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Belleville Public Schools

Curriculum Guide

MATH ESSENTIALS GRADES 11-12

UNIT 3 MEASUREMENT

Belleville Board of Education

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Unit Overview

Unit 3: Measurement

In this unit, students should learn to convert measurement units, solve distance problems, find the circumference of circles, find the perimeter of polygon, find the area of two-dimensional figures, and find the volume of three-dimensional figures.

Enduring Understanding

Unit Enduring Understandings: Students will understand that..

- Conversions of measurement units can be done with simple multiplication & division, proportions, or multiplication by conversion factors.
- The distance that an object travels is equal to the product of its rate of travel and the time that it has traveled.
- Distance problems can be done with diagrams or charts.
- Circumference is a special case of perimeter, that of a curved figure.
- Perimeter is the total distance or length around an object.
- Area is the total number of unit squares that can be placed inside an object.
- Volume is the measure of the amount of space inside a solid figure.
- The perimeter/circumference, area, and volume are respectively measured in units, square units, and cubic units.
- Depending a given situation, students may need to find the perimeter/circumference, area or volume of an

object.

Essential Questions

Unit Essential Questions: Students will keep considering..

- Why does one need to convert measurement units?
- In a conversion, how can we know which operation (multiplication or division) to use?
- In solving word problems, when is it necessary to convert from one unit to another?
- How do I know which operation to use in a distance problem?
- What are some different strategies to find perimeter, area and volume?
- What ways, if any, are perimeter, area and volume related?
- How can you find and compare the area and volume of similar solids?
- How can you convert from one square/cubic unit of measure to another?
- How do I know whether to find perimeter/circumference, area or volume in solving word problems?

Exit Skills

By the end of Unit 3 Students will be able to:

- Convert from one unit of measure to another, using the proper operation.
- Know when conversion from one unit to another is necessary in a word problem.
- Understand and solve simple distance problems.
- Find the perimeter/circumference of a given object.
- Find the area of a given object.
- Find the volume of a given object.
- Know whether perimeter/circumference, area or volume is necessary to solve a given word problem.

New Jersey Student Learning Standards (NJSLS-S)

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.4	Model with mathematics.
MA.A-SSE.B	Write expressions in equivalent forms to solve problems
MA.N-Q.A.1	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.A-CED.A.1	Create equations and inequalities in one variable and use them to solve problems.
MA.G-GPE.B.7	Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.
MA.G-GMD.A.1	Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone.

Interdisciplinary Connections

LA.RL.11-12.4	Determine the meaning of words and phrases as they are used in the text, including figurative and connotative meanings; analyze the impact of specific word choices on meaning and tone, including words with multiple meanings or language that is particularly fresh, engaging, or beautiful. (e.g., Shakespeare as well as other authors.)
LA.W.11-12.2.D	Use precise language, domain-specific vocabulary, and techniques such as metaphor, simile, and analogy to manage the complexity of the topic.
LA.SL.11-12.4	Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.
LA.L.11-12.6	Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

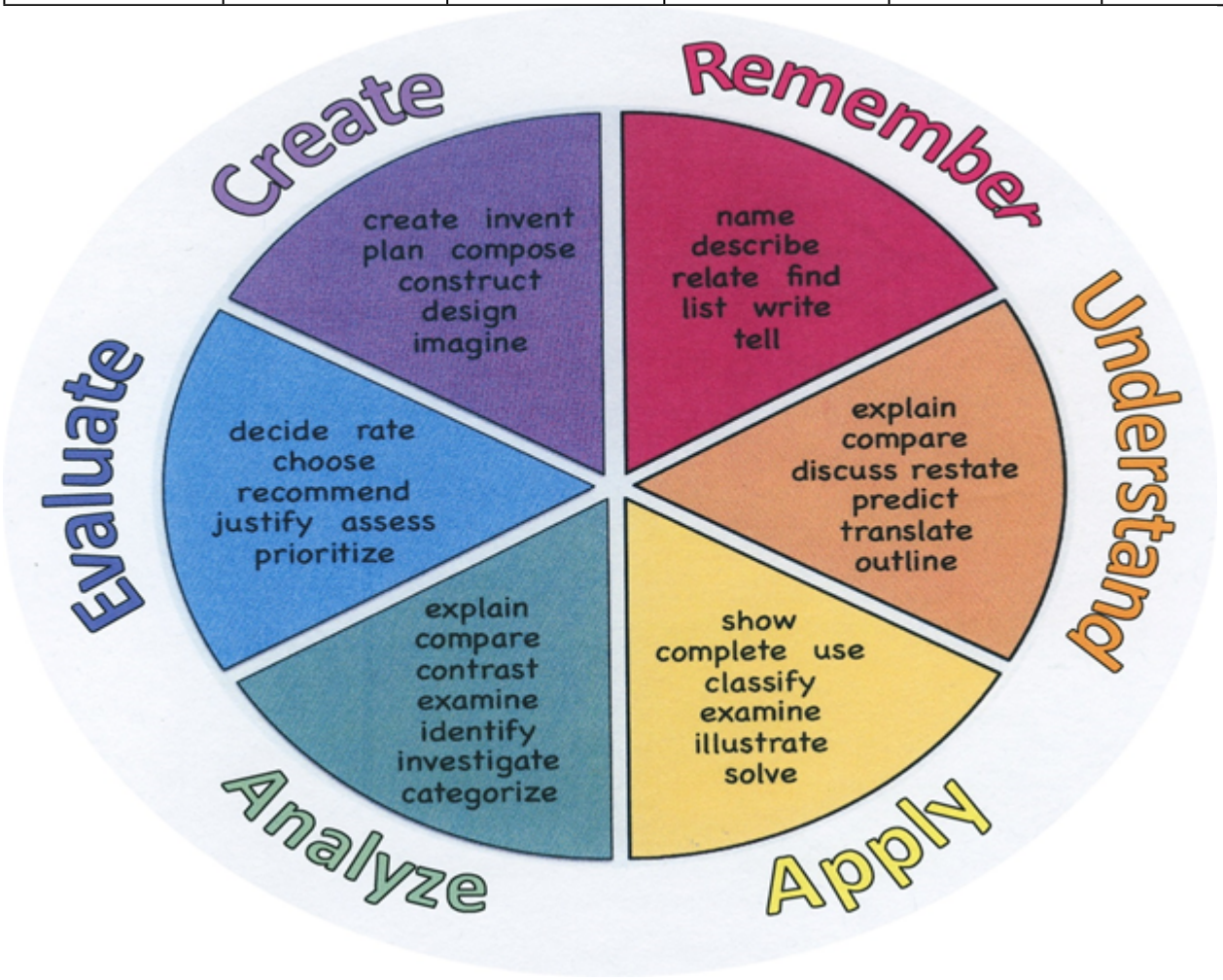
Learning Objectives

Students will be able to...

- Use conversions to rewrite a given measurement into one of different units.
- Decide which information represents the rate, time and distance in a given word problem.
- Illustrate and solve simple distance problems.
- Categorize measurement problems into finding the perimeter/circumference, area or volume.
- Explain how to use formulas to find the perimeter/circumference, area and volume.
- Compare and contrast the process of finding the area of an object to finding its volume.
- Solve a word problem involving perimeter/circumference/area/volume and justify the process.

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 State Count Draw Outline Point Quote Recall Recognize Repeat Reproduce	Interpret Infer Match Paraphrase Represent Restate Rewrite Select Show Summarize Tell Translate Associate Compute Convert Discuss Estimate Extrapolate Generalize Predict	Sketch Solve Use Add Calculate Change Classify Complete Compute Discover Divide Examine Graph Interpolate Manipulate Modify Operate Subtract	Arrange Breakdown Combine Detect Diagram Discriminate Illustrate Outline Point out Separate	Justify Measure Rank Rate Support Test	Plan Produce Role Play Drive Devise Generate Integrate Prescribe Propose Reconstruct Revise Rewrite Transform



Suggested Activities & Best Practices

Supplemental Materials:

- khanacademy.com
- njctl.org
- coolmath.com
- http://www.mathbitsnotebook.com/
- https://parcc-assessment.org/released-items/

Assessment and Learning:

- aleks.com
- Google Forms
- edulastic.com
- Google Classroom
- https://kahoot.com/explore/collections/math-kahoot-geometry/

Strategies:

- https://www.teachervision.com/problem-solving-use-formula
- http://www.alysion.org/dimensional/fun.htm
- http://www.mesacc.edu/~scotz47781/mat120/notes/dist_rate_time/dist_rate_time.html

Assessment Evidence - Checking for Understanding (CFU)

Edulastic Formative Assessment (Formative)

Kahoots - Various Topics (Formative)

Glencoe McGraw-Hill EAssessment Test Generator (Summative)

Common benchmarks on OnCourse (Benchmark)
"Do Now/Exit Ticket" Activity (Formative)

- Admit Tickets
- Anticipation Guide
- Common Benchmarks
- Compare & Contrast
- Create a Multimedia Poster
- Define
- Describe
- Evaluate
- Evaluation rubrics

- Exit Tickets
- Explaining
- Illustration
- Journals
- KWL Chart
- Learning Center Activities
- Multimedia Reports
- 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

Primary Resources & Materials

- https://www.nj.gov/education/cccs/2016/math/standards.pdf
- aleks.com
- edulastic.com
- njctl.org
- Glencoe McGraw-Hill Algebra 1 2014
- Glencoe McGraw-Hill Geometry 2014

Ancillary Resources

- teacher-prepared worksheets, notes and slides
- ASVAB for Dummies
- CliffsTestPrep ASVAB

- collegeboard.org
- homeschoolmath.net
- Glencoe Math Accelerated 2017

Technology Infusion

Create and assign exit tickets using Google Forms

Create and display slide presentations using Google Slides

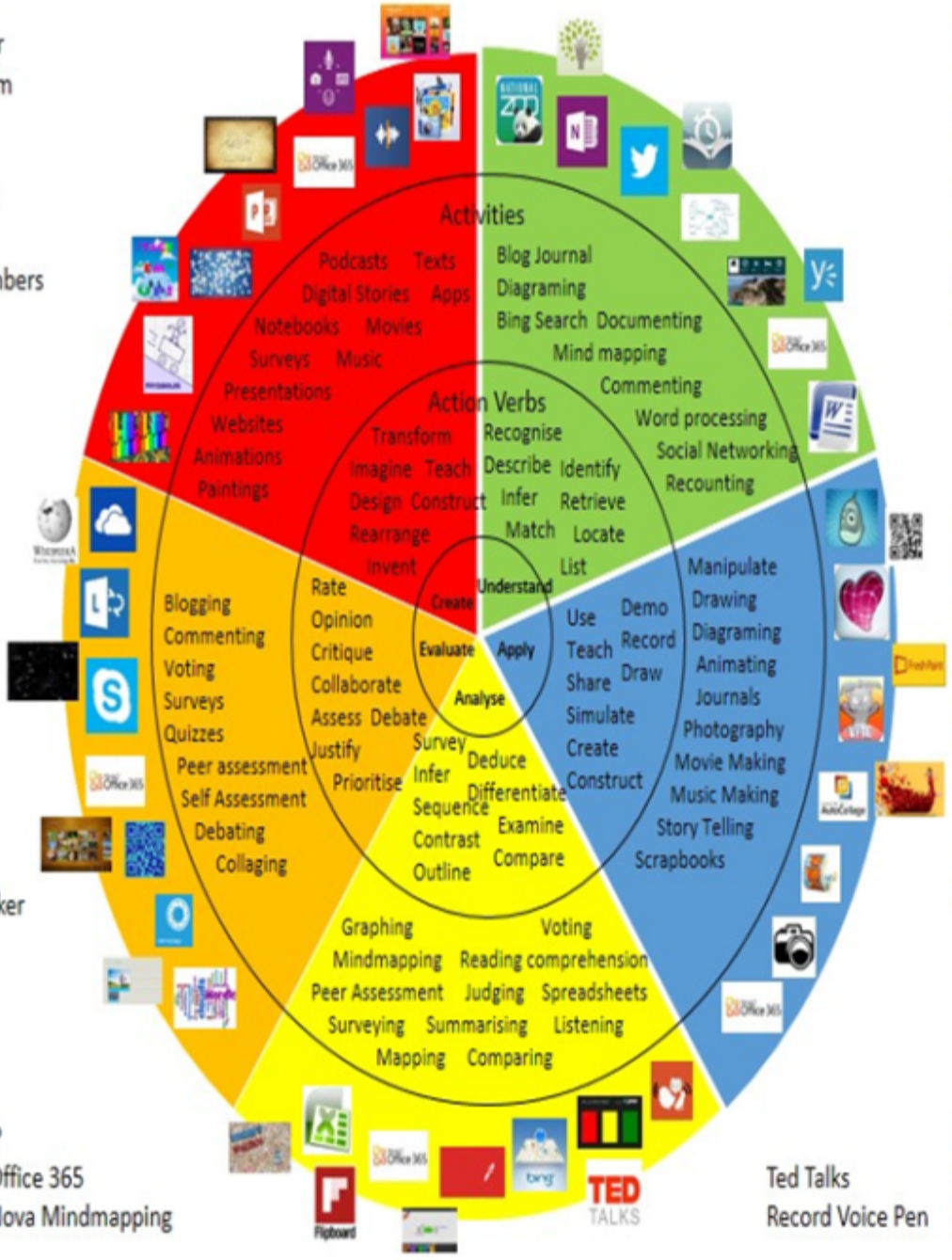
Explore area of figures using Geogebra

- Youtube
- Khan academy
- MS Word
- Google Slides
- Google Classroom
- Google Forms
- Edulastic
- ALEKS
- Desmos.com
- Geogebra.org
- Smart Exchange
- McGraw-Hill Education

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

CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
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.
TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.1.12.A.CS2	Select and use applications effectively and productively.
TECH.8.1.12.F.1	Evaluate the strengths and limitations of emerging technologies and their impact on educational, career, personal and or social needs.

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

- Financial, Economic, Business and Entrepreneurial Literacy
- Global Awareness

Differentiation

GENERAL EXAMPLES INCLUDE:

Use of Glencoe virtual manipulatives: http://www.glencoe.com/sites/common_assets/mathematics/ebook_assets/vmf/VMF-Interface.html
Study Guides provided prior to tests and quizzes
Use of ALEKS for differentiated practice or extension of skills

Differentiations:

- Small group instruction

- Small group assignments
- Extra time to complete assignments
- Pairing oral instruction with visuals
- Repeat directions
- Use manipulatives
- Center-based instruction
- Study guides
- Teacher reads assessments allowed
- Scheduled breaks
- Rephrase written directions
- Multisensory approaches
- Additional time
- Preview vocabulary
- Preview content & concepts
- 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
- 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 supplemental materials

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

Flash cards for vocabulary and new concepts
One-on-one questioning during testing to elicit responses
Use of Glencoe personal tutor or The Video Math Tutor for additional instruction

- 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 of multilingual mathematics glossary including definitions in English and its translations to other languages:
https://my.hrw.com/math06_07/nsmedia/tools/glossary/msm/glossary.html
Use of Spanish instructional videos of concepts:
https://www.youtube.com/user/KhanAcademyEspanol/videos
https://www.mathtv.com/
Peer partners for assignments with students that can verbally translate material and meanings of concepts

- teaching key aspects of a topic. Eliminate nonessential information
- using videos, illustrations, pictures, and drawings to explain or clarify
- 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 work presented 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

Printed or video copy of material missed during excessive absences
Retests or test corrections of incorrect work on tests
Working contract to ensure completion of prioritized tasks

- 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 work presented 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)

Glencoe Enrichment Activities and Chapter Projects

Complete higher level learning problems in textbook

Complete math league sample contest problems:

https://www.mathleague.com/index.php/annualcontestinformation/samplecontests

- 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 plan to solve an issue presented in the class or in a text
- 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

Unit Name: Circumference and Area of Circles

NJSLS: MA.9-12.G-CO.A.1 Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.

Interdisciplinary Connection: Real-Life Connection: How much leather to use on a circular tire depends on the size of the diameter.

Statement of Objective: SWAT Use radius and diameter to find the circumference and area of a circle and vice versa.

Anticipatory Set/Do Now: Do Now: Find the length of the radius and diameter in each circle.

Learning Activity: Do Now, Notes & Practice: Circumference and Area of a Circle, Students practice examples, Solutions placed on the board, Discussion of examples for Summary.

Student Assessment/CFU's: observation, questioning, compare & contrast, illustration

Materials: use of Smart TV, Google Slides, Notes & Practice: Circumference & Area of a Circle

21st Century Themes and Skills: communication, critical thinking, problem-solving

Differentiation: team work with peer tutoring, study guide, note-taking, highlighting text

Integration of Technology: use of Smart TV, Google Slides