**Subject area/course**: Mathematics/Integrated Math 3

**Grade level/band**: 9-12

**Task source**: New Hampshire Task Bank; Author: Kim Theriault

**Car Loans**

**TEACHER'S GUIDE**

1. **Task overview**:

Students imagine that they have been approved for a car loan, given that they have a cosigner. They will start by researching a *used* car they would like to purchase. They are instructed to consider their monthly income (or imagined income) when selecting a car. Given three loan scenarios, students will calculate loan costs and create an amortization schedule for their purchase. They will also find tax and insurance rates. Students should not seek a quote from an insurance company; rather, they should find some representative rate. Finally, students will produce graphs to accompany an explanation of their choice of car and loans.

1. **Aligned standards:**
2. **Common Core State Standards**

**Standards for Mathematical Practice:**

[CCSS.MATH.PRACTICE.MP1](http://www.corestandards.org/Math/Practice/MP1/) Make sense of problems and persevere in solving them.

[CCSS.MATH.PRACTICE.MP2](http://www.corestandards.org/Math/Practice/MP2/) Reason abstractly and quantitatively.

[CCSS.MATH.PRACTICE.MP5](http://www.corestandards.org/Math/Practice/MP5/) Use appropriate tools strategically.

[CCSS.MATH.PRACTICE.MP6](http://www.corestandards.org/Math/Practice/MP6/) Attend to precision.

**CCSS content standards (high school):**

A-CED.1**:** Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions*.

F-BF.B.5**:** Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.

F-LE.A.4**:** For exponential models, express as a logarithm the solution to *abct* = *d* where *a*, *c*, and *d* are numbers and the base *b* is 2, 10, or *e*; evaluate the logarithm using technology.

F-LE.B.5**:** Interpret the parameters in a linear or exponential function in terms of a context.

1. **Critical abilities**

Analysis of Information**:** Integrate and synthesize multiple sources of information (e.g., texts, experiments, simulations) presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to address a question, make informed decisions, understand a process, phenomenon, or concept, and solve problems while evaluating the credibility and accuracy of each source and noting any discrepancies among the data.

Use of Technology:Present information, findings, and supporting evidence, making strategic use of digital media and visual displays to enhance understanding. Use technology, including the Internet, to research, produce, publish, and update individual or shared products in response to ongoing feedback, including new arguments or information.

Modeling, Design, and Problem Solving**:** Use quantitative reasoning to solve problems arising in everyday life, society, and the workplace, e.g., to plan a school event or analyze a problem in the community, to solve a design problem or to examine relationships among quantities of interest. Plan solution pathways, monitoring and evaluating progress and changing course if necessary, and find relevant external resources, such as experimental and modeling tools, to solve problems. Interpret and evaluate results in the context of the situation and improve the model or design as needed.

1. **Other standards**

New Hampshire competencies:

Math 8. Students will demonstrate the ability to interpret, analyze, and use functions when applied in a variety of contexts, including real-world phenomena.

Math 9. Students will demonstrate the ability to build functions that model relationships between two quantities.

1. **Time/schedule requirements:**

The teacher instructions below require 5 periods of instruction, though they may be modified to fit individual school schedules.

1. **Materials/resources:**

* Access to the Internet
* Optional car magazines, newspaper advertisements
* Graphing calculator or graphing supplies
* Excel or similar program
* Amortization calculator (if needed) <http://www.bankrate.com/calculators/mortgages/amortization-calculator.aspx>

1. **Prior knowledge:**

Prior to beginning this performance task, students should be familiar with the following:

* Building and using functions
* Solving problems with multiple steps
* Choosing the type of graph that best supports the work

1. **Connection to curriculum:**

None listed.

1. **Teacher instructions:**

* Day 1: Introduce the task and rubric and have a group discussion about the factors that influence buying a car. Read through the entire task as a class.
* Day 2: Steps 1 and 2 of the task. Students will decide on a monthly payment they can afford and research used cars for sale. Make sure that students have access to the same materials for their research section. They can work in groups for this if there aren’t enough computers, cell phones, or magazines.
  + This section is limited in terms of time because it isn’t the focus of the assessment, but part of the real-world process of selecting a car. It may be necessary to remind the students of this. Students can treat this as a reason to look up a car given their current financial situation or forecast into their future life 5-10 years down the road.
* Day 3: Begin Step 3. Analyze one loan in groups and turn in results to teacher for feedback. If some students show that they don’t comprehend the analysis process, ask them questions about their work to get them back on track.
* Day 4: Students complete the rest of the calculations, charts, and graphs. Students may create their graphs and charts on paper or using graphing software. Either way is fine, but all students should have access to the same materials. Students may need to take some of their work home as homework in order to complete the task by Day 5.
* Day 5: Students write up their explanation, citing evidence for the choices they made.

1. **Student support:**

* Students with special needs may receive additional time to do the work.
* Students may have support reading the task and/or resources on the Internet (the task is not meant to assess their reading or research abilities, but their math abilities).
* You may ask students to hand in one sample loan calculation or table before completing the rest. This will allow you to give feedback before the students complete the remainder of the calculations.
* Helpful Hints (as needed): It may also help to prompt students with the following questions if they are struggling to get started.
  + How much do you plan to pay as a down payment? \_\_\_\_\_\_\_\_\_\_\_\_\_.
  + The principal value that you will be borrowing on a loan is \_\_\_\_\_\_\_\_\_\_\_\_\_\_. (principal = vehicle price – down payment)
  + Your monthly payment is \_\_\_\_\_\_\_\_\_\_\_\_\_\_.
  + The total amount of interest you will pay is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

1. **Extensions or variations:**

None listed.

1. **Scoring:**

Student work can be scored using the Car Loan Task Rubric. Introduce students to the descriptors of proficient performance in the rubric.