

## 2.2 Compound Interest

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### TRUE/FALSE

1. Doubling the frequency of compounding in a compound interest investment will not double the amount of the interest.

ANS: T                      PTS: 1                      MSC: wcfm04.05.02.68

2. The effective rate exceeds the nominal rate when the interest is compounded less than once a year resulting in a larger effective rate.

ANS: F                      PTS: 1                      MSC: wcfm04.05.02.73

### MULTIPLE CHOICE

1. Calculate the future value of an investment of \$3,000, after one year, if it is deposited in a savings account that is compounded quarterly at an annual rate of 12%.

- a. \$3,960.00
- b. \$3,576.95
- c. \$3,376.53
- d. \$3,380.00
- e. None of these

ANS: C                      PTS: 1                      MSC: wcfm04.05.02.01m

2. \$10,000 is deposited in a money market account when interest is compounded every month at an annual rate of 11%. Find the total amount accumulated at the end of 6 years. Round your answer to the nearest cent.

- a. \$19,289.84
- b. \$72,600.00
- c. \$17,290.08
- d. \$19,090.59
- e. None of these

ANS: A                      PTS: 1                      MSC: wcfm04.05.02.08m

3. You invest \$10,000 in Rapid Growth Funds, which appreciate by 4%/year, with yields reinvested quarterly. By how much will your investment have grown after 7 years? Round your answer to the nearest cent.

- a. \$19,987.03
- b. \$3,159.32
- c. \$3,212.91
- d. \$721.35
- e. None of these

ANS: E                      PTS: 1                      MSC: wcfm04.05.02.22m

4. How much would you have to invest when you are 22 years old at 7% compounded monthly to end up with a million dollars by age 52? Round your answer to the nearest thousand.

- a. \$213,000
- b. \$131,000
- c. \$215,000
- d. \$123,000
- e. None of these

ANS: D

PTS: 1

MSC: wcfm04.05.02.34m

5. Calculate, to the nearest 0.1%, what annual interest rate would be required if you invested \$6,000 in Apple stock and ended up with \$13,415 when you sold the stock after 12 years? Assume that interest was compounded quarterly.

- a. 7.2%
- b. 7.4%
- c. 6.8%
- d. 6.6%
- e. None of these

ANS: C

PTS: 1

MSC: wcfm04.05.02.55m

6. Inflation has been running 2%/year. A car now costs \$37,000. How much would it have cost 6 years ago?

- a. \$32,854.94
- b. \$33,004.94
- c. \$32,850.00
- d. \$32,776.17
- e. None of these

ANS: A

PTS: 1

MSC: wcfm04.05.02.37m

7. Find the effective annual interest rate of 5% compounded quarterly.

- a. 5.34%
- b. 5.25%
- c. 5.09%
- d. 5.39%
- e. None of these

ANS: C

PTS: 1

MSC: wcfm04.05.02.15m

8. You are offered three investments. What is the best investment?

- a. The second will earn 18.5% compounded quarterly.
- b. The third will earn 18% compounded weekly.
- c. The first promises to earn 19% compounded annually.

ANS: A

PTS: 1

MSC: wcfm04.05.02.44m

9. Calculate the future value of an investment of \$11,000 at 1.5%/year, compounded weekly, after 2 years. Assume 52 weeks per year.

- a. \$10,977.83
- b. \$11,206.80

- c. \$10,663.71
- d. \$11,334.95
- e. None of these

ANS: D                      PTS: 1                      MSC: wcfm04.05.02.04m

10. Calculate the future value of an investment of \$7,000 at 0.2%/year, compounded monthly, after 2 years.

- a. \$7,028.05
- b. \$7,028.03
- c. \$7,699.29
- d. \$7,156.20
- e. \$6,670.93

ANS: A                      PTS: 1                      MSC: wcfm04.05.02.07m

11. Calculate the present value of an investment that will be worth \$4,000 after 3 years at 7%/year compounded annually.

- a. \$3,137.04
- b. \$3,265.19
- c. \$3,622.31
- d. \$2,593.95
- e. \$3,244.32

ANS: B                      PTS: 1                      MSC: wcfm04.05.02.10m

12. Find the effective annual interest rate of 17% compounded monthly.

- a. 17.72%
- b. 18.50%
- c. 18.11%
- d. 18.39%
- e. 18.53%

ANS: D                      PTS: 1                      MSC: wcfm04.05.02.16m

13. Determine the amount of money, to the nearest dollar, you must invest now at 4%/year compounded annually, so that you will be a millionaire in 55 years. Round your answer to the nearest dollar.

- a. \$115,656
- b. \$124,420
- c. \$111,209
- d. \$110,255
- e. \$112,129

ANS: A                      PTS: 1                      MSC: wcfm04.05.02.33m

14. Calculate, to the nearest cent, the future value of an investment of \$11,000 at 4.5% per year, compounded quarterly ( 4 times / year ), after 10 years.

- a.  $FV = \$17,082.66$
- b.  $FV = \$12,302.07$
- c.  $FV = \$63,980.01$

- d.  $FV = \$17,208.15$
- e.  $FV = \$11,729.76$

ANS: D                      PTS: 1                      MSC: wcfm04.05.02.03m

15. Calculate, to the nearest cent, the future value of an investment of \$28,000 at 10.75% per year, compounded monthly, after 15 years.

- a.  $FV = \$32,007.85$
- b.  $FV = \$129,513.21$
- c.  $FV = \$139,424.70$
- d.  $FV = \$909,244.17$
- e.  $FV = \$47,813.65$

ANS: C                      PTS: 1                      MSC: wcfm04.05.02.06m

16. Calculate, to the nearest cent, the present value of an investment that will be worth \$3,000 after 16 years, at 5% per year, compounded annually.

- a.  $PV = \$3,750.00$
- b.  $PV = \$1,374.33$
- c.  $PV = \$1,350.23$
- d.  $PV = \$2,853.71$
- e.  $PV = \$2,806.91$

ANS: B                      PTS: 1                      MSC: wcfm04.05.02.09m

17. Calculate, to the nearest cent, the present value of an investment that will be worth \$10,000 after 6 years, at 6.2% compounded quarterly.

- a.  $PV = \$6,970.32$
- b.  $PV = \$6,900.15$
- c.  $PV = \$9,695.53$
- d.  $PV = \$9,699.32$
- e.  $PV = \$6,913.24$

ANS: E                      PTS: 1                      MSC: wcfm04.05.02.12m

18. Find the effective annual interest rate of 11% compounded monthly. Round your answer to the nearest 0.01%.

- a.  $r_{\text{eff}} = 11.57\%$
- b.  $r_{\text{eff}} = 132.00\%$
- c.  $r_{\text{eff}} = 1.12\%$
- d.  $r_{\text{eff}} = 11.62\%$
- e.  $r_{\text{eff}} = 11.47\%$

ANS: A                      PTS: 1                      MSC: wcfm04.05.02.17m

19. Find the effective annual interest rate of 15% compounded daily. Assume 365 days per year. Round your answer to the nearest 0.01%.

- a.  $r_{\text{eff}} = 16.23\%$
- b.  $r_{\text{eff}} = 16.18\%$

- c.  $r_{\text{eff}} = 54.75\%$
- d.  $r_{\text{eff}} = 4.11\%$
- e.  $r_{\text{eff}} = 16.08\%$

ANS: B

PTS: 1

MSC: wcfm04.05.02.18m

20. You deposit \$500 in an account at the Lifelong Trust Savings and Loan that pays 4%/year compounded quarterly. By how much will your deposit have grown after 4 years? Round the answer to the nearest cent.
- a. \$836.29
  - b. \$586.29
  - c. \$86.29
  - d. \$86.19
  - e. \$83.19

ANS: C

PTS: 1

MSC: wcfm04.05.02.21m

21. When I was considering what to do with my \$10,500 Lottery winnings, my broker suggested I invest half of it in gold, whose value was growing by 14%/year, and the other half in certificates of deposit (CDs), which were yielding 6%/year compounded every 6 months. Assuming that these rates are sustained, how much will my investment be worth in 13 years? Round your answer to the nearest cent.
- a. \$23,973.79
  - b. \$40,033.03
  - c. \$42,795.83
  - d. \$40,157.26
  - e. \$43,493.19

ANS: D

PTS: 1

MSC: wcfm04.05.02.27m

22. When I was considering what to do with the \$3,500 proceeds from my sale of technology stock, my broker suggested I invest half of it in municipal bonds, whose value was growing by 11%/year, and the other half in certificates of deposit (CDs), which were yielding 8%/year compounded every 2 months. Assuming that these rates are sustained, how much will my investment be worth in 12 years? Round your answer to the nearest cent.
- a. \$4,541.57
  - b. \$10,663.86
  - c. \$6,122.29
  - d. \$10,664.86
  - e. \$10,663.96

ANS: B

PTS: 1

MSC: wcfm04.05.02.28m

23. During a prolonged recession, property values on Long Island depreciated by 8% every six months. If my house cost \$240,000 originally, how much was it worth 7 years later? Round your answer to the nearest cent.
- a. \$74,685.98
  - b. \$74,691.28
  - c. \$74,687.38
  - d. \$74,686.28
  - e. \$74,687.28

ANS: D

PTS: 1

MSC: wcfm04.05.02.29m

24. My recent marketing idea, the *Miracle Algae Growing Kit*, has been remarkably successful, with monthly sales growing by 4% every 6 months over the past 4 years. Assuming that I sold 400 kits the first month, what is the present rate of sales? Round your answer to the nearest whole number.
- a. 433 kits per month
  - b. 432 kits per month
  - c. 470 kits per month
  - d. 547 kits per month
  - e. 469 kits per month

ANS: D

PTS: 1

MSC: wcfm04.05.02.36m

25. Inflation is running at 2.4% per year when you deposit \$12,000 in an account earning 6.3% per year compounded quarterly. In constant dollars, how much money will you have 7 years from now? Round your answer to the nearest cent.  
[Hint: First calculate the value of your account in 7 year's time, and then find its present value based on the inflation rate.]
- a. \$15,743.92
  - b. \$15,753.92
  - c. \$15,779.91
  - d. \$15,588.86
  - e. \$15,691.01

ANS: A

PTS: 1

MSC: wcfm04.05.02.41m

26. If Brazil has an annual inflation rate of 11% and an item will cost 150,000 *reals* in 4 years, what does the same item cost now? Round to the nearest *real*.
- a. 98,820 *reals*
  - b. 98,815 *reals*
  - c. 230,203 *reals*
  - d. 98,810 *reals*
  - e. 232,440 *reals*

ANS: D

PTS: 1

MSC: wcfm04.05.02.49m

27. The nominal rate exceeds the effective rate when the interest is compounded \_\_\_\_\_ once a year resulting in a larger effective rate.
- a. equally
  - b. less or equally than
  - c. more or equally than
  - d. less than
  - e. more than

ANS: D

PTS: 1

MSC: wcfm04.05.02.73m

28. Doubling the frequency of compounding in a compound interest investment \_\_\_\_\_ double the amount of the interest.
- a. will
  - b. will not

ANS: B

PTS: 1

MSC: wcfm04.05.02.68m

### NUMERIC RESPONSE

1. Find the effective annual interest rate of 8% compounded monthly. Round your answer to the nearest 0.01%.

$$r^{\text{eff}} = \underline{\hspace{2cm}} \%$$

ANS: 8.30

PTS: 1

MSC: wcfm04.05.02.16

2. Calculate, to the nearest cent, the future value of an investment of \$18,000 at 5% per year, compounded annually, after 11 years.

$$FV = \$ \underline{\hspace{2cm}}$$

ANS: 30,786.11

PTS: 1

MSC: wcfm04.05.02.01

3. Calculate, to the nearest cent, the future value of an investment of \$15,000 at 4.25% per year, compounded quarterly, after 5 years.

$$FV = \$ \underline{\hspace{2cm}}$$

ANS: 18,530.71

PTS: 1

MSC: wcfm04.05.02.02

4. Calculate, to the nearest cent, the future value of an investment of \$26,000 at 7% per year, compounded monthly, after 18 years.

$$FV = \$ \underline{\hspace{2cm}}$$

ANS: 91,326.02

PTS: 1

MSC: wcfm04.05.02.06

5. Calculate, to the nearest cent, the present value of an investment that will be worth \$3,000 after 8 years, at 11% per year, compounded annually.

$$PV = \$ \underline{\hspace{2cm}}$$

ANS: 1,301.78

PTS: 1

MSC: wcfm04.05.02.09

6. Calculate, to the nearest cent, the present value of an investment that will be worth \$10,000 after 9 years, at 8% compounded monthly.

$$PV = \$ \underline{\hspace{2cm}}$$

ANS: 4,879.17

PTS: 1 MSC: wcfm04.05.02.12

7. Find the effective annual interest rate of 9% compounded monthly. Round your answer to the nearest 0.01%.

$$r_{\text{eff}} = \underline{\hspace{2cm}} \%$$

ANS: 9.38

PTS: 1 MSC: wcfm04.05.02.17

8. Find the effective annual interest rate of 11% compounded daily. Assume 365 days per year. Round your answer to the nearest 0.01%.

$$r_{\text{eff}} = \underline{\hspace{2cm}} \%$$

ANS: 11.63

PTS: 1 MSC: wcfm04.05.02.18

9. When I was considering what to do with my \$10,500 Lottery winnings, my broker suggested I invest half of it in gold, whose value was growing by 11%/year, and the other half in certificates of deposit (CDs), which were yielding 6%/year compounded every 6 months. Assuming that these rates are sustained, how much will my investment be worth in 11 years? Round your answer to the nearest cent.

$$\$ \underline{\hspace{2cm}}$$

ANS: 26,606.27

PTS: 1 MSC: wcfm04.05.02.27

10. When I was considering what to do with the \$4,500 proceeds from my sale of technology stock, my broker suggested I invest half of it in municipal bonds, whose value was growing by 8%/year, and the other half in certificates of deposit (CDs), which were yielding 9%/year compounded every 2 months. Assuming that these rates are sustained, how much will my investment be worth in 9 years? Round your answer to the nearest cent.

$$\$ \underline{\hspace{2cm}}$$

ANS: 9,525.22

PTS: 1 MSC: wcfm04.05.02.28

11. You invest \$5,000 in Rapid Growth Funds, which appreciate by 7% per year, with yields reinvested quarterly. By how much will your investment have grown after 6 years? Round your answer to the nearest cent.

$$\$ \underline{\hspace{2cm}}$$



ANS: 2,582.21

PTS: 1 MSC: wcfm04.05.02.22

12. During a prolonged recession, property values on Long Island depreciated by 4% every six months. If my house cost \$140,000 originally, how much was it worth 9 years later? Round your answer to the nearest cent.

\$ \_\_\_\_\_

ANS: 97,318.95

PTS: 1 MSC: wcfm04.05.02.29

13. Determine the amount of money, to the nearest dollar, you must invest at 6.2% per year, compounded semiannually, so that you will be a millionaire in 24 years time. Round your answer to the nearest dollar.

\$ \_\_\_\_\_

ANS: 230,985

PTS: 1 MSC: wcfm04.05.02.33

14. My recent marketing idea, the *Miracle Algae Growing Kit*, has been remarkably successful, with monthly sales growing by 4% every 6 months over the past 8 years. Assuming that I sold 400 kits the first month, what is the present rate of sales? Round your answer to the nearest whole number.

\_\_\_\_\_ kits per month

ANS: 549

PTS: 1 MSC: wcfm04.05.02.36

15. Inflation is running at 2.6% per year when you deposit \$15,000 in an account earning 6.1% per year compounded quarterly. In constant dollars, how much money will you have 6 years from now? Round your answer to the nearest cent.

[Hint: First calculate the value of your account in 6 year's time, and then find its present value based on the inflation rate.]

\$ \_\_\_\_\_

ANS: 18,490.94

PTS: 1 MSC: wcfm04.05.02.41

16. If Brazil has an annual inflation rate of 11% and an item will cost 145,000 *reals* in 3 years, what does that same item cost now? Round to the nearest *real*.

\_\_\_\_\_ *reals*

ANS: 106,023

PTS: 1 MSC: wcfm04.05.02.49

17. Calculate, to the nearest cent, the future value of an investment of \$13,000 at 1.5%/year, compounded quarterly, after 4 years.

\$ \_\_\_\_\_

ANS: 13,802.33

PTS: 1 MSC: wcfm04.05.02.03

18. Calculate, to the nearest cent, the future value of an investment of \$6,000 at 5.5%/year, compounded weekly, after 6 years. Assume 52 weeks per year.

\$ \_\_\_\_\_

ANS: 8,344.35

PTS: 1 MSC: wcfm04.05.02.04

19. Calculate, to the nearest cent, the future value of an investment of \$15,000 at 0.4%/year, compounded monthly, after 5 years.

\$ \_\_\_\_\_

ANS: 15,302.97

PTS: 1 MSC: wcfm04.05.02.07

20. Calculate the present value of an investment that will be worth \$3,000 after 4 years at 3%/year compounded annually. Round your answer to the nearest cent.

$P =$  \_\_\_\_\_

ANS: 2,665.46

PTS: 1 MSC: wcfm04.05.02.10

21. You deposit \$500 in an account at the Lifelong Trust Savings and Loan that pays 4%/year compounded quarterly. By how much will your deposit have grown after 4 years? Round the answer to the nearest cent.

\$ \_\_\_\_\_

ANS: 86.29

PTS: 1 MSC: wcfm04.05.02.21

22. Determine the amount of money, to the nearest dollar, you must invest now at 5%/year compounded annually, so that you will be a millionaire in 50 years. Round your answer to the nearest cent.

\$ \_\_\_\_\_

ANS: 87,203.73

PTS: 1 MSC: wcfm04.05.02.34

23. Calculate, to the nearest cent, the future value of an investment of \$13,000 at 0.4% per month, compounded monthly, after 9 years.

$FV = \$$  \_\_\_\_\_

ANS: 20,007.11

PTS: 1 MSC: wcfm04.05.02.08

24. Inflation has been running 2%/year. A car now costs \$32,000. How much would it have cost 9 years ago? Round your answer to the nearest cent.

The car will have cost \_\_\_\_\_ 9 years ago.

ANS: 26,776.17

PTS: 1 MSC: wcfm04.05.02.37

25. Calculate, to the nearest 0.1%, what annual interest rate would be required if you invested \$4,000 in Apple stock and ended up with \$11,027 when you sold the stock after 9 years? Assume that interest was compounded quarterly.

The required annual interest rate is \_\_\_\_\_%.

ANS: 11.4

PTS: 1 MSC: wcfm04.05.02.55

### SHORT ANSWER

1. Find the effective annual interest rate of 5%/year compounded annually, semiannually, quarterly, and monthly. Round the answers to 0.01%.

nominal rate compound annually	$r_{eff} =$ _____ %/year
nominal rate compound semiannually	$r_{eff} =$ _____ %/year
nominal rate compound quarterly	$r_{eff} =$ _____ %/year
nominal rate compound monthly	$r_{eff} =$ _____ %/year

ANS:  
5.00; 5.06; 5.09; 5.12

PTS: 1 MSC: wcfm04.05.02.15

2. You are offered three investments. The first promises to earn 19% compounded annually, the second will earn 18.5% compounded quarterly, and the third will earn 18% compounded weekly. What is the best investment?

The best investment is the \_\_\_\_\_ investment.

ANS:

second

PTS: 1

MSC: wcfm04.05.02.44