

Content Area: Math
Grade/Course: Probability / ACCN: MXX1100

Strand	Numbers and Operations
Standard 1: Numbers and Operations: NUMBER SENSE: Understand numbers, ways of representing numbers, relationships among numbers, and number systems	
There are no benchmarks for this standard for this Grade/Course.	

Strand	Numbers and Operations
Standard 2: Numbers and Operations: OPERATION SENSE: Understand the meaning of operations and how they relate to each other	
There are no benchmarks for this standard for this Grade/Course.	

Strand	Numbers and Operations
Standard 3: Numbers and Operations: COMPUTATION STRATEGIES: Use computational tools and strategies fluently and, when appropriate, use estimation	
There are no benchmarks for this standard for this Grade/Course.	

Strand	Measurement
Standard 4: Measurement: FLUENCY WITH MEASUREMENT: Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring	
There are no benchmarks for this standard for this Grade/Course.	

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Strand	Geometry and Spatial Sense
Standard 5: Geometry and Spatial Sense: PROPERTIES AND RELATIONSHIPS: Analyze properties of objects and relationships among the properties	
There are no benchmarks for this standard for this Grade/Course.	

Strand	Geometry and Spatial Sense
Standard 6: Geometry and Spatial Sense: TRANSFORMATIONS AND SYMMETRY: Use transformations and symmetry to analyze mathematical situations	
There are no benchmarks for this standard for this Grade/Course.	

Strand	Geometry and Spatial Sense
Standard 7: Geometry and Spatial Sense: VISUAL AND SPATIAL SENSE: Use visualization and spatial reasoning to solve problems both within and outside of mathematics	
There are no benchmarks for this standard for this Grade/Course.	

Strand	Geometry and Spatial Sense
Standard 8: Geometry and Spatial Sense: REPRESENTATIONAL SYSTEMS: Select and use different representational systems, including coordinate geometry	
There are no benchmarks for this standard for this Grade/Course.	

Strand	Patterns, Functions, and Algebra
Standard 9: Patterns, Functions, and Algebra: PATTERNS AND FUNCTIONAL RELATIONSHIPS: Understand various types of patterns and functional relationships	
There are no benchmarks for this standard for this Grade/Course.	

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Strand	Patterns, Functions, and Algebra
Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION: Use symbolic forms to represent, model, and analyze mathematical situations	
There are no benchmarks for this standard for this Grade/Course.	

Strand	Data Analysis, Statistics, and Probability
Standard 11: Data Analysis, Statistics, and Probability: FLUENCY WITH DATA: Pose questions and collect, organize, and represent data to answer those questions	
There are no benchmarks for this standard for this Grade/Course.	

Strand	Data Analysis, Statistics, and Probability
Standard 12: Data Analysis, Statistics, and Probability: STATISTICS: Interpret data using methods of exploratory data analysis	
There are no benchmarks for this standard for this Grade/Course.	

Strand	Data Analysis, Statistics, and Probability
Standard 13: Data Analysis, Statistics, and Probability: DATA ANALYSIS: Develop and evaluate inferences, predictions, and arguments that are based on data	
There are no benchmarks for this standard for this Grade/Course.	

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Strand	Data Analysis, Statistics, and Probability
Standard 14: Data Analysis, Statistics, and Probability: PROBABILITY: Understand and apply basic notions of chance and probability	

Topic	Probability		
Benchmark MA.P.14.1	Describe the relationship among events (e.g., inclusive, disjoint, complementary, independent, dependent)		
Sample Performance Assessment (SPA)	The student: Provides an example of inclusive, disjoint, complementary, independent, and dependent events.		
Rubric			
Advanced	Proficient	Partially Proficient	Novice
Describe, in great detail, the relationship among events	Describe, in sufficient detail, the relationship among events	Describe, in some (but not enough) detail, the relationship among events	Describe, in insufficient detail, the relationship among events

Topic	Probability		
Benchmark MA.P.14.2	Calculate the probability of two events under union and intersection		
Sample Performance Assessment (SPA)	The student: Determines the probability of two events that are intersections and two events that are unions.		
Rubric			
Advanced	Proficient	Partially Proficient	Novice
Calculate the probability of two events under union and intersection, with accuracy	Calculate the probability of two events under union and intersection, with no significant errors	Calculate the probability of two events under union and intersection, with a few significant errors	Calculate the probability of two events under union and intersection, with many significant errors

Topic	Probability		
Benchmark MA.P.14.3	Differentiate between theoretical and experimental probability		
Sample Performance Assessment (SPA)	The student: Compares the theoretical probability to the experimental probability of an experiment and analyzes the difference between them.		
Rubric			
Advanced	Proficient	Partially Proficient	Novice
Explain, in great detail, the difference between theoretical and experimental probability	Explain, in sufficient detail, the difference between theoretical and experimental probability	Explain, in some (but not enough) detail, the difference between theoretical and experimental probability	Explain, in insufficient detail, the difference between theoretical and experimental probability

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Topic	Probability		
Benchmark MA.P.14.4	Explain the difference between probability and odds and convert from one to the other		
Sample Performance Assessment (SPA)	The student: Expresses the change of an event occurring as a probability and as odds, and describes how the representations reflect the events.		
Rubric			
Advanced	Proficient	Partially Proficient	Novice
Explain, in great detail, the difference between probability and odds, and convert from one to the other, with accuracy	Explain, in sufficient detail, the difference between probability and odds, and convert from one to the other, with no significant errors	Explain, in some (but not enough) detail, the difference between probability and odds, and convert from one to the other, with a few significant errors	Explain, in insufficient detail, the difference between probability and odds, and convert from one to the other, with many significant errors

Topic	Probability		
Benchmark MA.P.14.5	Calculate the probability of an outcome for an experiment with and without replacement		
Sample Performance Assessment (SPA)	The student: Shows/explains how to find the probability of events occurring with and without replacement.		
Rubric			
Advanced	Proficient	Partially Proficient	Novice
Calculate the probability of an outcome for an experiment with and without replacement, with accuracy	Calculate the probability of an outcome for an experiment with and without replacement, with no significant errors	Calculate the probability of an outcome for an experiment with and without replacement, with a few significant errors	Calculate the probability of an outcome for an experiment with and without replacement, with many significant errors

Topic	Probability		
Benchmark MA.P.14.6	Apply discrete random variables to solve for the probability of experimental outcomes		
Sample Performance Assessment (SPA)	The student: Shows/explains how to apply discrete random variables to solve for probability of experimental outcomes (e.g., determines the probability of rolling three 4's in nine rolls of a number cube).		
Rubric			
Advanced	Proficient	Partially Proficient	Novice
Apply discrete random variables to solve for the probability of experimental outcomes, with accuracy	Apply discrete random variables to solve for the probability of experimental outcomes, with no significant errors	Apply discrete random variables to solve for the probability of experimental outcomes, with a few significant errors	Apply discrete random variables to solve for the probability of experimental outcomes, with many significant errors

Topic	Probability		
Benchmark MA.P.14.7	Estimate and calculate expected values		
Sample Performance Assessment (SPA)	The student: Shows/explains how to calculate the expected values of an experiment.		
Rubric			
Advanced	Proficient	Partially Proficient	Novice
Estimate and calculate expected values, with accuracy	Estimate and calculate expected values, with no significant errors	Estimate and calculate expected values, with a few significant errors	Estimate and calculate expected values, with many significant errors

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Topic	Probability		
Benchmark MA.P.14.8	Apply permutations, combinations, and the fundamental counting principle to calculate the probability of two events		
Sample Performance Assessment (SPA)	The student: Uses permutations (or combinations) to determine the total number of possible outcomes and the total number of intended outcomes, and then represents the values as a ratio and simplifies.		
Rubric			
Advanced	Proficient	Partially Proficient	Novice
Apply permutations, combinations, and the fundamental counting principle to calculate the probability of two events, with accuracy	Apply permutations, combinations, and the fundamental counting principle to calculate the probability of two events, with no significant errors	Apply permutations, combinations, and the fundamental counting principle to calculate the probability of two events, with a few significant errors	Apply permutations, combinations, and the fundamental counting principle to calculate the probability of two events, with many significant errors