MasterLeap Tuition Grade 6 formula sheet

Topics Covered:

- Number System (Integers, Fractions, Decimals)
- Algebra (Introduction)
- Ratio and Proportion
- Geometry (Basic Shapes)
- Mensuration (Perimeter and Area)
- Data Handling

SECTION 1: NUMBER SYSTEM

Place Value Chart

Indian Place Value Chart

Ten Crore	Crore	Ten Lakh	Lakh	Ten Thousand	Thousand	Hundred	Tens	Ones
10,00,00,000	1,00,00,000	10,00,000	1,00,000	10,000	1,000	100	100	1
	4	5	6	7	8	3	2	1

Example: $4 \times 1,00,00,000 + 5 \times 10,00,000 + 6 \times 1,00,000 + 7 \times 10,000 + 8 \times 1,000 + 3 \times 100 + 1$

International Place Value Chart

Hundred Million	Ten Million	Million	Hundred Thousand	Ten Thousand	Thousand	Hundred	Tens	Ones
100,000,000	10,000,000	1,000,000	100,000	10,000	10,000	100	100	1
1	2	3	4	5	6	7	8

Example: $1 \times 10,000,000 + 2 \times 1,000,000 + 3 \times 100,000 + 4 \times 10,000 + 5 \times 1,000 + 7 \times 10 + 8$

Integers

Rule	Operation	Example
Addition	Same sign → Add and keep sign	(+5) + (+3) = +8; (-5) + (-3) = -8
Addition	Different signs → Subtract and use sign of larger number	(+8) + (-3) = +5; (-8) + (+3) = -5

Subtraction	Add the opposite of the second number	(+7) - (+4) = (+7) + (-4) = +3
Subtraction		(+7) - (-4) = (+7) + (+4) = +11
Multiplication	Same signs → Positive	(+3) × (+4) = +12; (-3) × (-4) = +12
Multiplication	Different signs → Negative	(+3) × (-4) = -12; (-3) × (+4) = -12
Division	Same signs → Positive	(+12) ÷ (+4) = +3; (-12) ÷ (-4) = +3
Division	Different signs → Negative	(+12) ÷ (-4) = -3; (-12) ÷ (+4) = -3

Fractions

Operation	Formula	Example
Addition (like denominators)	a/c + b/c = (a+b)/c	2/7 + 3/7 = 5/7
Addition (unlike denominators)	a/b + c/d = (ad + bc)/bd	2/3 + 3/4 = (8+9)/12 = 17/12
Subtraction (like denominators)	a/c - b/c = (a-b)/c	5/7 - 2/7 = 3/7

Subtraction (unlike denominators)	a/b - c/d = (ad - bc)/bd	3/4 - 1/3 = (9-4)/12 = 5/12
Multiplication	(a/b) × (c/d) = (a×c)/(b×d)	2/3 × 4/5 = 8/15
Division	(a/b) ÷ (c/d) = (a/b) × (d/c)	2/3 ÷ 4/5 = 2/3 × 5/4 = 10/12 = 5/6
Equivalent Fractions	Multiply numerator and denominator by same number	2/3 = 4/6 = 6/9 = 8/12

Decimals

Operation	Rule	Example
Addition	Line up decimal points, add	3.25 + 1.4 = 4.65
Subtraction	Line up decimal points, subtract	5.8 - 2.35 = 3.45
Multiplication	Multiply as whole numbers, count total decimal places	2.5 × 1.2 = 3.00 (2.5×1.2=3.00)
Division by whole number	Divide as usual, bring decimal point up	6.4 ÷ 2 = 3.2

Division by decimal	Move decimal in divisor to make it whole, move decimal in dividend same places	$6.25 \div 2.5 = 62.5 \div 25 = 2.5$

Factors and Multiples

Term	Definition	Example
Factor	Numbers that divide exactly into another number	Factors of 18: 1,2,3,6,9,18
Multiple	Number obtained by multiplying by an integer	Multiples of 6: 6,12,18,24,30,...
Prime Number	Number with exactly two factors (1 and itself)	2,3,5,7,11,13,17,19,23
Composite Number	Number with more than two factors	4,6,8,9,10,12,14,15,16
Even Number	Divisible by 2	2,4,6,8,10,...
Odd Number	Not divisible by 2	1,3,5,7,9,11,...
Prime Factorization	Expressing as product of primes	$18 = 2 \times 3 \times 3 = 2 \times 3^2$

Divisibility Rules

Divisible By	Rule	Example
2	Last digit is even (0,2,4,6,8)	346 ends with 6 → divisible by 2
3	Sum of digits is divisible by 3	423: 4+2+3=9 → divisible by 3
4	Last two digits are divisible by 4	732: last two digits 32 → divisible by 4
5	Last digit is 0 or 5	725 ends with 5 → divisible by 5
6	Divisible by both 2 and 3	432: even and sum=9 → divisible by 6
8	Last three digits are divisible by 8	3,416: 416÷8=52 → divisible by 8
9	Sum of digits is divisible by 9	729: 7+2+9=18 → divisible by 9
10	Last digit is 0	850 ends with 0 → divisible by 10
11	Difference of sum of digits at odd and even places = 0 or 11	121: (1+1)-2=0 → divisible by 11

HCF and LCM

Concept	Method	Example (12 and 18)

HCF (GCD)	List factors or prime factorization	Factors: 12(1,2,3,4,6,12), 18(1,2,3,6,9,18) → HCF = 6
LCM	List multiples or prime factorization	Multiples: 12(12,24,36,48...), 18(18,36,54...) → LCM = 36
Prime Factorization Method	Take common factors for HCF, all factors for LCM	$12=2^2×3$, $18=2×3^2$ → HCF=2×3=6, LCM=$2^2×3^2$=36
Relationship	HCF × LCM = Product of numbers	6 × 36 = 216 = 12 × 18 ✓

SECTION 2: ALGEBRA (INTRODUCTION)

Basic Terms

Term	Meaning	Example
Variable	A letter that represents an unknown number	x, y, a, b, p, q
Constant	A fixed value that does not change	3, -7, 10, ½
Coefficient	Number multiplied by a variable	In 5x, coefficient is 5

Term	Parts of expression separated by + or -	In 3x + 2y - 5, terms: 3x, 2y, -5
Expression	Combination of variables, constants, and operations	2x + 3, 4a - 2b + 7
Equation	Expression with an equals sign	2x + 3 = 11

Algebraic Operations

Rule	Formula	Example
Addition of like terms	$ax + bx = (a + b)x$	$3x + 5x = 8x$
Subtraction of like terms	$ax - bx = (a - b)x$	$7y - 2y = 5y$
Multiplication	$a \times b = ab$	$3 \times x = 3x$
Multiplication	$x \times x = x^2$	
Division	$a \div b = a/b$	$6x \div 3 = 2x$

Evaluating Expressions

Step	Process	Example (x = 4)
1	Replace variable with given value	$3x + 5 = 3(4) + 5$

2	Perform multiplication first	= 12 + 5
3	Perform addition/subtraction	= 17

Simple Equations

Equation Type	Solution Method	Example	Solution
x + a = b	Subtract a from both sides	x + 5 = 12	x = 7
x - a = b	Add a to both sides	x - 3 = 8	x = 11
a + x = b	Subtract a from both sides	7 + x = 15	x = 8
ax = b	Divide both sides by a	3x = 15	x = 5
x/a = b	Multiply both sides by a	x/4 = 3	x = 12
ax + b = c	Subtract b, then divide by a	2x + 3 = 11	x = 4

SECTION 3: RATIO AND PROPORTION

Ratio

Concept	Formula	Example

Ratio	Comparison of two quantities a : b = a/b	Ratio of 3 to 5 = 3:5 = 3/5
Equivalent Ratios	Multiply or divide both terms by same number	2:3 = 4:6 = 6:9 = 8:12
Simplest Form	Divide both terms by their HCF	12:18 = (12÷6):(18÷6) = 2:3

Proportion

Type	Definition	Example
Direct Proportion	As one quantity increases, the other increases in same ratio	More items → More cost
Inverse Proportion	As one quantity increases, the other decreases	More speed → Less time

Unitary Method

Step	Process	Example
1	Find value of ONE unit	If 8 pens cost ₹40, then 1 pen costs ₹40 ÷ 8 = ₹5
2	Multiply to find required value	Cost of 12 pens = ₹5 × 12 = ₹60

Percentage

Formula	Meaning	Example
Percentage	(Part/Whole) × 100	20 out of 40 = (20/40) × 100 = 50%
Finding Part	Part = (Percentage × Whole)/100	30% of 200 = (30×200)/100 = 60
Finding Whole	Whole = (Part × 100)/Percentage	25% of a number is 50 → Number = (50×100)/25 = 200
Fraction to %	Multiply fraction by 100	3/4 = (3/4)×100 = 75%
Decimal to %	Multiply decimal by 100	0.35 = 0.35×100 = 35%
% to Decimal	Divide by 100	45% = 45÷100 = 0.45
% to Fraction	Write over 100 and simplify	60% = 60/100 = 3/5

SECTION 4: GEOMETRY

Basic Geometric Figures

Figure	Definition	Example
Point	An exact location	• P

Line	Straight path extending in both directions	←───→
Line Segment	Part of a line with two endpoints	•──•
Ray	Part of a line with one endpoint	•───→
Angle	Formed by two rays with common endpoint	∠ABC

Types of Angles

Angle Type	Measure	Visual
Acute Angle	Less than 90°	< 90°
Right Angle	Exactly 90°	= 90° (∟)
Obtuse Angle	Greater than 90° but less than 180°	90° < angle < 180°
Straight Angle	Exactly 180°	= 180° (───)
Reflex Angle	Greater than 180° but less than 360°	180° < angle < 360°
Complete Angle	Exactly 360°	Full circle

Angle Properties

Property	Statement	Example
Complementary Angles	Sum = 90°	30° and 60° are complementary
Supplementary Angles	Sum = 180°	110° and 70° are supplementary
Vertically Opposite Angles	Equal	When two lines cross, opposite angles are equal
Angles at a Point	Sum = 360°	All angles around a point add to 360°
Angles on a Straight Line	Sum = 180°	Angles on a line add to 180°

Triangles

Type	Properties	Example
Equilateral Triangle	All sides equal, all angles 60°	△
Isosceles Triangle	Two sides equal, base angles equal	△
Scalene Triangle	All sides different, all angles different	△
Right-angled Triangle	One angle = 90°	△ with └
Acute Triangle	All angles < 90°	

Obtuse Triangle	One angle > 90°

Triangle Properties

Property	Statement
Angle Sum Property	Sum of three angles = 180°
Exterior Angle Property	Exterior angle = Sum of opposite interior angles
Triangle Inequality	Sum of any two sides > Third side

Quadrilaterals

Shape	Properties
Square	All sides equal, all angles 90°, diagonals equal and perpendicular
Rectangle	Opposite sides equal, all angles 90°, diagonals equal
Rhombus	All sides equal, opposite angles equal, diagonals perpendicular
Parallelogram	Opposite sides parallel and equal, opposite angles equal

Trapezium	One pair of opposite sides parallel

SECTION 5: MENSURATION

Perimeter Formulas

Shape	Formula	Variables
Square	$P = 4 \times s$	s = side length
Rectangle	$P = 2(l + b)$	l = length, b = breadth
Triangle	$P = a + b + c$	a,b,c = sides
Regular Pentagon	$P = 5 \times s$	s = side length
Regular Hexagon	$P = 6 \times s$	s = side length
Circle (Circumference)	$C = 2\pi r$ or $C = \pi d$	r = radius, d = diameter, π = 3.14 or 22/7

Area Formulas

Shape	Formula	Variables
Square	$A = s^2$	s = side length

Rectangle	$A = l \times b$	l = length, b = breadth
Triangle	$A = \frac{1}{2} \times b \times h$	b = base, h = height
Parallelogram	$A = b \times h$	b = base, h = height
Rhombus	$A = \frac{1}{2} \times d_1 \times d_2$	d_1, d_2 = diagonals
Circle	$A = \pi r^2$	r = radius

Important Conversions

Unit	Conversion
Length	1 cm = 10 mm, 1 m = 100 cm, 1 km = 1000 m
Area	1 cm² = 100 mm², 1 m² = 10,000 cm²
Volume	1 L = 1000 mL, 1 L = 1000 cm³

SECTION 6: DATA HANDLING

Basic Statistics

Term	Definition	Example

Data	Collection of facts and figures	Marks of students: 45,67,89,45,78
Frequency	Number of times a value occurs	In above data, 45 occurs twice → frequency = 2
Range	Largest value - Smallest value	Range = 89 - 45 = 44
Mean (Average)	Sum of all values ÷ Number of values	Mean = (45+67+89+45+78)/5 = 324/5 = 64.8
Median	Middle value when data is arranged in order	Arrange: 45,45,67,78,89 → Median = 67
Mode	Most frequently occurring value	Mode = 45 (appears twice)

Tally Marks

Count	Tally Marks
1	|
2	||
3	|||
4	||||
5	卌

Bar Graph

Component	Description
Horizontal Axis (x-axis)	Shows categories or groups
Vertical Axis (y-axis)	Shows frequency or values
Bars	Equal width, height represents value
Scale	Uniform intervals on axes

Pictograph

Component	Description
Symbol	Represents a certain number of items
Key	Shows what each symbol represents
Example	🍎 = 5 apples