Biology · Structure and Function in Living Organisms · Support and Movement in Living Organisms

Support in Living Organisms

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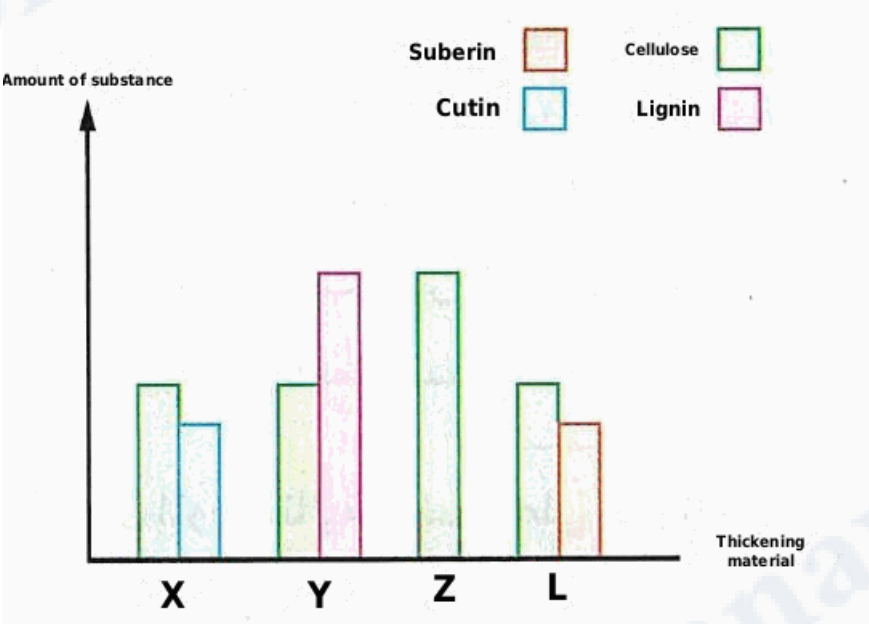
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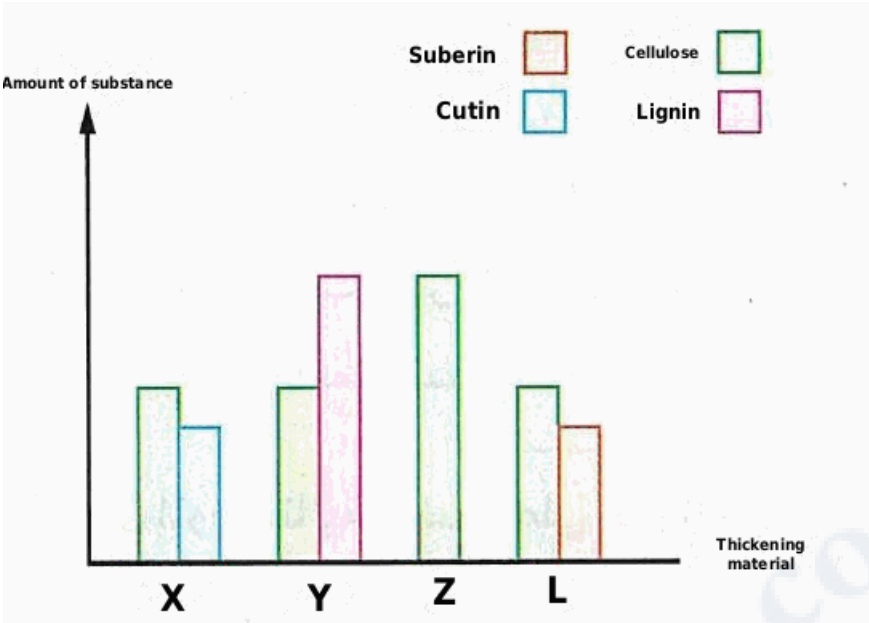
Multiple choice questions — 125 questions

1 The opposite graph shows the amounts of the substances in the walls of some plant cells:
Which of the following represents the epidermis cells of a herbaceous stem?



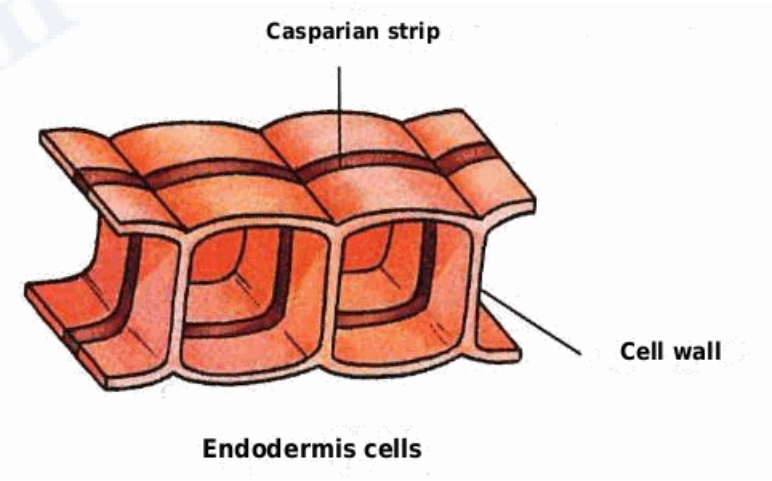
(A) X (B) Y (C) Z (D) L

2 The opposite graph shows the amounts of the substances in the walls of some plant cells:
Which of the following represents cork cells and xylem vessels, respectively?



(A) X / L (B) L / Y (C) Y / X (D) Z / Y

3 The opposite figure shows the endodermis cells in a plant root. In these cells, the middle of the horizontal and side walls is surrounded by a band of suberin called the Casparian strip. What is the result if these cells lose the Casparian strip?

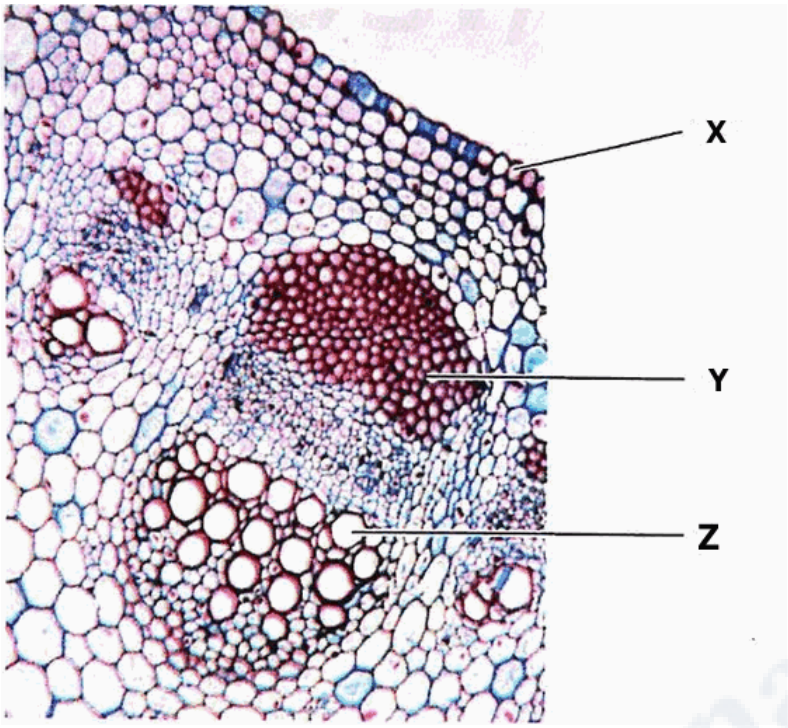


(A) Microbes can easily enter these cells
(B) The plant cells lose water quickly
(C) Water passes through all the cell walls
(D) All the plant cells lose their support

4 Which of the following is the main role of cutin and suberin in plants?

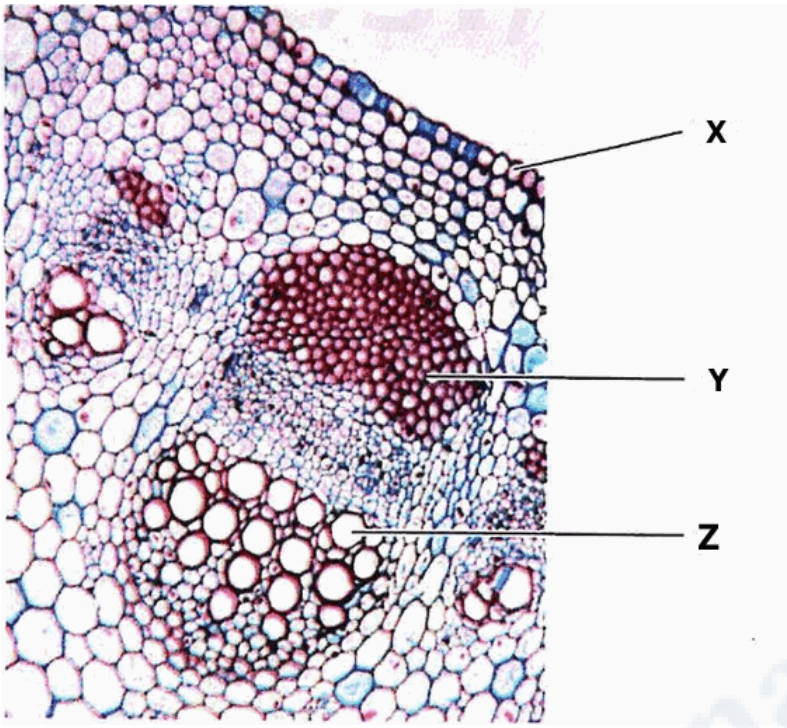
(A) Supporting the vascular tissues
(B) Keeping the shape of the cell walls
(C) Acting as barriers that are impermeable to water
(D) Controlling the movement of substances into and out of plant cells

5 The opposite figure shows part of a cross section in a young dicot stem. Study it, then answer: Which substances are deposited on the cell walls of tissue (Y) and tissue (Z), respectively?



(A) Cellulose / cellulose
(B) Lignin / lignin
(C) Cellulose / lignin
(D) Lignin / suberin

6 The opposite figure shows part of a cross section in a young dicot stem. Study it, then answer: Which of the following statements is incorrect?



(A) Tissue (X) is less hard than tissue (Y)

(B) The cells of tissue (Y) are not living

(C) The same substance is deposited on the cell walls of both (X) and (Y)

(D) (Z) is xylem tissue

7 Which of the following substances is deposited on the walls of sclerenchyma cells?

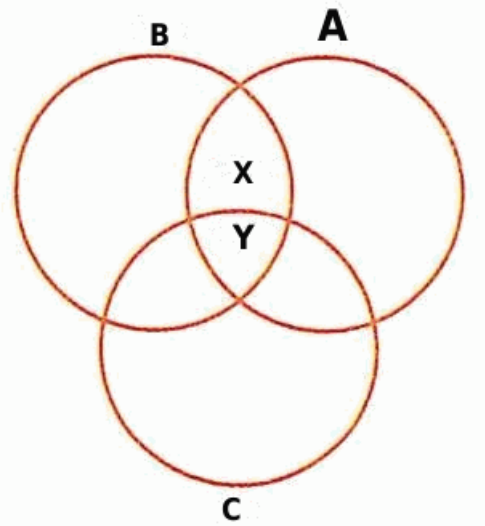
(A) Cutin

(B) Lignin

(C) Cutin and lignin

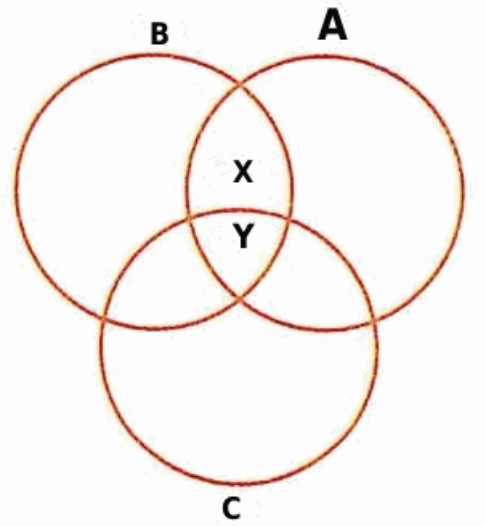
(D) Lignin and suberin

8 The opposite figure shows some common features of three different plant cells. If (A) is an epidermis cell, (B) is a collenchyma cell and (C) is a sclerenchyma cell, answer:
Which of the following describes (X)?



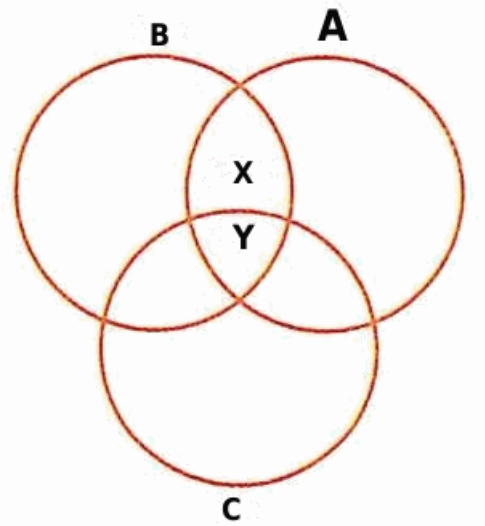
(A) Presence of cutin
(B) Deposition of lignin
(C) Presence of cytoplasm
(D) Deposition of suberin

9 The opposite figure shows some common features of three different plant cells. If (A) is an epidermis cell, (B) is a collenchyma cell and (C) is a sclerenchyma cell, answer:
Which of the following represents (Y)?



(A) Absence of protoplasm
(B) Absence of the nucleus
(C) Presence of a cell wall
(D) The type of substance deposited on the cell wall

10 The opposite figure shows some common features of three different plant cells. If (A) is an epidermis cell, (B) is a collenchyma cell and (C) is a sclerenchyma cell, answer:
Which of the following distinguishes cell (C) from cells (A) and (B)?



(A) Presence of the nucleus
(B) Absence of cytoplasm
(C) Presence of chloroplasts
(D) Deposition of suberin

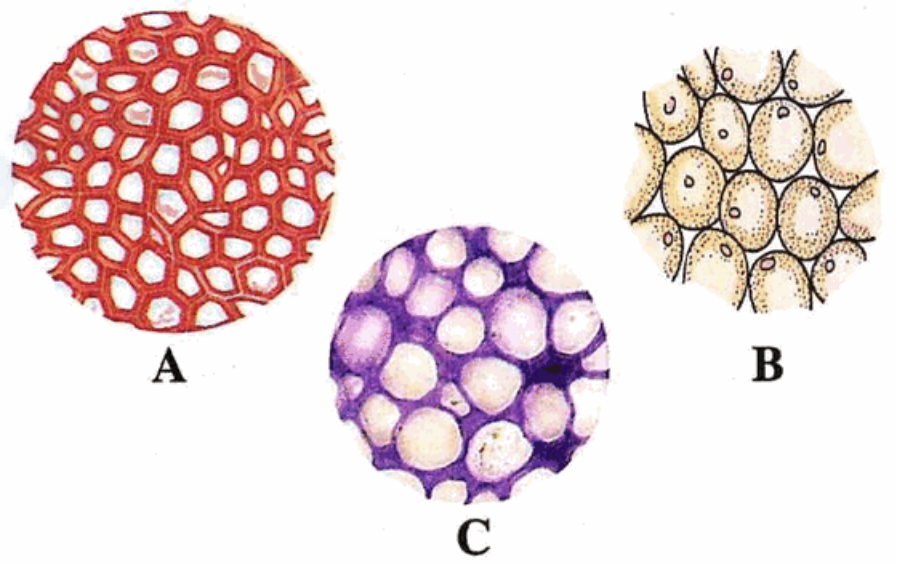
11 Which substance covers the epidermis of the stems and leaves of the bean plant?
(A) Suberin (B) Lignin (C) Cutin (D) Cellulose

12 Which of the following substances increase the strength of plant cell walls?
(A) Cutin only
(B) Cellulose only
(C) Suberin and pectin
(D) Cellulose and lignin

13 Which of the following does not agree with the rest regarding support in the plant?
(A) Cellulose (B) Chitin (C) Lignin (D) Suberin

14 Which of the following protect the inner tissues of trees and prevent water loss?
(A) Cellulose and lignin
(B) Cutin and cellulose
(C) Cutin and suberin
(D) Lignin and suberin

15 The opposite figures show several plant tissues. Which of them contain cellulose deposits?



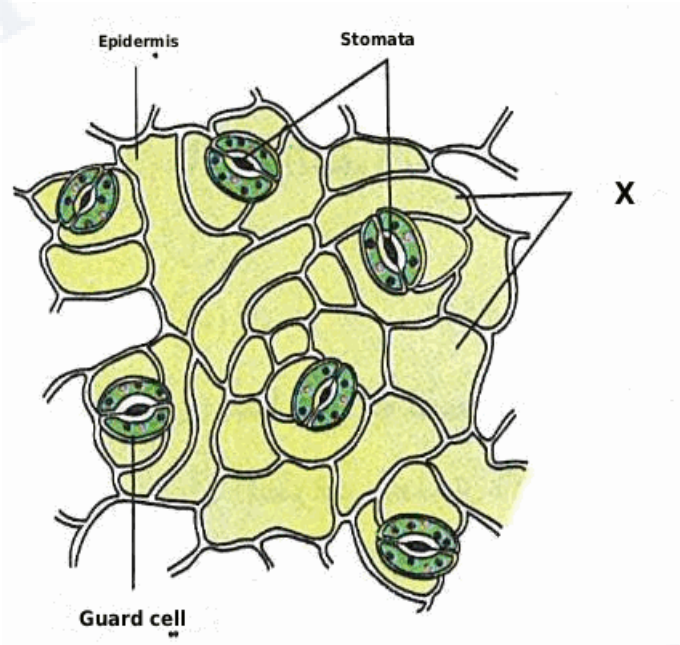
(A) (A) only (B) (C) only (C) (A), (B) (D) (B), (C)

16 The following table shows the thickness of the cutin layer (mm) on the stems of four different plants. Which of these plants has the most support?

(A) Plant (A): 0.3 mm (B) Plant (B): 1 mm

(C) Plant (C): 0.6 mm (D) Plant (D): 0.8 mm

17 The opposite figure shows part of the lower surface of a leaf of a herbaceous plant, showing structures called stomata through which most transpiration takes place. Why are cells (X) able to protect the inner tissues of the plant?



(A) Deposition of lignin
(B) Deposition of cellulose
(C) Deposition of cutin
(D) Deposition of cellulose and lignin

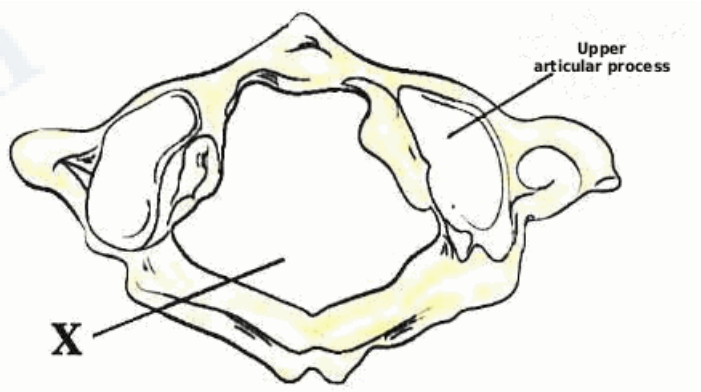
18 Plum fruits keep their water content because their outer layer contains .....

(A) suberin (B) cellulose (C) cutin (D) lignin

19 Which of the following is not an importance of support in plants?

(A) Giving the plant hardness
(B) Preventing water loss
(C) Protecting the inner tissues of the plant
(D) Transporting water and mineral salts

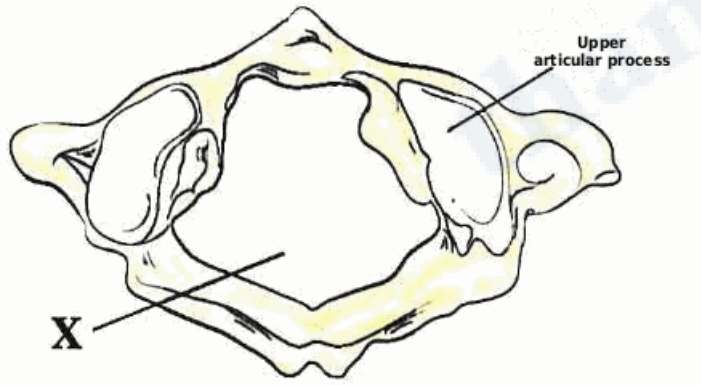
20 The opposite figure shows one of the vertebrae of the human vertebral column:
Which of the following lies directly above (X) in the anatomical position?



(A) The first cervical vertebra
(B) The foramen magnum
(C) The second cervical vertebra
(D) The lower jaw

---

21 The opposite figure shows one of the vertebrae of the human vertebral column:
What happens if the upper articular process is missing?



(A) A defect in the articulation with the second cervical vertebra
(B) A defect in the articulation with the bones of the cranium
(C) Erosion of the bones of the second cervical vertebra
(D) Erosion of the bones of the cranium

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22 Which of the following vertebrae is the largest movable vertebra in the human vertebral column?

(A) 7
(B) 19
(C) 24
(D) 25

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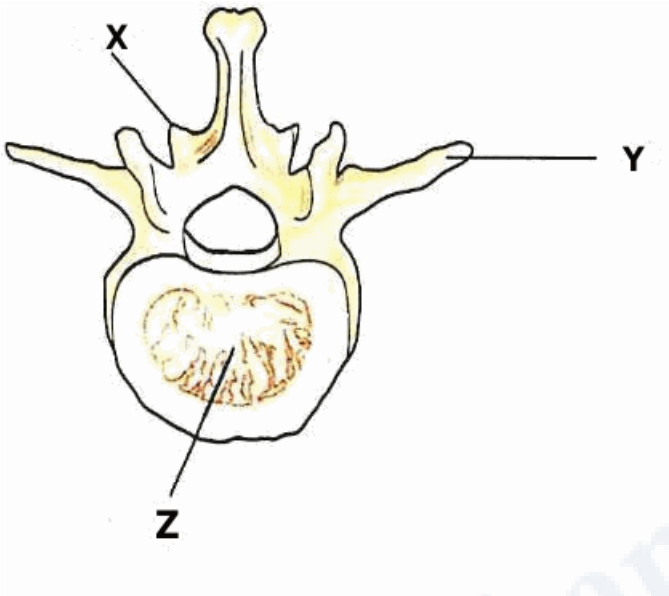
23 How many shapes of cervical vertebrae are there in the human vertebral column?

(A) 1
(B) 2
(C) 3
(D) 4

24 How many types of movable vertebrae are there in the human vertebral column?

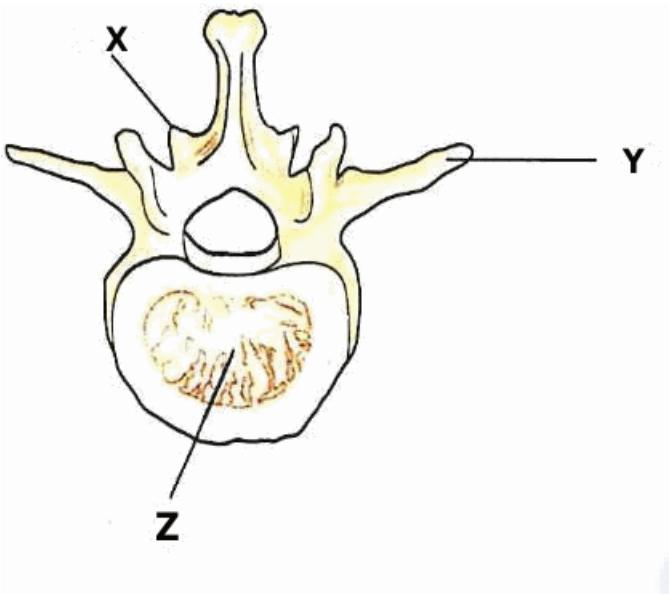
(A) 2 (B) 3 (C) 4 (D) 5

25 The opposite figure shows the fourth lumbar vertebra of a human. Study it, then answer:
What is the number of the vertebra that articulates with part (Z)?



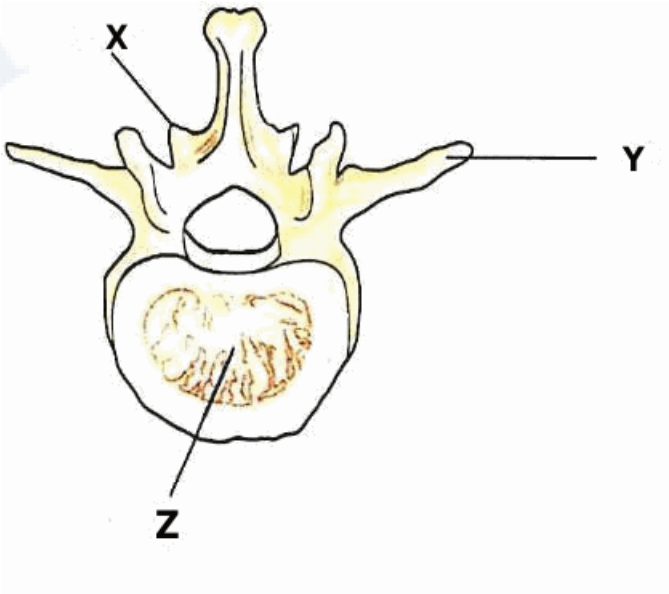
(A) 3 (B) 5 (C) 22 (D) 24

26 The opposite figure shows the fourth lumbar vertebra of a human. Study it, then answer:
Which of the following has the same direction as structure (Y)?



(A) The right upper limb (B) The left lower limb
(C) The sternum (D) The pubic symphysis

27 The opposite figure shows the fourth lumbar vertebra of a human. Study it, then answer:
What is the correct direction of structure (X)?



(A) Lower right (B) Lower left (C) Upper right (D) Upper left

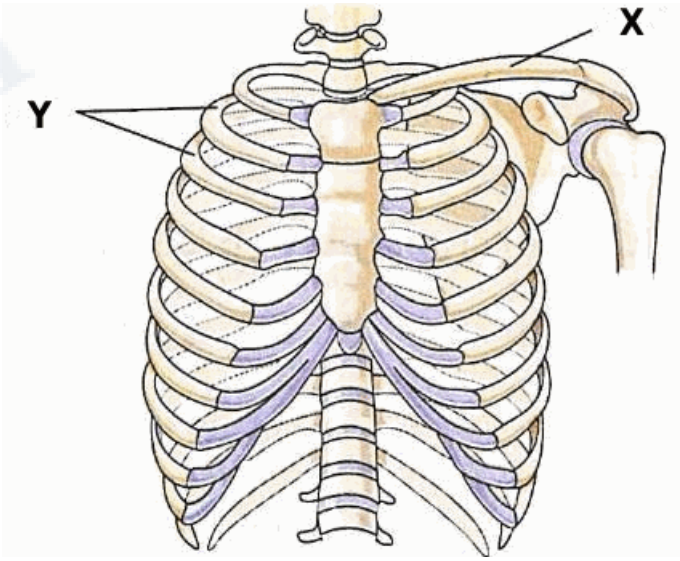
28 If you know that the giraffe has seven cervical vertebrae, what can you conclude?

(A) The vertebrae are similar in shape
(B) Each vertebra has a size that suits its function
(C) The number of vertebrae differs between organisms
(D) The sizes of vertebrae are equal in different organisms

29 Which of the following is on the same side as the sternum in the anatomical position?

(A) The pubis (B) The hip (C) The ilium (D) The scapula

30 The opposite figure shows the structure of the human rib cage. What distinguishes (X) from (Y)?



(A) The type of tissue
(B) Connection with the thoracic vertebrae
(C) Connection with the scapula
(D) Connection with the sternum

31 How many bones are there in the human axial skeleton?

(A) 153 (B) 126 (C) 80 (D) 51

32 The size of vertebra number (20) compared with the size of vertebra number (19) of the human vertebral column is .....

(A) smaller (B) equal (C) slightly larger (D) much larger

33 In which region is the vertebra that divides the vertebral column into two equal numbers?

(A) Cervical (B) Thoracic (C) Lumbar (D) Sacral

34 How many bones are there in the human vertebral column?

(A) 24 (B) 26 (C) 28 (D) 33

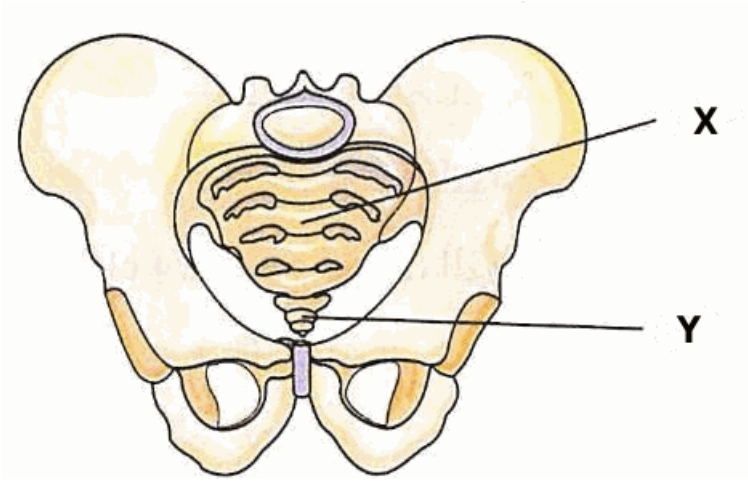
35 Which of the following structures does not belong to the axial skeleton?

(A) The clavicle
(B) The sternum
(C) The twelfth rib
(D) The first coccygeal vertebra

36 In which of the following are the first and third vertebrae of the vertebral column similar?

(A) Shape (B) Size (C) Function (D) Type

37 Which of the following is true for the two groups (X) and (Y) of vertebrae of the vertebral column?



(A) They have the same number of bones

(B) They have the same number of vertebrae

(C) They connect with the ilium

(D) They have equal sizes

38 What is vertebra number (27) of the vertebral column?

(A) The second lumbar (B) The third sacral

(C) The fourth coccygeal (D) The second sacral

39 What type is vertebra number (15) of the vertebral column?

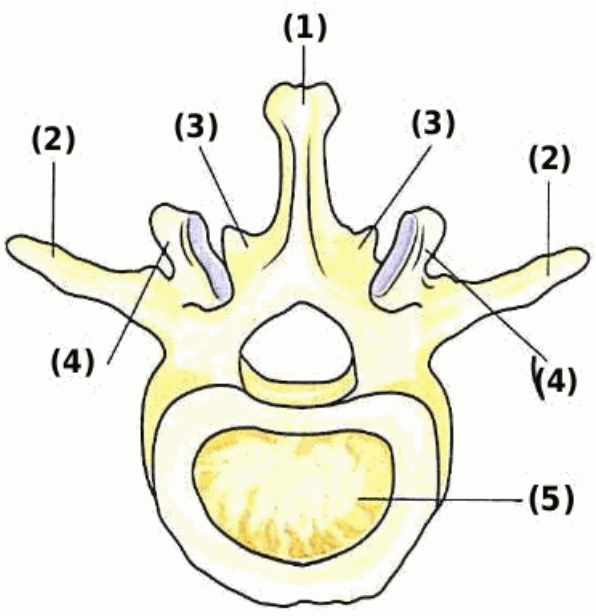
(A) Lumbar (B) Coccygeal (C) Sacral (D) Thoracic

40 Which of the following is the direction of curvature of the cervical, thoracic and lumbar groups of vertebrae, respectively?

(A) Forward / backward / forward (B) Backward / forward / forward

(C) Forward / forward / backward (D) Backward / backward / forward

41 In the opposite figure, which numbers represent the parts that help the movement of the vertebral column?



(A) (1), (2) (B) (2), (3) (C) (3), (4) (D) (2), (5)

42 What is the number of the vertebra to which rib pair number (5) is connected?

(A) 12 (B) 13 (C) 14 (D) 15

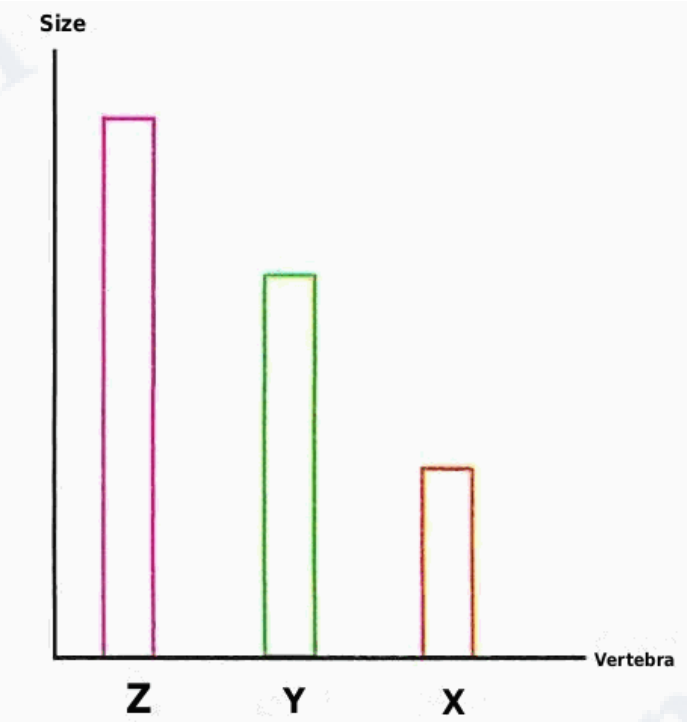
43 Which pair of ribs is connected to vertebra number (17) of the vertebral column?

(A) The seventh (B) The eighth (C) The ninth (D) The tenth

44 What is the number of the middle cervical vertebra?

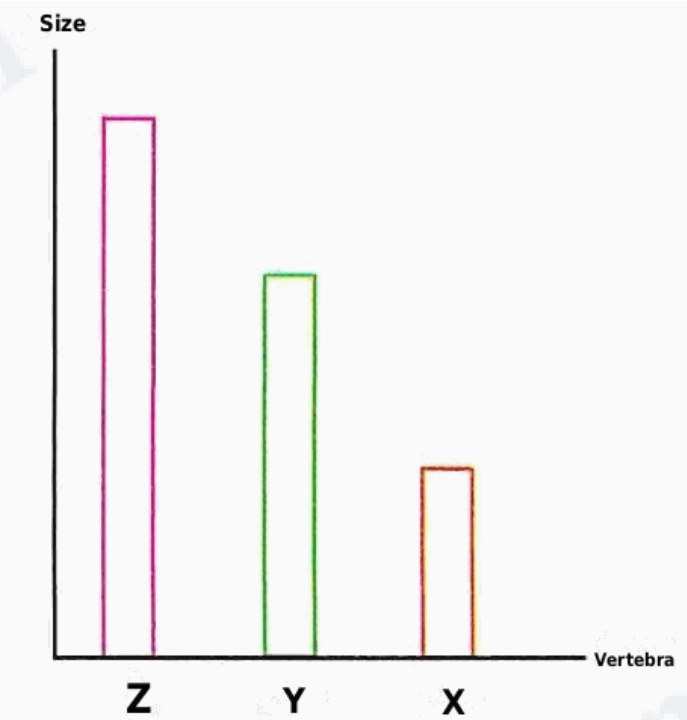
(A) 3 (B) 4 (C) 5 (D) 7

45 The opposite graph shows the sizes of three types of movable vertebrae in humans:
What do vertebrae (X), (Y) and (Z) represent, respectively?



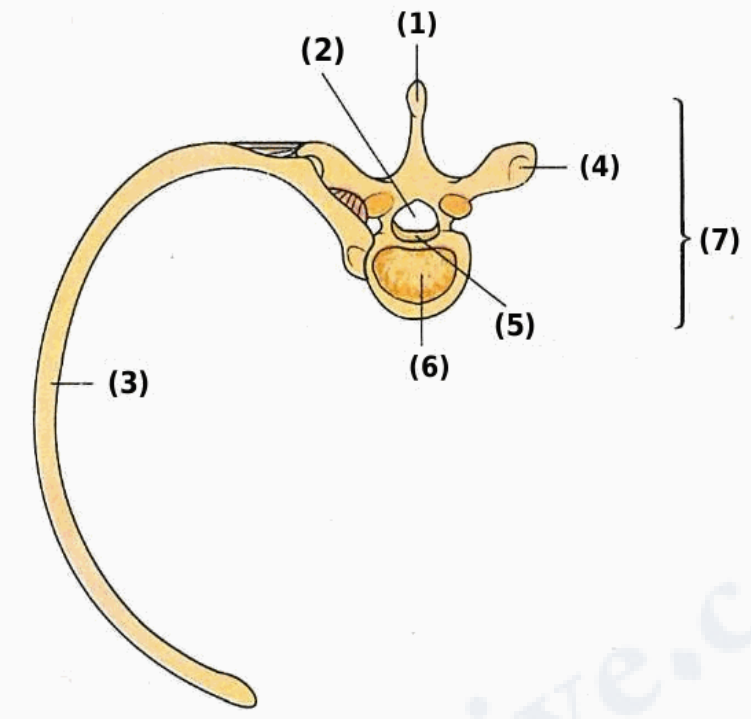
(A) Lumbar / cervical / thoracic
(B) Cervical / thoracic / lumbar
(C) Lumbar / thoracic / cervical
(D) Cervical / lumbar / thoracic

46 The opposite graph shows the sizes of three types of movable vertebrae in humans:
How many vertebrae of type (Y) are there?



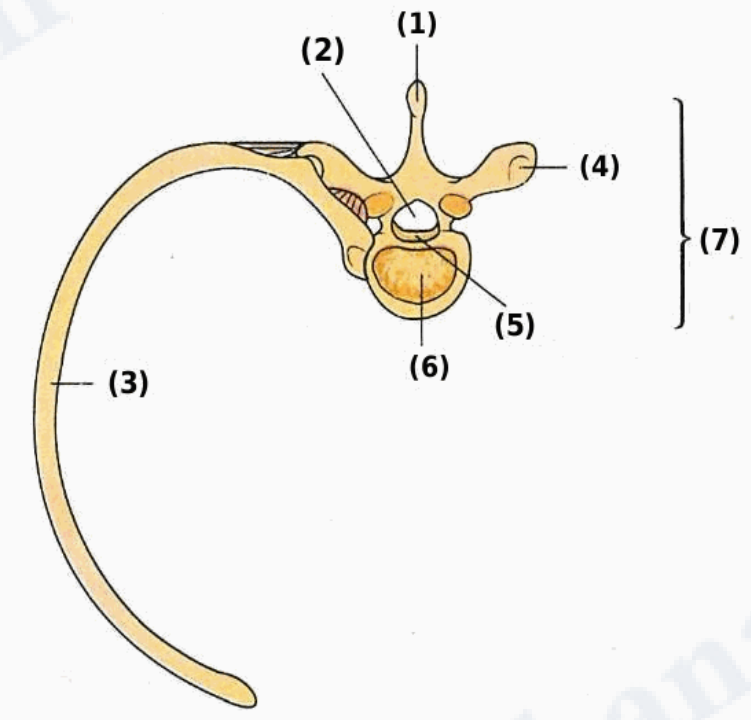
(A) 4 (B) 5 (C) 7 (D) 12

47 The opposite figure shows part of the human axial skeleton. Study it, then answer:
In which region of the vertebral column is this structure found?



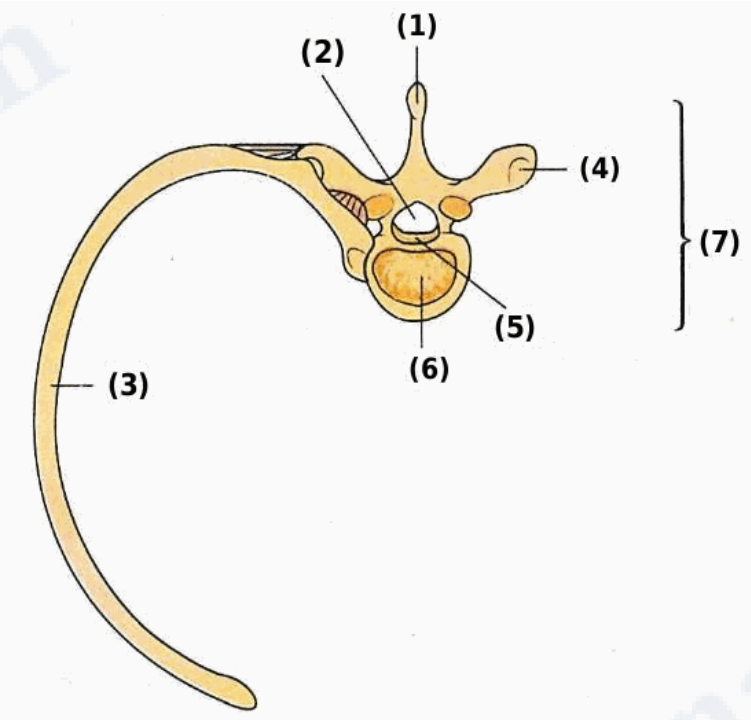
(A) Sacral (B) Lumbar (C) Thoracic (D) Cervical

48 The opposite figure shows part of the human axial skeleton. Study it, then answer:
What is the number of the part through which a component of the central nervous system passes?



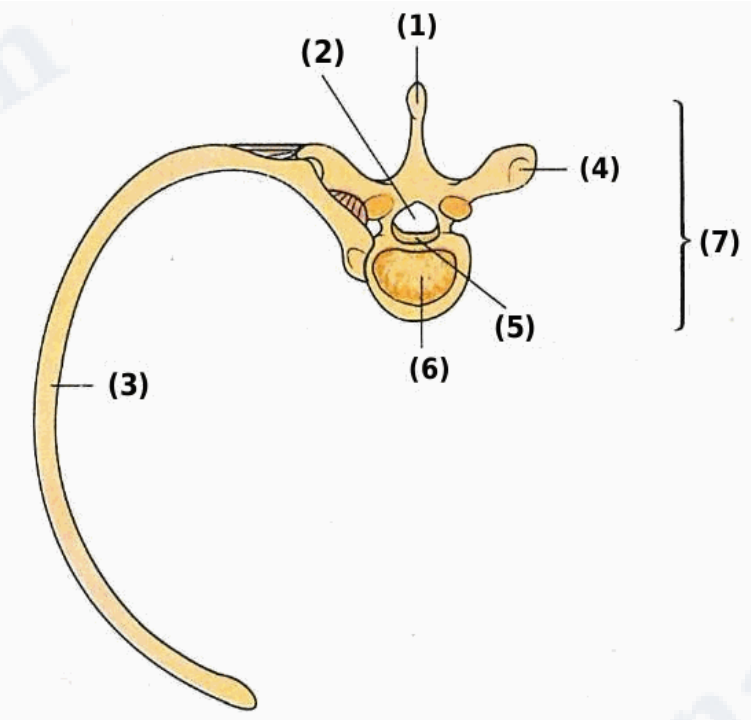
A (1) B (2) C (5) D (6)

49 The opposite figure shows part of the human axial skeleton. Study it, then answer:
Which of the following ribs can number (3) represent?



(A) The eleventh right rib
(B) The sixth right rib
(C) The twelfth left rib
(D) The seventh left rib

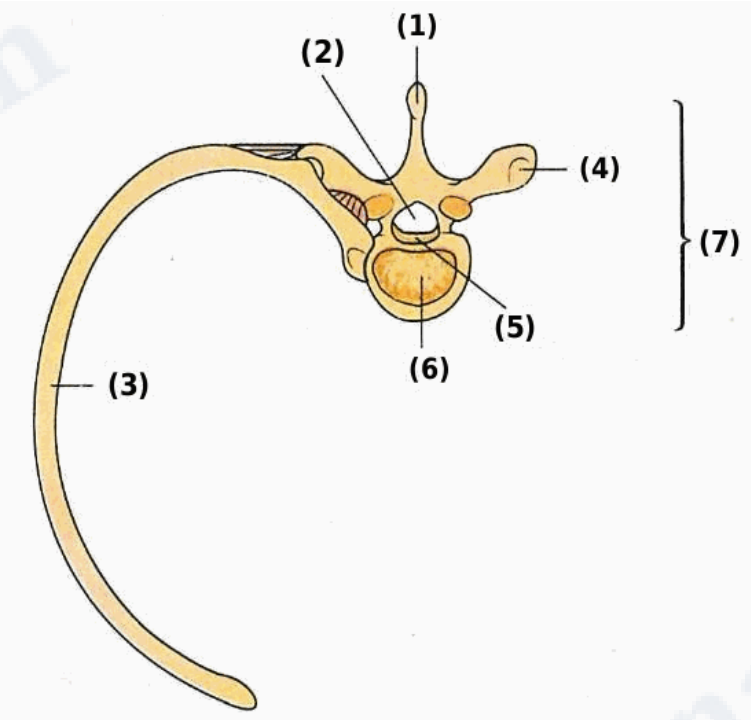
50 The opposite figure shows part of the human axial skeleton. Study it, then answer:
What does part number (4) represent?



(A) A spinous process
(B) An upper articular process
(C) A lower articular process
(D) A transverse process

51 The opposite figure shows part of the human axial skeleton. Study it, then answer:

Part number (6) articulates with vertebra number .....



(A) 12 (B) 13 (C) 14 (D) 17

52 If the rib number is (X), what is the number of the vertebra it is connected to?

(A) X + 7 (B) X – 7 (C) 18 – X (D) 19 – X

53 Which of the following gives the position of the vertebra that divides the vertebral column into two equal numbers?

(A) It comes before the vertebra connected to the second pair of floating ribs

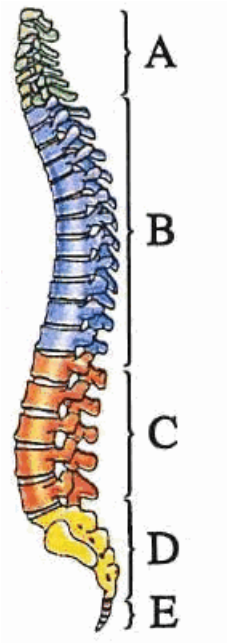
(B) It comes after the vertebra connected to the second pair of floating ribs

(C) It comes before the vertebra connected to the first pair of floating ribs

(D) It comes after the vertebra connected to the first pair of floating ribs

54 From the opposite figure:

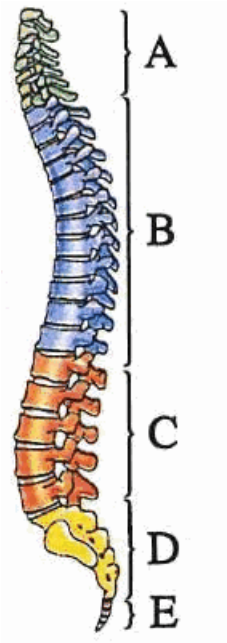
Which of the following groups take part in the connection with the other parts of the human axial skeleton?



(A) A, B (B) B, C (C) D, E (D) B, D

55 From the opposite figure:

Which of the following parts do not belong to the trunk region in humans?

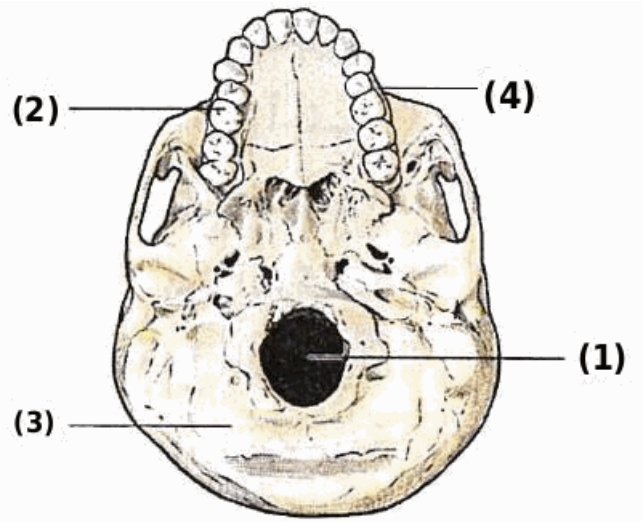


(A) (A) only (B) (B) only (C) (B), (C) (D) (D), (E)

56 How many paired processes are there in a thoracic vertebra?

(A) 2 (B) 3 (C) 6 (D) 7

57 Which of the following is true about the opposite figure?



(A) Structure (2) belongs to the skeletal system

(B) Structure (4) is a movable jaw

(C) Through structure (1) the brain is connected to the spinal cord

(D) Structure (3) is a facial part that protects the brain and the sense organs

58 In what are the cervical vertebrae similar to the lumbar vertebrae?

(A) Shape (B) Size (C) Articulation (D) Number

59 Which of the following represents two vertebrae that differ in general shape?

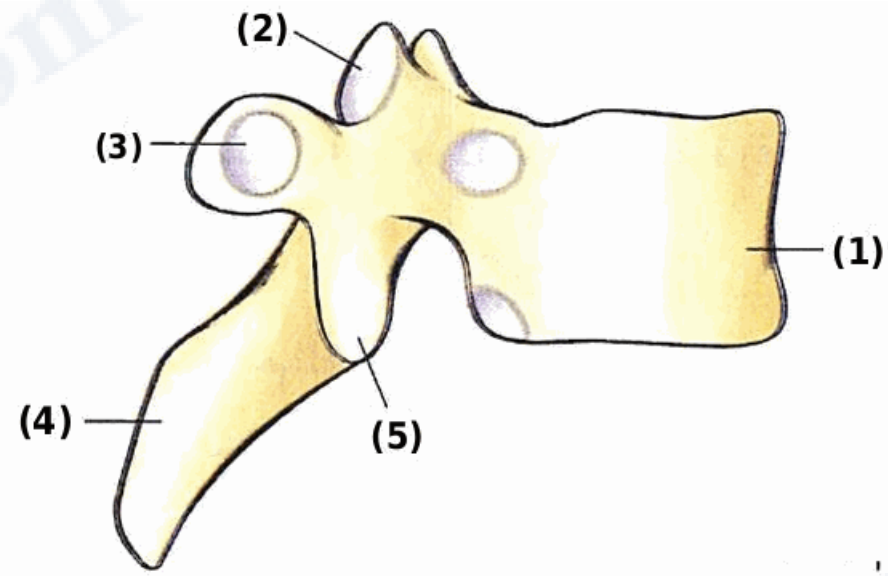
(A) 1, 2 (B) 6, 7 (C) 18, 19 (D) 20, 21

60 What is the ratio of the number of movable vertebrae to the number of fused vertebrae?

(A) 3 : 8 (B) 9 : 7 (C) 8 : 3 (D) 3 : 5

61 The figure in front of you is a side view of a vertebra. If this is vertebra number (18) of the vertebral column, answer:

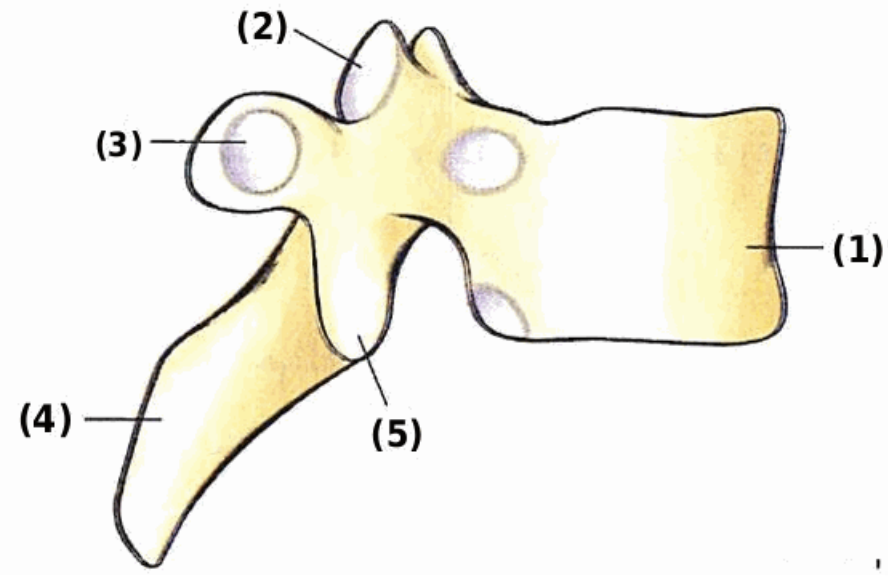
Which of the following structures connects this vertebra with vertebra number (17)?



(A) (2) (B) (3) (C) (4) (D) (5)

62 The figure in front of you is a side view of a vertebra. If this is vertebra number (18) of the vertebral column, answer:

Which of the following structures connects this vertebra with vertebra number (19)?



(A) (2) (B) (3) (C) (4) (D) (5)

63 How many bones are formed by the fusion of some vertebrae of the human vertebral column?

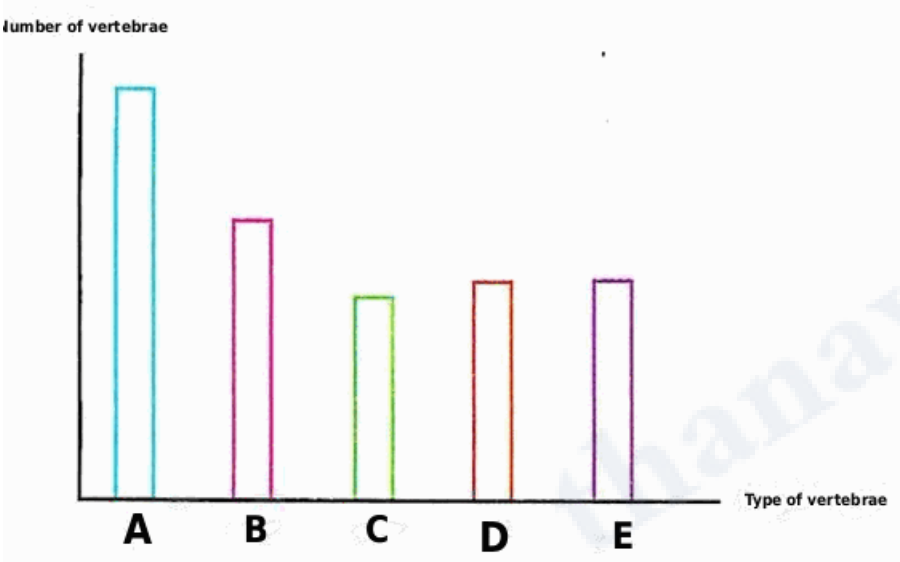
(A) 1 (B) 2 (C) 5 (D) 9

64 Which of the following is not a function of the axial skeleton?

(A) Protecting the spinal cord
(B) Supporting the heart
(C) Helping in movement
(D) Protecting the lungs

65 The opposite graph shows the numbers of the types of vertebrae of the vertebral column. Study it, then answer:

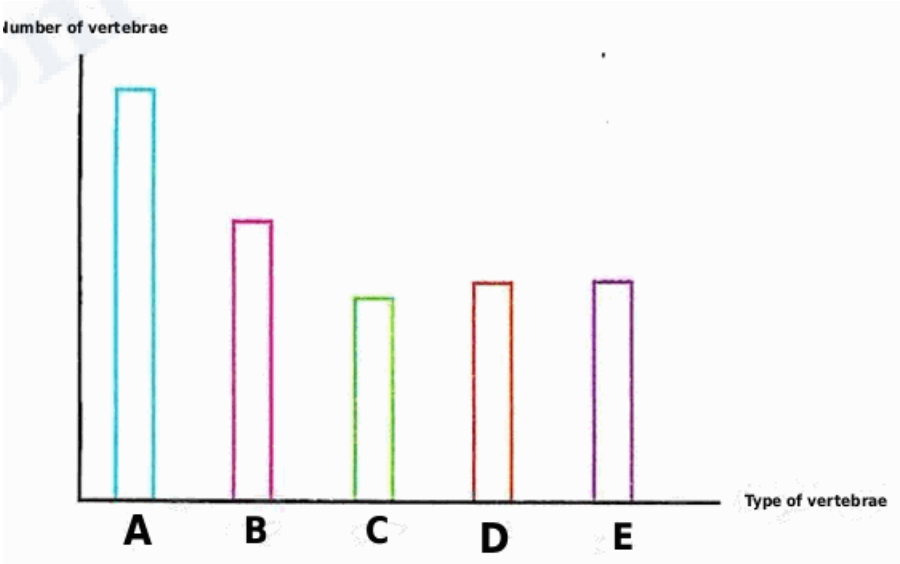
If (E) refers to the sacral vertebrae, which of the following is the correct order of the vertebrae of the vertebral column from top to bottom?



(A) B → A → C → E → D
(B) D → C → A → E → B
(C) B → A → D → E → C
(D) B → D → A → E → C

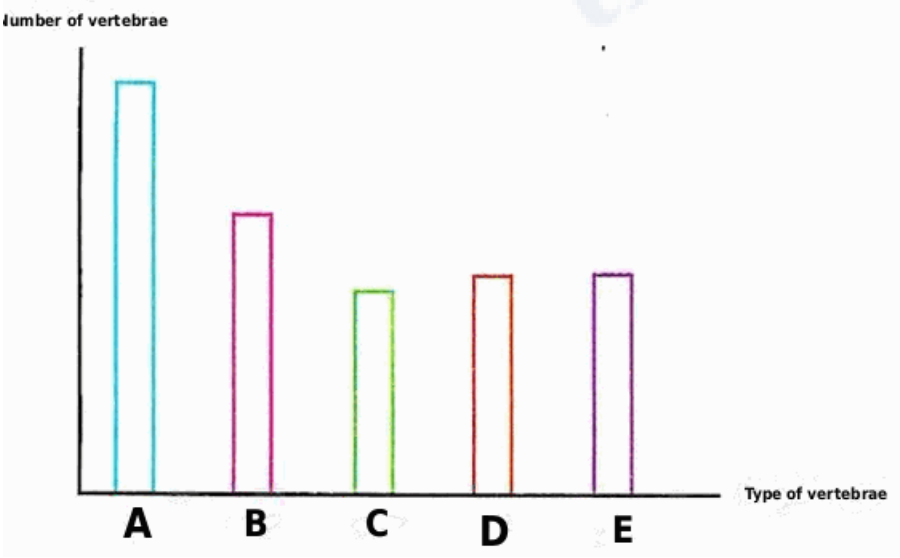
66 The opposite graph shows the numbers of the types of vertebrae of the vertebral column. Study it, then answer:

The vertebra that articulates with the skull belongs to .....



67 The opposite graph shows the numbers of the types of vertebrae of the vertebral column. Study it, then answer:

Which vertebrae take part in forming the rib cage?



68 Which of the following bones has the greatest effect on the movement of the lower part of the lower limb?

(A) The femur (B) The fibula (C) The tibia (D) The patella

69 Which of the following bones has no cavities?

(A) The ulna (B) The pelvis (C) The scapula (D) The radius

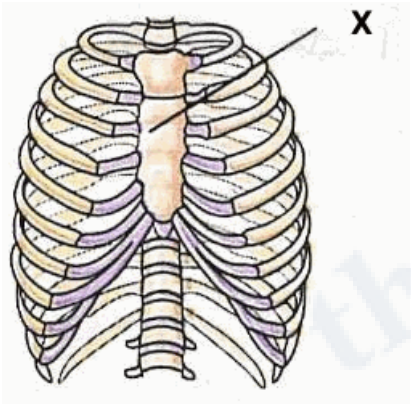
70 Which of the following bones of the axial skeleton is connected to the pectoral girdle?

(A) The seventh cervical vertebra (B) The first rib
(C) The first thoracic vertebra (D) The sternum

71 How many bones are there in one human upper limb?

(A) 15 (B) 20 (C) 25 (D) 30

72 From the opposite figure, bone (X) is connected to the two upper limbs by .....



(A) one pair of bones (B) ten pairs of bones
(C) eleven pairs of bones (D) twelve pairs of bones

73 How many bones are there in one human foot?

(A) 12 (B) 17 (C) 26 (D) 27

74 Which of the following corresponding parts of the upper limb and the lower limb differ in number of bones?

(A) The forearm and the leg
(B) The wrist and the ankle
(C) The palm and the metatarsus
(D) The phalanges of the hand and the phalanges of the foot

75 In what are the wrist bones similar to the ankle bones?

(A) Number (B) Type of tissue (C) Shape (D) Size

76 Which of the following is the correct order of the bones by length, from the longest to the shortest?

(A) Humerus → femur → ulna
(B) Ulna → femur → humerus
(C) Femur → humerus → ulna
(D) Ulna → humerus → femur

77 If the number of bones of the upper limb is (X), how many bones are there in the lower limb?

(A) X (B) X + 1 (C) X − 1 (D) X + 2

78 In what do the bones of the palm differ from the metatarsal bones of the foot?

(A) Number (B) Length (C) Type of tissue (D) Type of skeleton

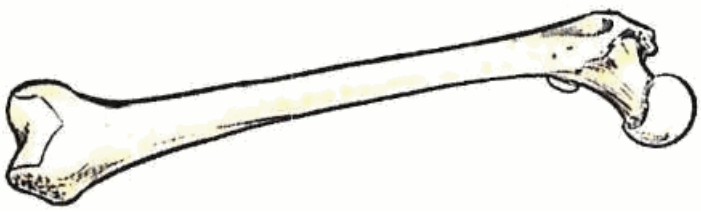
79 How many cavities are there in the appendicular skeleton?

(A) 2 (B) 4 (C) 6 (D) 8

80 What is the total number of bones of the pectoral girdle and the rib cage together with the thoracic vertebrae?

(A) 25 (B) 29 (C) 37 (D) 41

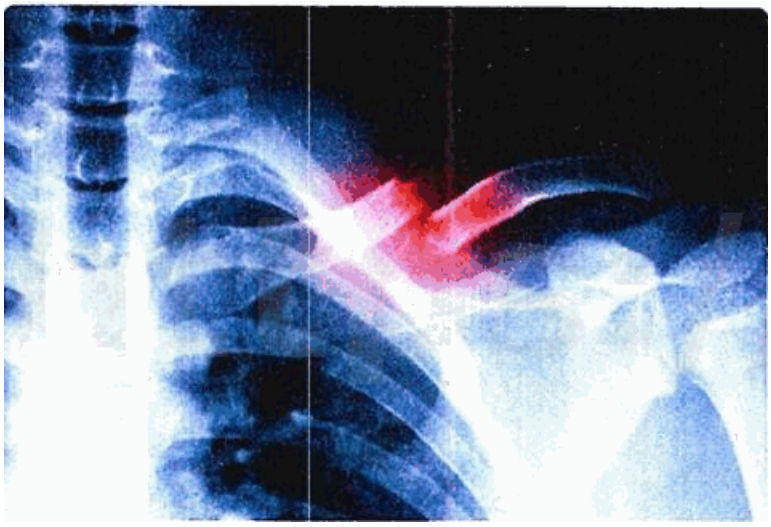
81 Which of the following statements applies to the opposite bone?



(A) It forms the upper part of the upper limb
(B) It forms the upper part of the lower limb
(C) Another bone lies parallel to it, and together they form part of one upper limb
(D) Another bone lies parallel to it, and together they form part of one lower limb

82 From the opposite figure:

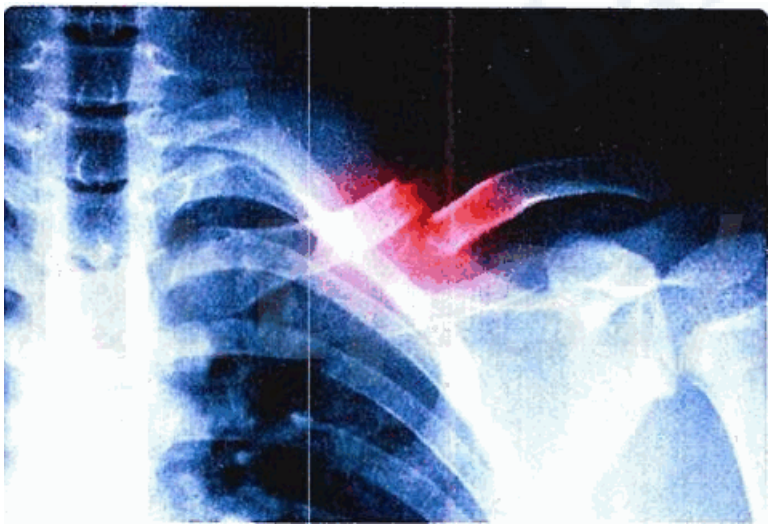
Which side does this figure represent?



(A) Right, front (B) Right, back (C) Left, front (D) Left, back

83 From the opposite figure:

Which bone does the red shading show to be broken?



(A) The scapula (B) The clavicle

(C) The sternum (D) The head of the humerus

84 Which of the following includes more than half the number of bones of the body?

(A) The girdles and the ribs

(B) The two upper limbs and the two lower limbs

(C) The vertebral column and the ribs

(D) The vertebral column and the girdles

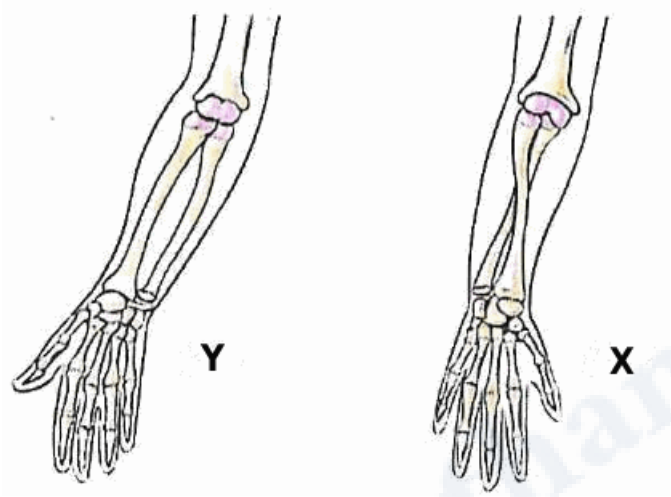
85 Which of the following is made of the smallest number of bones?

(A) The ankle
(B) The forearm
(C) The pectoral girdle
(D) The skull

86 How many bones are there in the appendicular skeleton?

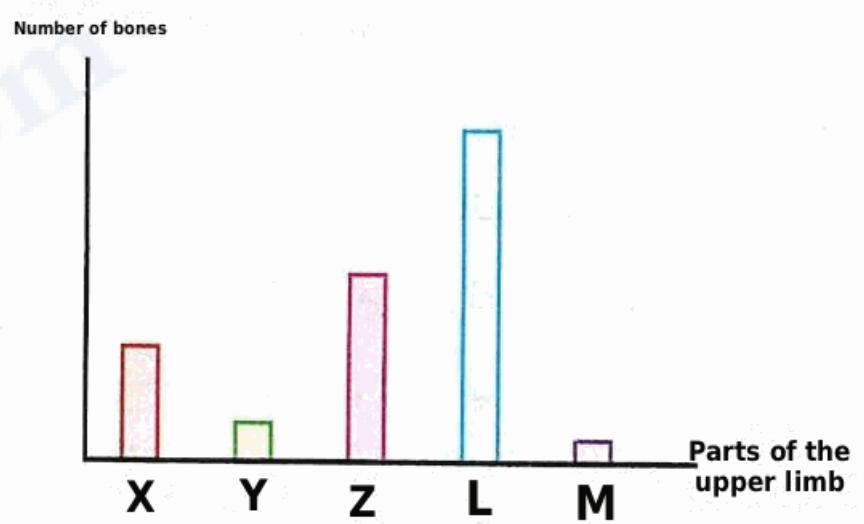
(A) 80 (B) 126 (C) 206 (D) 260

87 Which of the following statements applies to the two opposite figures (X) and (Y)?



(A) (X) is the left arm and (Y) is the right arm
(B) (X) is the right arm and (Y) is the left arm
(C) (X) is a broken arm and (Y) is a healthy arm
(D) (X) is (Y) after the rotation of the radius

88 The graph in front of you shows the number of bones of the parts of one human upper limb. Which of the following is the correct order of the bones of this limb from top to bottom?



(A) L → Y → Z → X → M
(B) M → Y → X → Z → L
(C) M → Y → Z → X → L
(D) L → X → Z → Y → M

89 From the opposite figure, which bones is this structure connected to in the human body?



(A) The first ten pairs of ribs only
(B) The first ten pairs of ribs and the two clavicles
(C) The twelve pairs of ribs only
(D) The twelve pairs of ribs and the two scapulae

90 Which of the following tissues covers the heads of bones?

(A) Nervous (B) Connective (C) Muscular (D) Epithelial

91 Which of the following applies to the knee joint?

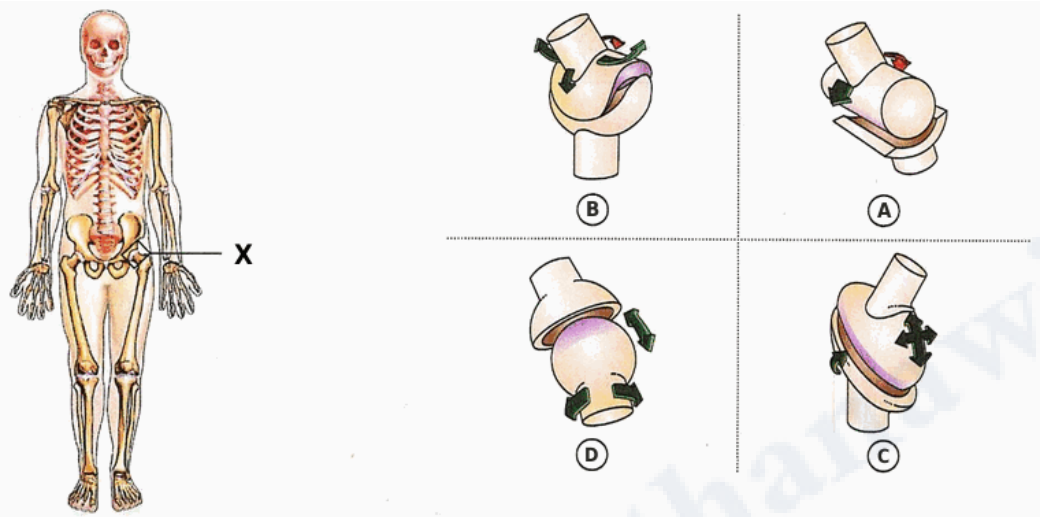
(A) It is formed where two bones meet

(B) It includes all the components of the skeletal system

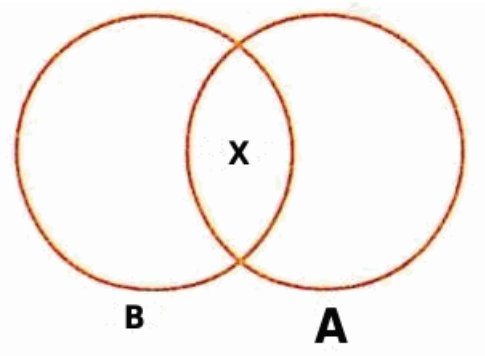
(C) It moves in a circular movement

(D) It includes a cartilage disc

92 Which of the following figures shows the movement at joint (X)?



93 The figure in front of you shows two joints in the human body: (A) is the knee joint and (B) is the hip joint. Which of the following does not correctly describe (X)?



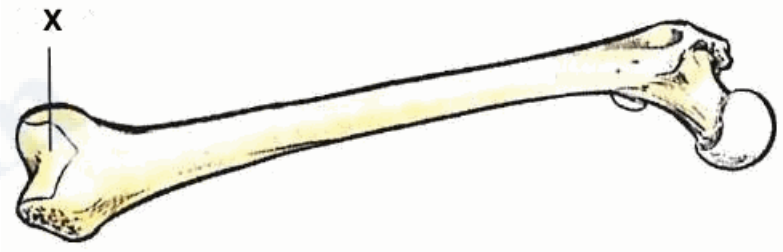
(A) The type of tissue between the bones at the joint

(B) The number of bones forming the joint

(C) The type of limb the joint belongs to

(D) The type of skeleton the joint belongs to

94 Which of the following joints does part (X) of the bone in front of you help to form?



(A) The elbow (B) The knee (C) The shoulder (D) The hip

95 Which of the following movements does not need joints?

(A) Chewing food
(B) Nodding the head
(C) Kicking a ball
(D) Closing the eyes

96 What type of joints connect the limbs with the girdles in humans?

(A) Freely movable synovial joints
(B) Slightly movable synovial joints
(C) Fibrous
(D) Cartilaginous

97 Which of the following bones form the shoulder joint?

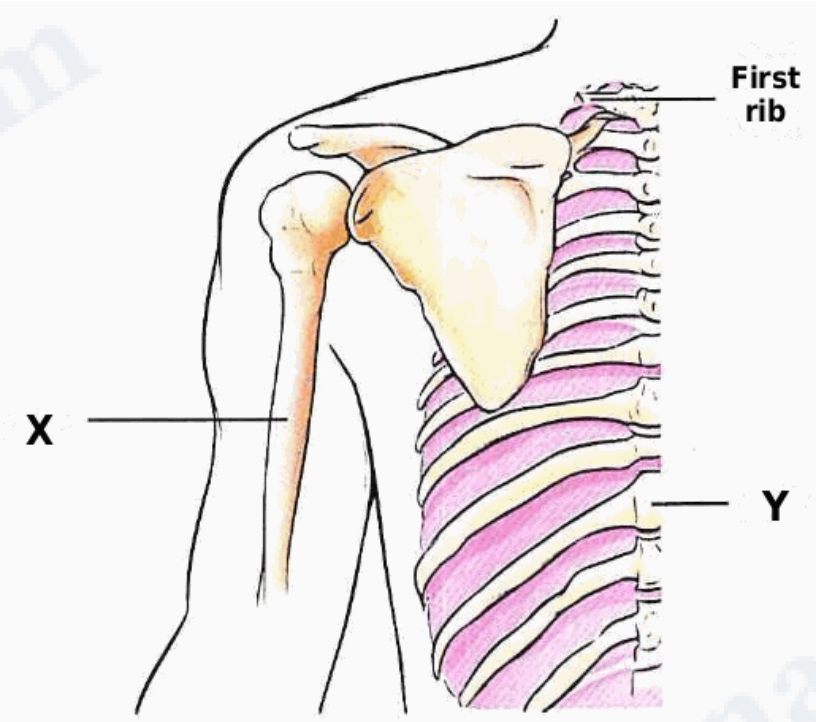
(A) The humerus, the scapula and the clavicle
(B) The humerus, the ulna and the radius
(C) The humerus and the clavicle only
(D) The humerus and the scapula only

98 Which of the following statements about synovial joints is true?

(A) They are all joints that allow movement
(B) They contain equal amounts of synovial fluid
(C) Each is the meeting of two bones only
(D) They contain hard cartilage discs

99 Study the opposite figure, then answer:

Which of the following bones does bone (X) articulate with?



(A) The scapula only

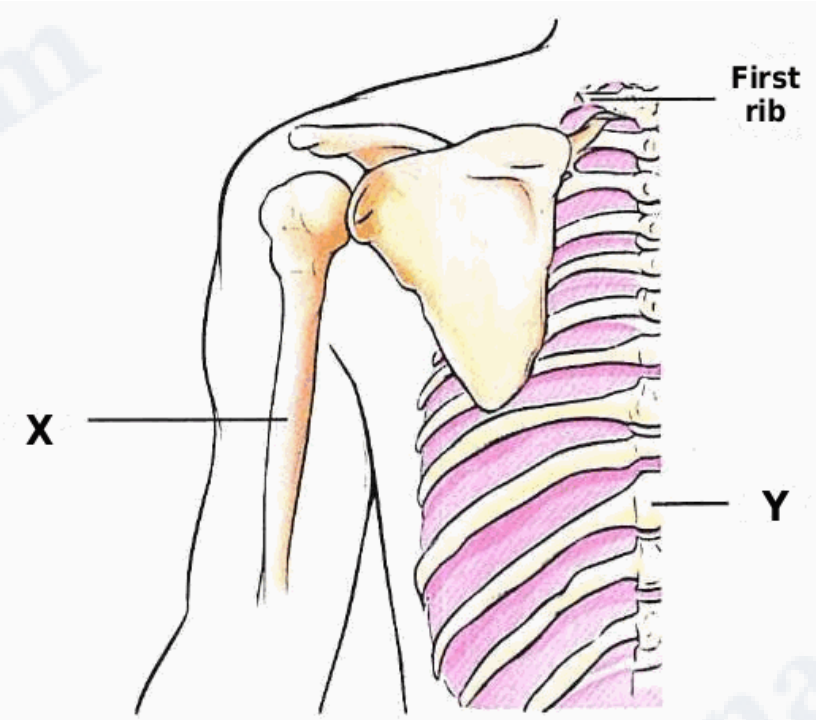
(B) The ulna and the radius only

(C) The scapula and the clavicle

(D) The scapula, the ulna and the radius

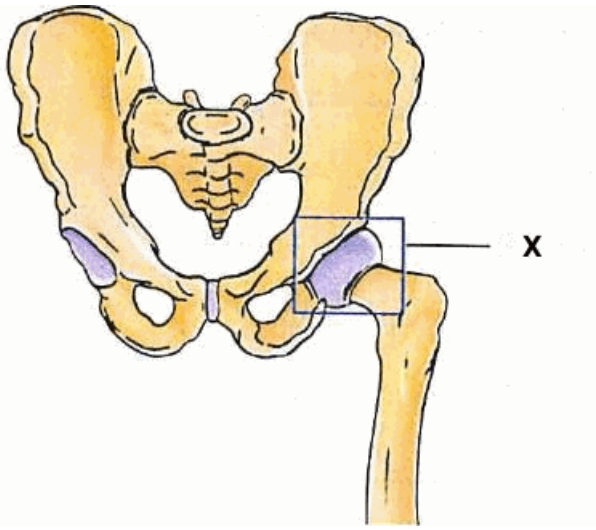
100 Study the opposite figure, then answer:

What is the number of the vertebra pointed to by letter (Y)?



(A) 7 (B) 9 (C) 12 (D) 17

101 From the opposite figure, how many bones form joint (X) in an adult?



(A) Two bones (B) Three bones (C) Four bones (D) Five bones

102 Figures (X) and (Y) show bones of the appendicular skeleton. Which of the following applies to them?



(A) A freely movable synovial joint is formed at the upper part of each of them
(B) A slightly movable synovial joint is formed at the upper part of each of them
(C) A fibrous joint is formed at the lower part of each of them
(D) Cartilaginous joints are formed at the lower part of each of them

103 Why do patients with osteoarthritis feel pain in the knee joint when they move and walk?

(A) Increase in synovial fluid
(B) Erosion of the cartilage
(C) Torn ligaments
(D) Inflamed tendons

104 Which of the following statements is incorrect?

(A) The hip joint is more stable than the shoulder joint
(B) The acetabulum (hip socket) is deeper than the glenoid cavity (shoulder socket)
(C) The hip joint has limited movement compared with the elbow joint
(D) The hip joint contains cartilage

105 Between which of the following pairs of vertebrae are there no cartilaginous joints?

(A) 3, 4
(B) 16, 17
(C) 24, 25
(D) 26, 27

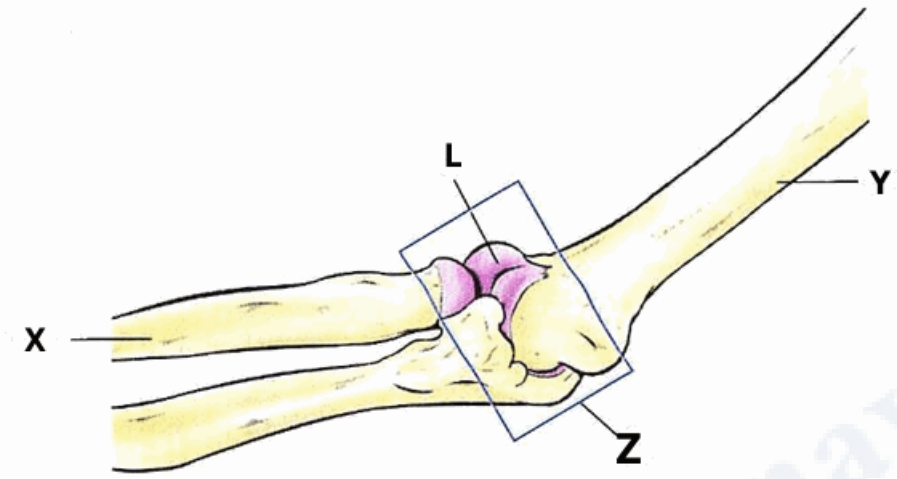
106 Which of the following bones starts with a freely movable synovial joint and ends with a slightly movable synovial joint?

(A) The humerus
(B) The tibia
(C) The radius
(D) The ulna

107 Which of the following bones does the lower part of the tibia articulate with?

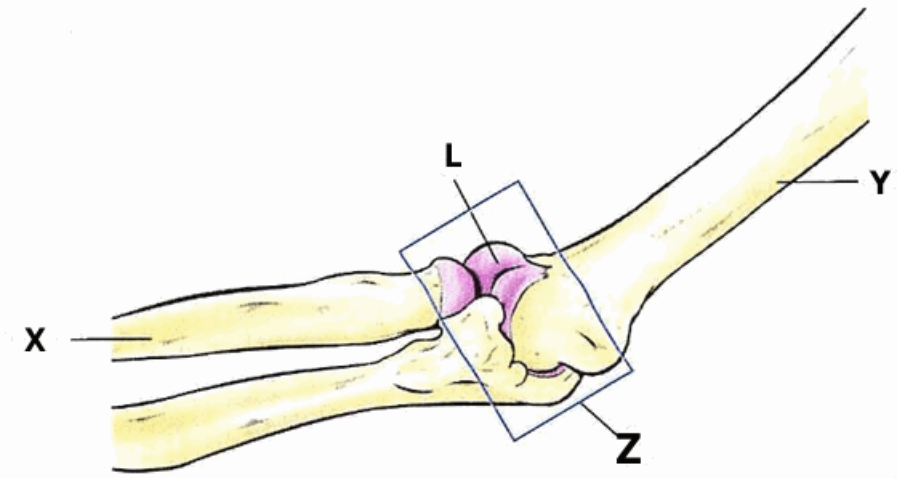
(A) The metatarsals
(B) The femur
(C) The ankle bones
(D) The phalanges of the foot

108 The opposite figure shows part of the upper limb of the human skeleton. Study it, then answer: Which of the following articulates with the lower end of bone (X)?



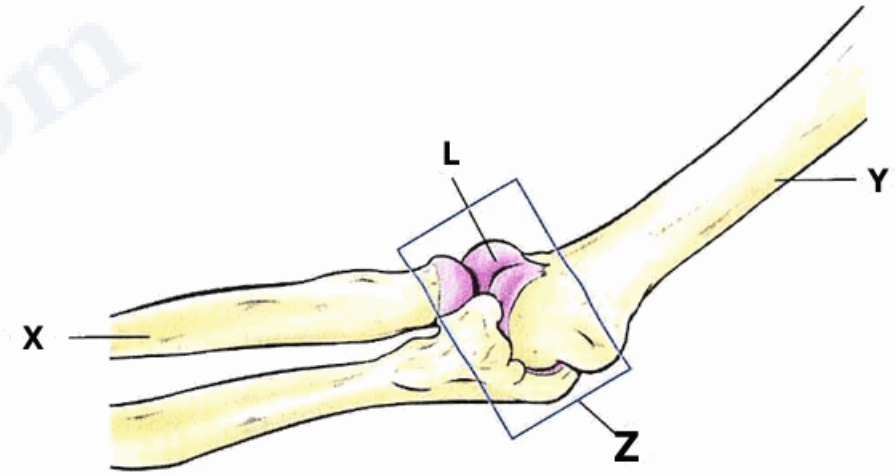
(A) The lower end of the ulna
(B) The lower part of the wrist
(C) The lower end of the humerus
(D) The upper part of the wrist

109 The opposite figure shows part of the upper limb of the human skeleton. Study it, then answer: In the cavity of which of the following does the head of bone (Y) sit?



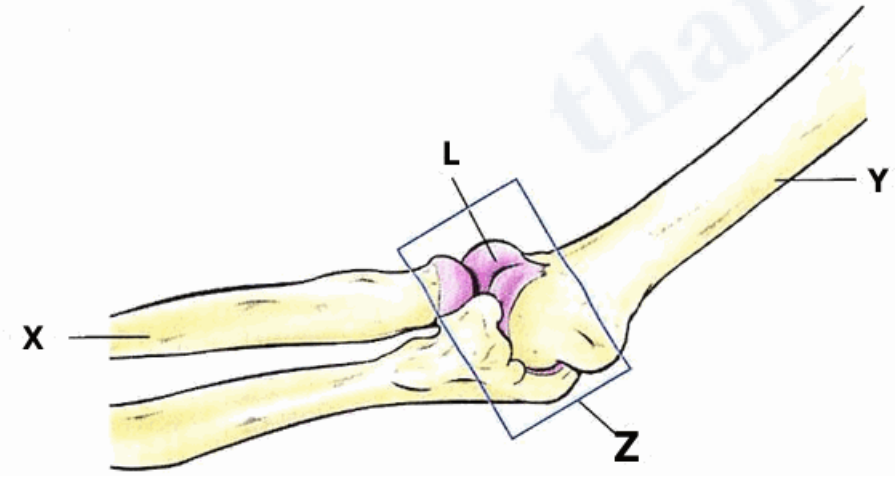
(A) The upper end of the ulna
(B) The lower end of the ulna
(C) The upper end of the radius
(D) The outer end of the scapula

110 The opposite figure shows part of the upper limb of the human skeleton. Study it, then answer: How many bones form joint (Z)?



(A) One bone (B) Two bones (C) Three bones (D) Four bones

111 The opposite figure shows part of the upper limb of the human skeleton. Study it, then answer: Which of the following is true about structure (L)?



(A) It is a connective tissue
(B) It is rich in blood capillaries
(C) It covers the ends of all bones
(D) It is found in all joints

112 Study the opposite figure, which shows a condition of the foot in which the foot swells when it is twisted. In which of the following do you expect a tear at the swollen area?



(A) The nerves (B) The ligaments (C) The muscles (D) The cartilages

113 Which of the following pairs is incorrect?

(A) Synovial joints – allow movement

(B) Cartilages – prevent movement

(C) Tendons – transmit movement

(D) Ligaments – limit the range of movement

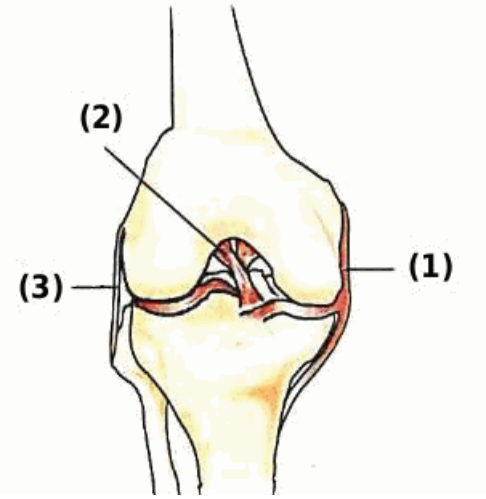
114 How many ligaments connect the femur with the tibia?

(A) 1 (B) 2 (C) 3 (D) 4

115 How many ligaments connect the femur with the fibula?

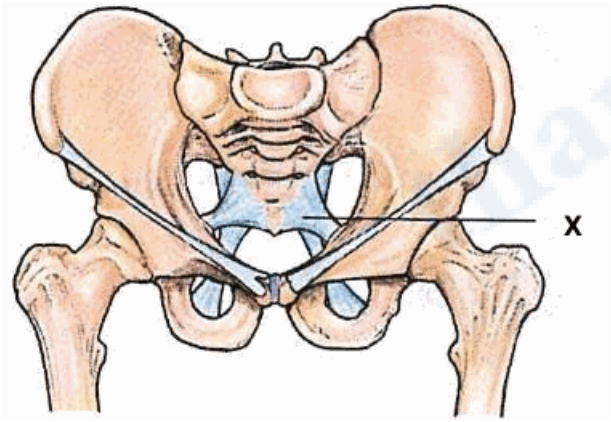
(A) 1 (B) 2 (C) 3 (D) 4

116 In the opposite figure, which structures are most likely to be torn in football players?



(A) (1), (2) (B) (2), (3) (C) (3) only (D) (2) only

117 What does letter (X) represent in the opposite figure?



(A) A ligament (B) A tendon (C) A bone (D) A cartilage

118 Which of the following does not apply to tendons?

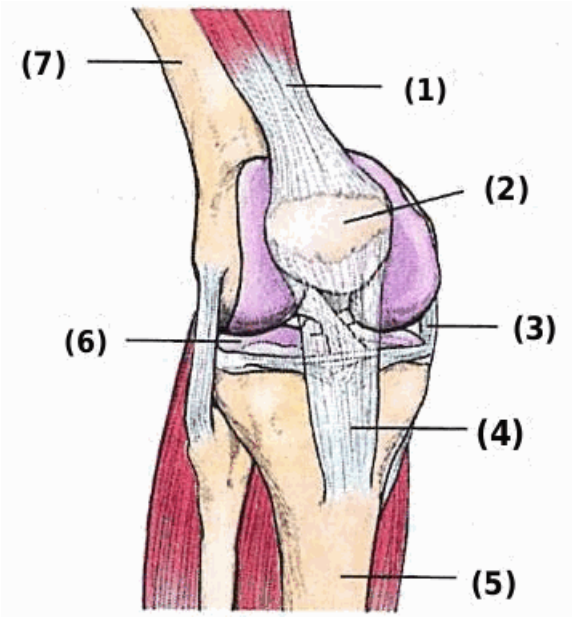
(A) They are attached to skeletal muscles

(B) They are attached to bones at the synovial joint

(C) They are highly elastic

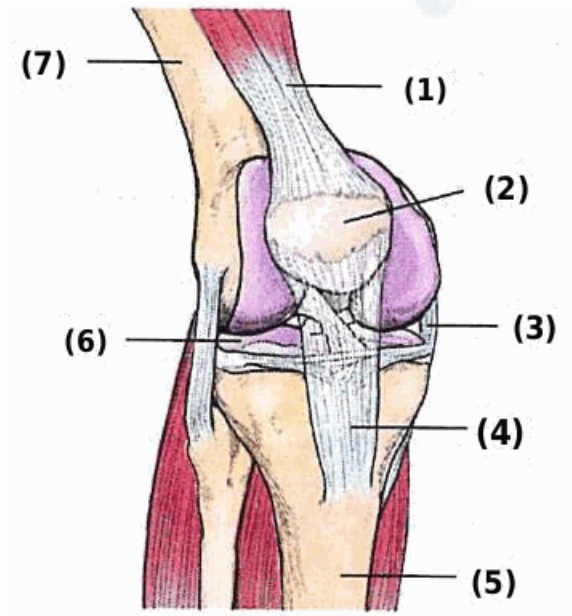
(D) They are a connective tissue

119 The opposite figure shows the knee joint. Study it, then answer:
Which bone does number (7) point to?



(A) The ulna (B) The tibia (C) The femur (D) The fibula

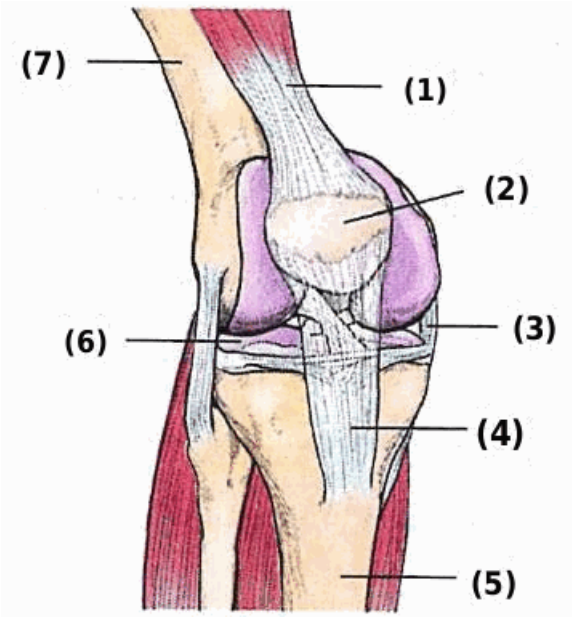
120 The opposite figure shows the knee joint. Study it, then answer:
What does number (1) point to?



(A) A ligament (B) A bone (C) A tendon (D) A muscle

121 The opposite figure shows the knee joint. Study it, then answer:

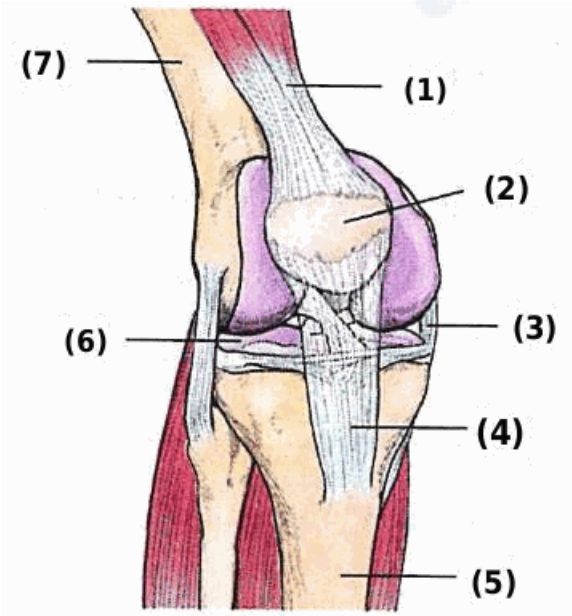
Which of the following has a role in determining the direction of movement in this joint?



(A) (1) (B) (7) (C) (1), (4) (D) (3), (4)

122 The opposite figure shows the knee joint. Study it, then answer:

Which of the following statements is incorrect?



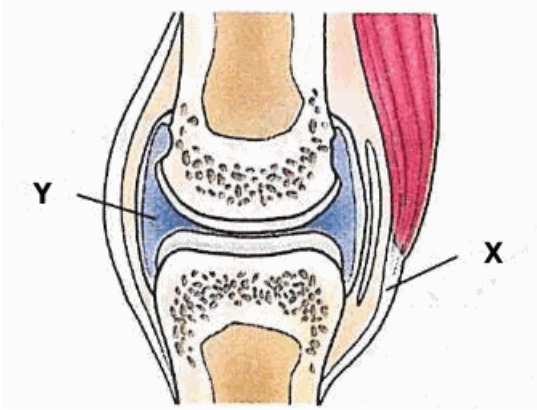
(A) Part (5) has a limited range of movement

(B) Part (2) is attached to a tendon and a ligament

(C) Part (6) is a connective tissue

(D) Part (1) determines the range of movement of part (7)

123 In the opposite figure, what do (X) and (Y) represent, respectively?

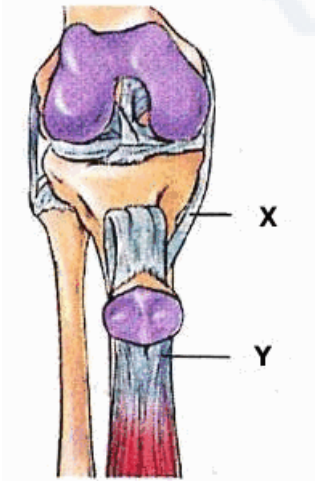


(A) Tendon / synovial fluid
(B) Ligament / synovial fluid
(C) Cartilage / tendon
(D) Tendon / cartilage

124 Which of the following distinguishes ligaments from tendons?

(A) They are strong and tough
(B) They are a connective tissue
(C) They have some elasticity
(D) They are attached to bones

125 In the opposite figure, in what is structure (X) similar to structure (Y)?



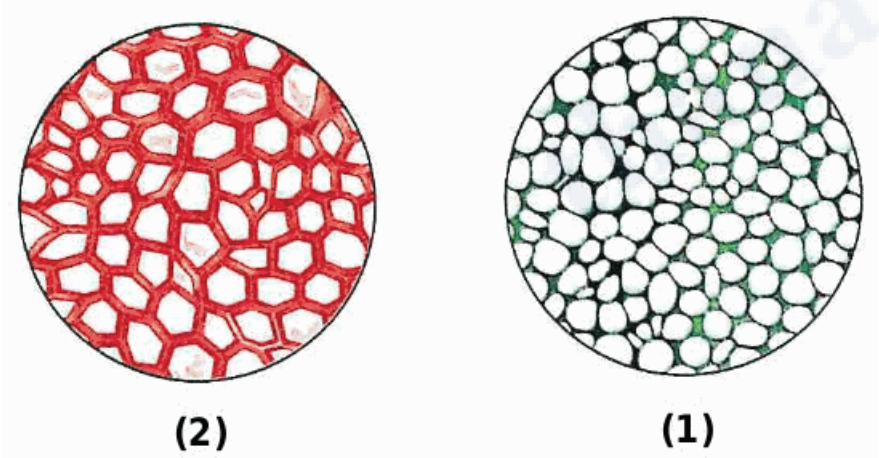
(A) Degree of elasticity
(B) Type of tissue
(C) Attachment to muscles
(D) How it works

Essay questions — 18 questions

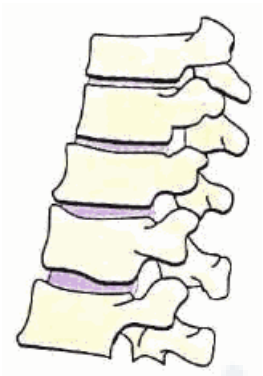
1 Study the following two figures, which show two different types of plant cells, then answer:
Suggest the name of the deposited substance (X) in figure (1) and the deposited substance (Y) in figure (2).



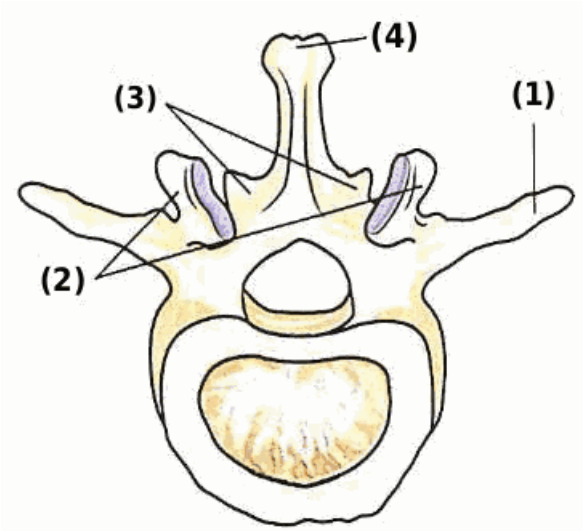
2 The two opposite figures show two types of plant tissues:
(1) What type are tissues (1) and (2)?
(2) What type of substances are deposited in tissue (1) and in tissue (2)?



3 How many articular processes take part in the movement of the vertebrae shown in the opposite figure?



4 The opposite figure shows vertebra number (20). What are the numbers and names of the structures that connect this vertebra with vertebra number (19) and vertebra number (21)?



5 What are the differences between vertebra number (15) and vertebra number (30) of the vertebral column?

6 If you know that human ribs are divided into:

(1) True ribs, each attached on its own to the sternum by one cartilage.

(2) False ribs: 3 pairs of ribs on the two sides; the three on each side join together before they are attached to the sternum by one cartilage.

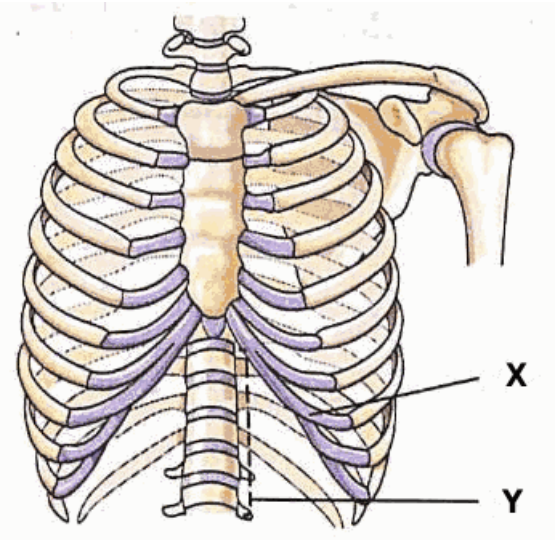
(3) Floating ribs, which are not attached to the sternum.

What are the numbers of the vertebrae to which the false ribs are connected?

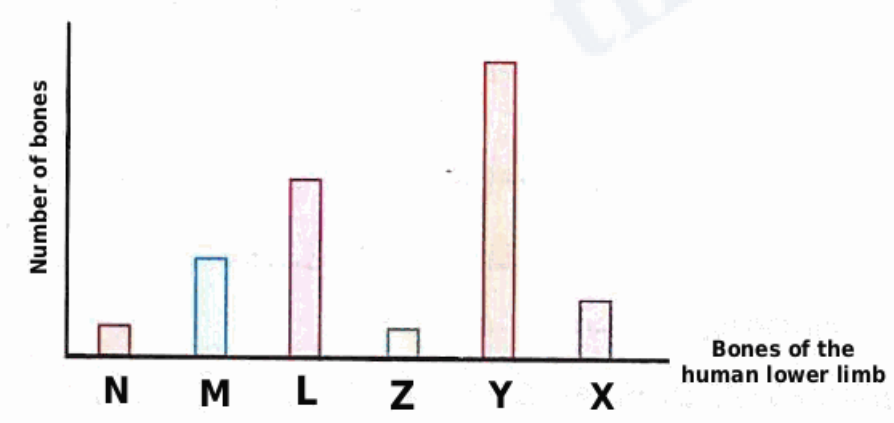
7 Study the opposite figure, which shows part of the human skeleton, then answer:

(1) Structure (X) takes a long time to heal after an accident. How do you explain this?

(2) What happens if structure (Y) is made of one bone?



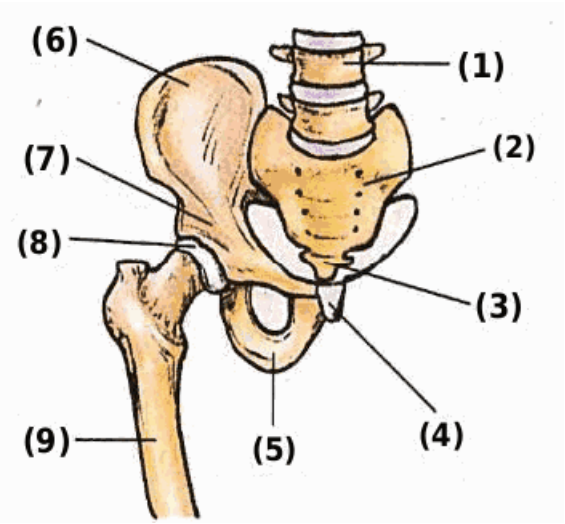
8 The opposite graph shows the numbers of bones of one human lower limb. If (Z) refers to the femur, give the letter, the name and the number of bones of each part forming the bones of the foot, in order from top to bottom.



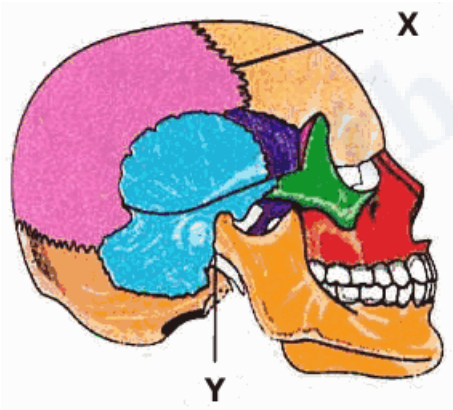
9 From the opposite figure:

(1) Based on what you have studied, what types of joints are in the figure?

(2) Give the numbers and names of the parts that are components of the axial skeleton.



10 In the opposite figure, what type is joint (X) and joint (Y)?

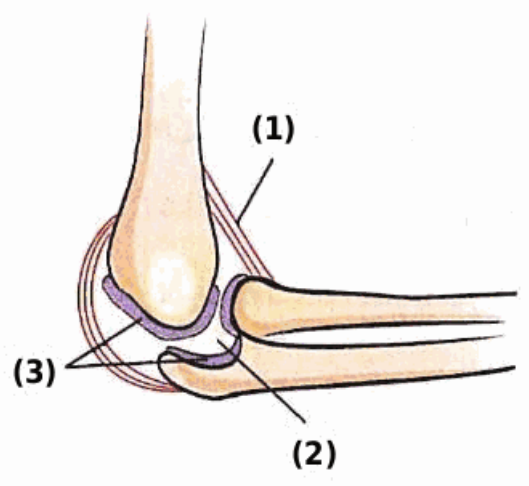


11 The opposite figure shows where 3 bones meet. Based on that, what happens in the following cases:

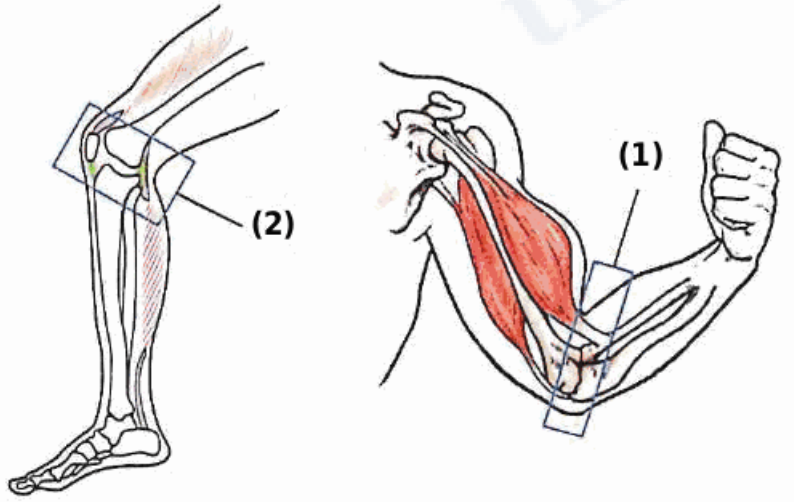
(1) The amount of substance number (2) decreases?

(2) Structure number (3) is absent?

(3) Structure number (1) is cut?



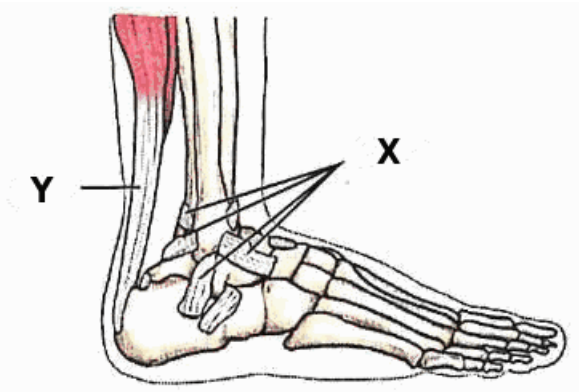
12 The two opposite figures show some joints in humans. What are the similarities and differences between joints (1) and (2)?



13 Study the opposite figure, then answer:

(1) What happens if structure (X) has no elasticity?

(2) Structure (Y) links two systems of the body. Explain this.

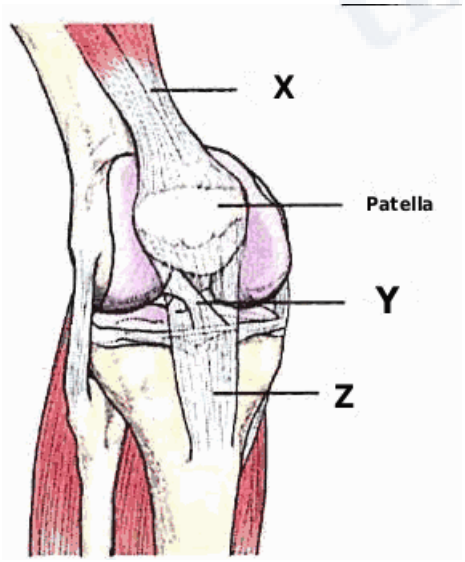


14 Although ligaments are important in the movement of joints, cutting a ligament completely may not stop the movement of the bones at the joint. Explain this.

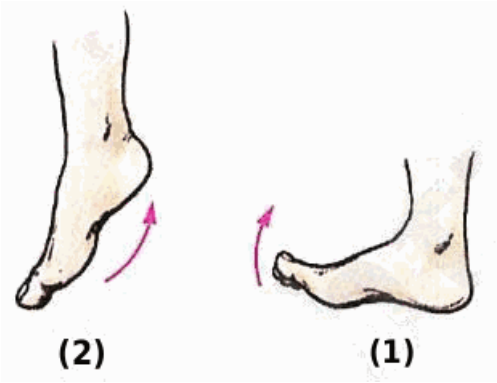
15 Study the opposite figure, which shows part of the human lower limb, then answer:

(1) What is the difference between structure (X) and structure (Z)?

(2) What happens when structure (Y) is torn? Explain.



16 The two opposite figures show two positions of foot movement. Which of them depends on the Achilles tendon? Explain your answer.



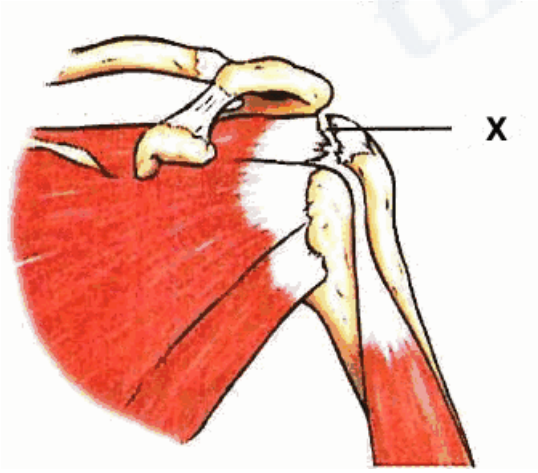
17 A person finds it difficult to move the humerus although it is healthy. What are the possible explanations?

18 Study the opposite figure, then answer:

(1) What are the expected causes of the tear (X)?

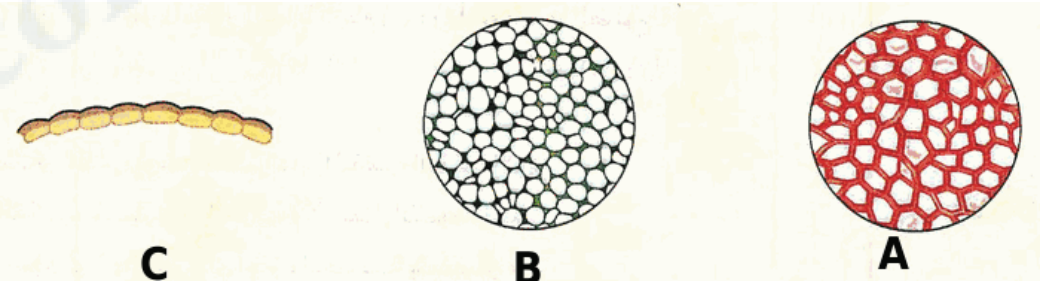
(2) Does this tear need surgery or not? Why?

(3) How can you recognise this injury by a physical examination?



Past exam questions — 28 questions

1 Which of the tissues shown in the following figures give the plant support and prevent water loss from its outer surface? (Sample exam 2026)

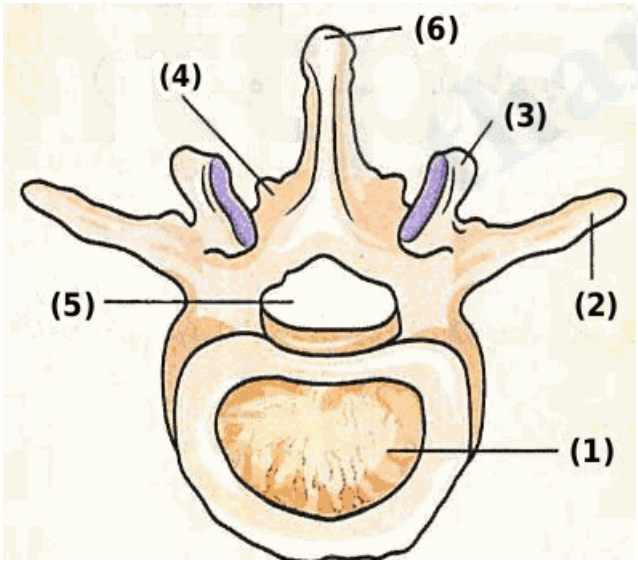


(A) (A) only (B) (B) only (C) (C) only (D) (A), (B)

---

2 The figure in front of you shows the structure of the last thoracic vertebra. Study it, then answer:

(1) What is the result of the absence of structure (2)? (2nd session 2021)



(A) A defect in the articulation with the second floating rib

(B) A defect in the articulation with the first lumbar vertebra

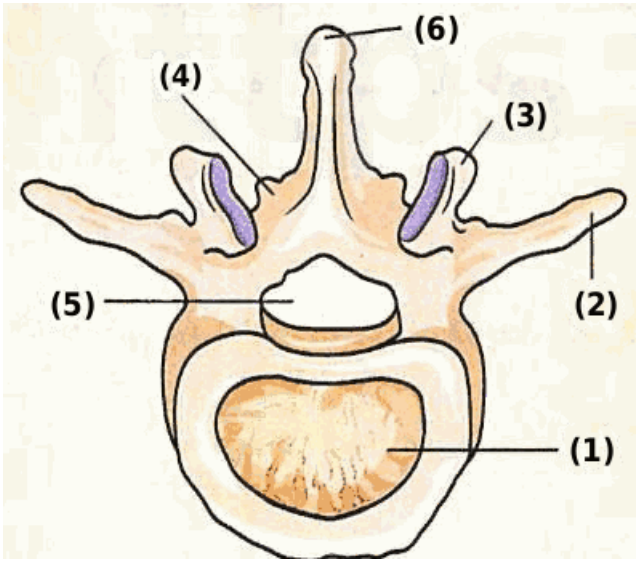
(C) The spinal cord is not protected

(D) No articulation with vertebra number (18) of the vertebral column

---

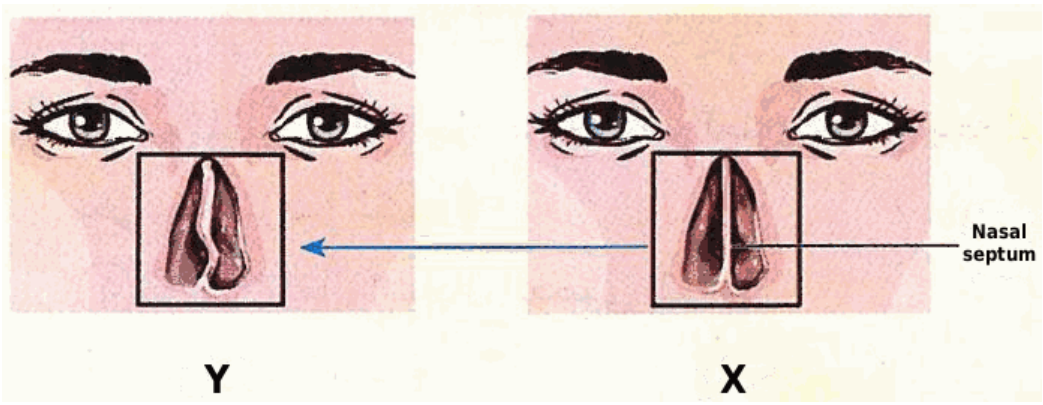
3 The figure in front of you shows the structure of the last thoracic vertebra. Study it, then answer:

(2) Through which of the parts shown in the drawing does a component of the central nervous system pass? (Sample exam 2026)



(A) (2) (B) (3) (C) (4) (D) (5)

4 Study the two opposite figures, then conclude: what is the result of the nasal septum changing from (X) to (Y)? (1st session 2022)



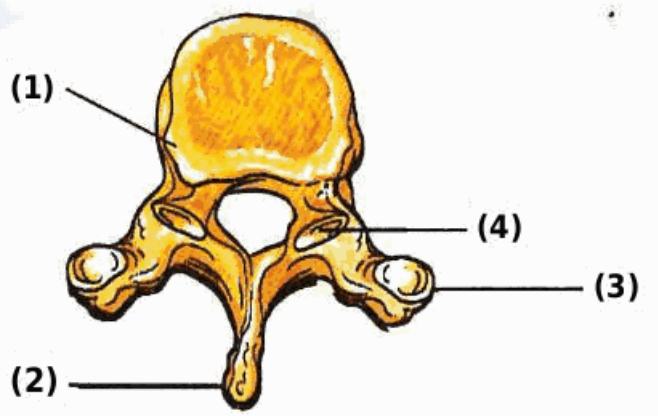
(A) Broken nasal bones

(B) A high proportion of O_2 reaching the lungs

(C) Difficulty in breathing

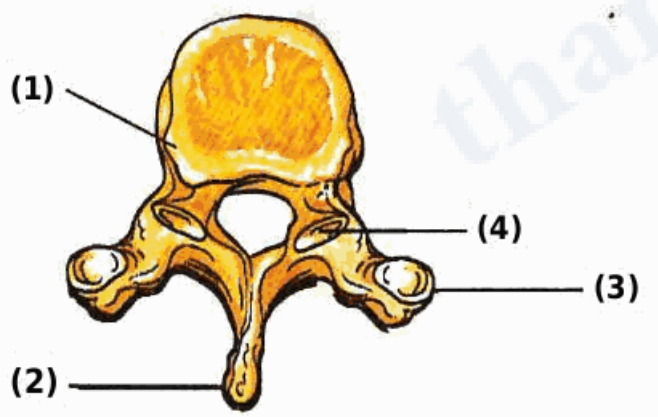
(D) Complete blockage of the air passages

5 Study the opposite figure, which shows a top view of a vertebra in the human body:
(1) Which of the following parts faces the same direction as the facial part of the skull? (1st session 2023, Sample exam 2025)



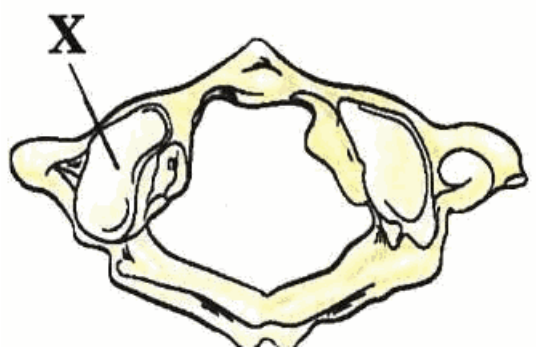
Ⓐ (1) Ⓑ (2) Ⓒ (3) Ⓓ (4)

6 Study the opposite figure, which shows a top view of a vertebra in the human body:
(2) Which of the parts numbered (1) to (4) are the ribs connected to? (Sample exam 2026)



Ⓐ (2), (4) Ⓑ (2), (3) Ⓒ (1), (3) Ⓓ (3), (4)

7 The opposite figure shows a top view of the first cervical vertebra, and the structure labelled (X) is the upper articular process of this vertebra. Which part of the skull articulates with the structure labelled (X)? (2nd session 2023)



(A) The cranium
(B) The facial part
(C) The foramen magnum
(D) The lower jaw

8 All the processes of vertebra number (12) of the vertebral column articulate with other bones except the ..... (Sample exam 2026)

(A) upper articular process
(B) spinous process
(C) transverse process
(D) lower articular process

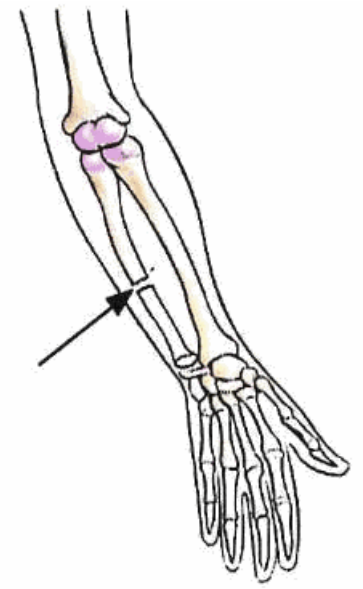
9 How many bones connect the appendicular skeleton with the axial skeleton? (1st session 2025)

(A) 2
(B) 4
(C) 6
(D) 26

10 How many bones form the rib cage, and what type are they? (2nd session 2025)

(A) 25 bones - flat
(B) 25 bones - long
(C) 35 bones - flat
(D) 33 bones - flat

11 The opposite drawing shows part of the upper limb. What is the result of this fracture? (1st session 2021)



(A) The nerve impulse stops reaching the muscle

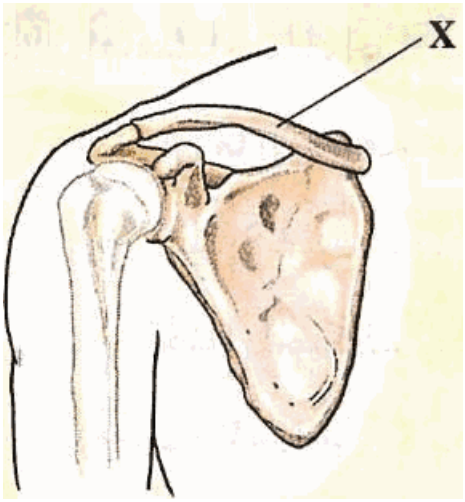
(B) The muscle tendon is torn

(C) The joint ligament is torn

(D) The forearm cannot be moved

---

12 The opposite figure shows some bones of the appendicular skeleton. Where do the two ends of the bone labelled (X) articulate? (2nd session 2025)



(A) The glenoid cavity and the rib cage

(B) The sternum and the ribs

(C) The humerus and the rib cage

(D) The sternum and the scapula

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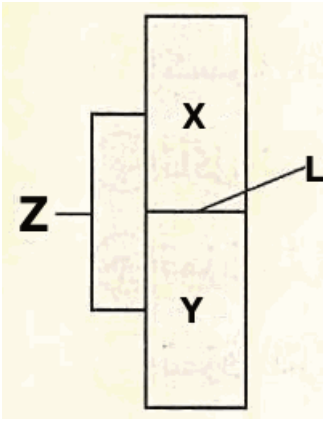
13 Which of the following bones has no cavity in which the head of another bone sits? (Sample exam 2026)

(A) The ulna (B) The radius (C) The scapula (D) The pelvis

---

14 If structures (X) and (Y) are made of the same tissue in the human skeletal system, and structure (Z) links them:

(1) What does symbol (L) represent? (Trial exam / June 2021)

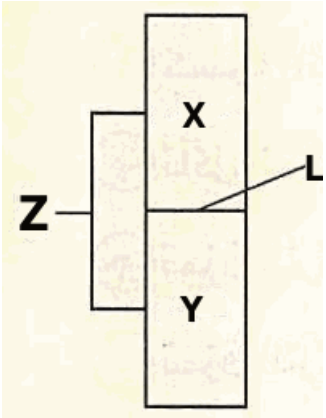


(A) A tendon (B) A ligament (C) A joint (D) A muscle

---

15 If structures (X) and (Y) are made of the same tissue in the human skeletal system, and structure (Z) links them:

(2) What is the effect of the absence of structure (L)? (1st session 2022)



(A) Structure (Y) stops moving

(B) The movement of structure (Y) cannot be controlled

(C) Structure (X) wears away

(D) Structure (Z) is strained

---

16 A person has severe pain in the region of the lumbar vertebrae, which affects the nerves that control the movement of the lower limb. What is the cause of this person's condition? (1st session 2021)

(A) A decrease in the synovial fluid between the lumbar vertebrae

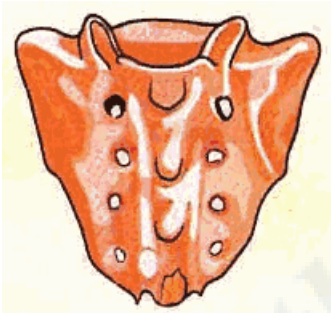
(B) Absence of the lower articular process of the lumbar vertebrae

(C) Erosion of the cartilage between the lumbar vertebrae

(D) A decrease in the amount of calcium in the lumbar vertebrae

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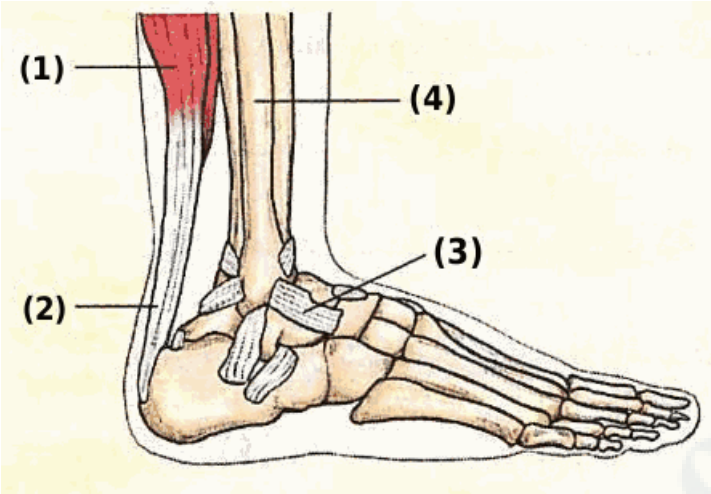
17 Study the opposite figure of a group of vertebrae of the vertebral column of an adult, then determine how many joints there are between the vertebrae shown in the figure. (1st session 2024)



(A) Four (B) Two (C) One (D) Zero

---

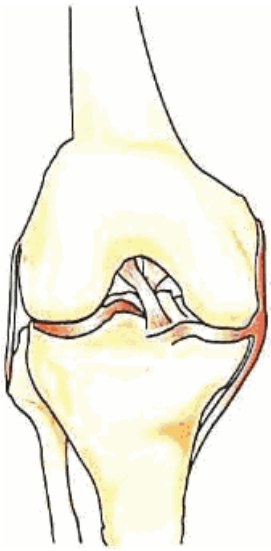
18 The figure in front of you shows some joints of the human body. Which structure is responsible for determining the direction of movement at these joints? (Trial exam / May 2021)



(A) (1) (B) (2) (C) (3) (D) (4)

---

19 In front of you is one of the joints of the human body. If the ligaments of this joint were replaced by tendons, which function would not be carried out at this joint? (1st session 2021)



(A) The ability to move the joint

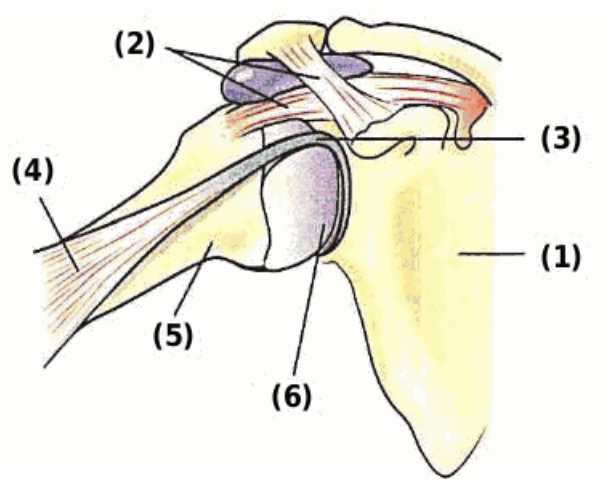
(B) Reducing the friction of the bones

(C) Growth of the bones in this region

(D) Controlling the direction of movement of the joint

---

20 Study the opposite figure, which shows one of the joints of the human body, then determine which of the following happens when this joint is sprained (twisted). (1st session 2023)



(A) A fracture in structure (5)

(B) Erosion of structure (6)

(C) A tear in structure (3)

(D) A tear in structure (2)

---

21 Which of the following is not a function of ligaments? (2nd session 2023)

(A) Binding the bones together at the joint

(B) Holding some body organs in place

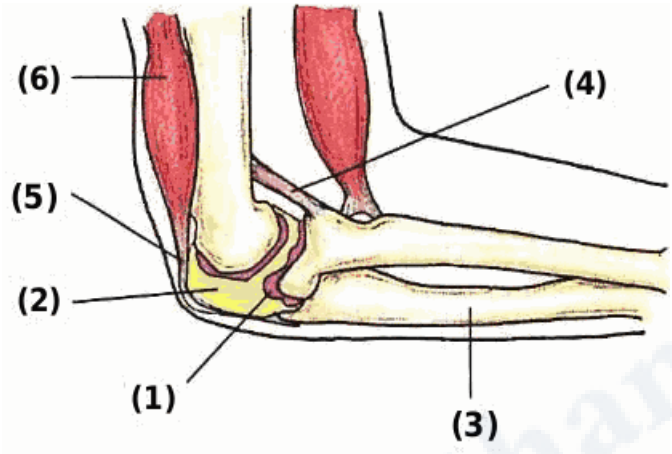
(C) Moving the bones when the muscles contract

(D) Allowing the uterus to expand during pregnancy

---

22 Study the opposite figure, which shows one of the joints of the human body:

(1) What is the expected result if muscle (6) loses its elasticity? (2nd session 2022)



(A) Structure (4) tears

(B) Structure (5) tears

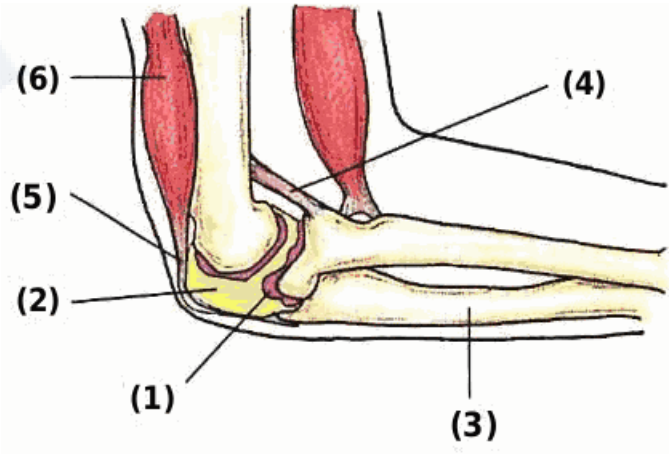
(C) Structure (1) wears away

(D) A decrease in structure (2)

---

23 Study the opposite figure, which shows one of the joints of the human body:

(2) What is the expected result if substance (2) is absent? (Trial exam 2023)



(A) Movement at the joint becomes difficult

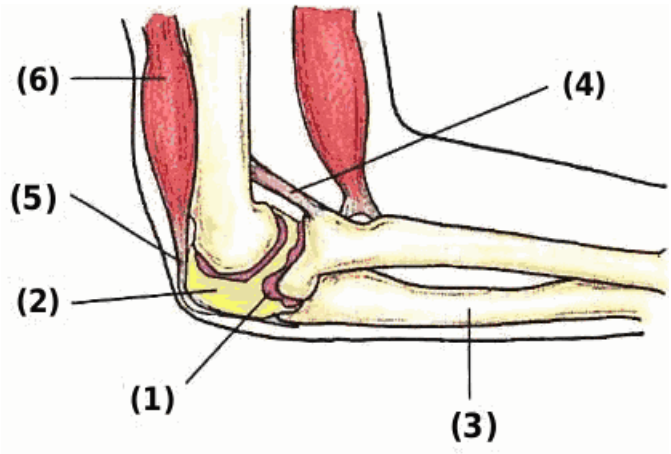
(B) The thickness of tissue (1) increases

(C) The joint becomes immovable

(D) Movement at the joint is not affected

24 Study the opposite figure, which shows one of the joints of the human body:

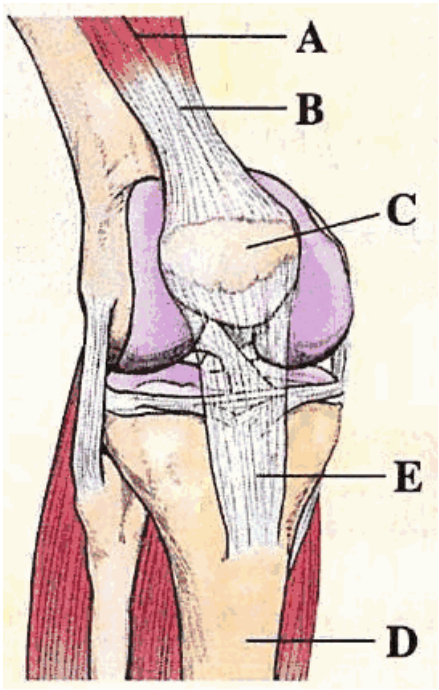
(3) Which of the structures shown in the figure has some elasticity and can increase in length? (Sample exam 2026)



(A) (2) (B) (4) (C) (5) (D) (3)

25 Study the figure in front of you, then conclude:

(1) What is the result of cutting the structure labelled (B)? (1st session 2024)



(A) Structure (A) becomes unable to contract

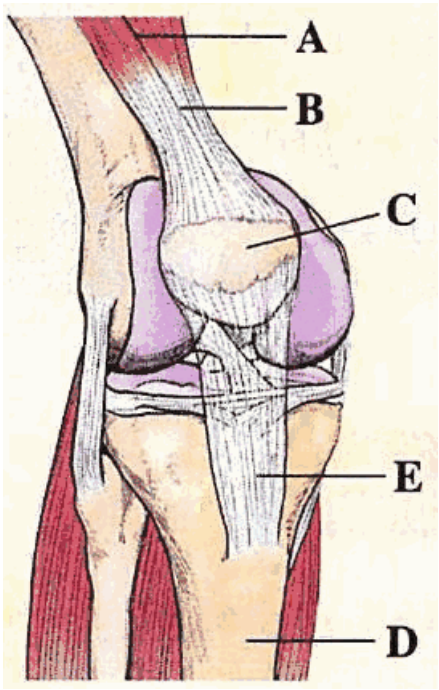
(B) Structure (C) moves in a different direction

(C) Structures (A) and (E) may tear

(D) Structures (C) and (D) become unable to move

26 Study the figure in front of you, then conclude:

(2) The bone labelled (C) works to ..... (Sample exam 2026)



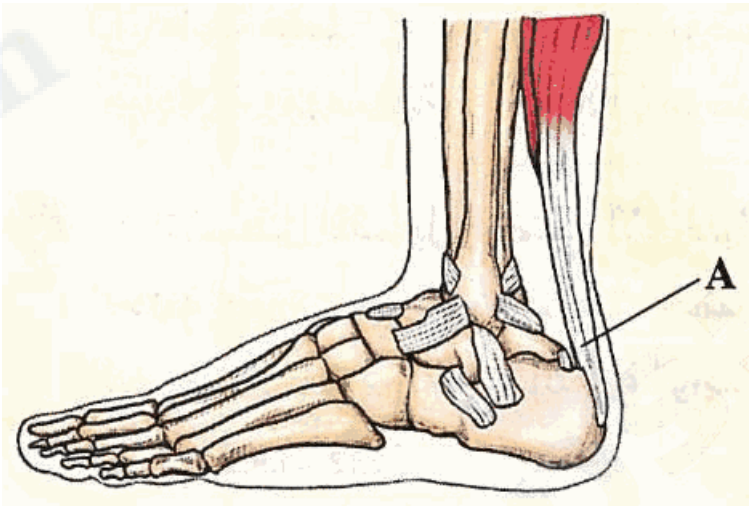
(A) reduce the friction of the bones at the joint

(B) protect the knee joint

(C) make the movement of the bones easier

(D) balance the knee joint

27 Study the opposite figure, then determine the possible cause of the tear in the structure labelled (A). (2nd session 2024)



(A) A sudden contraction in structure (A)

(B) Loss of elasticity of structure (A)

(C) Accumulation of lactic acid in the gastrocnemius muscle

(D) A defect in the performance of the gastrocnemius muscle

---

28 Which of the following parts of the skeletal system is not a connective tissue? (1st session 2025)

(A) Joints (B) Bones (C) Tendons (D) Ligaments

Answer key and solutions

Multiple choice questions

1 A	2 B	3 C	4 C	5 B	6 C	7 B	8 C	9 C	10 B
11 C	12 D	13 B	14 C	15 B	16 B	17 C	18 C	19 D	20 B
21 B	22 C	23 C	24 B	25 C	26 B	27 A	28 B	29 A	30 C
31 C	32 C	33 B	34 B	35 A	36 D	37 A	38 B	39 D	40 A
41 C	42 A	43 D	44 B	45 B	46 D	47 C	48 B	49 B	50 D
51 A	52 A	53 C	54 A	55 A	56 B	57 C	58 C	59 A	60 C
61 A	62 D	63 B	64 B	65 C	66 B	67 A	68 C	69 D	70 D
71 D	72 A	73 C	74 B	75 B	76 C	77 A	78 B	79 C	80 D
81 B	82 C	83 B	84 B	85 B	86 B	87 D	88 C	89 B	90 B
91 B	92 D	93 B	94 B	95 D	96 A	97 D	98 A	99 D	100 D
101 A	102 B	103 B	104 C	105 D	106 A	107 C	108 D	109 D	110 C
111 A	112 B	113 B	114 C	115 A	116 D	117 A	118 C	119 C	120 C
121 D	122 D	123 A	124 C	125 B					

1 **Answer (A)**

The epidermis cells of a herbaceous stem contain cellulose and cutin only.

(X) is the only one that has both cellulose and cutin.

2 **Answer (B)**

Cork cells: cellulose + suberin, which is (L).

Xylem vessels: cellulose + lignin, which is (Y).

3 **Answer (C)**

The Casparian strip of suberin stops water from passing through the side and horizontal walls.
If it is lost, water passes through all the cell walls.

4 **Answer (C)**

Cutin and suberin are waxy substances that are impermeable to water.

5 **Answer (B)**

(Y) is sclerenchyma tissue and (Z) is xylem tissue.
Lignin is deposited on the walls of both.

6 **Answer (C)**

Tissue (X) is collenchyma with cellulose walls, while lignin is deposited on the walls of (Y).
So the deposited substance is not the same, and statement (C) is incorrect.

7 **Answer (B)**

Lignin is deposited on the walls of sclerenchyma cells.

8 **Answer (C)**

(X) is shared by the epidermis and the collenchyma only, not by the sclerenchyma.
Cells (A) and (B) are living and contain cytoplasm, so the answer is the presence of cytoplasm.

9 **Answer (C)**

(Y) is in the middle of the three circles, so it is a feature shared by the three cells.
The three cells have a cell wall.

10 **Answer (B)**

The sclerenchyma cell (C) is dead when mature, so it has no cytoplasm.
The epidermis and collenchyma cells are living cells.

11 **Answer (C)**

The epidermis of stems and leaves is covered with a layer of cutin.

12 **Answer (D)**

Cellulose and lignin increase the strength of the walls and give support.

13 **Answer (B)**

Cellulose, lignin and suberin are substances of plant cell walls.

Chitin is not a plant component, so it does not agree with the rest.

14 **Answer (C)**

Cutin (on the epidermis) and suberin (in the cork) protect the inner tissues and prevent water loss.

15 **Answer (B)**

(C) is collenchyma: cellulose is deposited at the corners of its walls.

(A) is sclerenchyma with lignin walls, and (B) is parenchyma with thin walls and no deposits.

16 **Answer (B)**

Cutin protects the stem and prevents water loss; the thicker it is, the more protection and support.

The greatest thickness is 1 mm, in plant (B).

17 **Answer (C)**

Cells (X) are epidermis cells covered with a layer of cutin that protects the inner tissues.

18 **Answer (C)**

The outer layer of fruits contains cutin, which prevents water loss.

19 **Answer (D)**

Transporting water and salts is the job of the vascular tissues, not of support.

20 **Answer (B)**

The figure is of the first cervical vertebra (the atlas), and (X) is the vertebral foramen.

The foramen magnum of the skull lies directly above this opening.

21 **Answer (B)**

The upper articular process of the first cervical vertebra articulates with the cranium.

Without it, the articulation with the skull is defective.

22 **Answer (C)**

The largest movable vertebrae are the lumbar vertebrae, and the largest is vertebra 24 (the fifth lumbar).

Vertebra 25 is a fused sacral vertebra.

23 **Answer (C)**

Cervical vertebrae have 3 shapes: the atlas, the axis and the rest of the vertebrae.

24 **Answer (B)**

The movable vertebrae are of 3 types: cervical, thoracic and lumbar.

25 **Answer (C)**

The fourth lumbar vertebra is number 23.

The upper surface of its body (Z) articulates with the vertebra above it, which is number 22.

26 **Answer (B)**

The figure is seen from above, so the right of the picture is the left of the person.

(Y) is on the left side, like the left lower limb.

27 **Answer (A)**

The figure is seen from above, so the left of the picture is the right of the person.

(X) is a lower articular process on the right side: lower right.

28 **Answer (B)**

The giraffe and the human both have seven cervical vertebrae, although their necks differ in length.

The difference is in the size of the vertebra, to suit its function.

29 **Answer (A)**

The sternum is on the front side of the body.

The pubis is also on the front side.

30 **Answer (C)**

(X) is the clavicle, which connects with the scapula.

(Y), the ribs, do not connect with the scapula.

31 **Answer (C)**

The axial skeleton has 80 bones and the appendicular skeleton 126 bones (206 in total).

32 **Answer (C)**

Vertebra 19 is the last thoracic vertebra and vertebra 20 is the first lumbar vertebra.

The lumbar vertebra is slightly larger.

33 **Answer (B)**

There are 33 vertebrae, and the middle one is number 17.

Vertebrae 8 to 19 are thoracic, so it is in the thoracic region.

34 **Answer (B)**

24 free vertebrae + the sacrum + the coccyx = 26 bones.

35 **Answer (A)**

The clavicle belongs to the pectoral girdle (the appendicular skeleton).

36 **Answer (D)**

Vertebrae 1 and 3 are both cervical, so they are of the same type.

The first one (the atlas) differs in shape.

37 **Answer (A)**

(X) is the sacrum and (Y) is the coccyx; each is one bone formed by fusion.

38 **Answer (B)**

The sacral vertebrae are 25 to 29.

Vertebra 27 is the third sacral vertebra.

39 **Answer (D)**

Vertebrae 8 to 19 are thoracic.

40 **Answer (A)**

The cervical curve is forward, the thoracic backward and the lumbar forward.

41 **Answer (C)**

(3) and (4) are articular processes that articulate with the neighbouring vertebrae.

They help the movement of the vertebral column.

42 **Answer (A)**

Vertebra number = rib number + 7.

5 + 7 = 12

43 **Answer (D)**

Rib number = vertebra number − 7.

17 − 7 = 10, so it is the tenth rib.

44 **Answer (B)**

The cervical vertebrae are 1 to 7, and the middle one is number 4.

45 **Answer (B)**

The size of the vertebrae increases from cervical to thoracic to lumbar.

(X) cervical, (Y) thoracic, (Z) lumbar.

46 **Answer (D)**

(Y) are the thoracic vertebrae, and there are 12 of them.

47 **Answer (C)**

A rib is connected to the vertebra, so it is a thoracic vertebra.

48 **Answer (B)**

The spinal cord passes through the vertebral foramen (2).

49 **Answer (B)**

The body (6) of the vertebra is seen from above; it is vertebra 13.

The sixth rib is connected to vertebra 13, and it is on the right side.

50 **Answer (D)**

(4) is a transverse process.

51 **Answer (A)**

The body (6) of vertebra 13 articulates with the vertebra before it, which is number 12.

52 **Answer (A)**

Vertebra number = rib number + 7.

53 **Answer (C)**

The first floating rib is the eleventh, and it is connected to vertebra 18.

The middle vertebra, 17, comes before it.

54 **Answer (A)**

The cervical vertebrae (A) connect with the skull, and the thoracic vertebrae (B) connect with the ribs and the sternum.

55 **Answer (A)**

The trunk includes the vertebrae from the thoracic to the coccygeal.

The cervical vertebrae (A) belong to the neck.

56 **Answer (B)**

There are 3 pairs of processes: two transverse, two upper articular and two lower articular.

The spinous process is single.

57 **Answer (C)**

(1) is the foramen magnum, through which the brain is connected to the spinal cord.

58 **Answer (C)**

Both the cervical and the lumbar vertebrae are movable (articulated) vertebrae.

59 **Answer (A)**

Vertebrae 1 and 2 are the atlas and the axis, and their shapes are different.

The other pairs are of the same type.

60 **Answer (C)**

There are 24 movable vertebrae and 9 fused vertebrae (5 sacral + 4 coccygeal).

The ratio is 24 : 9 = 8 : 3

61 **Answer (A)**

Vertebra 18: the upper articular process (2) articulates with vertebra 17 above it.

62 **Answer (D)**

The lower articular process (5) articulates with vertebra 19 below it.

63 **Answer (B)**

Fusion forms two bones: the sacrum (5 vertebrae) and the coccyx (4 vertebrae).

64 **Answer (B)**

Protection and helping in movement are functions of the axial skeleton.

The rib cage protects the heart but does not support it.

65 **Answer (C)**

(B) 7 cervical, (A) 12 thoracic, (D) 5 lumbar, (E) 5 sacral, (C) 4 coccygeal.

The order from the top: B → A → D → E → C

66 **Answer (B)**

The vertebra that articulates with the skull is cervical, which is (B).

67 **Answer (A)**

The rib cage is formed with the thoracic vertebrae, which are (A).

68 **Answer (C)**

The tibia is the weight-bearing bone of the leg, so it has the greatest effect on the movement of the lower part of the lower limb.

69 **Answer (D)**

The ulna, the pelvis and the scapula have articular cavities, but the radius does not.

70 **Answer (D)**

The sternum is connected to the clavicle of the pectoral girdle.

71 **Answer (D)**

The upper limb has 30 bones: humerus 1 + forearm 2 + wrist 8 + palm 5 + phalanges 14.

72 **Answer (A)**

(X) is the sternum.

It is connected to the two upper limbs by the two clavicles, that is one pair.

73 **Answer (C)**

The foot has 26 bones: ankle 7 + metatarsals 5 + phalanges 14.

74 **Answer (B)**

The wrist has 8 bones and the ankle has 7 bones.

75 **Answer (B)**

Both are bones, so they are the same type of tissue.

76 **Answer (C)**

The femur is the longest bone of the body, then the humerus, then the ulna.

77 **Answer (A)**

The lower limb has 30 bones like the upper limb, so the number is (X).

78 **Answer (B)**

There are 5 in each, but the metatarsal bones are longer than the palm bones.

79 **Answer (C)**

The appendicular skeleton has 4 cavities: 2 in the two scapulae and 2 in the pelvis.

80 **Answer (D)**

The pectoral girdle has 4 bones.

The rib cage: 12 thoracic vertebrae + 24 ribs + the sternum = 37.

The total is 4 + 37 = 41

81 **Answer (B)**

The figure is the femur, which forms the upper part of the lower limb.

82 **Answer (C)**

The vertebral column is on the left of the picture, so the side is left, front.

83 **Answer (B)**

The red shading is on the clavicle.

84 **Answer (B)**

The bones of the two upper and two lower limbs are 4 × 30 = 120 bones.

This is more than half of 206 (which is 103).

85 **Answer (B)**

The forearm has only two bones (the radius and the ulna).

The pectoral girdle has 4, the ankle 7 and the skull more.

86 **Answer (B)**

The appendicular skeleton has 126 bones.

87 **Answer (D)**

(Y) is the right arm; when the radius rotates half a turn, the two bones cross in an X shape.

So figure (X) is (Y) after the rotation of the radius.

88 **Answer (C)**

Number of bones: humerus 1 (M), forearm 2 (Y), wrist 8 (Z), palm 5 (X), phalanges 14 (L).

The order from the top: M → Y → Z → X → L

89 **Answer (B)**

The figure is the sternum.

It is connected to the first ten pairs of ribs and to the two clavicles.

90 **Answer (B)**

The heads of bones are covered with cartilage, which is a connective tissue.

91 **Answer (B)**

The knee joint has cartilage discs between the femur and the tibia.

92 **Answer (D)**

(X) is the hip joint, a ball-and-socket joint.

Figure (D) shows the ball-and-socket movement of this type.

93 **Answer (B)**

(X) is a feature shared by the two joints.

The knee has 3 bones (femur, tibia and patella) and the hip 2 bones, so the number of bones does not describe (X).

94 **Answer (B)**

Part (X) is the lower end of the femur, which forms the knee joint.

95 **Answer (D)**

Closing the eyes is a muscular movement only and does not need a joint.

96 **Answer (A)**

The limbs are connected to the girdles by freely movable synovial joints (the shoulder and the hip).

97 **Answer (D)**

Shoulder joint: the head of the humerus in the cavity of the scapula only.

The clavicle is not part of it.

98 **Answer (A)**

All synovial joints allow movement.

Cartilage discs are found in only some of them.

99 **Answer (D)**

(X) is the humerus.

It articulates with the scapula above and with the ulna and the radius below.

100 **Answer (D)**

A rib is connected to the vertebra whose number = rib number + 7.

(Y) is at the tenth rib, so the vertebra is 17.

101 **Answer (A)**

The hip joint is formed by the femur and the pelvic bone.

The pelvic bones are fused in an adult, so the number is two bones.

102 **Answer (B)**

(Y) is the forearm, and its upper part forms the elbow joint.

(X) is the leg, and its upper part forms the knee joint.

Both are slightly movable synovial joints.

103 **Answer (B)**

Osteoarthritis is caused by erosion of the cartilage covering the ends of the bones.

So bone rubs against bone and causes pain.

104 **Answer (C)**

The hip joint is freely movable, so statement (C) is incorrect.

105 **Answer (D)**

Vertebrae 25 to 29 are fused, so there are no cartilaginous joints between 26 and 27.

106 **Answer (A)**

The humerus starts with the shoulder joint (freely movable) and ends with the elbow joint (slightly movable).

107 **Answer (C)**

The lower end of the tibia articulates with the ankle bones.

108 **Answer (D)**

The lower end of the two forearm bones articulates with the upper part of the wrist.

109 **Answer (D)**

The head of the humerus (Y) sits in the cavity at the outer end of the scapula.

110 **Answer (C)**

The elbow joint (Z) is formed by the humerus, the ulna and the radius, that is 3 bones.

111 **Answer (A)**

(L) is cartilage that covers the ends of the bones, and it is a connective tissue.

112 **Answer (B)**

Twisting the foot tears the ligaments that bind the bones of the joint.

113 **Answer (B)**

Cartilages do not prevent movement; they reduce friction and absorb shocks.

114 **Answer (C)**

There are 3 ligaments between the femur and the tibia.

115 **Answer (A)**

One ligament connects the femur with the fibula.

116 **Answer (D)**

(2) is the cruciate ligament in the middle of the knee.
It is the most likely to be torn in football players.

117 **Answer (A)**

(X) is a ligament that binds the pelvic bones together.

118 **Answer (C)**

Tendons are not elastic, while ligaments have some elasticity.

119 **Answer (C)**

(7) is the femur, above the knee joint.

120 **Answer (C)**

(1) is a tendon that connects the muscle with the patella.

121 **Answer (D)**

(3) and (4) are side ligaments that determine the direction of movement in the knee.

122 **Answer (D)**

The tendon (1) connects the muscle with the bone and does not determine the range of movement of the femur (7).

The range is determined by the ligaments.

123 **Answer (A)**

(X) is a tendon that connects the muscle with the bone.

(Y) is the synovial fluid inside the joint.

124 **Answer (C)**

Ligaments have some elasticity, unlike tendons.

125 **Answer (B)**

(X) is a ligament and (Y) is cartilage; both are connective tissue.

Essay questions

1 **Model answer**

(X) cutin or cellulose, (Y) lignin or suberin.

2 **Model answer**

(1) Tissue (1): collenchyma tissue, tissue (2): sclerenchyma tissue.

(2) Tissue (1): cellulose, tissue (2): lignin.

3 **Model answer**

16 articular processes.

4 **Model answer**

(2) "The two upper articular processes" articulate with vertebra number (19).

(3) "The two lower articular processes" articulate with vertebra number (21).

5 **Model answer**

Classification: vertebra (15) is the eighth thoracic vertebra, vertebra (30) is the first coccygeal vertebra.

Articulation: vertebra (15) is movable (articulated), vertebra (30) is fused.

Size: vertebra (15) is medium-sized, vertebra (30) is small.

6 **Model answer**

The false rib pairs are numbers (8), (9), (10), and they are connected to vertebrae (15), (16), (17), respectively.

7 **Model answer**

(1) Because structure (X), "the cartilages", has no blood vessels, so it gets food and oxygen from the bone cells by diffusion.

(2) The person will not be able to move the head and the upper half of the body.

8 **Model answer**

The order: L, then M, then Y

L: the ankle (tarsus), made of 7 bones.

M: the metatarsus, made of 5 bones.

Y: the phalanges of the toes, made of 14 phalanges.

9 **Model answer**

(1) Cartilaginous joints "between the bodies of the vertebrae of the vertebral column", and a freely movable synovial joint "the hip joint".

(2) (1) a lumbar vertebra, (2) sacral vertebrae, (3) coccygeal vertebrae; all are vertebrae of the vertebral column, which belongs to the axial skeleton.

10 **Model answer**

(X) a fibrous joint, (Y) a synovial joint.

11 **Model answer**

(1) A decrease in the synovial fluid "substance number (2)" causes gradual erosion of the cartilages "structure number (3)" covering the ends of the bones of the elbow joint, because these cartilages rub against each other, which makes the movement of the bones at the joint difficult.

(2) The movement of the bones forming the joint becomes difficult, and the ends of the articulating bones wear away because they keep rubbing against each other.

(3) The bones separate from each other, which affects the movement of the bones at this joint.

12 **Model answer**

Similarity: both are slightly movable synovial joints, and each is formed by 3 bones.

Difference: (1) the elbow joint is in the upper limb, and the bones forming it are (the humerus + the radius + the ulna).

(2) The knee joint is in the lower limb, and the bones forming it are (the femur + the patella + the tibia).

13 **Model answer**

(1) Structure (X), "the ligaments", will not stretch during movement, which may cause it to tear.
(2) Because structure (Y), "the Achilles tendon", connects the gastrocnemius muscle (the calf muscle) with the heel bone, so it links the muscular system with the skeletal system.

14 **Model answer**

Because tendons connect the muscles with the bones at the joint, which allows movement when the muscles contract and relax. Also, the bones are bound together by more than one ligament, like the ligaments of the knee joint, so movement is still transmitted when one ligament at the joint is cut.

15 **Model answer**

(1) Structure (X), "a tendon": a strong connective tissue that connects one of the thigh muscles with the patella, which allows movement when the muscle contracts and relaxes.
Structure (Z), "a ligament": separate bundles of fibrous connective tissue that connect the patella with the tibia, which limits the range of movement of the bones at the joint.
(2) The knee joint loses its stability, because structure (Y), "the anterior cruciate ligament", binds the femur to the tibia at the knee joint and also limits the movement of the leg at the joint.

16 **Model answer**

(2), because figure (2) shows the heel moving upward. Here the gastrocnemius muscle (the calf muscle) contracts and pulls the heel bone upward through the Achilles tendon, while the movement in figure (1) is a movement of the foot bones, not of the heel bone (which is fixed in this position).

17 **Model answer**

Torn ligaments at the shoulder joint.
Cut tendons at the shoulder joint.
Erosion of the cartilages covering the head of the humerus and lining the glenoid cavity.
Absence of the synovial fluid in the shoulder joint.

18 **Model answer**

(1) Sudden contraction of the muscle, lack of elasticity in the muscle, violent effort.
(2) Yes, it needs surgery, because the tendon is completely torn.
(3) Swelling at the injured area, inability to move the upper limb and severe pain.

Past exam questions

1	2	3	4	5	6	7	8	9	10
C	A	D	C	A	C	A	B	C	A
11	12	13	14	15	16	17	18	19	20
D	D	B	C	A	C	D	C	D	D
21	22	23	24	25	26	27	28		
C	B	A	B	D	B	D	A		

1 **Answer (C)**

Tissue (C) is an epidermis covered with a layer of cutin, which prevents water loss from the outer surface of the plant.

2 **Answer (A)**

Structure (2) is the transverse process of the last thoracic vertebra, and it articulates with the twelfth rib (the second floating rib).

3 **Answer (D)**

Part (5) is the neural canal through which the spinal cord passes.

4 **Answer (C)**

A deviated nasal septum narrows the air passages, which causes difficulty in breathing.

5 **Answer (A)**

Part (1) is the body of the vertebra, and it faces forward, the same direction as the facial part of the skull.

6 **Answer (C)**

The ribs are connected to the body of the vertebra (1) and the transverse process (3).

7 **Answer (A)**

The two upper articular processes of the first cervical vertebra articulate with the cranium (the occipital bone).

8 **Answer (B)**

The spinous process does not articulate with other bones.

9 **Answer (C)**

The pectoral girdle (the two clavicles and the two scapulae) and the pelvic girdle (the two hip bones): 6 bones.

10 **Answer (A)**

The rib cage is made of 12 pairs of ribs and the sternum = 25 bones, and all of them are flat bones.

11 **Answer (D)**

The fracture is in the forearm bones, so the person cannot move the forearm.

12 **Answer (D)**

Bone (X) is the clavicle, and its two ends articulate with the sternum and the scapula.

13 **Answer (B)**

The radius has no cavity in which the head of another bone sits.
The scapula has the glenoid cavity, the pelvis has a cavity for the head of the femur and the ulna has a cavity for the end of the humerus.

14 **Answer (C)**

(X) and (Y) are two bones and (Z) is a ligament that links them, so region (L) between them is a joint.

15 **Answer (A)**

Without the joint the two bones are fused, so structure (Y) stops moving.

16 **Answer (C)**

Erosion of the cartilages between the lumbar vertebrae presses on the nerves coming out of the spinal cord, which causes the pain.

17 **Answer (D)**

The sacral vertebrae in an adult are fused into one bone, so there are no joints between them.

18 **Answer (C)**

Structure (3) is the ligaments, which determine the range and direction of movement of the bones at the joint.

19 **Answer (D)**

Ligaments determine the direction of movement of the joint, while tendons transmit movement from the muscles to the bones, so the direction of movement would not be controlled.

20 **Answer (D)**

A sprain tears the ligaments at the joint, which are structure (2).

21 **Answer (C)**

Moving the bones when the muscles contract is a function of tendons, not ligaments.

22 **Answer (B)**

When the muscle loses its elasticity and contracts, it pulls the tendon (5), which may tear.

23 **Answer (A)**

Substance (2) is the synovial fluid; without it the friction of the bones increases, so movement at the joint becomes difficult.

24 **Answer (B)**

Structure (4) is a ligament; ligaments are elastic and can increase in length.

25 **Answer (D)**

(B) is a tendon that connects the thigh muscle with the patella; cutting it stops the movement being transmitted, so the patella (C) and the tibia (D) do not move.

26 **Answer (B)**

Bone (C) is the patella, which protects the knee joint from the front.

27 **Answer (D)**

Structure (A) is the Achilles tendon, which may tear because of a defect in the performance of the gastrocnemius muscle (a sudden contraction or a violent effort).

28 **Answer (A)**

Joints are the places where bones meet, not a tissue, while bones, tendons and ligaments are connective tissues.