Time Value of Money - Six Functions of a Dollar
Appraisal Training: Self-Paced Online Learning Session

Lesson 7: Periodic Repayment

Problem 1

Calculate the payment amount (*PMT*) for each loan amount using the Periodic Repayment (*PR*) factors in AH 505:

	PV (Loan Amount)	*n* (years)	Annual Rate (%)	*PMT* = *PV* x *PR*
1	$125,000	10	5	
2	$300,000	30 (monthly)	5	
3	$500,000	10	8	
4	$1,000,000	30	12	
5	$75,000	5	15	

Solution:
To solve, calculate the payment amount by multiplying the loan amount by the *PR* factor found in the AH 505 compound interests tables for the given interest rate and term.

1. *PMT* = *PV* × *PR*
   PMT = $125,000 × **0.129505** (AH 505, page 29, column 6)
   PMT = $16,188.13
2. *PMT* = *PV* × *PR*
   PMT = $300,000 × **0.005368** (AH 505, page 28, column 6)
   PMT = $1,610.40
3. *PMT* = *PV* × *PR*
   PMT = $500,000 × **0.149029** (AH 505, page 41, column 6)
   PMT = $74,514.50
4. *PMT* = *PV* × *PR*
   PMT = $1,000,000 × **0.124144** (AH 505, page 57, column 6)
   PMT = $124,144.00
5. *PMT* = *PV* × *PR*
   PMT = $75,000 × **0.298316** (AH 505, page 69, column 6)
   PMT = $22,373.70

Problem 2

You take out a car loan for $8,000 at an annual interest rate of 10% with 48 monthly payments due at the end of each month. What is the monthly payment?

Solution:
To solve, calculate the payment amount using the monthly *PR* factors in the annual compound interest tables of AH 505. Multiply the loan amount by the *PR* factor for the interest rate of 10% (monthly) for a 4 year term.

- *PMT* = *PV* × *PR* (10%, 4 yrs, monthly)
  PMT = $8,000 × **0.025363** (AH 505, page 48, column 6)
  PMT = $202.90

The monthly payment is $202.90.

Problem 3

Show the amortization schedule for a loan of $25,000 at an annual rate of 6% that will be repaid in four annual end-of-period installments.

Solution:

The interest payment for each year is equal to the beginning loan balance (outstanding principal) multiplied by the annual rate (for year 1, $25,000.00 × 0.06 = $1,500.00).

The principal repayment for each year is equal to the difference between the payment amount and the interest amount (for year 1, $7,214.78 - $1,500.00 = $5,714.78).

The principal payment for each year reduces the beginning loan balance for the following year (beginning balance year 2, $25,000.00 - $5,714.78 = $19,285.22).

Yr	Beginning Balance	Payment	Interest	Principal	Ending Balance
1	$25,000.00	$7,214.78	$1,500.00	$5,714.78	$19,285.22
2	$19,285.22	$7,214.78	$1,157.11	$6,057.67	$13,227.55
3	$13,227.55	$7,214.78	$793.65	$6,421.14	$6,806.41
4	$6,806.41	$7,214.78	$408.38	$6,806.41	$0.00

Problem 4

Joan will deposit $4,000 at the end of each year for 15 years, after which she will withdraw the balance in 20 equal annual installments, beginning at the end of year 16. Assuming an annual interest rate of 12% throughout, how much can she withdraw each year?

Solution:
This exercise combines the use of the Future Worth of $1 Per Period (*FW*$1/*P*) and the *PR* factors.

First, calculate the future amount at the end of year 15 using the *FW*$1/*P* factor.

Second, calculate the payment amount that will amortize this future amount over the ensuing 20 years using the *PR* factor. That's how much Joan can withdraw each year for the next 20 years with nothing left over.

Calculate the future value by multiplying the deposit amount by the *FW*$1/*P* factor for the interest rate of 12% and a 15 year term.

- *FV* = *PMT* × *FW*$1/*P* (12%, 15 yrs, annual)
  FV = $4,000 × **37.279715** (AH 505, page 57, column 2)
  FV = $149,119.86

Calculate the payment that will amortize the above future value by multiplying the future value by the *PR* factor for the interest rate of 12% for a 20 year term.

- *PMT* = *PV* × *PR* (12%, 20 yrs, annual)
  PMT = $149,119 × **0.133879** (AH 505, page 57, column 6)
  PMT = $19,963.63