Lesson 3: Compound Interest

Student Guide Pages: 9-15

Lesson Objectives: By the end of this lesson, your students should be able to:

- Define *simple interest* and *compound interest*
- Understand how compound interest works and why it is so important to start financial planning now
- Define the Rule of 72

Lesson Summary:

Interest is the rental fee on money. When we rent anything, even a kayak or a DVD, we pay a rental fee. When we rent money, the rental fee, interest, is charged as a percentage of the money borrowed. The original amount borrowed is called the *principal*.

Remember, though, that just as we can borrow money and pay interest to someone else, we can also invest or lend our money to others and expect them to pay interest to us. As we learned in Lesson 1, the amount of money you get back for investing or lending money to others is called a *return*.

There are two types of interest: simple and compound. *Simple interest* is interest paid on your initial investment, and that's all. If you have a $1,000 investment that pays 5 percent simple interest annually, you will receive $50 every year in interest ($1,000 × 5% = $50). Year after year, you would only get $50.

Compound interest is interest paid on your initial investment *and* on the interest already accumulated. So, if the above investment paid compound interest, you would still receive $50 at the end of the first year ($1,000 × 5% =$50). In the second year, things get interesting: You would receive a payment of $52.50 because you are earning 5 percent on your initial investment of $1,000 *plus* the $50 you have already earned. In year three, you earn $55.

The Rule of 72 can be used to calculate how long it will take your investment to double in value. Simply divide the compound interest rate into the number 72. The answer is how many years it will take for your investment to double in value.

Review Questions:

- Why should you start investing in compound investments today?

  Answer: Investing is all about getting your money to double in value over time. The more opportunities to do so, the more

money you will have. Imagine someone who wanted to stop working when they were 65 but started investing at a 10 percent return when they were 20 years old. The Rule of 72 tells us that their money will double in value about every eight years. In this case, the person's money will double about 8.5 times over those 45 years of investing.

If that same person waits until they are 35 to begin investing, their money only doubles in value 3.75 times, and they will end up with significantly less money.

- How long will it take to double the value of an investment that pays a compound 8 percent-per-year return?
  Answer: Use the Rule of 72 by dividing your annual compound return (8 percent, in this case) into 72. The answer is 72/8=9 years for your money to double in value.

Homework Assignment:

Go to **www.FACScourse.com** and click on the online calculator for compound interest. Answer the following questions:

1. $1,000 invested every year at 8 percent for 45 years equals $417,426.
2. $1,000 invested every year at 8 percent for 35 years equals $186,102.

3. $1,000 invested every year at 8 percent for 25 years equals $78,954.

   Can you see how damaging it is to wait?

Think of one item you can cut out of your daily life to free up more money for investment.

- How much does that item cost you every year?

  _____

  (For instance, if you buy a $2 cup of coffee every day, it costs $730 a year to drink that coffee!)
- Using the online calculator, determine how much you would earn if you instead invest that amount at an 8 percent compound return for 30 years.

  Write that number here: _____.

  Now, do you still want that coffee?

Class Activity:

Go to **www.FACScourse.com** and click on the financial calculator for compound interest.

Show your students just how far a little bit goes.

1. Ask them to guess how much money they would have if they invested just $1 a day for the next 45 years at 8 percent.

   Answer: $152,361

2. Now ask them to guess how much they'll have if they invest $1 for the next 35 years at 8 percent
   Answer: $67,927

Additional Information:

Below is a story about a student named Old Gil, though I am not sure why we call him Old Gil, since he was only 23 at the beginning of the story. Also, the story uses financial terms such as inflation, which we will talk about later in this course. Basically, Old Gil is a guy who didn't have much financial luck in life. However, because he started investing at a young age, he still did fine, despite nearly everything going wrong. Enjoy and learn from Gil's story!

Old Gil was a 23-year-old student who had only a couple of encounters with good luck in his life. The first was the job he landed right out of college, one that earned him $40,000 a year. The second was this incredible course, and because of the information he gleaned, he decided early on to take control of his financial life. Unfortunately, other than that, just about everything went wrong for Old Gil.

Throughout his career, the only raise Old Gil received was the typical one that kept pace with *inflation*, which is the rising cost of goods and services. While it was a steady increase year after year, he never

received a big bonus and never saw a double-digit increase in his annual salary.

Old Gil's company had a retirement plan that matched 10 percent of what employees put in. He remembered from this course that he should save 10 percent of his income, so he put in $4,000 a year. His company matched 10 percent of that 10 percent, so the account swelled to $4,400.

For 45 years, Old Gil's return, after factoring in inflation, was *zero.* That's right: He pulled out only what he and his company put in. While his money kept pace with inflation, it did not grow at all, not even by one cent!

When he turned 30, Old Gil bought a house for $200,000. Two years after he bought it, the value of that home fell to $170,000. For 35 years, Old Gil lived in that house but, much like his retirement plan, the house never rose in value beyond inflation. After 35 years, its worth was $450,000, or $200,000 in today's dollars.

At age 35, Old Gil bought a rental property for $200,000. Again, the moment he bought it, it dropped in value by $15,000. Gil rented out the property but averaged a *loss* of $100 a month for 30 years. That's right: Old Gil thought the property would increase his cash flow, but

the opposite was true. He lost $100 a month, every month, for 30 years.

As if that wasn't bad enough, two years before Old Gil was set to retire, Congress cut his Social Security benefits in half! Poor old Gil, right?

Well, maybe not.

Let's take a look at old Gil's situation. Currently, he's 65, with a retirement account worth $450,000. While he had a 0 percent return, he did keep pace with inflation, so his $450,000 can buy, factoring in inflation, what $200,000 can buy today. He also owns his home free and clear, for $450,000, or $200,000 in today's dollars, factoring in inflation again. The fair market rental of his home is about $3,000 a month, or $1,500 a month in today's dollars.

Old Gil also scored a rental property. Even though it lost $36,000 over 30 years, he now owns it free and clear as well. It never went up in value either and merely kept pace with inflation, but it's now worth about $450,000. Based on current rent, Gil could earn $3,000 monthly.

Assuming Old Gil will live for another 20 years, he will find himself in the following financial situation:

- His retirement account is worth $450,000. Even if he continues to get zero growth after inflation, he will still be able to spend $22,500 a year.
- He lives in his house and pays no rent, so one of his biggest expenses is gone.
- He rents his other property out and gets, after insurance, taxes, and management fees, another $2,000 a month.
- Social Security, while cut severely, still yields Gil $1,000 a month.

So in total, Old Gil's income is $58,500. He earns about 70 percent of what he made while working, adjusting for inflation. Remember that he had to pay for his house as an employee, but now he owns it free and clear, and it is no longer an expense. If, after 10 years of retirement, Old Gil needs more money, he can sell his house or rental property. Perhaps he can work part-time at a job he enjoys. The point is, despite all that happened to him, Gil still did fine. The lesson you should take away from this is that if you are steady and consistent, even when things don't seem to be working well, they can still work out.

Fun Facts:

In the early 1600s, the American Indians sold an island, now called Manhattan, for various beads and trinkets worth about $16. Since Manhattan real estate is now some of the most expensive in the world, it seems that those Native Americans made a terrible deal. However, had they sold their beads and trinkets, invested their $16, and received 8 percent compound annual return, not only would they have enough money to buy back a large part of Manhattan, but they would still have money left over and likely be the richest people in the world. That is the power of compound interest over time. (www.pfadvice.com)

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Compound Interest Chart

What happens when you invest just one dollar? The right column of this chart shows that when $1 is invested at 8 percent compound annual interest, it will be worth $32 in 45 years. So, *every* dollar in your pocket has the ability to be worth 32 *times* more than it is today. The next time you're compelled to spend, remember that even at 5 or 1 percent, your money still grows!

Year	Starting Cash	1%	Starting Cash	5%	Starting Cash	8%
1	$1.00	$1.01	$1.00	$1.05	$1.00	$1.08
2	$1.01	$1.02	$1.05	$1.10	$1.08	$1.17
3	$1.02	$1.03	$1.10	$1.16	$1.17	$1.26
4	$1.03	$1.04	$1.16	$1.22	$1.26	$1.36
5	$1.04	$1.05	$1.22	$1.28	$1.36	$1.47
6	$1.05	$1.06	$1.28	$1.34	$1.47	$1.59
7	$1.06	$1.07	$1.34	$1.41	$1.59	$1.71
8	$1.07	$1.08	$1.41	$1.48	$1.71	$1.85
9	$1.08	$1.09	$1.48	$1.55	$1.85	$2.00
10	$1.09	$1.10	$1.55	$1.63	$2.00	$2.16
11	$1.10	$1.12	$1.63	$1.71	$2.16	$2.33
12	$1.12	$1.13	$1.71	$1.80	$2.33	$2.52
13	$1.13	$1.14	$1.80	$1.89	$2.52	$2.72
14	$1.14	$1.15	$1.89	$1.98	$2.72	$2.94
15	$1.15	$1.16	$1.98	$2.08	$2.94	$3.17
16	$1.16	$1.17	$2.08	$2.18	$3.17	$3.43
17	$1.17	$1.18	$2.18	$2.29	$3.43	$3.70
18	$1.18	$1.20	$2.29	$2.41	$3.70	$4.00
19	$1.20	$1.21	$2.41	$2.53	$4.00	$4.32
20	$1.21	$1.22	$2.53	$2.65	$4.32	$4.66
21	$1.22	$1.23	$2.65	$2.79	$4.66	$5.03
22	$1.23	$1.24	$2.79	$2.93	$5.03	$5.44
23	$1.24	$1.26	$2.93	$3.07	$5.44	$5.87
24	$1.26	$1.27	$3.07	$3.23	$5.87	$6.34

25	$1.27	$1.28	$3.23	$3.39	$6.34	$6.85
26	$1.28	$1.30	$3.39	$3.56	$6.85	$7.40
27	$1.30	$1.31	$3.56	$3.73	$7.40	$7.99
28	$1.31	$1.32	$3.73	$3.92	$7.99	$8.63
29	$1.32	$1.33	$3.92	$4.12	$8.63	$9.32
30	$1.33	$1.35	$4.12	$4.32	$9.32	$10.06
31	$1.35	$1.36	$4.32	$4.54	$10.06	$10.87
32	$1.36	$1.37	$4.54	$4.76	$10.87	$11.74
33	$1.37	$1.39	$4.76	$5.00	$11.74	$12.68
34	$1.39	$1.40	$5.00	$5.25	$12.68	$13.69
35	$1.40	$1.42	$5.25	$5.52	$13.69	$14.79
36	$1.42	$1.43	$5.52	$5.79	$14.79	$15.97
37	$1.43	$1.45	$5.79	$6.08	$15.97	$17.25
38	$1.45	$1.46	$6.08	$6.39	$17.25	$18.63
39	$1.46	$1.47	$6.39	$6.70	$18.63	$20.12
40	$1.47	$1.49	$6.70	$7.04	$20.12	$21.72
41	$1.49	$1.50	$7.04	$14.43	$21.72	$23.46
42	$1.50	$3.04	$14.43	$15.15	$23.46	$25.34
43	$3.04	$3.07	$15.15	$15.91	$25.34	$27.37
44	$3.07	$3.10	$15.91	$16.71	$27.37	$29.56
45	**$3.10**	**$3.13**	**$16.71**	**$17.54**	**$29.56**	**$31.92**