

# Alignment of Core-Plus Mathematics with the College Board AP Calculus Guide

## Algebra and Trigonometry

Elementary set concepts and set notation

Course 4, Unit 4, pp. 230; Unit 9, pp. 579-588

Real number properties; the real number line

Course 1, Unit 1, p. 16; Unit 3, pp. 224, 239

Course 3, Unit 3, p. 194, 229-234

Integers; rational and irrational numbers

Course 2, Unit 4, pp. 291-310

Course 3, Unit 4, pp. 262, 271

Course 4, Unit 10, pp. 593-594

Absolute value: equations, inequalities, interpretation as distance

Course 1, Unit 1, pp. 63-66; Unit 3, p. 168

Course 2, Unit 3, pp. 214-217

Course 3, Unit 3, pp. 229-234; Unit 6, pp. 442-443, 463-466

Course 4, Unit 7, p. 456

Linear and quadratic equations, the quadratic formula

Course 1, Unit 2, pp. 142-153

Course 2, Unit 4, pp. 265-288

Course 3, Unit 3, pp. 209-224, 230-233; Unit 6, pp. 477-479

Factoring techniques

Course 3, Unit 3, pp. 209-224

Course 4, Unit 6, pp. 382-403

Completion of the square

Course 3, Unit 3, pp. 224, 242

Course 4, Unit 8, p. 528

Direct and indirect variation

Course 2, Unit 4, pp. 256-258

Course 3, Unit 1, p. 10

Polynomial equations and inequalities

Course 4, Unit 6, pp. 360-390

Division of polynomials; rational expressions

Course 3, Unit 3, pp. 215-218

Course 4, Unit 6, pp. 406-425

Remainder, factor, and rational root theorems

Course 4, Unit 6, pp. 385-387, 401

Relationship between polynomial degree and the number of zeros

Course 2, Unit 4, pp. 280-281

Course 4, Unit 6, pp. 361-365, 371

Rational equations and inequalities

Course 3, Unit 1, pp. 2-24

Course 4, Unit 6, pp. 406-425

Exponents and radicals; laws of exponents

Course 2, Unit 4, pp. 290-310

Course 4, Unit 3, pp. 164, 439, 457

Properties of logarithms

Course 4, Unit 3, pp. 165-166; Unit 6, p. 441

General functions: domain, range, zeros, inverse, graphs of  $y = f(x)$

Course 3, Unit 3, pp. 177-178; Unit 6, pp. 422-433

Course 4, Unit 3, pp. 142-155

Function properties (increasing, decreasing, periodic, odd, even, one-to-one)

Course 1, Unit 3, pp. 184-185

Course 2, Unit 6, pp. 431-442

Course 3, Unit 6, pp. 428-433, 439

Course 4, Unit 1, p. 15; Unit 3, p. 144, 185; Unit 7, p. 474

Domain, range, and graphical analysis of:

Polynomial functions

Course 3, Unit 6, p. 432

Course 4, Unit 6, pp. 368-372

Rational functions

Course 4, Unit 6, pp. 406-425

Exponential functions (base  $a > 0$ ,  $a \neq 1$ );  $e^x$

Course 1, Unit 6, pp. 422-476

Course 3, Unit 6, pp. 425-428, 431-438, 457, 473

Course 4, Unit 1, p. 25; Unit 3, pp. 181-195; Unit 6, pp. 436-440

Logarithmic functions (base  $a > 0$ ,  $a \neq 1$ ); natural logarithms  
Course 4, Unit 3, pp. 158-163; Unit 6, pp. 444-447

Trigonometric (circular) functions; radian measure  
Course 2, Unit 6, pp. 431-449  
Course 3, Unit 6, pp. 428-430, 449-453  
Course 4, Unit 3, pp. 144, 155; Unit 7, pp. 480-484

Single algebraic functions  
Course 2, Unit 4, pp. 250-264  
Course 3, Unit 6, p. 457  
Course 4, Unit 1, pp. 1-49; Unit 3, pp. 142-213

Functions involving absolute value  
Course 3, Unit 6, pp. 442-448, 457

Step functions (e.g., the greatest integer function)  
Course 3, Unit 3, pp. 183, 185; Unit 6, p. 436

Functions defined on split domains  
Course 3, Unit 3, p. 186; Unit 6, p. 479  
Course 4, Unit 3, p. 155

Trigonometric identities  
Course 4, Unit 7, pp. 464-477

Trigonometric equations  
Course 4, Unit 7, pp. 480-491

The Binomial Theorem  
Course 4, Unit 5, pp. 245-249

Sequences and series; summations notation (for BC course)  
Course 3, Unit 7, pp. 488-515, 519-529

Forming functions from verbal descriptions (in all contexts)  
Throughout see for examples: Course 3, Unit 1, Unit 6  
Course 4, Unit 1, Unit 5

Problem solving (in all contexts)  
Throughout see for examples Course 3, Unit 3, pp. 170-182  
Course 4, Unit 1, pp. 22-28, 56-71; Unit 2, pp. 80-133

## **Geometry**

The Pythagorean Theorem

Course 1, Unit 5, pp. 362-365

Course 2, Unit 2, p. 83

Congruent and similar triangles

Course 3, Unit 4, pp. 297-322

Parallel and perpendicular lines

Course 3, Unit 4, pp. 282-295

Polygons

Course 1, Unit 5, pp. 383-393

Circles

Course 1, Unit 5, pp. 359, 369

Deductive proof

Course 3, Unit 3, pp. 240-251; Unit 4, pp. 260-344

Indirect proof

Not addressed

Areas (rectangles, triangles, trapezoids, circles, parallelograms, regular polygons)

Course 1, Unit 2, p. 136; Unit 5, pp. 355-361

Volumes (regular prisms, cylinders, cones, spheres)

Course 1, Unit 5, pp. 373-382

Total and lateral surface areas (regular prisms, cones, spheres)

Course 1, Unit 5, pp. 373-382

## **Coordinate Geometry**

Lines (slopes, parallel and perpendicular lines)

Course 1, Unit 3, pp. 182-188

Course 2, Unit 2, pp. 87-96

Distance and midpoint formulas

Course 2, Unit 2, pp. 80-87

Graphs of functions (see also topics under Algebra and Trigonometry)

Throughout Courses 1-4

Symmetry and periodicity (function and graph behavior)

Course 2, Unit 6, pp. 431-449

Course 3, Unit 6, p. 438

Course 4, Unit 6, pp. 369, 431-479

Translating and reflecting graphs; graphing inverse relations

Course 1, Unit 5, p. 411

Course 2, Unit 2, pp. 109-129

Course 3, Unit 6, pp. 441-482

Course 4, Unit 3, pp. 143-157

Conic sections

Course 4, Unit 8, pp. 527-543

Polar coordinate system; polar graphs (for BC course)

Course 4, Unit 2, pp. 94-98

Vectors (for BC course)

Course 4, Unit 2, pp. 80-105

## **Graphing Calculators**

Basic calculation procedures and computation

Throughout: Course 1, Unit 2, Unit 3, Unit 6

Course 2, Unit 3

Course 4, Unit 1, Unit 2, Unit 3

Graphing functions; viewing windows

Throughout: Course 1, Unit 2, Unit 3, Unit 6

Course 2, Unit 4

Course 3, Unit 6

Course 4, Unit 1, Unit 3, Unit 6, Unit 7, Unit 8

Finding roots of equations

Course 2, Unit 4

Course 3, Unit 3

Course 4, Unit 3, pp. 158-168; Unit 6, pp. 360, 384-403, 412-425; Unit 7, pp. 448-455, 480-491

Recognizing function behavior from graphical observation

Course 3, Unit 6

Course 4, Unit 6, pp. 368-372, 381, 405, 412-416, 420

Hidden behavior and limitations of calculator graphs

Course 4, Unit 6, p. 412-415

Error accumulation and roundoff procedures  
Not addressed

### **Other Topics**

Permutations and combinations  
Course 3, p. 110, 415  
Course 4, Unit 4, pp. 222-249

Complex numbers  
Course 4, Unit 6, pp. 390-403; Unit 7, pp. 494-505

Probability and statistics  
Throughout

Mathematical induction  
Course 4, Unit 4, pp. 258-273

Matrices and determinants  
Course 2, Unit 1

Linear programming  
Course 3, Unit 1, pp. 63-85

Computer topics (spreadsheets, computer algebra systems, simulations)  
Course 1, Unit 7  
Course 2, Unit 7  
Course 4, Unit 8, p. 557; Unit 10