

Money Math for Teens

Debt Elimination: Power Tools for Building Wealth





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Debt Elimination: Power Tools for Building Wealth

Lesson Plan

OBJECTIVE

Offer different strategies for eliminating debt and strengthening one's financial position and cash flow.

STUDENTS WILL BE ABLE TO:

- ▶ Calculate the minimum monthly payment required to reduce a debt
- ▶ Understand two different approaches to achieving debt-free living
- ▶ Calculate time frames and budget requirements for eliminating debt
- ▶ Determine which debt elimination approach fits their comfort zone.

TEACHING MATERIALS

- ▶ Lesson plan with answer key for student assessment
- ▶ Debt Elimination: Power Tools for Building Wealth student handout
- ▶ Student assessment worksheet

LESSON ACTIVITY

- 1. Talk to students about wealth.**
 - Ask students how many of them plan to be wealthy.
 - What specific plans do they have for becoming wealthy?
 - How will they know when they have achieved wealth?
 - Ask for definitions of wealth. Can they agree on the definition?
- 2. Introduce the student handout.**
 - Ask students to read the first page.
 - What is the definition of *wealthy*?
 - What is the difference between *rich* and *wealthy*?
 - What is a budget, and how can it be seen as a tool for building wealth?
 - How does carrying debt affect a budget?
 - How would eliminating debt affect that budget?



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3. Introduce the concept of eliminating debt to build wealth.

- Two debt elimination strategies: mathematical strategy and psychological strategy (also known as the debt snowball approach).
- Since a wealthy person is defined as a person who spends less money than he or she earns, one can build wealth by:
 - Earning more money
 - Spending less money.

4. Review the formula for calculating a minimum monthly payment necessary to eliminate a debt at a certain interest rate over a defined period of time (page 5 of the handout).

The formula to calculate the monthly payment on an original principal loan amount (P) at an annual interest rate (I) that will be necessary to pay the entire loan off in N months is:

$$\text{Monthly Payment} = \frac{(P \times (I \div 12))}{(1 - (1 + (I \div 12))^{-N})}$$

P = Principal amount of the loan

I = Interest rate of the loan

N = Number of months to pay off the loan

Work through the presented example, and make sure students know how to do a calculation with negative exponents:

$$a^{-N} = \frac{1}{a^N} \quad \text{Example: } 2^{-3} = \frac{1}{2^3} = \frac{1}{8}$$

5. Discuss the mathematical strategy.

- Focus on the debt with the highest interest rate and eliminate that one first.
- Financial advisors prefer this method.
- Work through the example:
 - Use the minimum monthly payment formula to calculate payments for each of Taylor's four debts.
 - Sort the debts in descending order by interest rate—highest rate first.
 - Use the amortization calculator (<http://www.bankrate.com/calculators/mortgages/loan-calculator.aspx>) to determine how many months it will take to eliminate each debt.
 - Apply funds that become available after each debt is paid off to pay off the next debt.



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6. **Discuss the psychological (debt snowball) strategy.**
 - Focus on the debt with the lowest balance and eliminate it first.
 - Individual debts disappear more quickly, so progress seems faster. This is the preferred method for those needing positive feedback and reinforcement quickly.
 - Work through the example:
 - Use the minimum monthly payment formula to calculate payments for each of Taylor's four debts.
 - Sort the debts in ascending order by balance—lowest balance first.
 - Use the amortization calculator to determine how many months it will take to eliminate each debt.
 - Apply funds that become available after each debt is paid off to pay off the next debt.
7. **Conclusions:**
 - The time frame for eliminating debts using either method was about the same, but there is a significant difference in the amount of interest paid—the psychological strategy costs more over time.
 - Poll the students and see how they feel about the methods. Do they prefer one over the other?
8. Evaluate students' comprehension (see assessment worksheet).
 - Allow students to use the lesson handout as a resource because the assessment uses the formula presented in the handout.

Assessment Answer Key

1. B
2. C
3. A
4. C
5. D
6. D
7. A
8. D
9. B
10. D



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Student Handout: Debt Elimination: Power Tools for Building Wealth

Wealth is an attention-getting word, but what exactly does it mean, and what is the key to obtaining it? Perhaps some windfall of good fortune or having a brilliant idea that makes you lots of money? Not exactly. The key to being a wealthy person is not a mystery. A truly wealthy person (not just someone who seems wealthy but is actually deep in debt) is one who spends *less money* than he or she earns.

A rich person may have a lot of money available but may not actually be wealthy. If a person spends money at a rate faster than he or she earns it, then eventually that pile of money will soon disappear. Wealthy people, on the other hand, spend less money than they earn, so their money will grow.

If your expenses are less than your income, it will be easier to work toward a goal of achieving wealth. So how do you make that happen?

The first step is **knowing exactly where you are monetarily**—that is, doing an honest analysis of your expenses and income. Only then will you know how far you are from spending less than you earn.

The next step is to **reduce your spending and increase your earnings**. You'll see that this is very similar to the process used to create a budget. A **budget** is a spending plan designed to cover your needs, provide for your wants and put you on the path to wealth.

Budgeting

Create a Budget

Start by comparing your expenses to your monthly income, but be honest about it. Make a list of your recurring expenses, including those for entertainment. And of course, don't forget the payments you make to reduce debt.

Do your expenses exceed your income? If so, where can you cut down to stop spending more than your monthly income?

Review and Edit Your Budget

An honest budget you can live with will be a powerful tool to help build wealth. Your budget will become more effective as you continue to edit it based on changes in your circumstances, such as income and expenses, and needs, as well as your self-discipline to stick with it.

Get used to living within a budget, but don't get too comfortable. Keeping a close eye on the delicate balance between expenses and income will keep you on the path to wealth.



Debt Elimination: Power Tools for Building Wealth

Two Strategies, One Goal: Reducing and Eliminating Debt

Debt doesn't have to be forever. Eliminating it will make a big difference in your quest for wealth. Use your budget to eliminate *one debt at a time*. When a single debt is eliminated, take the income you were using to service that debt and apply it to the next. Applying the funds you have budgeted for debt reduction in a focused, deliberate way will help you pay off debts more quickly. As your budgeting skills improve, you'll have more success paying off debts.

There are two different strategies that can be used to reduce and eliminate debt: the **mathematical strategy** and the **psychological strategy**. Both advocate paying off debts completely; however, each strategy suggests paying them in a different order. Both strategies are effective; you'll need to find the one that works best for you. Also, both strategies rely on a calculation that determines a minimum monthly payment required to pay off a balance in a certain amount of time.

The formula to calculate the monthly payment on an original principal loan amount (P) at an annual interest rate (I) that will be necessary to pay the entire loan off in N months is:

$$\text{Monthly Payment} = \frac{(P \times (I \div 12))}{(1 - (1 + (I \div 12))^{-N})}$$

P = Principal amount of the loan

I = Interest rate of the loan

N = Number of months to pay off the loan

Example >>>

What is the minimum payment required to pay off a \$2,000 debt at 6% interest in four years?

$$P = 2000$$

$$I = 6\% = 0.06$$

$$N = 4 \text{ years} = 48 \text{ months}$$

$$\text{Monthly Payment} = \frac{(2000 \times (0.06 \div 12))}{(1 - (1 + (0.06 \div 12))^{-48})} = \frac{2000 \times 0.005}{(1 - (1 + 0.005)^{-48})} =$$

$$\frac{2000 \times 0.005}{(1 - (1.005)^{-48})} = \frac{125}{(1 - 0.78709)} = \frac{125}{0.21291} = \mathbf{\$46.97}$$

A minimum payment of **\$46.97** is required to pay off this debt in four years.



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Mathematical Strategy

Almost any financial advisor will suggest this approach to debt elimination. This strategy advises paying off debts by focusing on eliminating the debt with the highest interest rate first, then the next highest. This method makes mathematical sense because it focuses effort on paying off the debts that cost the most money in interest. Here's an example:

Taylor awakes one morning to realize that she's out of college, but she's in debt and needs to do something about it. She commits **\$700/month** of her budget to eliminate her debt. Let's say she's facing the following debts:

- ▶ \$20,000 college loan at 5% interest
- ▶ \$8,000 credit card balance at 12% interest
- ▶ \$2,000 computer loan at 10% interest
- ▶ \$3,000 car loan at 4% interest.

Using the mathematical approach, Taylor would pay her debts in this order:

- ▶ \$8,000 credit card balance at 12% interest
- ▶ \$2,000 computer loan at 10% interest
- ▶ \$20,000 college loan at 5% interest
- ▶ \$3,000 car loan at 4% interest.

If she pays her debts in this order, Taylor minimizes the total she will eventually pay in interest. The end result has her paying off the debts for the least amount of money.

Let's do a few calculations. What is Taylor's minimum required payment on these debts, assuming each debt can be paid over 10 years?

- ▶ \$8,000 at 12% interest will be **\$114.78/month**
- ▶ \$2,000 at 10% interest will be **\$26.43/month**
- ▶ \$20,000 at 5% interest will be **\$212.13/month**
- ▶ \$3,000 at 4% interest will be **\$30.37/month.**

Taylor's total minimum required payment will be **\$383.71** each month. She has dedicated \$700/month toward those debts, so she has **\$316.29** more than she needs. She can put this toward the debt with the highest interest rate.



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Here's the process Taylor will take to eliminate these four debts using the mathematical approach:

1. She combines her \$114.78 monthly minimum payment on the \$8,000 debt at 12% interest with the extra \$316.29 she has dedicated toward debt elimination, making her monthly debt payment \$431.07. Paying \$431.07 against this debt will **eliminate the entire \$8,000 debt in 21 months**. Taylor will have paid a total of \$893.89 in interest on this debt.
2. Having eliminated the \$8,000 debt, she will now turn her attention to the debt with the second-highest interest rate: the \$2,000 computer loan at 10% interest. Taylor has been paying the minimum on this loan for 21 months and has paid \$331.98 in interest in that time. At the beginning of month 22, the balance will be \$1,776.94. She adds the \$431.07 that she was paying each month toward the \$8,000 loan to the \$26.43 she has been paying toward this \$2,000 loan, giving her a new monthly payment of \$457.50. With this new payment, the computer loan will be **eliminated in another four months!** At that time, she will have paid an additional \$36.97 in interest, making her total interest paid on this loan \$368.95.
3. It has been 25 months since Taylor implemented this plan. Now she's ready to pay down the \$20,000 college loan at 5% interest. She has been paying the minimum of \$212.13 on this loan for 25 months, paying \$1,917.07 in interest and leaving a balance of \$16,613.80. Taylor adds the \$457.50 she has been paying toward the \$2,000 loan to the \$212.13 she has been paying on her college loan for the last 25 months, giving her a new monthly payment of \$669.63. This loan will now be **eliminated in an additional 27 months**, and she will have paid an additional \$959.69 in interest, bringing her total interest paid on this debt to \$2,876.76.
4. Finally, Taylor's last debt is a \$3,000 loan at 4% interest, which she has been paying for 52 months. She has paid \$424.74 in interest and is left with a balance of \$1,845.31. Applying the entire \$700/month to this single debt will **eliminate it in three payments**. By the time Taylor has paid off the loan, she will have paid an additional \$11.51 in interest, bringing her total interest paid on this debt to \$436.25.

Following the mathematical approach, paying off her debts from highest to lowest interest rate took Taylor **55 months (about 4.6 years)** and cost her **\$4,575.85 in interest**.



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Psychological Strategy

The psychological strategy to debt elimination is similar to the mathematical strategy in that it advocates focusing on one debt at a time, throwing everything you have toward that debt until it is gone and then moving to the next until all debt is eliminated.

However, note that it took Taylor 21 months to eliminate her first debt. For some, achieving success sooner rather than later gives them the psychological reinforcement they may need to stay on track. For some, behavior modification is more important than saving extra interest.

The psychological strategy is also known as the **debt snowball approach**. With this approach, you ignore interest rates when determining the order in which you'll pay off your debt and order the debts from lowest to highest balance. This should get those small debts paid off quickly, so you'll start to see your plan is working soon after you begin.

Using this approach, Taylor would pay off her debts in this order:

- ▶ \$2,000 computer loan at 10% interest
- ▶ \$3,000 car loan at 4% interest
- ▶ \$8,000 credit card balance at 12% interest
- ▶ \$20,000 college loan at 5% interest.

By paying off debts in this order, Taylor eliminates the smallest balance in the shortest time, giving her a sense of accomplishment. This approach will eventually cost Taylor more in total interest paid, but it will yield results quickly, which may be the difference between success and failure.

Taylor's minimum required payments on these debts, assuming each debt can be paid over a 10-year period, are the same as in the previous example:

- ▶ \$2,000 at 10% interest will be **\$26.43/month**
- ▶ \$3,000 at 4% interest will be **\$30.37/month**
- ▶ \$8,000 at 12% interest will be **\$114.78/month**
- ▶ \$20,000 at 5% interest will be **\$212.13/month.**



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Again, Taylor's total minimum required payment will be **\$383.71** each month, and she has dedicated \$700/month toward debt reduction. Therefore, Taylor has \$316.29 more than she needs to cover the minimum required payment, and she can focus on the debt with the smallest balance first.

1. Taylor combines the \$26.43 monthly minimum on the \$2,000 debt at 10% interest with the extra \$316.29 she has dedicated toward debt elimination, giving her a monthly payment of \$342.72. Paying \$342.72 against the \$2,000 debt will **eliminate it in seven months**. Taylor will have paid a total of \$58.81 in interest on this debt.
2. Having eliminated the \$2,000 debt, Taylor will now turn her attention to the debt with the second lowest balance: the \$3,000 car loan at 4% interest. She has been paying the minimum on this loan for seven months already and will have paid \$68.57 in interest. At the beginning of month 8, the balance will be \$2,855.95. Taylor adds the \$342.72 that she was paying toward the \$2,000 loan to the \$30.37 she has been paying toward the \$3,000 loan, giving her a new monthly payment of \$373.09. With this new payment, the loan will be **eliminated in another eight months!** At that time, Taylor will have paid an additional \$42 in interest, so her total interest paid on this loan will be \$110.57.
3. It has now been 15 months since Taylor implemented this plan. Now she moves on to the \$8,000 loan at 12% interest. She has been paying the minimum of \$114.78 on this loan for 15 months, paying \$1,161.85 in interest and leaving a balance of \$7,440.20. She adds the \$373.09 she has been paying toward the \$3,000 loan to the \$114.78 she has been paying for 15 months, giving her a new monthly payment of \$487.87. This loan will now be **eliminated in an additional 17 months**, and Taylor will have paid an additional \$673.40 in interest, bringing her total interest paid on this debt to \$1,835.25.
4. Taylor's last debt is a \$20,000 loan at 5% interest, which she has been paying now for 32 months. She has paid \$2,389.05 in interest and is left with a balance of \$15,600.86. Applying the entire \$700/month to this single debt will **eliminate the debt in 24 more payments**. By the time Taylor has paid off the loan, she will have paid an additional \$807.03 in interest, bringing her total interest paid on this debt to \$3,196.08.



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Using the psychological strategy, paying off her debts in order from lowest to highest balance took Taylor **56 months (about 4.7 years)** and cost her **\$5,200.71 in total interest**.

| Mathematical Strategy | | Psychological Strategy | |
|-----------------------|---------------|------------------------|---------------|
| Months | Interest Paid | Months | Interest Paid |
| 55 | \$4,575.85 | 56 | \$5,200.71 |

When the two strategies are compared, we can see that there is only a one-month difference in how long it took Taylor to pay off all of her debts, but there is a monetary difference of **\$624.86**. Even though the psychological strategy costs more over time, Taylor started seeing her debts eliminated at a much faster pace. Some would argue that the \$624.86 could be considered wasted; others would say that succeeding more quickly was just the boost Taylor may have needed to stay on track. What do you think?

Regardless of the approach, the goal is the same: eliminating debt. Both methods are designed to accomplish this. The important thing is to pick the approach that works best for you, make a plan and stick to it!

Acknowledgments

The calculations presented here were done using an online loan minimum payment calculator and amortization. It would take considerable time to calculate months of data and arrive at accurate figures without one. Thanks to Bankrate.com for their assistance. Access the same calculator at <http://www.bankrate.com/calculators/mortgages/loan-calculator.aspx>.



Name _____

Date _____

Assessment: Debt Elimination: Power Tools for Building Wealth

- How can you determine if a person is truly wealthy?
 - By the car he/she drives
 - She spends less money than she earns
 - He has no discernible budget; he spends what he wants, when he wants
 - Wealth is based on appearances—for example, the car, watch or clothes one has
- If the interest rate on a loan is fixed (constant) what effect does decreasing the term of the loan (number of months) have on the overall loan?
 - Lowers the monthly payment, increases total interest paid
 - Lowers the monthly payment, total interest paid is a constant
 - Raises the monthly payment, lowers total interest paid
 - Raises the monthly payment, total interest paid is a constant
- Both methods for eliminating debt presented in this lesson:
 - Focus on paying off debts in a particular order
 - Focus on paying off debts with the highest interest rates first
 - Focus on paying off debts with the highest balances first
 - All of the above
- What is the minimum payment required to pay off a \$3,150 debt at 11.5% interest in five years?
Monthly Payment =
$$\frac{(P \times (I \div 12))}{(1 - (1 + (I \div 12))^{-N})}$$
 - \$53.47
 - \$132.31
 - \$69.27
 - \$58.53
- The debt snowball, or psychological, strategy:
 - Means that debt keeps increasing—it is a road to bankruptcy
 - Eliminates debt starting with the highest balance first
 - Eliminates debt starting with the highest interest rate first
 - Eliminates debt starting with the lowest balance first



Name _____

Date _____

6. Consider a person with the following debts:

- \$275 medical bill at 18%
- \$11,750 credit card bill at 16.5%
- \$4,750 car loan at 13.75%
- \$2,150 computer/office equipment loan at 15%
- \$18,000 school loan at 8.25%
- \$1,150 personal loan at 12%

Using the debt snowball approach presented in the lesson, what would be the second debt eliminated?

- A. Car loan
- B. Computer/office equipment
- C. Credit card
- D. Personal loan

7. Most financial experts consider the mathematical strategy to be superior to the psychological approach because:

- A. Less interest will be paid over time using the mathematical strategy
- B. Excessive debt is a mathematical problem, not a psychological problem
- C. It is easier to calculate success using the mathematical approach
- D. Success comes more quickly with the mathematical approach

8. The debt snowball approach ignores:

- A. Balances
- B. Time frames
- C. Minimum payments
- D. Interest rates



Name _____

Date _____

9. Taylor purchases a used car from a dealer. The purchase price is \$7,200, and the dealer will finance the purchase at 7% interest. How much will Taylor save on her *monthly* car payment if she chooses to finance for four years instead of three years?
- A. \$0—at 7% interest, both payments will be the same
 - B. About \$50/month
 - C. About \$30/month
 - D. \$172.41
10. The mathematical and debt snowball approaches:
- A. Accomplish the same goal: debt elimination
 - B. Each have their pros and cons; determine which makes you more comfortable
 - C. Create a plan that works
 - D. All of the above