1  □  Skeletal System (Part 2)  
   - Blood and nerve supply of the bone  
   - Bone formation  
   - Bone growth  
2  □  Blood supply to the bone  
   Figure 6.5 - page 167  
   - Nutrient artery/vein  
     - Enters the bone through nutrient foramen  
     - Supplies inner part of compact bone tissue and red marrow up to the epiphyseal plate  
   - Metaphyseal arteries/veins  
     - Supplies the red bone marrow and bone tissue of the metaphysis  
   - Epiphyseal arteries/veins  
     - Supplies the red bone marrow and bone tissue of the epiphysis  
3  □  Nerve supply to bone  
   - Accompany the blood vessels that supply bone tissue  
   - Periosteum is rich in sensory nerves  
     - Is the reason for the extreme pain when you break a bone  
4  □  Bone Formation (Ossification)  
   - Human embryo skeleton consists of fibrous connective tissue and hyaline cartilage in the shape of the bones that will develop  
   - Ossification (also known as Osteogenesis) begins during the sixth or seventh week of embryonic development  
   - There are two patterns of ossification  
     - Intramembranous ossification  
     - Endochondral ossification  
5  □  Intramembranous Ossification  
   Figure 6.6 - page 169  
   - Flat bones of the skull and mandible are formed by this method  
   - Proceeds in the following steps  
     1  Development of the center of ossification  
     2  Calcification  
     3  Formation of trabeculae  
     4  Development of periosteum  
6  □  Endochondral Ossification  
   Figure 6.7 - page 171  
   - Most bones are formed this way
Proceeds in the following steps
1 Development of the cartilage model
2 Growth of the cartilage model
3 Development of the primary ossification center
4 Development of the secondary ossification center
5 Formation of articular cartilage and the epiphyseal plate

7 Bone Growth - Length
Figure 6.8 - page 172
• Growth occurs on the diaphyseal side of the epiphyseal plate
  – Zone of resting cartilage
  – Zone of proliferating cartilage
  – Zone of hypertrophic cartilage
  – Zone of calcified cartilage
• Eventually epiphyseal plate forms the epiphyseal line and bone stops growing in length

8 Bone Growth - thickness
Figure 6.9 - page 173
• Referred to as appositional growth
  1 Osteoblasts secrete matrix which forms ridges as it forms around blood vessels
  2 Ridges fold and fuse together
    – This space will be the haversian canal
    – Former Periosteum will become the endosteum

9 Bone Growth - thickness
Figure 6.9 - page 173
  3 Osteoblasts in new endosteum form bone matrix
    – Formation of lamellae ‘rings’ moves inward forming new osteon
  4 Osteoblasts in periosteum continue to increase thickness repeating the cycle again when in contact with more blood vessels

10 Factors affecting bone growth
• Dietary intake of vitamins and minerals
  – Calcium, phosphorus, flouride, magnesium, iron and manganese
  – Vitamin C is needed for collagen formation and for differentiation of osteoblasts into osteocytes

11 Factors affecting bone growth (continued)
• Hormones
  – IGFs (insulinlike growth factors)
• Promotes cell division at epiphyseal plate and periosteum
  – hGH (human growth hormone)
    • Stimulates production of IGFs
  – Sex steroids
    • Can cause ‘growth spurts’ through increased osteoblast activity
    • Responsible for shut down of growth at epiphyseal plate