Mississippi Mathematics

Calculus

Standards for Mathematical Practice (SMP)

Approach Mathematics Confidently and Adaptively, Applying Understanding and Skills Effectively across Diverse Contexts

1 Make sense of problems and persevere in solving them. C.SMP.1

2 Reason abstractly and quantitatively. C.SMP.2

3 Construct viable arguments and critique the reasoning of others. C.SMP.3

4 Model with mathematics. C.SMP.4

5 Use appropriate tools strategically. C.SMP.5

6 Attend to precision. C.SMP.6

7 Look for and make use of structure. C.SMP.7

8 Look for and express regularity in repeated reasoning. C.SMP.8

Number and Quantity (N)

Compute and Determine the Reasonableness of Results in Mathematical and Real-world Situations

1 Estimate limits from graphs or tables. C.N.1

2 Estimate numerical derivatives from graphs or tables of data. C.N.2

3 Prove statements using mathematical induction. C.N.3

Algebra (A)

Demonstrate Basic Knowledge of Functions, Including their Behavior and Characteristics

4 Predict and explain the characteristics and behavior of functions and their graphs (domain, range, increasing/decreasing intervals, intercepts, symmetry, and end behavior). C.A.4

5 Investigate, describe, and determine asymptotic behavior using tables, graphs, and analytical methods C.A.5

6 Determine and justify the continuity and discontinuity of functions C.A.6

Evaluate the Limits and Communicate an Understanding of the Limiting Process

7 Solve mathematical situations and application problems involving or using derivatives, including exponential, logarithmic, and trigonometric functions. C.A.7

8 Calculate limits using algebraic methods. C.A.8

Verify the behavior and direction of non-determinable limits. C.A.9

Skip to main content

Use the Definition and Formal Rules of Differentiation to Compute Derivatives

10 State and apply the formal definition of a derivative. C.A.10

11 Apply differentiation rules to sums, products, quotients, and powers of functions. C.A.11

12 Use the chain rule and implicit differentiation. C.A.12

13 Describe the relationship between differentiability and continuity. C.A.13

Apply Derivatives to Find Solutions in a Variety of Situations

14 Define a derivative and explain the purpose/utility of the derivative. C.A.14

15 Apply the derivative as a rate of change in varied contexts, including velocity, speed, and acceleration. C.A.15

16 Apply the derivative to find tangent lines and normal lines to given curves at given points. C.A.16

17 Predict and explain the relationships between functions and their derivatives. C.A.17

18 Model rates of change to solve related rate problems. C.A.18

19 Solve optimization problems. C.A.19

Employ Various Integration Properties and Techniques to Elevate Integrals

20 State and apply the First and Second Fundamental Theorem of Calculus. C.A.20

21 Apply the power rule and u-substitution to evaluate indefinite integrals. C.A.21

Geometry (G)

Geometry

22 Demonstrate and explain the differences between average and instantaneous rates of change. C.G.22

23 Apply differentiation techniques to curve sketching C.G.23

24 Apply Rolle's Theorem and the Mean Value Theorem and their geometric consequences. C.G.24

25 Identify and apply local linear approximations. C.G.25

26 Analyze curves with attention to non-decreasing functions (monotonicity) and concavity. C.G.26

Statistics and Probability (S)

Adapt Integration Methods to Model Situations to Problems

27 Apply integration to solve problems of area. C.S.27

28 Utilize integrals to model and find solutions to real-world problems such as calculating displacement and total distance traveled. C.S.28

Apply Appropriate Techniques, Tools, and Formulas to Determine Values for the Definite Integral

29 Interpret the concept of definite integral as a limit of Riemann sums over equal subdivisions. C.S.29