

**Worksheet 6-3: Compound Interest Formula**

For compound interest, the formula  $A = P(1 + i)^n$  is used to calculate the amount, or final amount of a loan or an investment, where

- $A$  is the amount, or final amount
- $i$  is the interest rate **per compounding period**
- $P$  is the principal, or initial amount
- $n$  is the number of **compounding periods**

Initial Amount ( $P$ )	Annual Interest Rate ( $r$ )	Time in Years ( $y$ )	Compounding Effect	Compounding Periods per Year ( $N$ )	Interest rate per Period ( $i$ )	Number of Periods ( $n$ )
100	12%	1	Annually			
100	12%	1	Semi-annually			
100	12%	1	Quarterly			
100	12%	1	Monthly			
100	12%	2	Annually			
100	12%	2	Semi-annually			
100	12%	2	Quarterly			
100	12%	2	Monthly			
100	12%	5	Annually			
100	12%	5	Semi-annually			
100	12%	5	Quarterly			
100	12%	5	Monthly			

To calculate the value of  $i$ , use  $i = r \div N$ , where  $r$  is the annual interest rate and  $N$  is the number of compounding periods per year.

$$i = \frac{\text{Annual Interest Rate } (r)}{\text{Number of Compounding Periods per Year } (N)}$$

To calculate the value  $n$ , use  $n = yN$ , where  $y$  is the number of years and  $N$  is the number of compounding periods per year.

$$n = \text{Number of Years } (y) \times \text{Number of Compounding Periods per Year } (N)$$

**1. For each scenario,****(a) state the values of  $P$ ,  $n$ , and  $i$ .****(b) Write in the form  $A = P(1 + i)^n$  and calculate the final amount  $A$ .**

(i) You invested \$500 for 6 years at 4% per year, compounded semi-annually.

(a)

(b)

(ii) Mr. Fourman borrowed \$300 for 2 years at 5% per year, compounded quarterly

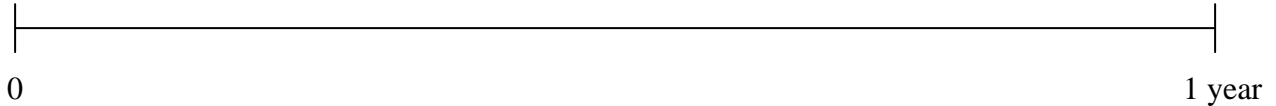
(a)

(b)

**2. Ms. Chor borrowed \$5000 to start a small business. The interest rate on the loan was 9% per year, compounded monthly. She is expected to repay the loan in full after four years.****(a) How much must Ms. Chor repay?****(b) How much of the amount Ms. Chor repays will be interest?****Answers:** 1. (i)(a)  $P = 500$ ,  $i = 0.02$ ,  $n = 12$ , (b) \$634.12, (ii)(a)  $P = 300$ ,  $i = 0.0125$ ,  $n = 8$ , (b) \$331.35;  
2. (a) \$7157.03, (b) \$2157.03

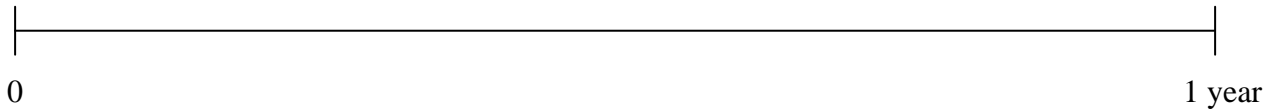
**Timeline of Compound Interest**

1. Interest Compounding **Annually**: Annual Interest =  $r = 12\%$



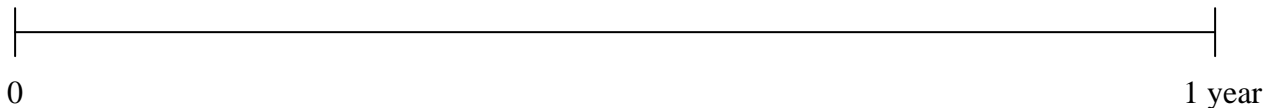
Interest Rate per Compound Period,  $i =$  \_\_\_\_\_      Number of Compounding Periods,  $n =$  \_\_\_\_\_

2. Interest Compounding **Semi-annually**: Annual Interest =  $r = 12\%$



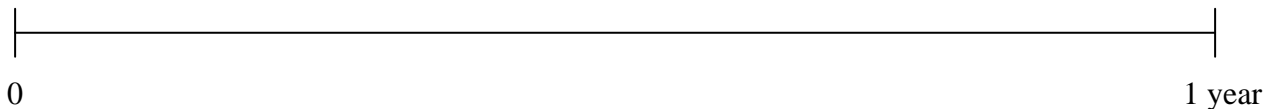
Interest Rate per Compound Period,  $i =$  \_\_\_\_\_      Number of Compounding Periods,  $n =$  \_\_\_\_\_

3. Interest Compounding **Quarterly**: Annual Interest =  $r = 12\%$



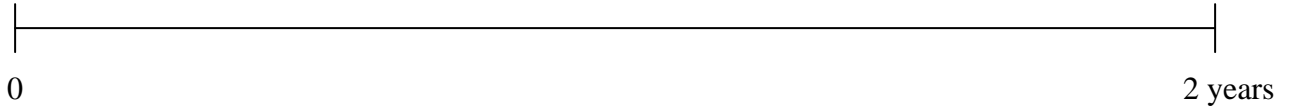
Interest Rate per Compound Period,  $i =$  \_\_\_\_\_      Number of Compounding Periods,  $n =$  \_\_\_\_\_

4. Interest Compounding **Monthly**: Annual Interest =  $r = 12\%$



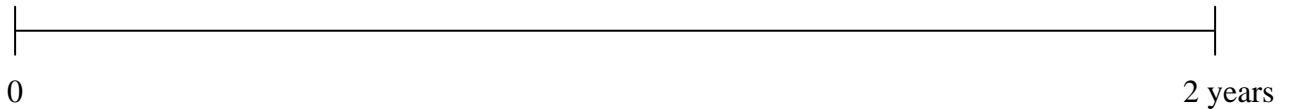
Interest Rate per Compound Period,  $i =$  \_\_\_\_\_      Number of Compounding Periods,  $n =$  \_\_\_\_\_

5. Interest Compounding **Annually**: Annual Interest =  $r = 12\%$



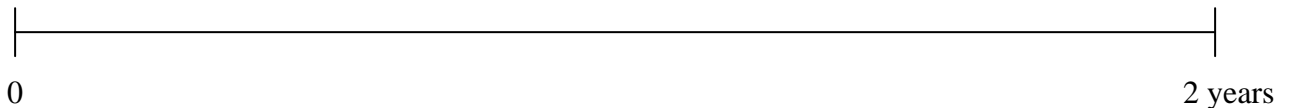
Interest Rate per Compound Period,  $i =$  \_\_\_\_\_ Number of Compounding Periods,  $n =$  \_\_\_\_\_

6. Interest Compounding **Semi-annually**: Annual Interest =  $r = 12\%$



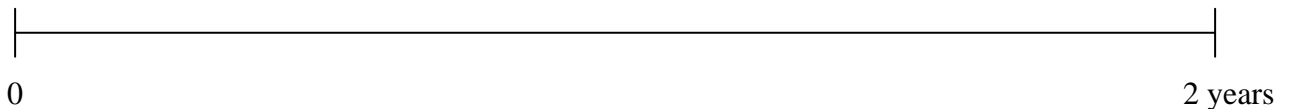
Interest Rate per Compound Period,  $i =$  \_\_\_\_\_ Number of Compounding Periods,  $n =$  \_\_\_\_\_

7. Interest Compounding **Quarterly**: Annual Interest =  $r = 12\%$



Interest Rate per Compound Period,  $i =$  \_\_\_\_\_ Number of Compounding Periods,  $n =$  \_\_\_\_\_

8. Interest Compounding **Monthly**: Annual Interest =  $r = 12\%$



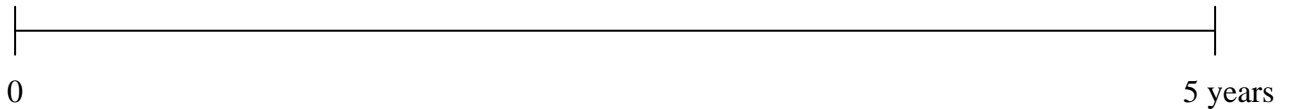
Interest Rate per Compound Period,  $i =$  \_\_\_\_\_ Number of Compounding Periods,  $n =$  \_\_\_\_\_

9. Interest Compounding **Annually**: Annual Interest =  $r = 12\%$



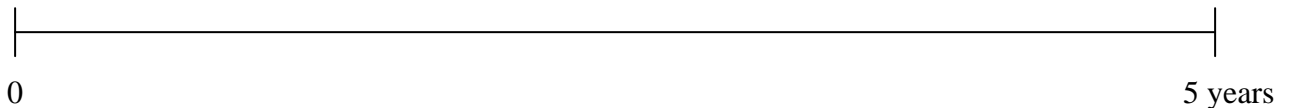
Interest Rate per Compound Period,  $i =$  \_\_\_\_\_ Number of Compounding Periods,  $n =$  \_\_\_\_\_

10. Interest Compounding **Semi-annually**: Annual Interest =  $r = 12\%$



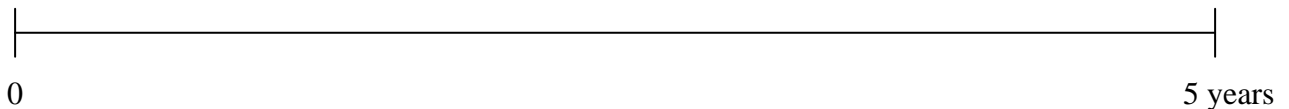
Interest Rate per Compound Period,  $i =$  \_\_\_\_\_ Number of Compounding Periods,  $n =$  \_\_\_\_\_

11. Interest Compounding **Quarterly**: Annual Interest =  $r = 12\%$



Interest Rate per Compound Period,  $i =$  \_\_\_\_\_ Number of Compounding Periods,  $n =$  \_\_\_\_\_

12. Interest Compounding **Monthly**: Annual Interest =  $r = 12\%$



Interest Rate per Compound Period,  $i =$  \_\_\_\_\_ Number of Compounding Periods,  $n =$  \_\_\_\_\_