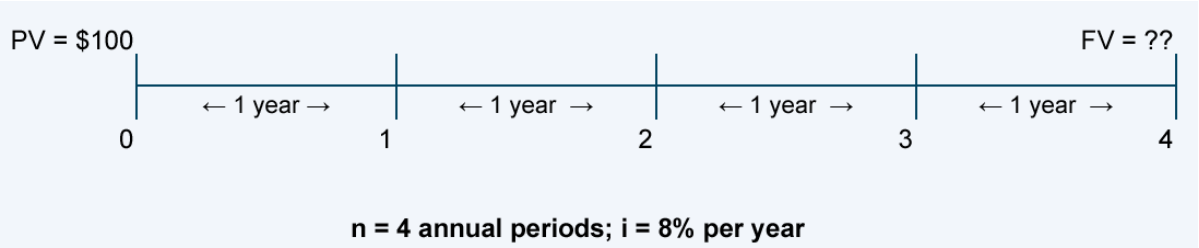
BUAD 340 Principles of Finance Fall 2018/Dr. Minor Time Value of Money Handout 180924

N – number of compounding periods (TVM) or payments (annuities)
Rate (or I) – interest rate
PV – present value
FV – future value
PMT – payment
Type – payment at ending (American) or beginning (European) of a period

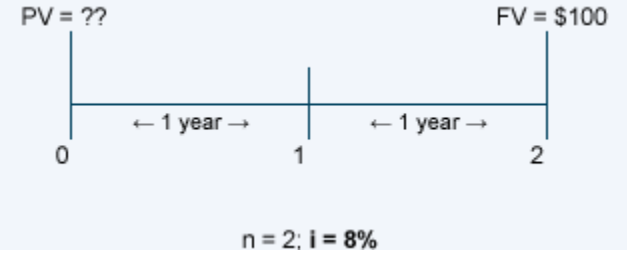
Future Value (Increased Value) - FV



Answer $136.00

- ❑ Example 5.1: The future value of $500 in 2 years with annual compounding interest rate of 5%: **$551.25**
- ❑ Example 5.1: The future value of $500 in 5 years with annual compounding interest rate of 5%: **$638.14**
- ❑ What's the future value of $100 compounded at a rate of 8% per year for 10 years? **$215.89** 15 years? **$317.22** 10%/25 years? **$1,083.47** 15%/25 years? **$3,291.90** 20%/25 years? **$9,539.62** 20%/30 year **$23,737.63**
- ❑ Checkpoint 5.2: If you invest $100,000 at 7% for 10 years, how much will you have? **$196,715**
- ❑ 20 years: **$386,968**
- ❑ 12%: **$964,629**
- ❑ Example 5.2: 8000 DVDs today that grow by 7% for 10 years. **$15,737.21**
- ❑ Example 5.3: $20,000 annual tuition increases by 6% for 25 years. **$85,837.41**
- ❑ Example 5.4: You invest $500 for seven years to earn an annual interest rate of 8%, and the investment is compounded semi-annually. What will be the future value of this investment? **$865.84**
- ❑ Checkpoint 5.3: If you deposit $1,000 with Plaza National Bank at an interest rate of 12% semi-annually, what will your account balance be in five years? **$1790.85**
- ❑ Checkpoint 5.3: If you deposit $50,000 in an account that pays an annual interest rate of 10% compounded monthly, what will your account balance be in 10 years? **$135,352.07**

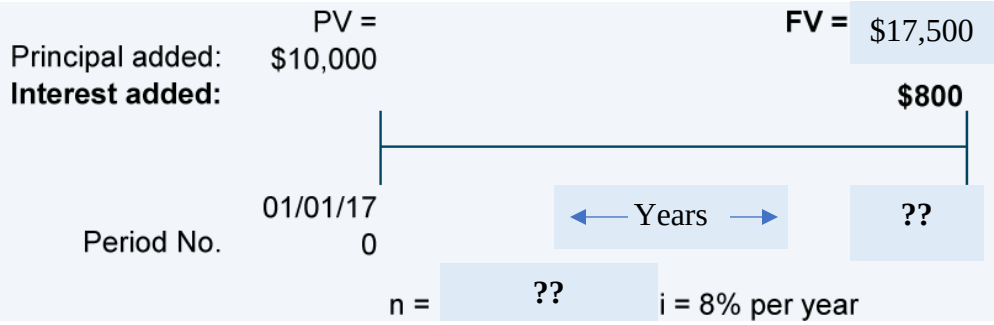
Present Value (Discounted Value) -PV



Answer: $85.73

- ❑ Example 5.5: How much will $5,000 to be received in 10 years be worth today if the interest rate is 7%? **$2,541.50** 9%? **$2,112.00** 2%? **$4,101.50**
- ❑ Checkpoint 5.4: Your firm has just sold a piece of property for $500,000, but under the sales agreement, it won't receive the $500,000 until ten years from today. What is the present value of $500,000 to be received ten years from today if the discount rate is 6% annually? **$279,197.39**
- ❑ Checkpoint 5.4: What is the present value of $100,000 to be received at the end of 25 years given a 5% discount rate? **$29,530.28**

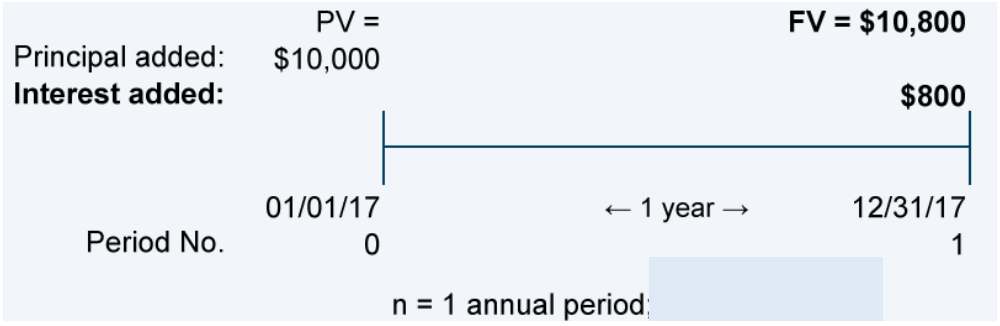
Solving for the Number of Periods - NPER



Answer: 7.27 years

- ❑ Example 5.6. How many years will it take for an investment of $7,500 to grow to $23,000 if it is invested at 8% annually? **14.56 years**
- ❑ Checkpoint 5.5. Let's assume that the Toyota Corporation has guaranteed that the price of a new Prius will always be $20,000, and you'd like to buy one but currently have only $7,752. How many years will it take for your initial investment of $7,752 to grow to $20,000 if it is invested so that it earns 9% compounded annually? **11 years**
- ❑ Checkpoint 5.5. How many years will it take for $10,000 to grow to $200,000 given a 15% compound growth rate? **21.43 years**

Solving for the Interest Rate - Rate



Answer 8%

- ❑ Example 5.8. At what rate of interest must your savings of $10,000 be compounded annually for it to grow to $22,000 in 8 years? **10.36%**
- ❑ Checkpoint 5.6. Let's go back to that Prius example in Checkpoint 5.5. Recall that the Prius always costs $20,000. In 10 years, you'd really like to have $20,000 to buy a new Prius, but you only have $11,167 now. At what rate must your $11,167 be compounded annually for it to grow to $20,000 in 10 years? **6%**
- ❑ Checkpoint 5.6. At what rate will $50,000 have to grow to reach $1,000,000 in 30 years? **10.5%**

Effective Annual Rate

=Effect

- ❑ Example 5.9. Calculate the EAR for a loan that has a 5.45% quoted annual interest rate compounded monthly. **5.59%**
- ❑ Checkpoint 5.7. Calculate the EAR for a loan that has a 21.7% quoted annual interest rate compounded daily. **24.23%**
- ❑ Checkpoint 5.7. What is the EAR on a quoted or stated rate of 13% that is compounded monthly? **13.80%**

=EXP(.18)-1

- ❑ Example 5.10. What is the EAR on your credit card with continuous compounding if the APR is 18%? **19.72%**