The Skull

1. First, match the bone names in column B with the descriptions in column A (the items in column B may be used more than once). Then, circle the bones in column B that are cranial bones.

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>b; frontal</td>
<td>a. ethmoid</td>
</tr>
<tr>
<td>n; zygomatic</td>
<td>b. frontal</td>
</tr>
<tr>
<td>e; mandible</td>
<td>c. hyoid</td>
</tr>
<tr>
<td>g; nasal</td>
<td>d. lacrimal</td>
</tr>
<tr>
<td>i; palatine</td>
<td>e. mandible</td>
</tr>
<tr>
<td>j; parietal</td>
<td>f. maxilla</td>
</tr>
<tr>
<td>h; occipital</td>
<td>g. nasal</td>
</tr>
<tr>
<td>k; sphenoid</td>
<td>h. occipital</td>
</tr>
<tr>
<td>d; lacrimal</td>
<td>i. palatine</td>
</tr>
<tr>
<td>f; maxilla</td>
<td>j. parietal</td>
</tr>
<tr>
<td>a; ethmoid</td>
<td>k. sphenoid</td>
</tr>
<tr>
<td>l; temporal</td>
<td>l. temporal</td>
</tr>
<tr>
<td>k; sphenoid</td>
<td>m. vomer</td>
</tr>
<tr>
<td>a; ethmoid</td>
<td>n. zygomatic</td>
</tr>
<tr>
<td>e; mandible</td>
<td>a; ethmoid</td>
</tr>
<tr>
<td>l; temporal</td>
<td>e; mandible</td>
</tr>
<tr>
<td>a; ethmoid</td>
<td>f; maxilla</td>
</tr>
<tr>
<td>b; frontal</td>
<td>f; maxilla</td>
</tr>
<tr>
<td>m; vomer (a; ethmoid)</td>
<td>h; occipital</td>
</tr>
<tr>
<td>a; ethmoid</td>
<td>i; palatine</td>
</tr>
<tr>
<td>e; mandible</td>
<td>j; parietal</td>
</tr>
<tr>
<td>f; maxilla</td>
<td>k. sphenoid</td>
</tr>
<tr>
<td></td>
<td>l. temporal</td>
</tr>
<tr>
<td></td>
<td>m. vomer</td>
</tr>
<tr>
<td></td>
<td>n. zygomatic</td>
</tr>
</tbody>
</table>

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2. Using choices from the numbered key to the right, identify all bones (line with ball on end), sutures (line with arrowhead on end), and bone markings provided with leader lines in the two diagrams below.

Key:
1. carotid canal
2. coronal suture
3. ethmoid bone
4. external occipital protuberance
5. foramen lacerum
6. foramen magnum
7. foramen ovale
8. frontal bone
9. glabella
10. incisive
11. inferior nasal concha
12. inferior orbital fissure
13. infraorbital foramen
14. jugular foramen
15. lacrimal bone
16. mandible
17. mandibular
18. mandibular symphysis
19. mastoid process
20. maxilla
21. mental foramen
22. middle nasal concha of ethmoid
23. nasal bone
24. occipital bone
25. occipital condyle
26. palatine bone
27. palatine process of maxilla
28. parietal bone
29. sagittal suture
30. sphenoid bone
31. styloid process
32. stylomastoid foramen
33. superior orbital fissure
34. supraorbital foramen
35. temporal bone
36. vomer
37. zygomatic bone
38. zygomatic process of temporal bone
3. Define **suture**: Fibrous joint between skull bones.

4. With one exception, the skull bones are joined by sutures. Name the exception. **Joint(s) between the mandible and temporal bones.**

5. What bones are connected by the lambdoid suture? **Occipital and parietal**

   What bones are connected by the squamous suture? **Temporal and parietal**

6. Name the eight bones of the cranium:

<table>
<thead>
<tr>
<th>frontal</th>
<th>occipital</th>
<th>right parietal</th>
<th>left parietal</th>
</tr>
</thead>
<tbody>
<tr>
<td>sphenoid</td>
<td>ethmoid</td>
<td>right temporal</td>
<td>left temporal</td>
</tr>
</tbody>
</table>

7. Give two possible functions of the sinuses. (1) **Lighten the skull**, (2) resonance chambers for speech.

8. What is the orbit? **Bony socket for the eye.**

   What bones contribute to the formation of the orbit? **Ethmoid, lacrimal, frontal, sphenoid, zygomatic, maxillary, palatine**

9. Why can the sphenoid bone be called the keystone of the cranial floor? **It articulates with all of the other cranial bones.**

**The Vertebral Column**

10. The distinguishing characteristics of the vertebrae composing the vertebral column are noted below. Correctly identify each described structure by choosing a response from the key.

   Key: a. atlas    d. coccyx    f. sacrum
   b. axis        e. lumbar vertebra  g. thoracic vertebra
   c. cervical vertebra—typical

   **c; cervical (also a & b)**  1. vertebral type containing foramina in the transverse processes, through which the vertebral arteries ascend to reach the brain
   **b; axis**  2. dens here provides a pivot for rotation of the first cervical vertebra (C₁)
   **g; thoracic**  3. transverse processes faceted for articulation with ribs; spinous process pointing sharply downward
   **f; sacrum**  4. composite bone; articulates with the hip bone laterally
   **e; lumbar**  5. massive vertebrae; weight-sustaining
   **d; coccyx**  6. “tail bone”; vestigial fused vertebrae
   **a; atlas**  7. supports the head; allows a rocking motion in conjunction with the occipital condyles
11. Using the key, correctly identify the vertebral parts/areas described below. (More than one choice may apply in some cases.) Also use the key letters to correctly identify the vertebral areas in the diagram.

Key: 
- a. body 
- b. intervertebral foramina 
- c. lamina 
- d. pedicle 
- e. spinous process 
- f. superior articular facet 
- g. transverse process 
- h. vertebral arch 
- i. vertebral foramen

___ i ___ 1. cavity enclosing the nerve cord
___ a ___ 2. weight-bearing portion of the vertebra
___ e, g ___ 3. provide levers against which muscles pull
___ a, g ___ 4. provide an articulation point for the ribs
___ b ___ 5. openings providing for exit of spinal nerves
___ a, h ___ 6. structures that form an enclosure for the spinal cord

12. Describe how a spinal nerve exits from the vertebral column. **Via the intervertebral foramina found between the pedicles of adjacent vertebrae.**

13. Name two factors/structures that permit flexibility of the vertebral column.

**Intervertebral discs** and **curvatures**

14. What kind of tissue composes the intervertebral discs? **Fibrocartilage**

15. What is a herniated disc? **A ruptured disc in which a portion of the disc protrudes outward.**

What problems might it cause? **It might compress a nerve, leading to pain and possibly paralysis.**

16. Which two spinal curvatures are obvious at birth? **Thoracic** and **sacral**

Under what conditions do the secondary curvatures develop? **The cervical curvature develops when the baby begins to raise its head independently. The lumbar curvature forms when the baby begins to walk (assumes upright posture).**
17. On this illustration of an articulated vertebral column, identify each curvature indicated and label it as a primary or a secondary curvature. Also identify the structures provided with leader lines, using the letters of the terms listed in the key below.

Key:  
- a. atlas  
- b. axis  
- c. intervertebral disc  
- d. sacrum  
- e. two thoracic vertebrae  
- f. two lumbar vertebrae  
- g. vertebra prominens

- Cervical-secondary curvature
- Thoracic-primary curvature
- Lumbar-secondary curvature
- Sacral-primary curvature
The Thoracic Cage

18. The major bony components of the thorax (excluding the vertebral column) are the ribs and the sternum.

19. Differentiate between a true rib and a false rib. A true rib has its own costal cartilage attachment to the sternum; a false rib attaches to the sternum indirectly or not at all.

Is a floating rib a true or a false rib? False

20. What is the general shape of the thoracic cage? Inverted cone shape

21. Using the terms in the key, identify the regions and landmarks of the bony thorax.

Key:  
- a. body  
- b. clavicular notch  
- c. costal cartilage  
- d. false ribs  
- e. floating ribs  
- f. jugular notch  
- g. manubrium  
- h. sternal angle  
- i. sternum  
- j. true ribs  
- k. xiphisternal joint  
- l. xiphoid process
**The Appendicular Skeleton**

**Time Allotment:** 2 hours.

**Multimedia Resources:** See Appendix B for Guide to Multimedia Resource Distributors.

- *Anatomy of a Runner (Structure and Function of the Lower Limb)* (DE: 38 minutes, DVD)
- *Anatomy of the Hand* (FHS: 14 minutes, VHS, DVD, 3-year streaming webcast)
- *Anatomy of the Shoulder* (FHS: 18 minutes, VHS, DVD, 3-year streaming webcast)
- *Bones and Joints* (FHS: 20 minutes, VHS, DVD, 3-year streaming webcast)
- *Interactive Foot and Ankle* (LP: CD-ROM)
- *Interactive Shoulder* (LP: CD-ROM)
- *Practice Anatomy Lab™ 3.0 (PAL)* (BC: CD-ROM, Website)

**Laboratory Materials**

*Ordering information is based on a lab size of 24 students, working in groups of 4. A list of supply house addresses appears in Appendix A.*

- 6–12 disarticulated skeletons
- 2 articulated skeletons (one male, one female)
- 1 articulated male pelvis
- 1 articulated female pelvis
- X rays of bones of the appendicular skeleton

**Advance Preparation**

1. Have articulated skeletons (male and female) available.
2. Set out disarticulated skeletons. One per group of 3–4 students is ideal.
3. Set out male and female articulated pelves in a demonstration area.
4. Set out blunt probes, pipe cleaners, or unsharpened pencils with erasers for use during bone identification.
5. Set out X rays of bones of the appendicular skeleton.

**Comments and Pitfalls**

1. Students may have trouble distinguishing between right and left samples of bones. Remind them to review the bone markings before checking the disarticulated skeleton.
2. Stress the importance of bony landmarks for muscle location and identification.

**Answers to Pre-Lab Quiz (p. 145)**

1. appendicular
2. pectoral
3. scapulae
4. b, humerus
5. metacarpals
6. Female
7. a, femur
8. patella
9. true