

# Lesson 5.1: Spending & Saving

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## Lesson Author

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## Standards and Benchmarks

See page 5.

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## Lesson Description

In this lesson, students examine the benefits and costs of spending and saving. Students learn how compound interest and the Rule of 72 makes savings grow and provides an incentive to save early. To obtain answer keys for the handouts and assessment in this lesson, create an account on [FederalReserveEducation.org](https://FederalReserveEducation.org).

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## Concepts

Compound Interest  
Opportunity Cost  
Rule of 72

Rate of return  
Saving

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## Objectives

Students will be able to:

- identify and compare the opportunity cost and the benefit of spending and saving.
- calculate investment accumulations for various interest rates and investment time periods.
- analyze and explain the impact of the amount saved, time, and rate of return on financial accumulations.
- estimate the change in the value of an asset using the Rule of 72.

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## Compelling Question

What effect does compound interest have on your net wealth?

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## Time Required

60-90 minutes

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## Materials

- Spending & Saving Lesson 5.1 Slides
- Handout 5.1.1: The Story of Two Savers, one copy for each student
- Handout 5.1.2: The Price of Procrastination, one copy for each student
- Handout 5.1.3: Gallery Walk Stations, one copy for the teacher
- Handout 5.1.4: Gallery Walk Responses, one copy for each student

- Handout 5.1.5: Assessment
- Video Clip, “What is Compound Interest?”, <https://www.youtube.com/watch?v=wf91rEGw88Q>
- Compound Interest Calculator, <https://www.investor.gov/financial-tools-calculators/calculators/compound-interest-calculator>

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## Preparation

- Before class: Display the 6 stations from Handout 5.1.3: Gallery Walk Stations for the Gallery Walk Activity around your classroom.

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## Procedure

1. Provide students with a copy of Handout 5.1.1: The Story of Two Savers. Have students read the two profiles independently. Ask them to respond to the question, “Who do you believe will have more money saved by the age of 65, Amara or Brandon?”.
2. Ask all students who voted for Brandon to stand up. Ask one or two students why they chose him. Student responses may include: *“He saved for more years.”* or *“He put in more total money”*. Repeat this step for students who voted for Amara. Student responses may include: *“She started much earlier, and that gave her money more time to grow.”* or *“By the time Brandon started saving, Amara already had money saved that was earning interest”*.

NOTE: Do not provide the correct answer to students. This will be revealed in the next activity.

3. Provide students with a copy of Handout 5.1.2: The Price of Procrastination. Explain to students that they will now compare the year-by-year investments for Amara and Brandon and ultimately be able to explain the opportunity cost and benefit of spending vs. saving. Ask the students to read the handout and answer the questions. When students are finished, ask for volunteers to share their answers.
4. Display Slide 2. Present the following scenario to students as an exaggerated example of the power of compound interest: “You just landed your dream summer job. Your boss is giving you two choices for how you will be paid for the next 30 days. Option A: You get \$10,000 every single day for 30 days, or Option B: You get one penny on Day 1, and every day after that your pay doubles.” Ask them to silently make their choice.
5. Ask the students who selected Option A to stand on one side of the room, and the students who selected Option B to stand on the other. Reveal the totals for Day 10 found on Slide 3. Ask students who selected Option B how they are feeling about their decision right now. Explain to students that this is why most people stop saving; they don’t see quick results early on, so they stop saving.
6. Reveal the total for Day 20, found on Slide 4. Ask students how they are feeling about their decision now.

7. Reveal the Day 30 total on Slide 5. Explain that this is an exaggeration of a 100% rate of return. While you won't get 100% in the real world, the concept of compound interest is still the same.

NOTE: If you feel that your students need an in-depth explanation of compound interest, you can show them the video clip, "What is Compound Interest?":

<https://www.youtube.com/watch?v=wf91rEGw88Q>.

8. Display Slide 6 that compares the penny doubling exercise to a person's real savings and explain this connection to students.
9. Tell students that they will now complete a Gallery Walk Activity in which students will change different variables to see how those changes affect an individual's net wealth.
10. Divide the class into six groups. Have one student in each group have the compound interest calculator pulled up on their device.
11. Each group will start at a different station of the Gallery Walk. Each station represents a different individual with a different savings goal, but there is a variable missing. The group's job is to act as a Financial Consultant to find the missing variable (length of investment, interest rate, monthly contribution). Students will record their answers on Handout 5.1.4: Gallery Walk Responses.
12. Once every group has visited every station, have them stand at their final station. Ask each group to share their response to that specific station with the whole class. Review the correct answers.
13. Have students return to their seats. Pose the question on Slide 7: "If you have \$5,000 in an account earning 4% interest, how many years will it take to turn into \$10,000? Don't use a calculator- just guess."
14. Display Slide 8 and introduce the Rule of 72 as the "cheat code" for computing the time it takes to double your investment. Use Slides 9-11 to further explain the Rule of 72 and review the answers to the examples given.

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## Closure

15. Display Slide 12. Pose the following questions to the class:
  - a. Based on what you learned through today's activities, which of the three variables involved in saving is the most powerful? Why? (*Time, because it allows the power of compound interest to work to your advantage.*)
  - b. As a teenager starting your first job, which variable involved in saving is the easiest for you to control right now? Which is the hardest? (*Time is the easiest to control because a teenager has the ability to start saving at a very young age. The rate of return is the most difficult because we have no control over how the stock market performs.*)

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## Assessment

16. Give each student a copy of Handout 5.1.5: Assessment. Have them complete the assessment independently.

## Standards and Benchmarks

### National Standards for Personal Financial Education

#### Standard 3: Saving

People who have sufficient income can choose to save some of it for future uses such as emergencies or later purchases. Savings decisions depend on individual preferences and circumstances. Funds needed for transactions, bill-paying, or purchases, are commonly held in federally insured checking or savings accounts at financial institutions because these accounts offer easy access to their money and low risk. Interest rates, fees, and other account features vary by type of account and among financial institutions, with higher rates resulting in greater compound interest earned by savers.

##### **Benchmarks: Grade 8**

2. Savings decisions depend on individual preferences and circumstances, and can impact personal satisfaction and financial well-being.
4. Interest earned on savings is the interest rate multiplied by the balance in the account, which includes the original amount saved (principal) and previously earned interest.
5. Compound interest is interest on both the original principal and previously earned interest, as compared to simple interest which is only interest on the original principal.

## Handout 5.1.1: The Story of Two Savers

### Part I: Amara & Brandon

It is graduation day. Amara and Brandon both land great jobs starting at \$45,000 a year. Amara decides to make a sacrifice early. She lives in a modest apartment and packs her lunch every day. By doing this, she manages to save \$3,000 every year (\$250 a month). She puts this money into an investment account earning an 8% annual return. After 12 years of disciplined saving, Amara decides she wants to buy a house and travel. At age 34, she stops contributing to her investment account entirely. She never adds another dollar for the next 31 years. She just lets the balance sit and grow.

Meanwhile, Brandon spent his 20s and early 30s enjoying his paycheck. He drove a new car, ate out frequently, and traveled the world. At age 35, he has a "wake-up call" and realizes he has \$0 saved for retirement. Determined to catch up, he starts saving the exact same \$3,000 every year (\$250 a month) at the same 8% return. Unlike Amara, he stays disciplined and saves every single year until he turns 65.

**Which person do you believe had more savings by the end of their 65th year? Amara or Brandon?**

## Handout 5.1.2: The Price of Procrastination (Page 1 of 3)

### Part I: The Opportunity Cost of Spending & Saving

Every financial decision you make involves a tradeoff known as **opportunity cost**. When you choose to spend \$100 today on a new pair of shoes or dining out with friends, the immediate benefit is clear: you get the satisfaction from the new purchase and the instant gratification of enjoying your money now. However, the hidden cost is the future wealth that money could have generated. Because of the power of **compound interest**, that \$100 isn't just \$100; over 40 years at a standard stock market return, it could have grown into nearly \$1,500. By spending today, you are trading future wealth for present gratification.

On the other hand, the benefit of saving is a larger amount of money that you will have saved in the future. In the beginning, saving feels difficult because you are sacrificing something in the present moment. However, it is proven that the earlier you start saving the better off your future self will be. Early savers use time to their advantage, allowing interest to build. Ultimately the choice is yours; how will you decide to spend and save?

### Part II: Amara & Brandon

Now let's see what really happened with Amara and Brandon's savings strategies. Use the information from the table on the next page to answer the questions below.

#### Questions

- a) How much money had Amara put into savings by age 65?
- b) How much money had Brandon put into savings by age 65?
- c) How much in total savings (wealth) did Amara have at the end of her 65th year?
- d) How much in total savings (wealth) did Brandon have at the end of his 65th year?

## Handout 5.1.2: The Price of Procrastination (Page 2 of 3)

- e) In terms of money, what was the opportunity cost of Amara's savings decision?  
What was the benefit?
  
- f) In terms of money, what was the opportunity cost of Brandon's savings decision?  
What was the benefit?
  
- g) In trying to build wealth, the amount saved is obviously important. What other factors are important? Why?
  
- h) What are the incentives for saving early in life?
  
- i) What was Amara's opportunity cost of saving early?
  
- j) What conclusions can you draw from this activity?



## Handout 5.1.2: The Price of Procrastination (Page 3 of 3)

| Age | Interest Rate | Amara      |                 |                                    | Brandon    |                 |                                    |
|-----|---------------|------------|-----------------|------------------------------------|------------|-----------------|------------------------------------|
|     |               | Saved      | Interest Earned | Total Saved at the end of the year | Saved      | Interest Earned | Total Saved at the end of the year |
| 21  | 8%            | \$0.00     | \$0.00          | \$0.00                             | \$0.00     | \$0.00          | \$0.00                             |
| 22  | 8%            | \$3,000.00 | \$240.00        | \$3,240.00                         | \$0.00     | \$0.00          | \$0.00                             |
| 23  | 8%            | \$3,000.00 | \$499.20        | \$6,739.20                         | \$0.00     | \$0.00          | \$0.00                             |
| 24  | 8%            | \$3,000.00 | \$779.14        | \$10,518.34                        | \$0.00     | \$0.00          | \$0.00                             |
| 25  | 8%            | \$3,000.00 | \$1,081.47      | \$14,599.80                        | \$0.00     | \$0.00          | \$0.00                             |
| 26  | 8%            | \$3,000.00 | \$1,407.98      | \$19,007.79                        | \$0.00     | \$0.00          | \$0.00                             |
| 27  | 8%            | \$3,000.00 | \$1,760.62      | \$23,769.41                        | \$0.00     | \$0.00          | \$0.00                             |
| 28  | 8%            | \$3,000.00 | \$2,141.47      | \$28,909.88                        | \$0.00     | \$0.00          | \$0.00                             |
| 29  | 8%            | \$3,000.00 | \$2,552.79      | \$34,462.67                        | \$0.00     | \$0.00          | \$0.00                             |
| 30  | 8%            | \$3,000.00 | \$2,997.01      | \$40,459.69                        | \$0.00     | \$0.00          | \$0.00                             |
| 31  | 8%            | \$3,000.00 | \$3,476.77      | \$46,936.46                        | \$0.00     | \$0.00          | \$0.00                             |
| 32  | 8%            | \$3,000.00 | \$3,994.92      | \$53,931.38                        | \$0.00     | \$0.00          | \$0.00                             |
| 33  | 8%            | \$3,000.00 | \$4,554.51      | \$61,485.89                        | \$0.00     | \$0.00          | \$0.00                             |
| 34  | 8%            | \$0.00     | \$4,918.87      | \$66,404.76                        | \$0.00     | \$0.00          | \$0.00                             |
| 35  | 8%            | \$0.00     | \$5,312.38      | \$71,717.14                        | \$3,000.00 | \$240.00        | \$3,240.00                         |
| 36  | 8%            | \$0.00     | \$5,737.37      | \$77,454.51                        | \$3,000.00 | \$499.20        | \$6,739.20                         |
| 37  | 8%            | \$0.00     | \$6,196.36      | \$83,650.87                        | \$3,000.00 | \$779.14        | \$10,518.34                        |
| 38  | 8%            | \$0.00     | \$6,692.07      | \$90,342.94                        | \$3,000.00 | \$1,081.47      | \$14,599.80                        |
| 39  | 8%            | \$0.00     | \$7,227.44      | \$97,570.38                        | \$3,000.00 | \$1,407.98      | \$19,007.79                        |
| 40  | 8%            | \$0.00     | \$7,805.63      | \$105,376.01                       | \$3,000.00 | \$1,760.62      | \$23,768.41                        |
| 41  | 8%            | \$0.00     | \$8,430.08      | \$113,806.09                       | \$3,000.00 | \$2,141.47      | \$28,909.88                        |
| 42  | 8%            | \$0.00     | \$9,104.49      | \$122,910.58                       | \$3,000.00 | \$2,552.79      | \$34,462.67                        |
| 43  | 8%            | \$0.00     | \$9,832.85      | \$132,743.42                       | \$3,000.00 | \$2,997.01      | \$40,459.69                        |
| 44  | 8%            | \$0.00     | \$10,619.47     | \$143,362.90                       | \$3,000.00 | \$3,476.77      | \$46,936.46                        |
| 45  | 8%            | \$0.00     | \$11,469.03     | \$154,831.93                       | \$3,000.00 | \$3,994.92      | \$53,931.38                        |
| 46  | 8%            | \$0.00     | \$12,386.55     | \$167,218.49                       | \$3,000.00 | \$4,554.51      | \$61,485.89                        |
| 47  | 8%            | \$0.00     | \$13,377.48     | \$180,595.96                       | \$3,000.00 | \$5,158.87      | \$69,644.76                        |
| 48  | 8%            | \$0.00     | \$14,447.68     | \$195,043.64                       | \$3,000.00 | \$5,811.58      | \$78,456.34                        |
| 49  | 8%            | \$0.00     | \$15,603.49     | \$210,647.13                       | \$3,000.00 | \$6,516.51      | \$87,972.85                        |
| 50  | 8%            | \$0.00     | \$16,851.77     | \$227,498.90                       | \$3,000.00 | \$7,277.83      | \$98,250.68                        |
| 51  | 8%            | \$0.00     | \$18,199.91     | \$245,698.82                       | \$3,000.00 | \$8,100.05      | \$109,350.73                       |
| 52  | 8%            | \$0.00     | \$19,655.91     | \$265,354.72                       | \$3,000.00 | \$8,988.06      | \$121,338.79                       |
| 53  | 8%            | \$0.00     | \$21,228.38     | \$286,583.10                       | \$3,000.00 | \$9,947.10      | \$134,285.89                       |
| 54  | 8%            | \$0.00     | \$22,926.65     | \$309,509.75                       | \$3,000.00 | \$10,982.87     | \$148,268.76                       |
| 55  | 8%            | \$0.00     | \$24,760.78     | \$334,270.53                       | \$3,000.00 | \$12,101.50     | \$163,370.27                       |
| 56  | 8%            | \$0.00     | \$26,741.64     | \$361,012.17                       | \$3,000.00 | \$13,309.62     | \$179,679.89                       |
| 57  | 8%            | \$0.00     | \$28,880.97     | \$389,893.14                       | \$3,000.00 | \$14,614.39     | \$197,294.28                       |
| 58  | 8%            | \$0.00     | \$31,191.45     | \$421,084.59                       | \$3,000.00 | \$16,023.54     | \$216,317.82                       |
| 59  | 8%            | \$0.00     | \$33,686.77     | \$454,771.36                       | \$3,000.00 | \$17,545.43     | \$236,863.25                       |
| 60  | 8%            | \$0.00     | \$36,381.71     | \$491,153.07                       | \$3,000.00 | \$19,189.06     | \$259,052.31                       |
| 61  | 8%            | \$0.00     | \$39,292.25     | \$530,445.31                       | \$3,000.00 | \$20,964.18     | \$283,016.49                       |
| 62  | 8%            | \$0.00     | \$42,435.63     | \$572,880.94                       | \$3,000.00 | \$22,881.32     | \$308,897.81                       |
| 63  | 8%            | \$0.00     | \$45,830.48     | \$618,711.41                       | \$3,000.00 | \$24,951.82     | \$336,849.63                       |
| 64  | 8%            | \$0.00     | \$49,496.91     | \$668,208.33                       | \$3,000.00 | \$27,187.97     | \$367,037.60                       |
| 65  | 8%            | \$0.00     | \$53,456.67     | \$721,664.99                       | \$3,000.00 | \$29,603.01     | \$399,640.61                       |

## Station 1

Client: Javi (Age 18)

Goal: Wants to have \$60,000 in exactly 10 years to buy his dream car in cash.

Current savings: \$5,000

Monthly contribution: \$300 per month

Consultant Task: What annual interest rate does Javi need to achieve his goal?

## Station 2

Client: Elena (Age 25)

Goal: Wants to retire at age 50 with \$1,500,000

Current savings: \$0

Expected Interest Rate: 10%

Consultant Task: How much must Elena contribute each month to hit her target?

### **Station 3**

Clients: Sam & Jordan

Goal: Need \$80,000 for a down payment on a house

Current savings: \$20,000

Monthly contribution: \$1,000

Expected Interest Rate: 5%

Consultant Task: How many years will it take them to reach their goal?

### **Station 4**

Client: Quinn (Age 20)

Goal: Wants to be a millionaire by age 60

Current savings: \$1,000

Monthly contribution: \$200 per month

Consultant Task: What annual interest rate does Quinn need to hit the million-dollar mark?

## Station 5

Client: The Perez Family

Goal: Want to save \$100,000 for their newborn's college fund in 18 years

Current savings: \$5,000

Expected Interest Rate: 7%

Consultant Task: How much do they need to save monthly starting today?

## Station 6

Client: Rowan (Age 45)

Goal: Wants to have \$500,000 when he retires.

Current savings: \$50,000

Monthly contribution: \$1,500 per month

Expected Interest Rate: 8%

Consultant Task: How many years will it take Rowan to reach his goal? What age will he be when he retires?

## Handout 5.1.4: Gallery Walk Responses

**Instructions:** At each station, you are the Financial Consultant. Use an online compound interest calculator to find the missing variable (time, interest rate, or monthly contribution) that your client needs to reach their goal. Record your findings and analysis.

| Station # | Target Goal | Missing Variable | Is this realistic? (Why or why not?) |
|-----------|-------------|------------------|--------------------------------------|
| 1         |             |                  |                                      |
| 2         |             |                  |                                      |
| 3         |             |                  |                                      |
| 4         |             |                  |                                      |
| 5         |             |                  |                                      |
| 6         |             |                  |                                      |

## Handout 5.1.5: Assessment

1. Using the Rule of 72, if you invest money at an 8% interest rate, how many years will it take for your initial investment to double in value?
  - a. 4 years
  - b. 8 years
  - c. 9 years
  - d. 12 years
  
2. In the Amara vs. Brandon scenario, Amara ended up with significantly more wealth than Brandon at age 65. What was the primary reason for this outcome?
  - a. Amara invested a larger total amount of cash out-of-pocket.
  - b. Amara earned a much higher annual interest rate than Brandon.
  - c. Amara utilized time to her advantage by starting 13 years earlier.
  - d. Brandon stopped saving too early in his career.
  
3. Which of the following best describes the opportunity cost of a teenager spending \$1,000 on a luxury item today instead of investing it for retirement?
  - a. The \$1,000 price tag of the luxury item.
  - b. The sales tax paid at the time of the purchase.
  - c. The immediate satisfaction and use of the item.
  - d. The potential thousands of dollars in compound interest lost over 40 years.
  
4. Imagine you are explaining the variables involved in creating wealth to a friend who believes they don't need to save for retirement until they are 40 years old because "they will make more money then". Using what you have learned about time, compound interest, and opportunity cost, explain why waiting until age 40 might be the most expensive mistake they ever make. Use evidence from the class activities to support your answer.