Color the Neuron and Neuroglial Cells

Fluid filled cavity of brain

Capillary

- Oligodendrocytes (purple)
- Ependymal Cells (orange)
- Myelin sheaths (pink)
- Microglial cells (yellow)
- Astrocyte (green)
- Body of Neuron (blue)
- Capillary (red)
- Nodes or Ranvier and the Axon (brown)

What is the function of:
1) Oligodendrocytes
2) Astrocytes
3) Microglial cells
4) Myelin sheaths

5) Describe the path of a nerve impulse in a neuron starting with the dendrite.
The Anatomy of a Synapse

Neurons form elaborate networks through which nerve impulses—action potentials—travel. Each neuron has as many as 15,000 connections with neighboring neurons.

Neurons do not touch each other; instead, neurons interact at contact points called synapses: a junction within two nerve cells, consisting of a miniature gap which impulses pass by a neurotransmitter. A neuron transports its information by way of a nerve impulse called an action potential. The action potential can originate in the cell body when it has received a stimulus, then it moves down the axon of that neuron. When an action potential arrives at the synapse, it stimulates the release of neurotransmitters. These neurotransmitters are released into the synaptic cleft to bind to the receptors of the adjacent cell.

On the image below: Color the cell body and the dendrites blue.
Color the axon (and myelin sheaths) red.
Highlight the synapse with yellow.
Use an arrow to show movement of the action potential.

On a cellular level, the neuron cell has vesicles that contain the neurotransmitters. Each neurotransmitter can carry a different type of message. Some neurotransmitters, like serotonin, regulate appetite, sleep and mood. Serotonin is thought to be associated with certain types of depression and anxiety disorders.

The image below shows how serotonin is released from the neuron and how a drug called SSRI (selective serotonin re-uptake-inhibitors) is used to treat mood disorders. The neuron, like most cells of the body has mitochondria which provide the energy the cell needs to function. Color the mitochondria (A) orange and the axon on the nerve cell (X) blue.

The axon area contains the vesicles that store the neurotransmitters. These neurotransmitters are released into the synaptic cleft where they cross the gap and land on the receptors of the dendrites of the next neuron.

Color the axon (X) light blue.
Color the neurotransmitters (E) red.
Color the vesicles (B) pink.
Color the receptors (D) green.
Color the dendrite (Y) yellow.

The neurotransmitters are returned to the original cell through transporters, a process called re-uptake. As long as the neurotransmitter remains in the cleft, the receptors will continue to be stimulated. Certain drugs, called SSRI's can inhibit this re-uptake process, leaving the serotonin neurotransmitter active for longer within the cleft. This has an effect of elevating the person's mood or reducing anxiety and depression. Many anti-depressants are marketed as SSRI's.

Color the transporter (re-uptake area) purple.
Color the inhibitor (F) brown.
Questions:

1. What is the relationship between a receptor and a neurotransmitter?

2. Where are neurotransmitters stored in the cell?

3. What happens if the re-uptake transporter is blocked?

4. What is an SSRI? What does this type of drug treat?

5. An agonist is a chemical capable of binding to a receptor and initiating a reaction. An antagonist is a chemical that binds to the receptor but does not cause a reaction, effectively blocking that receptor. Sketch a model (using the one you colored as a guide) to show how an antagonist works.
22. What happens if the body temperature rises too high above 37°C?

23. What happens if the core body temperature has dropped below 37°C?

24. Is the following sentence true or false? The part of the brain that monitors and controls Thermostratons is the hypothalamus.

25. Which of the following best describes the body's response to a decrease in body temperature?
   a. Increase in metabolic rate to generate heat
   b. Increase in hormonal production to inhibit heat loss
   c. Increase in sweat production to cool the body

26. What are four types of tissues found in the human body?

27. Match the system with its function.

   a. Digestive system
   b. Circulatory system
   c. Respiratory system
   d. Reproductive system
   e. Endocrine system
   f. Nervous system

28. Which of the following is an example of how the body's homeostatic mechanisms interact?
   a. The heartbeat increases to pump more blood to the brain during exercise.
   b. The body decreases the production of sweat to conserve water.
   c. The pancreas releases insulin to lower blood sugar levels.

29. What are the key concepts related to human body systems? (pages 891-896)

   - Homeostasis
   - Organization of the body
   - Commonalities

30. What is the human body organized into?

   a. Tissues
   b. Organs
   c. Systems
   d. Orgel

31. How is the human body organized?

   a. Tissue level
   b. Organ level
   c. System level
   d. Organellar level

32. Date

33. Name
Reading Skill Practice

13. Describe what happens when an impulse reaches an axon terminal.

12. What are neurotransmitters? (page 900)

The Synapse

11. How does a nerve impulse follow the all-or-nothing principle?

10. The minimum level of a stimulus that is sufficient to excite a neuron is called the

9. Increase in negative ions in a neuron due to the flow of sodium ions out of a neuron

8. How does a nerve impulse begin?

7. The electrical changes across the membrane of a neuron in its resting state is called the

The Nerve Impulse (pages 899-900)

6. What is the function of the myelin sheath?

5. Label the following features in the drawing of a neuron: cell body, dendrites, and axon.

4. Is the following sentence true or false? Synaptic neurons carry impulses from the brain

Introduction (page 897)

2. How are neurons classified?

1. What is the function of the nervous system?

Neurons (pages 897-899)

3. What are three types of neurons?
12. Why is it important to have two systems that control the same organ?

13. Which does the endocrine nervous system regulate?
   a. Thinking a person
   b. Flowing a person
   c. Regulating the body

14. What is the central core and where is it found?

15. The central nervous system is made up of the outer layer of the brain or the skull. The outer layer of the brain is called
   a. Myelinated
   b. Plexus
   c. Cortex

16. Identify the four lobes of the brain.

10. The two hemispheres of the brain are connected by a band of tissue called the

   a. Corpus callosum
   b. Hypothalamus
   c. Thalamus

2. The peripheral nervous system consists of the

   a. Central nervous system
   b. Peripheral nervous system
   c. Spinal cord

3. The peripheral nervous system controls the

   a. Spinal cord
   b. Brain
   c. Is separated into

4. The brain and spinal cord are protected and guarded by

   a. Cerebral
   b. Brain stem
   c. Spinal cord

5. The somatic nervous system consists of the

   a. Sensory system
   b. Motor system
   c. Sympathetic system

6. The autonomic nervous system consists of the

   a. Parasympathetic system
   b. Sympathetic system
   c. Somatic system

7. The central nervous system consists of the

   a. Spinal cord
   b. Brain
   c. Peripheral nervous system

8. The autonomic nervous system is divided into two divisions, the sympathetic nervous system, and the

   a. Sympathetic nervous system
   b. Parasympathetic nervous system
   c. Central nervous system

9. The peripheral nervous system consists of the

   a. Nervous system
   b. Central nervous system
   c. Peripheral nervous system

10. The peripheral nervous system consists of the

   a. Nervous system
   b. Central nervous system
   c. Peripheral nervous system

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   c. Peripheral nervous system

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   a. Nervous system
   b. Central nervous system
   c. Peripheral nervous system

16. The peripheral nervous system consists of the

   a. Nervous system
   b. Central nervous system
   c. Peripheral nervous system

17. The two regions of the brain stem are the

   a. Cerebrum
   b. Brain stem
   c. Spinal cord

18. The brain stem is the function of the

   a. Sympathetic nervous system
   b. Parasympathetic nervous system
   c. Somatic nervous system

19. The brain stem is the function of the

   a. Sympathetic nervous system
   b. Parasympathetic nervous system
   c. Somatic nervous system

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   b. Parasympathetic nervous system
   c. Somatic nervous system

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   b. Parasympathetic nervous system
   c. Somatic nervous system

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   b. Parasympathetic nervous system
   c. Somatic nervous system

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   b. Parasympathetic nervous system
   c. Somatic nervous system

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   b. Parasympathetic nervous system
   c. Somatic nervous system

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   a. Sympathetic nervous system
   b. Parasympathetic nervous system
   c. Somatic nervous system

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   a. Sympathetic nervous system
   b. Parasympathetic nervous system
   c. Somatic nervous system

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   a. Sympathetic nervous system
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   c. Somatic nervous system

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   a. Sympathetic nervous system
   b. Parasympathetic nervous system
   c. Somatic nervous system

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   a. Sympathetic nervous system
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   c. Somatic nervous system

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   b. Parasympathetic nervous system
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   c. Somatic nervous system

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   a. Sympathetic nervous system
   b. Parasympathetic nervous system
   c. Somatic nervous system

50. The brain stem is the function of the

   a. Sympathetic nervous system
   b. Parasympathetic nervous system
   c. Somatic nervous system
Nervous System Review (9-1 to 9.10)

1. The skeletal muscles are controlled by the ______________________ nervous system.
2. The smooth muscles and glands are controlled by the ______________________ nervous system.
3. Neurons are composed of a network of fine threads called ______________________
4. The nervous system consists of two parts, the brain and spinal cord make up the ______________________ nervous system, and the nerves throughout the body make up the ______________________ nervous system.
5. ______________________ are cells found between neurons and blood vessels.
6. Neurons consist of a cell body, axons, and ______________________, which receive information.
7. Neurons that have a single process extending from the cell body are classified as __________, if they have two processes, they are classified as ________________
8. White matter is composed of axons that are sheathed in ______________________
9. Two ions necessary to create an electric current in a nerve fiber are potassium and ______________________
10. The ______________________ function of the nervous system refers to information being interpreted so that the brain can make decisions.
11. The junction between two communicating neurons is called the ______________________
12. Acetylcholine, serotonin and endorphins are all forms of ______________________
13. The ______________________ arc refers to a simple nerve pathway that would be involved with involuntary actions (like knee-jerk, or withdrawal)
14. Groups of neurons that perform a common function, such as the storing of procedural memory (tying your shoe) are called neuronal ____________
15. ______________________ cells help destroy bacterial cells and cellular debris.
16. There are 31 pairs of ______________________ nerves.
17. These types of neurotransmitters increase membrane permeability, thus increasing the chance that threshold will be achieved. ______________________
18. When a threshold is achieved, an event called the ______________________ potential occurs.
19. Gaps in the myelin sheath are called Nodes of ______________________
20. These support cells are responsible for secreting the myelin sheaths: ______________________
21. A nerve impulse is received by the dendrites and then travels down the ______________________
22. There are twelve pairs of _______ nerves.
23. This neurotransmitter stimulates the muscles to contract. ______________________
24. These cells form a membrane that covers specialized brain parts: ____________
25. These cells have the same function as oligodendrocytes, but are packed within the myelin:
Hemisphere Dominance Inventory

1. ___ If you had to give someone directions to your house, which of the following methods would you most likely use?
   a. Write a paragraph that explains where and when to turn
   b. Draw a road map

2. ___ Which of the following are you better at solving?
   a. Jigsaw puzzle b. Crossword puzzle

3. ___ Do you remember faces easily? a. Yes b. No

4. ___ Do you think you'd earn higher grades in a geometry class or in an algebra class?
   a. geometry b. algebra

5. ___ Imagine that you're vacationing at a resort. Which of the following would you most likely do?
   a. Obtain a brochure of local attractions and plan what you'd like to do for the day
   b. Drive around without a plan and decide what you'd like to do as you drive along

6. ___ Was it usually easy or difficult to learn grammar in school? a. difficult b. easy

7. ___ Imagine enrolling in a music course. You and a partner in the course must write a song. Which of the following would you prefer to do?
   a. Write the lyrics b. Compose the melody

8. ___ When you read a new chapter in a textbook, which of the following are you most likely to do?
   a. Skim through the entire chapter first to get a general idea of what the chapter is about
   b. Read the chapter from beginning to end without doing much skimming

9. ___ In which of the following English classes would you most likely enroll?
   a. Journalism
   b. Creative writing

10. ___ Imagine that you volunteered to work for the school newspaper. Which of the following would you rather do?
    a. Cut and paste and lay out the stories and decide which stories should appear where
    b. Write one or two of the stories

11. ___ After reading a new chapter in a textbook, which of the following would you rather do?
    a. Summarize the chapter b. Outline the chapter

12. ___ If you had an important project due in a class, would you prefer to work? a. in a group b. alone

13. ___ Which of the following classroom situations do you prefer?
    a. A teacher announces assignments on a weekly basis and sets specific weekly due dates
    b. A teacher announces all the assignments at the beginning of the course and allows you to complete them at any time before the end of the course

14. ___ Which of the following statements best applies to you?
    a. I'm good at guessing a person's mood by his or her body language
    b. I'm not good at guessing a person's mood by his or her body language

15. ___ Which of the following would you rather play? a. Scrabble b. Checkers

16. ___ With which of the following statements do you most agree?
    a. We should continue exploring outer space since one day this exploration may benefit us
    b. We should continue exploring outer space only if we can be sure ahead of time of certain benefits we would receive

Scoring

How many "a" answers did you have for odd-numbered questions? __________
How many "b" answers did you have for even-numbered questions? __________
LEFT HEMISPHERE TOTAL __________

How many "a" answers did you have for even-numbered questions? __________
How many "b" answers did you have for odd-numbered questions? __________
RIGHT HEMISPHERE TOTAL __________

Left-Hemisphere Dominance (left total = 10 or more)

Your score indicates that you are generally a highly organized person. If you are sloppy, even your mess makes sense to you. When given a job to do, you like to approach the task one step at a time rather than plunging into it. If you are involved in extra-curricular activities, you are probably well-disciplined. For example, if you are a musician, you probably follow a practice schedule well. In the future, you'd probably do well in one of the following areas: accounting, engineering, or computer programming

Right - Hemisphere Dominance (right total = 10 or more)
Your total indicates that you use intuition and creativity to achieve certain goals, rather than an outlined, detailed plan of action. You feel that too much planning tends to limit possibilities. If you are involved in extra-curricular activities that require practice or drilling, you perform well when inspired but otherwise do not enjoy the routine of practicing every day. Chances are good that you are interested in one of the following areas: music, art, athletics.

Balanced Hemispheres (both totals = less than 10)

As indicated in the previous descriptions, left-hemisphere people prefer structure; right-hemisphere people do not. Your score indicates that you fall somewhere between these two extremes. When given a job to do, you may prepare yourself by making lists (something a left-hemisphere person would do), but the lists may not be highly organized (which a right hemisphere person may prefer).

<table>
<thead>
<tr>
<th>LEFT BRAIN FUNCTIONS</th>
<th>RIGHT BRAIN FUNCTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>uses logic</td>
<td>uses feeling</td>
</tr>
<tr>
<td>detail oriented</td>
<td>&quot;big picture&quot; oriented</td>
</tr>
<tr>
<td>facts rule</td>
<td>imagination rules</td>
</tr>
<tr>
<td>words and language</td>
<td>symbols and images</td>
</tr>
<tr>
<td>present and past</td>
<td>present and future</td>
</tr>
<tr>
<td>math and science</td>
<td>philosophy &amp; religion</td>
</tr>
<tr>
<td>can comprehend</td>
<td>can &quot;get it&quot; (i.e. meaning)</td>
</tr>
<tr>
<td>knowing</td>
<td>believes</td>
</tr>
<tr>
<td>acknowledges</td>
<td>appreciates</td>
</tr>
<tr>
<td>order/pattern perception</td>
<td>spatial perception</td>
</tr>
<tr>
<td>knows object name</td>
<td>knows object function</td>
</tr>
<tr>
<td>reality based</td>
<td>fantasy based</td>
</tr>
<tr>
<td>forms strategies</td>
<td>presents possibilities</td>
</tr>
<tr>
<td>practical</td>
<td>impetuous</td>
</tr>
<tr>
<td>safe</td>
<td>risk taking</td>
</tr>
</tbody>
</table>
THE HUMAN NERVOUS SYSTEM

HUMAN NERVOUS SYSTEM

CENTRAL NERVOUS SYSTEM

BRAIN

PERIPHERAL NERVOUS SYSTEM

SPINAL CORD

SENSORY NERVES

MOTOR NERVES

3 Main Parts of the Nervous System
1. Brain
2. Spinal Cord
3. Nerves – Sensory and _____________ Nerves

The Neurone
♦ Nerve cells are called _____________.
♦ A neurone consists of a cell body (with a nucleus and cytoplasm), dendrites which carry electrical ___________ to the cell, and a long axon which carries the impulses away from the cell.
♦ The axon of one neurone and the dendrites of the next neurone do not actually touch. The __________ between neurones is called the synapse.

Neuronal Function
There are 3 processes involved in nerve transmission:
1. Generation of a nerve impulse (action potential) of a sensory neurone occurs as a result of a stimulus such as light, a particular chemical or stretching of a cell membrane by sound.
2. Conduction of an impulse along a neurone occurs from the _____________ to the cell body to the axon.
3. A chemical transmitter substance is released across the _____________ to allow the electrical impulses to pass from one neurone to the next. This substance causes the next neurone to be electrically stimulated and keeps the signal going along a nerve.
The Central Nervous System

- The **Central Nervous System** comprises the parts that are enclosed and protected by bone - the Brain and the _______________ Cord.
- The **Brain** is composed of _______________ of interconnected neurones. It is protected within the _______________ or **cranium**.
- The **Spinal Cord** is a bundle of nerve fibres made of many neurones. It is protected by the **vertebral column**.
- **Cerebro-spinal Fluid** surrounds the brain and spinal cord and acts as a buffer against hard knocks or jolts.

**3 Parts of The Brain**

1. Cerebrum (Forebrain) – the largest section of the brain, which lets us think, interpret sensory messages, carry out voluntary _______________ movements, remember and have consciousness
2. Cerebellum (Midbrain) – helps us to keep our balance, and have repetitive muscle control
3. Medulla Oblongata (Hindbrain or Brain Stem) – control the vital functions of heartbeat and _______________

The Hypothalamus

- The hypothalamus is a small cluster of neurones deep within the brain. It plays a central role by regulating many vital processes (e.g. regulating body temperature, heart rate, water balance and blood pressure, carbohydrate and fat metabolism, appetite, sleep and sex drive).
- It also links the nervous system with the endocrine system, because it controls the **pituitary gland** which is the master gland of the _______________ system.

The Peripheral Nervous System

- This is the part of the nervous system that does not include the brain and the spinal cord.
- There are 2 types of nerves – sensory and motor nerves.
- **Sensory Nerves** carry information about the surroundings from the sense receptors in the skin, _______ ears, nose and tongue along the spinal cord to the brain to be interpreted.
- **Motor Nerves** carry messages from the brain through the spinal cord to the muscles and other organs to produce an action.
- Some of the nerves of the peripheral nervous system are under voluntary control (e.g. _______________). Other nerves are involuntary or uncontrolled (e.g. regulating heartbeat).
A Reflex Arc

- A reflex arc involves transmission of a nervous impulse or message from sensory receptors to the spinal cord and back to muscles. Later, the message also reaches the brain for interpretation.
Answers:

A = parietal lobe  |  B = gyrus of the cerebrum  |  C = corpus callosum  |  D = frontal lobe  
E = thalamus  |  F = hypothalamus  |  G = pituitary gland  |  H = midbrain  
J = pons  |  K = medulla oblongata  |  L = cerebellum  |  M = transverse fissure  |  N = occipital lobe
Structure of the Brain

Read 958-96. Label the correct parts of the brain and spinal cord on the diagram at the left below. Give the purpose/function of each part.

a. cerebellum
b. medulla oblongata
c. thalamus
d. hypothalamus
e. corpus callosum
f. pons
g. spinal cord
h. cerebrum
i. pituitary gland

Lobes of the Cerebrum

The diagram to the right above shows the four lobes of each hemisphere of the cerebrum: frontal, parietal, occipital and temporal. Label each lobe (page 965). Then, fill in the blanks below with the correct answers.

The __________ lobes control some body movements, reasoning, judgment and emotions.
The sense of vision is located in the __________ lobe. The sense of hearing is interpreted in the __________ lobes. The __________ lobes interpret sensations such as pain, pressure, touch, hot and cold.
Central Nervous System Review II (9.11-9.13)

1. The worm-like ridges on the surface of the brain are called _______________________.
2. The thin, web-like membrane between the outer and inner layer of meninges is called the _______ mater.
3. The right side of your brain controls the _______ side of your body.
4. The ___________________ enlargement of the spinal cord supplies nerves to the lower limbs, whereas the _______ enlargement supplies nerves to the shoulders and arms.
5. The innermost layer of meninges that supplies blood vessels to the brain called the _______ mater.
6. The ___________________ fissure separates the two hemispheres.
7. _______ tracts within the spinal cord carry motor impulses to the muscles.
8. The ___________________ connects the two hemispheres of the brain.
9. The ___________________ is the major part of the brain that controls higher mental activities, such as learning and making decisions.
10. The ___________________ is the part of the brain that controls the coordination, balance and equilibrium.
11. The outermost of the three meninges is the _______ mater.
12. The fluid-filled cavities within our brains are called ___________________.
13. The brain and spinal cord are surrounded (and float within) ___________________ fluid.
14. The brain ___________________ consists of the midbrain, pons, and medulla oblongata.
15. The ___________________ oblongata is responsible for regulation of the body, such as heart rate, body temperature and blood pressure.
16. The ___________________ system controls emotional experiences.
17. The part of the brain that plays a major role in memory is the ___________________.
18. The master gland of the endocrine system dealing with hormones is the ___________ gland.
19. Part of the diencephalon, controls basic functions such as body temperature, and hunger: ___________.
Nervous System

In the space provided, write the letter of the description that best matches the term or phrase.

1. neuron  
   a. the difference in electrical charge across a cell membrane
2. dendrite  
   b. part of a neuron that conducts nerve impulses
3. axon  
   c. the membrane potential of a neuron at rest
4. nerve  
   d. nerve cell; transmits information throughout the body
5. membrane potential  
   e. bundle of neurons
6. resting potential  
   f. part of a neuron that receives information from other neurons
7. action potential  
   g. a junction at which a neuron meets another cell
8. synapse  
   h. a signal molecule that transmits nerve impulses across synapses
9. neurotransmitter  
   i. nerve impulse

Write the correct term from the list below in the space next to its definition.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
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<tbody>
<tr>
<td>brain</td>
<td>hypothalamus</td>
</tr>
<tr>
<td>brain stem</td>
<td>reflex</td>
</tr>
<tr>
<td>central nervous system</td>
<td>sensory neuron</td>
</tr>
<tr>
<td>cerebellum</td>
<td>spinal cord</td>
</tr>
<tr>
<td>cerebrum</td>
<td>thalamus</td>
</tr>
</tbody>
</table>

10. carries motor responses from the central nervous system to muscles, glands and other organs
11. site of capacity for learning, memory, perception and intellectual function
12. consists of the brain and spinal cord
13. relays sensory information
14. dense cable of nervous tissue that runs through the vertebral column
15. contains neurons that branch throughout the body
16. carries information from sense organs to the central nervous system
17. the body’s main processing center
18. regulates breathing, heart rate and endocrine functions
19. link neurons to each other
20. collection of structures leading down to the spinal cord
21. regulates balance, posture and movement
22. a sudden, rapid and involuntary self-protective motor response
In the space provided, write the letter of the description that best matches the term or phrase.

23. sensory receptor a. the lining of photoreceptors and neurons in the eye
24. retina b. aids in hearing
c. type of photoreceptor that responds best to dim light
25. rod d. runs from the back of each eye to the brain
e. helps maintain equilibrium
26. cone f. a specialized neuron that detects sensory stimuli
g. type of photoreceptor that enables color vision
27. optic nerve
28. cochlea
29. semicircular canal

Complete each statement by writing the correct term or phrase in the space provided.

30. The need for increasing amount of a drug to achieve the desired sensation is called

31. A drug that generally decreases the activity of the central nervous system is called a(n)

32. A drug that generally increases the activity of the central nervous system is called a(n)

33. Drugs that alter the functioning of the central nervous system are known as

34. ____________________ is a set of emotional and physical symptoms caused by removing a drug from the body of a drug addict.

35. ____________________ is a physiological response caused by repeated use of a drug that alters the normal functioning of neurons and synapses.
Spinal Cord and Reflex Act

Cross Section of Spinal Cord

Read pages 906 - 908 in your text. Label the following parts of a spinal cord on the cross-section diagram.

a. white matter  
b. grey matter  
c. dorsal root ganglion  
d. nerve fibers  
e. interneuron  
f. synapse  
g. sensory neuron  
h. motor neuron

Reflex Act

Label the following parts of a reflex act on the diagram of a boy stepping on a tack and jerking his leg away.

a. sensory neuron  
b. motor neuron  
c. stimulus  
d. spinal cord  
e. receptor (in skin)  
f. effector (muscle)

Fill in the blanks with the correct answers.

Suppose you stepped on a tack. You jerked your leg away from the _______ you were aware of what happened. The impulse traveled from the _______ in the skin, along a(n) _______ to a(n) _______; then across another synapse to a _______ neuron. The impulse traveled along this nerve to an _______, muscle in your leg. You jerked your leg away. Only a fraction of a second later, a(n) _______ traveled up your _______ to your _______. But you had _______ reacted. This kind of reaction is known as a(n) _______. reflex acts occur without thinking.
Mini – Review Nervous System (9.14 to 9.15)

1. The __________________ nervous system consists of the nerves that branch out from the CNS and connect to other body parts.
2. The peripheral nervous system is divided into two parts:
   Conscious activities are controlled by the __________________ nervous system.
   Unconscious activities, such as heart rate, are controlled by the __________________ nervous system.
3. There are 8 pairs of __________________ nerves.
   There are 12 pairs of __________________ nerves.
   There are 5 pairs of __________________ nerves.
   There are also 5 __________________ nerves and one pair of __________________ nerves.
4. The lumbar, sacral, coccygeal nerves descend from the end of the cord — the cauda __________________ which translates to "horse’s tail".
5. Spinal nerves combine to form a network known as the __________________.
6. During high stress or emergencies, the __________________ part of the autonomic nervous system will take over.
   During resting, the __________________ part is active.
7. The sympathetic response is sometimes referred to as FIGHT or __________________.
8. Each nerve emerges from the spinal cord at points called __________________.
9. With the lumbrosacral plexus, what is the large nerve that runs through your pelvis and into your leg __________________.
   Which nearby nerve follows the femur down __________________.
10. The parasympathetic and sympathetic systems act against each other, one excites and the other __________________.
11. This group (plexus) supplies the nerves of the neck __________________
    arm __________________
    pelvis and legs __________________
List by number the 12 pairs of cranial nerves. You have a mnemonic to help you remember there and you will need to be able to list them all on the quiz.
Section: Neurons and Nerve Impulses

The figure below shows a myelinated neuron. In the space provided, write the letter of the name of the following structures:

- a. myelin sheaths
- b. axon terminals
- c. dendrites
- d. nucleus
- e. cell body
- f. nodes of Ranvier
- g. axon

In the space provided, write the letter of the term or phrase that best completes each statement or best answers each question.

8. The conduction of nerve impulses is faster in myelinated axons because
   a. neurotransmitter molecules are released in greater amounts.
   b. the myelin sheath covers the entire axon.
   c. nerve impulses "jump" from node to node as they move down the axon.
   d. the membrane potential does not change.

9. The resting potential of a neuron is usually which of the following?
   a. positive
   b. negative
   c. neutral
   d. Either (a) or (b)

10. Neurotransmitter molecules are removed from a synapse by
    a. being broken down by enzymes.
    b. being reabsorbed by the presynaptic neuron.
    c. being absorbed by muscle tissue.
    d. Both (a) and (b)
Section: Sensory Systems

In the space provided, write the letter of the term or phrase that best completes each statement or best answers each question.

1. Sensory information from the olfactory receptors is processed in which lobe of the brain?
   a. parietal lobe  
   b. frontal lobe  
   c. occipital lobe  
   d. temporal lobe

2. The area of the eye that contains photoreceptors and neurons is the
   a. cornea.  
   b. lens.  
   c. retina.  
   d. iris.

3. The cochlea is located
   a. in the outer ear.  
   b. in the taste buds.  
   c. in the inner ear.  
   d. on the tongue's surface.

4. Semicircular canals contain which of the following structures, which are stimulated by changes in the position of the head with respect to gravity?
   a. taste buds  
   b. hair cells  
   c. the hammer, the anvil, and the stirrup  
   d. rods and cones

5. Sensory receptors are most concentrated in which of the following areas of the body?
   a. eyes, ears, and skin  
   b. muscle tissue of the arms and legs  
   c. nose and mouth  
   d. Both (a) and (c)

In the space provided, write the letter of the description that best matches the term or phrase.

6. detect movement, pressure, and tension
   a. thermoreceptors  
   b. pain receptors  
   c. mechanoreceptors  
   d. photoreceptors  
   e. chemoreceptors

7. located in all tissues except the brain

8. are stimulated by light

9. located in the tongue and nose

10. detect changes in temperature
Section: Drugs and the Nervous System

In the space provided, write the letter of the term or phrase that best completes each statement or best answers each question.

_____ 1. Tars, produced from burning tobacco, do all of the following EXCEPT
   a. accumulate in the lungs and paralyze cilia.
   b. blacken lung tissue and decrease breathing ability.
   c. irritate mucous membranes in the mouth, nose, and throat.
   d. cause addiction to cigarettes.

_____ 2. Neurotransmitters called enkephalins
   a. prevent pain signals from reaching the brain.
   b. cause pain signals to reach the brain.
   c. stimulate pain receptors to send impulses.
   d. None of the above

_____ 3. Cirrhosis, a condition in which liver cells are replaced with scar tissue, can develop as a result of
   a. alcoholism.
   b. using stimulants.
   c. malnutrition.
   d. smoking cigarettes.

_____ 4. Examples of psychoactive drugs include which of the following?
   a. caffeine
   b. alcohol
   c. cocaine
   d. All of the above

In the space provided, write the letter of the description that best matches the term or phrase.

______ 5. depressants
   a. examples include heroin, morphine, and codeine

______ 6. stimulants
   b. psychoactive effects include sensory distortion, hallucinations, and numbness

______ 7. inhalants
   c. psychoactive effects include disorientation, confusion, and memory loss

______ 8. hallucinogens
   d. risks associated with use include lung damage and loss of motivation

______ 9. THC
   e. examples include tranquilizers and alcohol

______ 10. narcotics
   f. psychoactive effects include increased activity of the central nervous system
Nervous System - Review Guide

1. Know how the nervous system is organized (autonomic, somatic, central, peripheral)
2. Describe a neuron – be able to label a picture of a neuron (axon, dendrite, nodes of ranvier, cell body, chromatophilic substance, myelin, nucleus)
3. Identify supporting cells of a neuron (neuroglia) and be able to label them on an image (oligodendrocyte, astrocyte, microglial cells, Schwann cells)
4. Define neurotransmitter, list examples of neurotransmitters
5. Distinguish between white matter and gray matter.
6. Describe the events in a nerve impulse. What is an action potential? What ions are necessary? What is a threshold?
7. What happens at the synapse of neuron?
8. What is a reflex? Name two reflexes.
9. Describe the 3 types of neurons: multipolar, bipolar, unipolar
10. Distinguish between the cervical enlargement and the lumbar enlargement. (Where are they located, what do they control?)
11. What is the difference between a gyri, a sulcus, and a fissure?
12. Distinguish between ascending tracts and descending tracts of the spinal cord. (sensory vs motor)
13. Identify the locations of the large fissures of the brain: lateral, longitudinal, transverse
14. Know the layers of the meninges: Dura mater, arachnoid mater, pia mater
15. What connects the two hemispheres of the brain?
16. Be able to label a brain on an image, also know what each area of the brain is responsible for.
17. Know the lobes of the brain and where each is located.
18. Label a picture of the brain stem (diencephalon, thalamus, hypothalamus, pons, medulla oblongata, optic chiasma, pituitary gland)

19. Define the four types of memory, describe tasks associated with each.

See also Brain Crossword Puzzle
Across

4. Descending tracts within the spinal cord carry ____________ impulses to the muscles.
6. The thalamus and hypothalamus make up this part of the brain:
8. Ascending tracts within the spinal cord carry ________ impulses to the brain.
9. The innermost layer of meninges that supplies blood vessels to the brain and spinal cord is called the _______ mater
11. Controls emotional experiences and expression; _______ system
12. The thin, weblike membrane between the outer and inner layer of meninges is called the _________ mater
13. The _______ is the major part of the brain that controls sensory functions, motor functions and higher mental activities
14. Shallow grooves between the gyri of the brain
15. Consists of the midbrain, pons, and medulla oblongata, connects brain to spinal cord

Down

1. The brain and spinal cord are surrounded (and float within) ____________ fluid.
2. The outermost of the three meninges is the _______ mater
3. Responsible for regulation of the body, such as heart rate, body temperature and blood pressure (part of the brain stem)
5. The _______ is the major part of the brain that controls the coordination of skeletal muscles and equilibrium.
7. This part of the brain was named after its shape (a seahorse) and is responsible for memory:
10. Fluid filled cavities within the brain