2.4 Buy, Rent, or Lease?

YOU WILL NEED

- calculator
- financial application
- spreadsheet software

GOAL

Solve problems by analyzing renting, leasing, and buying options.

EXPLORE...

Explain why your answers to the questions below might differ.

- You need a new pencil. Would you rent or buy?
- You need a new computer. Would you rent or buy?
- You need a new car. Would you rent or buy?
- You need a place to live. Would you rent or buy?

lease

A contract for purchasing the use of property, such as a building or vehicle, from another, the lessor, for a specified period.

equity

The difference between the value of an item and the amount still owing on it; can be thought of as the portion owned. For example, if a $25 000 down payment is made on a $230 000 home, $205 000 is still owing and $25 000 is the equity or portion owned.

asset

An item or a portion of an item owned; also known as property. Assets include such items as real estate, investment portfolios, vehicles, art, and gems.

LEARN ABOUT the Math

Amanda is a civil engineer. She needs a vehicle for work, on average, 12 days each month. She has been renting a vehicle when she needs it.

The advantage to renting is that she simply fills the gas tank and drops off the vehicle when she is done with it. The disadvantage is that she has to spend time arranging for the rental, picking up the vehicle, and getting home after dropping it off. She is wondering if renting is the most economical choice and is considering her options:

- She could **lease** a vehicle, which requires a down payment of $4000 and lease payments of $380 per month plus tax. She would need insurance at $1220 each year (which could be paid monthly) and would have to pay for repairs and some maintenance, which would average $50 each month. For the 4-year lease she is looking at, she would have no **equity** in the vehicle at the end of the term, since the car would belong to the leasing company.
- She could buy a vehicle for $32 800 and finance it for a 4-year term at 4.5% interest, compounded monthly. She would have the same insurance, repair, and maintenance costs that she would have with leasing. However, the equity of the vehicle would be considered an **asset**.
- She could continue to rent at $49.99 per day, plus tax, with unlimited kilometres.

? Which option would you recommend for Amanda, and why?

EXAMPLE 1 Solving a problem that involves leasing, buying, or renting a vehicle

Mitchell's Solution

Leasing:
The term is 4 years.
The down payment is $4000.
The lease, at $380 per month, is $380 \cdot 12 \cdot 4$ or $18 240.
The insurance, at $1220 per year, is $1220 \cdot 4$ or $4880.
Repairs and maintenance, at $50 per month, are $50 \cdot 12 \cdot 4$ or $2400.

I decided to estimate the monthly costs of each option based on the costs over 4 years, since 4 years is often the term for leases and purchases.

I didn't consider the cost of gas for any option since it would be the same for all three options.

$$\text{Total cost} = 4000 + 18\,240 + 4880 + 2400$$
$$\text{Total cost} = 29\,520$$

$$\text{Monthly cost} = \frac{29\,520}{48}$$
$$\text{Monthly cost} = 615$$

I divided the sum of the costs over 4 years by the number of months in 4 years to determine the monthly cost.

Leasing would cost $615 per month.

Buying:
The term is 4 years.
The purchase price is $32 800.
The interest on the loan at 4.5%, compounded monthly, with payments of $747.95 per month is $3101.81.

I used the financial application on my calculator to solve for the regular payment amount. Then I used the sum of interest application to determine the cost of financing.

The insurance, at $1220 per year, is $4880.
Repairs and maintenance, at $50 per month, are $2400.

$$\text{Total cost} = 32\,800 + 3101.81 + 4880 + 2400$$
$$\text{Total cost} = 43\,181.81$$

$$\text{Monthly cost} = \frac{43\,181.81}{48}$$
$$\text{Monthly cost} = 899.621...$$

Buying would cost $899.62 per month.

Renting:
12 days, at $49.99 per day, is $599.88 each month.

Leasing: $615 per month
Buying: $899.62 per month
Renting: $599.88 per month
I recommend that Amanda continue to rent, since the monthly cost is the lowest.

I also think that Amanda should reassess her situation monthly. Renting makes it possible for her to do this, because she is not locked into an agreement.

Reflecting

A. Mitchell made his decision based on the monthly costs of all three options. Are there other benefits that should be taken into account when comparing the three options?

B. How many more days a month would Amanda have to rent before leasing was the best option?

C. Suppose that Amanda hired an employee who needed a car from time to time. What might you recommend for her? Explain.

D. When considering only monthly costs, leasing was better than buying for Amanda's situation. Why might this change if you looked at overall costs, as well as equity at the end of 4 years?

E. Suppose that Amanda had $15 000 for a down payment on a new car. Would this change which option is best? Explain.

F. Property can **appreciate** or **depreciate**. How does this apply to vehicles? How might this affect a decision about buying a new car versus a used car?

appreciation
Increase in the value of an asset over time.

depreciation
Decrease in the value of an asset over time.

APPLY the Math

EXAMPLE 2 Solving a problem that involves vehicle depreciation

A luxury vehicle rental company depreciates the value of its vehicles each year over 5 years. At the end of the fifth year, the company writes off a vehicle for its scrap value. The company uses a depreciation rate of 40% a year.

a) What is the scrap value of each car below?
- **i)** Car A, which is currently 2 years old and has a value of $43 200
- **ii)** Car B, which is currently 1 year old and has a value of $75 600

b) What was the original purchase price of each car?

Bella's Solution

a) Car A:

	A	B	C	D
1	**Year**	**Value at Start of Year ($)**	**Depreciation Amount ($)**	**Value at End of Year ($)**
2	**1**			
3	**2**			43200
4	**3**	43200	17280	25920
5	**4**	25920	10368	15552
6	**5**	15552	6220.8	9331.2

The scrap value for car A is $9331.20.

I set up a spreadsheet to determine the value of each car over 5 years.

- I used the depreciation rate of 40% per year to create the formula in the Depreciation Amount column.
- The formula in the Value at the End of the Year column calculated the difference between the value at the start of the year and the depreciation amount.
- I entered the end-of-year value for car A, which is 2 years old, into the year 2 row. Then I completed the table for years 3 to 5.

Car B:

	A	B	C	D
1	**Year**	**Value at Start of Year ($)**	**Depreciation Amount ($)**	**Value at End of Year ($)**
2	**1**			75600
3	**2**	75600	30240	45360
4	**3**	45360	18144	27216
5	**4**	27216	10886.4	16329.6
6	**5**	16329.6	6531.84	9797.76

I entered the end-of-year value for car B, which is 1 year old, into the year 1 row. Then I completed the table for years 2 to 5.

The scrap value for car B is $9797.76.

b) Car A:

	A	B	C	D
1	**Year**	**Value at Start of Year ($)**	**Depreciation Amount ($)**	**Value at End of Year ($)**
2	**1**	120000	48000	72000
3	**2**	72000	28800	43200
4	**3**	43200	17280	25920
5	**4**	25920	10368	15552
6	**5**	15552	6220.8	9331.2

The original purchase price of car A was $120 000.

To determine the original purchase price, I worked backward.

Since the cars retain 60% of their value each year, the formula for the Value at the Start of Year column divides the value of each car at the end of the year by 0.6 to determine its value at the start of the year.

The formula in the Depreciation Amount column calculated the difference between the start-of-year and end-of-year values.

Car B:

	A	B	C	D
1	**Year**	**Value at Start of Year ($)**	**Depreciation Amount ($)**	**Value at End of Year ($)**
2	**1**	126000	50400	75600
3	**2**	75600	30240	45360
4	**3**	45360	18144	27216
5	**4**	27216	10886.4	16329.6
6	**5**	16329.6	6531.84	9797.76

The original purchase price of car B was $126 000.

I verified my solution using a rate of 60% over 5 years.
Car A: $120\,000(0.6)^5 = 9331.20$
Car B: $126\,000(0.6)^5 = 9797.76$

Your Turn

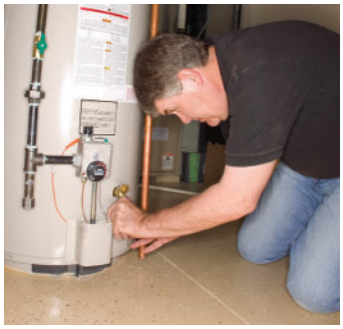
a) Is buying a luxury car a good investment? Explain.
b) Why might buying a used luxury car be preferable to buying a new one?

EXAMPLE 3 Solving a problem that involves leasing or buying a water heater

The 10-year-old hot water heater in Tom's home stopped working, so he needs a new one. Tom works for minimum wage. After paying his monthly expenses, he has \$35 **disposable income** left. He has an unused credit card that charges 18.7%, compounded daily. He has two options:

- Tom could lease from his utility company for \$17.25 per month. This would include parts and service.
- He could buy a water heater for \$712.99, plus an installation fee of \$250, using his credit card. He could afford to pay no more than \$35 each month.

a) What costs are associated with buying and leasing?
b) What do you recommend for Tom? Justify your recommendation.
c) Suppose that the life expectancy of a water heater is 8 years. Would this change your recommendation? Explain.



disposable income
The amount of income that someone has available to spend after all regular expenses and taxes have been deducted.

Monica's Solution

a) Buying:
Cost of water heater = \$712.99 + \$250
Cost of water heater = \$962.99

I used the financial application on my calculator to solve for the number of payments.

Cost of loan using credit card:
The present value is \$962.99.
The payment amount is \$35.
The payment frequency is 12 times per year.
The payments are made at the end of each payment period.
The number of payments is unknown.
The annual interest rate is 18.7%.
The compounding frequency is 365 times per year.
The future value is \$0.

The number of payments is 36.307....

It would cost (36.307...)(35)
or \$1270.76 over 37 months to buy a water heater.

I multiplied the number of payments by the amount of each payment to determine the overall cost. I didn't consider equity or appreciation, since I doubt that Tom could sell a used hot water heater.

Leasing:
Cost of lease = $37 \cdot 17.25$
Cost of lease = 638.25

It would cost \$638.25 over 37 months to lease a water heater.

To compare leasing with borrowing, I determined the cost of leasing over the same time period (64 months) that Tom would be paying off the credit card loan.

b) I recommend that Tom lease because the cost is lower and the lease has the benefit of free repairs and service.

If he leased, the company would replace the water heater as part of servicing.

c) Cost for purchasing: $1270.76.
Cost over 8 years for leasing:
$17.25 · 12 · 8 or $1656

My recommendation now is to purchase, since the cost is lower over the 8 years he will have the water heater.

Your Turn

Suppose that Tom decided to lease, and he invested $17.75 each month (the difference between the lease payments and the $35 of disposable income that he has left). If the interest rate is 5%, compounded monthly, how much interest could he earn on his investment over 37 months?

EXAMPLE 4 Solving a problem that involves leasing or buying office space

Lance started his own construction business 2 years ago. His business has grown quickly, and his home office is no longer big enough. He is considering these two options:

- He could sign a 3-year lease on office space, with monthly rental payments of $2000, and a refundable damage deposit of $2000, but there is a penalty for breaking the lease.
- He could purchase a house for $285 000 and renovate so it could be used as an office. A 5% down payment would be required, and he would take out a 15-year mortgage at 5%, compounded semi-annually, with monthly payments. Assume appreciation of 2% yearly.

a) What are the costs of leasing over 15 years?
b) What are the costs of buying over 15 years?
c) What do you recommend for Lance? Justify your advice.

Shauna's Solution

a) Leasing cost:
Leasing cost = Number of years · Number of payments per year · Payment amount
Leasing cost = 15 · 12 · 2000
Leasing cost = 360 000

It will cost $360 000 to lease the office space.

I didn't include costs that are the same for both options, such as property insurance and utilities.

I also didn't include the damage deposit because it is refundable.

I assumed the same rent for 15 years.

b) Buying cost:
The down payment is 5% of $285 000, or $14 250.

The present value is $285 000 − $14 250 or $270 750.
The payments are made 12 times a year.
The regular payment is unknown.
The number of payments is 15 · 12 or 180.
The payments are made at the end of the payment periods.
The annual interest rate is 5%.
The compounding period is 2 times per year.
The future value is $0.

I assumed an average interest rate of 5% over 15 years.

I entered these values into the financial application on my calculator to solve for the payment amount.

The mortgage payment is 2133.845... or $2133.85.

Buying cost = Down payment + (Number of payments · Payment amount)
Buying cost = $14 250 + 180($2133.85)
Buying cost = $398 343.00

I added the cost of the down payment and the mortgage payments over 15 years to determine the cost.

Value of house = Initial value · Appreciation rate
Value of house = $285 000$(1.02)^{15}$
Value of house = $383 572.48

Actual cost = Buying cost − Equity
Actual cost = $398 343.00 − $383 572.48
Actual cost = $14 760.52

I determined the equity in the house by calculating its value using an appreciation of 2% per year. After 15 years, the mortgage would be paid off, so the entire value of the house would be equity.

I subtracted the equity from the cost.

It will cost $14 760.52 to buy the office space, taking into account equity.

c) Benefits of leasing: Lance can move after 3 years without having to worry about selling and he doesn't have to worry about maintenance.

With leasing, Lance is only guaranteed the office space for the term of the lease. As well, if he moves sooner than 3 years, he will have to pay a penalty.

Benefits of buying: Lance can create the office space he wants, stay there as long as he wants, and have equity, which will likely grow over time.

Cost of leasing: $360 000
Cost of purchasing: $14 760.52

I recommend that Lance buy because it is more economical and his equity will grow.

The big difference between leasing and buying is the equity. Appreciation adds to this.

Your Turn

Suppose that the value of the house appreciated an average of 5% per year over 15 years. How does the equity in the house change?

EXAMPLE 5 Solving a problem that involves renting or buying a house

Two couples made different decisions about whether to rent or buy:

- Helen and Tim bought a house for $249 900. They have negotiated a mortgage of 95% of the purchase price, so they will need a 5% down payment. The mortgage is compounded semi-annually at 5.5%, has a 20-year term, and requires monthly payments.
- Don and Pat are renting a house for $1600 per month. They plan to renew the lease yearly.

After 3 years, both couples decide to move. Helen and Tim discover that the value of their house has depreciated by 10% over the 3 years.

Compare each couple's situation after 3 years.

Glenn's Solution

Don and Pat:
Rental cost $= 3 \cdot 12 \cdot 1600$
Rental cost $= \$57\,600$

I determined the total they would pay in rent over 3 years.

Helen and Tim:
Down payment $= 249\,900(0.05)$
Down payment $= \$12\,495$

The present value is $\$249\,900 - \$12\,495$ or $\$237\,405$.
The payment frequency is 12 times per year.
The regular payment amount is unknown.
The number of payments is $20(12) = 240$.
The payments are made at the end of the payment periods.
The annual interest rate is 5.5%.
The compounding frequency is 2 times per year.

I entered these values into the financial application on my calculator to solve for the monthly mortgage payment amount.

The monthly mortgage payments are $1624.78.

The present value is $237 405.
The payment frequency is 12 times per year.
The regular payment amount is $1624.78.
The number of payments is 3(12) or 36.
The payments are made at the end of the payment periods.
The annual interest rate is 5.5%.
The compounding period is 2 times per year.
The future value is unknown.

When Helen and Tim sell after 3 years, they must pay off what is left of the mortgage.

I entered these values into the financial application to solve for the future value of the mortgage after 3 years.

The future value is $215 992.52.

Resale value of house = 249 900 − 249 900(0.1)
Resale value of house = $224 910

The resale value is the purchase price less 10% due to depreciation.

Profit = $224 910 − $215 992.52
Profit = $8917.48

After paying off the mortgage, Helen and Tim will have made $8917.48 in profit.

Cost over 3 years = 12 495 + (36)(1624.78) − 8917.48
Cost over 3 years = $62 069.60

The cost over 3 years includes the down payment and monthly mortgage payments, less the profit on the sale of the house after paying off the mortgage.

Over 3 years,
Don and Pat will have paid $57 600.
Helen and Tim will have paid $62 069.60.

Helen and Tim also had additional costs associated with buying and selling a house, which were not considered.

Your Turn

What percent depreciation on the value of Helen and Tim's house over 3 years would have made the cost of buying the same as renting at $1600 per month?

In Summary

Key Ideas

- When deciding whether to rent, buy (with or without financing), or lease, each situation is unique. A cost and benefit analysis should take everything into account.
  - Costs include initial costs and fees, short-term costs, long-term costs, disposable income, the cost of financing, depreciation and appreciation, penalties for breaking contracts, and equity.
  - Benefits include convenience, commitments, flexibility, and personal needs or wants, such as how often you want to buy a new car.
- Since each situation is unique, it is impossible to generalize about whether renting, leasing, or buying is best.

Need to Know

- When renting, leasing, and buying, you often need to make payments up front. Some payments go toward the overall cost, such as a down payment on a house or a lease deposit and the first and last month's rent. Other deposits, such as a rental damage deposit, are refunded at a later date.
- Appreciation and depreciation affect the value of a piece of property and should be considered when making decisions about renting, buying, or leasing, based on the particular situation. They are usually expressed as a rate per annum.
- Equity can make buying a house a form of investment.

CHECK Your Understanding

1. Lu, a physiotherapist, works 4-month contracts in communities in southern Yukon. He has two options for housing:

- He can rent a room with a kitchenette at a hotel for $75 per day, which includes cleaning service and utilities.
- He can take a 4-month lease of a furnished apartment for $1600 per month. This requires the first and last month's rent up front, along with a refundable damage deposit of $1600. As well, Lu would need to pay utilities, at about $125 each month.

a) Analyze the costs and benefits of leasing versus renting.

b) Which option would you recommend? Explain.

2. A new branch office of an insurance company requires 20 computers, a server, and 8 printers. The company's technology policy requires upgrades and renewals every 3 years because the value of computer equipment depreciates at an annual rate of 40%. The manager investigated the costs of purchasing and leasing, as shown in the chart.

Equipment	Lease ($)	Purchase ($)
20 computers	5548.20 per year	24 000
1 server	2200.00 per year	7 200
8 printers	215.00 per year	5 200

a) Analyze the costs and benefits of leasing versus purchasing.
b) Would it be better for the company to purchase or lease? Explain.

3. Paul and Ali are planning a 2-week canoe trip on the Yukon River from Lindeman Lake to Dawson City, tracing the journey of the Gold Rush Trail of 1898. For past canoe trips, they rented their gear at $45 per day. They now wonder, however, if they should purchase instead. A Kevlar canoe costs $3000, safety equipment costs $160, and three paddles cost $120 each.

a) For a 2-week trip, is it more economical to rent or buy? Explain.
b) For how many days could they rent at the same cost as buying?
c) Suppose that they average 30 days of canoeing each year. After how many full canoeing seasons would purchasing become more economical than renting?
d) Why might Paul and Ali not choose to buy?

PRACTISING

4. Kami needs a new septic bed for her home's sewage system. Since she is in the business of landscaping, she can do the job herself. Kami estimates that the job will take at least 3.5 days to complete, but she will need a backhoe. She could pay $6000 to rent a backhoe for a week, or she could pay $700 per half day. Which should she do? Explain.

5. Susie purchased a limited edition print of a Robert Bateman painting for $7800. Bateman's prints appreciate, on average, 1.5% annually.
a) How long will Susie need to keep the print until its value exceeds $10 000?
b) About how long will Susie need to keep the print until its value has doubled?

6. Jake and Archie are looking for places to live.

- Jake decides to rent a house for $1400 per month.
- Archie buys a house for $189 900, with a down payment of 10%. The bank has offered Archie a 20-year mortgage for the remainder of the cost, at 4% compounded semi-annually, with payments every two weeks.

Jake and Archie both move after 5 years. Archie's house has depreciated by 2% per year. Compare Jake's and Archie's housing costs.

7. Joe is a house painter and needs scaffolding for his next job. He has three options:

- Rent steel scaffolding for $340 per month.
- Buy new scaffolding for $1302.80.
- Buy used scaffolding at 60% of the purchase price when new.

a) What is the cost of each option?

b) If the job will take 3 months to complete, which option is better for Joe?

8. The cardio equipment at a fitness studio needs to be replaced. The cost of new equipment is $16 500. The owner of the studio does not have enough cash to pay for it. She has two options:

- Use a line of credit with an interest rate of 12.4%, compounded monthly.
- Lease the equipment for 2 years, for $1000 down and $480 each month.

a) What is the cost of buying with a line of credit if the owner pays off the loan in 2 years?

b) What is the cost of leasing for 2 years?

c) The equipment depreciates at 30% per year. What is its value after 2 years?

d) Should the owner buy or lease? Explain.

9. A community recreation centre needs new sound equipment every 18 months. The manager is looking at these two options:

- Buy equipment for $11 200 on credit at 0.7%, compounded monthly, for 18 months. The store selling the equipment guarantees that it will take the equipment back as a trade-in for new equipment in 18 months. The trade-in value will be $5000.
- Lease equipment for $1000 down and $455.56 per month for 18 months.

The recreation centre will recoup some of the cost of the equipment by charging groups that use the centre $35 a night. As well, the centre will rent out the equipment an average of 4 nights a week.

a) What would a lease cost the centre?

b) What would the centre pay to buy the equipment if it makes one payment at the end of 18 months?

c) How much would the centre earn from renting the equipment over 18 months? How does this affect the overall cost of each option?

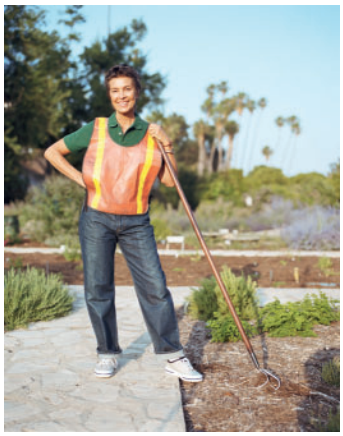
d) What would you advise the manager to do? Explain.

10. A company has spent $70 000 for car rentals over 2 years. The company's financial officer wants to determine if the company should continue to rent or if it should buy or lease two vehicles instead.

- A new car costs $32 000. A 5% down payment is required. The rest can be financed at 3.6%, compounded monthly, for 2 years. Assume depreciation of 40% a year and monthly payments.
- A 2-year lease for a car requires a down payment of $2000 and monthly payments of $770.

a) Determine the costs of each option: renting, buying, and leasing.

b) Recommend a course of action for the company. Justify your recommendation.



11. A landscaping company needs a small tractor to use from March to November.

a) Predict whether the company should rent, buy, or lease, based on the costs described below. Justify your prediction.

- A new tractor costs $18 600 and can be financed at 5.6%, compounded monthly, for 9 months.
- Renting a tractor will cost $60 per day.
- Leasing costs are $2000 down and $1345 per month for 9 months.

b) Verify your prediction.

c) What factors might make renting the best option? Explain.

12. Kalik has just inherited $25 000 and is looking for a good investment.

a) One option is to buy a house as an investment. The house he is considering would cost $250 000, with a 10% down payment. He could get a 30-year mortgage at 3.5%, compounded monthly. He is counting on annual appreciation of 3.1%. He would live in the house for 5 years and then sell it. How much could he make on the house as an investment?

b) Kalik is also thinking about investing the $25 000 in a 5-year bond. What fixed interest rate, with monthly compounding, would he need to make the bond a comparable investment to the house?

c) If Kalik could make the same amount investing in a bond as investing a house, why might he prefer one investment over the other?

13. This summer, Gerald is opening his own bicycle messenger service. He has 10 clients who have hired him to deliver small packages from May to September. Gerald wants to earn $5000 over the summer. He plans to buy a new bike and biking gear, for a total cost of $2000. He can get a loan from a bank at 4.8%, compounded monthly, with monthly payments of $125.

a) How much is it going to cost Gerald to open his business?

b) How much should he charge each client if he wants to earn $5000?

Closing

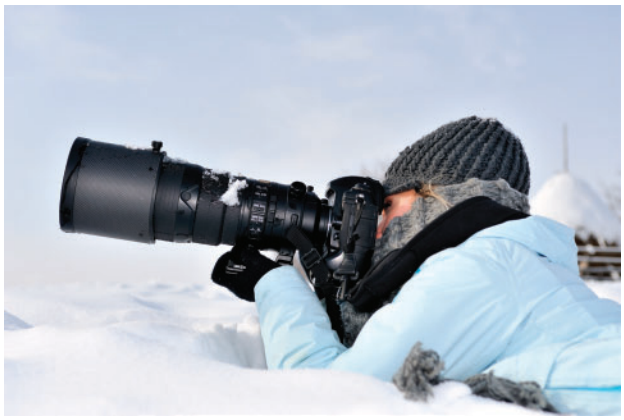
14. Describe a situation in which renting, buying, or leasing is the best option, once both costs and benefits are taken into account.

Extending

15. Carmen is a photographer. She wants three new lenses: a 16–35 mm ($1800), a 24–70 mm ($1600), and a 70–200 mm ($2800). She has two options to pay for the lenses:

- She could buy the lenses with a loan from her bank at 8.7%, compounded monthly, over a term of 18 months.
- She could rent all three lenses for a total of $40 per day.

For how many days a month could Carmen rent for the cost of buying?



16. Create and solve a cost and benefit problem with a scenario that involves two costs to compare (two of buying, renting, and leasing).

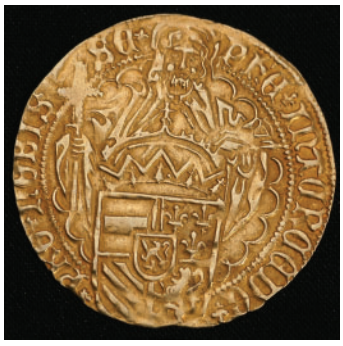
History | Connection

Usury

In medieval times, the term usury referred to lending money with interest. The money that was received above the principal was referred as the "interest," since this was the primary aspect of the moneylender's business. If the debt could not be repaid, the moneylender could seize assets, such as land and livestock. Over time, a negative connotation has become attached to the term usury. It now means lending money at exorbitant rates, above the legal limit.

A. Choose a provincial or territorial jurisdiction in Canada. Determine what legislation is in place to govern usury.

B. Legal action has been taken in several provinces against money-lending businesses that charge high interest rates. What has been the result?



A gold coin used in England and France circa 1350.