Trignometry fromulas:

* sin θ = Opposite Side/Hypotenuse
* cos θ = Adjacent Side/Hypotenuse
* tan θ = Opposite Side/Adjacent Side

**Matrices**

* Any rectangular arrangement of numbers in m rows and n columns is called a matrix of order m×n.
* Where aij denotes the element of the ith row and jth column. The above [matrix](https://byjus.com/jee/matrices/) is denoted as [aij]m×n . The elements a11, a22, a33 etc are called diagonal elements. Their sum is called the trace of A denoted by Tr(A).
* **2. Basic Definitions**
* (i) Row matrix: A matrix having one row is called a row matrix.
* (ii) Column matrix: A matrix having one column is called a column matrix.
* (iii) Square matrix: A matrix of order m×n is called square matrix if m = n.
* (iv) Zero matrix: A = [aij]m×n is called a zero matrix, if aij = 0 for all i and j.
* (v) Upper triangular matrix: A = [aij]m×n is said to be upper triangular, if aij= 0 for i > j.
* (vi) Lower triangular matrix: A = [aij]m×n is said to be lower triangular, if aij = 0 for i < j.
* (vii) Diagonal matrix: A square matrix [aij]m×n is said to be diagonal, if aij = 0 for i ≠ j.
* (viii) Scalar matrix: A diagonal matrix A = [aij]m×n is said to be scalar, if aij = k for i = j.
* (ix) Unit matrix (Identity matrix): A diagonal matrix A = [aij]n is a unit matrix, if aij = 1 for i = j.
* (x) Comparable matrices: Two matrices A and B are comparable, if they have the same order.
* **3. Equality of matrices:** Two matrices A = [aij]m×n and B = [bij]p×q are are said to be equal, if m = p and n = q and aij = bij ∀ i and j.
* **4. Multiplication of a matrix by a scalar:** Let λ be a scalar, then λA = [bij]m×n where bij= λaij ∀ i and j.
* **5. Addition of matrices:** Let A = [aij]m×n and B = [bij]m×n be two matrices, then A+B = [aij]m×n+ [bij]m×n = [cij]m×n where cij = aij+bij ∀ i and j.
* **6. Subtraction of matrices:** A-B = A+(-B), where -B = ( -1)B.
* **7. Properties of addition and scalar multiplication:**
* (i) λ(A+B) = λA+λB
* (ii) λA = Aλ
* (iii) (λ1+λ2)A = λ1A+λ2A
* **8. Multiplication of matrices:** Let A = [aij]m×p and B = [bij]p×n , then AB = [cij]m×n where cij =
* **9. Properties of matrix multiplication:**
* (i) AB ≠ BA
* (ii) (AB)C = A(BC)
* (iii) AIn = A = InA
* (iv) For every non singular square matrix A (i.e., | A |≠ 0 ) there exists a unique matrix B so that AB = In = BA. In this case we say that A and B are multiplicative inverses of one another. I.e., B = A-1 or A = B-1 .
* **10. Transpose of a Matrix.**
* Let A = [aij]m×n then A’ or AT the transpose of A is defined as A’ = [aji]n×m .
* (i) (A’)’ = A
* (ii) (λA)’ = λA’
* (iii) (A+B)’ = A’+B’
* (iv) (A-B)’ = A’-B’
* (v) (AB)’ = A’B’
* (vi) For a square matrix A, if A’ = A , then A is said to be a symmetric matrix.
* (vii) For a square matrix A, if A’ = -A , then A is said to be a skew symmetric matrix.
* sec θ = Hypotenuse/Adjacent Side
* cosec θ = Hypotenuse/Opposite Side
* cot θ = Adjacent Side/Opposite Side

The **Reciprocal Identities** are given as:

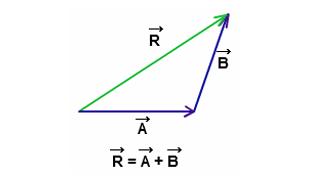
* cosec θ = 1/sin θ
* sec θ = 1/cos θ
* cot θ = 1/tan θ
* sin θ = 1/cosec θ
* cos θ = 1/sec θ
* tan θ = 1/cot θ

### Trigonometry Table

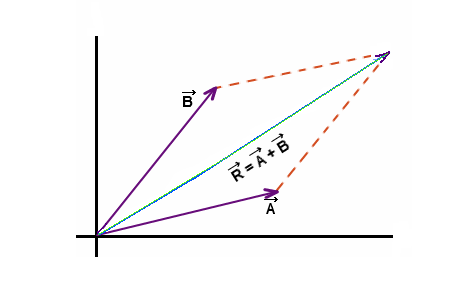
| **Angles (In Degrees)** | **0°** | **30°** | **45°** | **60°** | **90°** | **180°** | **270°** | **360°** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Angles (In Radians)** | **0°** | **π/6** | **π/4** | **π/3** | **π/2** | **π** | **3π/2** | **2π** |
| sin | 0 | 1/2 | 1/√2 | √3/2 | 1 | 0 | -1 | 0 |
| cos | 1 | √3/2 | 1/√2 | 1/2 | 0 | -1 | 0 | 1 |
| tan | 0 | 1/√3 | 1 | √3 | ∞ | 0 | ∞ | 0 |
| cot | ∞ | √3 | 1 | 1/√3 | 0 | ∞ | 0 | ∞ |
| csc | ∞ | 2 | √2 | 2/√3 | 1 | ∞ | -1 | ∞ |
| sec | 1 | 2/√3 | √2 | 2 | ∞ | -1 | ∞ | 1 |

* sin (π/2 – A) = cos A & cos (π/2 – A) = sin A
* sin (π/2 + A) = cos A & cos (π/2 + A) = – sin A
* sin (3π/2 – A) = – cos A & cos (3π/2 – A) = – sin A
* sin (3π/2 + A) = – cos A & cos (3π/2 + A) = sin A
* sin (π – A) = sin A & cos (π – A) = – cos A
* sin (π + A) = – sin A & cos (π + A) = – cos A
* sin (2π – A) = – sin A & cos (2π – A) = cos A
* sin (2π + A) = sin A & cos (2π + A) = cos A
* sin(90°−x) = cos x
* cos(90°−x) = sin x
* tan(90°−x) = cot x
* cot(90°−x) = tan x
* sec(90°−x) = csc x
* csc(90°−x) = sec x

VECTOR FORMULAS:

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### **Parallelogram law of addition**



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