

# **Essentials Math 40S**

## **Unit 1 – Vehicle Financing**



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## **Learning checklist – Vehicle Financing**

Learning increases when you have a goal to work towards. Use this checklist as guide to track how well you are grasping the material. In the center column, rate your understand of the topic from 1-5 with 1 being the lowest and 5 being the highest. Be sure to write down any questions you have about the topic in the last column so that you know what you have yet to learn.

<b>Outcome</b>	<b>Understanding</b>	<b>Questions</b>
Solve problems that involve the acquisition, operation, and maintenance of a vehicle, when buying, leasing, leasing to buy.		
Describe and explain various options for buying, leasing, or leasing to buy a vehicle.		
Determine costs associated with buying, leasing, or leasing to buy a new or used vehicle.		
Solve, with or without technology, problems that involve the purchase, lease, or lease to purchase of a vehicle.		
Determine costs associated with operating a vehicle including regular maintenance, repairs, fuel consumption, or depreciation.		
Determine the costs of insuring a vehicle for various uses.		
Justify a decision related to buying, leasing, or leasing to buy a vehicle, based on factors such as personal finances, intended use, maintenance, warranties, mileage, insurance, or safety considerations.		

## Review of Percents and Taxes

# 1

## Getting Started

**You will need**

- Internet access

**Hint**

You will use the chart in Question 1 throughout this chapter.

1. Research the current taxes for these provinces and territories. Record the taxes as percents.

Province/ territory	Provincial sales tax (PST/RST)	Goods and services tax (GST)
Manitoba		
Saskatchewan		
Alberta		
British Columbia		
Yukon		
Northwest Territories		
Nunavut		

**Hint**

When working with money, round to the nearest cent after you have made the final calculation.

2. Evaluate each percent.

a) 7% of \$120

=  $0.07 \times \$$  \_\_\_\_\_

= \_\_\_\_\_

b) 12% of \$5858

= \_\_\_\_\_

= \_\_\_\_\_

3. Evaluate.

a) 105% of \$25.99

=  $(1.05)(\$25.99)$

= \_\_\_\_\_

b) 110% of \$9358.45

=  $(\text{_____})(\text{_____})$

= \_\_\_\_\_

**Hint**

$(1.05)(\$25.99)$  is another way to write  $1.05 \times \$25.99$ .

**Hint**

Use the tax chart from Question 1.

4. Cole is a delivery driver in Manitoba. He bought new seat covers for his car. The purchase price was \$49.99. What was the total cost with taxes?

- a) Complete the chart.

Provincial RST paid	GST paid	Total cost with taxes
_____% of \$49.99 = $(\text{_____})(\$49.99)$ = \$ _____ _____	_____% of \$49.99 = $(\text{_____})(\$49.99)$ = \$ _____ _____	Total price = purchase price + RST + GST = \$ _____ + \$ _____ + \$ _____ = \$ _____ The cost with taxes was \$ _____.

- b) Darlene says that she can determine the total cost with taxes by calculating 112% of the purchase price. Do you agree? Explain.

5. Evaluate each expression.

a)  $12 + 8 \times 3 - 10$       c)  $400 - (26 + 1.05 \times 20 - 11)$   
=  $12 + \underline{\quad} - 10$

b)  $(15)(8) - 22 + 45$       d)  $(1.12)(54 + 88 - 37) - 10$

**Hint**

Follow the order of operations:  
**B**rackets  
**E**xponents  
**D**ivision and  
**M**ultiplication  
in the order they appear  
**A**ddition and  
**S**ubtraction  
in the order they appear

6. Marli bought a new snowmobile helmet. The regular price was \$154.99. The helmet was on sale for 40% off.

- a) What was the discount?

$$\underline{\quad}\% \text{ of } \$154.99 = (\underline{\quad})(\$154.99)$$
$$= \$\underline{\quad}$$

The discount was  $\underline{\quad}$ .

- b) What was the sale price?

$$\$154.99 - \$\underline{\quad} = \$\underline{\quad}$$



- c) Marli says that she can calculate the sale price in Part b) by determining 60% of the regular price. Do you agree?

# CHOOSING A VEHICLE



## Things to Consider:

**Affordability:** *If you wish to borrow money to purchase a car, financial planners generally advise that your total monthly debt should be no more than 40% of your net income.*

**Max. Monthly Debt Repayment = 40% x Net Income**

**Net Income = Debt or Loan ÷ 40%**

**Ex 1)** If your monthly net income is \$1200, what is the maximum monthly debt repayment you can afford?

**Ex 2)** What is the minimum monthly net income that is needed if you wish to take a loan with monthly repayments of \$600?

**Taxes:** *GST and PST must be paid on a new or used vehicle purchased from a dealer. In Manitoba and British Columbia, a vehicle purchased privately requires payment only of PST.*

**Ex 3)** A new SUV is purchased from a dealer in St. Boniface, MB for \$45 000. What are the taxes on this purchase? What is the total amount paid?

# MAINTENANCE/REPAIRS

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**Ex. 1 :** Jane took her vehicle to a car dealer in Manitoba for servicing. The oil and the oil filter were changed, and new wiper blades were installed. The costs for parts were as follows:

4 litres of oil	\$9.69 a litre
1 oil filter	\$14.99
2 wiper blades	\$16.99 each

The time required to service Jane's vehicle was 0.6 hours. The shop rate for labour was \$110 an hour. How much is this service going to cost Jane?

*Only GST is charged on labour or services in Manitoba. (If a package deal is offered say \$25.99 for oil change, these usually include all parts and labour and then GST and PST are charged.)*



## INSURING A VEHICLE

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You are required by law to register, buy license plates for and insure any car you buy. In Manitoba, car insurance must be purchased from Autopac, which is run by the province.

**Basic-all perils coverage:**

**Premium:**

**Third Party Liability:**

**The following things affect the Autopac rates that you pay:**

**Ex. 1)** Evan has a 1995 Ford Taurus GI four-door, six-cylinder (Rating #18). He wants to use the car regularly to drive to work and for personal use. He has 5 merits and would like a \$200 deductible and \$2,000,000 Third Party Liability. He lives in Territory 1. What will his insurance costs be?

The screenshot shows a web browser window titled "Insurance Rate Calculator" with the URL [www.mpi.mb.ca/lrc/intro\\_2.asp?Lang=0](http://www.mpi.mb.ca/lrc/intro_2.asp?Lang=0). The page features a yellow header with the text "INSURANCE RATE CALCULATOR" and a "Help" link. Below the header, a blue banner reads: "Your vehicle's risk of a claim is one of four factors that determine its Autopac rate. Please identify your vehicle below." The main content area displays six vehicle categories with corresponding images: "Passenger Vehicles" (a blue sedan), "Trucks" (a red pickup truck), "Motorcycles" (a yellow motorcycle), "Motorhomes" (a white motorhome), "Trailers" (a white travel trailer), and "Rental Car Insurance" (a red sedan). The central text "Insurance Rate Calculator" is prominently displayed, with the subtitle "for Common Vehicle Types and Uses" below it. A disclaimer at the bottom states: "In order to make the calculator easy to use, some of the more detailed rate calculations, like for commercial vehicles, are not included. Please contact an insurance broker if you have a vehicle not listed or for further estimate information."



# INSURING AND REGISTERING A VEHICLE

*For all the calculations below, use the school postal code. (RIA 2C8) Use the MPI website. Do not make print the calculations. Transfer the information onto your answer sheet.*

1. You win a contest and decide to buy a 2004 Chevy Corvette Z06. You decide to take a \$100 deductible and \$2 000 000 in third party liability. You wish to pay in 12 monthly installments. You are insuring for pleasure use only. You currently have 1 merit on your driver's license.
  - a) How much will the insurance cost each month?
  - b) What is the total per year?
  
2. You graduate from Selkirk and decide to insure the same car as in question 1. Now you have a full time job at Walmart and you plan to drive the Corvette to work every day.
  - a) How much will the insurance cost now each month?
  - b) Each year?
  - c) What is the plate charge?
  - d) What is the interest and administration fee?
  - e) You change your mind and decide to pay the insurance in one lump sum. Calculate the insurance cost for pleasure use. How much do you save by paying in full?
  
3. This summer, you decide to start a small lawn care business. You need a truck to transport your equipment to your job sites. You find a good deal on a 2000 Ford F150 XL. The truck is 4-wheel drive. You decide to register with a \$200 deductible and \$2 000 000 in third party liability. You have a good driving record so you have 2 merits on your license. Since you need to have a reliable business, you opt to take out an optional loss of use insurance (level 2). You will make payments quarterly.
  - a) Calculate the cost of each payment.
  - b) Calculate the yearly cost as well.
  
4. Your friend is selling her 2000 Honda Civic DX hatchback. You've always loved the car so you offer to buy it. You can only afford to buy it if your insurance payments are less than \$100 per month. Calculate your monthly insurance payments based on pleasure use, a \$300 deductible and \$1 000 000 in third party liability. You just got your license so you do not have any merits. The car does come with a Honda immobilizer against theft. Can you afford to buy the car? (What are the monthly payments?)
  
5. Your Mom, who has a great driving record (5 merits), offers to register the car in question 4 for you. Can you afford the payments now? What would the payments be?







## FUEL ECONOMY

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Fuel is a major cost of operating a vehicle. Fuel economy is defined as the number of litres required to travel 100 km.

$$\text{fuel economy} = \frac{\text{litres of fuel used} \times 100}{\text{km driven}}$$

**Ex. 1:** A car requires 52 litres of gasoline to fill the tank. If the cost of gasoline is 102.9 cents a litre, calculate the cost to fill the tank.

**Ex. 2:** Calculate the distance traveled in kilometers, given the following odometer Readings:

Initial reading: 012862.8

Final reading: 013639.7

**Ex. 3:** Which car has the best fuel economy?

Car A: 8L/100 km

Car B: 6.8L/100 km

Car C: 11.5L/100 km

**Ex. 4:** A car with a full tank of gas traveled 572 km before stopping at a gas station. If the car requires 41.2 litres of gas to fill the tank, find the fuel economy and the cost of the fuel for the trip if the cost per litres is 95.6¢.

**Ex. 5:** Gina traveled a total of 350 km in the city, and 200 km on the highway during one week of driving. Her car has a fuel economy of 10.5 L/100 km in the city, and 7.4 L/100 km on the highway. Gasoline costs 111.5 cents per litre. Calculate the number of litres of fuel she used, and the cost of the fuel.

# BUYING NEW



When you buy a new vehicle, you will have to decide on the options you would like to have included in the car.

## Definitions:

**Base price:** The cost of a vehicle with \_\_\_\_\_ equipment.

**Optional equipment:** Extras that you can \_\_\_\_\_ on to a vehicle.

**Equipment packages:** This is a set of \_\_\_\_\_ equipment that you can purchase as a “package deal”.

There are also additional charges that you must pay for a new vehicle (other than the price of the car).

**Freight charges:** The cost of \_\_\_\_\_ a vehicle from the manufacturer to the dealership.

**Sticker price/Manufacturer’s suggested retail price:** The full asking price of a vehicle including the \_\_\_\_\_, plus \_\_\_\_\_, plus \_\_\_\_\_ and air conditioning tax (in MB, this is \$100).

You will also have to pay a “tire tax” of \$14.

If you are trading in an older vehicle, you receive a **trade-in allowance**. This is the amount the dealership will give you for your old vehicle.

**Example:** Mark is going to buy a 2 door Camaro sport coupe with a base price of \$22 570. He adds on an options package that costs \$1675. The freight on the vehicle is \$655 and to install a block heater will cost \$152.55. The dealership will give him a trade-in allowance of \$5000 on his old car. There is a documentation fee of \$150, air conditioning tax of \$100, and tire tax of \$14. Mark lives in Manitoba. Find the total price of this car.

-The value of your trade in is subtracted from the purchase price, before any taxes are determined

- Freight charges, Excise tax on air conditioning
- Tire environmental tax, Dealer “documentation” fees, options, Taxes



Vehicles lose value every year – this is known as depreciation.

- They lose between 20 – 30% in their first year
- They then lose 15% each year after that.
- Minivans, trucks & SUV's tend to lose a little less after the first year – around 10%

**Ex. 1:** A new car is sold for \$35,000 (sticker price). Calculate the depreciation and resale value at the end of 3 years.

YEAR		DEPREC.		VALUE AT END OF YEAR
Year 1				
Year 2				
Year 3				

Total depreciation =

What is the car's resale value at the end of three years?

# BUYING USED

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Why buy used?

Advantages/disadvantages of purchasing from dealership or privately?

**Things to look for when purchasing used:**

**Steps to buying:**

1. Start with the cost of the vehicle
2. Will a diagnostic test or any repairs need to be done on the vehicle? Add these costs + PST and +GST to the total.
3. Add the PST to the book value of the vehicle (you pay this when you license your car).
4. Do you need to carry out a safety check on the vehicle? Add \$70.00.
5. Do you need to do lien search? Add \$26 (including tax).
6. Find the total.

**Ex. 1:** Gord lives in Manitoba. He wants to buy a used car from a private owner, who is asking \$6,995 for the car. He does a lien search for \$26. He's not a mechanic so he gets a diagnostic test done for \$50.00. The mechanic tells him that the car needs some engine work that will cost \$650, including labour. When he gets the car licensed, he must pay PST on the book value of the car. The book value is \$7,000. He negotiates for the owner to pay for the safety check. How much will Gord have to pay for the car?

# LEASING A VEHICLE

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When you lease a vehicle, you pay a set amount each month for a specified number of months.

You are not buying the vehicle! At the end of the term you can either:

- 1) Purchase the vehicle by paying a residual value
- 2) Lease a new vehicle

## Definitions:

Lease term:

Lease payment:

Residual value:

Residual value rate:

Security deposit:

## ADVANTAGES

## DISADVANTAGES

**Example 1:** A vehicle in BC worth \$34000 has the following lease agreement:

Monthly lease payment: \$349

Lease term: 36 months

Down payment: \$3850

Security deposit: \$500

To lease the car, you pay the down payment, security deposit and the first month's payment.

- a) Calculate the total monthly payment.
  
  
- b) Calculate the total lease payment after 3 years.
  
  
- c) How much will you have to pay at the start of the lease?

**Example 2:** The residual value rate is 75% after 3 years for the car in Example 1. Calculate the residual value including taxes. (How much would it cost you to buy out the car?)

**Example 3:** If you bought out the car in example 1, how much did you pay in total? (Including down payment, lease payments and residual value)

# CAR LOANS

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Ex) Joel wishes to purchase a used car from a dealership for \$12,500. He decides to get a personal loan from his bank. He has command start and cruise control put into the car for \$199 and \$275 respectively.

a) Calculate the total cost to purchase this car.

b) If he has a down payment of \$2,750, calculate how much of a loan does he needs?

c) He gets a loan at his bank for 7.5% over 4 years. Using the loan payment chart, calculate his monthly payment.

d) Calculate the total paid for the loan.

e) Calculate the finance charge for the loan.

f) Calculate the total cost of the car including his down payment

## Review

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1. What minimum monthly net income is recommended if you wish to take out a loan with payments of \$580 a month?
2. What is the maximum debt repayment you can afford if your monthly net income is \$5 500?
3. Laura takes her car to a Manitoba car dealership for servicing. The dealership charges \$85 per hour for labour. The following items were replaced: three (3) spark plugs for \$2.25 each, one (1) air filter for \$11.50 and two (2) headlights for \$30. The job took 1.25 hours to complete.

Calculate the total cost of repairs including taxes.

4. Greta owns a Ford Taurus. The fuel consumption ratings are 11.5 L/100 km for city driving and 7.1 L/100 km for highway driving. Greta does about 120 km of city driving and 180 km of highway driving each week.
  - a) About how many litres of gas does Greta use each week?
  - b) If the cost of fuel is 109.7 ¢/L, about how much does Greta spend on fuel in 1 week?
  - c) About how much does Greta spend on fuel in 1 year?
5. A car with a full tank of gas travelled 600 km before stopping for gas. The car required 50 litres of gas and the cost of gas was 120.5 cents per litre.
  - a) Find the fuel economy of the car.
  - b) Find the cost of the gas purchased.
6. An NHL hockey player in Winnipeg. would like to buy a Porsche Boxster. The base price is \$75, 300. He wants heated leather seats, a leather steering wheel, a four-speaker CD player, and automatic air-conditioning and temperature control. These options cost a total of \$5 500. There is an air conditioning tax of \$100, a freight charge of \$750, and a documentation fee of \$180. Calculate the total price after taxes.

7. A new car worth \$31 400 depreciates by 20% in its first year, and then by 15% every year after that.
  - a) What is the value of the car after 3 years?
  
  - b) What is the total depreciation after 3 years?
  
8. You have a choice of two cars. One is a private sale for \$7465. A diagnostic check would need to be done for \$35 and a lien search for \$26. You will have to buy two new tires for \$275 each. A safety check that costs \$40 plus GST will need to be done. The book value of this car is \$5 000. The other car can be bought through a used car dealer on sale for \$7 500. Which is the better buy and by how much?
  
9. The monthly lease payment on a two-door Saturn in Flin Flon is \$203.79 plus taxes for a term of 60 months. A down payment of \$2 175 and the first monthly payment is required when the lease is signed. The sale price is \$25 000 and the guaranteed residual value is 58%.
  - a) Calculate the total monthly lease payment including taxes.
  
  - b) Calculate the total lease payment
  
  - c) Calculate the amount that must be paid at the start of the lease.
  
  - d) Calculate the residual value of the vehicle after 5 years (including taxes)
  
10. Mia makes a down payment of \$5000 on a new car she purchases for a price of \$20 703.54. To finance the remaining amount, she takes out a three-year loan at a fixed interest rate of 8% annually.
  - a. Calculate the principal for the loan she requires.
  - b. Calculate her monthly payment for the loan.
  - c. Calculate the total paid for the loan.
  - d. Calculate her finance charge for the loan.
  - e. Calculate the total cost of the vehicle including the down payment.

**Answer Key**

1. \$1 450/mth
2. \$2 200
3. \$199.98
4. a) 26.6L      b) \$29.18      c) \$1 517.36
5. a) 8.3L/100 km      b) \$60.25
6. \$92 467.90
7. a) \$18 149.20      b) \$13 250.80
8. \$8594.05 and \$8475
9. a) \$230.28      b) \$15 991.80      c) \$2 405.28      d) \$16 910
10. a) \$15 703.54      b) \$492.15      c) \$17 717.40      d) \$2013.86      e) \$22 717.40