SCERT Kerala · Class 10 · Mathematics

Mathematics Part 2

PADIKAM
MATHEMATICS
PART II
Complete Study Notes | Standard X | English Medium
SCERT Kerala 2025 syllabus coverage
Original explanations, revision tools, exam focus and practice

PADIKAM | CLASS 10 MATHEMATICS - PART II
Contents
Six chapters complete the course with tangent geometry, polynomials, analytic geometry, mensuration and statistics.
Chapter 8 | Tangents
Chapter 9 | Polynomials and Equations
Chapter 10 | Circles and Lines
Chapter 11 | Geometry and Algebra
Chapter 12 | Solids
Chapter 13 | Statistics
How to use this book
• Read the chapter mission first to understand the learning target.
• Study the core notes and pause at every table, formula or process map.
• Use the exam focus list for last-minute revision.
• Answer the practice questions without looking back, then revise weak areas.
Official textbook links
SCERT Kerala Class 10 PART II
SCERT Kerala Standard 10 textbook catalogue

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CHAPTER 8
Tangents
Chapter mission: apply tangent theorems to angles, lengths and geometric constructions.
Tangent facts
• A tangent touches a circle at exactly one point locally. The radius to the point of contact is perpendicular to the tangent.
• Tangents drawn from the same external point have equal lengths.
$OP \perp PT$
$PA = PB$ (tangents from P)
Tangent-chord theorem
• The angle between a tangent and a chord through the contact point equals the angle in the alternate segment subtended by that chord.
• Mark the chord and corresponding arc before selecting the angle.
Constructions and proofs
• To draw tangents from an external point, use the circle with the segment joining the centre and external point as diameter; its intersections locate contact points.
• Proofs often combine right triangles, equal radii and congruence.
Exam focus
• Mark the right angle at contact.
• Use equal tangents only when they start at the same external point.
• State the alternate-segment relationship precisely.

Practice

1. Prove that tangents from an external point are equal.
2. Find a tangent length when centre distance and radius are given.
3. Explain the construction of two tangents from an external point.

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CHAPTER 9

Polynomials and Equations

Chapter mission: use polynomial operations, factor and remainder ideas, and relationships between zeros and coefficients.

Polynomial language

• A polynomial has non-negative integer powers of the variable. Degree is the highest power with non-zero coefficient.

• A zero r satisfies p(r)=0 and corresponds to a factor (x-r).

Remainder and factor theorems

• These theorems avoid long division when only a remainder or factor test is needed.

Remainder when p(x) is divided by (x-a) is p(a)

(x-a) is a factor ⇔ p(a)=0

Division and factorisation

• Polynomial division gives dividend = divisor × quotient + remainder, with lower-degree remainder.

• Use common factors, identities, grouping and known zeros to reduce degree step by step.

Zeros and coefficients

• For ax^2+bx+c, sum and product of zeros are $-b/a$ and c/a.

• A polynomial equation may be modelled from geometric or numerical conditions; every candidate root must be checked against the context.

Exam focus

• State degree and variable correctly.

• Use p(a), not synthetic work alone, to justify a factor.

• Verify factorisation by multiplication.

Practice

1. Find the remainder when $2x^3-3x+5$ is divided by $x-2$.
2. Factor a cubic when one zero is known.
3. Form a quadratic polynomial with zeros 2 and 5.

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CHAPTER 10

Circles and Lines

Chapter mission: represent circles and straight lines algebraically and solve their intersections.

Circle equation

• The centre is (a,b) and radius is r. Expand carefully when converting to general form.

$x^2+y^2+Dx+Ey+F=0$

• For $x^2+y^2+Dx+Ey+F=0$, completing squares reveals centre and radius.

$(x-a)^2+(y-b)^2=r^2$

Straight lines

• Parallel non-vertical lines have equal slopes. Perpendicular slopes multiply to -1 when both are defined.

• Vertical lines have equation x=k and undefined slope.

$y=mx+c$

slope $m=(y_2-y_1)/(x_2-x_1)$

Line-circle relationship

• Substitute the line equation into the circle equation. The resulting quadratic has two, one or no real solutions.

• Two intersections mean secant, one repeated intersection means tangent, and no real intersection means

external line.
• Distance from centre to line compared with radius provides another test.
Exam focus
• Read centre signs opposite to brackets.
• Treat vertical lines separately.
• Connect the discriminant with geometric intersections.
Practice
2 2
1. Find the centre and radius of x +y -6x+4y-12=0.
2. Find the equation of a line through two given points.
3. Explain how a quadratic discriminant shows a line is tangent to a circle.

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CHAPTER 11
Geometry and Algebra
Chapter mission: translate geometric conditions into equations and use algebra to prove geometric results.
Algebra as a geometry tool
• Assign coordinates or variables that exploit symmetry and known lengths.
• Use distance, midpoint, slope, Pythagoras and circle equations to express geometric facts.
• A good coordinate choice can reduce many terms to zero.
Locus
• A locus is the complete set of points satisfying a condition.
• Points equidistant from two fixed points lie on their perpendicular bisector; points equidistant from two intersecting lines lie on angle bisectors.
• An equation describes a locus only after both directions are justified: every locus point satisfies it and every solution point meets the condition.
Proof method
• State givens and target, choose variables, derive equations, simplify, and translate the result back into geometry.
• Avoid division by an expression that might be zero unless that case is handled separately.
Exam focus
• Explain coordinate choices.
• Prove both directions in locus arguments when required.
• Finish with the geometric meaning of the algebraic result.
Practice
1. Find the locus of points equidistant from (2,0) and (-2,0).
2. Use coordinates to prove the diagonals of a parallelogram bisect each other.
3. Derive the equation of a perpendicular bisector.

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CHAPTER 12
Solids
Chapter mission: calculate surface areas and volumes of standard solids and combinations.
Core formulas
Solid Volume Surface information
prism base area × height lateral area from perimeter and height
cylinder πr2h curved area 2πrh
pyramid 1/3 × base area × height sum of triangular faces
cone 1/3 πr2h curved area πrl
sphere 4/3 πr3 area 4πr2
hemisphere 2/3 πr3 curved area 2πr2
Cone geometry
• Slant height l is used for curved surface area; vertical height h is used for volume.
2 2 2

$l = r + h$

Combined and transformed solids

• Split a composite solid into familiar non-overlapping parts; add or subtract volumes and exposed areas as required.

• When material is melted and recast without loss, initial volume equals final volume.

$2\ 3$

• A scale factor k changes lengths by k, areas by k and volumes by k.

Units and approximation

• Convert all lengths to one unit before substitution.

• Area uses square units and volume cubic units. Capacity conversions must be stated.

• Use the instructed value of π and round only at the end.

Exam focus

• Separate total, curved and exposed surface area.

• Use vertical height for volume.

• Draw composite solids and mark hidden or joined faces.

Practice

1. Find the volume and total surface area of a cylinder.
2. A cone and cylinder have equal base and height. Compare volumes.
3. Solve a recasting problem using conservation of volume.

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CHAPTER 13

Statistics

Chapter mission: organise data and calculate measures of centre and spread for informed interpretation.

Data and frequency

• Raw data may be organised in discrete or grouped frequency tables. Class intervals should be clear and non-overlapping.

• Cumulative frequency gives the running total and supports median and percentile location.

Mean, median and mode

• For grouped data, x is the class midpoint, so the mean is an estimate.

• Median is the middle ordered value and is resistant to extreme observations.

• Mode is the most frequent value or modal class and is useful for the most common category.

$\text{Mean} = \Sigma fx / \Sigma f$

Spread

• Two data sets can share a mean but differ greatly in consistency.

• Range is simple but uses only extremes; interpretation should consider the full distribution and sample size.

$\text{Range} = \text{maximum} - \text{minimum}$

Graphs and interpretation

• Bar charts suit separated categories; histograms represent continuous grouped data with touching bars.

• Frequency polygons and cumulative-frequency curves reveal shape and position.

• Check scale, axes, source, missing values and whether a graph exaggerates differences.

Exam focus

• Choose the correct average for the question.

• Use class midpoints only for grouped-data estimates.

• Interpret a calculated value in context and include units.

Practice

1. Calculate mean, median, mode and range for a small data set.
2. Estimate a grouped mean using midpoints.
3. Explain how a misleading graph scale can distort interpretation.

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Final Revision Checklist

• I can use tangent and circle theorems with reasons.

• I can factor and analyse polynomials.

• I can move between geometric diagrams and equations.
• I can select the correct mensuration formula and units.
• I can calculate and interpret statistical measures.

Padikam Learning Content

Prepared as an independent learning companion using the SCERT textbook only as the syllabus and notation reference.