7.3 Compound Interest

Loans and deposits earning simple interest are less common. More frequently, interest is earned using compound interest.

In compound interest, interest I is earned on the original principal deposited or borrowed (like simple interest) and interest is earned on all the interest that has already accumulated (unlike simple interest).

In compound interest, interest is calculated at the end of each compounding period or "cycle" which can be shorter than 1 year.

Equation for compound interest:

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

i = interest rate (as a decimal) $i = \dfrac{r}{n}$

n = # cycles in the problem $n = tN$

N = # cycles in one year

Compounding Periods

Keyword	Compounding period	# times a year interest recalculated
Annually	1 year	1x
Semi-annually	6 months	2x
Quarterly	3 months	4x
Monthly	1 month	12x
Biweekly	2 weeks	26x
Weekly	1 week	52x
daily	1day	365x

Example #1: Determine the amount of a $1000 investment earning 3%/a for 5 year.

Compound Interest

Name_____   Date_____

A amount in $

i interest % per period in decimal

n = number of compounding periods

N number of periods per year

P principal in $

r rate % per year in decimal

t time in years

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

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

P	r	Compounded	t	N	i	n	A
$550	14% /a	Semi-annually	4a				
$500	16% /a	Quarterly	3a4m				
$400	17% /a	Annually	2a				
$450	12% /a	monthly	5a4m				

P	r	Compounded	t	N	i	n	A
$500	7% /a	Semi-annually	6a				
$600	4% /a	Quarterly	8a 9m				
$700	6% /a	Annually	5a				
$800	6% /a	monthly	7a 10m				

Example #2: A $500 investment earns interest at 6% compounded quarterly for 8 years. How much interest will be earned in the final year of the 8-year term?