Biology 201-Worksheet on Skeletal System  
(Answers are in your power point outlines—there is no key!)  

1. List 6 functions of your skeletal system.  

2. Identify the Latin or Greek roots for the following terms.  
   Bone  
   Cartilage  
   Joint  

3. The branch of medicine that deals with preservation and restoration of the skeletal system, joints, and associated structures is called:  

4. Name two GAGs found in cartilage.  

5. Name two fibers found in cartilage.  

6. The cartilage cell type that actively secrete a matrix and also has divisional abilities is the:  

7. The cartilage cell type that maintains a matrix and has no divisional abilities is the:  

8. What is the perichondrium and identify the two sublayers with each sublayer’s specific function.  

9. Identify the kind of cartilage based on the information provided.  
   a. Looks darker than other cartilages  
   b. Gives firm support with pliability  
   c. Thick and densely interwoven collagen fibers with chondrocytes squeezed between  
   d. Epiglottis, pinna, & Eustachian tubes  
   e. Great flexibility for stretching  
   f. Gives very strong support & withstands heavy pressure  
   g. Most abundant cartilage  
   h. Articular cartilages, costal cartilages, nose, trachea, embryonic skeleton, & growth plates  
   i. Pubic symphysis, intervertebral discs, & menisci  
   j. Matrix is blue/purple and translucent; collagen fibers not visible  

10. Identify components of the organic matter of bone.  

11. Name 3 components of the inorganic matter of bone.  

12. Identify the cell components of bone based on the information provided.  
   a. Cells that have become trapped in lacunae and are connected to each other via canaliculi.  
   b. Reside in pits called resorption bays  
   c. Cytoplasmic extensions of these cells secrete proteolytic enzymes to break down collagen and secrete acids to dissolve Calcium.  
   d. These cells form organic matter of matrix and help mineralize it in response to stress or fractures.
e. These cells are the divisional cells of bone that form osteoblasts.

13. The type of bone that is much longer than it is wide.

14. The pit on the surface of bone where an osteoclast resides.

15. Identify these bone macrostructures based on the descriptions given.
   a. Thin layer of hyaline cartilage covering the epiphyses.
   b. Space within diaphysis filled with yellow marrow.
   c. Expanded ends of a bone.
   d. Shaft or long portion of a bone.
   e. Growth zone in subadults composed mostly of cartilage and found between the epiphysis and diaphysis.
   f. Layer of osteoblasts and osteoclasts that line medullary cavity.
   g. Narrow zone where epiphysis connects to diaphysis.
   h. Layer of connective tissue that surrounds diaphysis.
   i. High density bone without visible spaces; smooth and homogeneous; mostly in shaft and outer bone layers.
   j. Remnant of epiphyseal plate present in an adult.
   k. Low density bone with many visible spaces; mostly located in epiphyses.
   l. Fatty substance that fills most of medullary cavity.
   m. Substance that fills spaces in spongy bone of epiphyses.

16. Name the two sublayers of the periosteum and give the function of each sublayer.
   Sublayer ________________________ Function ______________________________________
   Sublayer ________________________ Function ______________________________________

17. Spongy bone is composed of bony struts called:

18. Identify these microstructure components of bone based on the descriptions below.
   a. Pockets or spaces between lamellae housing osteocytes.
   b. Hair-like canals filled with cytoplasmic extensions of osteocytes radiating out from each lacuna.
   c. These canals run transversely to shaft axis.
   d. Concentric rings of bone matrix surrounding central canal.
   e. Units of compact bone.
   f. Remnant osteons that fill spaces between complete osteons.
   g. Canals that run parallel to longitudinal axis of a bone; filled with blood vessels and nerves.
   h. Cells that reside in lacunae.

19. Identify the bone as spongy, compact, or both based on the descriptions provided.
   a. Composed of osteons.
   b. Composed of lamellae.
   c. No Haversian Canals.
   d. Osteocytes in lacunae.
   e. Composed of trabeculae.
   f. Provides strength with little weight.

20. Define ossification.

21. What kind of connective tissue does the template for bone form from?

22. Name two kinds of ossification and the kind of template each kind starts from.
    Ossification ___________________________ Template _____________________________________
    Ossification ___________________________ Template _____________________________________

23. The key trigger for bone to start forming on any template is the invasion of the:

24. Which bones are involved in intramembranous ossification?

25. Which bones are involved in endochondral ossification?
26. Describe the process of intramembranous ossification. Write your essay in the space provided.

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27. Describe the process of endochondral ossification. Write your essay in the space provided.

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28. Outer and inner layers of compact bone enclosing a middle layer of spongy bone is called the:

29. What is the difference between primary and secondary ossification centers? _________________

30. What is the periosteal bud? __________________________________________________________

31. At which ages does bone stop growing in males _________________ and females _______________?
32. Name the 5 zones of the metaphysis from the epiphysis to the diaphysis.
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33. Identify the zone of the metaphysis based on the descriptions provided.
a. Chondrocytes die and osteoblasts invade along with blood vessels and marrow elements.
__________________________________________________________________________
b. Chondroblasts enlarge.
c. Multiple chondroblasts per lacuna.
d. Layer of resting cartilage with one chondrocyte per lacuna.
__________________________________________________________________________
e. Anchors plate to epiphysis.
f. Where chondroblasts are highly mitotic.
g. Chondroblasts rupture and cause calcium crystals to attach to collagen fibers.
__________________________________________________________________________
h. Provides new cells for other zones.
i. Cements epiphysis to diaphysis.

34. Explain how bone grows in length. ____________________________________________
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35. Explain how bone grows in diameter. __________________________________________
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36. The replacement of old bone tissue by new bone tissue is called: ________________

37. What is meant by the term homeostasis? ________________________________________
__________________________________________________________________________

38. How often is the distal femur remodeled compared to the frontal bone? ____________
__________________________________________________________________________

39. Name 3 things remodeling allows the body to do. ________________________________
__________________________________________________________________________
__________________________________________________________________________
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40. Normal bone growth depends on 3 factors. Name them. __________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

41. Identify the hormone associated with bone growth based on the description provided.
a. Increases metabolism and osteoblast activity. ________________________________
b. Enhance bone deposition and stimulates osteoblast activity. ________________
c. Released in response to low blood Calcium; stimulates osteoclasts to digest bone and release calcium into blood. ________________________________
d. Accelerates bone growth at epiphyseal plate; increases chondroblast divisions. ________________________________
e. Released in response to high blood calcium; inhibits osteoclasts and accelerates calcium absorption by bones. ________________________________

42. Bone grows or remodels in response to the forces or stresses placed upon it. ______

43. List 5 pieces of evidence to support the Law described in question 42. ________________
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44. What happens to bones with aging and what are the consequences of these changes?

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___________________________________________________________________________________

45. A break in a bone is called a(n):

___________________________________________________________________________________

46. Distinguish between a stress and pathological fracture.

___________________________________________________________________________________
___________________________________________________________________________________

47. Identify the kind of fracture based on the description provided. (From Saladin Text, 2010)
   a. Skin is not broken.
   b. Skin is broken; bone protrudes through skin.
   c. Bone is broken into two or more pieces.
   d. Partial fracture that extends only partway across bone.
   e. Bone is broken into 3 or more pieces.
   f. Bone is bent on one side and has incomplete fracture on opposite side.
      g. Epiphysis is separated from the diaphysis along the epiphyseal plate; seen in juveniles.
      h. Fracture of the distal end of the radius and ulna.
      i. Fracture at the distal end of the tibia, fibula, or both.

48. What is a hematoma?

49. Describe the process of fracture repair.

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50. Distinguish between open and closed reductions.

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51. What is a free vascular fibular graft?

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52. What is osteoporosis?

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53. List and rank 5 risk factors for osteoporosis.

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54. What is osteomalacia?

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55. What is spina bifida?

___________________________________________________________________________________

56. ________________ is a progressive bone disease where a pattern of excessive bone destruction is followed by deposition which causes excessive thickening; deformities in the pelvis, skull, and lower appendages are the result.

57. The study of joints is called:

58. What is kinesiology?

59. List 3 classification categories of joints based on degree of mobility.

___________________________________________________________________________________
___________________________________________________________________________________
___________________________________________________________________________________
60. List 4 classification categories of joints based on kind of connective tissue involved.

61. Name 3 kinds of fibrous joints.

62. Name 2 kinds of cartilaginous joints.

63. Identify the joint list as FIBROUS, CARTILAGINOUS, or BONY based on the descriptions provided.
   a. Coronal suture.
   b. Pubic symphysis.
   c. Intervertebral discs.
   d. Epiphyseal plate.
   e. Tooth held in place by periodontal ligament.
   f. Costal cartilages.

64. Identify the specific kind of joint based on the descriptions provided.
   a. Two bony shafts are bound by a ligament.
   b. Intervertebral discs.
   c. Tooth in its socket.
   d. Bone edges interlock like puzzle pieces.
   e. Epiphyseal plate.
   f. Connective tissue that holds two pubis bones together.

65. A freely movable joint is called a(n):

66. A slightly or partially movable joint is called a(n):

67. A joint that does not move is called a(n):

68. How do synovial joints differ from fibrous, cartilaginous, and bony joints?

69. Identify the components of a synovial joint based on the descriptions provided.
   a. Viscous slippery fluid rich in albumin and hyaluronic acid.
   b. Pad of fibrocartilage allowing bone ends to fit together more precisely.
   c. Hyaline cartilage covering of bony surfaces.
   d. Composed of 2 layers and creates cavity around bones.
   e. Attaches bone to bone.
   f. Outer layer of capsule.
   g. Inner layer of capsule.

70. What is arthroscopic surgery and give a brief summary of what is done during the procedure.

71. A sac-like, fluid-filled extension of joint capsule that extends between nearby structures allowing them to slide more easily past each other is called a(n):

72. What is a tendon sheath and how does it differ from a bursa?

73. What is tendininitis?
74. Identify the type of joint motion based on the verbal descriptions given.
   a. Movement that raises a bone vertically; mandibles are raised during biting and clavicles raised during shoulder shrug.
   b. Extension of a joint beyond 180 degrees.
   c. Movement of a part away from the midsagittal line; raising arm to side.
   d. Movement that straightens a joint to the natural anatomical position.
   e. Lowering of the mandible or shoulders.
   f. Movement that decreases the angle of a joint; bending of elbow.
   g. Movement of body part towards midsagittal line.
   h. Movement in which the soles are turned medially.
   i. Movement of a bone anteriorly on a horizontal plane.
   j. Raising of toes as when you swing the foot forward to take a step.
   k. Movement of a bone posteriorly.
   l. Movement in which one end of an appendage remains stationary while the other end makes a circular motion.
   m. Rotation of the forearm so that the palm faces forward or upward.
   n. Movement that turns the soles to face laterally.
   o. Rotation that turns the bone inwards.
   p. Rotation of the forearm so the palm faces rear or downward.
   q. Rotation that turns the bone outwards.

75. Identify the kind of synovial joint based on the information provided.
   a. One bone with convex surface fits into a concave depression of another bone.
   b. Each articular surface is shaped like a saddle.
   c. Oval convex surface of one bone fits into a similarly shaped depression on another bone.
   d. Articular surfaces on flat.
   e. One bone has a rounded, pointed, or conical projection that fits into a ring-like ligament of other bones.
   f. Smooth, rounded spherical head fits within a concave depression created by one or more bones and connective tissue.
   g. Femur and tibia at knee joint.
   h. Proximal radioulnar joints allows radius to move during pronation and supination.
   i. Radiocarpal joint at wrist.
   j. Head of femur and acetabulum.
   k. Opposable thumb.
   l. Superior and inferior articulating surfaces of vertebrae.
   m. Ulna and radius at elbow.
   n. Occipital condyles and atlas.
   o. Head of humerus and glenoid cavity.

76. Define the following terms:
   a. monoaxial
   b. biaxial
   c. multiaxial

77. Identify the following joints as synarthrotic, amphiarthrotic, or diarthrotic.
   a. Ball and socket.
   b. Gliding.
   c. Suture.
78. What do the 3 “C’s” in a knee joint stand for?  ______________________________________

79. What is the difference between cruciate and collateral ligaments? _______________________

80. What is the difference between anterior and posterior cruciate ligaments? ______________

81. What is the difference between medial and collateral ligaments? ________________________

82. What is arthritis? ___________________________ __________________________________________

83. What do all forms of arthritis have in common? ________________________________________

84. Any painful state associated with supporting structures such as bones, ligaments, joints, muscles or tendons is called: ___________________________ ___________________________ ___________________________ ___________________________ ___________________________ ___________________________ ___________________________ ___________________________ ___________________________ ___________________________ ___________________________ ___________________________ ___________________________ ___________________________ ___________________________ ___________________________ ___________________________ ___________________________ ___________________________ ___________________________ ___________________________ ___________________________ ___________________________ ___________________________ ___________________________ ___________________________ ___________________________ ___________________________ ___________________________ ___________________________ ___________________________ 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85. Identify the kind of arthritis based on the information provided.
   a. Caused by a build up of uric acid. _____________________________________________________
   b. Forms as a result of normal wear and tear on joints associated with age.

   c. An autoimmune disease. ____________________________________________________________
   d. Generally affects people 30-40 years old. ______________________________________________

86. Forcible wrenching and twisting of a joint is called: ____________________________________

87. Overstretching of a muscle. __________________________________________________________