Unit 3: Sampling and Inferences

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Title Section

Department of Curriculum and Instruction

Belleville Public Schools

Curriculum Guide

Pre-Algebra H, Grade 7

Sampling and Inference

Belleville Board of Education

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Unit Overview

In this unit students will analyze and use statistics to make interferences about a population.

From this unit students will be able to use sampling to draw inferences about a population, investigate chance processes, and use and evaluate probability models.

Enduring Understanding

Students will understand .....

measures of center and measures of variability

that statistics can be used to gain information about a population by examining a sample of the population

various sampling techniques and how they can predict the actions of a larger group

that the probability of an event is a number between 0 and 1 and expresses the likelihood of the event occurring.

the difference between experimental probability and theoretical probability.

that data, statistics, and probability are used to understand and interpret data to make informed decisions

Essential Questions

How are statistics measures can be used to compare data sets?

How can selected data be used to draw inferences, make predictions, and compare populations?

How do you use a survey to make conclusions about the general population?

How can experimental and theoretical probabilities be used to make predictions or draw conclusions?

How do you find the probability of a compound event?

Exit Skills

Compute and use measures of central tendencies(mean, median and mode)

Choose an appropriate measure of central tendency.

Compute measures of variability.

Compute mean absolute deviation.

Compare populations using the measure of center and variability.

Use dotplots and box and whisker plots to compare data.

Determine distribution of data from a dotplot.

Identify sampling techniques.

Predict actions of a larger group using an appropriate sample.

Determine probability of an event.

Determine the probability of the complement of an event.

Discover and compare experimental and theoretical probabilities.

Determine the number of outcomes for an event.

Determine the probability of a compound event.

New Jersey Student Learning Standards (NJSLS)

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.7.SP.A.1	Understand that statistics can be used to gain information about a population by

	examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.
MA.7.SP.A.2	Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions.
MA.7.SP.B.3	Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability.
MA.7.SP.B.4	Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.
MA.7.SP.C.5	Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.
MA.7.SP.C.6	Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability.
MA.7.SP.C.7	Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.
MA.7.SP.C.7a	Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events.
MA.7.SP.C.7b	Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process.
MA.7.SP.C.8	Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.
MA.7.SP.C.8a	Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.
MA.7.SP.C.8b	Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., “rolling double sixes”), identify the outcomes in the sample space which compose the event.
MA.7.SP.C.8c	Design and use a simulation to generate frequencies for compound events.

Interdisciplinary Connections

LA.RI.7.1	Cite several pieces of textual evidence and make relevant connections to support analysis of what the text says explicitly as well as inferences drawn from the text.
9.3.ST-SM.4	Apply critical thinking skills to review information, explain statistical analysis, and to translate, interpret and summarize research and statistical data.
LA.W.7.1.A	Introduce claim(s), acknowledge alternate or opposing claims, and organize the reasons and evidence logically.

Learning Objectives

The student will be able to .....

Obtain the measures of center and variability of a data set and use them to interpret and analyze data.

Determine if a set of data contains an outlier.

Compute and compare the mean absolute deviation for two sets of data.

Create a dot plot for a set of data.

Display and analyze data in box-&-whisker plots and dot plots and use these to compare populations.

Describe the distribution of a set of data by analyzing a dotplot of the data.

Identify , compare and analyze sampling methods.

Make a inference about a larger population based on a sample.

Determine the theoretical probability of a simple event and its complement.

Compare experimental and theoretical probability.

Use Counting Principle to find number of outcomes of an event.

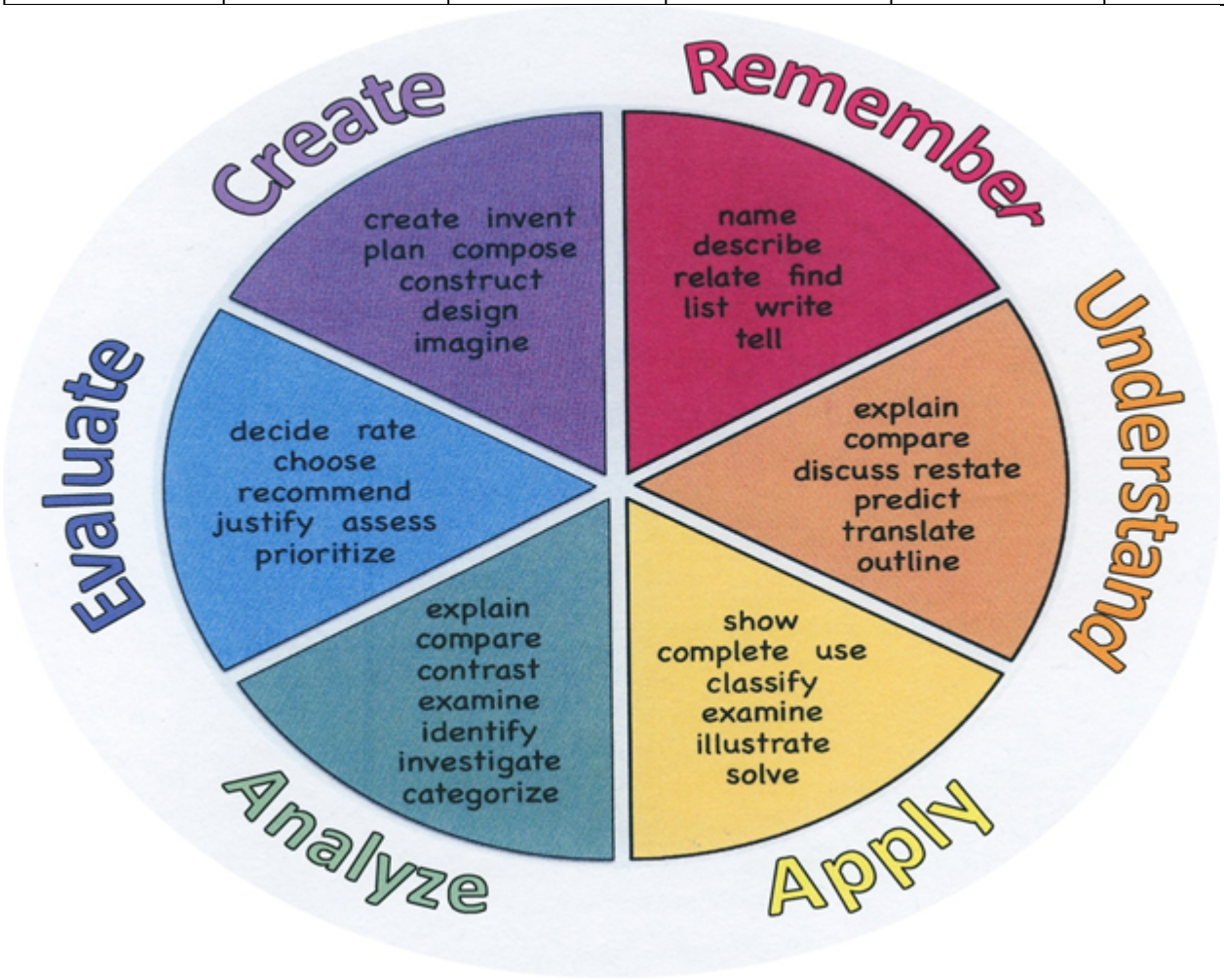
Determine the probability of a compound event.

Simulate an event by using a spinner, dice, or virtual simulation tool.

Action Verbs: Below are examples of action verbs associated with each level of the Revised Bloom's Taxonomy.

Remember	Understand	Apply	Analyze	Evaluate	Create
Choose	Classify	Choose	Categorize	Appraise	Combine
Describe	Defend	Dramatize	Classify	Judge	Compose
Define	Demonstrate	Explain	Compare	Criticize	Construct
Label	Distinguish	Generalize	Differentiate	Defend	Design
List	Explain	Judge	Distinguish	Compare	Develop
Locate	Express	Organize	Identify	Assess	Formulate
Match	Extend	Paint	Infer	Conclude	Hypothesize
Memorize	Give Examples	Prepare	Point out	Contrast	Invent
Name	Illustrate	Produce	Select	Critique	Make
Omit	Indicate	Select	Subdivide	Determine	Originate
Recite	Interrelate	Show	Survey	Grade	Organize
Select	Interpret	Sketch	Arrange	Justify	Plan
State	Infer	Solve	Breakdown	Measure	Produce
Count	Match	Use	Combine	Rank	Role Play
Draw	Paraphrase	Add	Detect	Rate	Drive
Outline	Represent	Calculate	Diagram	Support	Devise
Point	Restate	Change	Discriminate	Test	Generate
Quote	Rewrite	Classify	Illustrate		Integrate
Recall	Select	Complete	Outline		Prescribe

Recognize Repeat Reproduce	Show Summarize Tell Translate Associate Compute Convert Discuss Estimate Extrapolate Generalize Predict	Compute Discover Divide Examine Graph Interpolate Manipulate Modify Operate Subtract	Point out Separate		Propose Reconstruct Revise Rewrite Transform



Suggested Activities & Best Practices

Inquiry Labs - Textbook pages 452,475,487

Textbook, eAssessment, supplemental materials:

https://my.mheducation.com/login

AI Assessment and Learning System:

https://www.aleks.com/

Probabilty Video:

https://www.youtube.com/watch?v=tyAwxrUadtw

Videos on mathematical concepts (grade 6 - alg 2)

https://www.virtualnerd.com/

Lessonplans and instructional resources:

https://betterlesson.com/home?from=bl_landing_plans_cta

Mindset:

https://www.youtube.com/watch?v=3icoSeGqQtY

http://www.youcubed.org/wp-content/uploads/Positive-Classroom-Norms2.pdf

Math Discourse:

https://mrorr-isageek.com/start-a-math-fight/

Teaching Strategies for Improving Algebra Knowledge in Middle and High School Students:

https://ies.ed.gov/ncee/wwc/PracticeGuide/20

Coaching Corner:

https://sites.google.com/belleville.k12.nj.us/thecoachingcorner/home

Algebra Tools - Functions:(Refer to problems included in the pre-requisite skills in this document)

https://www.state.nj.us/education/aps/cccs/math/NJISTFunctions.pdf

Algebra Tools - Algebra:(Refer to problems included in the pre-requisite skills in this document)

https://www.state.nj.us/education/aps/cccs/math/NJISTAlgebra.pdf

Quia (Quintessential Instructional Archive)- use to create or use already created online activities:

https://www.quia.com/web

Misc Mathematics materials:

http://www.mathnstuff.com/

Kahoot:

https://create.kahoot.it/

Interactive spinner/dice:

http://www.shodor.org/interactivate/activities/ExpProbability/

Assessment Evidence - Checking for Understanding (CFU)

Use interactive classroom tools such as Nearpod, peardeck, edpuzzle to infuse CFUs throughout lesson.

Glencoe McGraw Hill : Chapter Assessments, Midchapter Assessments-summative assessment

EAssessment test generator: https://assess.k12.mhedu.com/Instructor/TestGenerator.aspx-summative assessment

Illustration-formative assessment

Written report-alternate assessment

Create a Multimedia poster-benchmark assessment

- Admit Tickets
- Anticipation Guide
- Common Benchmarks
- Compare & Contrast
- Create a Multimedia Poster
- DBQ's
- Define
- Describe
- Evaluate
- Evaluation rubrics
- Exit Tickets
- Explaining
- Fist- to-Five or Thumb-Ometer
- Illustration
- Journals
- KWL Chart
- Learning Center Activities
- Multimedia Reports
- Newspaper Headline
- Outline

- Question Stems
- Quickwrite
- Quizzes
- Red Light, Green Light
- Self- assessments
- Socratic Seminar
- Study Guide
- Surveys
- Teacher Observation Checklist
- Think, Pair, Share
- Think, Write, Pair, Share
- Top 10 List
- Unit review/Test prep
- Unit tests
- Web-Based Assessments
- Written Reports

Primary Resources & Materials

Math Accelerated-A Pre-Algebra Program 2017 - McGraw-Hill

Math Accelerated-A Pre-Algebra Program 2017 - Digital Resources - McGraw-Hill

Ancillary Resources

Glencoe McGraw-Hill Algebra 1 2014

Aleks

Technology Infusion

Use interactive tools such as nearpod, peardeck, edpuzzle to enhance a presentation and allow students to

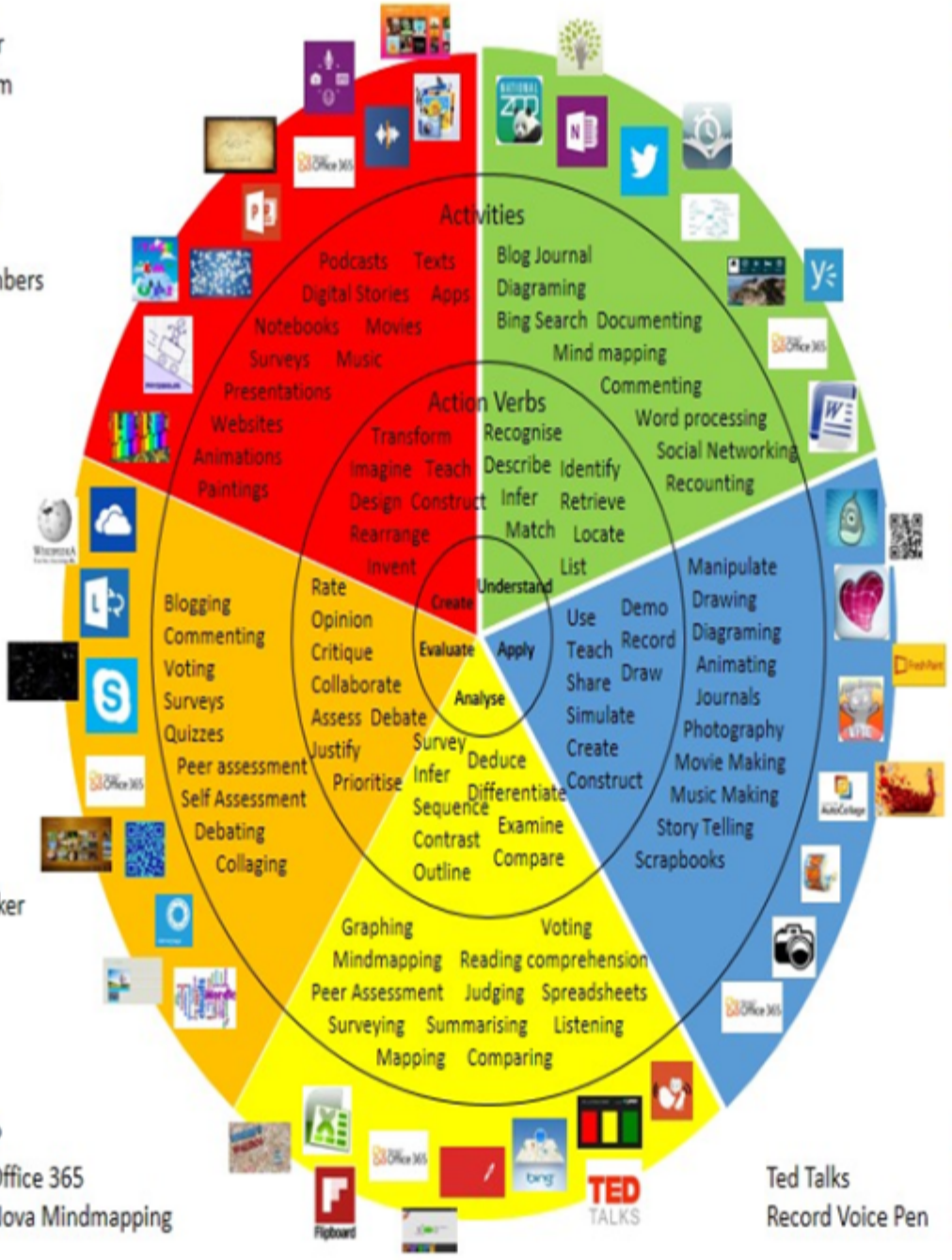
engage during the lesson while the teacher gathers data throughout the lesson

- ALEKS
- Calculator/Graphing calculator
- Google Classroom
- Google Suites
- McGraw-Hill Education
- Edulastic
- EdPuzzle
- Desmos.com
- geogebra.org
- Youtube
- Khan academy
- MS Excel
- Office 365
- MS Word
- Peardeck
- Nearpod
- PodCasts
- MS Powerpoint
- Wikipedia
- Skype
- Twitter
- Ted Talks
- Flipgrid

Win 8.1 Apps/Tools Pedagogy Wheel

Podcasts
Photostory 3
Kid Story Builder
Music Maker Jam
Paint A Story
Office 365
MS PowerPoint
Stack 'Em Up
NqSquared Numbers
Physamajig
Xylophone 8

Wikipedia
Skydrive
Lync
SkyMap
Skype
Office 365
Puzzle Touch
Easy QR
Memorylage
Life Moments
Word Cloud Maker



Where's Waldo?
MS Excel Office 365
Flipboard Nova Mindmapping

Ted Talks
Record Voice Pen

Originally taken from http://www.coetail.com/vzimmer/files/2013/02/iPadagogy-Wheel.001.jpg
And adapted for Windows 8.1 devices by Charlotte Beckhurst @CharBeckhurst

Alignment to 21st Century Skills & Technology

Mastery and infusion of **21st Century Skills & Technology** and their Alignment to the core content areas is essential to student learning. The core content areas include:

- English Language Arts;
- Mathematics;
- Science and Scientific Inquiry (Next Generation);
- Social Studies, including American History, World History, Geography, Government and Civics, and Economics;
- World languages;
- Technology;
- Visual and Performing Arts.

CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP7	Employ valid and reliable research strategies.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP11	Use technology to enhance productivity.
CAEP.9.2.8.B.2	Develop a Personalized Student Learning Plan with the assistance of an adult mentor that includes information about career areas of interest, goals and an educational plan.
CAEP.9.2.8.B.3	Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.
TECH.8.1.12.A.3	Collaborate in online courses, learning communities, social networks or virtual worlds to discuss a resolution to a problem or issue.
TECH.8.1.12.F.CS1	Identify and define authentic problems and significant questions for investigation.

21st Century Skills/Interdisciplinary Themes

- Communication and Collaboration
- Creativity and Innovation
- Critical thinking and Problem Solving
- ICT (Information, Communications and Technology) Literacy
- Information Literacy
- Life and Career Skills
- Media Literacy

21st Century Skills

- Civic Literacy
- Environmental Literacy
- Financial, Economic, Business and Entrepreneurial Literacy
- Global Awareness
- Health Literacy

Differentiation

Use The Glencoe Personal Tutor (English and Spanish) to reteach or revisit concepts such as measures of center and mearures of variability

Aleks - Assign student content involving integers or have students follow their track

Create a digital or physical word wall students can refer to

Differentiations:

- Small group instruction
- Small group assignments
- Extra time to complete assignments
- Pairing oral instruction with visuals
- Repeat directions
- Use manipulatives
- Center-based instruction
- Token economy
- Study guides
- Teacher reads assessments allowed
- Scheduled breaks
- Rephrase written directions
- Multisensory approaches
- Additional time
- Preview vocabulary
- Preview content & concepts
- Story guides
- Behavior management plan
- Highlight text
- Student(s) work with assigned partner
- Visual presentation
- Assistive technology
- Auditory presentations
- Large print edition
- Dictation to scribe
- Small group setting

Hi-Prep Differentiations:

- Alternative formative and summative assessments

- Choice boards
- Games and tournaments
- Group investigations
- Guided Reading
- Independent research and projects
- Interest groups
- Learning contracts
- Leveled rubrics
- Literature circles
- Multiple intelligence options
- Multiple texts
- Personal agendas
- Project-based learning
- Problem-based learning
- Stations/centers
- Think-Tac-Toes
- Tiered activities/assignments
- Tiered products
- Varying organizers for instructions

Lo-Prep Differentiations

- Choice of books or activities
- Cubing activities
- Exploration by interest
- Flexible grouping
- Goal setting with students
- Jigsaw
- Mini workshops to re-teach or extend skills
- Open-ended activities
- Think-Pair-Share
- Reading buddies
- Varied journal prompts
- Varied supplemental materials

Special Education Learning (IEP's & 504's)

Use The Glencoe-McGrawHill Personal Tutor to review or revisit content

Create Number Talks in Google Classroom

Reteach Measures of Center using Glencoe reteach masters

- printed copy of board work/notes provided

- additional time for skill mastery
- assistive technology
- behavior management plan
- Center-Based Instruction
- check work frequently for understanding
- computer or electronic device utilizes
- extended time on tests/ quizzes
- have student repeat directions to check for understanding
- highlighted text visual presentation
- modified assignment format
- modified test content
- modified test format
- modified test length
- multi-sensory presentation
- multiple test sessions
- preferential seating
- preview of content, concepts, and vocabulary
- Provide modifications as dictated in the student's IEP/504 plan
- reduced/shortened reading assignments
- Reduced/shortened written assignments
- secure attention before giving instruction/directions
- shortened assignments
- student working with an assigned partner
- teacher initiated weekly assignment sheet
- Use open book, study guides, test prototypes

English Language Learning (ELL)

Use The Glencoe-McGrawHill Personal Tutor to review or revisit content

Create Number Talks in Google Classroom, desmos or peardeck to keep students anonymous

Reteach Measures of Center or Measures of Variabilty using Glencoe reteach masters

Aleks - Assign student content involving Measures of Center or have students follow their track (students can use Spanish toggle)

- teaching key aspects of a topic. Eliminate nonessential information
- using videos, illustrations, pictures, and drawings to explain or clarif
- allowing products (projects, timelines, demonstrations, models, drawings, dioramas, poster boards, charts, graphs, slide shows, videos, etc.) to demonstrate student's learning;
- allowing students to correct errors (looking for understanding)
- allowing the use of note cards or open-book during testing
- decreasing the amount of workpresented or required
- having peers take notes or providing a copy of the teacher's notes
- modifying tests to reflect selected objectives
- providing study guides
- reducing or omitting lengthy outside reading assignments
- reducing the number of answer choices on a multiple choice test
- tutoring by peers
- using computer word processing spell check and grammar check features
- using true/false, matching, or fill in the blank tests in lieu of essay tests

At Risk

Use The Glencoe-McGrawHill Personal Tutor to review or revisit content

Create Number Talks in Google Classroom or desmos

Reteach Theoretical and Experimental Proobability using Glencoe reteach masters

Aleks - Assign student content involving iprobabilities or have students follow their track (students can use Spanish toggle)

Use Virtual Manipualtives or Physical Manipulatives

- allowing students to correct errors (looking for understanding)
- teaching key aspects of a topic. Eliminate nonessential information
- allowing products (projects, timelines, demonstrations, models, drawings, dioramas, poster boards, charts, graphs, slide shows, videos, etc.) to demonstrate student's learning
- allowing students to select from given choices
- allowing the use of note cards or open-book during testing
- collaborating (general education teacher and specialist) to modify vocabulary, omit or modify items to reflect objectives for the student, eliminate sections of the test, and determine how the grade will be determined prior to giving the test.
- decreasing the amount of workpresented or required
- having peers take notes or providing a copy of the teacher's notes
- marking students' correct and acceptable work, not the mistakes
- modifying tests to reflect selected objectives
- providing study guides

- reducing or omitting lengthy outside reading assignments
- reducing the number of answer choices on a multiple choice test
- tutoring by peers
- using authentic assessments with real-life problem-solving
- using true/false, matching, or fill in the blank tests in lieu of essay tests
- using videos, illustrations, pictures, and drawings to explain or clarify

Talented and Gifted Learning (T&G)

Use Glencoe Enrichment Activities and Worksheets to extend the lesson such as

& Experimental Proability: https://catalog.mcgraw-hill.com/repository/private_data/DOC/50000405/69/62.pdf

Math Forum: Problems of the Week, Sample Lesson(Min,Max), Reasoning and Making Sense Task Library

- Above grade level placement option for qualified students
- Advanced problem-solving
- Allow students to work at a faster pace
- Cluster grouping
- Complete activities aligned with above grade level text using Benchmark results
- Create a blog or social media page about their unit
- Create a plan to solve an issue presented in the class or in a text
- Debate issues with research to support arguments
- Flexible skill grouping within a class or across grade level for rigor
- Higher order, critical & creative thinking skills, and discovery
- Multi-disciplinary unit and/or project
- Teacher-selected instructional strategies that are focused to provide challenge, engagement, and growth opportunities
- Utilize exploratory connections to higher-grade concepts
- Utilize project-based learning for greater depth of knowledge

Sample Lesson

Using the template below, please develop a **Sample Lesson** for the first unit only.

Unit Name:

NJSLS:

Interdisciplinary Connection:

Statement of Objective:

Anticipatory Set/Do Now:

Learning Activity:

Student Assessment/CFU's:

Materials:

21st Century Themes and Skills:

Differentiation/Modifications:

Integration of Technology: