

# The Spinal Cord

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1. There are  
\_\_\_\_\_ pairs of cervical spinal nerves  
\_\_\_\_\_ pairs of thoracic spinal nerves  
\_\_\_\_\_ pairs of lumbar spinal nerves  
\_\_\_\_\_ pairs of sacral spinal nerves  
\_\_\_\_\_ pairs of coxxygeal spinal nerves
2. Describe the sensory roles of each regions: cervical, thoracic, lumbar, sacral
3. Describe the motor output from each region. Be sure to differentiate between voluntary and involuntary output. When involuntary, differentiate between parasympathetic and sympathetic.
4. List the type of cell structure (bodies or axons; sensory or motor) found:
  - dorsal horn
  - ventral horn
  - dorsal root
  - ventral root
  - spinal nerve
  - dorsal root ganglion
  - sympathetic chain ganglion
5. Describe the neuronal signaling necessary to move a skeletal muscle—begin in the brain, and end at the target muscle.
6. Describe the neuronal signaling necessary to perceive touch on your hand—begin in the hand and end at the brain.
7. How does a reflex bypass central brain processing?
8. Generally, describe reflexes in terms of speed and purpose.
9. What cushion is found between the vertebrae?
10. How do the spinal nerves exit the bony protection of the vertebrae?
11. Describe two attachments of a rib to a vertebra.
12. What attaches to the various projections of a bone?
13. Start at the body of the vertebra—recite in a clockwise direction each structure of the vertebrae until you end up back at the body again.

# Answers:

## The Spinal Cord

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1. There are
  - a. **8** pairs of cervical spinal nerves
  - b. **12** pairs of thoracic spinal nerves
  - c. **5** pairs of lumbar spinal nerves
  - d. **5** pairs of sacral spinal nerves
  - e. **1** pair of coxxygeal spinal nerves
2. Sensory roles of regions: cervical, thoracic, lumbar, sacral  
**Cervical region of the spinal cord: receives sensory information from neck and arms**  
**Thoracic: chest and back**  
**Lumbar: hips and legs**  
**sacral: lower limbs**
3. Motor output from each region. Be sure to differentiate between voluntary and involuntary output. When involuntary, differentiate between parasympathetic and sympathetic.  
**Cervical – voluntary motor control of neck and arms**  
**Thoracic –voluntary motor control of chest and back muscles; involuntary (autonomic) sympathetic control to all organs**  
**Lumbar—voluntary motor control of hips and legs**  
**Sacral –voluntary motor control of lower legs; involuntary (autonomic) parasympathetic control of bladder and reproductive organs**
4. Types of cell structure (bodies or axons; sensory or motor) found:
  - dorsal horn –**sensory cell bodies**
  - ventral horn – **motor cell bodies**
  - dorsal root –**sensory axons**
  - ventral root –**motor axons**
  - spinal nerve -- **motor and sensory axons**
  - dorsal root ganglion – **sensory cell bodies**
  - sympathetic chain ganglion – **motor cell bodies**
5. Describe the neuronal signaling necessary to move a skeletal muscle—begin in the brain, and end at the target muscle.  
**Neurons in the motor cortex (located in the precentral gyrus of the frontal lobe) fire action potentials down the spinal cord. The axon synapses with a motor cell body in the ventral horn of the spinal cord. This neuron fires an action potential out the ventral root and spinal nerve to the target muscle.**
6. Describe the neuronal signaling necessary to perceive touch on your hand—begin in the hand and end at the brain.  
**Neuronal receptors in the skin of the hand fire an action potential in response to touch. The action potential travels up the arm, through the dorsal root ganglion, and into the dorsal horn of the spinal cord, where it synapses with another sensory neuron. This neuron fires an action potential up the spinal cord to the somatosensory cortex, located in the postcentral gyrus of the parietal lobe.**
7. How does a reflex bypass central brain processing?  
**A sensory neuron synapses directly with a motor neuron in the spinal cord.**
8. Generally, describe reflexes in terms of speed and purpose.  
**Faster, and for protection (from falling, from these getting in eyes, etc.)**
9. What cushion is found between the vertebrae?  
**Intervertebral discs**
10. How do the spinal nerves exit the bony protection of the vertebrae?  
**Intervertebral notch**
11. Describe two attachments of a rib to a vertebra.  
**Head of rib attaches to the costal facet on the body of the vertebrae; the tubercle of the rib attaches to the transverse costal facet on the transverse process of the vertebrae.**
12. What attaches to the various projections of a bone?  
**Muscles and ligaments**
13. Start at the body of the vertebra—recite in a clockwise direction each structure of the vertebrae until you end up back at the body again.  
**Body, pedicle, transverse process, lamina, spinous process, lamina, transverse process, pedicle, body**