Applications

To make a million, start with $900,000.
Morton Shulman, Politician, Businessman, and Television Personality

TEACH

Exercises 1–11
Remind students to write the formula for each problem, and identify the value for each variable in the formula. This way, if they enter an incorrect keystroke sequence into the calculator, you can troubleshoot where their difficulties began. You can also use it to give partial credit on a graded assignment or exam.

ANSWERS

1. Bank interest on its own will not make you rich; the interest rates are much smaller than possible returns on business investments. However, there is much less risk.

1. How might these words apply to what is in this lesson? See margin.

2. Jimmy invests $4,000 in an account that pays 5% annual interest, compounded semiannually. What is his balance, to the nearest cent, at the end of 10 years? $6,554.47

3. On Olga's 16th birthday, her uncle invested $2,000 in an account that was locked into a 4.75% interest rate, compounded monthly. How much will Olga have in the account when she turns 18? Round to the nearest cent. $2,198.91

4. Samantha deposits $1,500 into the Park Street Bank. The account pays 4.12% annual interest, compounded daily. To the nearest cent, how much is in the account at the end of three non-leap years? $1,697.3

5. Joanne deposits $4,300 into a one-year CD at a rate of 4.3%, compounded daily.
a. What is her ending balance after the year? $4,488.92
b. How much interest does she earn? $188.92
c. What is her annual percentage yield to the nearest hundredth of a percent? 4.39%

6. Mike deposits $5,000 in a three-year CD account that yields 3.5% interest, compounded weekly. What is his ending balance at the end of three years? $5,553.36

7. Rob deposits $1,000 in a savings account at New York State Bank that pays 4.4% interest, compounded monthly.
a. How much is in his account at the end of one year? $1,044.90
b. What is the APY for this account to the nearest hundredth of a percent? 4.49%

8. How much more does $1,000 earn in eight years, compounded daily at 5%, than $1,000 over eight years at 5%, compounded semiannually? $7.27

9. If $3,000 is invested at an interest rate of 4.8%, compounded hourly for two years, what is the ending balance? $3,302.28

10. Mike and Julie receive $20,000 in gifts from friends and relatives for their wedding. They deposit the money into an account that pays 4.75% interest, compounded daily.
a. Will their money double in fourteen years? no
b. Will their money double in fifteen years? yes

11. Lindsay invests $80 in an account that pays 5% annual interest, compounded monthly. Michele invests $60 in an account that pays 8% annual interest, compounded weekly.
a. Whose balance is greater after one year? Lindsay's
b. Whose balance is greater after twelve years? Michele's

3.5

12. Investigate the difference between compounding annually and simple interest for parts a–j.

a. Find the simple interest for a one-year CD for $5,000 at a 6% interest rate. $300

b. Find the interest for a one-year CD for $5,000 at an interest rate of 6%, compounded annually. $300

c. Compare the results from parts a and b. The interest is the same.

d. Find the simple interest for a three-year CD for $5,000 at an interest rate of 6%. $900

e. Find the interest for a three-year CD for $5,000 at an interest rate of 6%, compounded annually. $955.08

f. Compare the results from parts d and e. See margin.

g. Find the simple interest for a six-year CD for $5,000 at an interest rate of 4%. $1,200

h. Find the interest for a six-year CD for $5,000 at an interest rate of 4%, compounded annually. $1,326.60

i. Compare the results from parts g and h. See margin.

j. Is interest compounded annually the same as simple interest? Explain. See margin.

13. Rodney invests a sum of money, P, into an account that earns interest at a rate of r, compounded yearly. Gerald invests half that amount into an account that pays twice Rodney's interest rate. Which of the accounts will have the higher ending balance after one year? Explain. See margin.

14. Island Bank is advertising a special 6.55% APR for CDs. Manny takes out a one-year CD for $40,000. The interest is compounded daily. Find the annual percentage yield for Manny's account to the nearest hundredth of a percent. 6.77%

15. Businesses deposit large sums of money into bank accounts. Imagine an account with 10 million dollars in it.

a. How much would the account earn in one year of simple interest at a rate of 5.12%? $512,000

b. How much would the account earn in one year at 5.12% if the interest was compounded daily? $525,296.00

c. How much more interest is earned by interest compounded daily compared to simple interest? $13,296

16. An elite private college receives large donations from successful alumni. The account that holds these donations has $955,000,000 currently.

a. How much would the account earn in one year of simple interest at a rate of 5.33%? $50,901,500

b. How much would the account earn in one year at 5.33% if the interest was compounded daily? Round to the nearest cent. $52,278,530.93

c. How much more interest is earned by compounded daily as compared to simple interest? $1,377,030.93

d. If the money is used to pay full scholarships, and the price of tuition is $61,000 per year to attend, how many more students can receive full four-year scholarships if the interest was compounded daily rather than using simple interest? 22

Exercises 15 and 16
Students get a glimpse into the world of high finance. Seldom do they get a chance to see the large amount of interest that can be earned on savings accounts with high principals.

ANSWERS

12f. The annual compounded interest earned $55.08 more than the simple interest.

12i. The annual compounded interest earned $126.60 more than the simple interest.

12j. No; they are the same for one year. For anything longer, compounded interest grows faster than simple interest.

13. Rodney's account balance will always be greater; $p\left(1+\frac{r}{1}\right)^t > 0.5p\left(1+\frac{2r}{1}\right)^t$, or $p(1+r) > p(0.5+r)$