## Nursing Tip

Double the child's height at the age of 2 years to estimate how tall he or she may be as an adult.

At birth, **weight** is more variable than height and is, to a greater extent, a reflection of the intrauterine environment. The average newborn weighs from 3175 to 3400 g (7 to 7.5 pounds). In general, the birth weight doubles by 4 to 7 months old and triples by the end of the first year. By 2 to 2½ years old, the birth weight usually quadruples. After this point, the "normal" rate of weight gain, just as the growth in height, assumes a steady annual increase of approximately 2 to 2.75 kg (4.4 to 6 pounds) per year until the adolescent growth spurt.

Both **bone age** determinants and state of **dentition** are used as indicators of development. Because both are discussed elsewhere, neither is elaborated here (see the next section for bone age; see Chapters 11 and 12 for dentition).

## Skeletal Growth and Maturation

The most accurate measure of general development is **skeletal** or **bone age**, the radiologic determination of osseous maturation. Skeletal age appears to correlate more closely with other measures of physiologic maturity (e.g., onset of menarche) than with chronologic age or height. Bone age is determined by comparing the mineralization of ossification centers and advancing bony form to age-related standards.

Bone formation begins during the second month of fetal life when calcium salts are deposited in the intercellular substance (matrix) to form calcified cartilage first and then true bone. Bone formation exhibits some differences. In small bones, the bone continues to form in the center, and cartilage continues to be laid down on the surfaces. In long bones, the ossification begins in the **diaphysis** (the long central portion of the bone) and continues in the **epiphysis** (the end portions of the bone). Between the diaphysis and the epiphysis, an **epiphyseal cartilage plate** (or **growth plate**) unites with the diaphysis by columns of spongy tissue, the **metaphysis**. Active growth in length takes place in the epiphyseal growth plate. Interference with this growth site by trauma or infection can result