

GRADE 11 MATH PRE-CALCULUS: Financial Literacy

Summary of Learning Opportunity		
<p>Students explored the cost of owning and maintaining a vehicle of their choice. The teacher developed a series of questions to guide students to use numeracy skills to understand the context (ie, financing and leasing prices), and to apply mathematics skills and competencies to visualize their debts and costs. Students justified their financial decision using evidence from their calculations.</p>		
Curricular Competencies and Content	Pre-Calculus 11	<ul style="list-style-type: none"> • Model with mathematics in situational contexts • Develop, demonstrate, and apply conceptual understanding of mathematical ideas through...inquiry, and problem solving • Visualize to explore and illustrate mathematical concepts and relationships • Reflect on mathematical thinking • Connect mathematical concepts with each other, with other areas, and with personal interests • Financial literacy: compound interest, investments, loans

Literacy and Numeracy Connections	Instruction and Assessment	Competencies Developed, Practiced, and/or Assessed
NUMERACY: Interprets—Understands the real-world problem	→ The teacher created a worksheet package which guided students through research regarding various costs of vehicle ownership such as fuel, insurance, and maintenance. The teacher modeled and assisted students in finding information such as maintenance schedules and lease buyout costs.	→ Develop, demonstrate, and apply conceptual understanding of mathematical ideas through...inquiry, and problem solving
NUMERACY: Applies—Represents the mathematical problem (visualizes)	→ Students visualized the information collected in various tables, graphs, and calculations.	→ Model with mathematics in situational contexts Visualize to explore and illustrate mathematical concepts and relationships
NUMERACY: Solves—Solves the mathematical problem	→ The students used the mathematical representations to support their decisions about vehicle ownership.	→ Reflect on mathematical thinking Connect mathematical concepts with each other, with other areas, and with personal interests
NUMERACY: Analyzes—Reflects on the reasonableness of the solution in context		

Proficient Student Work

12.

You also have an option to LEASE a vehicle.

When you lease a vehicle, you only pay tax on the lease payments, not on the entire cost of the vehicle.

If you make a down payment, you pay the tax on it.

The buyout (or residual value) of a vehicle is usually:

- 60% on a 2-year lease
- 45% on a 4-year lease
- 53% on a 3-year lease
- 37% on a 5-year lease

The interest rate on the lease increases with the length of the lease; for example, for a 2-year lease, the interest rate might be 1.99% and for a 5-year lease, the interest rate might be 4.99%. If you are leasing a used vehicle, these interest rates increase by 0.50% because the manufacturer's warranty may have expired or there may not be incentive/competitive interest rates for the used vehicle.

Assume you buy the car at the end of the 5 year lease. Calculate the total amount paid for the lease and the buyout.

a) The buyout value:

$$(\$48,190) \times 37 = 15,940.53 \text{ [\$]}$$

A: The buyout after a 5 year lease is 37% of the buyout value is \$15,940.53

b) The amount of the lease (list price - buyout value - down payment) in present:

list price: \$43,190

buyout value: \$15,940.53

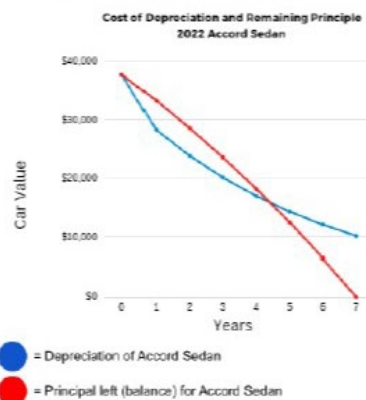
down payment: 63% of \$27,249.47

c) The Monthly Payment:

All taxes: \$5,182.80

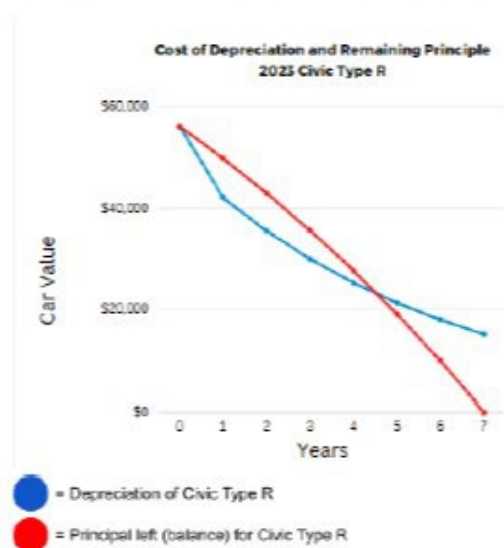
A: The costs per month for 5 year will be \$87.78

Graph of cost of depreciation and principle left for 2022 Accord Sedan:



7.

Graph of cost of depreciation and principle left for 2023 Civic Type R:



Teacher's Assessment and Reflection

Assessment: Proficient--The student was able to gather information, use it to make calculations, and graph (visualize) the data. Understanding the complex information and evaluating on how they would weigh it helped them to choose the best option for their personal contexts.

Teacher's reflection: The students said that this assignment was very useful and universal in helping to look towards their futures. I wanted students to understand that the solutions to the problems are now requiring them to come up with mathematical rationale to support their personal decisions. By using the Numeracy aspects, I was able to plan this assignment to assess both competencies and content.

Based on the calculations we found, we would rather finance our vehicle. First of all, when leasing a vehicle you are renting it. So once your lease is up you turn the car in if you do not choose to buy it out. If you choose to buy out your vehicle, the buy out cost itself is quite expensive. We saw this from our project example, it was equivalent to 37% of the initial price. This is extremely costly over the rest of the lease payments. Financing a vehicle is significantly cheaper than leasing your vehicle and buying it out. For instance, if we use our 2023 Civic Type R as an example, the monthly payment is \$1125.65 if you are financing the vehicle. When you multiply this value by the number of pay periods, 60, you get \$67,539. This is your total cost for financing the vehicle. Whereas, if you compare that value to the total amount paid over the 5 year lease with buying out the vehicle, it comes to \$84,196.12. Both of these values are over a 5 year period and financing the car saves a significantly greater amount of money. Secondly, the graphs from our project reveal how the vehicle's value will depreciate over time until the principal is 0 (future value.) This is unfortunate, although the cash value is yours to use as you like. When you lease a car, you do not have any equity in the car since you do not own it. By financing the car, it is yours to keep as you have no further payments once you pay off the loan. The graphs provided us with this insight. By paying off your loan, it builds equity which can help you financially with your next vehicle. In addition to this, it is important to consider how long we plan to own the vehicle. If we were to purchase the car now or even in the next few years we would look to finance the car. This project provided us with a sample amount of years to show the difference in payments between financing and leases. From this project we learnt that financing a car results in each month's payment being slightly larger than leasing a car. Although, we don't have other financial responsibilities such as a mortgage. Financing a car would allow us to pay it out and then gain full ownership of the car. If we were to lease the car, once the lease is up we would have to start again. Based on our research and calculations it is significantly more to lease the car rather than finance it in the long run. We see ourselves keeping this car for many years to come as it is more financially beneficial. At a young age, we don't think that we will be looking to get new cars every few years so paying off a car and gaining ownership would allow us to stop the monthly payments earlier