3 - Auto & Home

Content Area: **Mathematics**
Course(s):
Time Period: **Marking Period 2**
Length: **20 Days**
Status: **Published**

Summary

Introduction: Unit 3 will focus on leasing/purchasing auto and home options. Auto options will include comparing gas cars with electric cars, and home options will compare apartments, condos, and houses.

Revision Date: June 2023

Essential Questions/Enduring Understandings

Essential Questions:

- Why is having auto insurance so important?
- How does probability affect your auto insurance?
- What is the value of your car?
- How does your car lose its value?
- What data is important to a driver?
- Where will you live?
- How much space do you want?
- How much space do you need?
- What do you need to know about mortgages?
- What will the American dream cost you?
- What alternatives are there to purchasing a single-family home?

Enduring Understanding:

- Identify different types of auto insurance coverage.
- Compute insurance costs and payments on insurance claims.
- Explain and interpret two-way tables, and compute conditional probabilities.

- Create and interpret Venn diagrams.
- Write, interpret, and graph a straight line depreciation equation.
- Write, interpret, and graph an exponential depreciation equation.
- Manipulate the exponential depreciation equation in order to determine time, original price, and depreciated value.
- Write, interpret, and use the distance formula for the relationship between distance, fuel economy, and gas usage.
- Calculate the affordability of monthly rent, and the relationship between square footage and monthly rent.
- Determine lease signing costs and moving expenses.
- Compute the perimeter and area of a polygon and irregular regions.
- Compute the monthly cost of paying for a house, and explain the research that goes into this payment.
- Estimate closing costs.
- Create, investigate, and compare an amortization table for a fixed rate mortgage, fixed rate mortgage with extra payments, and adjustable rate mortgage.
- Compute the costs of purchasing a cooperative or a condominium.
- Explain the advantages and disadvantages of purchasing different types of homes.

Objectives

Students will know: (content area knowledge)

- How to compute insurance costs and payments on insurance claims.
- How to compute conditional probabilities.
- How to create Venn diagrams.
- How to write and graph a straight line depreciation.
- How to write and graph an exponential depreciation equation.
- How to solve the exponential depreciation equation for all variables.
- How to write and use the distance formula.
- How to calculate rent affordability.

- How to solve for lease signing costs and moving expenses.
- How to compute the perimeter and area of polygons.
- How to compute the monthly cost of paying for a house.
- How to estimate closing costs.
- How to create amortization tables for various scenarios.
- How to compute the costs of purchasing a cooperative or a condominium.

Students will be skilled at: (skills)

- Compare and contrast types of auto insurance coverages.
- Explain and interpret two-way tables.
- Interpret Venn diagrams.
- Interpret a straight line depreciation.
- Interpret an exponential depreciation equation.
- Manipulate the exponential depreciation equation for any variables.
- Interpret the distance formula for distance, fuel economy, and gas usage.
- Analyze the relationship between square footage and monthly rent.
- Apply perimeter and area formulas to irregular regions.
- Research the parts of a monthly mortgage and closing costs.
- Investigate and compare amortization tables.
- Explain the advantages and disadvantages of purchasing different types of homes.

Learning Plan

- Warm - Up: Students will complete either the warm-up in the textbook for a specific section, or a related problem from the teacher. A timer at the front of the room will maintain timeframes of this activity. When the timer sounds, the students are to hand their work to the teacher for a grade.
- Homework: While the warm-up is being completed, the teacher will walk the room to check homework has been completed. Teacher will check in individually with students who did not fully complete the assignment. Teacher will also take time to ask students with completed assignments if there are specific problems that they would like discussed.
- Discussion: Teacher will go over the warm-up as well as requested homework problems. This will

allow time for students to clarify questions on material that has already been covered, and the warm-up gives students a glimpse into the material that will be covered in the new lesson. Teacher will be actively listening during this discussion for signs that students need additional time with previous information before continuing with the next lesson.

- Lesson: Teacher will lead students through discovering how to apply their prior mathematical knowledge into new content. Students will lead the lesson on how much they remember about the math concept before the application. Once students have a complete knowledge of the concept, teacher will encourage students to apply the concept to the real world situation. Calculations will be completed by students alongside teacher, then within small groups to compare with each other, and finally independently. During the group work time, teacher will circulate the room to listen to each group's discussion of the lesson, monitoring if specific students are struggling and encouraging them. A timer at the front of the room will maintain timeframes of these discussions. During independent work time, teacher will circulate the room to monitor students' progress, especially the aforementioned struggling students.

- Free Work: If time allows, students will be encouraged to spend the rest of the period working on either their homework assignment or progressing on the main project for the unit.

Assessment

Formative Assessments:

- Prior math concept assessments
- Warm-ups

Summative Assessments:

- Chapter assessments
- Unit assessments
- Unit projects

Benchmark Assessments:

- Informal observations
- Small group observations
- Oral and written explanations of reasoning
- Homework completion

Alternative Assessments

- Group discussions

- Performance tasks

Materials

Core Instructional Materials: Core Book List including

- Financial Algebra: Advanced Algebra with Financial Applications
- Authored by Robert Gerver, Richard Sgroi

Supplemental materials:

- Financial Algebra website
- Edia website
- Khan Academy website

Standards

In accordance with New Jersey's Chapter 32 Diversity and Inclusion Law, this unit includes instructional materials that highlight and promote diversity, including: economic diversity, equity, inclusion, tolerance, and belonging in connection with gender and sexual orientation, race and ethnicity, disabilities, and religious tolerance.

Students will focus on equity, inclusion, and tolerance when analyzing the comparison of various quantities regarding characteristics of people. Equality will also be highlighted which can be associated with both numerical representations and the connection between people. This can be associated with treating people fairly and equality.

LA.L.11-12.1	Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
LA.L.11-12.2	Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.
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.
LA.W.11-12.6	Use technology, including the Internet, to produce, share, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
LA.W.11-12.7	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
MA.G-C.A.2	Identify and describe relationships among inscribed angles, radii, and chords.
MA.G-C.B.5	Derive using similarity the fact that the length of the arc intercepted by an angle is

	proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.
MA.F-BF.A.1	Write a function that describes a relationship between two quantities.
MA.F-BF.B.3	Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $kf(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology.
MA.F-BF.B.5	Use the inverse relationship between exponents and logarithms to solve problems involving logarithms and exponents.
MA.F-IF.B.4	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.
MA.F-IF.B.5	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.
MA.F-IF.C.7	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
MA.F-IF.C.9	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
MA.F-LE.A.1	Distinguish between situations that can be modeled with linear functions and with exponential functions.
MA.F-LE.A.2	Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).
MA.F-LE.A.4	Understand the inverse relationship between exponents and logarithms. For exponential models, express as a logarithm the solution to ab to the ct power = d where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.
MA.F-LE.B.5	Interpret the parameters in a linear or exponential function in terms of a context.
MA.F-TF.A.1	Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.
MA.G-CO.A.4	Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.
MA.G-CO.B.8	Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.
MA.G-CO.C.10	Prove theorems about triangles.
MA.G-MG.A.1	Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).
MA.G-MG.A.3	Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).
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.
MA.G-GMD.A.3	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.
MA.G-GPE.A.1	Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.
MA.G-SRT.A.1	Verify experimentally the properties of dilations given by a center and a scale factor:
MA.G-SRT.A.3	Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.

MA.G-SRT.B.5	Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.
MA.G-SRT.C.6	Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.
MA.G-SRT.C.8	Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.
WRK.9.2.12.CAP.3	Investigate how continuing education contributes to one's career and personal growth.
WRK.9.2.12.CAP.4	Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them, including educational/training requirements, costs, loans, and debt repayment.
WRK.9.2.12.CAP.5	Assess and modify a personal plan to support current interests and post-secondary plans.
WRK.9.2.12.CAP.9	Locate information on working papers, what is required to obtain them, and who must sign them.
WRK.9.2.12.CAP.14	Analyze and critique various sources of income and available resources (e.g., financial assets, property, and transfer payments) and how they may substitute for earned income.
WRK.9.2.12.CAP.15	Demonstrate how exemptions, deductions, and deferred income (e.g., retirement or medical) can reduce taxable income.

Integrated Accommodation and Modifications, Special Education students, English Language Learners, At-Risk students, Gifted and Talented students, Career Education, and those with 504s