

B2		fx				
		=(1+A2/365)^365-1				
	A	B	C	D	E	F
1	APR	APY				
2	9.95%	0.104603				
3	6.49%	0.067046				
4	5.95%	0.061301				

FIGURE 6.1.11

Converting these APYs to percentages and rounding to the nearest hundredth we have 10.46%, 6.70%, and 6.13%.

Now, we are ready to complete the table. Notice that the difference between the APY and the corresponding APR is not the same for all levels, even though the compounding periods are the same.

Table 6.1.7: APD Bank of the South Personal Loan Rates

Loan Amount	APR*	APY
< \$20,000	9.95%	10.46%
\$20,000 – \$99,999	6.49%	6.70%
≥ \$100,000	5.95%	6.13%

\*Interest is compounded daily, and accrued interest is posted to the account monthly.

### Skill Check Answers

1. \$5292 2. \$14,802.78 3. \$1454.99 4. 4.28%

## 6.1 Exercises

### ✓ CONCEPT CHECK

- The amount of money that you are charged for \_\_\_\_\_ money is called interest.
- The two types of interest are \_\_\_\_\_ interest and \_\_\_\_\_ interest.
- With compound interest, the interest charged applies not only to the \_\_\_\_\_, but also to any interest that has already been accrued.
- The largest amount of interest that could possibly accrue over a given time period is \_\_\_\_\_.
- True or False: Simple interest grows exponentially.

 PRACTICE

Calculate the simple interest for each situation. Round your answer to the nearest cent, if necessary.

6. Determine the interest owed on \$800 for 5 years at a rate of 8.5%.
7. Determine the interest owed on \$5000 for 2 years at a rate of 10%.
8. Determine the interest owed on \$1200 for 30 months at a rate of 19.5%.
9. Determine the interest owed on \$550 for 5 years at a rate of 8.5%.
10. Determine the simple interest owed on \$2700 for 3 years at a rate of 15%.
11. Determine the simple interest owed on \$1050 for 18 months at a rate of 8%.
12. Determine the future value owed on \$1300 after 5 years at a simple interest rate of 3.2%.
13. Determine the future value owed on \$3200 after 4 years at a simple interest rate of 4%.

Use the compound interest formula to find the following for each situation.

- a. Calculate the total amount in the account after the given time period.
  - b. Determine the amount of interest earned for each.
14.  $P = \$2500$ ,  $r = 6.5\%$  compounded weekly,  $t = 10$  years
  15.  $P = \$3500$ ,  $r = 4.5\%$  compounded monthly,  $t = 10$  years
  16.  $P = \$2500$ ,  $r = 6.5\%$  compounded daily,  $t = 10$  years
  17.  $P = \$5650$ ,  $r = 8\%$  compounded biannually,  $t = 15$  years
  18.  $P = \$2500$ ,  $r = 6.5\%$  compounded yearly,  $t = 10$  years
  19.  $P = \$15,000$ ,  $r = 6\%$  compounded semiannually,  $t = 25$  years
  20.  $P = \$12,500$ ,  $r = 8\%$  compounded biweekly,  $t = 15$  years
  21.  $P = \$7300$ ,  $r = 19.9\%$  compounded weekly,  $t = 20$  years

22. Angela deposits \$2500 into an account with an APR of 5.5% for 10 years. Find each of the following.
- Amount of interest earned if the account is compounded annually
  - Amount of interest earned if the account is compounded monthly
  - Amount of interest earned if the account is compounded weekly
  - Amount of interest earned if the account is compounded daily
  - Amount of interest earned if the account is compounded continuously
23. David deposits \$4000. Determine the APY for each of the following.
- APR of 5% compounded monthly
  - APR of 5% compounded weekly
  - APR of 5% compounded daily
  - APR of 7.5% compounded monthly
  - APR of 7.5% compounded weekly
  - APR of 7.5% compounded daily
24. Determine the simple interest earned on \$10,000 after 10 years if the APR is each of the following rates.
- 3%
  - 6%
  - 12%
  - 24%

### APPLICATIONS

25. Julia takes out a simple-interest loan to buy a new TV set. If she borrows \$1500 for 2 years at a rate of 12%, how much interest will she have to pay back?
26. Suppose a friend asked you to lend him \$3500 and promised to return the money several years later with a 10% annual interest. How much interest will he pay you if he decides to return all the money in two and a half years?
27. Suppose your bank gives you a special offer for a simple interest loan of \$10,000 for 5 years at an annual interest rate of 5%. How much will you owe the bank at the end of the loan term?
28. Kamil deposits \$3000 in an account with a simple interest rate of 2.2%. If he decides to take all the money from the account after 8 years, how much will he withdraw?

29. A lending company offers small personal loans with a simple interest rate. If the loan is paid off in full within 30 days, the annual interest rate is 14%. If you take more than 30 days to return the full loan amount, the interest is calculated at an annual rate of 31% on the original loan amount. How much would you need to pay back to the company if you borrowed \$400 and returned the full loan amount after 15 days?
30. Lina is purchasing a new washing machine on credit at a simple annual interest rate of 24.99%. How much will she owe the store in 60 days if the price of the washer is \$650?
31. Emiel deposits \$700 on a savings account with a simple annual interest rate of 6.5%. What will the future value of his account be after 180 days?
32. Bart deposits \$6000 into an account with an annual percentage rate of 3.1% compounded daily. What will the future value of his account be after 5 years?
33. A bank offers Eleanor a loan of \$9000 for 8 years with an annual interest rate of 5.5% compounded monthly. What will the future value of the loan be at the end of the loan period?
34. Barbara added \$2100 to her bank account that already had \$6200. How much will she have in the account after 2 years if the interest is compounded quarterly at an annual rate of 2.4%?
35. To buy a car, Cornelis takes out a loan of \$13,500 for 15 years with an annual interest rate of 1.35% compounded semiannually. What is the total cost of the car, including interest?
36. Laura needs \$3600 to renovate her condo and plans to take out a two-year loan for this purpose. After searching through available bank offers, she narrowed the choice to two banks. The first bank offered an APR of 4.4% compounded semi-annually, and the second bank offered an APR of 3.9% compounded monthly. Which of the offers should Laura choose?
37. Ralph ponders which of two banks he should place his money in. The first bank offers an APR of 2.15% compounded monthly. The second offers an APR of 2.29% compounded quarterly. Ralph has \$12,000 and plans to leave it in the bank for at least 7 years. Which of the banks should he choose?
38. Donald invests \$7000 into an account that pays 2.3% interest compounded continuously.
- Find the future value of his account in 6 years.
  - How long will it take for his account to be worth \$10,000?
39. In order to get an implant in place of her extracted tooth, Rachel takes out a five-year loan for \$4000 with a 5.58% interest rate compounded continuously.
- How much will she need to repay at the end of the loan term?
  - If she wants her total repayment to be no more than \$5000, for how long can she borrow the money?

40. If you deposit \$4500 into an account with an interest rate of 2.19% compounded continuously, how much will you have in the account in 10 years?
41. Suppose that in 2020 Amanda deposited \$14,000 into an account that earns 1.89% APR and is compounded continuously. What will be the value of her investment in 2030?
42. After getting a part-time job, Evelyn decided to move from the student dorm to her own apartment. She borrowed \$1600 to pay the deposits to rent the apartment and decided to pay it back over the course of two years. How much will she need to pay in total if the interest rate is 4.4% compounded continuously?
43. Samuel buys a new refrigerator using an in-store offer for a loan with an APR of 22.5% compounded continuously. If the refrigerator costs \$1250, how much will Samuel owe the store after half a year?
44. After selling an old car she got from her parents for \$11,000, Leah decided to place the money in a savings account with an APR of 3.07% compounded continuously. How long will it take for the money in the account to increase by \$1000?
45. How long would it take for \$26,000 invested at a rate of 4.09% compounded continuously to reach the value of \$30,000?
46. Joshua takes a loan of \$2000 with an APR of 8.01% compounded continuously. How long will it take for the amount owed to increase by \$700?
47. How long would it take for an amount owed to double if the interest rate is 10.39% compounded continuously?
48. A bank is offering new customers an IRA that earns 1.75% APR compounded monthly. Adam uses this offer to deposit \$15,000 for 10 years. What is the annual percentage yield for this deposit?
49. Peter invests \$34,000 for six years into an account with an APR of 2.12% compounded daily. Find the annual percentage yield for this investment.
50. If \$9000 is invested for 4 years at an interest rate of 7.19% compounded semi-annually, what will be the annual percentage yield?
51. Megan places \$6000 into a savings account for one year. The APR for this account is 1.65% and is compounded quarterly. What is the annual percentage yield for her deposit?
52. Assume you wish to borrow \$500 for two weeks and the amount of interest you must pay is \$20 per \$100 borrowed. What is the APR at which you are borrowing money? Round your answer to the nearest hundredth.
53. Suppose your salary in 2022 is \$65,000. If the annual inflation rate is 4%, what salary do you need to make in 2030 in order for it to keep up with inflation?

54. Suppose the First Bank of Lending offers a CD (Certificate of Deposit) that has a 6.45% interest rate and is compounded quarterly for three years. You decide to invest \$5500 into this CD.
- Determine how much money you will have at the end of the three years?
  - Find the APY.
55. The First Bank of Lending lists the following APR for loans. Determine the APY, or effective interest rate for each category.

Loan Amount	APR
< \$20,000	11.25%
\$20,000–\$99,999	8.99%
≥ \$100,000	5.75%

\*Interest rates are compounded quarterly

### WRITING & THINKING

56. You are purchasing a new computer using the store’s “90 days same as cash” deal. If the cost of the computer is \$1575 (tax included) with an annual interest rate of 19.99%, how much would you owe on the 91st day if you make no payments during the first 90 days?

## 6.1 PROJECT

### INFLATION AND TIME TRAVEL: THE VALUE OF MONEY OVER TIME

In 1979, the federal minimum wage in the United States was \$2.90 per hour. By 2019, that number increased to \$7.25 per hour. While there is a clear increase in the minimum wage in dollars, it is hard to compare the two figures without knowing more about how the economy changed between 1979 and 2019.

In this activity, you will explore different ways to compare the value of money across different time periods.

Economists define inflation as the rise of price levels in the economy over time. The average yearly rate of inflation between 1979 and 2019 was 3.2%. That means prices of goods and services went up by an average of 3.2% every year between 1979 and 2019.

- Suppose that an item cost \$1.00 in 1979. What was the price of that item in 2019 when adjusted for inflation? (**Hint:** You can think about this in terms of an investment that compounds interest—if you invested \$1.00 in 1979 at 3.2% compound annually, how much would you have in 2019?)

The answer to part 1 represents the value of \$1.00 of 1979 currency in 2019 when adjusted by inflation.