

Applications

Loans and debts make worries and frets.

—Traditional Proverb

1. How might the quote apply to what you have learned in this section?
2. What is the total interest on a 10-year, 6.1% loan with a principal of \$32,000? **\$10,824.40**
3. Jamie wants to borrow \$15,000 from South Western Bank. They offered her a 4-year loan with an APR of 5.5%. How much will she pay in interest over the life of the loan? **\$1,744.80**
4. Charlie and Kathy want to borrow \$20,000 to make some home improvements. Their bank will lend them the money for 10 years at an interest rate of 5.75%. How much will they pay in interest? **\$6,344.80**
5. Devon is considering taking out a \$7,000 loan. He went to two banks. Stevenson Trust Company offered him an 8-year loan with an interest rate of 8.6%. First National Bank offered him a 5-year loan with an interest rate of 10%. Which loan will have the lower interest over its lifetime?
6. A bank offers a \$25,000 loan at an interest rate of 7.7% that can be paid back over 2–10 years.
 - a. Write the monthly payment formula for this loan situation. Let t represent the number of years from 2 to 10 inclusive. *See additional answers.*
 - b. Write the total interest formula for this loan situation. Let t represent the number of years from 2 to 10 inclusive. *See additional answers.*
 - c. Construct a graph. Let the independent variable represent years and the dependent variable represent the interest paid. *See additional answers.*
 - d. Use your graph to estimate the interest for a $6\frac{1}{2}$ -year loan. **approx. \$6,800**
7. Jennifer wants to borrow \$20,000. Her bank offers a 7.1% interest rate. She can afford \$500 a month for loan payments. What should be the length of her loan to the nearest tenth of a year? **3.8 years**
8. Louis wants to take out a \$14,000 loan with a 6.8% APR. He can afford to pay no more than \$400 per month for loan payments. What would be the length of his loan? Round to the nearest tenth of a year. **3.3 years**
9. Use your answer and the loan information from Exercise 8 to determine what effect a \$50 decrease in Louis's monthly payment would have on the length of his loan. **The loan length would increase to 3.8 years.**
10. Dave wants to borrow \$22,000 from First Finance Bank. The bank will give him a 15-year loan at an interest rate of 4.85%. How much will he pay the bank in interest over the life of the loan? Round to the nearest hundred dollars. **\$9,000**

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Exercises 2–5

Here students are asked to determine the total interest over the life of the loan. They will need to first determine the monthly payment and then multiply that monthly payment by the loan length in months. Subtracting the principal from that amount will yield the desired result.

Exercise 6

Students may need some assistance in setting up an appropriate viewing window when graphing. Keep in mind that the formula calculates a monthly payment, but the independent variable for the graph is stated in years.

ANSWERS

1. The proverb is a warning about loans and debts. Entering into any debt agreement should be made cautiously.
5. First National: Stevenson, \$2,705.60; First National, \$1,923.80

11. Use the given yearly payment schedule.

\$10,000
10 years

\$4,559.31

- What is the loan amount?
- What is the length of the loan?
- What is the monthly payment? **\$1,455.93**
- What is the total interest paid?
- Construct a scatter plot using the data points (year, loan balance). *See margin.*
- Write a linear regression equation that approximates the year–loan balance relationship. Round to the nearest hundredth. $y = -1,029.43x + 10,812.73$
- Write a quadratic regression equation that approximates the year–loan balance relationship. Round to the nearest hundredth. $y = -40.85x^2 - 580.08x + 9,914.03$
- Write a cubic regression equation that approximates the year–loan balance relationship. Round to the nearest hundredth. $y = -1.08x^3 - 22.98x^2 - 662.48x + 10,006.94$

Year	Principal Paid	Interest Paid	Loan Balance
			\$10,000.00
1	\$680.52	\$775.41	\$9,319.48
2	\$737.01	\$718.92	\$8,582.47
3	\$798.18	\$657.75	\$7,784.29
4	\$864.43	\$591.50	\$6,919.86
5	\$936.17	\$519.76	\$5,983.69
6	\$1,013.88	\$442.05	\$4,969.81
7	\$1,098.03	\$357.90	\$3,871.78
8	\$1,189.16	\$266.77	\$2,682.62
9	\$1,287.86	\$168.07	\$1,394.76
10	\$1,394.76	\$61.18	\$0.00

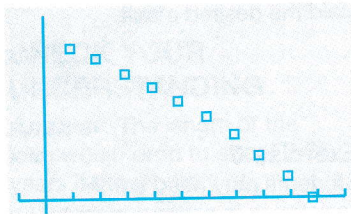
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Exercises 11 and 12

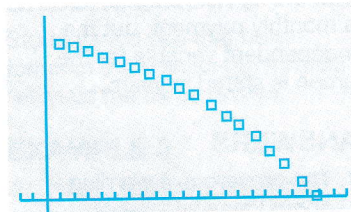
Once the data have been entered into the calculator, the regression equations are easy to determine. Use the regression keystroke sequence that enters the equations into Y1, Y2, and Y3, respectively, so that those equations are not overwritten, and students can easily refer to them.

ANSWERS

11e.



12e.



12f. $y = -1,945.42x + 39,737.05$

12g. $y = -90.18x^2 - 231.99x + 34,025.63$

12h. $y = -2.81x^3 - 10.04x^2 - 857.63x + 35,147.$

12. Use the given payment schedule.

- What is the loan amount? **\$35,000**
- What is the length of the loan? **18 years**
- What is the approximate monthly payment rounded to the nearest cent? **\$4,065.22**
- What is the total interest paid over the life of the loan? **\$38,174.09**
- Construct a scatter plot using the data points (year, loan balance). *See margin.*
- Write a linear regression equation that approximates the year–loan balance relationship. Round to the nearest hundredth. *See margin.*
- Write a quadratic regression equation that approximates the year–loan balance relationship. Round to the nearest hundredth. *See margin.*
- Write a cubic regression equation that approximates the year–loan balance relationship. Round to the nearest hundredth. *See margin.*

Yearly Payment Schedule			
Year	Principal Paid	Interest Paid	Loan Balance
			\$35,000.00
2010	\$773.32	\$3,291.90	\$34,226.68
2011	\$850.08	\$3,215.15	\$33,376.60
2012	\$934.44	\$3,130.78	\$32,442.16
2013	\$1,027.18	\$3,038.04	\$31,414.97
2014	\$1,129.13	\$2,936.10	\$30,285.84
2015	\$1,241.19	\$2,824.03	\$29,044.65
2016	\$1,364.38	\$2,700.85	\$27,680.27
2017	\$1,499.79	\$2,565.44	\$26,180.48
2018	\$1,648.64	\$2,416.59	\$24,531.84
2019	\$1,812.26	\$2,252.96	\$22,719.57
2020	\$1,992.13	\$2,073.10	\$20,727.45
2021	\$2,189.84	\$1,875.39	\$18,537.61
2022	\$2,407.18	\$1,658.05	\$16,130.43
2023	\$2,646.08	\$1,419.14	\$13,484.34
2024	\$2,908.70	\$1,156.53	\$10,575.64
2025	\$3,197.38	\$867.84	\$7,378.26
2026	\$3,514.72	\$550.51	\$3,863.54
2027	\$3,863.54	\$201.69	\$0.00