
Important Maths Formulae E Book Max

CONTENTS

1. FRACTIONS
2. SURDS
3. MATRICES
4. COMMERCIAL MATHEMATICS (ವಾಣಿಜ್ಯ ಗಣಿತ)
5. RATIO AND PROPORTION
6. POLYNOMIAL EQUATIONS (ಬಹುಪದಯೋಕ್ತಿ ಸಮೀಕರಣಗಳು)
7. TRIGONOMETRY
8. STATISTICS
9. UNDERSTANDING ANGLES
10. GEOMETRY (ರೇಖಾಗಣಿತ) PERIMETER AND AREA FINDING FORMULA

1. FRACTIONS

The Number which is in the form of $\frac{p}{q}$ is called the fraction. Where **p** is called **Numerator** and **q** is called **Denominator**.

Fractions Types :

1. **Proper Fractions** : If a Numerator is smaller than Denominator then it is called Proper Fraction.

E.g. : $\frac{1}{5}, \frac{2}{5}$

2. **Improper Fractions** : If Number is greater than Denominator then it is called Improper

Fraction E.g. : $\frac{7}{9}, \frac{8}{5}$

3. **Mixed Fractions** : If Number contains Integer with proper fraction then it is called Mixed

Fraction : E.g : $1\frac{1}{3}, 2\frac{2}{5}$

2. SURDS :

A surd is defined as the irrational root of rational number.

E.g. $\sqrt[2]{5}$ Here 2 is called Order. 5 is called Radicand $\sqrt{\quad}$ is called square root

$\sqrt[3]{\quad}$ is called cube root.

$$1) \sqrt{a} = a^{\frac{1}{2}}$$

$$2) \sqrt{a^2} = a$$

$$3) \sqrt[3]{a} = a^{\frac{1}{3}}$$

$$4) \sqrt[3]{a^3} = a$$

$$11) (\sqrt{a} + \sqrt{b})(\sqrt{a} - \sqrt{b}) = a - b$$

$$12) (a + \sqrt{b})(a - \sqrt{b}) = a^2 - b$$

$$13) (\sqrt{a} + \sqrt{b})(\sqrt{c} + \sqrt{d}) = \sqrt{ac} + \sqrt{ad} + \sqrt{bc} + \sqrt{bd}$$

$$14) (\sqrt{a} + \sqrt{b})^2 = a + \sqrt{2ab} + b$$

$$5) (\sqrt{a})^2 = a^{\frac{2}{2}} = a$$

$$6) \sqrt{axa} = a$$

$$7) \left(\frac{\sqrt{a}}{\sqrt{b}}\right)^2 = \frac{a}{b}$$

$$8) \sqrt[3]{axaxa} = a$$

$$9) \sqrt{ab} = \sqrt{a}\sqrt{b}$$

$$10) \sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$$

$$11) \sqrt[n]{a} = a^{\frac{1}{n}}$$

$$12) \sqrt[m]{\sqrt[n]{a}} = \sqrt[mn]{a}$$

$$13) \sqrt[n]{ab} = \sqrt[n]{a}\sqrt[n]{b}$$

$$14) \sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}$$

$$15) \sqrt[n]{a^m} = a^{\frac{m}{n}}$$

3. MATRICES

A matrix is a rectangular arrangement of number in rows and columns enclosed within square brackets.

E.g. Here the order of 1st matrix is 3 x 3 2nd Matrix is 3 x 2

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \end{bmatrix}$$

There are different types of Matrixes

Row Matrix $[1 \ 3 \ 2]$ **Zero Matrix** $\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$

Column Matrix $\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$ **Unit /Identity Matrix** $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

Diagonal Matrix $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix}$ **Scaler Matrix** $\begin{bmatrix} 3 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 3 \end{bmatrix}$

Symmetric Matrix $\begin{bmatrix} 3 & 2 & 4 \\ 2 & 0 & 5 \\ 4 & 5 & 6 \end{bmatrix}$

Transpose of Matrix is obtained by interchanging its rows and columns

Eg. $A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$ its transpose form is $A^T = \begin{bmatrix} 1 & 4 & 7 \\ 2 & 5 & 8 \\ 3 & 6 & 9 \end{bmatrix}$

4. Commercial Mathematics (ವಾಣಿಜ್ಯ ಗಣಿತ)

Profit and Loss (ಲಾಭ ಮತ್ತು ನಷ್ಟ)**Profit = Selling Price – Original Price**

ಲಾಭ = ಮಾರಾಟ ಬೆಲೆ – ಅಸಲು ಬೆಲೆ

Loss = Original Price – Selling Price

ನಷ್ಟ = ಅಸಲು ಬೆಲೆ – ಮಾರಾಟ ಬೆಲೆ

ಲಾಭ

$$\text{ಲಾಭ} = \frac{\text{ಲಾಭ}}{\text{ಅಸಲು ಬೆಲೆ}} \times 100$$

$$\text{Profit} = \frac{\text{Profit}}{\text{Selling price}} \times 100$$

$$\text{Selling Price} = \left(\frac{100 + \text{Profit}\%}{100} \right) \times \text{cost price}$$

Calculation of Simple Interest

$$\text{SI} = \frac{\text{PTR}}{100}$$

Where I = Simple Interest
 P = Principal Amount
 T = Time Period
 R = Rate of Interest

$$P = \frac{I \times 100}{TR}$$

$$T = \frac{I \times 100}{PR}$$

$$R = \frac{I \times 100}{PT}$$
TOTAL AMOUNT PAYABLE (A) = Principal Amount (P) + Interest (I)

$$A = P + I$$

5. Ratio - Proportion :

1:3

2:4

Converting Percent to Decimals :

Convert 5% into Decimal = 0.05

1.5% into Decimal = 0.015

Decimals to Percent :

Convert 0.398 = 39.8%

1.9 = 190%

Percent to Fraction :

$$47.5\% = \frac{47.5}{100} = \frac{475}{1000}$$

$$25\% = \frac{25}{100} = 0.25$$

6. POLYNOMIAL EQUATIONS (ಬಹುಪದೋಕ್ತಿಗಳು)

$$1) (x + y)^2 = x^2 + y^2 + 2xy$$

$$2) (x - y)^2 = x^2 + y^2 - 2xy$$

$$3) x^2 - y^2 = (x + y)(x - y)$$

$$4) (x+a)(x+b) = x^2 + (a+b)x + ab$$

$$5) (x + y + z)^2 = x^2 + y^2 + z^2 + 2xy + 2yz + 2zx$$

$$6) (x+y)^3 = x^3 + y^3 + 3xy(x+y)$$

$$7) (x - y)^3 = x^3 - y^3 - 3xy(x-y)$$

$$8) x^3 + y^3 + z^3 - 3xyz = (x + y + z)(x^2 + y^2 + z^2 - xy - yz - zx)$$

$$9) (x+y+z)^2 = x^2 + y^2 + z^2 + 2xy + 2yz + 2zx$$

$$10) x^3 + y^3 = (x+y)(x^2 + y^2 - xy)$$

$$11) x^3 - y^3 = (x-y)(x^2 + y^2 + xy)$$

$$12) (x^4 + y^4 + x^2y^2) = (x^2 + y^2 + xy)(x^2 + y^2 - xy)$$

$$13) (x+a)(x+b)(x+c) = x^3 + x^2(a+b+c) + x(ab+bc+ca) + abc$$

$$14) a^3 + b^3 + c^3 - 3abc = (a+b+c)(a^2 + b^2 + c^2 - ab - bc - ca)$$

$$15) (a+b)^2 - (a-b)^2 = 4ab$$

$$16) (a+b)^2 + (a-b)^2 = 2(a^2 + b^2)$$

Quadratic Equation : (ವರ್ಗ ಸಮೀಕರಣಗಳು)

Standard form of quadratic equation is $ax^2 + bx + c = 0$

ವರ್ಗ ಸಮೀಕರಣದ ಆದರ್ಶ ರೂಪ $ax^2 + bx + c = 0$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

(ಶೋಧಕ) Discriminant

$$\Delta = b^2 - 4ac$$

$$b^2 - 4ac > 0$$

Two Distinct real roots
ಮೂಲಗಳು ವಾಸ್ತವ ಮತ್ತು ಭಿನ್ನ

$$b^2 - 4ac < 0$$

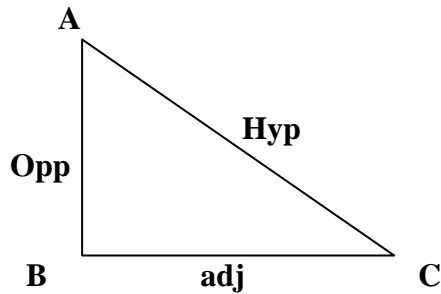
No real roots
ಯಾವುದೇ ವಾಸ್ತವ ಮೂಲಗಳಿಲ್ಲ

$$b^2 - 4ac = 0$$

Two equal roots
ಸಮನಾದ ಮೂಲಗಳನ್ನು ಹೊಂದಿರುತ್ತದೆ.

7. Trigonometry :

In a right angle triangle We can define as follows



$$\sin \theta = \frac{\text{opp}}{\text{hyp}} = \frac{AB}{AC}$$

$$\cos \theta = \frac{\text{adj}}{\text{hyp}} = \frac{BC}{AC}$$

$$\tan \theta = \frac{\text{opp}}{\text{adj}} = \frac{AB}{BC}$$

$$\tan \theta = \frac{\sin \theta}{\cos \theta}$$

$$\cot \theta = \frac{1}{\tan \theta}$$

$$\sin^2 \theta + \cos^2 \theta = 1$$

$$\sin^2 \theta = 1 - \cos^2 \theta$$

$$\sin \theta = \sqrt{\cos^2 \theta - 1}$$

$$1 + \tan^2 \theta = \sec^2 \theta$$

$$\tan^2 \theta = \sec^2 - 1$$

$$\sec \theta = \sqrt{1 + \tan^2 \theta}$$

$$\text{cosec}^2 \theta - \cot^2 \theta = 1$$

$$\cot^2 \theta = \text{cosec}^2 \theta - 1$$

$$\text{Cos}A = \text{Sin}(90^\circ - A)$$

$$\text{Sec}A = \text{Cosec}(90^\circ - A)$$

$$\text{cosec} \theta = \frac{\text{hyp}}{\text{opp}} = \frac{AC}{AB} = \frac{1}{\sin \theta}$$

$$\sec \theta = \frac{\text{hyp}}{\text{adj}} = \frac{AC}{BC} = \frac{1}{\cos \theta}$$

$$\cot \theta = \frac{\text{adj}}{\text{opp}} = \frac{BC}{AB} = \frac{\cos \theta}{\sin \theta}$$

$$\cot \theta = \frac{\cos \theta}{\sin \theta}$$

$$\text{cosec} \theta = \frac{1}{\sin \theta}$$

$$\sec \theta = \frac{1}{\cos \theta}$$

$$\cos^2 \theta = 1 - \sin^2 \theta$$

$$\cos \theta = \sqrt{1 - \sin^2 \theta}$$

$$\sec^2 - \tan^2 \theta = 1$$

$$\tan \theta = \sqrt{\sec^2 - 1}$$

$$\text{cosec}^2 \theta = 1 + \cot^2 \theta$$

$$\text{Sin}A = \text{Cos}(90^\circ - A)$$

$$\text{Cosec} A = \text{Sec}(90^\circ - A)$$

$$\text{Cot}A = \text{Tan}(90^\circ - A)$$

$$\text{Tan}A = \text{Cos}(90^\circ - A)$$

Standard Angles

θ	0°	30°	45°	60°	90°	180°	270°	360°
$\sin \theta$	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1	0	-1	0
$\cos \theta$	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0	-1	0	1
$\tan \theta$	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	ND	0	ND	0
$\operatorname{cosec} \theta$	ND	2	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	1			
$\sec \theta$	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	N			
$\cot \theta$	ND	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	0			

8. Statistics (ಸಂಖ್ಯಾ ಶಾಸ್ತ್ರ)

$$X = \text{Average} = \frac{\sum xi}{n}$$

$$\text{Mode} = 3 \text{ Median} - 2 \text{ Average}$$

$$\text{Median} = (n \text{ is odd Number}) - \left(\frac{n+1}{2}\right)$$

$$(n \text{ is even}) = \left(\frac{n}{2}\right) \text{ and } \left(\frac{n}{2}+1\right)$$

$$\text{Average} = \bar{X} = \frac{\sum fixi}{\sum fi}$$

$$\text{Median} = I + \left[\frac{\frac{n}{2} - cf}{f} \right] xh$$

$$\text{Mode} = \left[\frac{f_i - f_a}{2f_i - f_a - f_2} \right] xh$$

$$\text{Direct Method} = \bar{X} = \frac{\sum fixi}{\sum fi}$$

$$\text{Assumed mean method} = \bar{X} = a + \frac{\sum fixi}{\sum fi}$$

$$\text{Step Deviation Method} = \bar{X} = a + \left(\frac{\sum fixi}{\sum fi} \right) xh$$

9. Understanding Angles

An Angle is formed by two rays with same starting point.

Point : A fine dot made by sharp pencil on sheet of paper.

Straight Line : Straight line is also a set of points and extended endlessly in both direction.

Ray : It is a part of straight line it can go in one direction infinitely.

Line Segment : A part of straight line having two end points is called a line segment.

Parallel Lines : Any two straight lines which do not have any common points are said to be parallel to each other.

ಅಘು ಕೋನ / **Acute Angle :** The angle lies between 0^0 to 90^0 is called Acute Angle. $0^0 < x < 90^0$.

ಲಂಬ ಕೋನ / **Right Angle :** The angle which is exactly 90^0 is called Right Angle.

ಅಧಿಕ ಕೋನ / **Obtuse Angle :** The angle lies between 90^0 to 180^0 is called Obtuse Angle. $90^0 < x < 180^0$.

ಸರಳ ಕೋನ / **Straight Angle :** The angle which is 180^0 is called Straight Angle.

ReflexAngle : The angle lies between 180^0 to 360^0 is called Reflex Angle. $180^0 < x < 360^0$.

Complete Angle : An Angle of complete 360^0 is called Complete Angle.

Two Angle are called Complementary angle if their sum is one right angle i.e. 90^0 .

Two angles are called supplementary angles if their sum is 180^0 .

Types of Angles :

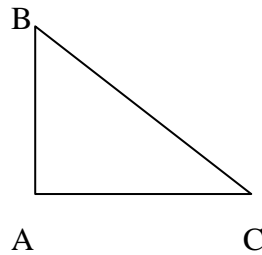
Adjacent Angles :

Linear Pair of Angles :

Vertically opposite Angles :

In Right angle triangle :

$$BC^2 = CA^2 + AB^2$$



Types of Triangles

1. Scalene Triangle
2. Isoscles Triangle
3. Equilateral Triangle
4. Right Angled Triangle
5. Obtuse Angled Triangle

Circles : The fixed point of a circle is called the centre.

Circumference : The perimeter of a circle is called a circumference of the circle.

$$\text{Circumference} = C = \pi d.$$

Radius : The distance between the centre and any point on the circumference of a circle is called radius.

Chord : The line jointing any two points on the circumference of a circle is called a Chord.

Diameter : A chord passing through the centre of a circle is called a diameter . $d = 2r$ (one diameter = two radius)

Arc : A part of the circumference of a circle is called arc.

Segment : The region bounded by an arc and chord of a circle.

Sector : A part of the circle bounded by the radii and an arc cutoff by it.

$$\text{Area of circle} = \pi r^2$$

10. Geometry (ರೇಖಾಗಣಿತ) Perimeter and Area Finding Formula :

1. Square : ಚೌಕ

ಚೌಕದ ಸುತ್ತಳತೆ = Perimeter of Square = AB + BC + CD + DA = 4 (Sides length) = 4l

ಚೌಕದ ವಿಸ್ತೀರ್ಣ = Area = (side length)² = l x l = l²

2. Rectangle : ಆಯತ

Perimeter = P = 2(l+b) = 2l + 2b l = length ; b = breadth

Area = lxb

Parallelogram : ಸಮಾಂತರ ಚತುರ್ಭುಜದ ಕ್ಷೇತ್ರಫಲ

Perimeter = Sum of all sides

Area = bxh where b = breadth ; h = height

Trapezium ತ್ರಾಪಿಜ್ಯದ ವಿಸ್ತೀರ್ಣ

Perimeter = Sum of all sides

Area = $\frac{1}{2}(a+b) \times h$

Rhombus ವಜ್ರಾಕೃತಿಯ ವಿಸ್ತೀರ್ಣ

Perimeter = Sum of all sides

Area = $\frac{1}{2} \times d_1 \times d_2$

Triangle : ತ್ರಿಕೋನದ ವಿಸ್ತೀರ್ಣ

Perimeter = P = a + b + c
= sum of side lengths

Area = $\frac{1}{2} b \times h$ where b = breadth ; h = height

Circle : ವೃತ್ತದ ವಿಸ್ತೀರ್ಣ

Circumference = $2\pi r = \pi d$

Area = πr^2 Where r is radius

Cube :

Surface Area = $6a^2 = 6(\text{length})^2$

Volume = V = $a^3 = (\text{side length})^3$

Rectangular Solid

Surface Area = $2(lw + lh + hw)$

Volume = V = lwh
= length x width x height

Pyramid :

$$\begin{aligned}\text{Volume} = V &= \frac{1}{3} B h \\ &= \frac{1}{3} (\text{Base area}) \times (\text{height})\end{aligned}$$

Prism :

$$\text{Volume } V = B h = (\text{Base Area}) \times (\text{height})$$

Cylinder :

$$\begin{aligned}\text{Volume } V &= B h = (\text{Base Area}) \times (\text{height}) \\ &= \pi r^2 h = \pi (\text{radius})^2 \times (\text{height})\end{aligned}$$

Cone :

$$\begin{aligned}\text{Volume} &= \frac{1}{3} B h = \frac{1}{3} (\text{Base Area}) \times (\text{height}) \\ &= \frac{1}{3} \pi r^2 h = \frac{1}{3} \pi (\text{radius})^2 \times (\text{height})\end{aligned}$$

Sphere :

$$\begin{aligned}\text{Surface Area } A &= 4 \pi r^2 \\ \text{Volume } V &= \frac{4}{3} \pi r^3\end{aligned}$$

Figure Name	Corners	Sides
Triangle	3	3
Star	5	5
Square	4	4
Rectangle	4	4
Parallelogram	4	4
Diamond	4	4
Pentagon	5	5
Hexagon	6	6