

Check below the important formulas, terms and properties for CBSE Class 10 Maths Exam 2020:

1. Real Numbers:

Euclid's Division Algorithm (lemma): According to Euclid's Division Lemma if we have two positive integers a and b , then there exist unique integers q and r such that $a = bq + r$, where $0 \leq r < b$. (Here, a = dividend, b = divisor, q = quotient and r = remainder.)

2. Polynomials:

(i) $(a + b)^2 = a^2 + 2ab + b^2$

(ii) $(a - b)^2 = a^2 - 2ab + b^2$

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

(iv) $(a + b)^3 = a^3 + b^3 + 3ab(a + b)$

(v) $(a - b)^3 = a^3 - b^3 - 3ab(a - b)$

(vi) $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

(vii) $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

(viii) $a^4 - b^4 = (a^2)^2 - (b^2)^2 = (a^2 + b^2)(a^2 - b^2) = (a^2 + b^2)(a + b)(a - b)$

(ix) $(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$

(x) $(a + b - c)^2 = a^2 + b^2 + c^2 + 2ab - 2bc - 2ca$

(xi) $(a - b + c)^2 = a^2 + b^2 + c^2 - 2ab - 2bc + 2ca$

(xii) $(a - b - c)^2 = a^2 + b^2 + c^2 - 2ab + 2bc - 2ca$

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

3. Linear Equations in Two Variables:

For the pair of linear equations

$$a_1x + b_1y + c_1 = 0 \text{ and } a_2x + b_2y + c_2 = 0,$$

the nature of roots (zeroes) or solutions is determined as follows:

(i) If $a_1/a_2 \neq b_1/b_2$ then we get a unique solution and the pair of linear equations in two variables are consistent. Here, the graph consists of two intersecting lines.

(ii) If $a_1/a_2 \neq b_1/b_2 \neq c_1/c_2$, then there exists no solution and the pair of linear equations in two variables are said to be inconsistent. Here, the graph consists of parallel lines.

(iii) If $a_1/a_2 = b_1/b_2 = c_1/c_2$, then there exists infinitely many solutions and the pair of lines are coincident and therefore, dependent and consistent. Here, the graph consists of coincident lines.

4. Quadratic Equation:

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

$$x = \frac{-b \pm \sqrt{D}}{2a}$$

Where $D = b^2 - 4ac$

- 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:

$x^2 - (\text{sum of the roots})x + \text{product of the roots} = 0$

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

• Important Formulas - Boats and Streams

(i) Downstream

In water, the direction along the stream is called downstream.

(ii) Upstream

In water, the direction against the stream is called upstream.

(iii) Let the speed of a boat in still water be u km/hr and the speed of the stream be v km/hr, then

Speed downstream $= (u + v)$ km/hr

Speed upstream $= (u - v)$ km/hr.

5. Arithmetic Progression:

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

$$S_n = \frac{n}{2} [2a + (n-1)d]$$

6. Similarity of Triangles:

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

i.e., $\triangle ABC \sim \triangle PQR$ 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.

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

7. Coordinate Gemetry:

- **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:

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

- **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:

$$\left(\frac{mx_2 + nx_1}{m+n}, \frac{my_2 + ny_1}{m+n} \right)$$

- **Mid Point Formula:** The coordinates of the mid-point of a line AB with coordinates A(x₁, y₁) and B(x₂, y₂), are given as:

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

- **Area of a Triangle:** Consider the triangle formed by the points A(x₁, y₁) and B(x₂, y₂) and C(x₃, y₃) then the area of a triangle is given as-

$$\text{ar}(\Delta ABC) = \frac{1}{2} [x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)]$$

8. Trigonometry:

In a right-angled triangle, the Pythagoras theorem states

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

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

- $\sin A = P / H$
- $\cos A = B / H$
- $\tan A = P / B$
- $\cot A = B / P$
- $\text{cosec} A = H / P$
- $\sec A = H / B$

Trigonometric Identities:

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

Relations between trigonometric identities are given below:

- $\tan A = \frac{\sin A}{\cos A}$
- $\cot A = \frac{\cos A}{\sin A}$
- $\text{cosec} A = \frac{1}{\sin A}$
- $\sec A = \frac{1}{\cos A}$

Trigonometric Ratios of Complementary Angles are given as follows:

- $\sin (90^\circ - A) = \cos A$
- $\cos (90^\circ - A) = \sin A$
- $\tan (90^\circ - A) = \cot A$
- $\cot (90^\circ - A) = \tan A$
- $\sec (90^\circ - A) = \text{cosec} A$
- $\text{cosec} (90^\circ - A) = \sec A$

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

$\angle A$	0°	30°	45°	60°	90°
$\sin A$	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
$\cos A$	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
$\tan A$	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	Not defined
$\operatorname{cosec} A$	Not defined	2	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	1
$\sec A$	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	Not defined
$\cot A$	Not defined	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	0

9. Circles:

Important properties related to circles:

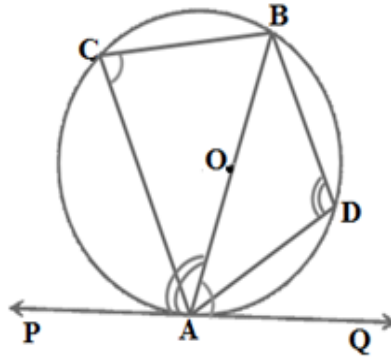
Equal chord of a circle are equidistant from the centre.

The perpendicular drawn from the centre of a circle, bisects the chord of the circle.

The angle subtended at the centre 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.

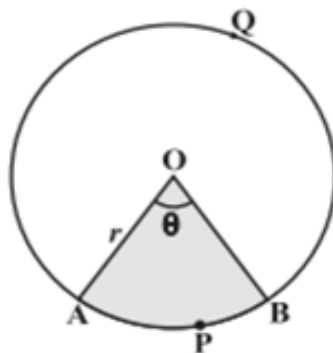
To a circle, if a tangent is drawn and a chord is drawn from the point of contact, then the angle made between the chord and the tangent is equal to the angle made in the alternate segment.



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

Important formulas related to circles:

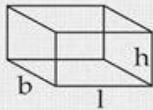
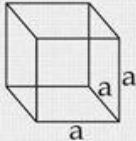
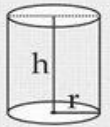
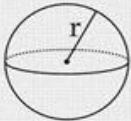
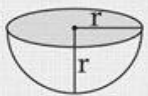
- Area of a Circle = πr^2
- Circumference of a Circle = $2\pi r$
- Area of the sector of angle $\theta = \frac{\theta}{360^\circ} \times \pi \times r^2$
- Length of an arc of a sector of angle $\theta = \frac{\theta}{360^\circ} \times 2\pi r$
- Area of a Circle = πr^2
- Circumference of a Circle = $2\pi r$
- Area of the sector of angle $\theta =$
- Length of an arc of a sector of angle $\theta =$
- Area of a Segment of a Circle: If AB is a chord which divides the circle into two parts, then the bigger part is known as major segment and smaller one is called minor segment.



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

10. Mensuration:

Check below the important formulas for areas and volumes of solids:

Name of the solid	Figure	Volume	Lateral/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 $3\pi r^2$

11. Statistics:

For Ungrouped Data:

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.

$$a_m = \frac{a_1 + a_2 + a_3 + a_4}{4} = \frac{\sum_0^n a}{n}$$

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 a statistical data is the value of that variable which has the maximum frequency

For Grouped Data:

Mean: If $x_1, x_2, x_3, \dots, x_n$ are observations with respective frequencies $f_1, f_2, f_3, \dots, f_n$ then mean is given as:

$$\bar{x} = \frac{f_1 x_1 + f_2 x_2 + f_3 x_3 + \dots + f_n x_n}{f_1 + f_2 + f_3 + \dots + f_n} \text{ or } \bar{x} = \frac{\sum_{i=1}^n f_i x_i}{\sum_{i=1}^n f_i}, \text{ where } \sum_{i=1}^n f_i = f_1 + f_2 + f_3 + \dots + f_n$$

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

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

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)

Mode: *Modal class:* The class interval having 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 = frequency of the class preceding the modal class,

f_2 = frequency of the class succeeding the modal class.

12. Probability:

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

Understanding the basic concepts and learning all the important formulas is extremely sufficient to pass the Maths exam with flying colours. If you know the formulas very well then it will not take much time for you to solve questions in exam paper. So, keep practicing with the list of important formulas given above in this article.