2 Mid-Chapter Review

FREQUENTLY ASKED Questions

Q: Why are the strategies used for investment calculations also used for borrowing calculations?

A: Investments and loans can be considered the same thing, but from different perspectives.

- If a bank loans money to a customer and charges interest, it is making an investment; it will get the amount that it loaned back, plus the interest earned on the investment.
- The customer has taken out a loan from the bank and will repay what was borrowed, plus the interest charged as the cost of borrowing.

For example, suppose that a bank has loaned you $1000 at 12%, compounded monthly, for 1 year.

- How much interest will the bank earn for loaning you the money?
- How much interest will you be charged for borrowing the money?

The same formula can be used to answer both questions.

$A = P(1 + i)^n$

$P = 1000$

$i = \frac{0.12}{12}$

$n = 12$

$A = 1000\left(1 + \frac{0.12}{12}\right)^{12}$

$A = 1126.825...$

$I = A - P$

$I = 1126.825... - 1000$

$I = 126.825...$

The bank earns $126.83 in interest. You pay $126.83 in interest.

Study *Aid*

- See Lesson 2.1, Examples 1, 2, and 3.
- Try Mid-Chapter Review Questions 1 and 2.

Study *Aid*

- See Lessons 2.1 and 2.2.
- Try Mid-Chapter Review Questions 3 to 8.

Q: What factors are critical when making a decision about borrowing money?

A: The main consideration is to keep the cost of borrowing to a minimum. Three factors are important:

- Generally, the lower the interest rate and the less frequent the compounding, the less interest you will be charged. For example, compare the interest paid on the following loans, with the same principal borrowed but different compounding frequencies:

$1000 at 12%, compounded monthly, for 1 year	$1000 at 12%, compounded annually, for 1 year
Total loan payment: $1126.83	Total loan payment: $1120.00
Total interest charged: $126.83	Total interest charged: $120.00

- Another factor is how the loan is repaid, whether in a lump sum at the end of the term (as in the examples above) or in regular payments. If regular payments are required, the greater and more frequent the payments, the less interest you will have to pay. For example, compare the total interest charged for the loans below, with the same principal borrowed, $1000, and interest rate, 5%, but different payment frequencies:

Weekly payments of $10	Monthly payments of $10
Total interest charged: $50.59	Total interest charged: $286.96

- A third factor is incentives, such as credit card promotions. You need to consider the amount you will end up paying overall to purchase an item using credit. For example, compare the total payments and interest charged by two credit cards for a $1000 purchase, with monthly payments of $100. One credit card offers a cash rebate, and the other does not. The credit card with the greater interest is actually the better option, since the overall payments are lower:

12% interest, compounded daily	19% interest, compounded daily
No cash rebate	$50 cash rebate
Total payments: $1059.29	Total payments: $1038.60
Total interest charged: $59.29	Total interest charged: $88.60

PRACTISING

Lesson 2.1

1. Le Petit Monde, a preschool, ordered $1020 in books.

a) Suppose that the bookstore offered the school a loan at 4% simple interest for 1.5 years. How much would the school need to repay the store in a single payment at the end of the term?

b) Suppose that the bookstore offered the school a loan at 4%, compounded monthly, for 1.5 years. How much would the school need to repay the store in a single payment on the maturity date?

2. A uniform manufacturer is making 40 new uniforms, at $275 each, for a security company. The security company took out a bank loan at 5.3%, compounded monthly, with a 9-month term. The bank is offering a choice between two repayment schedules:

- Pay it off in one payment at the end of the term.
- Pay it off in monthly payments.

a) If the loan is repaid in one payment, how much interest will be charged?

b) If the loan is repaid in monthly payments,

i) how much will each payment be?

ii) how much interest will be charged?

c) Explain why there is a difference in the interest paid for the two repayment schedules.

3. Abi's roof needed to be repaired, at a cost of $6240. The bank agreed to a loan for this amount at 7.1%, compounded weekly.

a) If Abi makes weekly payments of $80, how long will it take him to repay the loan?

b) Abi predicts that he can pay off the loan in half the time if he doubles his payments. Do you agree? Explain.

4. Lily bought Evelyn's exercise equipment for $4300. Evelyn is willing to let Lily pay for it in monthly payments of $365 for 1 year.

a) What annual interest rate, compounded monthly, is Evelyn charging?

b) If the interest had been simple interest, predict whether the interest rate would have been greater or less. Explain your prediction.

5. Dyami had his wedding photographs framed. The bill came to $1250. Dyami arranged to make payments every month for a year, at an interest rate of 15%, compounded monthly.

a) How much will each payment need to be?

b) Will half the loan be paid off after 6 months?

c) How much interest will Dyami end up paying?

d) Suppose that Dyami's loan doubled to $2500 with a term of 12 months and an interest rate of 15%, compounded monthly. Would his payments also double? Explain.

Lesson 2.2

6. Lauren and Morgan are buying new equipment for their home office for $13 400. They can afford payments of $1250 each month. Whose credit card should they use, if neither card has an outstanding balance? Explain.

- Lauren's credit card has an interest rate of 17.2%, compounded daily, but she will receive a 2% cash back on purchases at the end of a year.
- Morgan's credit card has an interest rate of 16.5%, compounded daily.

7. The new drum set Jayson wants is on sale for $3999.99, plus taxes of 13%. He can afford monthly payments of $250. He has two credit options:

- Use the store credit card, which charges 18.2% interest, compounded daily. As an incentive, the store will pay the taxes.
- Use his bank credit card, which charges 12.9% interest, compounded daily, and has no outstanding balance.

Which credit card should he use? Why?

8. Maris needs a loan for $1734 and can afford payments of $165 each month. Which credit plan should Maris choose? Explain.

- A credit card, at a rate of 14% compounded daily with a yearly fee of $100, which is charged the first time that the card is used and then annually
- Store financing, at a rate of 19.995% compounded daily, with an immediate rebate of $50