### Exercises 2.3

1. You set up a savings plan for retirement in 35 years. You will deposit $250 each month for 35 years. The account will earn an average of 6.5% compounded monthly.
   1. How much will you have in your retirement plan in 35 years?
   2. How much interest did you earn?
   3. What percent of the final balance is interest?
2. You set up a savings plan for retirement in 40 years.  You will deposit $75 each week for 40 years. The account will earn an average of 8.5% compounded weekly
   1. How much will you have in your retirement plan in 40 years?
   2. How much interest did you earn?
   3. What percent of the final balance is interest?
3. You set up a savings plan for retirement in 30 years. You will deposit $750 each quarter for 30 years. The account will earn an average of 7.75% compounded quarterly.
   1. How much will you have in your retirement plan in 30 years?
   2. How much interest did you earn?
   3. What percent of the final balance is interest?
4. You set up a savings plan for retirement in 25 years. You will deposit $20 per day for 25 years. The account will earn an average of 2.35% compounded daily.
   1. How much will you have in your retirement plan in 25 years?
   2. How much interest did you earn?
   3. What percent of the final balance is interest? ADD
5. Suppose you invest $130 a month for 5 years into an account earning 9% compounded monthly. You leave the money, without making additional deposits, in the account for another 25 years.
   1. How much will you have in the end?
   2. How much interest did you earn?
   3. What percent of the final balance is interest?
6. Suppose you invest $200 per month for 10 years into an account earning 5% interest compounded monthly. You then leave the money, without making additional deposits, in the account for another 20 years.
   1. How much will you have after the first 10 years?
   2. How much will you have after the additional 20 years?
   3. How much total interest did you earn?
   4. What percent of the final balance is interest? ADD
7. Suppose you have 30 months in which to save $3,500 for a cruise for your family. If you can earn an APR of 3.8%, compounded monthly, how much should you deposit each month?
8. You wish to have $3,000 in 2 years to buy a fancy new stereo system.  How much should you deposit each quarter into an account paying 6.5% compounded quarterly?
9. Jamie has determined they need to have $450,000 for retirement in 30 years. Their account earns 6% interest. How much would Jamie need to deposit in the account each month?
10. Lashonda already knows that she wants $500,000 when she retires. If she sets up a saving plan for 40 years in an account paying 10% interest, compounded quarterly how much should she deposit each quarter?
11. Jose’ inherits $55,000 and decides to put it in the bank for the next 25 years to save for his retirement. He will earn an average of 5.6% compounded monthly for the next 25 years. His partner deposits $375 a month in a separate savings plan that earns 5.6% interest compounded monthly for the next 25 years.
    1. How much will each have at the end of 25 years?
    2. How much interest did each person earn?
    3. What percent of balance is interest for each person?
12. Akiko inherits $45,000 and decides to put it in the bank for the next 30 years to save for her retirement. She will earn an average of 7.8% compounded monthly for the next 30 years. Her spouse deposits $200 a month in a separate savings plan that earns 7.8% interest compounded monthly for the next 30 years.
    1. How much will each have at the end of 30 years?
    2. How much interest did each person earn?
    3. What percent of balance is interest for each person?
13. Sylvin makes an initial deposit of $1000 into a savings account and then adds $100 each month for 10 years into an account pays 4.5% (annual) interest, compounded monthly.
    1. What will be her final balance?
    2. How much interest did she earn?
    3. What percent of the final balance is interest? ADD

1. Elena makes an initial deposit of $5000 into a savings account and then adds $1000 each year for 20 years into an account pays 2.35% interest, compounded annually.
   1. What will be her final balance?
   2. How much interest did she earn?
   3. What percent of her final balance is interest? ADD
2. Vanessa just turned 40 years old. Her plan is to save $100 per month until retirement at age 65. Suppose she deposits that $100 each month into a savings account that earns 4% (annual) interest, compounded monthly.
   1. What will her balance be when she turns 65 years old?
   2. If she started saving when she turned 25 years old instead, what would her balance be? ADD
3. Chris wants to start saving money for retirement. Suppose he deposits $1000 every year into a savings account that pays 5% interest, compounded annually..
   1. How much will Chris have saved in 20 years?
   2. How much will Chris have saved in 40 years? ADD
4. Fareshta and Ahmad want to save to help send their child to college. Their plan is to put aside $50 every week. Suppose they deposit that money into an account that pays 3.5% interest, compounded weekly.
   1. How much money will be in the account in 18 years? (assume 52 weeks in a year)
   2. What minimum initial lump sum deposit would they need to make today to have the same balance in 18 years if they weren’t putting aside the $50 per week? ADD
5. Elisa decides to cancel her cable TV and to deposit the $100 she will save each month into an account that pays 4.5% interest, compounded monthly.
   1. How much will she have in the account in 10 years?
   2. What minimum initial lump sum deposit would she need to make today to have the same balance in 10 years without saving the $100 per month? ADD

2.3 Answers

1. a)  **OR** =FV(0.065/12,12\*35,250)

In 35 years you will have $400,079.05 in your retirement plan.

b) 400079.05 – 12\*35\*250

You will have earned $295,079.05 in interest.

c) 295079.05/400079.05

The final balance will be about 73.8% interest.

2. a)  **OR** =FV(0.085/52,52\*40,75)

In 40 years you will have $1,325,130.09 in your retirement plan.

b) 1325130.09 – 52\*40\*75

You will have earned $1,169,130.09 in interest.

c) 1169130.09/1325130.09

The final balance will be about 88.2% interest.

3. a)  OR =FV(0.0775/4,4\*30,750)

In 30 years you will have $348,456.10 in your retirement plan.

b) 348456.1 – 4\*30\*750

You will have earned $258,456.10 in interest.

c) 258456.1/348456.1

The final balance will be about 74.2% interest.

4. a)  **OR** =FV(0.0235/365,365\*25,20)

In 25 years you will have $248,339.80 in your retirement plan.

b) 248339.8 – 365\*25\*20

You will have earned $65,839.80 in interest.

c) 65839.8/248339.8

The final balance will be about 26.5% interest.

5. a) In 5 years:  **OR** =FV(0.09/12,12\*5,130)

## In 25 more years: OR =FV(0.09/12,12\*25,0,9805.14)

Your final balance will be $92,250.82.

b) 92250.82 – 130\*5\*12

You will earn $84,450.82 in interest.

c) 84450.82/92250.82

The final balance will be about 91.5% interest.

6. a) In 10 years:  **OR** =FV(0.05/12,12\*10,200)

After 10 years the balance will be $31,056.46.

b) In 20 more years:  **OR** =FV(0.05/12,12\*20,0,31056.46)

The final balance will be $84,245.00.

c) 84245 – 200\*12\*10

You will earn $60,245 in interest.

d) 60245/84245

Your final balance will be about 71.5% interest.

7.  **OR** =PMT(0.038/12,30,0,3500)

You should deposit $111.40 each month.

8.   **OR** =PMT(0.065/4,4\*2,0,3000)

You should deposit $354.19 each quarter.

9.  **OR** =PMT(0.06/12,12\*30,0,450000)

Jamie needs to deposit $447.98 each month.

10.  **OR** =PMT(0.1/4,4\*40,0,500000)

Lashonda should deposit $245.20 each quarter.

11. a) Jose:  **OR**  =FV(0.056/12,12\*25,0,55000)

Jose’s partner:  OR =FV(0.056/12,12\*25,375)

Jose will have $222,310.85 and his partner will have $244,447.68.

b) Jose: 222310.85 – 55000 Jose’s partner: 244447.68 – 375\*12\*25

Jose will earn $167,310.85 and his partner will earn $131,947.68 in interest.

c) Jose: 167310.85/222310.85 Jose’s partner: 131947.68/244447.68

Jose’s final balance will be about 75.3% interest and Jose’s partner’s final balance will

be about 54.0% interest.

12. a) Akiko:  **OR** =FV(0.078/12,12\*30,0,45000)

Her spouse:  **OR** =FV(0.078/12,12\*30,200)

Akiko will have $463,631.61 and her spouse will have $286,243.83.

b) Akiko: 463631.61 – 45000 her spouse: 286243.83 – 200\*12\*30

Akiko will earn $418,631.61 and her spouse will earn $214,243.83 in interest.

c) Akiko: 418631.61/463631.61 her spouse: 214243.83/286243.83

Akiko’s final balance will be about 90.3% interest and her spouse’s final

balance will be about 74.8% interest.

13. a)  **OR** =FV(0.045/12,12\*10,100,1000)

Sylvin will have a final balance of $16,686.80.

b) 16686.8 – (1000 + 100\*12\*10)

Sylvin will earn $3,686.80 in interest.

c) 3686.8/16686.8

The final balance will be about 22.1% interest.

14. a) **OR** =FV(0.0235,20,1000,5000)

Elena’s final balance will be $33,119.05.

b) 33119.05 – (5000 + 1000\*20)

Elena will earn $8,119.05 in interest.

c) 8119.05/33119.05

The final balance will be about 24.5% interest.

15. a)  **OR** =FV(0.04/12,12\*25,100)

Vanessa will have $51,412.95 when she turns 65.

b)  OR =FV(0.04/12,12\*40,100)

Vanessa would have $118,196.13 if she had started saving when she was 25.

16. a)  **OR** =FV(0.05,20,1000)

Chris will have $33,065.95 after 20 years.

b)  **OR** =FV(0.05,40,1000)

Chris will have $120,799.77 after 40 years.

17. a)  **OR** =FV(0.035/52,52\*18,50)

They will have saved $65,164.37 after 18 years.

b)  **OR** =PV(0.035/52,52\*18,0,65164.37)

They would have needed an deposit of $34,713.37.

18. a)  **OR** =FV(0.045/12,12\*10,100)

Elisa will have $15,119.81 in 10 years.

b)  OR =PV(0.045/12,12\*10,0,15119.81)

She would have needed an initial deposit of $9,648.93.