

Laboratory Exercise

15

Vertebral Column and Thoracic Cage

Materials Needed

Textbook
Human skeleton, articulated
Samples of cervical, thoracic, and lumbar vertebrae
Human skeleton, disarticulated

The vertebral column, consisting of twenty-six bones, extends from the skull to the pelvis and forms the vertical axis of the human skeleton. The vertebral column includes seven cervical vertebrae, twelve thoracic vertebrae, five lumbar vertebrae, one sacrum of five fused vertebrae, and one coccyx of usually four fused vertebrae. To help you to remember the number of cervical, thoracic, and lumbar vertebrae from superior to inferior, consider this saying: breakfast at 7, lunch at 12, and dinner at 5. These vertebrae are separated from one another by cartilaginous intervertebral discs and are held together by ligaments.

The thoracic cage surrounds the thoracic and upper abdominal cavities. It includes the ribs, the thoracic vertebrae, the sternum, and the costal cartilages. Men and women, although variation can exist, possess the same total bone number of 206.

Purpose of the Exercise

To examine the vertebral column and the thoracic cage of the human skeleton and to identify the bones and major features of these parts.

LEARNING OUTCOMES

After completing this exercise, you should be able to

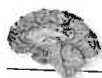
- 1 Identify the major features of the vertebral column.
- 2 Locate the features of a vertebra.
- 3 Distinguish between cervical, thoracic, and lumbar vertebrae, and locate the sacrum and coccyx.
- 4 Identify the structures and functions of the thoracic cage.
- 5 Distinguish between true and false ribs.

EXPLORE

Procedure A—The Vertebral Column

1. Review the section entitled "Vertebral Column" in chapter 7 of the textbook.
2. As a review activity, label figures 15.1, 15.2, 15.3, and 15.4.
3. Examine the vertebral column of the human skeleton and locate the following bones and features. At the same time, locate as many of the corresponding bones and features in your skeleton as possible.

atlas (C1)	(1)
axis (C2)	(1)
vertebra prominens (C7)	(1)
cervical vertebrae (includes atlas, axis, and vertebra prominens)	(7)
thoracic vertebrae	(12)
lumbar vertebrae	(5)
intervertebral discs (fibrocartilage)	
vertebral canal (contains spinal cord)	
sacrum	(1)
coccyx	(1)
cervical curvature	
thoracic curvature	
lumbar curvature	
sacral curvature	
intervertebral foramina (passageway for spinal nerves)	



Critical Thinking Application

Note the four curvatures of the vertebral column. What functional advantages exist with curvatures for skeletal structure instead of a straight vertebral column?

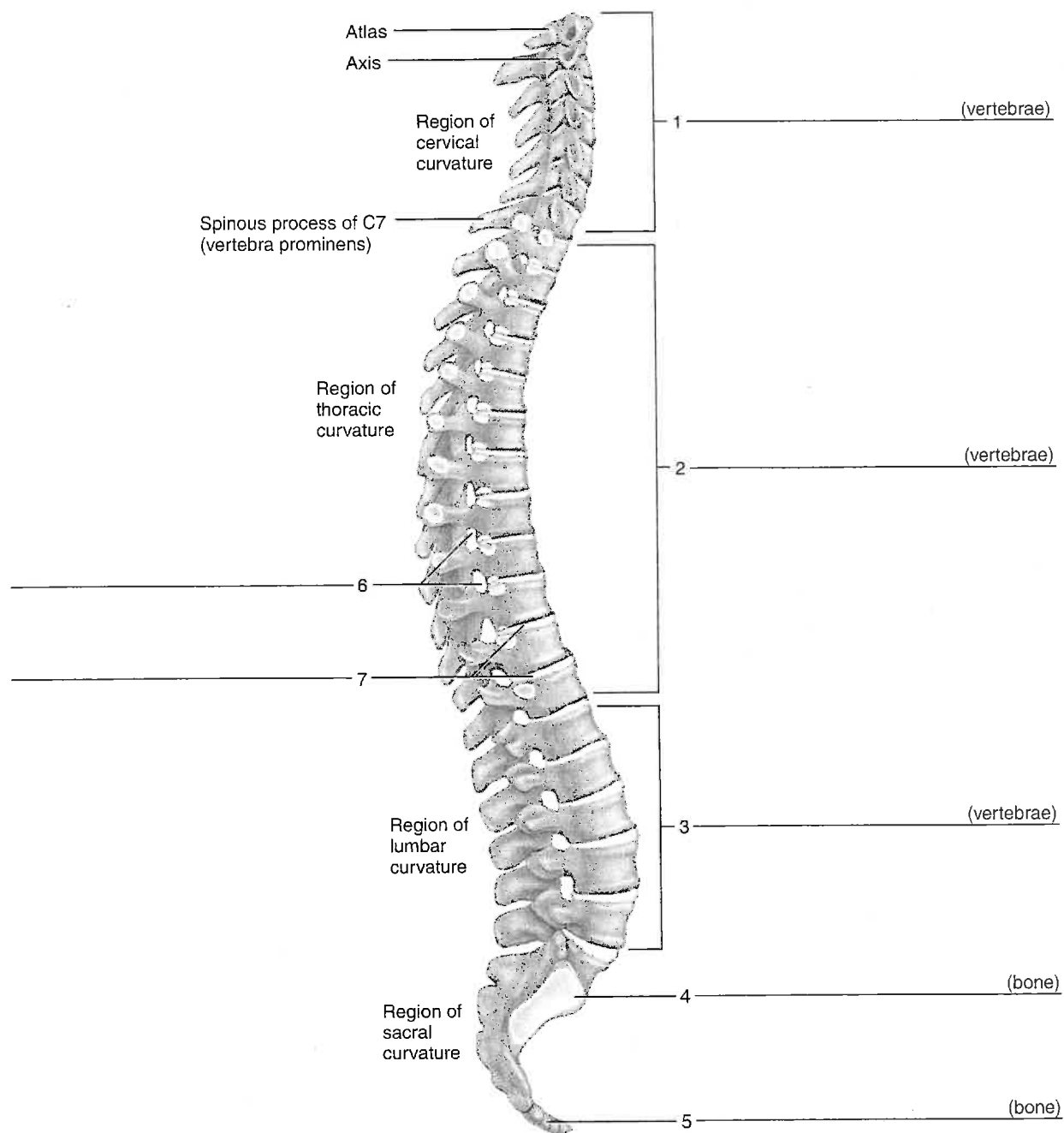


Figure 15.1 Label the bones and features of the vertebral column (right lateral view). 1

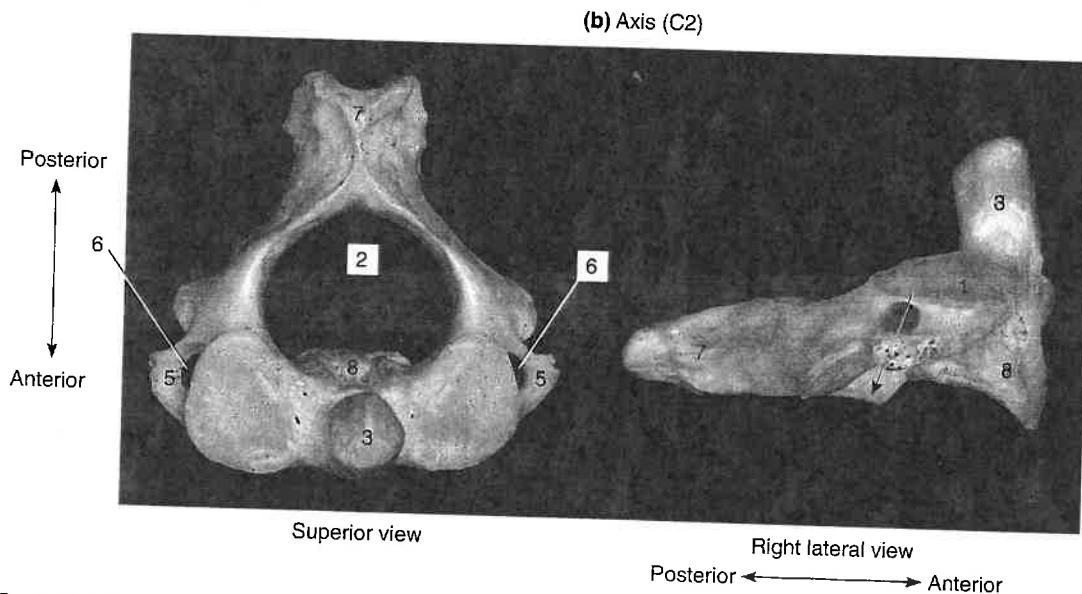
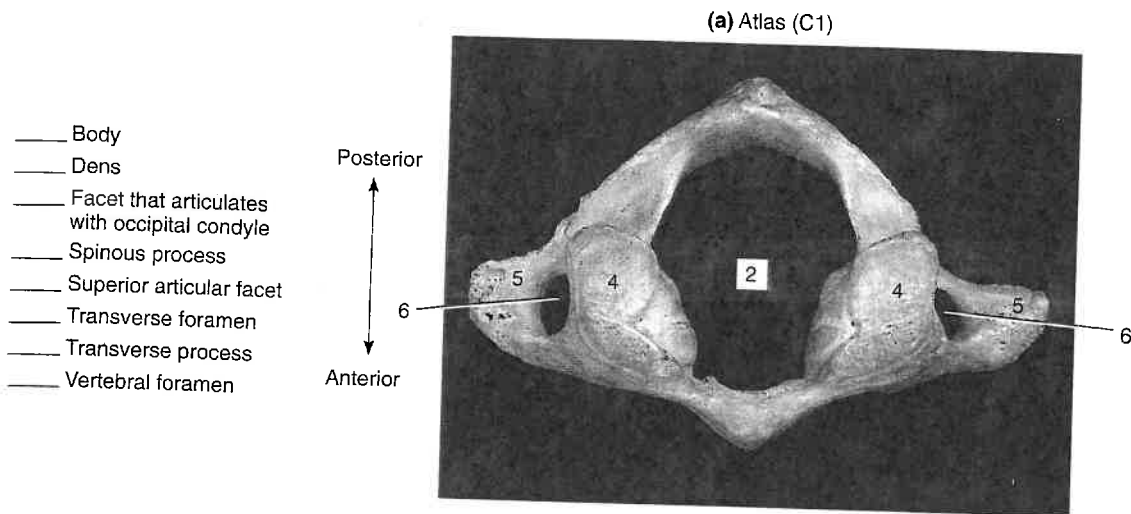
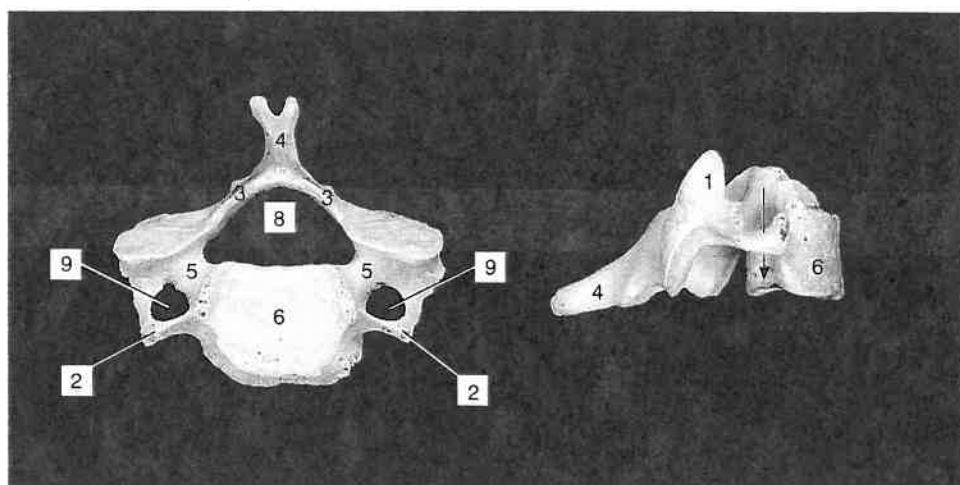


Figure 15.2 Label the superior features of (a) the atlas and the superior and right lateral features of (b) the axis by placing the correct numbers in the spaces provided. (The broken arrow indicates a transverse foramen.) 2 3

- Body
- Inferior notch
- Lamina
- Pedicle
- Spinous process
- Superior articular process
- Transverse foramen
- Transverse process
- Vertebral foramen

Superior views

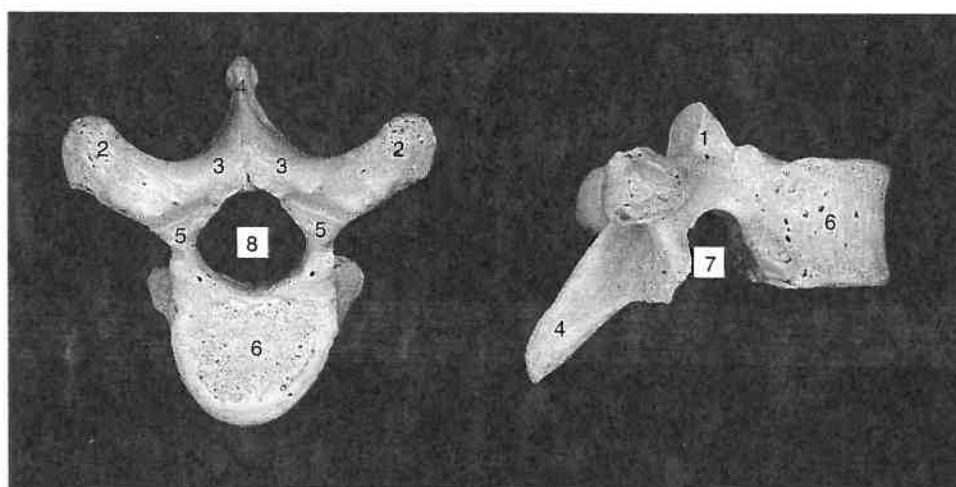
Right lateral views



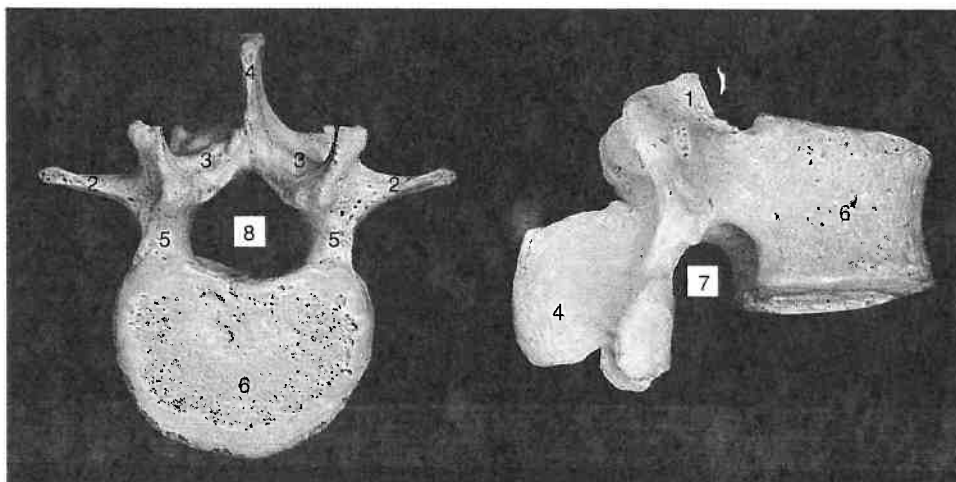
(a) Cervical vertebra

Posterior

Anterior



(b) Thoracic vertebra



(c) Lumbar vertebra

Posterior ← → Anterior

Figure 15.3 Label the superior and right lateral features of the (a) cervical, (b) thoracic, and (c) lumbar vertebrae by placing the correct numbers in the spaces provided. (The broken arrow indicates a transverse foramen.)

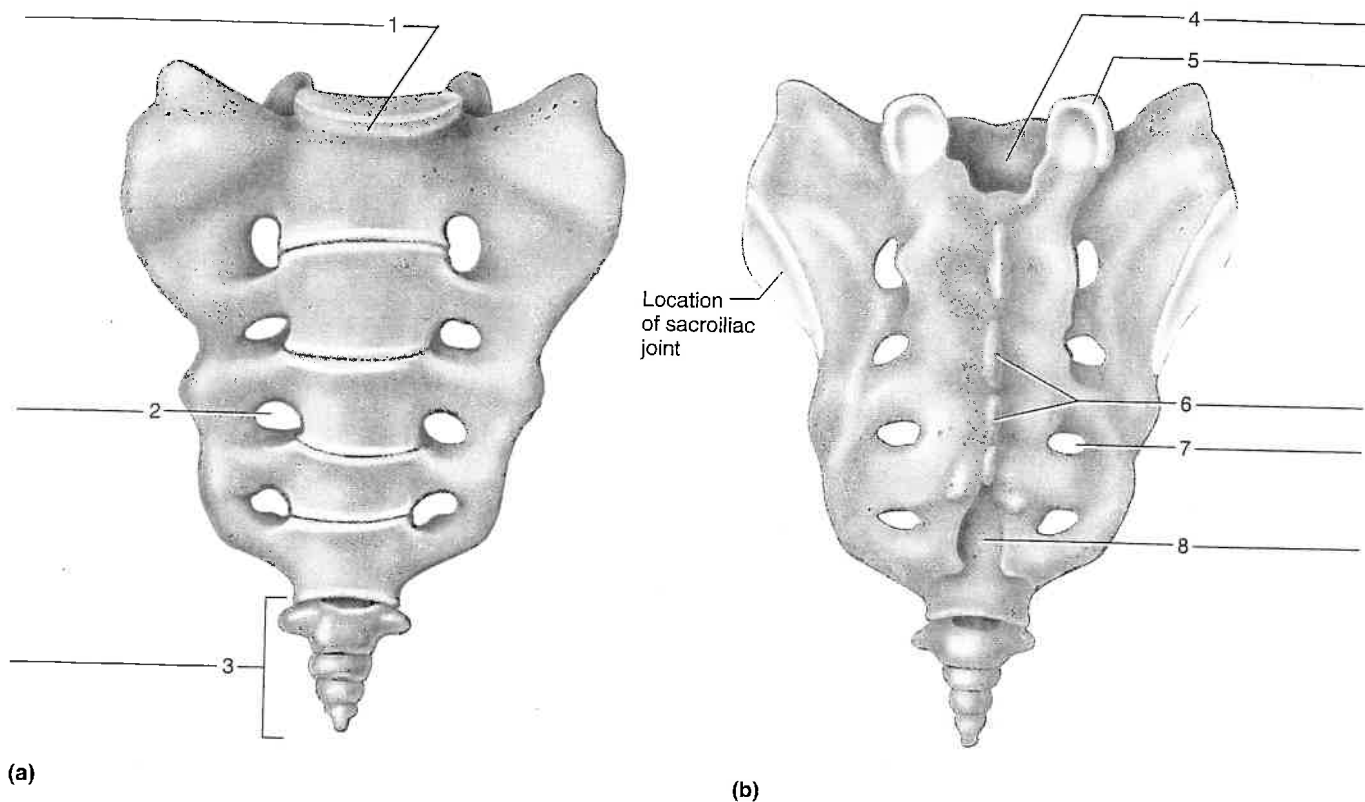


Figure 15.4 Label the coccyx and the features of the sacrum: (a) anterior view; (b) posterior view. **2 3**

4. Compare the available samples of cervical, thoracic, and lumbar vertebrae by noting differences in size and shape and by locating the following features:

vertebral foramen

body

pedicles

laminae

spinous process

vertebral arch

transverse processes

superior articular processes

inferior articular processes

inferior notch

transverse foramina

facets

dens of axis

5. Examine the sacrum and coccyx. Locate the following features:

sacrum

superior articular process

posterior sacral foramen

anterior sacral foramen

sacral promontory

sacral canal

tubercles

median sacral crest

sacral hiatus

coccyx

6. Complete Parts A and B of Laboratory Report 15.

Procedure B—The Thoracic Cage

1. Review the section entitled "Thoracic Cage" in chapter 7 of the textbook.
2. As a review activity, label figure 15.5.
3. Examine the thoracic cage of the human skeleton and locate the following bones and features:

rib

head
tubercle
neck
shaft
anterior (sternal) end

facets

true ribs (pairs 1–7)

false ribs (pairs 8–12) (includes floating ribs)

floating ribs (pairs 11–12)

costal cartilages (hyaline cartilage)

sternum

jugular (suprasternal) notch

clavicular notch

manubrium

sternal angle

body

xiphoid process

4. Complete Parts C and D of the laboratory report.

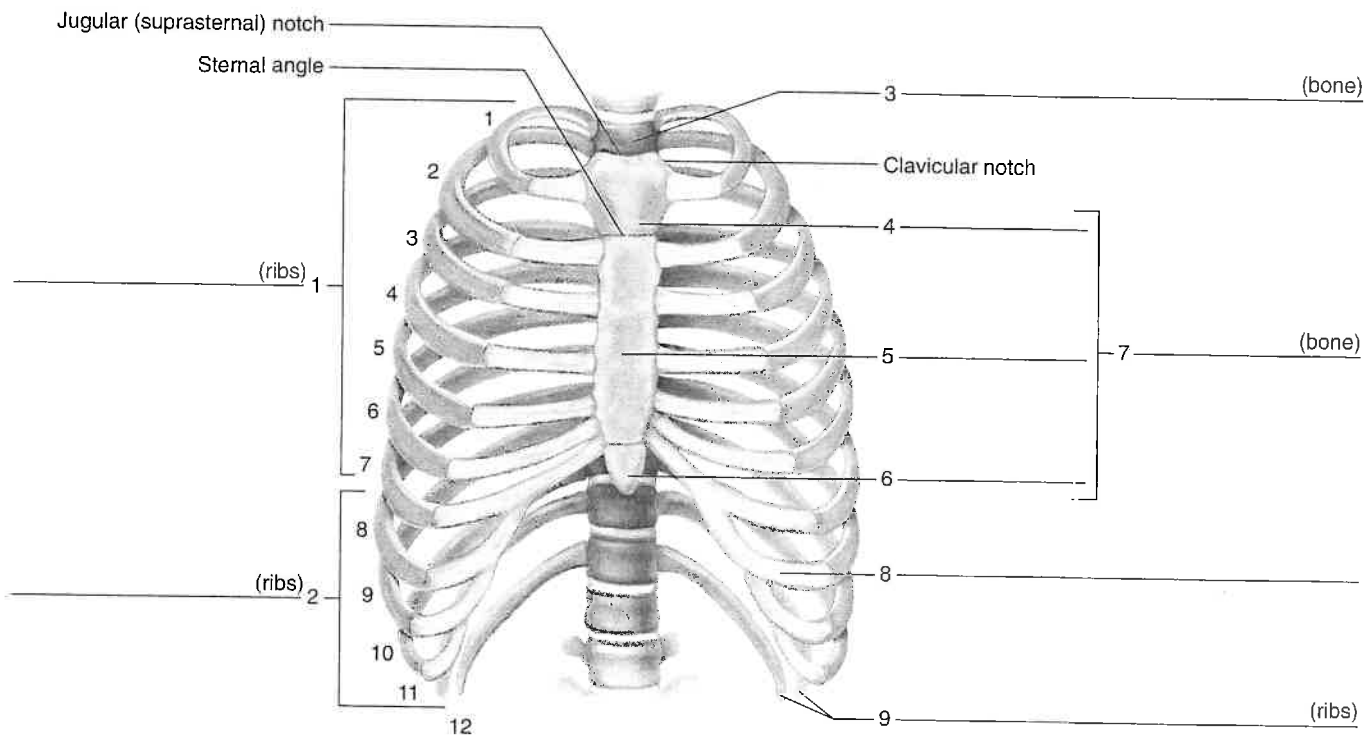


Figure 15.5 Label the bones and features of the thoracic cage (anterior view). **4 5**