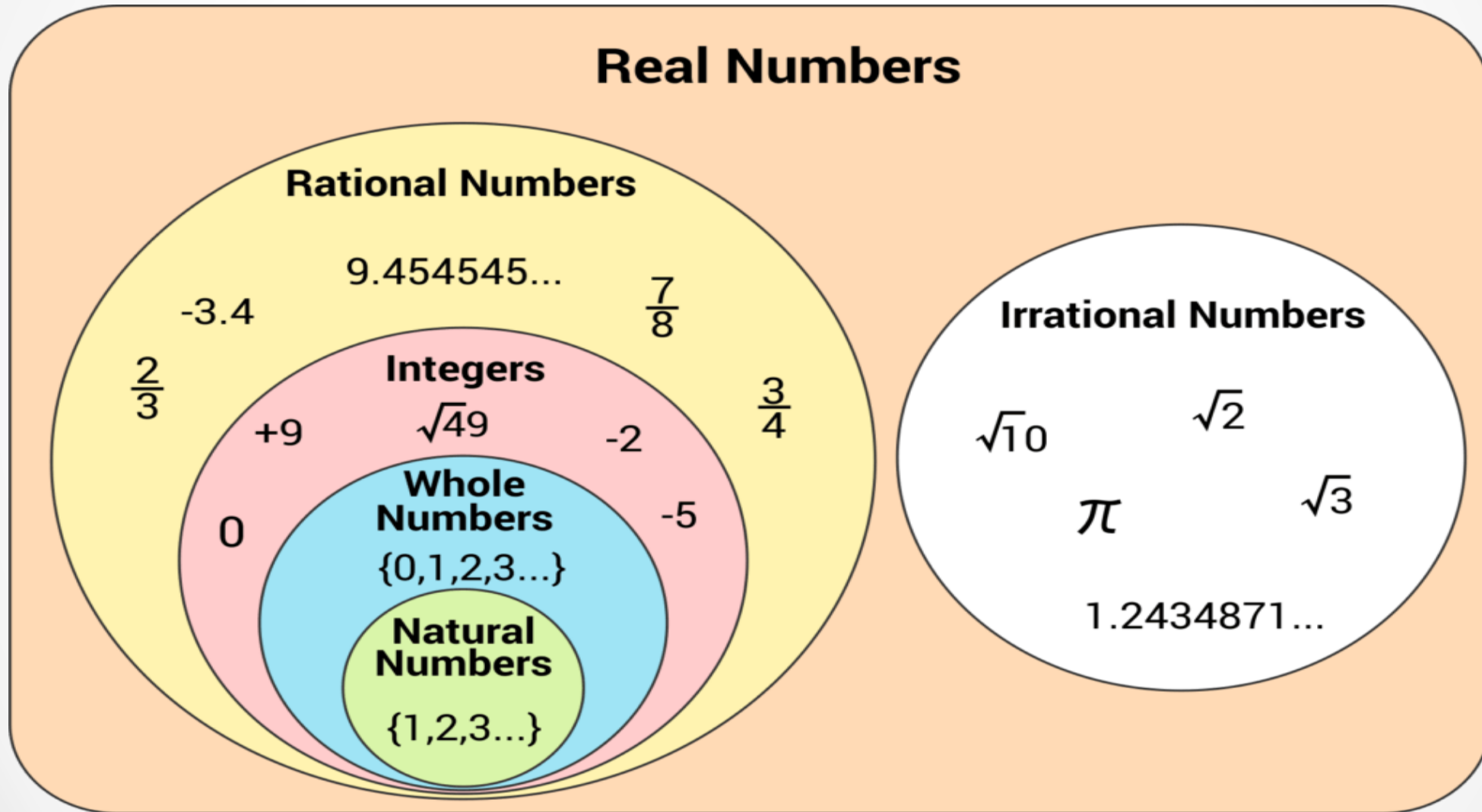
Classification of Numbers

DIVISIBILITY Rules

Classification of Numbers



Classification of Numbers



Classification of Numbers

Prime Number:

- A number greater than 1 with exactly two factors, i.e. 1 and the number itself is defined as a prime number.
- There are 25 prime numbers from 1 to 100.

List of Numbers	Prime Numbers
Between 1 and 10	2, 3, 5, 7
Between 11 and 20	11, 13, 17, 19
Between 21 and 30	23, 29
Between 31 and 40	31, 37
Between 41 and 50	41, 43, 47
Between 51 and 100	53, 59, 61, 67, 71, 73, 79, 83, 89, 97

Classification of Numbers

Q1. The sum of even numbers between 1 and 31 is:

A) 128

B) 198

C) 240

D) 188

Classification of Numbers

Q2. If a and b are odd numbers, then which of the following is even?

A) $a+b$

B) $a+b+1$

C) ab

D) $ab+2$

Classification of Numbers

Q3. The difference of the squares of two consecutive odd integers is divisible by which of the following integers?

A) 3

B) 8

C) 7

D) 6

Classification of Numbers

Q4. Find the sum of : $2^2 + 4^2 + 6^2 + \dots + 20^2$?

A) 1360

B) 1550

C) 1340

D) 1540

Classification of Numbers

Q5. If x and y are two consecutive natural numbers then $(-1)^x + (-1)^y$ is equals to:

a) 2

b) -2

c) 0

d) 1

Classification of Numbers

Q6. x , y and z are prime numbers and $x + y + z = 38$. What is the maximum value of x ?

a) 29

b) 31

c) 23

d) 17

Classification of Numbers

Q7. When the sum of four consecutive two-digit odd numbers divided by 10, the result obtained is a perfect square. Which of the following can possibly be one of these four numbers?

A) 39

B) 47

C) 67

D) 21

Classification of Numbers

Q8. Sum of three fractions is $2\frac{11}{24}$. On dividing the largest fraction by the smallest fractions, $\frac{7}{6}$ is obtained which is $\frac{1}{3}$ greater than the middle fractions. The smallest fractions is

A) $\frac{3}{4}$

B) $\frac{3}{7}$

C) $\frac{5}{8}$

D) $\frac{5}{6}$

Classification of Numbers

Q9. If the sum of two numbers is 42 and their product is 437, then find the difference between the numbers?

A) 12

B) 5

C) 4

D) 9

Classification of Numbers

Q10. What is the simplified fraction value of $0.1\overline{36}$

A) $\frac{19}{999}$

B) $\frac{11}{990}$

C) $\frac{17}{999}$

D) $\frac{3}{22}$



Classification of Numbers

Q11. What is the simplified fraction value of $2.5\overline{36}$

A) $\frac{133}{990}$

B) $\frac{637}{990}$

C) $\frac{23}{99}$

D) $\frac{279}{110}$

Classification of Numbers

Q12. The number $x = 1.24242424\dots$ can be expressed in the form $x = p/q$, where p and q are positive integers having no common factors. Then the value of $p + q$ is

A) 76

B) 72

C) 74

D) 222

Division Algorithms

1) If a and b are integers ; $b > 0$

then there exist unique integer q and r satisfying

$$a = qb + r; \quad 0 \leq r < b$$

where q and r are called quotient and remainders in the division of a by b .

2) If a and b are integers ; $b < 0$

then there exist unique integer q and r satisfying

$$a = qb + r; \quad 0 \leq r < |b|$$

where q and r are called quotient and remainders in the division of a by b .



Division Algorithm : Practice Questions

Q13. In a division problem, the divisor is 6 times the quotient and 3 times the remainder. If remainder is 40, then the dividend is

A) 2440

B) 2430

C) 2624

D) 2524



Division Algorithm :Practice Questions

Q14. A number when divided by 2736, leaves remainder 75. If the same number is divided by 24, the remainder will be

A) 3

B) 2

C) 1

D) 0

Divisibility rules of 2,4,8

2 – Last digit is even (0,2,4,6,8)

4- Last two digits are divisible by 4 (124, 123456, 23468)

8- Last three digits are divisible by 8 (123488, 1234888)

Divisibility rules of 3, 9

3 – Sum of the digits is divisibly by 3

9 – Sum of the digits is divisible by 9

Divisibility rules of 6

Divisibility rule of 6:

If a number is divisible by 2 and 3, it is divisible by 6

Divisibility rules of 6

Ex: 246

a. $2+4+6=12$, 12 is divisible by 3, so 246 is divisible by 3

b. 246 ends in 6, so 246 is divisible by 2

246 is divisible by 2 and 3 .so 246 is divisible by 6

Divisibility rules of 7

Take the last digit and double it, subtract that from the remaining digits, continue until you get a number that is divisible by 7.

Example: 442

Take the last digit and double it, $2 * 2 = 4$

$$44 - 4 = 40$$

Is 40 a multiple of 7? No, hence , 442 is not divisible by 7

Divisibility rules of 11

A shortcut to check for the numbers divisible by 11 is by adding the numbers in even and odd places and subtracting the two sums. If the difference is a multiple of 11, then divisibility by 11 is proved

Divisibility Rule of 11

Example: 1331

$$(1+3) - (1+3) = 0$$

Therefore number is
divisible by 11

Step 1 : Start from the leftmost or the rightmost digit.

Step 2 : Find the sum of all the digits at the odd positions.

Step 3 : Find the sum of all the digits at the even positions.

Step 4 : Find the difference between the sum obtained in step 2 and step 3.

Step 5 : If the difference is 0 or a number that 11 can divide completely without leaving a remainder, then the number is divisible by 11.



Divisibility rules of Prime Numbers: 13

Take the last digit and multiply by 4 , Add the product to the rest of the number

Example: 442

Take the last digit and multiply it by 4, $2 * 4 = 8$

$$44 + 8 = 52$$

Is 52 a multiple of 13? Yes, hence ,442 is divisible by 13.

Divisibility rules of Prime Numbers: 17

Take the last digit and multiply by 5 , Subtract the product to the rest of the number

Example: 15181

Take the last digit and multiply it by 5, $1 * 5 = 5$

$$1518 - 5 = 1513$$

Take the last digit again and multiply it by 5, $3 * 5 = 15$

$$151 - 15 = 136$$

Is 136 a multiple of 17? Yes, hence ,15181 is divisible by 17.

Divisibility Rules: Practice Questions

Q16. If the number 517?324 is completely divisible by 3, then the smallest whole number in place of ? will be:

A] 5

B] 3

C] 2

D] 8

Divisibility Rule :Practice Questions

Q17. If the number 23P62971335 is divisible by the smallest, odd composite number, then what is the value of P?

A. 4

B. 5

C. 7

D. 8



Divisibility Rule :Practice Questions

Q18. The smallest number, which should be added to 756896 so as to obtain a multiple of 11, is?

A) 1

B) 3

C) 5

D) 8

Divisibility Rule :Practice Questions

Q19. If x and y are the two digits of the number $653xy$ such that this number is divisible by 80, then $x+y$ is equal to ?

A) 6

B) 5

C) 8

D) 10

Divisibility Rule :Practice Questions

Q20. A 3-digit number $5a3$ is added to another 3-digit number 714 to give a 4-digit number $12b7$, which is divisible by 11 . Then, $(a + b) = ?$

A) 12

B) 15

C) 8

D) 20



Divisibility Rule :Practice Questions

Q 21. The given no 446673877 is divisible by which of the following no?

- A) 7only B) 13only C) Both 7 and 13 D) None

Divisibility Rule :Practice Questions

Q22. There is a 36- digit number consist of only one digit from 1,2,3,4,5,6,7,8 ...e.g. 5555.....555, 77777.....77. Such number is always divisible by:-

A) 7

B) 11

C) 13

D) All of the above

Divisibility Rule :Practice Questions

Q23. A number 15015 is divisible by

- A) 7 & 11 both B) 11 & 13 both C) 7 & 13 both D) All 7, 11, 13



Divisibility Rule :Practice Questions

Q24. A 12-digit number is formed by repeating a three-digit number; for example, 202202202202 or 978978978978 etc. Any number of this form is always exactly divisible by:

- A) 11 B) 13 C) 1001 D) All of these

Numbers , Divisibility Rules

Directions(25-26): In each of the questions below consists of a question and two statements numbered I and II given below it. You have to decide whether the data provided in the statements are sufficient to answer the question. Read both the statements and

Give answer

- (A) If the data in statement I alone are sufficient to answer the question, while the data in statement II alone are not sufficient to answer the question
- (B) If the data in statement II alone are sufficient to answer the question, while the data in statement I alone are not sufficient to answer the question
- (C) If the data either in statement I alone or in statement II alone are sufficient to answer the question
- (D) If the data given in both statements I and II together are not sufficient to answer the question and
- (E) If the data in both statements I and II together are necessary to answer the question

Data Sufficiency: Classification of Numbers

Q25. What is the two-digit number?

- i) The difference between the two digits is 9.
- ii) The sum of the digits is equal to the difference between the two digits.

Data Sufficiency: Classification of Numbers

Q26. Is the positive integer X divisible by 21?

i) When X is divided by 14, the remainder is 4

ii) When X is divided by 15, the remainder is 5

FACTORS AND FACTORIALS



Factors

- Concepts of Factors and Multiples
- Number of factors
- Sum of factors
- Product of factors
- Number of odd and even factors

Factorials

- Concept of Number of Zeros
- Highest power of a number in a factorial
- Number of zeroes in a factorial

FACTORS

Factors and Multiples : All the numbers that divide a number completely, i.e., without leaving any remainder, are called factors of that number.

For example, 24 is completely divisible by 1, 2, 3, 4, 6, 8, 12, 24. Each of these numbers is called a factor of 24 and 24 is called a multiple of each of these numbers.



FACTORS

These are certain basic formulas pertaining to factors of a number N, such that,

$$N = p^a q^b r^c$$

Where, p, q and r are prime factors of the number n.

a, b and c are non-negative powers/ exponents

- **Number of factors of N** = $(a+1)(b+1)(c+1)$
- **Sum of factors:** $(p^{a+1}-1)(q^{b+1}-1)(r^{c+1}-1) / (p-1)(q-1)(r-1)$
- **Product of factors of N , if N is not a perfect square** = $N^{\text{No. of factors}/2}$
- **Product of factors of N , if N is a perfect square** = $N^{(\text{No. of factors}-1)/2} * \sqrt{N}$

Number of even Factors and odd factors:

Let N as a number.

N in prime factorization = $a^p \times b^q \times c^r$

No. of factors of N = $(p+1)(q+1)(r+1)$

Now suppose that b and c are odd prime numbers in prime factorization of N

Now to find even no of factors you have to find odd no of factors first.

Odd no of factors = $(q+1)(r+1)$

Even no of factors = (total no of factors) - (odd no of factors).



FACTORS

1. What is the number of factors of 1125?

- A. 8 B. 12 C. 22 D. 24



FACTORS

2. What is the number of factors of $2^6 \times 3^3 \times 7^3$

A. 28

B. 36

C. 64

D. 112



FACTORS

3. What is the number of factors of $4^2 \times 9^3 \times 10^3$?

A. 112

B. 890

C. 224

D. 160

FACTORS

4. What is the sum of the factors of 72?

A. 220

B. 145

C. 195

D. 260



FACTORS

5. What is the sum of the factors of 600?

A. 1560

B. 1650

C. 1770

D. 1860



FACTORS

6. What is the product of the factors of 361?

A. 19^5

B. 19^3

C. 19^{10}

D. None



FACTORS

7. What is the product of the factors of 1024?

A. 2^{58}

B. 2^{36}

C. 2^{55}

D. None



FACTORS

8. What is the product of the factors of 360?

A. 360^{12}

B. 360^8

C. 360^{16}

D. None



FACTORS

9. What is the product of the factors of 524?

A. 524^2

B. 524^3

C. 524^6

D. None



FACTORS

10. Find the smallest number that has exactly 18 factors?

A. 156

B. 180

C. 360

D. 760



FACTORS

11. Find the odd factors of 252?

A. 8

B. 5

C. 7

D. 6



FACTORS

12. How many factors of $2^4 * 5^3 * 7^4$ are odd numbers?

A. 20

B. 25

C. 27

D. 29



FACTORS

13. Number $N = 2^6 * 5^5 * 7^6 * 10^7$; how many factors of N are even numbers?

A. 1183

B. 1173

C. 1673

D. 190

FACTORIALS

Number of zeroes:

It is very easy to find the number of zero at the end, all you have to do is count how many times did 2 and 5 occurred in the question as factor. Number of zeros is equal to the one (2 or 5) which occurred less times.

i.e. $2 \times 5 = 10$

$$2 \times 2 \times 5 \times 5 = 100$$

So the number of zeros depends upon the number of pairs of 2 and 5.

Example 1. How many numbers of zeros will be there at the trail (end) of the $1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8 \times 9 \times 10$?

Solution:

In given expression number of 2's = 8

Number of 5's = 2

So total number of pairs = 2

Two zeroes will be there at the end of the calculation.

FACTORIALS

Number of zeroes in a factorial:

5	25	
5	5	→
5	1	→
5	0	→

Quotient (Ignore the remainder)

There will be $5+1+0 = 6$ zeroes at the end of $25!$

FACTORIALS

Example . Find the number of zeros at the end of 500!

Solution:

5	500	
5	100	➡
5	20	➡
5	4	➡
	0	

Quotients(ignore the remainder)

Total number of 5's = $100+20+4 = 124$

FACTORIALS

14. The highest power of 3 that completely divides $43!$ is:

- A] 19 B] 26 C] 16 D] 15

FACTORIALS

15. What is the highest power of 7 in 100 factorials?

A] 16

B] 12

C] 21

D] 23

FACTORIALS

16. What is the highest power of 7 in 100 factorials?

A] 16

B] 12

C] 21

D] 23



FACTORIALS

17. What is number of trailing zeroes in 12135000?

A] 0

B] 2

C] 3

D] 5



FACTORIALS

18. What is number of trailing zeroes in $121350001!$?

- A] 0 B] 2 C] 3 D] 5



FACTORIALS

19. Find the number of zeros in $182!$?

A] 44

B] 42

C] 51

D] 48



FACTORIALS

20. Find the number of zeros in $532!$?

A] 144

B] 142

C] 131

D] 148



FACTORIALS

21. What is the number of trailing zeroes in $1173!$

A] 214

B] 233

C] 265

D] 290



FACTORIALS

22. Find the No. of zeroes at the end of $2^7 \times 3^5 \times 5^8 \times 7^5 \times 8^3 \times 10^5$.

A] 13

B] 17

C] 15

D] 20



FACTORIALS

23. Which of the following cannot be the number of zeroes at the end of any factorial?

A] 25

B] 26

C] 30

D] 36

FACTORIALS

24. If the number of zeros are 117 for the number $x!$, then find the least value of x ?

A] 289

B] 326

C] 430

D] None

Any Doubts???

