

Abington Heights School District Probability and Statistics Curriculum



In Probability and Statistics, students develop their numeracy skills through the following areas of study:

1. Statistics & Data Displays
2. Probability & Discrete Probability Distributions
3. The Normal Distribution & Its Applications

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Adoption: 2023 - 2024 SY

Review Date:

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

AH MATHEMATICS

Where collaborative problem solving and
perseverance lead to excellence

Abington Heights Math Framework

Stakeholders	Actions
Students	<ul style="list-style-type: none"> ★ Engage in mathematical discussions, share their ideas openly, be inquisitive, seek to understand and learn more about mathematical concepts, and try their best daily. ★ Exhibit creativity and curiosity in problem solving individually and collaboratively. ★ Persevere in engaging and challenging daily mathematical practice. ★ Come prepared to learn every day.
Teachers	<ul style="list-style-type: none"> ★ Create a safe and collaborative classroom environment where students feel vested in a shared vision for mathematical excellence. ★ Develop high quality instruction that meets the needs of all learners through differentiation. ★ Use a variety of 21st century methodologies to advance learning. ★ Partner with parents and guardians to support student success. ★ Establish a collaborative community within the building and amongst grade levels to ensure a cohesive level of instruction.
Building Leaders	<ul style="list-style-type: none"> ★ Deeply understand the needs of teachers, students, the instructional materials being used, programs being implemented, and the expectations for state-level assessment scores <ul style="list-style-type: none"> ○ Knowledgeable about program and grade level standards ○ Ensure consistent and equal access to high-quality instructional materials and resources, building. ★ Be partners with teachers, students and families: <ul style="list-style-type: none"> ○ Provide guidance and support to the mathematical community. ○ Understand needs of teachers, students and families. ★ Trust the educators to make professional decisions based on program, student, and district needs.
Central Admin	<ul style="list-style-type: none"> ★ Effectively communicate to the school board and community specific areas of need and how to support teachers and building leaders in a quest for mathematical excellence ★ Deeply understand the needs of teachers, students, the instructional materials being used, programs being implemented, and the expectations for state-level assessment scores <ul style="list-style-type: none"> ○ Have a common metric for mathematical excellence. ○ Ensure consistent and equal access to high-quality instructional materials and resources, district. ○ Re-examine best practices/curriculum routinely (6 years). ★ Support a culture of collaboration between the other stakeholder groups to maintain the standard of excellence of the Abington Heights ★ Trust the educators to make professional decisions based on program, student, and district needs.
Parents/Community	<ul style="list-style-type: none"> ★ Be a strong support system and contribute by building a positive math community for students. ★ Encourage a positive math mindset. ★ Have conversations with their children about school and ask what they are learning about in school. ★ Be open, receptive to the district's ideas about student learning and reach out to teachers/school to learn more about how they can support. ★ Trust the educators to make professional decisions based on program, student, and district needs.
School Board	<ul style="list-style-type: none"> ★ Provide the fiscal resources to support: <ul style="list-style-type: none"> ○ Highly qualified professionals for mathematics ○ High-quality instructional materials ○ Effective and efficient math interventions for remediation ○ Professional development for math content and instructional practices ★ Trust the educators to make professional decisions based on program, student, and district needs.

Probability and Statistics Scope and Sequence

Semester 1

Month	Unit	Estimated Number of Weeks
September	Statistics & Data Displays	4
October	Statistics & Data Displays	1
	Probability & Discrete Probability Distributions	3
November	Probability & Discrete Probability Distributions	3
December	The Normal Distribution & Its Applications	2
January	The Normal Distribution & Its Applications	2
	Final Exam Review / Final Exam	2

Semester 2

February	Statistics & Data Displays	4
March	Statistics & Data Displays	1
	Probability & Discrete Probability Distributions	3
April	Probability & Discrete Probability Distributions	3
	The Normal Distribution & Its Applications	1
May	The Normal Distribution & Its Applications	3
	Final Exam Review	1
June	Final Exam	1

	Essential Questions	Content	Skills	<u>PA Core Standards</u>	Activities	Assessment/ Evidence of Learning
STATISTICS & DATA DISPLAYS	What is statistics, and why should we study it?	An Overview of Statistics	Classify data by type	CC.2.4.HS.B.1	Chapter 1 Review WeBWork	Daily Homework Assignments - Chapter 1
	What makes a sampling method unbiased?	Data Classification	Classify data collection types and experimental design	CC.2.4.HS.B.2	Relative & Cumulative Frequency WeBWork	Daily Homework Assignments - Chapter 2
	What characteristics compose a well designed experiment and observational studies?	Experimental Design	Identify bias	CC.2.4.HS.B.3	Empirical & Chebychev WeBWork	Daily Classwork Exercises
	How does the data produced in an experiment or observational study determine the different conclusions that can be made?	Frequency Distributions and Their Graphs	Compute relative and cumulative frequencies	CC.2.4.HS.B.4	Measures of Center & Variation WeBWork	Textbook Review Exercises
	What are the best methods to display and describe categorical data?	Measures of Central Tendency	Compute and interpret measures of center (mean, median, mode)	CC.2.4.HS.B.5	Textbook Chapter 1 review problems	Chapter 1 Review WeBWork
	What are the best methods to display and describe quantitative data?	Measures of Variation	Compute and interpret measures of spread (range, IQR, standard deviation)		Textbook Chapter 2 review problems	Relative & Cumulative Frequency WeBWork
		Measures of Position	Apply the Empirical Rule & Chebychev's Theorem to find the approximate proportion of data within a range		Frequency Distribution (States Visited) Activity	Empirical & Chebychev WeBWork
					Empirical Rule (Heights) Activity	Measures of Center & Variation WeBWork
				Statistical Survey Project	Chapter 1 Quiz	
				Chapter 1 PowerPoint	Chapter 2 Quiz	
					Statistical Survey Project	

	Essential Questions	Content	Skills	<u>PA Core Standards</u>	Activities	Assessment/ Evidence of Learning
STATISTICS & DATA DISPLAYS (continued)	<p>How do we use and interpret statistical summaries to describe data sets?</p> <p>What measures of center and spread are most appropriate to use when describing a distribution?</p> <p>Why is the normal distribution essential to the study of statistics?</p> <p>Does the data always lead to the truth?</p> <p>Is all data created equal?</p>		Compute and interpret z-scores		<p>Chapter 2 PowerPoint</p> <p>Daily homework assignments</p>	
PROBABILITY & DISCRETE PROBABILITY DISTRIBUTIONS	<p>How can we use probability to model real-life scenarios?</p> <p>How can we base decisions on chance?</p>	<p>Basic Concepts of Probability</p> <p>Conditional Probability and the Multiplication Rule</p> <p>The Addition Rule</p> <p>Counting Principles</p>	<p>Classify probability by type</p> <p>Utilize the multiplication rule, addition rule, and complements to compute probability</p>	<p>CC.2.4.HS.B.6</p> <p>CC.2.4.HS.B.7</p>	<p>Discrete & Binomial Distributions Practice WKST</p> <p>Binomial & Geometric Distributions Practice WKST</p>	<p>Daily Homework Assignments - Chapter 3</p> <p>Daily Homework Assignments - Chapter 4</p> <p>Daily Classwork Exercises</p>

	Essential Questions	Content	Skills	<u>PA Core Standards</u>	Activities	Assessment/ Evidence of Learning
PROBABILITY & DISCRETE PROBABILITY DISTRIBUTIONS (continued)	<p>Is anything in nature truly random?</p> <p>How is probability used to express the strength of our conclusions?</p> <p>To what extent should decisions be made based on chance?</p>	<p>Probability Distributions</p> <p>Binomial Distributions</p> <p>More Discrete Probability Distributions</p>	<p>Determine if events are independent or dependent</p> <p>Determine if events are mutually exclusive</p> <p>Utilize the fundamental counting principle, permutations, and combinations in order to compute advanced probability</p> <p>Differentiate between the binomial, geometric, and Poisson distribution</p> <p>Compute and interpret the mean and standard deviation for binomial, geometric, and Poisson distributions</p>		<p>Binomial, Geometric, Poisson Distributions Practice WKST</p> <p>Probability Concepts WeBWork</p> <p>Permutations & Combinations WeBWork</p> <p>Binomial Distribution WeBWork</p> <p>Geometric & Poisson Distributions WeBWork</p> <p>Textbook Chapter 3 review problems</p> <p>Textbook Chapter 4 review problems</p> <p>Conditional Probability (Hair Color vs Eye Color) Activity</p>	<p>Textbook Review Exercises</p> <p>Discrete & Binomial Distributions Practice WKST</p> <p>Binomial & Geometric Distributions Practice WKST</p> <p>Binomial, Geometric, Poisson Distributions Practice WKST</p> <p>Probability Concepts WeBWork</p> <p>Permutations & Combinations WeBWork</p> <p>Binomial Distribution WeBWork</p> <p>Geometric & Poisson Distributions WeBWork</p>

	Essential Questions	Content	Skills	PA Core Standards	Activities	Assessment/ Evidence of Learning
PROBABILITY & DISCRETE PROBABILITY DISTRIBUTIONS (continued)			Compute probabilities for binomial, geometric, and Poisson distributions		Addition Rule (Social Media) Activity Discrete Probability Distribution (Lottery) Activity Chapter 3 PowerPoint Chapter 4 PowerPoint Daily homework assignments - Chapter 3 Daily homework assignments - Chapter 4	Sections 3.1 & 3.2 Quiz Sections 3.3 & 3.4 Quiz Sections 4.1 & 4.2 Quiz Distributions Quiz
THE NORMAL DISTRIBUTION & ITS APPLICATIONS	What are the best methods to display and describe quantitative data? How do we use and interpret statistical summaries to describe data sets?	Introduction to Normal Distributions and the Standard Normal Distribution Normal Distributions: Finding Probabilities	Calculate the area under a normal distribution (area to left, to right, between two points) using calculators and tables		Normal Distribution Calculator Functions WKST #1 Normal Distribution Calculator Functions WKST #2	Daily Homework Assignments Daily Classwork Exercises Textbook Review Exercises

	Essential Questions	Content	Skills	PA Core Standards	Activities	Assessment/ Evidence of Learning
THE NORMAL DISTRIBUTION & ITS APPLICATIONS (continued)	<p>What measures of center and spread are most appropriate to use when describing a distribution?</p> <p>Why is the normal distribution essential to the study of statistics?</p>	<p>Normal Distributions: Finding Values</p> <p>Sampling Distributions and the Central Limit Theorem</p> <p>Normal Approximations to Binomial Distributions</p>	<p>Find z-scores when given a probability/ percentile /area under the normal curve</p> <p>Transform a z-score to an x-value</p> <p>Use the Central Limit Theorem to compare population and sample means/ standard deviations</p> <p>Calculate probabilities under the Normal curve while using the Central Limit Theorem</p> <p>Approximate a binomial distribution using the Normal distribution</p>		<p>Normal Distribution Properties WeBWorK</p> <p>Normal Distribution Probabilities WeBWorK</p> <p>Normal Approximation of Binomial WeBWorK</p> <p>Central Limit Theorem WeBWorK</p> <p>Textbook Chapter 5 review problems</p> <p>Normal Distribution (Heights) Activity</p> <p>Central Limit Theorem (Heights Part 2) Activity</p> <p>Chapter PowerPoints</p> <p>Daily homework assignments</p>	<p>Normal Distribution Calculator Functions WKST #1</p> <p>Normal Distribution Calculator Functions WKST #2</p> <p>Normal Distribution Properties WeBWorK</p> <p>Normal Distribution Probabilities WeBWorK</p> <p>Normal Approximation of Binomial WeBWorK</p> <p>Central Limit Theorem WeBWorK</p> <p>Sections 5.1 & 5.2 Quiz</p> <p>Sections 5.3, 5.4, 5.5 Quiz</p>

	Essential Questions	Content	Skills	<u>PA Core Standards</u>	Activities	Assessment/ Evidence of Learning
THE NORMAL DISTRIBUTION & ITS APPLICATIONS (continued)						NFL Wins Distribution Assignment
FINAL EXAMINATION REVIEW	All essential questions from throughout the year	All content areas from throughout the year	Review concepts for final examination		Final Exam Review Assignment	Final Exam Review Assignment