In the following exercises, use the **Cost of Financing**. The difference between the total paid for a loan, along with all other charges paid to obtain the loan, and the original principal of the loan is the cost of financing. It measures how much more you paid for an item than the original price. In order to find the cost of financing, find the total paid over the life of the loan. Add to that any fees paid for the loan. Then subtract the principal.

$\text{Cost of Financing} = \text{Total of payments} + \text{fees} - \text{principal.}$

57. Yasmin decides to buy a used car. Her credit union offers 7.9% interest for 5-year loans on used cars. The cost of the car, including taxes and fees, is $11,209.50. How much did she pay the credit union over the 5 years? What was the cost of financing for Yasmin?

58. Cleo runs her own silk-screening company. She needs new silk-screening printing machines, and finds two that will cost her, in total, $5,489.00. She takes out a 3-year loan at 8.9% interest. What was the cost of financing for Cleo?

6.4 Compound Interest

Figure 6.6 The impact of compound interest (credit: "English Money" by Images Money/Flickr, CC BY 2.0)

Learning Objectives

After completing this section, you should be able to:

1. Compute compound interest.
2. Determine the difference in interest between simple and compound calculations.
3. Understand and compute future value.
4. Compute present value.
5. Compute and interpret effective annual yield.

For a very long time in certain parts of the world, interest was not charged due to religious dictates. Once this restriction was relaxed, loans that earned interest became possible. Initially, such loans had short terms, so only simple interest was applied to the loan. However, when loans began to stretch out for years, it was natural to add the interest at the end of each year, and add the interest to the principal of the loan. After another year, the interest was calculated on the initial principal plus the interest from year 1, or, the interest earned interest. Each year, more interest was added to the money owed, and that interest continued to earn interest.

Since the amount in the account grows each year, more money earns interest, increasing the account faster. This growth follows a geometric series (Geometric Sequences). It is this feature that gives compound interest its power. This module covers the mathematics of compound interest.

Understand and Compute Compound Interest

As we saw in Simple Interest, an account that pays simple interest only pays based on the original principal and the term of the loan. Accounts offering **compound interest** pay interest at regular intervals. After each interval, the interest is added to the original principal. Later, interest is calculated on the original principal plus the interest that has been added previously.

After each period, the interest on the account is computed, then added to the account. Then, after the next period, when interest is computed, it is computed based on the original principal AND the interest that was added in the previous periods.

The following example illustrates how compounded interest works.

EXAMPLE 6.39

Interest Compounded Annually

Abena invests $1,000 in a CD (certificate of deposit) earning 4% compounded annually. How much will Abena's CD be worth after 3 years?

Solution

Since the interest is compounded annually, the interest will be computed at the end of each year and added to the CD's value. The interest at the end of the following year will be based on the value found form the previous year.

Step 1: After the first year, the interest in Abena's CD is computed using the interest formula $I = P \times r \times t$. The principal is P = 1,000, the rate, as a decimal, is 0.04, and the time is one year, so t = 1. Using that, the interest earned in the first year is $I = P \times r \times t = 1{,}000 \times 0.04 \times 1 = 40$, so the interest earned in the first year was $40.00. This is added to the value of the CD, making the CD worth $\$1{,}000 + \$40 = \$1{,}040$.

Step 2: At the end of the second year, interest is again computed, but is computed based on the CD's new value, $1,040. Using this new value and the interest formula (r and t are still 0.04 and 1, respectively), we see that the CD earned $I = P \times r \times t = 1{,}040 \times 0.04 \times 1 = 41.6$, or $41.60. This is added to the value of the CD, making the CD now worth $\$1{,}040.00 + \$41.60 = \$1{,}081.60$.

Step 3: At the end of the third year, interest is again computed, but is computed based on Abena's CD's new value, $1,081.60. Using this value and the interest formula (r and t are still 0.04 and 1, respectively), we see that the CD earned $I = P \times r \times t = 1{,}081.60 \times 0.04 \times 1 = 43.264$, or $43.26 (remember to round down). This is added to the value of the CD, making the CD now worth $\$1{,}081.60 + \$43.26 = \$1{,}124.86$.

After 3 years, Abena's CD is worth $1,124.86.

YOUR TURN 6.39

1. Oksana deposits $5,000 in a CD that earns 3% compounded annually. How much is the CD worth after 4 years?

Determine the Difference in Interest Between Simple and Compound Calculations

It is natural to ask, does compound interest make much of a difference? To find out, we revisit Abena's CD.

EXAMPLE 6.40

Comparing Simple to Compound Interest on a 3-Year CD

Abena invested $1,000 in a CD that earned 4% compounded annually, and the CD was worth $1,124.86 after 3 years. Had Abena invested in a CD with simple interest, how much would the CD have been worth after 3 years? How much more did Abena earn using compound interest?

Solution

Had Abena invested $1,000 in a 4% simple interest CD for 3 years, her CD would have been worth $P + P \times r \times t = 1{,}000 + 1{,}000 \times 0.04 \times 3 = 1{,}120$, or $1,120.00. With interest compounded annually, Abena's CD was worth $1,124.86. The difference between compound and simple interest is $\$1{,}124.86 - \$1{,}120.00 = \$4.86$. So compound interest earned Abena $4.86 more than the simple interest did.

YOUR TURN 6.40

1. Oksana deposits $5,000 in a CD that earned 3% compounded annually and was worth $5,627.54 after 4 years. Had Oksana invested in a CD with simple interest, how much would the CD have been worth after 4 years? How much more did Oksana earn using compound interest?

VIDEO

[Compound Interest (https://openstax.org/r/compound_interest_beginners)](https://openstax.org/r/compound_interest_beginners)

Understand and Compute Future Value

Imagine investing for 30 years and compounding the interest every month. Using the method above, there would be 360 periods to calculate interest for. This is not a reasonable approach. Fortunately, there is a formula for finding the future value of an investment that earns compound interest.

FORMULA

The future value of an investment, A, when the principal P is invested at an annual interest rate of r (in decimal form), compounded n times per year, for t years, is found using the formula $A = P\left(1 + \frac{r}{n}\right)^{nt}$. This is also referred to as the future value of the investment.

Note, sometimes the formula is presented with the total number of periods, n, and the interest rate per period, r. In that case the formula becomes $A = P(1 + r)^n$.

EXAMPLE 6.41

Computing Future Value for Compound Interest

In the following, compute the future value of the investment with the given conditions.

1. Principal is $5,000, annual interest rate is 3.8%, compounded monthly, for 5 years.
2. Principal is $18,500, annual interest rate is 6.25%, compounded quarterly, for 17 years.

Solution

1. The principal is P = $5,000, interest rate, in decimal form, r = 0.038, compounded monthly so n = 12, and for t = 5 years. Substituting these values into the formula, we find

$$\begin{aligned} A = P\left(1 + \frac{r}{n}\right)^{nt} &= 5,000\left(1 + \frac{0.038}{12}\right)^{12 \times 5} \\ &= 5,000\left(1 + 0.0031\overline{6}\right)^{60} \\ &= 5,000\left(1.0031\overline{6}\right)^{40} \\ &= 5,000 \times 1.20888663572 \\ &= 6,044.4332 \end{aligned}$$

The future value of the investment is $6,044.43.

2. The principal is P = $18,500, interest rate, in decimal form, r = 0.0625, compounded quarterly so n = 4, and for t = 17 years. Substituting these values into the formula, we

$$\begin{aligned} A = P\left(1 + \frac{r}{n}\right)^{nt} &= 18,500\left(1 + \frac{0.0625}{4}\right)^{4 \times 17} \\ &= 18,500(1 + 0.015625)^{68} \\ &= 18,500(1.015625)^{68} \\ &= 18,500 \times 2.86992151999 \\ &= 53,093.5481 \end{aligned}$$

The future value of the investment is $53,093.54.

YOUR TURN 6.41

In the following, compute the future value of the investment with the given conditions.

1. Principal is $7,600, annual interest rate is 4.1%, compounded monthly, for 10 years.

2. Principal is $13,250, annual interest rate is 2.79%, compounded quarterly, for 25 years.

EXAMPLE 6.42

Interest Compounded Quarterly

Cody invests $7,500 in an account that earns 4.5% interest compounded quarterly (4 times per year). Determine the value of Cody's investment after 10 years.

Solution

Cody's initial investment is $7,500, so P = $7,500. The annual interest rate is 4.5%, which is 0.045 in decimal form. Compounding quarterly means there are four periods in a year, so n = 4. He invests the money for 10 years. Substituting those values into the formula, we calculate

$$\begin{aligned} A = P\left(1+\tfrac{r}{n}\right)^{nt} &= 7,500\left(1+\tfrac{0.045}{4}\right)^{4\times 10} \\ &= 7,500(1+0.01125)^{40} \\ &= 7,500(1.01125)^{40} \\ &= 7,500 \times 1.564376865391 \\ &= 11,732.8265 \end{aligned}$$

After 10 years, Cody's initial investment of $7,500 is worth $11,732.82.

YOUR TURN 6.42

1. Maggie invests $3,000 in an account that earns 5.1% interest compounded monthly. How much is the account worth after 13 years?

EXAMPLE 6.43

Interest Compounded Daily

Kathy invests $10,000 in an account that yields 5.6% compounded daily. How much money will be in her account after 20 years?

Solution

Kathy's initial investment is $10,000, so P = $10,000. The annual interest rate is 5.6%, which is 0.056 in decimal form. Compounding daily means there are 364 periods in a year, so n = 365. She invests the money for 20 years, so t = 20. Substituting those values into the formula, we calculate

$$\begin{aligned} A = P\left(1+\tfrac{r}{n}\right)^{nt} &= 10{,}000\left(1+\tfrac{0.056}{365}\right)^{365\times 20} \\ &= 10{,}000(1+0.000153424657534)^{7300} \\ &= 10{,}000(1.000153424657534)^{7300} \\ &= 10{,}000 \times 3.06459091598 \\ &= 30{,}645.909 \end{aligned}$$

After 20 years, Kathy's initial investment of $10,000 is worth $30,645.90.

YOUR TURN 6.43

1. Jacob invests $3,000 in a CD that yields 3.4% compounded daily for 5 years. How much is his CD worth after 5 years?

VIDEO

Compare Simple Interest to Interest Compounded Annually (https://openstax.org/r/compare_simple_compound_interest1)
Compare Simple Interest and Compound Interest for Different Number of Periods Per Year (https://openstax.org/r/compare_simple_compound_interest2)

WORK IT OUT

To truly grasp how compound interest works over a long period of time, create a table comparing simple interest to compound interest, with different numbers of periods per year, for many years would be useful. In this situation, the principal is $10,000, and the annual interest rate is 6%.

1. Create a table with five columns. Label the first column YEARS, the second column SIMPLE INTEREST, the third column COMPOUND ANNUALLY, the fourth column COMPOUND MONTHLY and the last column COMPOUND DAILY, as shown below.

YEARS	SIMPLE INTEREST	COMPOUND ANNUALLY	COMPOUND MONTHLY	COMPOUND DAILY

2. In the years column, enter 1, 2, 3, 5, 10, 20, and 30 for the rows.
3. Calculate the account value for each column and each year.
4. Compare the results from each of the values you find. How do the number of periods per year (compoundings per year) impact the account value? How does the number of years impact the account value?
5. Redo the chart, with an interest rate you choose and a principal you choose. Are the patterns identified earlier still present?

Understand and Compute Present Value

When investing, there is often a goal to reach, such as "after 20 years, I'd like the account to be worth $100,000." The question to be answered in this case is "How much money must be invested now to reach the goal?" As with simple interest, this is referred to as the present value.

FORMULA

The money invested in an account bearing an annual interest rate of r (in decimal form), compounded n times per year for t years, is called the present value, PV, of the account (or of the money) and found using the formula $PV = \frac{A}{(1 + \frac{r}{n})^{n \times t}}$, where A is the value of the account at the investment's end. Always round this value up to the nearest penny.

EXAMPLE 6.44

Computing Present Value

Find the present value of the accounts under the following conditions.

1. A = $250,000, invested at 6.75 interest, compounded monthly, for 30 years.
2. A = $500,000, invested at 7.1% interest, compounded quarterly, for 40 years.

Solution

1. To reach a final account value of A = $250,000, invested at 6.75% interest, in decimal form r = 0.0675 (decimal form!), compounded monthly, so n = 12, for 30 years, substitute those values into the formula for present value.

Calculating, we find the present value of the $250,000.

$$\begin{aligned} PV &= \frac{A}{\left(1 + \frac{r}{n}\right)^{n \times t}} = \frac{250{,}000}{\left(1 + \frac{0.0675}{12}\right)^{12 \times 30}} \\ &= \frac{250{,}000}{(1 + 0.005625)^{360}} \\ &= \frac{250{,}000}{(1.005625)^{360}} \\ &= \frac{250{,}000}{7.5332454772} \\ &= 33{,}186.2277 \end{aligned}$$

In order for this account to reach $250,000 after 30 years, $33,186.23 needs to be invested.

2. To reach a final account value of A = $500,000, invested at 7.1% interest, in decimal form r = 0.071, compounded quarterly, so n = 4, for 40 years, substitute those values into the formula for present value. Calculating, we find the present value of the $500,000.

$$\begin{aligned} PV &= \frac{A}{\left(1 + \frac{r}{n}\right)^{n \times t}} = \frac{500{,}000}{\left(1 + \frac{0.071}{4}\right)^{4 \times 40}} \\ &= \frac{500{,}000}{(1 + 0.01775)^{160}} \\ &= \frac{500{,}000}{(1.01775)^{160}} \\ &= \frac{500{,}000}{16.6946672846} \\ &= 29{,}949.6834 \end{aligned}$$

In order for this account to reach $500,000 after 40 years, $29,949.69 needs to be invested.

YOUR TURN 6.44

Find the present value of the accounts under the following conditions.

1. A = $1,000,000, invested at 5.75% interest, compounded monthly, for 40 years.
2. A = $175,000, invested at 3.8% interest, compounded quarterly, for 20 years.

EXAMPLE 6.45

Investment Goal with Compound Interest

Pilar plans early for retirement, believing she will need $1,500,000 to live comfortably after the age of 67. How much will she need to deposit at age 23 in an account bearing 6.35% annual interest compounded monthly?

Solution

Knowing how much to deposit at age 23 to reach a certain value later is a present value question. The target value for Pilar is $1,500,000. The interest rate is 6.35%, which in decimal form is 0.0635. Compounded monthly means n = 12. She's 23 and will leave the money in the account until the age of 67, which is 44 years, making t = 44. Using this information and substituting in the formula for present value, we calculate

$$\begin{aligned} PV &= \frac{A}{(1 + \frac{r}{n})^{n \times t}} = \frac{1{,}500{,}000}{\left(1 + \frac{0.0635}{12}\right)^{12 \times 44}} \\ &= \frac{1{,}500{,}000}{(1 + 0.005291\overline{6})^{528}} \\ &= \frac{1{,}500{,}000}{(1.005291\overline{6})^{528}} \\ &= \frac{1{,}500{,}000}{16.226302189} \\ &= 92{,}442.5037 \end{aligned}$$

Pilar will need to invest $92,442,51 in this account to have $1,500,000 at age 67.

YOUR TURN 6.45

1. Hajun turns 30 this year and begins to think about retirement. He calculates that he will need $1,200,000 to retire comfortably. He finds a fund to invest in that yields 7.23% and is compounded monthly. How much will Hajun need to invest in the fund when he turns 30 so that he can reach his goal when he retires at age 65?

Compute and Interpret Effective Annual Yield

As we've seen, quarterly compounding pays interest 4 times a year or every 3 months; monthly compounding pays 12 times a year; daily compounding pays interest every day, and so on. **Effective annual yield** allows direct comparisons between simple interest and compound interest by converting compound interest to its equivalent simple interest rate. We can even directly compare different compound interest situations. This gives information that can be used to identify the best investment from a yield perspective.

Using a formula, we can interpret compound interest as simple interest. The effective annual yield formula stems from the compound interest formula and is based on an investment of $1 for 1 year.

Effective annual yield is $Y = \left(1 + \frac{r}{n}\right)^n - 1$ where Y = effective annual yield, r = interest rate in decimal form, and n = number of times the interest is compounded in a year. Y is interpreted as the equivalent annual simple interest rate.

EXAMPLE 6.46

Determine and Interpret Effective Annual Yield for 6% Compounded Quarterly

Suppose you have an investment paying a rate of 6% compounded quarterly. Determine and interpret that effective annual yield of the investment.

Solution

Here, n = 4 (quarterly) and r = 0.06 (decimal form). Substituting into the formula we find that the effective annual yield is

$$\begin{aligned} Y &= \left(1 + \frac{0.06}{4}\right)^4 - 1 \\ &= (1.015)^4 - 1 \\ &= 1.06136 - 1 \\ &= 0.0614 \\ &= 6.14\% \end{aligned}$$

Therefore, a rate of 6% compounded quarterly is equivalent to a simple interest rate of 6.14%.

YOUR TURN 6.46

1. Calculate and interpret the effective annual yield for an investment that pays at a 7% interest compounded quarterly.

EXAMPLE 6.47

Determine and Interpret Effective Annual Yield for 5% Compounded Daily

Calculate and interpret the effective annual yield on a deposit earning interest at a rate of 5% compounded daily.

Solution

In this case, the rate is $r = 0.05$ and $n = 365$ (daily). Using the formula $Y = \left(1 + \frac{r}{n}\right)^n - 1$, we have

$$\begin{aligned} Y &= \left(1 + \frac{0.05}{365}\right)^{365} - 1 \\ &= (1.0001369863)^{365} - 1 \\ &= 1.051267 - 1 \\ &= 0.0513 \end{aligned}$$

This tells us that an account earning 5% compounded daily is equivalent to earning 5.13% as simple interest.

YOUR TURN 6.47

1. Calculate and interpret the effective annual yield on a deposit earning 2.5% compounded daily.

EXAMPLE 6.48

Choosing a Bank

Minh has a choice of banks in which he will open a savings account. He will deposit $3,200 and he wants to get the best interest he can. The banks advertise as follows:

Bank	Interest Rate
ABC Bank	2.08% compounded monthly
123 Bank	2.09% compounded annually
XYZ Bank	2.05% compounded daily

Which bank offers the best interest?

Solution

To compare these directly, Minh could change each interest rate to its effective annual yield, which would allow direct comparison between the rates. Computing the effective annual yield for all three choices gives:

ABC Bank: $Y = \left(1 + \frac{0.0208}{12}\right)^{12} - 1 = 0.0210 = 2.10\%$

123 Bank: $Y = \left(1 + \frac{0.0209}{1}\right)^{1} - 1 = 0.0209 = 2.09\%$

XYZ Bank: $Y = \left(1 + \frac{0.0205}{365}\right)^{365} - 1 = 0.0207 = 2.07\%$

ABC Bank has the highest effective annual yield, so Minh should choose ABC bank.

YOUR TURN 6.48

1. Isabella decides to deposit $5,500 in a CD but needs to choose between banks that offer CDs. She identifies four banks and finds out the terms of their CDs. Her findings are in the table below.

Bank	Interest Rate
Smith Bank	3.08% compounded quarterly
Park Bank	3.11% compounded annually
Town Bank	3.09% compounded daily
Community Bank	3.10% compounded monthly

Which bank has the best yield?

Check Your Understanding

19. What is compound interest?

20. Which yields more money, simple interest or compound interest?

21. Find the future value after 15 years of $8,560.00 deposited in an account bearing 4.05% interest compounded monthly.

22. $10,000 is deposited in an account bearing 5.6% interest for 5 years. Find the difference between the future value when the interest is simple interest and when the interest is compounded quarterly.

23. Find the present value of $75,000 after 28 years if money is invested in an account bearing 3.25% interest compounded monthly.

24. What can be done to compare accounts if the rates and number of compound periods per year are different?

25. Find the effective annual yield of an account with 4.89% interest compounded quarterly.

SECTION 6.4 EXERCISES

1. What is the difference between simple interest and compound interest?

2. What is a direct way to compare accounts with different interest rates and number of compounding periods?

3. Which type of account grows in value faster, one with simple interest or one with compound interest?

How many periods are there if interest is compounded?

4. Daily
5. Weekly
6. Monthly
7. Quarterly
8. Semi-annually

In the following exercises, compute the future value of the investment with the given conditions.

9. Principal = $15,000, annual interest rate = 4.25%, compounded annually, for 5 years
10. Principal = $27,500, annual interest rate = 3.75%, compounded annually, for 10 years
11. Principal = $13,800, annual interest rate = 2.55%, compounded quarterly, for 18 years
12. Principal = $150,000, annual interest rate = 2.95%, compounded quarterly, for 30 years
13. Principal = $3,500, annual interest rate = 2.9%, compounded monthly, for 7 years
14. Principal = $1,500, annual interest rate = 3.23%, compounded monthly, for 30 years
15. Principal = $16,000, annual interest rate = 3.64%, compounded daily, for 13 years
16. Principal = $9,450, annual interest rate = 3.99%, compounded daily, for 25 years

In the following exercises, compute the present value of the accounts with the given conditions.

17. Future value = $250,000, annual interest rate = 3.45%, compounded annually, for 25 years
18. Future value = $300,000, annual interest rate = 3.99%, compounded annually, for 15 years
19. Future value = $1,500,000, annual interest rate = 4.81%, compounded quarterly, for 35 years

20. Future value = $750,000, annual interest rate = 3.95%, compounded quarterly, for 10 years
21. Future value = $600,000, annual interest rate = 3.79%, compounded monthly, for 17 years
22. Future value = $800,000, annual interest rate = 4.23%, compounded monthly, for 35 years
23. Future value = $890,000, annual interest rate = 2.77%, compounded daily, for 25 years
24. Future value = $345,000, annual interest rate = 2.99%, compounded daily, for 19 years

In the following exercises, compute the effective annual yield for accounts with the given interest rate and number of compounding periods. Round to three decimal places.

25. Annual interest rate = 2.75%, compounded monthly
26. Annual interest rate = 3.44%, compounded monthly
27. Annual interest rate = 5.18%, compounded quarterly
28. Annual interest rate = 2.56%, compounded quarterly
29. Annual interest rate = 4.11%, compounded daily
30. Annual interest rate = 6.5%, compounded daily

The following exercises explore what happens when a person deposits money in an account earning compound interest.

31. Find the present value of $500,000 in an account that earns 3.85% compounded quarterly for the indicated number of years.
    a. 40 years
    b. 35 years
    c. 30 years
    d. 25 years
    e. 20 years
    f. 15 years
32. Find the present value of $1,000,000 in an account that earns 6.15% compounded monthly for the indicated number of years.
    a. 40 years
    b. 35 years
    c. 30 years
    d. 25 years
    e. 20 years
    f. 15 years
33. In the following exercises, the number of years can reflect delaying depositing money. 40 years would be depositing money at the start of a 40-year career. 35 years would be waiting 5 years before depositing the money. Thirty years would be waiting 10 years before depositing the money, and so on. What do you notice happens if you delay depositing money?
34. For each 5-year gap for exercise 32, compute the difference between the present values. Do these differences remain the same for each of the 5-year gaps, or do they differ? How do they differ? What conclusion can you draw?

35. Daria invests $2,500 in a CD that yields 3.5% compounded quarterly for 5 years. How much is the CD worth after those 5 years?

36. Maurice deposits $4,200 in a CD that yields 3.8% compounded annually for 3 years. How much is the CD worth after those 3 years?

37. Georgita is shopping for an account to invest her money in. She wants the account to grow to $400,000 in 30 years. She finds an account that earns 4.75% compounded monthly. How much does she need to deposit to reach her goal?

38. Zak wants to create a nest egg for himself. He wants the account to be valued at $600,000 in 25 years. He finds an account that earns 4.05% interest compounded quarterly. How much does Zak need to deposit in the account to reach his goal of $600,000?

39. Eli wants to compare two accounts for their money. They find one account that earns 4.26% interest compounded monthly. They find another account that earns 4.31% interest compounded quarterly. Which account will grow to Eli's goal the fastest?

40. Heath is planning to retire in 40 years. He'd like his account to be worth $250,000 when he does retire. He wants to deposit money now. How much does he need to deposit in an account yielding 5.71% interest compounded semi-

annually to reach his goal?

41. Jo and Kim want to set aside some money for a down payment on a new car. They have 6 years to let the money grow. If they want to make a $15,000 down payment on the car, how much should they deposit now in an account that earns 4.36% interest compounded monthly?

42. A newspaper's business section runs an article about savings at various banks in the city. They find six that offer accounts that offer compound interest.
Bank A offers 3.76% compounded daily.
Bank B offers 3.85% compounded annually.
Bank C offers 3.77% compounded weekly.
Bank D offers 3.74% compounded daily.
Bank E offers 3.81% compounded semi-annually.
To earn the most interest on a deposit, which bank should a person choose?

43. Paola reads the newspaper article from exercise 32. She really wants to know how different they are in terms of dollars, not effective annual yield. She decides to compute the future value for accounts at each bank based on a principal of $100,000 that are allowed to grow for 20 years. What is the difference in the future values of the account with the highest effective annual yield, and the account with the second highest effective annual yield?

44. Paola reads the newspaper article from exercise 32. She really wants to know how different they are in terms of dollars, not effective annual yield. She decides to compute the future value for accounts at each bank based on a principal of $100,000 that are allowed to grow for 20 years. What is the difference in the future values of the account with the highest effective annual yield, and the account with the lowest effective annual yield?

45. Jesse and Lila need to decide if they want to deposit money this year. If they do, they can deposit $17,400 and allow the money to grow for 35 years. However, they could wait 12 years before making the deposit. At that time, they'd be able to collect $31,700 but the money would only grow for 23 years. Their account earns 4.63% interest compounded monthly. Which plan will result in the most money, depositing $17,400 now or depositing $31,700 in 12 years?

46. Veronica and Jose are debating if they should deposit $15,000 now in an account or if they should wait 10 years and deposit $25,000. If they deposit money now, the money will grow for 35 years. If they wait 10 years, it will grow for 25 years. Their account earns 5.25% interest compounded weekly. Which plan will result in the most money, depositing $15,000 now or depositing $25,000 in 10 years?

6.5 Making a Personal Budget

Figure 6.7 Calculating a budget is important to your financial health. (credit: "Budget planning concept on white desk" by Marco Verch Professional Photographer/Flickr, CC BY 2.0)