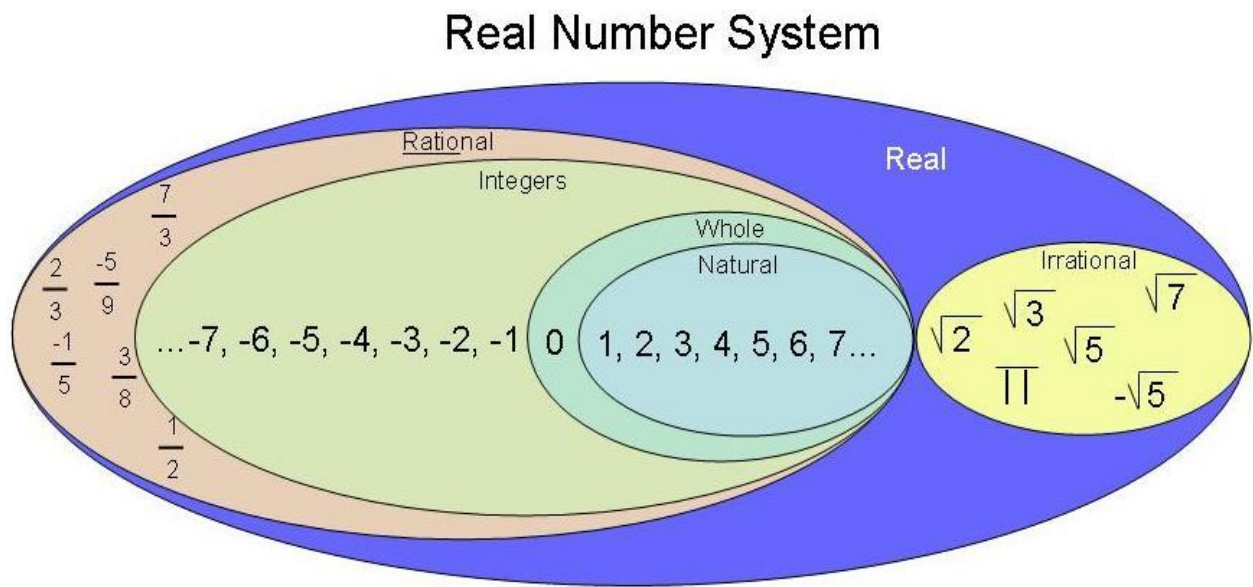


ARITHMETIC

Tip #1

An easy way to Understand the real number system:



Tip #2

Unit digit table:

d	d ²	d ³	d ⁴	d ⁵	d ⁶	d ⁷	d ⁸	d ⁹
1	1	1	1	1	1	1	1	1
2	4	6	8	2	4	6	8	2
3	9	7	1	3	9	7	1	3
4	6	4	6	4	6	4	6	4
5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6
7	9	3	1	7	9	3	1	7
8	4	2	6	8	4	2	6	8
9	1	9	1	9	1	9	1	9

Where 'd' is the Unit digit of the Number (Mod 10). Assuming that 'n' is positive and 'd' is non-negative.

Ways to find it:

As you can see, the pattern repeats itself every 4 powers for all the numbers. Now that we know the cycle is 4, we can make a very important observation.

- Find the unit digit of 7^{86}

Remainder of 86 is 2 when we divided it by 4

The unit digit of 7^{86} is same as $7^2 = 9$.

- Find the unit digit of $33^{46} + 48^{33}$

Remainder of 46 when divided by 4 is 2

Remainder of 33 when divided by 4 is 1

Unit digit of 33^{46} is same as $3^2 = 9$ as cyclic of unit digit of 3 – (3, 9, 7, 1)

Unit digit of 48^{33} is same as $8^1 = 8$ as cyclic of unit digit of 8 – (8, 4, 2, 6)

So unit digit of $33^{46} + 48^{33} = 3+8 = 11 \rightarrow 1$

Tip #3

We don't have enough time to do the long method to get the remainder. So get the value using online calculator.

Remainder of $3455/7 = 493.571$

This will tell that the Quotient is 493.

Remainder = Number – Quotient * divisor

Remainder = $3455 - 493*7 = 3455 - 3451 = 4$ will be the remainder

Tip #4

The easiest way to factor quadratic equations

$$x^2 + bx + c = 0$$

- If c is positive, then the factors you're looking for are either both positive or else both negative.
If b is positive, then the factors are positive
If b is negative, then the factors are negative.
In either case, you're looking for factors that add to b.
- If c is negative, then the factors you're looking for are of alternating signs; that is, one is negative and one is positive.
If b is positive, then the larger factor is positive.
If b is negative, then the larger factor is negative.
In either case, you're looking for factors that are b units apart.

Let us try few examples:

- $x^2 - 5x + 6 = 0$

In this case, C = 6 is positive, so the factors are either both positives or negatives.

But $b = -5$ is negative, so the both factors should be negative. So the factors of 6 that add up to 5 is 3 and 2. So we can use -3, -2.

$$(x-3)(x-2) = 0 \rightarrow x = 3, 2$$

- $x^2 - x - 6 = 0$

In this case, $C = -6$ is negative, so the factors are opposite signs: both positives or negatives.

But $b = -5$ is negative, so the both factors should be negative. So the factors of 6 that add up to 5 are 3 and 2. So we can use -3, -2.

Tip #5

BODMAS:

Order of operation – BODMAS will tell us which procedures should be performed first in a given mathematical expression.

B for Brackets

O for Orders (powers and square roots)

D for Division

M for Multiplication

A for Addition

S for Subtraction

$$40 - (2*12+15\%5) + 14*4\%8$$

Here, let us remove the bracket first

$$2*12+15\%5$$

$$= 2 * 12 + 3$$

$$= 24 + 3$$

$$= 27 \text{ (Follow the BODMAS order)}$$

$$\text{Now, } 40 - (2 * 12 + 15\% 5) + 14 * 4\% 8$$

$$= 40 - 27 + 14 * 4\% 8$$

$$= 40 - 27 + 14 * 1/2$$

$$= 40 - 27 + 7$$

$$= 20$$

Tip #6

When a question says:

By what percentage is A greater than B? OR By what percentage is A lesser than B?

We must find: $|A - B| * 100 / B$

Whereas when a Question says:

By what percentage is B greater than A? OR By what percentage is B lesser than A?

We must find: $|A - B| * 100 / A$

Percentage increase = $(\text{Final value} - \text{Initial value}) * 100 / \text{Initial value}$

Percentage decrease = $(\text{Initial value} - \text{Final value}) * 100 / \text{Initial value}$

@Note: Initial values is same as reference value

Tip #7

$5 * 7 \frac{1}{2}$ is not same as $35 \frac{1}{2}$. It will be $5 * 15/2 = 75/2 = 37 \frac{1}{2}$

Tip #8

$-3 \frac{1}{2}$ is not same as $-5/2$. It will be $-(3 + 1/2) = -7/2$

Tip #9

Multiplication rule:

Positive* Positive = Positive

Negative * Negative = Positive

Negative * Positive = Negative

Positive* Negative = Negative

This is same for Division too.

Even*Even =Even

Even*Odd=Even

Even*Odd=Even

Odd*Odd = Odd

Tip #10

Square root:

When we take square root for any value, the answer will always be positive only.

If we need to find the value of A, when A^2 is given, then the answer will be positive and negative.

If we need to find the value of \sqrt{A} , when A is given, then the answer will always be positive only.

Examples:

(i) Find the value of A, if $A^2 = 36$

Given, $A^2 = 36$

$A = +6$ or -6

(ii) Find the value of, \sqrt{A} , if $A = 36$

$\sqrt{A} = +6$ (It will never be negative, this is the mathematical rule)

Tip #11

Finding number of Factors:

To find the number of factors of a number, express the number as a product of powers of prime numbers.

In this case, 24 can be written as $8 * 3 = (2^3 * 3^1)$

Now, increment the power of each of the prime numbers by 1 and multiply the result.

In this case it will be $(3 + 1) \times (1 + 1) = 4 \times 2 = 8$ (the power of 2 is 3 and the

power of 3 is 1)

Therefore, there will 8 factors including 1 and 24.

Excluding, these two numbers, you will have $10 - 2 = 8$ factors.

Tip #12

Sum of n natural numbers

The sum of first n natural numbers = $n(n+1)/2$

The sum of squares of first n natural numbers is $n(n+1)(2n+1)/6$

The sum of first n even numbers = $n(n+1)$

The sum of first n odd numbers = n^2

Tip #13

Finding Squares of numbers:

To find the squares of numbers near numbers of which squares are known

To find 41^2 , Add $40 + 41$ to $1600 = 1681$

To find 59^2 , Subtract $60^2 - (60+59) = 3481$

Tip #14

Product of HCF and LCM

Product of any two numbers = Product of their HCF and LCM.

Hence product of two numbers = LCM of the numbers if they are prime to each other

Tip #15

Despite the fact that it is extremely difficult to lay down all possible combinations of series, still if you follow few steps, you may solve a series question easily and quickly.

Step 1: Do a preliminary screening of the series. If it is simple series, you will be able to solve this easily.

Step 2: If you fail in preliminary screening then determine the trend of the series. Determine whether this is increasing or decreasing or alternating.

Step 3: Perform this step only if a series is increasing or decreasing.

Use following rules:

- If rise is slow or gradual, this type of series is likely to have an additional based increase. Successive numbers have been found by adding some numbers.
- If rise is very sharp initially but slows down later on, the series is likely to be formed by adding squared or cubed numbers.
- If the rise of a series is throughout equally sharp, the series is likely to be multiplication based.
- If the rise is irregular and haphazard, there may be two possibilities. Either there may be a mix of two series or two different kinds of operations may be

going on alternately. (The first is very likely when the increase is very irregular; the second is more likely when there is a pattern, even in the irregularity of the series.)

Step 4:

To be performed when series is alternating.

- If the rise is irregular and haphazard, there may be two possibilities. Either there may be a mix of two series or two different kinds of operations may be going on alternately. (The first is very likely when the increase is very irregular; the second is more likely when there is a pattern, even in the irregularity of the series.)