

Section 3-4, Present Value of an Annuity; Amortization

The **present value** of an account paying a certain amount of interest (compounded periodically) into which regular periodic deposits are made can be found by solving the compound interest formula for P .

Present Value of an Ordinary Annuity

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

where

PMT = periodic payment

i = rate per period

n = number of periods

PV = present value of all payments

Q1 (#22, page 167). American General offers a 7-year ordinary annuity with a guaranteed rate of 6.35% compounded annually. How much should you pay for one of these annuities if you want to receive payments of \$10,000 annually over the 7-year period?

Q2 (#30, page 167). You want to purchase an automobile for \$28,500. The dealer offers you 0% financing for 60 months or a \$6,000 rebate. You can obtain 6.2% financing for 60 months at the local bank. Which option should you choose? Explain.

Amortizing a debt means that the debt is retired in a given length of time by equal periodic payments that include compound interest (“*Mort*” means “death.”).

Q3 (#34, page 168). Construct the amortization schedule for a \$10,000 debt that is to be amortized in six equal quarterly payments at 2.6% interest per quarter on the unpaid balance.

Payment number	Payment	Interest	Unpaid balance reduction	Unpaid balance
0				\$10,000.00
1				
2				
3		177.74	1,643.84	5,192.40
4		135.00	1,686.58	3,505.82
5		91.15	1,730.43	1,775.39
6		46.16	1,775.39	0.00
Totals	\$10,929.45	\$929.45	\$10,000.00	

The unpaid balance of a loan with n remaining payments is the **present value** of that annuity.

Q4 (#36, page 168). A man establishes an annuity for retirement by depositing \$50,000 into an account that pays 7.2% compounded monthly. Equal monthly withdrawals will be made each month for 5 years, at which time the account will have a zero balance. Each year taxes must be paid on the interest earned by the account during that year. How much interest was earned during the first year? [*Hint*: The amount in the account at the end of the first year is the present value of a 4-year annuity.]

The **equity** in a home = (current net market value) – (unpaid loan balance).

Q5 (#50, page 169, slightly modified). A person purchased a house 10 years ago for \$100,000. The house was financed by paying 20% down and signing a 30-year mortgage at 9.6% on the unpaid balance. Equal monthly payments were made to amortize the loan over a 30-year period. The owner now (after the 120th payment) wishes to refinance the house because of a need for additional cash. If the appraised value of the house is \$136,000, what is the owner's equity in the house? If the loan company agrees to a new 30-year mortgage of 80% of the new appraised value of the house, how much cash (to the nearest dollar) will the owner receive after repaying the balance of the original mortgage?