

Financial Literacy with Mr. 401(k) Winter Term 2024 - 2025 February 12, 2025

Time and Money Class 22: The Power of Time - Annuity Basics & Business Plan Project



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- Jane earns a \$25 weekly allowance if she completes her chores and homework.
- Remembering to pay the allowance at the end of each week was a nuisance for Jane's parents.
- Jane's parents offer to pay her an allowance of \$100 after every 4-week period, instead of \$25 at the end of each week.

Should Jane accept the offer? Why or why not?

Recap: Money today is always worth more than the same amount of money in the future.\*

## Time Value of Money

\* Presuming an inflating monetary unit of account

# <u>Recap</u>: The Time Value of Money is based on the effects of...



### Inflation

"When prices go UP, your money buys LESS; 🛃 "

Imagine your favorite snack costs \$1 today, but \$2 in the future!



### **Interest Rates**

*"When you* SAVE *or* INVEST, *your money can* GROW; 1

Like putting \$100 in a bank savings account and earning \$5 over time!

### <u>Recap</u>: Time Value of Money Lump Sum Formulas Can Calculate the...



#### **Future Value**

Helps you know how much the money you have today can grow, if you save or invest it.

• How much will your money grow?



### %

### 

#### **Present Value**

Helps you know how much money you need today to reach a certain amount in the future.

• How much do you need today?

#### **Interest Rate**

Helps you to know how fast your money will grow, or the interest rate you earn

• What interest rate do I need for my money to reach my goal in the future?

#### Time

Helps you to know how long it will take to reach a specific savings goal or investment outcome

• How long before I save enough for a big purchase?



### Class Discussion

Do you see any limitations in the time value of money lump sum formulas?



### Time Value of Money Lump Sum Formula Limitations



#### Lump Sum Basis

#### "Like getting \$100 all at once for your birthday!"

Formulas calculate values based only on lump sums of money.



#### **Ignores Periodic Cashflows**

"Like saving part of a weekly allowance for something big!"

Formulas do not consider regular periodic cashflows or payments.



### Class Discussion

Can you think of any examples of regular periodic cashflows or payments over time?

### **Examples of Periodic Cashflows or Payments**



#### Earn a Weekly Allowance

Get \$5 for doing chores like cleaning your room.



Save for a Big Purchase

Save \$10 each week to buy a new video game console. Invest Babysitting Income

Save part of what you earn from babysitting. Pay for a Monthly Phone Plan

Cover \$20 each month for your phone data.



Pay for Streaming Services

Monthly Netflix or Disney+ subscription.



Series of regular periodic cashflows or payments for a fixed period of time

# Annuity

### Time Value of Money Annuity Formulas Can Calculate the...



Future Value of an Ordinary Annuity

Helps you know how much your regular payments (ex. savings or investments) will grow with interest.

• How much will my regular savings be worth in the future?

Present Value of an Ordinary Annuity

Helps you know how much money you need today to receive regular payments in the future.

 How much do I need to invest today to receive regular payments later? Number of Payments for the Future Value of an Ordinary Annuity

Helps you figure out how many payments you need to make to reach your savings goal.

 How many months do I need to save to buy something big? (ex. gaming console)



Number of Payments for the Present Value of an Ordinary Annuity

Helps you figure out how long it will take to pay off a loan or debt with regular payments.

 How long will it take to pay off a loan if I make regular payments?

### Future Value of an Ordinary Annuity Formula

#### Analyzing the Formula:

- i / n shows the interest rate applied to each payment period, since there are n periods in a year.
- n · t gives the total number of payment periods over the life of the annuity.



- FV = 🔮 Future Value of an ordinary annuity
- PMT = Payment or cashflow amount per period
- i = Annual interest rate or growth rate as a percentage
- n = 
   Number of payment periods per year (e.g., 12 for monthly payments)
- t = 🗾 Time in years

### Present Value of an Ordinary Annuity Formula

#### Analyzing the Formula:

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- n · t gives the total number of payment periods over the life of the annuity.



- PV = **Present Value of an ordinary annuity**
- PMT = Payment or cashflow amount per period
- i = Annual interest rate or growth rate as a percentage
- n = 
   Number of payment periods per year (e.g., 12 for monthly payments)
- t = 🗾 Time in years

Number of Payments for the Future Value of an Ordinary Annuity Formula

This formula assumes that payments are made at the end of each period, and the compounding happens at the same frequency as the payments (e.g., monthly or yearly). If the frequencies don't match, the formula will need to be adjusted.

$$N = \frac{\ln\left(\frac{FV \cdot \frac{i}{n} + PMT}{PMT}\right)}{\ln\left(1 + \frac{i}{n}\right)}$$

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John is 13 years old. He earns a weekly allowance of \$30 if he does his chores and homework. John wants to invest \$15 per week in a stock portfolio. John expects to earn 8% annually on the stock portfolio. John wants to estimate how much the portfolio will be worth in 5 years when he graduates high school.

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### l'm 26 Years Old and in \$95,487.73 of Debt

College can be valuable, but not understanding student loans can lead to big financial struggles. Let's watch this video. It is important to know the true cost of borrowing, before you decide to borrow money for college.



Jane borrowed \$100,000 in student loans to pay for college education. Jane recently graduated and now has a full-time job. Jane has budgeted \$600 per month towards her student loan debt. The student loan is at a fixed annual interest rate of 6%. How long will it take Jane to payoff the loan?

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 $\cong$  30 years

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If Jane graduated college at the age of 22, she would not pay off her student loans until she was 52 years old! What if Jane increased her student loan payments from \$600 to \$1,000?

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Future Value of an Ordinary Annuity Formula & Future Value of a Lump Sum Example



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Future Value of an Ordinary Annuity Formula & Future Value of a Lump Sum Example

From age 13 to age 18, Jane invests **\$10 per week** from her allowance, in an investment account earning 10% annual investment returns. Jane stops funding her investment account while she attends college. How large does it grow?





### Three Key Takeaways

- 1. Annuities are regular periodic cashflows or payments over time.
- 2. Regular periodic cashflows into investment vehicles can grow significantly over time through cashflows and the power of compound interest.
- 3. You can use annuity formulas to plan better for your future.



#### Where to Learn More

- <u>Time Value of Money Explained</u> with Formula and Examples by Jason Fernado via Investopedia
- Understanding the Time Value of Money by Shauna Carther Heyford via Investopedia
- Video: <u>Time Value of Money</u>, by Khan Academy



# Business Idea & Business Plan Project within Money Mavericks Groups



#### Develop Business Idea

What problem does your business solve? Who are the business's target customers? [Completed]

#### Write Business Plans

How does the business earn money? What are the ongoing costs? How will it differentiate?



#### Present Your Business Plans

Each Money Mavericks Group gives a10-minute presentation of their business plan to class

### Money Mavericks

**Objective:** First, give your business a name – you can always change it later as your business plan develops. A good business plan demonstrates how a business idea will be a developed into successful company. Here are some questions to help you get started...



#### **1. Business Identity**

- What is your business name?
- Design a logo for your business. (Optional but encouraged!)
- What is your business's mission? (What problem does it solve? Why does it exist?)
- What is your business's vision? (Where do you see your business in the future?)

#### 2. Products & Services

- What products and/or services does your business offer?
- What makes your product or service valuable to customers? (What problem does it solve or what needs or wants does it fulfill?)

#### 2. Products & Services (continued)

- How does your business earn money? (Sales, subscriptions, services, etc.)
- How much will you charge for your products or services? How did you decide on these prices?
- How many products or services do you need to sell to cover your costs? (*Break-even point*)

#### 3. Target Market & Customers

- Who are your business's target customers? (Age, interests, location, etc.)
- Where will customers find your business? (Online, in a store, at events, etc.)

#### 4. Costs & Expenses

- What are the costs to start your business? (Supplies, materials, website, etc.)
- Where will your business's startup costs come from? (Savings, investors, fundraising, etc.)
- What are your business's ongoing expenses? (Rent, supplies, marketing, employee wages, etc.)

#### 5. Competition & Differentiation

- Who are your main competitor(s)?
- What makes your business different from the competition?
- Why would customers choose your business over a competitor?

#### 6. Marketing & Customer Engagement

- How will your business promote its products and/or services? (Social media, flyers, ads, word of mouth, etc.)
- How will you attract new customers and keep them coming back? (Special deals, loyalty programs, great customer service, etc.)

#### 7. Team & Responsibilities

- Who are the members of your business team?
- What roles and responsibilities will each team member have? (Who is in charge of marketing, finances, operations, etc.?)

#### 8. Challenges & Risks

- What are some possible challenges your business might face? (Competition, cost overruns, customer interest, etc.)
- How will your business overcome these challenges? (Backup plans, strategies, adjustments, etc.)

#### 9. Business Pitch

• Write a short "elevator pitch" that describes your business to potential customers. (*This should be a persuasive and engaging summary.*)



in <u>https://linkedin.com/in/petrosk</u>

#### Empowering Young Minds to Understand Money

# Financial Literacy with Mr. 401(k)

https://petros.us/about-finlit



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