South Carolina Mathematics

Algebra 2 with Probability

Mathematical Process Standards MPS

1 Problem Solving MPS.PS

1a Make sense of problems and persevere in solving them strategically. MPS.PS.1

2 Representation & Communication MPS.RC

2a Explain ideas using precise and contextually appropriate mathematical language, tools, and models. MPS.RC.1

3 Connections MPS.C

3a Demonstrate a deep and flexible conceptual understanding of mathematical ideas, operations, and relationships while making real-world connections. MPS.C.1

4 Analyze & Justify MPS.AJ

4a Use critical thinking skills to reason both abstractly and quantitatively. MPS.AJ.1

5 Structure & Patterns MPS.SP

5a Identify and apply regularity in repeated reasoning to make generalizations. MPS.SP.1

Data, Probability, and Statistical Reasoning A2P.DPSR

1 Understand independence and conditional probability and use them to interpret data. A2P.DPSR.1

1a Describe events as subsets of a sample space using characteristics or categories of the outcomes, or as unions, intersections, or complements of other events. A2P.DPSR.1.1

1b Explain whether two events, A and B, are independent if and only if the probability of A and B occurring together is the product of their probabilities and use this characterization to determine if they are independent. A2P.DPSR.1.2

1c Determine whether the conditional probability of A given B as P(A and B)/P(B) and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B in mathematical and real-world situations. A2P.DPSR.1.3

1d Recognize and explain the concepts of conditional probability and independence. A2P.DPSR.1.4

2 **Use the rules of probability to compute probabilities of compound events in a uniform probability model.** A2P.DPSR.2

- 2a Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A and interpret the answer in terms of the model. A2P.DPSR.2.1
- 2b Apply the Addition Rule, P(A or B) = P(A) + P(B) − P(A and B) and interpret the answer in terms of the model. A2P.DPSR.2.2
- 2c Apply the general Multiplication Rule in a uniform probability model, P(A and B) = P(A)·P(B|A) = P(B)·P(A|B) and interpret the answer in terms of the model. A2P.DPSR.2.3
- 2d Use permutations and combinations to determine the number of possible outcomes in a sample space. A2P.DPSR.2.4

Measurement, Geometry, and Spatial Reasoning A2P.MGSR

1 **Explore and analyze sine and cosine functions using the unit circle, right triangle definitions, and models of periodic phenomena.** A2P.MGSR.1

- 1a Build the unit circle for sine and cosine functions using right triangle definitions. A2P.MGSR.1.1
- 1b Use models of periodic phenomena to evaluate and analyze the graph of sine and cosine functions. A2P.MGSR.1.2

Numerical Reasoning A2P.NR

1 **Recognize that the complex number system extends the real number system to allow for solution to all polynomial equations.** A2P.NR.1

- 1a Understand that there is an imaginary unit i such that i^2 = -1 and explain the structure of a complex number as a + bi, where a and b are real. A2P.NR.1.1
- 1b Add, subtract, and multiply complex numbers. A2P.NR.1.2

2 **Represent and manipulate data using matrices.** A2P.NR.2

- 2a Perform operations with matrices including addition, subtraction, and scalar multiplication. A2P.NR.2.1

Patterns, Algebra, and Functional Reasoning A2P.PAFR

1 **Explore and analyze quadratic and polynomial functions and inequalities and use them to model real-world situations.** A2P.PAFR.1

- 1a Graph, identify roots, and analyze quadratic functions in mathematical and real-world situations. A2P.PAFR.1.1
- 1b Solve quadratic inequalities that model mathematical and real-world situations. A2P.PAFR.1.2
- 1c Graph and analyze polynomial functions in mathematical and real-world situations. A2P.PAFR.1.3
- 1d Solve polynomial inequalities that model mathematical and real-world situations. A2P.PAFR.1.4
- 1e Recognize perfect squares and perfect cubes and use them to describe the structure of polynomials. A2P.PAFR.1.5

2 Explore and analyze rational and radical functions and use them to model real-world phenomena. A2P.PAFR.2

- 2a Graph rational and radical functions and describe their key features. Limit to square roots and cube roots only. A2P.PAFR.2.1
- 2b Perform arithmetic operations on rational expressions, including problems in context, and express rational expressions in irreducible form. A2P.PAFR.2.2
- 2c Create and solve rational and radical equations in one variable, including those that model real-life situations, and verify solutions to identify extraneous solutions if they appear. A2P.PAFR.2.3

3 Explore and analyze exponential functions and use them to model real-world phenomena. A2P.PAFR.3

- 3a Create, solve, and graph exponential functions, including those that model real-life situations. A2P.PAFR.3.1
- 3b Find the sum of the terms of arithmetic and geometric sequences. A2P.PAFR.3.2

4 Reason with parent functions to find families of functions that all have similar distinguishing attributes common to the family and use common characteristics to aid in rewriting and identifying functions. A2P.PAFR.4

- 4a Identify the effect on the graph of replacing $f(x)$ by $kf(x), f(x)+k, f(x-k), f(kx)$ for any real number k including multiple transformations; write an equation of a transformed parent function given its graph. Extend to equations involving rational, polynomial, radical, exponential, and piecewise. A2P.PAFR.4.1

5 Explore and analyze piecewise functions and linear absolute value inequalities and use them to model real-world phenomena. A2P.PAFR.5

- 5a Graph piecewise functions and describe their key features. A2P.PAFR.5.1
- 5b Solve linear absolute value inequalities. A2P.PAFR.5.2

6 Represent and interpret functions symbolically and graphically. A2P.PAFR.6

- 6a Find the inverse of functions and verify graphically. A2P.PAFR.6.1
- 6b Calculate and interpret the average rate of change of the function over a specified interval, given a function in graphical, symbolic, or numerical form. A2P.PAFR.6.2
- 6c Use linear programming to solve systems of equations and inequalities by addressing the constraints that arise in real-world situations. A2P.PAFR.6.3