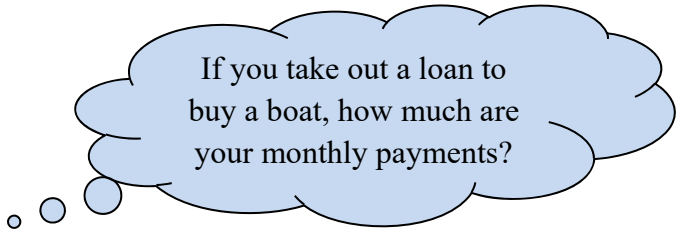
Business Mathematics
Class notes
Personal Property Loans (section 12.4)

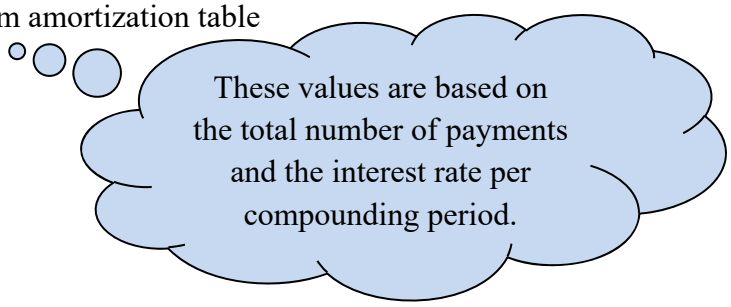


Definition: Personal property versus real property: Items that can be moved from place to place, like cars, stereos, or boats, are **personal property**. On the other hand, land or homes that *cannot* be moved are **real estate** or **real property**.

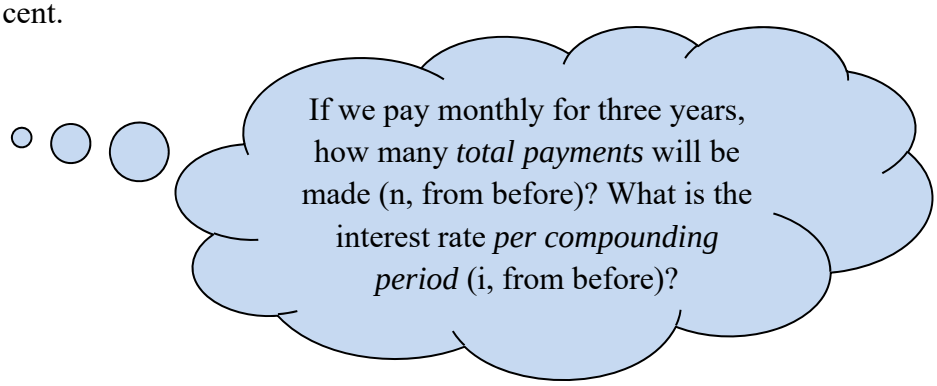
Typically, these loans are amortized (repaid) using equal, periodic (usually monthly) payments.

To figure the (monthly) payment a borrower owes, we will use the Amortization Table on the next page. Our basic formula will be

Payment = Loan amount × Value from amortization table



expl 1: Find the payment necessary to amortize the loan using the Amortization Table on the next page. Round to the nearest cent.
Amount of loan: $6,800
Interest rate: 6%
Payments made: monthly
Number of years: 3



Amortization Table

Interest Rate per Period										
# of Payments	**0.50%**	**1%**	**1.50%**	**2%**	**2.50%**	**3%**	**4%**	**5%**	**8%**	**10%**
1	1.00500	1.01000	1.01050	1.02000	1.02500	1.03000	1.04000	1.05000	1.08000	1.10000
2	0.50375	0.50751	0.50789	0.51505	0.51883	0.52261	0.53020	0.53780	0.56077	0.57619
3	0.33667	0.34002	0.34036	0.34675	0.35014	0.35353	0.36035	0.36721	0.38803	0.40211
4	0.25313	0.25628	0.25660	0.26262	0.26582	0.26903	0.27549	0.28201	0.30192	0.31547
5	0.20301	0.20604	0.20634	0.21216	0.21525	0.21835	0.22463	0.23097	0.25046	0.26380
6	0.16960	0.17255	0.17284	0.17853	0.18155	0.18460	0.19076	0.19702	0.21632	0.22961
7	0.14573	0.14863	0.14892	0.15451	0.15750	0.16051	0.16661	0.17282	0.19207	0.20541
8	0.12783	0.13069	0.13098	0.13651	0.13947	0.14246	0.14853	0.15472	0.17401	0.18744
9	0.11391	0.11674	0.11703	0.12252	0.12546	0.12843	0.13449	0.14069	0.16008	0.17364
10	0.10277	0.10558	0.10587	0.11133	0.11426	0.11723	0.12329	0.12950	0.14903	0.16275
11	0.09366	0.09645	0.09674	0.10218	0.10511	0.10808	0.11415	0.12039	0.14008	0.15396
12	0.08607	0.08885	0.08913	0.09456	0.09749	0.10046	0.10655	0.11283	0.13270	0.14676
13	0.07964	0.08241	0.08269	0.08812	0.09105	0.09403	0.10014	0.10646	0.12652	0.14078
14	0.07414	0.07690	0.07718	0.08260	0.08554	0.08853	0.09467	0.10102	0.12130	0.13575
15	0.06936	0.07212	0.07240	0.07783	0.08077	0.08377	0.08994	0.09634	0.11683	0.13147
16	0.06519	0.06794	0.06822	0.07365	0.07660	0.07961	0.08582	0.09227	0.11298	0.12782
17	0.06151	0.06426	0.06454	0.06997	0.07293	0.07595	0.08220	0.08870	0.10963	0.12466
18	0.05823	0.06098	0.06126	0.06670	0.06967	0.07271	0.07899	0.08555	0.10670	0.12193
19	0.05530	0.05805	0.05833	0.06378	0.06676	0.06981	0.07614	0.08275	0.10413	0.11955
20	0.05267	0.05542	0.05569	0.06116	0.06415	0.06722	0.07358	0.08024	0.10185	0.11746
21	0.05028	0.05303	0.05331	0.05878	0.06179	0.06487	0.07128	0.07800	0.09983	0.11562
22	0.04811	0.05086	0.05114	0.05663	0.05965	0.06275	0.06920	0.07597	0.09803	0.11401
23	0.04613	0.04889	0.04917	0.05467	0.05770	0.06081	0.06731	0.07414	0.09642	0.11257
24	0.04432	0.04707	0.04735	0.05287	0.05591	0.05905	0.06559	0.07247	0.09498	0.11130
25	0.04265	0.04541	0.04569	0.05122	0.05428	0.05743	0.06401	0.07095	0.09368	0.11017
26	0.04111	0.04387	0.04415	0.0	0.0		06257	0.06956	0.09251	0.10916
27	0.03969	0.04245					4	0.06829	0.09145	0.10826
28	0.03836	0.0411						0.06712	0.09049	0.10745
29	0.03713	0						0.06605	0.08962	0.10673
30	0.03598	0.						0.06505	0.08883	0.10608
31	0.03490	0.0					6	0.06413	0.08811	0.10550
32	0.03389	0.0					.05595	0.06328	0.08745	0.10497
33	0.03295	0.0357	0.			0.04816	0.05510	0.06249	0.08685	0.10450
34	0.03206	0.0348	0.03513	0.04082	0.04401	0.04732	0.05431	0.06176	0.08630	0.10407
35	0.03122	0.03400	0.03429	0.04000	0.04321	0.04654	0.05358	0.06107	0.08580	0.10369
36	0.03042	0.03321	0.03350	0.03923	0.04245	0.04580	0.05289	0.06043	0.08534	0.10334

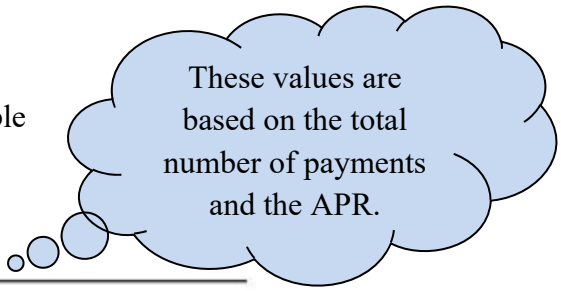
Look up the total number of payments needed and the interest rate per compounding period. The table value will be multiplied by the amount of the loan.

Loan Payoff Table:

This table does the same as the previous page's table. However, it has higher interest rates and longer terms. Another big difference is that the table uses the APR (*not* the interest rate per compounding period).

Our basic formula will (again) be

Payment = Loan amount × Value from loan payoff table

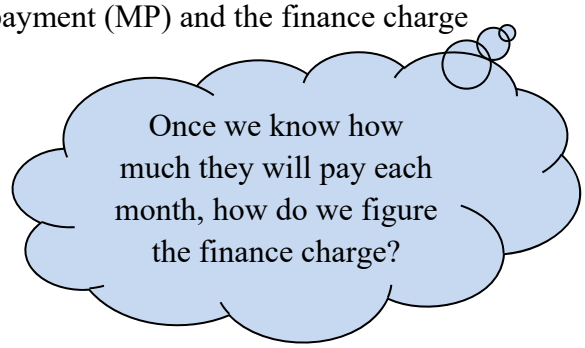


Loan Payoff Table

	Number of Months								
APR	18	24	30	36	42	48	54	60	APR
8%	.05914	.04523	.03688	.03134	.02738	.02441	.02211	.02028	8%
9%	.05960	.04568	.03735	.03180	.02785	.02489	.02259	.02076	9%
10%	.06006	.04615	.03781	.03227	.02832	.02536	.02307	.02125	10%
11%	.06052	.04661	.03828	.03274	.02879	.02585	.02356	.02174	11%
12%	.06098	.04707	.03875	.03321	.02928	.02633	.02406	.02225	12%
13%	.06145	.04754	.03922	.03369	.02976	.02683	.02456	.02275	13%
14%	.06192	.04801	.03970	.03418	.03025	.02733	.02507	.02327	14%
15%	.06238	.04849	.04018	.03467	.03075	.02783	.02558	.02379	15%
16%	.06286	.04896	.04066	.03516	.03125	.02834	.02610	.02432	16%
17%	.06333	.04944	.04115	.03565	.03176	.02885	.02662	.02485	17%
18%	.06381	.04993	.04164	.03615	.03226	.02937	.02715	.02539	18%
19%	.06428	.05041	.04213	.03666	.03278	.02990	.02769	.02594	19%
20%	.06476	.05090	.04263	.03716	.03330	.03043	.02823	.02649	20%

As the formula above says, these values will be multiplied by the loan amount to figure the periodic payment. Do *not* let the table's name fool you. We are *not* finding the amount needed to pay off the loan in full.

expl 2: Use the Loan Payoff Table to find the monthly payment (MP) and the finance charge (FC).
Amount financed: $4,800
Number of months: 24
APR: 12%



Making Amortization Schedules:

An **amortization schedule** is a table that lists the payments, interest, and remaining principal (balance) for some time. We will complete these for several payments in a row.

expl 3: R. Reed borrows $120,000. She agreed to amortize the loan with monthly payments at 10% for four years. Prepare an amortization schedule for the first five payments.

Payment number	Amount of payment	Interest for period	Portion to principal	Principal at end of period
0	---NA---	---NA---	---NA---	$ 120,000
1				
2				
3				
4				
5				

Step 1: Use the Loan Payoff Table to find the monthly payments (all the same).
APR = 10%
Number of payments = ?

Step 2: Use I = PRT to find the interest for *that* month. Remember that P will change as we go.

Steps 3 & 4: Subtract the interest from the payment to find how much to apply to the principal. Find the new principal (balance).

Continue down the table. Recall P changes as we go.

extra space for calculations: