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General Maths Formulas for Class 10

Here is a list of other important formulas for class 10-

1. $(a+b)2 = a2 + b2 + 2ab$
2. $(a-b)2 = a2 + b2 – 2ab$
3. $(a+b)\ (a-b) = a2 – b2$
4. $(x + a)(x + b) = x2 + (a + b)x + ab$
5. $(x + a)(x – b) = x2 + (a – b)x – ab$
6. $(a + b)3 = a3 + b3 + 3ab(a + b)$
7. $(a – b)3 = a3 – b3 – 3ab(a – b)$
8. $(x – a)(x + b) = x2 + (b – a)x – ab$
9. $(x – a)(x – b) = x2 – (a + b)x + ab$
10. $(x + y + z)2 = x2 + y2 + z2 + 2xy + 2yz + 2xz$
11. $(x + y – z)2 = x2 + y2 + z2 + 2xy – 2yz – 2xz$
12. $(x – y + z)2 = x2 + y2 + z2 – 2xy – 2yz + 2xz$
13. $(x – y – z)2 = x2 + y2 + z2 – 2xy + 2yz – 2xz$
14. $x3 + y3 + z3 – 3xyz = (x + y + z)(x2 + y2 + z2 – xy – yz -xz)$
15. $x2 + y2 =½ [(x + y)2 + (x – y)2]$
16. $(x + a)\ (x + b)\ (x + c) = x3 + (a + b +c)x2 + (ab + bc + ca)x + abc$
17. $x3 + y3= (x + y)\ (x2 – xy + y2)$
18. $x3 – y3 = (x – y)\ (x2 + xy + y2)$
19. $x2 + y2 + z2 -xy – yz – zx = ½ [(x-y)2 + (y-z)2 + (z-x)2]$

Maths Formulas for Class 10 All Chapters

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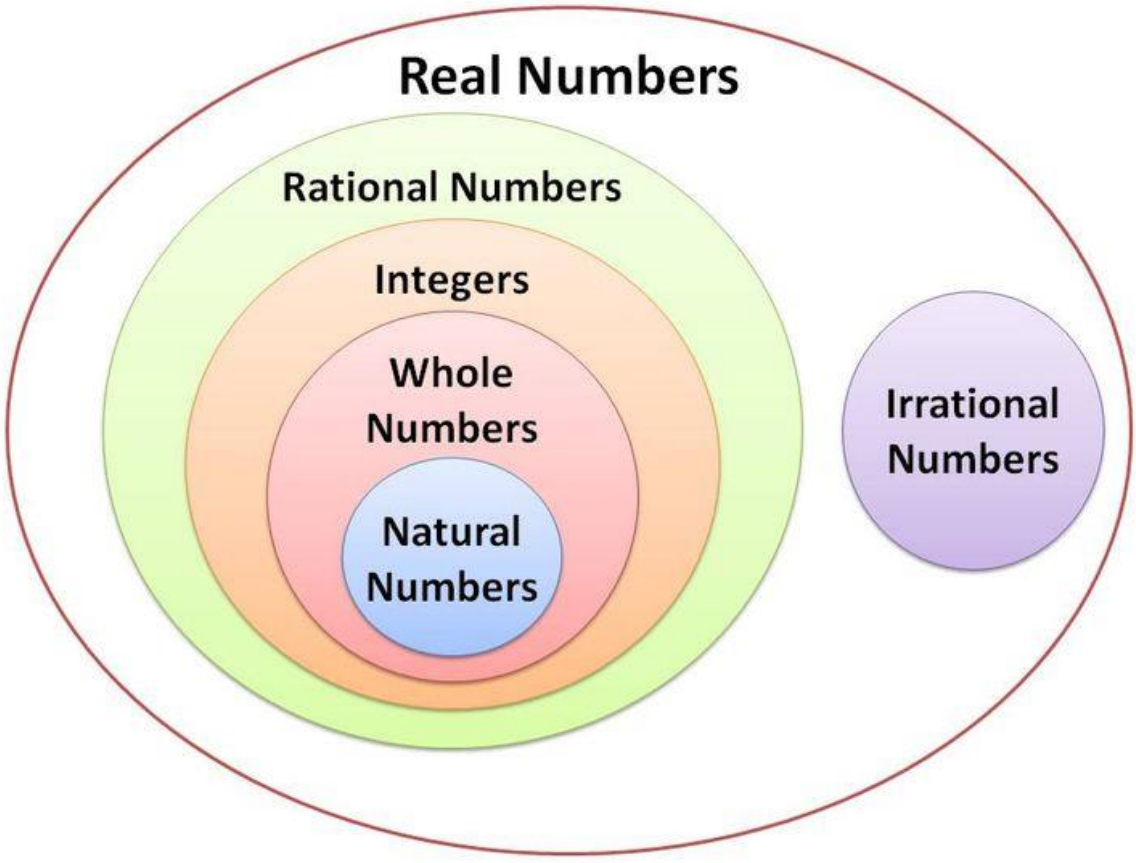
Now let us quickly go through Maths formulas for class 10 of all the chapters-

Chapter 1: Real Numbers

The first chapter of class 10th mathematics will equip you with a variety of concepts related to Natural numbers, Whole Numbers and Real Numbers, etc. Let us have a look at maths formula for class 10-

Numbers	Details
Natural Numbers	N ={ 1, 2,3,4,5 … }
Whole Numbers	W={ 0, 1, 2, 3, 4, 5… }
Rational Numbers	Those numbers which can be presented in the form of a/b are called Rational Numbers.
Re Numbers	Real Numbers can be found on a number line



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S. No	Type of Numbers	Description

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1	Natural Numbers	N = {1,2,3,4,5 > It is the counting numbers
2	Whole number	W= {0,1,2,3,4,5> It is the counting numbers + zero
3	Integers	All whole numbers including Negative number + Positive number ……-4,-3,-2,-1,0,1,2,3,4,5… so on. Like whole numbers, integers don't include fractions or decimals.
4	Positive integers	Z_+ = 1,2,3,4,5, ……
5	Negative integers	Z_- = -1,-2,-3,-4,-5, ……
6	Rational Number	A number is called rational if it can be expressed in the form p/q where p and q are integers (q> 0). Ex: P/q, 4/5
7	Irrational Number	A number is called rational if it cannot be expressed in the form p/q where p and q are integers (q> 0). Ex: √2, Pi, … etc
8	Real Numbers	A real number is a number that can be found on the number line. Real Numbers are the numbers that we normally use and apply in real-world applications. Real Numbers include Natural Numbers, Whole Numbers, Integers, Fractions, Rational Numbers and Irrational Numbers

Chapter 2 PolynomialsThrough the Polynomials chapter, you will have a firm understanding regarding various degree Polynomials such as Linear, Quadratic, Cubic etc. Here are the important formula for this chapter

Polynomials	General Form	Formula
Linear	$ax + b = 0, a \neq 0$	$k = \frac{-constant}{coefficient(x)}$
Quadratic	$ax^2 + bx + c = 0, a \neq 0$	$k_1 + k_2 = \frac{coefficient(x)}{coefficient(x^2)}$
Cubic	$ax^3 + bx^2 + cx = 0, a \neq 0$	$k_1 + k_2 + k_3 = \frac{coefficient(x^2)}{coefficient(x^3)}$

Chapter 3: Pair of Linear Equations in Two Variables

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It is an integral chapter containing a variety of important Maths formula for class 10 especially from the competitive exams point of view. Tabulated below are some of the formula of this chapter:

- **Linear equation in one variable: ax +b =0**
- **Linear equation in two variables: ax+ by+ c =0**
- **Linear equation in three variables: ax+ by+ cz= 0**

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Chapter 4: Quadratic Equations

For a quadratic equation, $ax^2 + bx + c = 0$

$ax^2+bx+c=0$ where $a \neq 0$ And $x = [-b \pm \sqrt{(b^2 – 4ac)}]/2a$

- Sum of roots = –b/a
- Product of roots = c/a
- If roots of a quadratic equation are given, then the quadratic equation can be represented as:

x^2 – (sum of the roots)x + product of the roots = 0

- If Discriminant > 0, then the roots of the quadratic equation are real and unequal/unique.
- If Discriminant = 0, then the roots of the quadratic equation are real and equal.
- If Discriminant < 0, then the roots of the quadratic equation are imaginary (not real).

Chapter 5: Arithmetic Progression

- **nth Term of an Arithmetic Progression:** For a given AP, where a is the first term, d is a common difference, n is the number of terms, its nth term (a_n) is given as

$$a_n = a + (n−1)×d$$

- Sum of First n Terms of an Arithmetic Progression, S_n is given as:

$$S_n = n/2 [a + (n-1) d]$$

Chapter 6: Triangles

- **If two triangles are similar then the ratio of their sides is equal.**

$$\text{i.e., } \Delta ABC \sim \Delta PQR \text{ then } \frac{AB}{PQ} = \frac{BC}{QR} = \frac{AC}{PR}$$

- **Theorem on the area of similar triangles: If two triangles are similar, then the ratio of the area of both triangles is proportional to the square of the ratio of their corresponding sides.**

$$\frac{\text{area of } \Delta ABC}{\text{area of } \Delta PQR} = \left(\frac{AB}{PQ}\right)^2 = \left(\frac{BC}{QR}\right)^2 = \left(\frac{CA}{RP}\right)^2$$

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Chapter 7: Coordinate Geometry

- **Distance Formulae:** Consider a line having two-point A(x_1, y_1) and B(x_2, y_2), then the distance of these points is given as:

$$\mathbf{AB = \sqrt{[(x_2 - x_1)^2 + (y_2 - y_1)^2]}}$$

- **Section Formula:** If a point p divides a line AB with coordinates A(x_1, y_1) and B(x_2, y_2), in ratio m:n, then the coordinates of the point p are given as:

$$\mathbf{P=\{[(mx_2+nx_1)/(m+n)],[(my_2+ny_1)/(m+n)]\}}$$

- **Midpoint Formula:** The coordinates of the mid-point of a line AB with coordinates A(x_1, y_1) and B(x_2, y_2), are given as:

$$\mathbf{P=\{(x_1+x_2)/2,(y_1+y_2)/2\}}$$

- **Area of a Triangle:** Consider the triangle formed by the points A(x_1, y_1) and B(x_2, y_2) and C(x_3, y_3) then the area of a triangle is given as-

$$\mathbf{\Delta ABC = \frac{1}{2} |x_1(y_2-y_3)+x_2(y_3-y_1)+x_3(y_1-y_2)|}$$

Chapter 8: Trigonometry

In a right-angled triangle, the Pythagoras theorem states

$$\mathbf{(\text{perpendicular})^2 + (\text{base})^2 = (\text{hypotenuse})^2}$$

Important trigonometric properties: (with P = perpendicular, B = base and H = hypotenuse)

- **SinA** = P / H
- **CosA** = B / H
- **TanA** = P / B
- **CotA** = B / P
- **CosecA** = H / P
- **SecA** = H/B

Trigonometric Identities:

- $\sin^2A + \cos^2A=1$
- $\tan^2A +1 = \sec^2A$
- $\cot^2A + 1= \operatorname{cosec}^2A$

Relations between trigonometric identities are given below:

- $\sec\theta = 1/\cos\theta$
- $\cot\theta = 1/\tan\theta$
- $\operatorname{cosec}\theta = 1/\sin\theta$
- $\tan\theta = \sin\theta/\cos\theta$

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Trigonometric Ratios of Complementary Angles are given as follows:

- sin (90° – A) = cos A
- cos (90° – A) = sin A
- tan (90° – A) = cot A
- cot (90° – A) = tan A
- sec (90° – A) = cosec A
- cosec (90° – A) = sec A

Angle	0°	30°	45°	60°	90°
Sinθ	0	½	1/√2	√3/2	1
Cosθ	1	√3/2	1/√2	½	0
Tanθ	0	1/√3	1	√3	Undefined
Cotθ	Undefined	√3	1	1/√3	0
Secθ	1	2/√3	√2	2	Undefined
Cosecθ	Undefined	2	√2	2/√3	1

Values of Trigonometric Ratios of 0° and 90° are tabulated below:

θ	0°	30°	45°	60°	90°	180°
Sin	0	1/2	½	3/2	1	0
Cos	1	3/2	½	1/2	0	-1
Tan	0	1/3	1	3	∞	0
Cot	∞	3	1	1/3	0	∞
Sec	1	2/3	2	2	∞	-1
Cosec	∞	2	2	2/3	1	∞

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- **Sinθ= 1/ Cosecθ or Sin θ.Cosecθ= 1**
- **Cosθ= 1/Secθ or Cos θ.Secθ= 1**
- **Tanθ= 1/Cotθ or Tanθ.Cotθ= 1**
- **Sin (A+B)= SinA.CosB + CosA.SinB**
- **Sin (A-B)= SinA.CosB – CosA.SinB**
- **Cos (A+B)= CosA.CosB- SinA.SinB**
- **Cos (A-B)= CosA.CosB+SinA.SinB**
- **Tan (A+B)= (TanA + TanB)/ (1-TanA TanB)**
- **Tan (A-B)= (TanA- TanB)/ (1+TanA TanB)**

Chapter 10: Area of Circle

Terms	Formula
Area of Circle	πr^2
Circumference of Circle	$2\pi r$
Length of the Arch	$\frac{\Theta}{360}2\pi r$
Area of the sector	$\frac{\Theta}{360}\pi r^2$

Chapter 12: Areas Related to Circle

Terms	Formula
Area of the Ring	$a = \pi R^2 - \pi r^2$
Perimeter of Semicircle	$p = \pi r + 2r$
Perimeter of Sector	$p = \frac{\pi r\Theta}{180} + 2\pi r$

- The equal chord of a circle is equidistant from the center.
- The perpendicular drawn from the center of a circle bisects the chord of the circle.
- The angle subtended at the center by an arc = Double the angle at any part of the circumference of the circle.
- Angles subtended by the same arc in the same segment are equal.
- To a circle, if a tangent is drawn and a chord is drawn from the point of contact, then the angle made between the chord and the tangent is equal to the angle made in the alternate segment.

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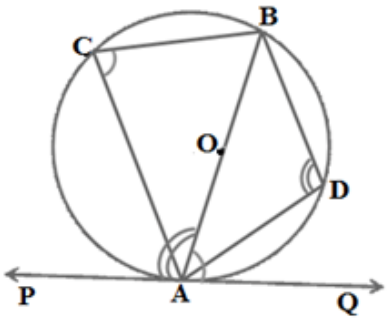
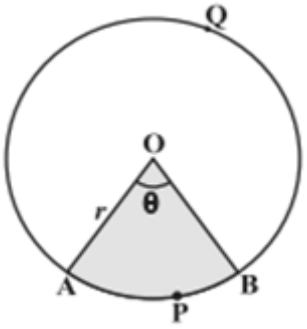


The sum of the opposite angles of a cyclic quadrilateral is always 180°.

- Area of a Segment of a Circle: If AB is a chord that divides the circle into two parts, then the bigger part is known as the major segment and the smaller one is called the minor segment.



Here, Area of the segment APB = Area of the sector OAPB – Area of ∆ OAB

Chapter 13: Surface Area and Volume

- **Sphere Formulas**

Diameter of sphere	2r
Circumference of Sphere	$2 \pi r$
The surface area of a sphere	$4 \pi r^2$
Volume of Cylinder	$4/3 \pi r^2$

- **Cylinder Formulas**

Circumference of Cylinder	$2 \pi rh$
The curved surface area of Cylinder	$2 \pi r^2$

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Perimeter of cuboid	4(l + b +h)
Length of the longest diagonal of a cuboid	$\sqrt{(l^2 + b^2 + h^2)}$
The total surface area of the cuboid	2(l×b + b×h + l×h)
Volume of Cuboid	l × b × h

The total surface area of Cylinder	Circumference of Cylinder + Curved surface area of Cylinder = $2\pi rh + 2\pi r^2$
Volume of Cylinder	$\pi r^2 h$

- **Cone**

The slant height of a cone	$l = \sqrt{(r^2 + h^2)}$
The curved surface area of a cone	Πrl
The total surface area of a cone	πr (l + r)
Volume of cone	⅓ π r^2 h

Here, l = length, b = breadth and h = height In case of Cube, put l = b = h = a, as cube all its sides of equal length, to find the surface area and volumes.

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Terms	Formulas
Surface Area of a Cuboid	$s = 2(LB + BH + LH)$
Total Surface Area of a Cylinder	$s = 2\pi r(h + r)$
Total Surface Area of a Cone	$s = \pi r(l + r)$

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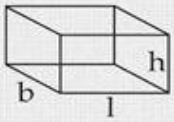
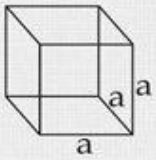
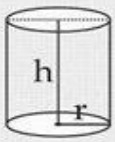
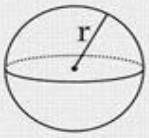
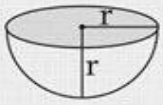
Surface Area of a Sphere	$s = 4\pi r^2$
Total Surface Area of a Frustum of a Cone	$s = \pi l(r_1 + r_2) + \pi(r_1^2 + r_2^2)$

Name of the solid	Figure	Volume	Laterial/Curved Surface Area	Total Surface Area
Cuboid		lbh	2lh + 2bh or 2h(l+b)	2lh+2bh+2lb or 2(lh+bh+lb)
Cube		a^3	$4a^2$	$4a^2+2a^2$ or $6a^2$
Right circular cylinder		$\pi r^2 h$	$2\pi rh$	$2\pi rh + 2\pi r^2$ or $2\pi r(h+r)$
Right circular cone		$\frac{1}{3}\pi r^2 h$	πrl	$\pi rl + \pi r^2$ or $\pi r(l+r)$
Sphere		$\frac{4}{3}\pi r^3$	$4\pi r^2$	$4\pi r^2$
Hemisphere		$\frac{2}{3}\pi r^3$	$2\pi r^2$	$2\pi r^2+\pi r^2$ or $3\pi r^2$

Chapter 14: Statistics

Terms	Formulas
Mean	$m = \frac{\sum f_i x_i}{\sum f_i}$

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Mode	$M_o = l + (\frac{f_1 - f_0}{2f_1 - f_0 - f_2})h$
Median	$M_m = l + (\frac{\frac{n}{2} - cf}{f})h$

Mean: The mean value of a variable is defined as the sum of all the values of the variable divided by the number of values. $a_m = \frac{a_1 + a_2 + a_3 + a_4}{4} = \frac{\sum_0^n a}{n}$

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Median: The median of a set of data values is the middle value of the data set when it has been arranged in ascending order. That is, from the smallest value to the highest value.
Median is calculated as

$$\frac{1}{2}(n+1)$$

Where n is the number of values in the data. If the number of values in the data set is even, then the median is the average of the two middle values.

Mode: Mode of statistical data is the value of that variable that has the maximum frequency

For Grouped Data:
Mean: If $x_1, x_2, x_3, \ldots\ldots x_n$ are observations with respective frequencies f1, f2, f3,…..fn then mean is given as:

$$\bar{x} = \frac{f_1x_1 + f_2x_2 + f_3x_3 + \ldots. + f_nx_n}{f_1 + f_2 + f_3 + \ldots. + f_n} \text{ or } \bar{x} = \frac{\sum_{i=1}^{n} f_i x_i}{\sum_{i=1}^{n} f_i}, \text{ where } \sum_{i=1}^{n} f_i = f_1 + f_2 + f_3 + \ldots\ldots + f_n$$

Median: For the given data, we need to have a class interval, frequency distribution, and cumulative frequency distribution. Then, the median is calculated as

$$\text{Median} = l + \left(\frac{\frac{n}{2} - cf}{f}\right)h$$

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Where
l = lower limit of median class,
n = number of observations,
cf = cumulative frequency of class preceding the median class,
f = frequency of median class,
h = class size (assuming class size to be equal)

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Mode: *Modal class*: The class interval having the highest frequency is called the modal class and Mode is obtained using the modal class.

$$M_o = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right)h$$

Where
l = lower limit of the modal class,
h = size of the class interval (assuming all class sizes to be equal),
f_1 = frequency of the modal class,
f_0 = frequency of the class preceding the modal class,
f_2 = frequency of the class succeeding in the modal class.

Chapter 15: Probability

$$\text{Probability of an event, P(E)} = \frac{\text{Number of outcomes favorable to E}}{\text{Total number of outcomes}}$$

	1	2	3	4	5	6
1	(1, 1)	(1, 2)	(1, 3)	(1, 4)	(1, 5)	(1, 6)
2	(2, 1)	(2, 2)	(2, 3)	(2, 4)	(2, 5)	(2, 6)
3	(3, 1)	(3, 2)	(3, 3)	(3, 4)	(3, 5)	(3, 6)
4	(4, 1)	(4, 2)	(4, 3)	(4, 4)	(4, 5)	(4, 6)

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5	(5, 1)	(5, 2)	(5, 3)	(5, 4)	(5, 5)	(5, 6)
6	(6, 1)	(6, 2)	(6, 3)	(6, 4)	(6, 5)	(6, 5)

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