Amortization Schedules

Creating an Amortization Schedule

Sometimes problems require the construction of an amortization schedule. This is done to determine how much interest is paid on any given repayment of a loan compared to the repayment of the borrowed principal.

Consider the following sample problem:

> A debt of $10,000 is amortized by making equal payments at the end of every six months for three years, and interest is 6% compounded semi-annually. Construct an amortization schedule.

Solution:

Step 1: Determine the payment value.

First we calculate the value of the payments using known methods, such as the formula for a *general ordinary* annuity:

$$PV = PMT \left[\frac{1-(1+i)^{-n}}{i} \right]$$

Or, we can use a financial calculator to compute the payment:

Enter the known information as follows:

$PV = 10000$ $P/Y = C/Y = 2$ $I/Y = 6$ $FV = 0$ $N = 6$

Compute the payment.
CPT $PMT = 1845.975005$

The answer is rounded to the nearest cent. $PMT = \$1,845.98$

Step 2: Construct the columns and rows of an amortization schedule with the known information. See table below.

Payment Number	Payment Amount	Interest Paid	Principal Paid	Remaining Principal
0	0	0	0	$10,000.00
1	1,845.98			
2	1,845.98			
3	1,845.98			
4	1,845.98			
5	1,845.98			
6	1,845.98			
Total				

Step 3: Calculate the missing information in each row using the steps below.

    Step 3a: Calculate the interest component of the payment (Interest Paid) by multiplying the periodic interest by the remaining principal (from the previous row).
        Interest Paid = i * Remaining Principal
        0.03 * $10,000= $300

    Step 3b: Calculate the Principal Paid by subtracting the Interest Paid from the Payment Amount.
        Principal Repaid = Payment Amount – Interest Paid
        $1,845.98 – $300 = $1545.98

    Step 3c: Subtract the Principal Paid from the Remaining Principal (in the previous row).
Remaining Principal = Remaining Principal (from the previous row) – Principal Paid
        $10,000 – $1545.98 = $8454.02

Payment Number	Payment Amount	Interest Paid	Principal Paid	Remaining Principal
0	0	0	0	$10,000.00
1	1,845.98	300	1545.98	8454.02
2	1,845.98	253.62	1592.36	6861.66
3	1,845.98	205.85	1640.13	5221.53
4	1,845.98	156.65	1689.33	3532.20
5	1,845.98	105.97	1740.01	1792.19
6	1,845.98	53.77	1792.21	-0.02
Total				

Step 4: Adjust the last payment.

It often happens that the remaining principal is not exactly 0 after the last payment. This is because rounding to the nearest penny after each step loses some precision in the answer. To account for this, the Payment Amount and the Principle Paid columns are adjusted to the appropriate amount to make the final balance (Remaining Principal) zero.

In our example, the following changes are made in the last payment row:

6	**1,845.96**	53.77	**1792.19**	**0**

Step 5: Sum the totals for Payment Amount, Interest Paid and Principal Paid.

Payment Number	Payment Amount	Interest Paid	Principal Paid	Remaining Principal
0	0	0	0	$10,000.00
1	1,845.98	300	1545.98	8454.02
…	…	…	…	…
6	1,845.96	53.77	1792.19	0
Total	11075.86	1075.86	10,000	