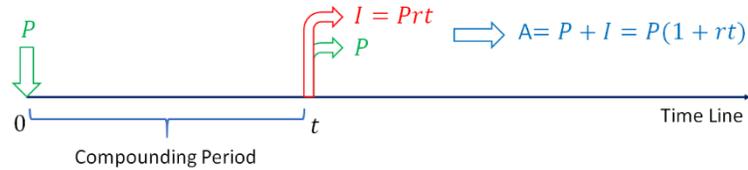


8.2 Compound Interest

A Simple Interest

- ✓ One time investment
- ✓ Interest is calculated only once, at the end of the compounding period (regularly one year)



where:

P is the *principal* or the *present value*

A is the *amount* or the *future value*

I is the total accumulated *interest*

r is the *interest rate* per compounding period (regularly given as percentage per year)

B Investigate a Simple Interest Investment

Example 1. For an investment of \$10,000 at 5% interest rate per year, complete the following table of values:

Present value or Principal $P =$

Interest Rate $r =$

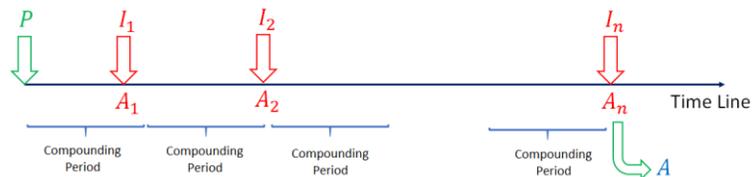
Time t (in years)	Accumulated Interest $I = Prt$	Future Value $A = P + i$
0		
1		
2		
3		
4		

Use Desmos and make a Scatter Plot with the columns t and A .

What kind of relation is between A and t ?

B Compound Interest

- ✓ Time Line is divided into *compounding periods*
- ✓ Interest is calculated *at the end of each compounding period and added to the principal*
- ✓ Interest rate is calculated per compounding period



C Interest Rate per Compounding Periods

If the interest rate r is given *per year*, then in order to find the interest rate *per compounding period* i , divide the annual interest rate r by the number of compounding periods in a year m :

$$i = \frac{r}{m}$$

Example 2. Complete the following table if the interest rate per year is 6% and the investment is over 3 years and 6 months.

$r =$

$t =$

Interest is compounded	Number of compounding periods per year m	Interest Rate per compounding period i	Number of compounding periods in 3 years and 6 months $n = m \cdot t$
annually			
quarterly			
monthly			
weekly			
daily			
bi-weekly			

D Investigate a Compound Interest Investment

Example 3. For an investment of \$10,000 at 6% interest rate per year compounded monthly, complete the following table of values:

Present value or Principal $P =$

Interest Rate per Year $r =$

Number of compounding periods per year $m =$

Interest Rate per compounding Period $i =$

Time t (in months)	Present Value at the beginning of the Compounding Period P	Accumulated Interest over the compounding period $I = Pi$	Future Value at the end of the Compounding Period $A = P + I$
0			
1			
2			
3			
4			

Use Desmos and make a Scatter Plot with the columns t and A .

What kind of relation is between A and t ?

E Compound Interest Formula

If an investment has a compounded interest, the future value is given by:

$$A = P(1 + i)^n$$

$$i = \frac{r}{m}$$

$$A = P + I$$

where:

P is the *principal* or the *present value*

A is the *amount* or the *future value*

I is the total accumulated *interest*

r is the *interest rate* per year

i is the *interest rate* per compounding period

n is the *total number of compounding periods*

Example 4. Let consider an investment of \$25,000 with an interest rate of 5% compounded quarterly over 4 years.

a) How many months are in one year?

b) What is the interest rate per month?

c) How many months are in 4 years?

d) What if the future value of the investment?

e) What is the accumulated interest over the 4 years period?

Example 5. Let consider buying a car of \$50,000 with a credit card with an interest rate of 20% compounded daily over 3 years.

a) How many days are in one year?

b) What is the interest rate per day?

c) How many days are in 3 years?

d) What if the future value of your credit card?

e) What is the accumulated interest over the 3 years period?

E Technology

We may use technology to find the answers for simple and compounded interest applications.

Free online Simple and Compound Interest calculator -> [Good Calculators](#)

Example 6. Use the online application to find the future value of an investment of \$12,000 at 3% interest rate per year compounded weekly over 5 years.

Reading Pages 430-432

Homework Pages 432-435 # 3, 5, 12