CBSE NCERT · Class 10 · Mathematics

Mathematics

PADIKAM LEARNING CONTENT
PADIKAM
NCERT Class 10
Mathematics
Class 10 Study Notes
14 chapters
Fourteen current chapters. Standard symbols and NCERT-style working are used throughout.
Padikam explanations are independently written. The NCERT book is used only for chapter order, standard terminology and coverage.

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How to use this note
Read the quick understanding first, recall the key points aloud, then answer the exam prompts without looking back.
Official book source
https://ncert.nic.in/textbook.php?jemh1=0-14

LESSON 1
Real Numbers
Quick understanding
Use prime factorisation and Euclid's division idea to study divisibility, HCF, LCM and decimal expansions.
Must remember Exam practice
Euclid form: a = bq + r, where 0 <= r < b. Find the HCF of 135 and 225 by Euclid's algorithm.
For two positive integers: HCF x LCM = product of the integers. Decide whether 13/3125 has a terminating decimal.
A rational number p/q in lowest form terminates only when q = 2^m x 5^n.
Formula and notation
a = bq + r
HCF(a,b) x LCM(a,b) = a x b
Watch this: Reduce p/q to lowest form before testing the denominator.
One-line recall Euclid form: a = bq + r, where 0 <= r < b.

LESSON 2

Polynomials
Quick understanding
Connect the zeroes of a polynomial with its graph and with the coefficients of a quadratic polynomial.
Must remember Exam practice
Azero is a value of x for which p(x) = 0. Form a quadratic polynomial whose
zeroes are 3 and -2.
For ax^2 + bx + c, sum of zeroes = -b/a.
Verify the coefficient relations for 2x^2 -
For ax^2 + bx + c, product of zeroes = c/a.
7x + 3.
Formula and notation
alpha + beta = -b/a
alpha beta = c/a
Watch this: The relations depend on the leading coefficient a; do not assume it is 1.
One-line recall Azero is a value of x for which p(x) = 0.
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LESSON 3
Pair of Linear Equations in Two Variables
Quick understanding
Represent two conditions as two lines and decide whether they meet once, never, or everywhere.
Must remember Exam practice
Unique solution when a1/a2 is not equal to b1/b2. Solve 2x + 3y = 13 and 3x - 2y = 4.
No solution when a1/a2 = b1/b2 but not c1/c2. Convert a word problem on prices into a
pair of equations.
Infinitely many solutions when all three ratios are
equal.
Formula and notation
a1x + b1y + c1 = 0
a2x + b2y + c2 = 0
Watch this: Keep signs consistent when moving terms or using elimination.
One-line recall Unique solution when a1/a2 is not equal to b1/b2.
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LESSON 4
Quadratic Equations
Quick understanding
Solve equations of degree two and use the discriminant to understand the nature of their roots.
Must remember Exam practice
Write the equation as ax^2 + bx + c = 0, a not equal Solve 2x^2 - 5x - 3 = 0.
to 0.
Find k if x^2 + kx + 9 = 0 has equal roots.
D = b^2 - 4ac: positive gives two real roots, zero
gives equal roots, negative gives no real roots.
Factorisation is fastest when factors are visible; the
formula always works.
Formula and notation
x = (-b +/- sqrt(b^2 - 4ac)) / 2a
D = b^2 - 4ac
Watch this: The denominator is 2a, not just 2.
One-line recall Write the equation as ax^2 + bx + c = 0, a not equal to 0.
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LESSON 5
Arithmetic Progressions

Quick understanding

Recognise sequences with a constant difference and calculate any term or a sum without listing every term.

Must remember Exam practice

Common difference d = a2 - a1. Find the 25th term of 7, 11, 15, ...

The nth term is measured from the first term. Find the sum of the first 30 multiples of 3.

The sum formula can use either the last term l or the nth-term expression.

Formula and notation

a_n = a + (n - 1)d

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

S_n = n/2 (a + l)

Watch this: Adecreasing AP has a negative common difference.

One-line recall Common difference d = a2 - a1.

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LESSON 6

Triangles

Quick understanding

Use similarity to compare shapes, divide sides proportionally and relate the areas of similar triangles.

Must remember Exam practice

AAA, SAS and SSS are similarity criteria. Prove two given triangles similar and find an unknown side.

Aline parallel to one side divides the other two sides in the same ratio. Use the Basic Proportionality Theorem in a labelled diagram.

Area ratio of similar triangles equals the square of the corresponding-side ratio.

Formula and notation

ar(Delta ABC)/ar(Delta DEF) = (AB/DE)^2

Watch this: Write corresponding vertices in the same order.

One-line recall AAA, SAS and SSS are similarity criteria.

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LESSON 7

Coordinate Geometry

Quick understanding

Turn a geometric problem into arithmetic using coordinates.

Must remember Exam practice

Distance comes from the Pythagorean theorem. Find the distance between (-2, 3) and (4, -5).

The section formula gives the point dividing a segment in a stated ratio. Find the point dividing A(1,2), B(7,8) in the ratio 2:1.

The midpoint is the special case 1:1.

Formula and notation

d = sqrt((x2-x1)^2 + (y2-y1)^2)

P = ((mx2+nx1)/(m+n), (my2+ny1)/(m+n))

Watch this: In AP:PB = m:n, multiply B by m and Aby n.

One-line recall Distance comes from the Pythagorean theorem.

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LESSON 8

Introduction to Trigonometry

Quick understanding
Describe a right triangle through ratios and use standard identities to move between them.
Must remember Exam practice
sin theta = perpendicular/hypotenuse; cos theta = Evaluate sin 60 cos 30 + cos 60 sin 30.
base/hypotenuse.
If tan theta = 3/4, find sin theta and cos
tan theta = sin theta/cos theta. theta.
Learn exact values at 0, 30, 45, 60 and 90 degrees.
Formula and notation
sin^2 theta + cos^2 theta = 1
1 + tan^2 theta = sec^2 theta
1 + cot^2 theta = cosec^2 theta
Watch this: Ratios depend on the chosen angle; label opposite and adjacent sides first.
One-line recall sin theta = perpendicular/hypotenuse; cos theta = base/hypotenuse.
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LESSON 9
Some Applications of Trigonometry
Quick understanding
Use angles of elevation or depression to find inaccessible heights and distances.
Must remember Exam practice
Draw the horizontal through the observer before Find the height of a tower from a 30
marking the angle. degree elevation at 20 m.
Angle of depression equals the corresponding angle Solve a two-position observation
of elevation. problem.
Add observer height only after solving the right
triangle.
Formula and notation
tan theta = vertical height / horizontal distance
Watch this: Keep eye level separate from the object's full height.
One-line recall Draw the horizontal through the observer before marking the angle.
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LESSON 10
Circles
Quick understanding
Use the special right-angle and equal-length properties of tangents.
Must remember Exam practice
Atangent is perpendicular to the radius at the point Prove PA= PB for tangents from P.
of contact.
Find a tangent length using a right
Tangents drawn from one external point are equal. triangle.
Join the centre to points of contact before proving
results.
Formula and notation
OAperpendicular PA
PA= PB
Watch this: Atangent touches at exactly one point; a secant cuts at two.
One-line recall Atangent is perpendicular to the radius at the point of contact.
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LESSON 11
Areas Related to Circles
Quick understanding
Break a figure into sectors, segments and familiar polygons before calculating area or perimeter.

Must remember Exam practice
Asector is a fraction theta/360 of a circle. Find the area of a 90 degree sector of radius 14 cm.
Asegment equals sector minus triangle for a minor segment. Find the shaded area formed by a chord and arc.
Use the same value of pi throughout a problem.
Formula and notation
Sector area = theta/360 x pi r^2
Arc length = theta/360 x 2 pi r
Watch this: Perimeter of a sector includes two radii as well as the arc.
One-line recall Asector is a fraction theta/360 of a circle.
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LESSON 12
Surface Areas and Volumes
Quick understanding
Model a combined solid, identify exposed surfaces and keep units cubic or square as required.
Must remember Exam practice
CSAmeans curved surface only; TSAincludes all exposed faces.
For a combination, add volumes but count only outer surface areas.
When a solid is recast, volume is conserved.
Find the volume of a cone mounted on a cylinder.
Find the number of small spheres made from a larger sphere.
Formula and notation
Cylinder V = pi r^2h
Cone V = 1/3 pi r^2h
Sphere V = 4/3 pi r^3
Watch this: Do not include a joined circular face in the external surface area.
One-line recall CSAmeans curved surface only; TSAincludes all exposed faces.
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LESSON 13
Statistics
Quick understanding
Summarise grouped data with mean, median and mode, and interpret what each measure represents.
Must remember Exam practice
Class mark xi is the midpoint of a class interval. Find the mean by the step-deviation method.
Median uses cumulative frequency and the median class. Find the median of a grouped frequency table.
The modal class has the highest frequency.
Formula and notation
Mean = sum(fi xi)/sum(fi)
Median = l + [(n/2 - cf)/f]h
Mode = l + [(f1-f0)/(2f1-f0-f2)]h
Watch this: Use the cumulative frequency before the median class, not the class total.
One-line recall Class mark xi is the midpoint of a class interval.
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LESSON 14
Probability
Quick understanding
Measure chance as favourable equally likely outcomes divided by all equally likely outcomes.

Must remember Exam practice

Probability lies from 0 to 1. Find the probability of a sum of 8 with two dice.

P(not E) = 1 - P(E).

A card is drawn: find P(not a face card).

List the sample space carefully before counting.

Formula and notation

P(E) = favourable outcomes / total outcomes

P(not E) = 1 - P(E)

Watch this: Theoretical probability requires equally likely outcomes.

One-line recall Probability lies from 0 to 1.

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