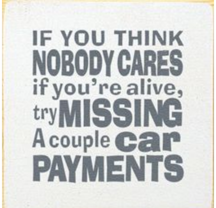
Loan Payments and Amortization

$$\text{payment} = \frac{\text{loan amount } r}{1-(1+r)^{-n}} = \frac{14500\frac{.12}{12}}{(1-(1+\frac{.12}{12})^{(-12\times 4)})} = \$381.84$$

month	Payment	Interest Paid	Principal Paid	Loan Balance
1	381.84	\$145	\$236.84	\$14,263.16
		$14500\frac{.12}{12}$	$381.84-145$	$14500-236.84$
2	381.84	\$142.63	\$239.21	\$14,023.95
		$14263.16\frac{.12}{12}$	$381.84-142.63$	$14263.16-239.21$
3	381.84	\$140.24	\$241.60	\$13,782.35
		$14023.95\frac{.12}{12}$	$381.84-140.24$	$14023.95-241.60$

- total paid = $381.84 \times 12 \times 4$ − overpayment
- total interest = total paid - loan = $381.84 \times 12 \times 4 - 14500$



Loan Payments

lender earns what it could elsewhere, we pay in installments:

lump sum of loan = periodic payment of our monthly payment

$$\text{loan amount } (1+r)^n = \frac{\text{monthly payment}((1+r)^n - 1)}{r}$$

r = periodic rate (like $\frac{.05}{12}$)

n = # times compounded (like 120 or 360)

1. $\text{loan amount } r\frac{(1+r)^n}{(1+r)^n - 1} = \text{loan payment}$
2. reduce further using $x = (1+r)^n$
   $$\frac{(1+r)^n}{(1+r)^n-1} = \frac{x}{x-1} = \frac{x}{x-1}\frac{\frac{1}{x}}{\frac{1}{x}} = \frac{1}{x\frac{1}{x}-1\frac{1}{x}} = \frac{1}{1-\frac{1}{x}} = \frac{1}{1-(1+r)^{-n}}$$
3. sub back in $\frac{\text{loan amount } r}{1-(1+r)^{-n}} = \text{loan payment}$