

APPLIED MATH

Car Ownership - Unit Breakdown

Lesson 1: Costs of Car Ownership

- Watch video overview of costs involved in car ownership
- Research yearly costs for gasoline, maintenance of oil changes & tire rotations, & registration

Lesson 2: New vs Used Cars

- Watch video overview of differences between new & used cars in financing, gas, insurance, & maintenance
- Identify pros & cons of new cars & used cars

Lesson 3: Dealership Fees

- Identify sales tax differences between different counties & how that impacts a car's price
- Determine the trade-in difference & calculate sales tax
- Research your state's registration, title, & license plate fees
- Compute the documentation fee & see what that fee is used for
- Note destination charges & calculate those costs with tax
- Identify fees to negotiate

Lesson 4: Calculating Total Price of a New Car

- Given an ad from a website, find the total price of a new car that includes MSRP, doc fee, destination charge, registration fee, title fee, license plate fee, trade-in difference, & sales tax.

Lesson 5: Depreciation

- Exponential Decay
 - Use exponential decay formula to find a car's **current worth** given new price, time, & depreciation rate
 - Use exponential decay formula to find a car's **original value** given current worth, time, & depreciation rate
- n^{th} Roots
 - Use exponential decay formula & nth roots to find the average depreciation **rate** given time & a car's new & current values
- Logarithms
 - Convert between logarithmic and exponential forms
 - Use exponential decay formula & logarithms to find the **time** of depreciation given a car's new & current values & the average depreciation rate

- Continuous Decay/Natural Logs
 - Convert between natural logarithmic & exponential forms
 - Use the continuous decay formula to find the depreciation **rate** given a car's new & current values
 - Use the continuous decay formula to find the **time** of depreciation given a car's new & current values & the depreciation rate
 - Solve the exponential decay formula for time using natural logs
- Exponential Regression
 - Use Desmos tables to create regression formulas
 - Use regression formulas & their accompanying graphs to find values of used cars at a given time or vice versa
- Online Calculators
 - Note the progression of hand calculations starting with the exponential decay formula and how it led to technological calculations
 - Use an online calculator to find the total depreciation, the total depreciation percentage, & the value at the end of ownership

Lesson 6: Buying vs. Leasing

- Research pros & cons of buying a car and pros & cons of leasing a car
- Watch mathematical video explanation of the cost difference between buying & leasing
- Use online calculators to identify cost differences between buying & leasing
- Use the 20/10 Rule to calculate personal budget that can help in determining what price range is appropriate to maintain healthy debt level

Lesson 7: Loan Rates

- Research car loan rates at different financial institutions & see how rates affect total cost of car
- Use online payment calculators to see differences in loan rates
- See sample loan application & identify what information is needed prior to applying

Lesson 8: Car Safety Data

- Calculate the reaction distances and braking distances at given speeds & use those to find total stopping distance.
- Use online calculator with advanced total stopping distance formula
- Use metric measuring wheel to physically measure distances in the school building that correlate with total stopping distances
- Note the 3 Second Rule
- Compare parabolic relationship between gas mileage & speed
- Identify ways to increase fuel efficiency