CLASS 7 MATHS FORMULAS HANDBOOK

Class 7 Maths Formulas Handbook (Chapter-wise)

A chapter-wise, continuously updated handbook of key formulas, definitions and concepts from the Class 7 NCERT Maths textbook (Ganita Prakash, Parts 1 & 2, 2026-27 edition). Each section below is added as the corresponding chapter's Solutions/Extra Questions/Revision Notes are published.

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See also: Class 7 Maths Part 1 NCERT Book | Class 7 Maths Part 2 NCERT Book

Chapter 1: Large Numbers Around Us

Indian system: ones, tens, hundreds, thousand, lakh (1,00,000), crore (1,00,00,000) — commas after 3 digits, then every 2.

International system: ones, tens, hundreds, thousand, million (10^6), billion (10^9) — commas every 3 digits.

1 lakh = 1,00,000; 1 crore = 1,00,00,000 = 10 million; 1 billion = 1,00,00,00,000 = 10,000 lakh.

Estimation: round each number to its largest place value before adding/subtracting for a quick sanity check.

Multiplying two n-digit numbers always gives a product with (2n−1) or 2n digits.

Multiplication shortcuts: 25=100/4, 125=1000/8, 250=1000/4 — regroup factors to create round numbers.

See full Chapter 1 Solutions.

Chapter 2: Arithmetic Expressions

Term: a part of an expression separated by + or −; terms can be reordered freely without changing the value.

Subtracting a number = adding its negative (e.g. 56 − 17 = 56 + (−17)).

Removing a bracket after plus: signs stay the same. After minus: every sign inside flips.

Distributive law: a times (b+c) = a times b + a times c — useful for mental math (e.g. 95 times 8 = (100 minus 5) times 8 = 760).

Order of operations: evaluate multiplication/division chunks first, then combine terms left to right; brackets first of all.

See full Chapter 2 Solutions.

Chapter 3: A Peek Beyond the Point

Decimal place values: tenths (1/10), hundredths (1/100), thousandths (1/1000).

To compare decimals, compare digit by digit starting from the whole-number part, then tenths, then hundredths, etc.

Equal decimals: trailing zeros after the decimal point do not change value (4.5 = 4.50 = 4.500).

Unit conversions: 1m = 1000mm = 100cm; 1km = 1000m; 1kg = 1000g; 1L = 1000mL; Re 1 = 100 paise.

To add/subtract decimals, align the decimal points before performing the operation.

Estimation range: a number rounds to X if it lies within 0.5 of X (exclusive of the next boundary).

Fraction to decimal: divide numerator by denominator (e.g., 1/4 = 0.25, 1/2 = 0.5, 3/4 = 0.75).

More digits after the decimal point does NOT mean a bigger number (e.g., 0.9 > 0.123456789).

Chapter 4: Expressions Using Letter-Numbers

A letter-number (variable) represents an unknown or changing quantity; an algebraic expression combines letter-numbers, numbers, and operations.

A term is a part of an expression separated by + or minus signs; like terms have the same letter-number(s) and can be combined by adding/subtracting coefficients.

When removing brackets preceded by a minus sign, flip the sign of every term inside.

Perimeter formulas: triangle = 3a, square = 4a, pentagon = 5a, hexagon = 6a, octagon = 8a.

To add expressions, combine like terms; to subtract, flip the sign of every term in the subtracted expression, then combine like terms.

Patterns can be described algebraically: matchstick/shape patterns follow constant + step times increment; number sequences follow nth-term formulas like 4n+1, 3n-2.

Chapter 5: Parallel and Intersecting Lines

Two distinct straight lines intersect at only one point; if they never meet, they are parallel.

Vertically opposite angles (formed by two intersecting lines) are always equal; a linear pair of adjacent angles on a straight line always sums to 180 degrees.

Perpendicular lines intersect at exactly 90 degrees.

A transversal crossing a pair of parallel lines creates: equal corresponding angles, equal alternate interior angles, and co-interior angles that sum to 180 degrees.

Two lines perpendicular to the same line, or two lines parallel to the same line, are parallel to each other.

A line parallel to a given line through an external point can be drawn using a ruler and set-square, or by paper-folding (fold twice, each perpendicular to the previous crease).

Chapter 6: Number Play

Parity rules: Even+Even=Even, Odd+Odd=Even, Even+Odd=Odd. Product is even if at least one factor is even; odd only if both factors are odd.

All even numbers: 2n. All odd numbers: 2n minus 1 (n = 1, 2, 3, …).

A classic 3×3 magic square using 1-9 has magic sum 15; for centre value m, every row/column/diagonal sums to 3m. Adding constant c to every cell increases the sum by 3c; multiplying every cell by k multiplies the sum by k.

The Virahanka-Fibonacci sequence (1, 2, 3, 5, 8, 13, 21, 34, 55, 89…) is formed by adding the two previous terms; its parity repeats as odd, odd, even every 3 terms.

The number of ways to write n as an ordered sum of 1s and 2s equals the nth Virahanka term.

Chapter 7: A Tale of Three Intersecting Lines

Triangle Inequality: a triangle can exist only if the sum of any two sides is strictly greater than the third side (equivalently, the two smaller sides must sum to more than the largest side).

If two sides are a and b (a less than b), the third side c must satisfy (b minus a) less than c less than (a plus b).

An equilateral triangle always exists for any positive side length.

SSS construction: draw the base, then draw arcs of the other two side lengths from each end; their intersection is the third vertex. SAS: draw one side, construct the included angle, then mark the second side. ASA: draw the side, construct both angles at its ends.

Angle Sum Property: the three interior angles of any triangle always sum to 180 degrees.

Exterior Angle Theorem: an exterior angle of a triangle equals the sum of the two remote interior angles.

By sides: equilateral (3 equal), isosceles (2 equal), scalene (none equal). By angles: acute (all less than 90), right (one equals 90), obtuse (one greater than 90). A triangle can never have two right or two obtuse angles.

Chapter 8: Working with Fractions

To multiply fractions: (a/b) times (c/d) = (a times c)/(b times d) – multiply numerators together and denominators together.

When one factor is between 0 and 1, the product is smaller than the other factor; when one factor is

greater than 1, the product is larger than the other factor.

To divide by a fraction, multiply by its reciprocal: a divided by (b/c) = a times (c/b).

Dividing by a fraction less than 1 gives a larger result; dividing by a fraction greater than 1 gives a smaller result.

Telescoping product pattern: (1 minus 1/2) times (1 minus 1/3) times … times (1 minus 1/n) always simplifies to 1/n.

This completes the Class 7 Maths Formulas Handbook (Chapters 1-8, Ganita Prakash Part 1).

Chapter 9: Geometric Twins (Ganita Prakash Part 2)

Congruence criteria for triangles: SSS, SAS, ASA, AAS, RHS (right triangles only).

SSA is not a valid congruence criterion (ambiguous case), except when the angle is a right angle (becomes RHS).

AAA (equal angles) proves similarity only, not congruence.

CPCT: once two triangles are proven congruent, all corresponding sides and angles are equal.

Two circles are congruent iff same radius; two rectangles are congruent iff same length and breadth.

Chapter 10: Operations with Integers (Ganita Prakash Part 2)

Sign rules for multiplication/division: $(+)\times(+)=+$, $(-)\times(-)=+$, $(+)\times(-)=-$, $(-)\times(+)=-$. Same rules apply for division.

Distributive property: $a\times(b+c) = a\times b + a\times c$, useful for simplifying combined integer expressions.

Product of three consecutive negative integers is negative (e.g., $(-6)\times(-5)\times(-4) = -120$).

Real-world applications: profit/loss (positive/negative values), temperature changes, elevation above/below sea level.

For sum/difference puzzles: if $a+b=S$ and $a-b=D$, then $a=(S+D)/2$ and $b=(S-D)/2$.

Chapter 11: Finding Common Ground (Ganita Prakash Part 2)

HCF (Highest Common Factor): largest number dividing two or more numbers exactly; find via prime factorisation (common primes at lowest powers) or the division method.

LCM (Least Common Multiple): smallest number that is a multiple of two or more numbers; find via prime factorisation (all primes at highest powers).

Key relationship: HCF × LCM = product of the two numbers (for exactly two numbers).

Two consecutive numbers are always co-prime (HCF=1); co-prime numbers have LCM = product of the numbers.

Use LCM for “smallest number divisible by several numbers” problems (bells tolling together, events repeating); use HCF for “largest equal-sized grouping/tiling/cutting” problems.

Chapter 12: Another Peek Beyond the Point (Ganita Prakash Part 2)

Multiplying decimals: multiply as whole numbers, then give the product the same total number of decimal digits as both factors combined (e.g. 4.23 × 3.7 = 15.651).

Multiplying/dividing by powers of 10: the decimal point shifts right (multiplication) or left (division) by as many places as the number of zeros.

Size of a decimal product: both factors > 1 → product > both; both factors < 1 → product < both; one factor < 1 and the other > 1 → product lies between the two.

Dividing by a decimal divisor: multiply both dividend and divisor by the same power of 10 to make the divisor a whole number, then divide as usual (e.g. 48.65 ÷ 3.5 = 486.5 ÷ 35 = 13.9).

Terminating vs repeating decimals: a fraction terminates only if its lowest-terms denominator has no prime factors besides 2 or 5; otherwise it repeats (e.g. 5/11 = 0.454545…).

Chapter 13: Connecting the Dots (Ganita Prakash Part 2)

Mean (average) = (sum of all values) ÷ (number of values); it can be pulled up or down a lot by outliers.

Median = the middle value of sorted data. Odd n: median = ((n+1)/2)th term. Even n: median = average of the (n/2)th and (n/2 + 1)th terms.

Both mean and median always lie between a data set’s minimum and maximum values.

Dot plot: shows each data value as a dot above a number line — repeated values are stacked dots.

Double-bar graph: compares two related quantities side by side for each category, using a scale, two colours, and a legend.

To find “how many times more” one value is than another, **divide**; to find “how many more,” **subtract**.

Chapter 14: Constructions and Tilings (Ganita Prakash Part 2)

Perpendicular bisector: the set of points equidistant from two given points; constructed with equal-radius arcs from each endpoint (each arc-pair must share one radius).

3-4-5 rope method: since $3^2+4^2=5^2$, a 3:4:5 triangle always has a right angle opposite its longest side.

Angle bisector: arc from the vertex cutting both arms, then equal-radius arcs from those points meeting at a new point — join vertex to that point.

Copying an angle/figure: use a compass to transfer chord lengths (not a protractor) via SSS congruence.

Regular hexagon in a circle: stepping off the circle's own radius as a chord 6 times always returns to the start exactly ($6 \times 60° = 360°$).

Checkerboard tiling-impossibility argument: a 2×1 domino always covers one black + one white square; unequal black/white counts make complete tiling impossible.

Chapter 15: Finding the Unknown (Ganita Prakash Part 2)

An **equation** states that two expressions are equal, containing an unknown whose value makes the statement true.

Balancing method: any operation done to one side of an equation must be done identically to the other side to keep it equal.

Isolate the unknown by moving other terms across the equals sign (a term changes sign when moved).

Always **check** a solution by substituting it back into the original equation.

Some equations have **no solution** (e.g. x+4=x+5 simplifies to 4=5, never true).

Distribute brackets before collecting like terms, e.g. 4(m+6) = 4m+24.

Word problems: assign a letter to the unknown, translate the relationships into an equation, solve, then check the answer makes sense.