

Biology 251  
6 October 2009  
Exam Two  
**FORM W KEY**

**PRINT YOUR NAME AND ID NUMBER in the space that is provided on the answer sheet, and then blacken the letter boxes below the corresponding letters of your name and ID number. You will have 4 points deducted if you fail to do this!!!!!!**

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**Your exam should have 33 questions. Please check to make sure it is complete.**

**For each of the following questions, please indicate the most correct answer by blackening the corresponding letter on the accompanying answer sheet. Each correct answer is worth 2 points. Partial credit of ½ point may be available for questions that have answers such as “all the above”, “both a and b are true”, etc.**

1. Which of the following is part of the autonomic nervous system?
  - a) *parasympathetic nervous*
  - b) *sympathetic nervous system*
  - c) somatic nervous system
  - d) both a and b**
  - e) all of the above
  
2. The part of the brain that is the critical link between the nervous and endocrine systems is
  - a) The brain stem
  - b) The cerebellum
  - c) The cerebral cortex
  - d) The hypothalamus**
  - e) The basal nuclei
  
3. The cerebellum is involved in
  - a) coordination of voluntary muscle activity**
  - b) coordination of slow sustained movement
  - c) crude awareness of sensation
  - d) all the above
  - e) both a and b
  
4. Which of the following is most involved in generating emotions?
  - a) Brain stem
  - b) Cerebellum
  - c) Hypothalamus
  - d) Thalamus
  - e) Limbic system**

5. Tight junctions between capillary endothelial cells in the central nervous system create the blood-brain barrier, thereby restricting the \_\_\_\_\_ molecules into the brain.
  - a) transcytosis of
  - b) active transport of
  - c) facilitated diffusion of hydrophobic
  - d) diffusion of hydrophilic**
  - e) diffusion of lipophilic
  
6. Which of the following statements about simple spinal reflexes is true?
  - a) The afferent neuron must synapse with an efferent neuron
  - b) Only excitatory neurons are used in reflex pathways
  - c) More than one efferent neuron can be activated as part of the reflex**
  - d) Both a and b are true
  - e) Both b and c are true
  
7. Information from chemoreceptors on your tongue is sent to the CNS via
  - a) A visceral afferent
  - b) A sensory afferent**
  - c) A somatosensory afferent
  - d) A sensory efferent
  - e) A visceral efferent
  
8. Conversion of stimulus energy into an action potential is called
  - a) Tonic response
  - b) Phasic response
  - c) Transduction**
  - d) Receptor potential
  - e) Graded potential
  
9. Fast adapting (also called phasic) receptors
  - a) Show a decline in membrane potential as a stimulus continues**
  - b) Show an increase in membrane potential as a stimulus continues
  - c) Continue to produce action potentials as a stimulus continues
  - d) Do not respond to stimuli
  - e) Both b and c are true
  
10. Which of the following is the best description of sweet taste bud receptor function?
  - a) Membrane receptors on sweet taste buds bind glucose or other sugars, which initiates a G protein system, which ultimately causes  $K^+$  channels to close, which thereby hyperpolarizes the membrane.
  - b) Membrane receptors on sweet taste buds bind glucose or other sugars, which closes the  $K^+$  channels, which ultimately initiates a G protein system, which thereby depolarizes the membrane.
  - c) Membrane receptors on sweet taste buds bind glucose or other sugars, which initiates a G protein system, which ultimately causes  $K^+$  channels to close, which thereby depolarizes the membrane.**
  - d) Membrane receptors on sweet taste buds bind acids ( $H^+$ ), which initiates a G protein system, which ultimately causes  $K^+$  channels to close, which thereby depolarizes the membrane.
  - e) Membrane receptors on sweet taste buds bind glucose or other sugars, which hyperpolarizes the membrane, which ultimately causes  $K^+$  channels to close, which thereby initiates a G protein system.

11. When an olfactory receptor binds a chemical, it causes \_\_\_\_\_ to \_\_\_\_\_ the receptor. This creates a(n) \_\_\_\_\_ in the receptor membrane.
- Na<sup>+</sup> and K<sup>+</sup>; enter; action potential
  - Na<sup>+</sup> and Ca<sup>++</sup>; enter; graded potential**
  - Na<sup>+</sup> and Ca<sup>++</sup>; enter; action potential
  - Na<sup>+</sup> and Ca<sup>++</sup>; exit; graded potential
  - Ca<sup>++</sup> and neurotransmitter; action potential
12. When you drink coffee, caffeine molecules bind to bitter receptors on taste buds, which reduce \_\_\_\_\_ leaking \_\_\_\_\_ the receptor cell, which depolarizes the membrane and causes \_\_\_\_\_ channels to open.
- K<sup>+</sup>; into; Ca<sup>++</sup>
  - K<sup>+</sup>; out of; Ca<sup>++</sup>**
  - Na<sup>+</sup>; into; K<sup>+</sup>
  - Na<sup>+</sup>; out of; Ca<sup>++</sup>
  - K<sup>+</sup>; out of; Na<sup>+</sup>
13. Parasympathetic preganglionic neurons release the neurotransmitter \_\_\_\_\_; sympathetic preganglionic neurons release the neurotransmitter \_\_\_\_\_.
- epinephrine : norepinephrine
  - norepinephrine : acetylcholine
  - acetylcholine : norepinephrine
  - norepinephrine : norepinephrine
  - acetylcholine : acetylcholine**
14. The preganglionic neurons of the sympathetic nervous system emerge from the \_\_\_\_\_ of the spinal cord.
- lumbar region*
  - thoracic and lumbar regions**
  - thoracic region*
  - lumbar and sacral regions
  - sacral region only
15. During a fight or flight response, \_\_\_\_\_ receptors in blood vessels leading to the GI tract bind primarily \_\_\_\_\_ which causes the blood vessels to \_\_\_\_\_.
- Beta-2; epi; dilate
  - Beta-2; norepi; constrict
  - Alpha; norepi; constrict**
  - Beta-1; epi; constrict
  - Beta-1; norepi; dilate
16. During a fight or flight response, \_\_\_\_\_ receptors in blood vessels leading to the heart bind primarily \_\_\_\_\_ which causes the blood vessels to \_\_\_\_\_.
- Beta-2; epi; dilate**
  - Beta-2; norepi; dilate
  - Alpha; norepi; constrict
  - Beta-1; epi; constrict
  - Beta-1; norepi; dilate

17. Which of the following events in the human female sexual cycle are NOT caused by the parasympathetic nervous system?
- Vasocongestion in the vagina
  - Reduction of the inner circumference of the vagina
  - Vasocongestion in the breasts
  - Rhythmic contraction of pelvic muscles at 0.8 second intervals**
  - Vasocongestion of the clitoris
18. When acetylcholine binds to the motor end plate it causes a net movement of \_\_\_\_\_ into the muscle cell by the process of \_\_\_\_\_ which results in a \_\_\_\_\_ potential in the motor end plate
- Na<sup>+</sup>; active transport; graded
  - Na<sup>+</sup>; diffusion; action
  - Ca<sup>++</sup>; diffusion; graded
  - Ca<sup>++</sup>; active transport; action
  - Na<sup>+</sup>; diffusion; graded**
19. Endocrine glands are composed of what primary tissue?
- Skeletal muscle
  - Connective
  - Nervous
  - Epithelial**
  - Smooth muscle
20. Which of the following statements are true?
- a given endocrine gland can only produce one hormone
  - a given hormone can be produced by only one endocrine gland
  - a single target cell can be influenced by only one hormone
  - none of the above are true**
  - b and c only are true
21. Which of the following are tropic hormones?
- TSH
  - FSH
  - Prolactin
  - all the above
  - a and b only**
22. When a lipophilic hormone reaches a target cell it
- binds to a protein on the cell membrane
  - binds to an alpha receptor on the cell membrane
  - passes through the cell membrane**
  - triggers a second messenger system
  - all the above except c
23. and ultimately \_\_\_\_\_
- interacts with DNA in the nucleus.*
  - activates pre-existing proteins
  - causes the formation of new protein molecules.*
  - both a and c.**
  - both a and b.

24. Which of the following statements about hormones initiating second messenger systems is (are) true?
- A lipophilic hormone initiates the system by binding to a receptor on the cell membrane
  - A single hormone molecule binding to a receptor can ultimately activate millions of proteins**
  - A G protein is considered to be the second messenger
  - Both a and b are true
  - Both b and c are true
25. Thyroid stimulating immunoglobulin causes hyperthyroidism because \_\_\_\_\_
- it positively feeds back on the hypothalamus
  - it positively feeds back on the pituitary
  - it bypasses the effects of negative feedback on both the hypothalamus and pituitary**
  - it negatively feeds back on the hypothalamus and pituitary
  - both a and b
26. and \_\_\_\_\_.
- causes TSH release from the pituitary
  - causes TRH release from the hypothalamus
  - prevents T3 and T4 release from the thyroid
  - causes T3 and T4 release from the thyroid**
  - a, b, and d are all correct
27. Human Chorionic Gonadotropin (HCG) mimics \_\_\_\_\_ which maintains the corpus luteum so that it produces \_\_\_\_\_ to maintain the pregnancy.
- LH; estrogen*
  - LH; progesterone*
  - FSH; progesterone
  - FSH; progesterone and estrogen
  - LH; progesterone and estrogen**
28. Parkinson's disease is caused by decreased dopamine release in the \_\_\_\_\_, the part of the brain responsible for \_\_\_\_\_.
- cerebellum, coordination of voluntary muscle activity
  - cerebellum, maintenance of balance
  - brain stem, sensory perception
  - basal nuclei, suppression of useless movement patterns**
  - cerebral cortex, suppression of useless movement patterns
29. ALS (Lou Gehrig's disease) is caused by the destruction of
- Sympathetic neurons
  - Parasympathetic neurons
  - Motor neurons**
  - Both a and b
  - All the above
30. High levels of anabolic steroids reduces sperm count because
- Steroids destroy sperm
  - Steroids cause production of inhibin
  - Steroids negatively feedback on the hypothalamus to stop GnRH release*
  - Steroids negatively feedback on the anterior pituitary to stop LH and FSH release*
  - Both c and d are true**

Questions 31 to 33 refer to the figure below.

31. The hormone(s) that completes follicle development and cause(s) ovulation

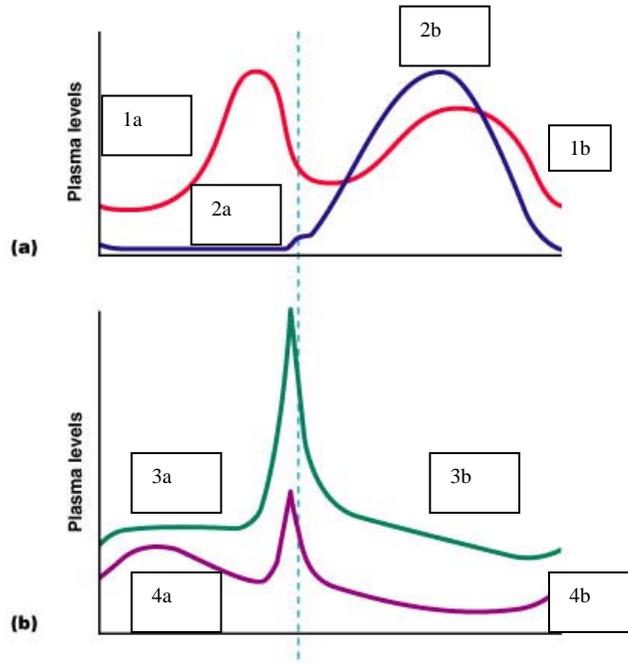
- a) 1a
- b) 2a
- c) **3a**
- d) 4a
- e) 1a and 3a

32. The hormone(s) produced by the corpus luteum

- a) 1a and 2a
- b) **1b and 2b**
- c) 2a
- d) 3b and 4b
- e) 1b, 2b, 3b, 4b

33. The hormone(s) produced by the developing follicle

- a) **1a**
- b) 3a
- c) 4a
- d) 1a, 3a, 4a
- e) 2b



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5 October 2010  
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1. How do anabolic steroids ingested by a male athlete disrupt the normal male reproductive system?
  - a) The steroids mimic LH and thereby shut down GnRH release
  - b) The steroids mimic FSH and thereby shut down GnRH release
  - c) The steroids mimic inhibin and thereby stop testosterone production
  - d) The steroids mimic testosterone and thereby negatively feedback on GnRH and LH production**
  - e) All the above are true except c
  
2. What anterior pituitary hormone is NOT a tropic hormone?
  - a) prolactin**
  - b) growth hormone
  - c) adrenocorticotrophic hormone
  - d) follicle stimulating hormone
  - e) luteinizing hormone
  
3. Which is (are) NOT a function(s) of the Basal Nuclei?
  - a) Language**
  - b) Inhibition of muscle tone
  - c) Coordination of slow sustained movement
  - d) Suppression of useless movement patterns
  - e) Both a and c
  
4. Which of the following happens during a fight or flight response?
  - a) The parasympathetic dominates
  - b) Blood flow to heart enhanced by beta-1 receptors on blood vessels to heart binding epi
  - c) Heart function increased by beta-2 receptors in heart binding epi
  - d) Both a and c occur
  - e) None of the above occur**

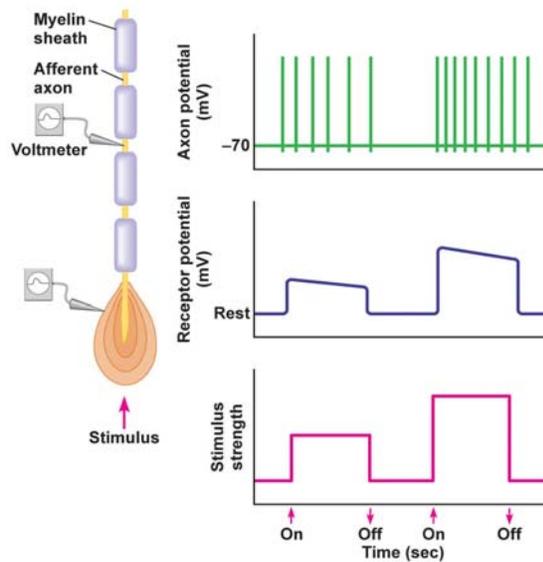
5. Which of the following statements about simple spinal reflexes is true?
- A spinal reflex can occur without input from the brain*
  - A spinal reflex can occur very rapidly because input from the brain is not required*
  - Only one efferent pathway can be activated by a spinal reflex
  - All the above are true
  - Only a and b are true**
6. Which of the following statements about Type II diabetes is true?
- It is the most prevalent form of diabetes in the US*
  - It is caused by too few insulin producing cells in the pancreas
  - It can cause blindness*
  - Both a and c are true**
  - Both b and c are true
7. During the luteal phase (days 15 to 28) of the female reproductive cycle, progesterone
- Is secreted by the corpus luteum*
  - Stimulates the hypothalamus and pituitary to cause LH and FSH release
  - Causes vascularization of the endometrium in preparation for embryo arrival*
  - All the above are true
  - Only a and c are true**
8. A person has a tumor in the anterior pituitary causing a decrease in ACTH secretion. Which of the following correctly describes changes in plasma levels of hormones?
- increased CRH, increased ACTH, and increased cortisol
  - decreased CRH, decreased ACTH, and decreased cortisol
  - increased CRH, increased ACTH, and decreased cortisol
  - decreased CRH, decreased ACTH, and increased cortisol
  - increased CRH, decreased ACTH, and decreased cortisol**
9. The \_\_\_\_\_ causes vasocongestion in the penis; the \_\_\_\_\_ causes emission of semen and the \_\_\_\_\_ causes expulsion of the semen.
- Parasympathetic; parasympathetic; sympathetic
  - Parasympathetic; sympathetic; sympathetic**
  - Parasympathetic; sympathetic; parasympathetic
  - Sympathetic; parasympathetic; sympathetic
  - Sympathetic; sympathetic; sympathetic
10. Lipophilic hormones are transported in blood \_\_\_\_\_ and bind to receptors located \_\_\_\_\_.
- dissolved in the plasma : on the plasma membrane of the target cell
  - dissolved in the plasma : inside the target cell
  - bound to carrier proteins : on the plasma membrane of the target cell
  - bound to carrier proteins : inside the target cell**
  - inside red blood cells : inside the target cell
11. Converting stimulus energy to an action potential is called:
- Specific stimuli
  - Transduction**
  - Special sense
  - Adapting stimulus
  - None of the above

12. The part of the brain most involved in controlling the respiratory system is
- The brain stem**
  - The cerebellum
  - The cerebral cortex
  - The hypothalamus
  - The basal nuclei
13. A person who suffers hypothyroidism probably has
- Poor cold tolerance*
  - Slow speech and poor memory*
  - Increased food consumption
  - All the above
  - Both a and b**
14. Where in the central nervous system do the preganglionic neurons of the parasympathetic nervous system originate?
- thoracic region of the spinal cord
  - sacral region of the spinal cord**
  - lumbar region of the spinal cord
  - both a and b
  - both b and c
15. Which of the following statements about the female sexual cycle is FALSE?
- It is controlled primarily by a spinal cord reflex
  - The parasympathetic nervous system causes lubrication of the vagina
  - The sympathetic nervous system causes vasodilatation of the vagina and clitoris**
  - Both a and b are false
  - Both b and c are false
16. The receptors in a sour taste bud bind \_\_\_\_\_ which block \_\_\_\_\_ channels. This depolarizes the membrane because \_\_\_\_\_.
- $\text{Na}^+$ ;  $\text{K}^+$ ; positive ions continue to leak into the cell but are prevented from leaking out
  - $\text{H}^+$ ;  $\text{K}^+$ ; positive ions continue to leak into the cell but are prevented from leaking out**
  - $\text{K}^+$ ;  $\text{Na}^+$ ; positive ions continue to leak into the cell but are prevented from leaking out
  - $\text{H}^+$ ;  $\text{Na}^+$ ; positive ions continue to leak out of the cell but are prevented from leaking in
  - $\text{H}^+$ ;  $\text{Ca}^{++}$ ; positive ions continue to leak into the cell but are prevented from leaking out
17. A portion of the \_\_\_\_\_, which must monitor the blood, is not subject to the blood brain barrier.
- The brain stem
  - The cerebellum
  - The cerebral cortex
  - The hypothalamus**
  - The basal nuclei
18. Which endocrine gland is innervated by sympathetic preganglionic neurons?
- adrenal cortex
  - pancreas
  - adrenal medulla**
  - thyroid gland
  - anterior pituitary

19. Which structure of the brain further manipulates missing visual data to complete the picture of “reality”, as occurs with optical illusions?
- a) **Cerebral Cortex**
  - b) Cerebellum
  - c) Hypothalamus
  - d) Brain Stem
  - e) Basal Nuclei
20. The function of a second messenger system is to \_\_\_\_\_.
- a) buffer a cells response to a ligand
  - b) isolate the response to the inside of a cell
  - c) keep calcium involved in these responses
  - d) **amplify the response of the first messenger**
  - e) facilitate the process of covalent modification of a protein
21. The type of neuron(s) with axon terminals in the central nervous system is (are)
- a) *Afferent neurons*
  - b) Efferent neurons
  - c) *Interneurons*
  - d) **Both a and c**
  - e) Both b and c
22. Information from chemoreceptors in your mouth is sent to the CNS via
- a) A visceral afferent
  - b) **A sensory afferent**
  - c) A somatosensory afferent
  - d) A sensory efferent
  - e) A visceral efferent
23. Hormone secreted by the growing follicle in females
- a) LH
  - b) FSH
  - c) Progesterone
  - d) GnRH
  - e) **Estrogen**
24. When a single hydrophilic hormone reaches a target cell, it can
- a) Enter the cell and ultimately binds to DNA
  - b) *Bind a receptor on the cell surface and activates a second messenger system in the cell*
  - c) *Open or close ion channels and thereby alter the membrane potential of the cell*
  - d) All the above can happen
  - e) **Only b and c can happen**
25. A person with Grave’s Disease has
- a) High levels of TSH
  - b) High levels of TRH
  - c) **High levels of T3 and T4**
  - d) All the above
  - e) a and c only

26. A person has a tumor in the hypothalamus causing an excess in TRH secretion. Which of the following correctly describes changes in plasma levels of hormones?
- increased TRH, increased TSH, and increased thyroid hormones**
  - decreased TRH, decreased TSH, and decreased thyroid hormones
  - increased TRH, increased TSH, and decreased thyroid hormones
  - decreased TRH, decreased TSH, and increased thyroid hormones
  - increased TRH, decreased TSH, and decreased thyroid hormones
27. The steps of synaptic transmission at the motor end plate are listed below, out of order. Choose the correct order.
- Acetylcholine binds to postsynaptic receptors.
  - Acetylcholine is released.
  - A graded depolarization is produced.
  - An action potential is produced on the muscle cell membrane.
  - Channels for both sodium and potassium are opened.
  - Voltage-gated calcium channels on the plasma membrane open.
  - An action potential arrives at the axon terminal.
- 7521346
  - 7621534**
  - 5231746
  - 2153674
  - 4357261
28. Which of the following statements about the late follicular phase in the female reproductive cycle is incorrect?
- The rise in estrogen inhibits the release of GnRH, LH, and FSH**
  - The follicle responds to LH because of the presence of FSH induced LH receptors
  - Takes place during the proliferative phase of the uterine cycle
  - The follicle ruptures at the end of the late follicular phase
  - Both a and c are incorrect.
29. The release of \_\_\_\_\_ from the pineal gland is important for establishing \_\_\_\_\_.
- melatonin : thirst
  - prolactin : circadian rhythm
  - melatonin : circadian rhythm**
  - prolactin : breast milk production
  - melanin : thirst
30. The sympathetic nervous system is part of the
- Afferent division
  - Efferent division*
  - Autonomic nervous system*
  - Central nervous system
  - Both b and c are correct**

31. When you drink coffee, caffeine molecules bind to bitter receptors on taste buds, which reduces        leaking        the receptor cell, which depolarizes the membrane and causes        channels to open.
- $K^+$ ; into;  $Ca^{++}$
  - $K^+$ ; out of;  $Ca^{++}$**
  - $Na^+$ ; into;  $K^+$
  - $Na^+$ ; out of;  $Ca^{++}$
  - $K^+$ ; out of;  $Na^+$
32. The significance of the information in Fig 1 is
- The stronger the stimulus, the stronger the action potential
  - The stronger the stimulus, the stronger the receptor potential*
  - The stronger the stimulus, the more action potentials will be produced*
  - All the above are true
  - Both b and c are true**
33. Birth control pills contain
- LH
  - FSH
  - GnRH
  - Estrogen and progesterone**
  - Both a and b



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4 October 2011  
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1. ALS (Lou Gehrig's disease) is caused by the destruction of
  - a) Sympathetic neurons
  - b) Parasympathetic neurons
  - c) **Motor neurons**
  - d) Both a and b
  - e) All the above
  
2. The type of neuron(s) with axon terminals in the central nervous system is (are)
  - a) *Afferent neurons*
  - b) Efferent neurons
  - c) *Interneurons*
  - d) **Both a and c**
  - e) Both b and c
  
3. When a single hydrophilic hormone reaches a target cell, it can
  - a) Enter the cell and ultimately bind to DNA
  - b) *Bind a receptor on the surface of the cell and activates a second messenger system inside the cell*
  - c) *Bind a receptor on the surface of the cell that causes an ion channels to open or close and thereby alter the membrane potential of the cell*
  - d) All the above can happen
  - e) **Only b and c can happen**
  
4. During a fight or flight response, \_\_\_\_\_ receptors in blood vessels leading to the heart bind primarily \_\_\_\_\_ which causes the blood vessels to \_\_\_\_\_.
  - a) **Beta-2; epi; dilate**
  - b) Beta-2; norepi; dilate
  - c) Alpha; norepi; constrict
  - d) Beta-1; epi; dilate
  - e) Beta-1; norepi; dilate

5. How do anabolic steroids ingested by a male athlete disrupt the normal male reproductive system?
- The steroids mimic LH and thereby shut down GnRH release
  - The steroids mimic GnRH and thereby shut down LH release
  - The steroids mimic inhibin and thereby stop testosterone production
  - The steroids mimic testosterone and negatively feedback on GnRH and LH production**
  - The steroids mimic sperm and therefore shut down testosterone production
6. Converting stimulus energy to an action potential is called:
- Specific stimuli
  - Transduction**
  - Special sense
  - Adapting stimulus
  - None of the above
7. The steps of synaptic transmission at the motor end plate are listed below, out of order. Choose the correct order.
- Acetylcholine binds to postsynaptic receptors.
  - Acetylcholine is released.
  - A graded potential is produced on the motor end plate.
  - An action potential is produced on the muscle cell membrane.
  - Channels for both sodium and potassium are opened.
  - Voltage-gated calcium channels on the plasma membrane open.
  - An action potential arrives at the axon terminal.
- 7-5-2-1-3-4-6
  - 7-6-2-1-5-3-4**
  - 7-6-2-1-3-5-4
  - 2-1-5-3-6-7-4
  - 4-3-5-7-2-6-1
8. Steroid hormones are
- Derived from tyrosine
  - Hydrophilic
  - Produced by the gonads**
  - Both a and c are true
  - Both b and c are true
9. Which of the following would you expect to be controlled by the endocrine system?
- Coordinating muscle contractions in your hand so you can write
  - Regulation of growth in teenagers*
  - Regulation of metabolic rate in adults*
  - All the above
  - Only b and c**
10. Which of the following are afferent receptors found in the human body?
- Photoreceptor*
  - Wetoreceptor*
  - Nocicepetor*
  - All the above are receptors
  - Only a and c are receptors**

11. Place the following events of emission and expulsion in the male sexual cycle in the correct order:

1. Pressure inside penis increased
2. Sperm and semen leave testis
3. Sympathetic causes muscle at base of penis contract at 0.8 second intervals
4. Sympathetic causes muscles in penis and scrotum to contract
5. Sperm and semen forcibly expelled from penis
6. Urethra fills with sperm and semen

- a) 2-1-5-3-6-4
- b) 3-2-6-4-1-5
- c) 4-2-1-6-3-5
- d) 6-3-2-4-1-5
- e) **4-2-6-3-1-5**

12. Which of the following physiological responses are associated with an elevation in parasympathetic nervous system activity?

- a) shifting blood flow away from the gastrointestinal tract
- b) **enhanced absorption of nutrients**
- c) increased heart rate
- d) increased contractile force of the heart
- e) enhanced mobilization of energy stores

13. Which of the following statements about Type II diabetes is (are) true?

- a) *It is the most prevalent form of diabetes in the US*
- b) It is caused by too few insulin producing cells in the pancreas
- c) *It can cause blindness*
- d) **Both a and c are true**
- e) Both b and c are true

14. The part of the brain most involved in regulating homeostasis is

- a) The brain stem
- b) The cerebellum
- c) The cerebral cortex
- d) **The hypothalamus**
- e) The basal nuclei

15. Brain cells make ATP

- a) just like any other cell in the body
- b) only using fatty acids
- c) **only from glucose in the presence of oxygen**
- d) all the above
- e) both a and b

16. Which of the following statements about simple spinal reflexes is true?

- a) The afferent neuron must synapse with an efferent neuron
- b) Only excitatory neurons are used in reflex pathways
- c) **More than one efferent neuron can be activated**
- d) Both a and b are true
- e) Both b and c are true

17. The intensity of a stimulus is encoded in the \_\_\_\_\_.
- strength of the action potentials
  - frequency of the action potentials*
  - number of receptors activated*
  - both a and c
  - both b and c**
18. During a fight or flight response, \_\_\_\_\_ receptors in the lungs bind primarily \_\_\_\_\_ which causes the airways to \_\_\_\_\_.
- Beta-2; epi; dilate**
  - Beta-2; norepi; dilate
  - Alpha; epi; constrict
  - Beta-1; epi; dilate
  - Beta-1; norepi; dilate
19. The receptors in a sour taste bud bind \_\_\_\_\_ which block \_\_\_\_\_ channels. This depolarizes the membrane because \_\_\_\_\_.
- $\text{Na}^+$ ;  $\text{K}^+$ ; positive ions continue to leak into the cell but are prevented from leaking out
  - $\text{H}^+$ ;  $\text{K}^+$ ; positive ions continue to leak into the cell but are prevented from leaking out**
  - $\text{K}^+$ ;  $\text{Na}^+$ ; positive ions continue to leak into the cell but are prevented from leaking out
  - $\text{H}^+$ ;  $\text{Na}^+$ ; positive ions continue to leak out of the cell but are prevented from leaking in
  - $\text{H}^+$ ;  $\text{K}^+$ ; positive ions continue to leak out of the cell but are prevented from leaking in
20. A person has a tumor in the anterior pituitary causing a decrease in ACTH secretion. Which of the following correctly describes changes in plasma levels of hormones?
- increased CRH, increased ACTH, and increased cortisol
  - decreased CRH, decreased ACTH, and decreased cortisol
  - increased CRH, increased ACTH, and decreased cortisol
  - decreased CRH, decreased ACTH, and increased cortisol
  - increased CRH, decreased ACTH, and decreased cortisol**
21. When a lipophilic hormone reaches a target cell it
- binds to a protein on the cell membrane
  - binds to an alpha receptor on the cell membrane
  - passes through the cell membrane**
  - triggers a second messenger system
  - all the above except c
22. and ultimately \_\_\_\_\_
- interacts with DNA in the nucleus.*
  - activates pre-existing proteins
  - causes the formation of new protein molecules.*
  - both a and c.**
  - both b and c.
23. The blood brain barrier
- shields the brain from changes in blood composition*
  - functionally depends on gap junctions in brain capillaries
  - functionally depends on tight junctions in brain capillaries*
  - both a and b
  - both a and c**

24. Which of the following neurons of the efferent branch of the peripheral nervous system does NOT release acetylcholine?
- sympathetic preganglionic neuron
  - parasympathetic preganglionic neuron
  - sympathetic postganglionic neuron**
  - parasympathetic postganglionic neuron
  - motor neuron
25. When an olfactory receptor binds a chemical, it causes \_\_\_\_\_ to \_\_\_\_\_ the receptor. This creates a(n) \_\_\_\_\_ in the receptor membrane.
- $K^+$ ; exit; graded potential
  - $Na^+$  and  $Ca^{++}$ ; enter; graded potential**
  - $Na^+$  and  $Ca^{++}$ ; enter; action potential
  - $Na^+$  and  $Ca^{++}$ ; exit; graded potential
  - $Ca^{++}$  and neurotransmitter; exit; action potential
26. In Graves Disease, thyroid stimulating immunoglobulin causes hyperthyroidism because \_\_\_\_\_
- it positively feedsback on the hypothalamus
  - it positively feedsback on the pituitary
  - it bypasses the effects of negative feedback on both the hypothalamus and pituitary**
  - it negatively feeds back on the hypothalamus and pituitary
  - both a and b
27. and \_\_\_\_\_.
- causes TSH release from the pituitary
  - causes TRH release from the hypothalamus
  - prevents T3 and T4 release from the thyroid
  - causes T3 and T4 release from the thyroid**
  - a, b, and d are all correct
28. The brain stem
- controls the cardiovascular, respiratory, and digestive systems*
  - is the critical connecting link between brain and spinal cord*
  - suppresses useless movement patterns
  - both a and b**
  - both b and c
29. Human Chorionic Gonadotropin (HCG) mimics \_\_\_\_\_ which maintains the corpus luteum so that it produces \_\_\_\_\_ during the first trimester of pregnancy.
- LH; estrogen*
  - LH; progesterone*
  - FSH; progesterone
  - FSH; progesterone and estrogen
  - LH; progesterone and estrogen**

30. Which structure of the brain further manipulates missing visual data to complete the picture of “reality”, as occurs with optical illusions?
- Cerebral Cortex**
  - Cerebellum
  - Hypothalamus
  - Brain Stem
  - Basal Nuclei

Questions 31 to 33 refer to Fig. 1 below.

31. Which hormone switches from negative feedback to positive feedback on the pituitary?
- 1a**
  - 2b
  - 3a and 3b
  - 4a
  - 4a and 4b
32. Menstruation occurs when \_\_\_ declines
- 4a
  - 1b
  - 2b
  - 1b and 2b**
  - 1b, 2b, and 3b
33. Hormone 2b negatively feedback on
- The corpus luteum
  - The follicle
  - The hypothalamus
  - The pituitary
  - The hypothalamus and pituitary**

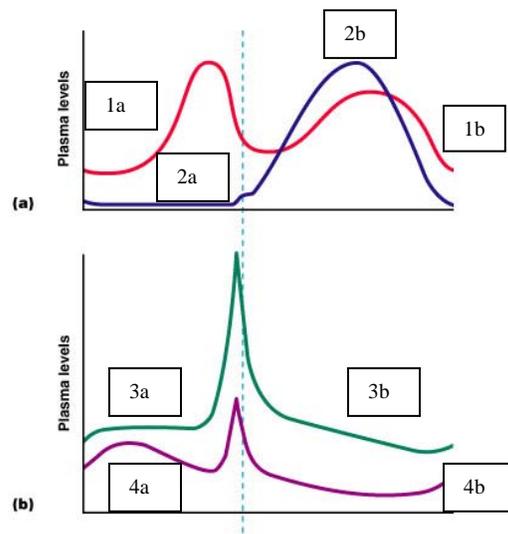


Fig. 1. Part "a" of each curve occurs before the dotted vertical line; part "b" occurs after.

**Biology 251  
2 October 2012  
Exam Two  
FORM W KEY**

**PRINT YOUR NAME AND ID NUMBER in the space that is provided on the answer sheet, and then blacken the letter boxes below the corresponding letters of your name and ID number. You will have 4 points DEDUCTED if you fail to do this!!!!!!**

**WRITE YOUR TEST FORM LETTER** above your name on the answer sheet.

**WRITE YOUR LAB SECTION # AND TA'S NAME** on the upper margin of your answer sheet.

**Your exam should have 33 questions. Please check to make sure it is complete.**

**For each of the following questions, please indicate the most correct answer by blackening the corresponding letter on the accompanying answer sheet. Each correct answer is worth 2 points. Partial credit of 1/2 point *may* be available for questions that have answers such as “all the above”, “both a and b are true”, etc.**

1. Caffeine blocks \_\_\_\_\_ receptors in brain neurons so you don't feel sleepy.
  - a) dopamine
  - b) GABA
  - c) acetylcholine
  - d) adenosine**
  - e) epinephrine
  
2. During birth, what stimulates contractions?
  - a) Estrogen
  - b) Progesterone
  - c) Corpus luteum
  - d) Oxytocin**
  - e) GnRH
  
3. What anterior pituitary hormone is NOT a tropic hormone?
  - a) prolactin**
  - b) growth hormone (GH)
  - c) adrenocorticotrophic hormone (ACTH)
  - d) follicle stimulating hormone (FSH)
  - e) luteinizing hormone (LH)
  
4. \_\_\_\_\_ can cross the blood brain barrier by moving through \_\_\_\_\_.
  - a) small non-polar molecules; capillary membranes**
  - b) small non-polar molecules; capillary pores
  - c) small non-polar molecules; gap junctions
  - d) small polar molecules; capillary pores
  - e) small polar molecules; capillary membranes

5. Unlike males, female humans can have multiple orgasms because
  - a) female sexual response is not a spinal reflex
  - b) there is no prolactin release after orgasm**
  - c) there is no testosterone release after orgasm
  - d) muscle contractions in the female orgasm are controlled by the parasympathetic
  - e) both a and b are true
  
6. Endocrine glands are composed of what primary tissue?
  - a) Skeletal muscle
  - b) Connective
  - c) Nervous
  - d) Epithelial**
  - e) Smooth muscle
  
7. Information about blood pressure is sent to the CNS via
  - a) A visceral afferent**
  - b) A sensory afferent
  - c) A somatosensory afferent
  - d) A sensory efferent
  - e) A visceral efferent
  
8. A person with Grave's Disease has
  - a) High levels of TSH
  - b) High levels of TRH
  - c) High levels of T3 and T4**
  - d) All the above
  - e) a and c only
  
9. When an afferent receptor that is a separate cell receives a stimulus, \_\_\_\_ enters the cell
  - a)  $\text{Ca}^{++}$**
  - b)  $\text{Na}^+$
  - c)  $\text{K}^+$
  - d)  $\text{Cl}^-$
  - e)  $\text{H}^+$
  
10. which causes a chemical messenger to exit the receptor cell and bind to the afferent axon, which causes \_\_\_\_\_ to enter the axon and the axon membrane to \_\_\_\_\_.
  - a)  $\text{Ca}^{++}$  ; depolarize
  - b)  $\text{Na}^+$  ; depolarize**
  - c)  $\text{Na}^+$  ; hyperpolarize
  - d)  $\text{Ca}^{++}$  ; hyperpolarize
  - e) Neurotransmitter ; depolarize
  
11. Type II diabetes is caused by
  - a) too few insulin producing cells in the pancreas
  - b) too little circulating insulin in the plasma
  - c) reduced sensitivity of insulin receptors to insulin**
  - d) all the above
  - e) a and b only

12. Brain cells can make ATP from \_\_\_\_\_ and can do so \_\_\_\_\_.
- glucose and fatty acids; with or without oxygen present
  - glucose only; with or without oxygen present
  - glucose and fatty acids; only with oxygen present
  - glucose only; only with oxygen present**
  - fatty acids only; with or without oxygen present
13. Which of the following statements about the autonomic nervous system is false?
- Every autonomic pathway consists of a two neuron chain
  - The cell body of the first neuron in each autonomic pathway lies in the CNS
  - Acetylcholine is released by the postganglionic neuron in every autonomic pathway**
  - The parasympathetic nervous system is used primarily for routine housekeeping duties
  - None of the above are false
14. During the luteal phase (days 15 to 28) of the female reproductive cycle, progesterone
- Is secreted by the corpus luteum*
  - Stimulates the hypothalamus and pituitary to cause LH and FSH release
  - Causes vascularization of the endometrium in preparation for embryo arrival*
  - All the above are true
  - Only a and c are true**
15. During the human female sexual response, the sympathetic system causes
- vasocongestion of the vagina
  - vasocongestion of the clitoris
  - reduction of the circumference of the vagina
  - lifting of the cervix
  - the sympathetic does not cause any of the above**
16. Which of the following statements about hormones initiating second messenger systems is (are) true?
- A lipophilic hormone initiates the system by binding to a receptor on the cell membrane
  - A single hormone molecule binding to a receptor can ultimately activate millions of proteins**
  - A G protein is considered to be the second messenger
  - Both a and b are true
  - Both b and c are true
17. Which structure of the brain further manipulates missing visual data to complete the picture of “reality”, as occurs with optical illusions?
- Cerebral Cortex**
  - Cerebellum
  - Hypothalamus
  - Brain Stem
  - Basal Nuclei
18. Which of the following statements are true?
- a given endocrine gland can only produce one hormone
  - a given hormone can be produced by only one endocrine gland
  - a single target cell can be influenced by only one hormone
  - none of the above are true**
  - b and c only are true

19. Which of the following statements about lipophilic hormones is false?
- They can not dissolve in plasma and so are transported bound to proteins
  - Steroids are a lipophilic hormone derived from cholesterol
  - They function by interacting with DNA and causing formation of new proteins
  - Thyroid hormones are lipophilic
  - None of the above are false**
20. The part of the brain that is the critical link between the nervous and endocrine systems is
- The brain stem
  - The cerebellum
  - The cerebral cortex
  - The hypothalamus**
  - The basal nuclei
21. When acetylcholine binds to the motor end plate on a skeletal muscle it causes a net movement of \_\_\_\_\_ into the muscle cell by the process of \_\_\_\_\_ which results in a \_\_\_\_\_ potential in the motor end plate
- Na<sup>+</sup>; active transport; graded
  - Na<sup>+</sup>; diffusion; action
  - Ca<sup>++</sup>; diffusion; graded
  - Ca<sup>++</sup>; active transport; action
  - Na<sup>+</sup>; diffusion; graded**
22. Which of the following is the best description of sweet taste bud receptor function?
- Membrane receptors on sweet taste buds bind glucose or other sugars, which initiates a G protein system, which ultimately causes K<sup>+</sup> channels to close, which thereby hyperpolarizes the membrane.
  - Membrane receptors on sweet taste buds bind glucose or other sugars, which closes the K<sup>+</sup> channels, which ultimately initiates a G protein system, which thereby depolarizes the membrane.
  - Membrane receptors on sweet taste buds bind glucose or other sugars, which initiates a G protein system, which causes K<sup>+</sup> channels to close, which depolarizes the membrane.**
  - Membrane receptors on sweet taste buds bind acids (H<sup>+</sup>), which initiates a G protein system, which ultimately causes K<sup>+</sup> channels to close, which thereby depolarizes the membrane.
  - Membrane receptors on sweet taste buds bind glucose or other sugars, which hyperpolarizes the membrane, which ultimately causes K<sup>+</sup> channels to close, which thereby initiates a G protein system.
23. Which of the following is part of the autonomic nervous system?
- parasympathetic nervous*
  - sympathetic nervous system*
  - somatic nervous system
  - both a and b**
  - all of the above
24. The effects of T3 and T4 on the body
- tend to be fast acting
  - tend to decrease metabolic rate
  - tend to decrease heart rate
  - both b and c
  - none of the above**

25. A patient has symptoms of poor cold tolerance, weight gain, slow speech and reflexes, and poor memory. What endocrine abnormality are they experiencing?
- Hypothyroidism in adults**
  - Hypothyroidism from birth
  - Graves disease
  - Type I diabetes
  - Effects of taking anabolic steroids
26. When you step on a nail, pain receptors send action potentials via \_\_\_\_\_ neurons to the spinal cord, where they synapse with \_\_\_\_\_ neurons which in turn synapse with \_\_\_\_\_ neurons which send action potentials to \_\_\_\_\_.
- afferent; multiple interneurons; efferent; multiple leg muscles**
  - afferent; only one interneuron; efferent; multiple leg muscles
  - efferent; multiple interneurons; afferent; multiple leg muscles
  - afferent; multiple interneurons; efferent; only one leg muscle
  - efferent; only one interneuron; afferent; only one leg muscle
27. Which of the following does NOT happen during a fight or flight sympathetic response?
- Blood flow to digestive organs is restricted by alpha receptors on blood vessels binding norepinephrine
  - Blood flow to heart enhanced by beta-2 receptors on blood vessels to heart binding epinephrine
  - Heart rate increased by beta-1 receptors in heart binding epinephrine and norepinephrine
  - Airways in lung dilated by beta-2 receptors binding epinephrine
  - Blood vessels to skeletal muscle dilated by alpha receptors binding epinephrine**
28. Which of the following statements about the late follicular phase in the female reproductive cycle is false?
- The rise in estrogen inhibits the release of GnRH, LH, and FSH**
  - The follicle responds to LH because of the presence of FSH induced LH receptors
  - Takes place during the proliferative phase of the uterine cycle
  - The follicle ruptures at the end of the late follicular phase
  - Both a and c are false.
29. If a male human had a non-functioning sympathetic system, which of the following would happen?
- sperm and semen could not be emitted into the urethra**
  - vasodilation of the penis could not occur
  - an erection could not occur
  - both a and c
  - both b and c
30. The part of the brain most involved in controlling the respiratory system is
- The brain stem**
  - The cerebellum
  - The cerebral cortex
  - The hypothalamus
  - The basal nuclei

31. Fast adapting (also called phasic) receptors
- a) **Stop producing action potentials as a stimulus continues**
  - b) Show an increase in membrane potential as a stimulus continues
  - c) Continue to produce action potentials as a stimulus continues
  - d) Do not respond to stimuli
  - e) Both b and c are true
32. Which of the following statements about regulation of thyroid hormones is true?
- a) TSH positively feeds back on the hypothalamus causing TRH release
  - b) **T3 and T4 negatively feed back on the pituitary to reduce TSH release**
  - c) T3 and T4 negatively feed back on the pituitary to reduce TRH release
  - d) TSH negatively feeds back on the hypothalamus to reduce TRH release
  - e) Both b and d are true
33. Anabolic steroids can disrupt the male reproductive cycle by
- a) stimulating the pituitary to release FSH
  - b) stimulating the pituitary to release LH
  - c) **mimicking the negative feedback effects of testosterone on the pituitary**
  - d) all the above occur
  - e) both a and b occur