## Section 3-3, Future Value of an Annuity; Sinking Funds

An annuity is any sequence of equal periodic payments. If payments are made at the end of each time interval, then the annuity is called an ordinary annuity. The amount, or future value, of an annuity is the sum of all payments plus all interest earned.

Future Value of an Ordinary Annuity

$$
F V=P M T \frac{(1+i)^{n}-1}{i}
$$

where
$P M T=$ periodic payment
$i=$ rate per period
$n=$ number of payments (periods)
$F V=$ future value (amount)
[Note: Payments are made at the end of each period.]
Q1 (\#22, page 156). Recently, USG Annuity and Life offered an annuity that pays $7.25 \%$ compounded monthly. If $\$ 1000$ is deposited into this annuity every month, how much is in the account after 15 years? How much of this is interest?

Q2 (\#26, page 157). Recently, The Hartford offered an annuity that pays 5.5\% compounded monthly. What equal monthly deposit should be made into this annuity in order to have $\$ 100,000$ in 10 years?

Q3 (\#30, page 157). If $\$ 2000$ is deposited at the end of each quarter for 2 years into an ordinary annuity earning $7.9 \%$ compounded quarterly, construct a balance sheet showing the interest earned during each quarter and the balance at the end of each quarter.

| Period | Amount | Interest | Balance |
| :---: | :---: | :---: | :---: |
| 1 | $\$ 2,000.00$ | $\$ 0.00$ | $\$ 2,000.00$ |
| 2 | $\$ 2,000.00$ |  |  |
| 3 | $\$ 2,000.00$ |  |  |
| 4 | $\$ 2,000.00$ | $\$ 120.86$ | $\$ 8,240.14$ |
| 5 | $\$ 2,000.00$ | $\$ 162.74$ | $\$ 10,402.88$ |
| 6 | $\$ 2,000.00$ | $\$ 205.46$ | $\$ 12,608.34$ |
| 7 | $\$ 2,000.00$ | $\$ 249.01$ | $\$ 14,857.35$ |
| 8 | $\$ 2,000.00$ | $\$ 293.43$ | $\$ 17,150.78$ |

Any account established for accumulating funds to meet future obligations or debts is
called a sinking fund.

Q4 (\#40, page 157). A company establishes a sinking fund for upgrading office equipment with monthly payments of $\$ 2000$ into an account paying $0.55 \%$ monthly interest. How long will it be before the account has $\$ 100,000$ ? (Round up to the nearest month if not exact.)

